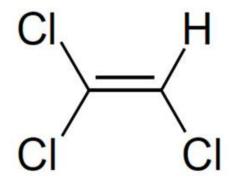


## Final Risk Evaluation for Trichloroethylene

## Systematic Review Supplemental File:

## Data Quality Evaluation of Environmental Fate and Transport Studies

CASRN: 79-01-6



November 2020

EPA's Office of Pollution Prevention and Toxics (OPPT) developed data quality criteria for environmental fate and transport studies. The first version of the criteria was documented in the *Application of Systematic Review in TSCA Risk Evaluations* document (EPA Document#740-P1-8001). The initial criteria were updated after considering EPA/OPPT's practical experience and comments from the public. This systematic review supplemental document describes the updated data quality criteria for environmental fate and transport studies that EPA/OPPT intends to apply for the TSCA risk evaluations. Refer to Appendix C of the *Application of Systematic Review in TSCA Risk Evaluations* document for details about the data quality evaluation tools.

## **Table of Contents**

Barrows, ME; Petrocelli, SR; Macek, KJ; Carroll, JJ. (1980). Bioconcentration and elimination of selected water pollutants by bluegill sunfish (Lepomis macrochirus). In R Haque (Ed.),
Dynamics, exposure and hazard assessment of toxic chemicals (pp. 379- 392). Ann Arbor, MI: Ann Arbor Science. HERO ID: 18050
Umweltbundesamt. (1984). Assessments of the feasibility and evidence of test methods of levels I and ii of the chemicals act on thiourea. (OTS: OTS0000551-0; 8EHQ Num: FYI-OTS-0787-0551 ; DCN: NA; TSCATS RefID: 304314; CIS: NA). HERO ID: 4215574
Fogel, MM; Taddeo, AR; Fogel, S. (1986). Biodegradation of chlorinated ethenes by a methane- utilizing mixed culture. Appl Environ Microbiol 51: 720-724. HERO ID: 1739397
Cheng, D; Chow, WL; He, J. (2010). A Dehalococcoides-containing co-culture that dechlorinates tetrachloroethene to trans-1,2-dichloroethene. ISME J 4: 88-97. http://dx.doi.org/10.1038/ismej.2009.90. HERO ID: 379893
Parsons, F; Wood, PR; Demarco, J. (1984). Transformations of tetrachloroethene and trichloroethene in microcosms and groundwater. J Am Water Works Assoc 762: 56-59. HERO ID: 75110
<ul> <li>van Eekert, MHA; Schröder, TJ; van Rhee, A; Stams, AJM; Schraa, G; Field, JA. (2001). Constitutive dechlorination of chlorinated ethenes by a methanol degrading methanogenic consortium. Bioresour Technol 77: 163-170. http://dx.doi.org/10.1016/S0960-8524(00)00149-8. HERO ID: 1166576</li></ul>
Bjerg, PL; Rügge, K; Cortsen, J; Nielsen, PH; Christensen, TH. (1999). Degradation of aromatic and chlorinated aliphatic hydrocarbons in the anaerobic part of the Grindsted Landfill leachate plume: In situ microcosm and laboratory batch experiments. Ground Water 37: 113-121. http://dx.doi.org/10.1111/j.1745- 6584.1999.tb00964.x. HERO ID: 1486371
Bjerg, PL; Rügge, K; Cortsen, J; Nielsen, PH; Christensen, TH. (1999). Degradation of aromatic and chlorinated aliphatic hydrocarbons in the anaerobic part of the Grindsted Landfill leachate plume: In situ microcosm and laboratory batch experiments. Ground Water 37: 113-121. http://dx.doi.org/10.1111/j.1745- 6584.1999.tb00964.x. HERO ID: 1486371
Nielsen, PH; Bjerg, PL; Nielsen, P; Smith, P; Christensen, TH. (1996). In situ and laboratory determined first-order degradation rate constants of specific organic compounds in an aerobic aquifer. Environ Sci Technol 30: 31-37. http://dx.doi.org/10.1021/es9407220. HERO ID: 1486742
Nielsen, PH; Bjerg, PL; Nielsen, P; Smith, P; Christensen, TH. (1996). In situ and laboratory determined first-order degradation rate constants of specific organic compounds in an aerobic aquifer. Environ Sci Technol 30: 31-37. http://dx.doi.org/10.1021/es9407220. HERO ID: 1486742
Long, JL; Stensel, HD; Ferguson, JF; Strand, SE; Ongerth, JE. (1993). Anaerobic and aerobic treatment of chlorinated aliphatic compounds. J Environ Eng 119: 300-320. http://dx.doi.org/10.1061/(ASCE)0733-9372(1993)119:2(300). HERO ID: 1717600
Long, JL; Stensel, HD; Ferguson, JF; Strand, SE; Ongerth, JE. (1993). Anaerobic and aerobic treatment of chlorinated aliphatic compounds. J Environ Eng 119: 300-320. http://dx.doi.org/10.1061/(ASCE)0733-9372(1993)119:2(300). HERO ID: 1717600
Long, JL; Stensel, HD; Ferguson, JF; Strand, SE; Ongerth, JE. (1993). Anaerobic and aerobic treatment of chlorinated aliphatic compounds. J Environ Eng 119: 300-320. http://dx.doi.org/10.1061/(ASCE)0733-9372(1993)119:2(300). HERO ID: 1717600
Long, JL; Stensel, HD; Ferguson, JF; Strand, SE; Ongerth, JE. (1993). Anaerobic and aerobic treatment of chlorinated aliphatic compounds. J Environ Eng 119: 300-320. http://dx.doi.org/10.1061/(ASCE)0733-9372(1993)119:2(300). HERO ID: 1717600
Long, JL; Stensel, HD; Ferguson, JF; Strand, SE; Ongerth, JE. (1993). Anaerobic and aerobic

<ul> <li>treatment of chlorinated aliphatic compounds. J Environ Eng 119: 300-320. http://dx.doi.org/10.1061/(ASCE)0733-9372(1993)119:2(300). HERO ID: 1717600</li></ul>
9372(2000)126:10(934). HERO ID: 1747865
Bouwer, EJ; McCarty, PL. (1983). Transformations of 1- and 2-carbon halogenated aliphatic organic compounds under methanogenic conditions. Appl Environ Microbiol 45: 1286-1294. HERO ID: 18060
Schmidt, KR; Tiehm, A. (2008). Natural attenuation of chloroethenes: identification of sequential reductive/oxidative biodegradation by microcosm studies. Water Sci Technol 58: 1137-1145. http://dx.doi.org/10.2166/wst.2008.729. HERO ID: 1941207
<ul> <li>Haas, JR; Shock, EL. (1999). Halocarbons in the environment: Estimates of thermodynamic properties for aqueous chloroethylene species and their stabilities in natural settings. Geochim Cosmo Act 63: 3429-3441. HERO ID: 1960428</li></ul>
Bielefeldt, AR; Stensel, HD; Strand, SE. (1995). Cometabolic degradation of TCE and DCE without intermediate toxicity. J Environ Eng 121: 791-797. http://dx.doi.org/10.1061/(ASCE)0733- 9372(1995)121:11(791). HERO ID: 2303792
Kästner, M. (1991). Reductive dechlorination of tri- and tetrachloroethylenes depends on transition from aerobic to anaerobic conditions. Appl Environ Microbiol 57: 2039-2046. HERO ID: 2310605
<ul> <li>Powell, CL; Goltz, MN; Agrawal, A. (2014). Degradation kinetics of chlorinated aliphatic hydrocarbons by methane oxidizers naturally-associated with wetland plant roots. J Contam Hydrol 170: 68-75. http://dx.doi.org/10.1016/j.jconhyd.2014.10.001. HERO ID: 2533464</li></ul>
microorganisms. Chemosphere 119C: 971-977. http://dx.doi.org/10.1016/j.chemosphere.2014.09.040. HERO ID: 2534473
Freedman, DL; Gossett, JM. (1989). Biological reductive dechlorination of tetrachloroethylene and trichloroethylene to ethylene under methanogenic conditions. Appl Environ Microbiol 55: 2144-2151. HERO ID: 2802294
Henry, SM; Grbić-Galić, D. (1991). Influence of endogenous and exogenous electron donors and trichloroethylene oxidation toxicity on trichloroethylene oxidation by methanotrophic cultures from a groundwater aquifer. Appl Environ Microbiol 57: 236-244. HERO ID: 2802580
Kim, JY; Park, JK; Emmons, B; Armstrong, DE. (1995). Survey of volatile organic compounds at a municipal solid waste cocomposting facility. Water Environ Res 67: 1044-1051. http://dx.doi.org/10.2175/106143095X133284. HERO ID: 2802998
Tobajas, M; Verdugo, V; Polo, AM; Rodriguez, JJ; Mohedano, AF. (2016). Assessment of toxicity and biodegradability on activated sludge of priority and emerging pollutants. Environ Technol 37: 713-721. http://dx.doi.org/10.1080/09593330.2015.1079264. HERO ID: 3070754
Phelps, TJ; Niedzielski, JJ; Malachowsky, KJ; Schram, RM; Herbes, SE; White, DC. (1991). Biodegradation of mixed-organic wastes by microbial consortia in continuous-recycle expanded-bed bioreactors. Environ Sci Technol 25: 1461-1465. HERO ID: 354330777

Lee, W; Park, SH; Kim, J; Jung, JY. (2015). Occurrence and removal of hazardous chemicals and toxic metals in 27 industrial wastewater treatment plants in Korea. Desalination Water Treat Parsons, F; Lage, GB; Rice, R. (1985). Biotransformation of chlorinated organic solvents in static microcosms. Environ Toxicol Chem 4: 739-742. http://dx.doi.org/10.1002/etc.5620040604. Wakeham, SG; Davis, AC; Karas, JA. (1983). Mesocosm experiments to determine the fate and persistence of volatile organic compounds in coastal seawater. Environ Sci Technol 17: 611-617. Wakeham, SG; Davis, AC; Karas, JA. (1983). Mesocosm experiments to determine the fate and persistence of volatile organic compounds in coastal seawater. Environ Sci Technol 17: 611-617. Gossett, JM. (1985). Anaerobic degradation of C1 and C2 chlorinated hydrocarbons. (ESL-TR-85-Alvarez-Cohen, L; McCarty, PL. (1991). Effects of toxicity, aeration and reductant supply on trichloroethylene transformation by a mixed methanotrophic culture. Appl Environ Microbiol Dow Chem Co. (1977). The Inhibition Of Anaerobic Sludge Gas Production By 1,1,1trichloroethane, Methylene Chloride, Trichloroethylene and Perchloroethylene, Part 2. (OTS: OTS0517178; 8EHO Num: NA; DCN: 86- 870002089; TSCATS RefID: 309930; CIS: NA). Kao, CM; Prosser, J. (1999). Intrinsic bioremediation of trichloroethylene and chlorobenzene: field Kao, CM; Prosser, J. (1999). Intrinsic bioremediation of trichloroethylene and chlorobenzene: field Freitag, D; Ballhorn, L; Gever, H; Korte, F. (1985). Environmental hazard profile of organic chemicals: an experimental method for the assessment of the behaviour of organic chemicals in the ecosphere by means of simple laboratory tests with 14C labelled chemicals. Chemosphere 14: 1589-1616. HERO ID: 85251...... 104 Bouwer, EJ; Rittmann, BE; McCarty, PL. (1981). Anaerobic degradation of halogenated 1- and 2carbon organic compounds. Environ Sci Technol 15: 596-599. http://dx.doi.org/10.1021/es00087a012. HERO ID: 9818 ...... 106 Bouwer, EJ; Rittmann, BE; McCarty, PL. (1981). Anaerobic degradation of halogenated 1- and 2carbon organic compounds. Environ Sci Technol 15: 596-599. http://dx.doi.org/10.1021/es00087a012. HERO ID: 9818 ......108 Jensen, S; Rosenberg, R. (1975). Degradability of some chlorinated aliphatic hydrocarbons in sea water and sterilized water. Water Res 9: 659-661. HERO ID: 9841 ...... 110 Tabak, HH; Quave, SA; Mashni, CI; Barth, EF. (1981). Biodegradability studies with organic priority pollutant compounds. J Water Pollut Control Fed 53: 1503-1518. HERO ID: 9861...113 Wood, PR; Parsons, FZ; DeMarco, J; Harween, HJ; Lang, RF; Payan, IL; Ruiz, MC. (1981). Introductory study of the biodegradation of the chlorinated methane, ethane and ethene compounds. Paper presented at American Water Works Association Annual Conference and Exposition, June 7-11, 1981, St. Louis, MO. HERO ID: 9881......115 Dilling, WL; Tefertiller, NB; Kallos, GJ. (1975). Evaporation rates and reactivities of methylene chloride, chloroform, 1,1,1-trichloroethane, trichloroethylene, tetrachloroethylene, and other chlorinated compounds in dilute aqueous solutions. Environ Sci Technol 9: 833-838. http://dx.doi.org/10.1021/es60107a008. HERO ID: 58054 ...... 117 Jeffers, PM; Ward, LM; Woytowitch, LM; Wolfe, NL. (1989). Homogeneous Hydrolysis Rate **Constants for Selected Chlorinated Methanes Ethanes Ethanes and Propanes. Environ Sci** Technol 23: 965-969. http://dx.doi.org/10.1021/es00066a006. HERO ID: 661098......119 Rodriguez, C; Linge, K; Blair, P; Busetti, F; Devine, B; Van Buvnder, P; Weinstein, P; Cook, A.

(2012). Recycled water: potential health risks from volatile organic compounds and use of 1,4dichlorobenzene as treatment performance indicator. Water Res 46: 93-106. http://dx.doi.org/10.1016/j.watres.2011.10.032. HERO ID: 1008978......121 Tancrede, M; Yanagisawa, Y; Wilson, R. (1992). Volatilization of volatile organic compounds from showers: I. Analytical method and quantitative assessment (pp. 1103-1111). (BIOSIS/92/15798). Tancrede, M; Yanagisawa, Y; Wilson, R. HERO ID: 1023248.....123 Chiou, CT; Freed, VH; Peters, LJ; Kohnert, RL. (1980). Evaporation of solutes from water. Environ Int 3: 231-236. http://dx.doi.org/10.1016/0160-4120(80)90123-3. HERO ID: 18077.... 125 Dilling, WL. (1977). Interphase transfer processes. II. Evaporation rates of chloro methanes, ethanes, ethylenes, propanes, and propylenes from dilute aqueous solutions. Comparisons with theoretical predictions. Environ Sci Technol 11: 405-409. http://dx.doi.org/10.1021/es60127a009. Dunovant, VS; Clark, CS; Que Hee, SS; Hertzberg, VS; Trapp, JH. (1986). Volatile Organics in the Wastewater and Airspaces of Three Wastewater Treatment Plants (pp. 886-895). (NIOSH/00165921). Dunovant, VS; Clark, CS; Que Hee, SS; Hertzberg, VS; Trapp, JH. HERO 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. Environ Pollut 177: 28-37. U.S. EPA (U.S. Environmental Protection Agency). (2012). Estimation Programs Interface Suite<sup>™</sup> for Microsoft® Windows, v 4.11 [Computer Program]. Washington, DC. Retrieved from https://www.epa.gov/tsca-screening-tools/epi-suitetm-estimation-program- interface. HERO ID: Soltanali, S; Hagani, ZS. (2008). Modeling of air stripping from volatile organic compounds in Chen, WH; Yang, WB; Yuan, CS; Yang, JC; Zhao, QL. (2014). Fates of chlorinated volatile organic compounds in aerobic biological treatment processes: the effects of aeration and sludge addition. Chemosphere 103: 92-98. http://dx.doi.org/10.1016/j.chemosphere.2013.11.039. HERO Parker, WJ; Thompson, DJ; Bell, JP; Melcer, H. (1993). Fate of volatile organic compounds in municipal activated sludge plants. Water Environ Res 65: 58-65. HERO ID: 2803053 ...... 140 Pant, P; Allen, M; Cai, Y; Jayachandran, K; Chen, Y, in. (2007). Influence of physical factors on trichloroethylene evaporation from surface water. Water Air Soil Pollut 183: 153-163. http://dx.doi.org/10.1007/s11270-007-9365-5. HERO ID: 3543365......142 Keefe, SH; Barber, LB; Runkel, RL; Ryan, JN. (2004). Fate of volatile organic compounds in constructed wastewater treatment wetlands. Environ Sci Technol 38: 2209-2216. http://dx.doi.org/10.1021/es034661i. HERO ID: 3566693.....144 Brüggemann, R; Trapp, S. (1988). Release and fate modelling of highly volatile solvents in the river Main. 17: 2029-2041. HERO ID: 3629597......146 Culver, TB; Shoemaker, CA; Lion, LW. (1991). Impact of vapor sorption on the subsurface transport of volatile organic compounds: A numerical model and analysis. Water Resour Res 27: 2259-2270. http://dx.doi.org/10.1029/91WR00223. HERO ID: 3809323......148 Matienzo, LV. (1989). Staff report on development of treatment standards for non-RCRA solvent waste. Sacramento, CA: Toxic Substances Control Program. http://infohouse.p2ric.org/ref/17/16884.pdf. HERO ID: 3982116 ...... 150 Matienzo, LV. (1989). Staff report on development of treatment standards for non-RCRA solvent waste. Sacramento, CA: Toxic Substances Control Program. Blaney, BL. (1989). Applicability of steam stripping to organics removal from wastewater streams. (EPA/600/9-89/072). Cincinnati, OH: Blaney, BL. http://infohouse.p2ric.org/ref/23/22522.pdf.

HERO ID: 3986884	154
Smith, JH; Bomberger, DC, Jr; Haynes, DL. (1980). Prediction of the volatilization rates of I	
volatility chemicals from natural water bodies. Environ Sci Technol 14: 1332-1337.	
http://dx.doi.org/10.1021/es60171a004. HERO ID: 58132	157
Bell, J; Melcer, H; Monteith, H; Osinga, I; Steel, P. (1993). Stripping of volatile organic com	pounds
at full-scale municipal wastewater treatment plants. Water Environ Res 65: 708-716.	4 50
http://dx.doi.org/10.2175/WER.65.6.2. HERO ID: 658661	
Stubin, AI; Brosnan, TM; Porter, KD; Jimenez, L; Lochan, H. (1996). Organic priority polluin New York City municipal wastewaters: 1989-1993. Water Environ Res 68: 1037-1044.	
http://dx.doi.org/10.2175/106143096X128108. HERO ID: 658797	161
Gay, BW, Jr; Hanst, PL; Bufalini, JJ; Noonan, RC. (1976). Atmospheric oxidation of chlorin ethylenes. Environ Sci Technol 10: 58-67. http://dx.doi.org/10.1021/es60112a005. HERO	
59310	
Park, J; Choi, E; Cho, IH; Kim, YG. (2003). Solar light induced degradation of trichloroethy	
(TCE) using TiO2: effects of solar light intensity and seasonal variations. J Environ Sci l	
A Tox Hazard Subst Environ Eng 38: 1915-1926. http://dx.doi.org/10.1081/ESE-1200228	389.
HERO ID: 1497906	165
Park, J; Choi, E; Cho, IH; Kim, YG. (2003). Solar light induced degradation of trichloroethy	ylene
(TCE) using TiO2: effects of solar light intensity and seasonal variations. J Environ Sci l A Tox Hazard Subst Environ Eng 38: 1915-1926. http://dx.doi.org/10.1081/ESE-1200228	
HERO ID: 1497906	
Dobaradaran, S; Nabizadeh, R; Mahvi, AH; Noroozi, A; Yunesian, M; Rastkari, N; Nazmar	
Zarei, S. (2012). Kinetic and degradation efficiency of trichloroethylene (TCE) via	,,
photochemical process from contaminated water. Afr J Biotechnol 11: 2006- 2012. HER	O ID:
2128765	
Shirayama, H; Tohezo, Y; Taguchi, S. (2001). Photodegradation of chlorinated hydrocarbon presence and absence of dissolved oxygen in water. Water Res 35: 1941-1950.	
http://dx.doi.org/10.1016/S0043-1354(00)00480-2. HERO ID: 3544747	172
Dilling, WL; Tefertiller, NB; Kallos, GJ. (1975). Evaporation rates and reactivities of methy	
chloride, chloroform, 1,1,1-trichloroethane, trichloroethylene, tetrachloroethylene, and (	
chlorinated compounds in dilute aqueous solutions. Environ Sci Technol 9: 833-838.	Juici
http://dx.doi.org/10.1021/es60107a008. HERO ID: 58054	174
Freitag, D; Ballhorn, L; Geyer, H; Korte, F. (1985). Environmental hazard profile of organic	
chemicals: an experimental method for the assessment of the behaviour of organic chemi	
the ecosphere by means of simple laboratory tests with 14C labelled chemicals. Chemosp	
14: 1589-1616. HERO ID: 85251	

Study Reference:	Barrows, ME; Petrocelli, SR; Macek, KJ; Carroll, JJ. (1980). Bioconcentration and elimination of selected water pollutants by bluegill sunfish (Lepomis macrochirus). In R Haque (Ed.), Dynamics, exposure and hazard assessment of toxic chemicals (pp. 379- 392). Ann Arbor, MI: Ann Arbor Science. HERO ID: 18050							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2		
	2. Test Substance Purity	High	The source of the test substance was reported; the purity was omitted; however, this omission was not likely to have had a substantial impact on the study results.	1	1	1		
Test Design	3. Study Controls	Medium	Negative controls were employed in the study. Some control group details were not included; however, the lack of data was not likely to have had a substantial impact on the study results.	2	2	4		
	4. Test Substance Stability	Medium	Details regarding this metric were not discussed; however, the omissions were not likely to have hindered the interpretation of the results.	2	1	2		
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1		
	6. Testing Conditions	High	Test conditions were monitored and documented, including dissolved oxygen, water temperature, and pH.	1	2	2		

	7 Testing	TT' - 1.	Test son ditients	1	1	1
	7. Testing	High	Test conditions were	1	1	1
	Consistency		consistent across			
			study groups and			
			aquaria, and			
			exposure conditions			
			were monitored.			
	8. System	High	The test system	1	1	1
	Type and	U	(modified continual-			
	Design		flow, proportional			
	200181		dilution closed			
			system) was			
			appropriate for the			
			test substance and			
			was capable of			
			maintaining the			
			appropriate exposure			
			concentration.			
Test	9. Test	Not rated	The metric is not	NR	NR	NR
Organisms	Organism		applicable to this			
-	Degradation		study type.			
	10. Test	High	Routine organism	1	2	2
	Organism	0	used, details			
	Partitioning		provided, including			
	1 untitioning		source, wet weight			
			and standard length,			
			acclimation details,			
			and physical			
0.1	11.0	TT: 1	condition.			
Outcome	11. Outcome	High	This metric met the	1	1	1
Assessment	Assessment		criteria for high			
	Methodology		confidence as			
			expected for this type			
			of study.			
	12. Sampling	High	The study used	1	1	1
	Methods		widely accepted			
			methods for the			
			chemical and			
			medium being			
			analyzed; no notable			
			limitations were			
			expected to have			
			influenced study			
Conforme l'are /	12	N. 4	results.	ND	ND	ND
Confounding/	13.	Not rated	No confounding	NR	NR	NR
Variable	Confounding		variables were noted.			
Control	Variables					
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
		High	The study reported	1	2	2
Data	15. Data	Ingn	The study reported		-	-
Data Presentation		Ingn	the mean chemical	-	-	2
	15. Data Reporting	Ingn		Ĩ	2	_

	16. Statistical Methods and Kinetic Calculations	Medium	Actual concentrations measured throughout the study were not reported; however, these details were not likely to have been severe or have had a substantial impact on the study results.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	17	19	23
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.21	Overall Score (Rounded):	1.2
$\geq 1$ and $< 1.7$	$\geq 1.7 \text{ and } \leq 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	Umweltbundesamt. (1984). Assessments of the feasibility and evidence of test methods of levels I and II of the chemicals act on thiourea. (OTS: OTS0000551-0; 8EHQ Num: FYI- OTS-0787-0551 ; DCN: NA; TSCATS RefID: 304314; CIS: NA). HERO ID: 4215574							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2		
	2. Test Substance Purity	Low	Test substance purity was not reported or verified by analytical means.	3	1	3		
	3. Study Controls	Medium	The use of negative controls was not reported; however, an OECD guideline is cited, which requires use of a control group.	2	2	4		
	4. Test Substance Stability	Medium	Details on whether test conditions were appropriate for maintaining stable test substance were not included; however, this was unlikely to have influenced the results substantially.	2	1	2		
Test Conditions	5. Test Method Suitability	High	The test method employed was suitable for the test substance.	1	1	1		
Con	6. Testing Conditions	Medium	Generalized details for 10 discrete chemicals tested; some fluctuation in water temperature and pH may have occurred.	2	2	4		
	7. Testing Consistency	Medium	Limited details were reported to evaluate this metric.	2	1	2		
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
Test Organisms	9. Test Organism	Not rated	The metric is not applicable to this	NR	NR	NR		

	Degradation		study type.			
	10. Test	High	Routine organism	1	2	2
	Organism	-	was used, and source			
	Partitioning		was reported;			
			guideline cited for			
			fish body weight.			
Outcome	11. Outcome	High	The outcome	1	1	1
Assessment	Assessment		assessment			
	Methodology		methodology			
			reported the intended			
			outcome of interest.			
	12. Sampling	Low	Details were not	3	1	3
	Methods		included on sampling			
			methods or			
			approaches.			
Confounding/	13.	Not rated	No confounding	NR	NR	NR
Variable	Confounding		variables were noted.			
Control	Variables					
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	Medium	Nominal	2	2	4
Presentation	Reporting		concentrations,			
and Analysis			average			
			concentrations in			
			water, average			
			concentrations in			
			fish, and BCFs were			
			reported; lipid			
			content was not			
			reported.			
	16. Statistical	High	The analysis of data	1	1	1
	Methods and		was clearly			
	Kinetic		described.			
	Calculations					
Other	17.	Low	Due to limited	3	1	3
	Verification or		information,			
	Plausibility of		evaluation of the			
	Results		reasonableness of the			
			study results was not			
			possible.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this			
			study type.			
			Sum of scores:	25	19	33
High	Medium	Low	Overall Score =	1.74	Overall	2.3
			Sum of Weighted		Score	
			Scores/Sum of Metric		(Rounded):	
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall	Low <sup>1</sup>
					Quality	
					Level:	
			d. Rationale: Evaluation c			

Study Reference:	methane-utiliz	zing mixed culture	S. (1986). Biodegradati e. Appl Environ Microb			by a
Domain	HERO ID: 17 Metric	39397 Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance purity and source were reported.	1	1	1
Test Design	3. Study Controls	High	A sterile control group was included.	1	2	2
	4. Test Substance Stability	High	Details regarding this metric were not reported but this did not limit the interpretation of the results.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	High	The conditions were suitable for the test substance.	1	2	2
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	High	Details regarding this metric were clearly reported.	1	2	2
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	Details regarding this metric were clearly reported.	1	1	1
	12. Sampling Methods	Medium	Limited details regarding this metric were reported.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Not rated	The metric is not applicable to this study type (evaluating factors that inhibited biodegradation).	NR	NR	NR

	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	High	Results were	1	2	2
Presentation	Reporting		reported for			
and Analysis			radiolabeled carbon			
			(14C).			
	16. Statistical	High	The analysis of data	1	1	1
	Methods and		was clearly			
	Kinetic		described.			
	Calculations					
Other	17.	Not rated	The metric is not	NR	NR	NR
	Verification		applicable to this			
	or Plausibility		study.			
	of Results					
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this			
			study type.			
			Sum of scores:	14	18	19
High	Medium	Low	Overall Score =	1.06	Overall	1.1
			Sum of Weighted		Score	
			Scores/Sum of		(Rounded):	
			Metric Weighting			
			Factors:			
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq 2.3$ and $\leq 3$			Overall	High
					Quality	
					Level:	

Study Reference:	Cheng, D; Chow, WL; He, J. (2010). A Dehalococcoides-containing co-culture that dechlorinates tetrachloroethene to trans-1,2-dichloroethene. ISME J 4: 88-97. http://dx.doi.org/10.1038/ismej.2009.90. HERO ID: 379893								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	High	The test substance purity and source were reported.	1	1	1			
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1			
	6. Testing Conditions	High	The conditions were suitable for the test substance.	1	2	2			
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1			
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Outcome Assessment	11. Outcome Assessment Methodology	Low	Limited details were reported to assess this metric.	3	1	3			
	12. Sampling Methods	Medium	Limited details were reported to assess this metric.	2	1	2			

Confounding/	13.	High	No confounding	1	1	1
Variable Control	Confounding		variables were noted.			
Control	Variables 14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Some information was not reported (reports dechlorination rates, test substance concentration in figures); however, the omissions were not likely to have had a substantial impact on the study	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	results. Limited calculation details were reported; but this was not likely to have impacted the study results.	2	1	2
Other	17. Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.	3	1	3
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
High	Medium	Low	Sum of scores: Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	<u>22</u> 1.4	20 Overall Score (Rounded):	<u>28</u> 2.3
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Low <sup>1</sup>

Study Reference:			o, J. (1984). Transform and groundwater. J An			
Domain	HERO ID: 75 Metric		Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	Medium	The test substance was identified by common name, but characterization details were omitted.	2	2	4
	2. Test Substance Purity	Low	The source and purity of the test substance were not reported or verified by analytical means.	3	1	3
Test Design	3. Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have had a substantial impact on the study results.	2	2	4
	4. Test Substance Stability	Medium	The test substance stability, homogeneity, preparation and storage conditions were not reported; however, these factors were not likely to have influenced the test substance or were not likely to have had a substantial impact on the study results.	2	1	2
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	Low	Anaerobic conditions were assumed and not determined analytically or strictly set up experimentally.	3	2	6
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System	High	This metric met the	1	1	1

	Type and Design		criteria for high confidence as			
			expected for this type of study.			
Test Organisms	9. Test Organism Degradation	Medium	The test organism, species, and inoculum source were reported, but not routinely used for similar study types.	2	2	4
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Medium	Other possible removal pathways were not considered.	2	1	2
	12. Sampling Methods	Low	Note from report: Sampling procedure resulted in increasing headspace and was not used in later work.	3	1	3
Confounding/ Variable Control	13. Confounding Variables	Low	Loss of mass balance was noted for starting material and attributed to adsorption; this may have been due to volatilization during sampling.	3	1	3
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, and mass balance were not reported; however, these omissions were not likely to have had a substantial impact on the study results.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Low	Statistical analysis or kinetic calculations were not conducted or were not described clearly, and the lack of information was not likely to have had a substantial impact on the study	3	1	3

			results for TCE.			
Other	17. Verification or Plausibility of Results	Not rated	The metric is not applicable to this study.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	30	19	41
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	2.16	Overall Score (Rounded):	0
≥1 and <1.7	≥1.7 and <2.3	$\geq 2.3 \text{ and } \leq 3$			Overall Quality Level:	NR <sup>1</sup>

Study Reference:	van Eekert, MHA; Schröder, TJ; van Rhee, A; Stams, AJM; Schraa, G; Field, JA. (2001). Constitutive dechlorination of chlorinated ethenes by a methanol degrading methanogenic consortium. Bioresour Technol 77: 163-170. http://dx.doi.org/10.1016/S0960-8524(00)00149- 8.							
	o. HERO ID: 11	166576						
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2		
	2. Test Substance Purity	Medium	The source of the test substance was reported but the purity was not reported.	2	1	2		
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study. Controls were included.	1	2	2		
	4. Test Substance Stability	Medium	The test substance stability, homogeneity, preparation and storage conditions were not reported; however, these factors were not likely to have influenced the Test substance or were not likely to have had a substantial impact on the study results.	2	1	2		
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance; the target chemical was tested at concentrations below its aqueous solubility.	1	1	1		
	6. Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.	1	2	2		
	7. Testing Consistency	High	Test conditions were consistent across samples or study groups.	1	1	1		

	8. System	Low	Some TCE removal	3	1	3
	Type and	LOW	was not accounted for	3	1	5
	Design		in this study;			
			however, absorption			
			to sludge was			
			suggested.			
Test	9. Test	High	The test organism	1	2	2
Organisms	Organism		information or			
	Degradation		inoculum source were			
			reported			
	10. Test	Not rated	The metric is not	NR	NR	NR
	Organism		applicable to this			
	Partitioning		study type.			
Outcome	11. Outcome	High	The outcome	1	1	1
Assessment	Assessment	8	assessment	_		_
	Methodology		methodology			
	wieniodology		addressed or reported			
			the intended			
	12 Compliant	τ	outcome(s) of interest.	2	1	2
	12. Sampling	Low	Details regarding	3	1	3
	Methods		sampling methods of			
			the outcome(s) were			
			not fully reported.			
Confounding/	13.	High	Sources of variability	1	1	1
Variable	Confounding		and uncertainty in the			
Control	Variables		measurements, and			
			statistical techniques			
			and between study			
			groups (if applicable)			
			were considered and			
			accounted for in data			
			evaluation			
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	Medium	The frequency of	2	2	4
Presentation	Reporting	muni	sampling, target	~	-	
and Analysis	Reporting		chemical and			
anu Analysis			transformation			
			product(s)			
			concentrations were			
		<b>TTT</b>	reported in a graph	4		
	16. Statistical	High	Statistical methods or	1	1	1
	Methods and		kinetic calculations			
	Kinetic		were clearly described			
	Calculations		and address the			
			dataset.			
Other	17.	High	This metric met the	1	1	1
	Verification or	-	criteria for high			
	Plausibility of		confidence as			
	Results		expected for this type			
			of study.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models	1 tot lateu	applicable to this	111	111	111
	WIGUEIS					
			study type.			

			Sum of scores:	22	20	28
High	Medium	Low	<b>Overall Score = Sum</b>	1.4	Overall	1.4
			of Weighted		Score	
			Scores/Sum of Metric		(Rounded):	
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$			Overall	High
					Quality	
					Level:	

Study Reference:	Bjerg, PL; Rügge, K; Cortsen, J; Nielsen, PH; Christensen, TH. (1999). Degradation of aromatic and chlorinated aliphatic hydrocarbons in the anaerobic part of the Grindsted Landfill leachate plume: In situ microcosm and laboratory batch experiments. Ground Water 37: 113-121. http://dx.doi.org/10.1111/j.1745- 6584.1999.tb00964.x. HERO ID: 1486371							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2		
	2. Test Substance Purity	High	The test substance source and purity were not reported; however, the test substance was detected by analytical technique.	1	1	1		
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	4. Test Substance Stability	Not rated	Not applicable; this study was an in-situ experiment.	NR	NR	NR		
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	6. Testing Conditions	Medium	Some testing conditions were not reported (such as temperature and pH); however, sufficient data were reported to determine that the omissions were not likely to have had a substantial impact on the study results.	2	2	4		
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		

	8. System Type and	Medium	Some system details were omitted but	2	1	2
	Design		these omissions were unlikely to have impacted the study results.			
Test Organisms	9. Test Organism Degradation	Medium	Naturally occurring microorganisms in the aquifer were used. No further information was provided.	2	2	4
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	All results were provided in form of graphs as percentage of test substance disappearing over time.	2	2	4
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	18	19	26

High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.37	Overall Score (Rounded):	1.4
≥1 and <1.7	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	aromatic and Landfill leach	l chlorinated aliphat hate plume: In situ r 3-121. http://dx.doi.	Nielsen, PH; Christens ic hydrocarbons in the nicrocosm and laborato org/10.1111/j.1745-658	anaerobic ory batch e	part of the Gr xperiments. G	indsted
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were not reported; however, the test substance was detected by analytical technique.	1	1	1
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	Medium	Some system details were omitted but these omissions were unlikely to have impacted the study results.	2	1	2
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	Medium	Some system details were omitted but these omissions were unlikely to have impacted the study results.	2	1	2

Test	9. Test	Medium	Naturally occurring	2	2	4
Organisms	Organism Degradation		microorganisms in the aquifer were used. No further information was provided.			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	All results were provided in form of graphs as percentage of test substance disappearing over time.	2	2	4
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	19	20	25
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.3	Overall Score (Rounded):	1.3
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	Nielsen, PH; Bjerg, PL; Nielsen, P; Smith, P; Christensen, TH. (1996). In situ and laboratory determined first-order degradation rate constants of specific organic compounds in an aerobic aquifer. Environ Sci Technol 30: 31-37. http://dx.doi.org/10.1021/es9407220. HERO ID: 1486742							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2		
	2. Test Substance Purity	High	The test substance purity was reported; all organics were analytical grade.	1	1	1		
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	4. Test Substance Stability	Not rated	Not applicable; this study was an in-situ experiment.	NR	NR	NR		
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	6. Testing Conditions	Low	Some testing conditions were not reported (such as temperature of the microcosm and pH); however, sufficient data were reported to determine that the omissions were not likely to have had a substantial impact on the study results.	3	2	6		
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	8. System Type and Design	Medium	Some system details were omitted but these omissions were unlikely to have impacted the study results.	2	1	2		

Test	9. Test	High	This metric met the	1	2	2
Organisms	Organism Degradation	_	criteria for high confidence as expected for this type of study.			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Medium	LOD was not specified, but this omission should not have affected the results.	2	1	2
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	17	18	25
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.33	Overall Score (Rounded):	1.3
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	Nielsen, PH; Bjerg, PL; Nielsen, P; Smith, P; Christensen, TH. (1996). In situ and laboratory determined first-order degradation rate constants of specific organic compounds in an aerobic aquifer. Environ Sci Technol 30: 31-37. http://dx.doi.org/10.1021/es9407220. HERO ID: 1486742							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2		
	2. Test Substance Purity	High	The test substance purity was reported; all organics were analytical grade.	1	1	1		
Test Design	3. Study Controls	High	Biologically deactivated controls were included in this study.	1	2	2		
	4. Test Substance Stability	Medium	The test substance stability, homogeneity, preparation and storage conditions were not reported; however, these factors were not likely to have influenced the Test substance or were not likely to have had a substantial impact on the study results.	2	1	2		
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	6. Testing Conditions	Low	Some testing conditions were not reported (such as temperature of the microcosm and pH); however, sufficient data were reported to determine that the omissions were not likely to have had a substantial impact on the study results.	3	2	6		

	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	Medium	Some system details were omitted but these omissions were unlikely to have impacted the study results.	2	1	2
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Medium	LOD was not specified, but this omission should not have affected the results.	2	1	2
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	19	19	27

High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.37	Overall Score (Rounded):	1.4
≥1 and <1.7	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	Long, JL; Stensel, HD; Ferguson, JF; Strand, SE; Ongerth, JE. (1993). Anaerobic and aerobic treatment of chlorinated aliphatic compounds. J Environ Eng 119: 300-320.							
	http://dx.doi.d	org/10.1061/(ASCE)	0733-9372(1993)119:2(		8			
Domain	HERO ID: 17 Metric	17600 Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2		
	2. Test Substance Purity	Medium	The test substance source and purity were not reported.	2	1	2		
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR		

Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as	1	1	1
			expected for this type of study.			
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Medium	Some details were omitted; however, these omissions were not likely to have had a substantial impact on the study results.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
***		•	Sum of scores:	17	20	22
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.1	Overall Score (Rounded):	1.1
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	Long, JL; Stensel, HD; Ferguson, JF; Strand, SE; Ongerth, JE. (1993). Anaerobic and aerobic treatment of chlorinated aliphatic compounds. J Environ Eng 119: 300-320.							
	http://dx.doi.d	org/10.1061/(ASCE)	0733-9372(1993)119:2(		8			
Domain	HERO ID: 17 Metric	17600 Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2		
	2. Test Substance Purity	Medium	The test substance source and purity were not reported.	2	1	2		
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR		

Outcome	11. Outcome	High	This metric met the	1	1	1
Assessment	Assessment Methodology	ingn	criteria for high confidence as expected for this type	1		Ŧ
	12. Sampling Methods	High	of study.This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Medium	Some details were omitted; however, these omissions were not likely to have had a substantial impact on the study results.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
High	Medium	Low	Sum of scores: Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	<u>17</u> 1.1	20 Overall Score (Rounded):	22 1.1
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	Long, JL; Stensel, HD; Ferguson, JF; Strand, SE; Ongerth, JE. (1993). Anaerobic and aerobic treatment of chlorinated aliphatic compounds. J Environ Eng 119: 300-320.								
	http://dx.doi.org/10.1061/(ASCE)0733-9372(1993)119:2(300). HERO ID: 1717600								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	Medium	The test substance source and purity were not reported.	2	1	2			
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR			

Outcome	11. Outcome	High	This metric met the	1	1	1
Assessment	Assessment Methodology		criteria for high confidence as expected for this type of study.			
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Medium	Some details were omitted; however, these omissions were not likely to have had a substantial impact on the study results.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	17	20	22
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.1	Overall Score (Rounded):	1.1
$\geq 1$ and $< 1.7$	≥1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	Long, JL; Stensel, HD; Ferguson, JF; Strand, SE; Ongerth, JE. (1993). Anaerobic and aerobic treatment of chlorinated aliphatic compounds. J Environ Eng 119: 300-320. http://dx.doi.org/10.1061/(ASCE)0733-9372(1993)119:2(300). HERO ID: 1717600							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2		
	2. Test Substance Purity	Medium	The test substance source and purity were not reported.	2	1	2		
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR		

Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as	1	1	1
	12.6		expected for this type of study.		1	1
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Medium	Some details were omitted; however, these omissions were not likely to have had a substantial impact on the study results.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
		•	Sum of scores:	17	20	22
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.1	Overall Score (Rounded):	1.1
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq 2.3$ and $\leq 3$			Overall Quality Level:	High

Study Reference:	Long, JL; Stensel, HD; Ferguson, JF; Strand, SE; Ongerth, JE. (1993). Anaerobic and aerobic treatment of chlorinated aliphatic compounds. J Environ Eng 119: 300-320.								
	http://dx.doi.org/10.1061/(ASCE)0733-9372(1993)119:2(300). HERO ID: 1717600								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	Medium	The test substance source and purity were not reported.	2	1	2			
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR			

Outcome	11. Outcome	High	This metric met the	1	1	1
Assessment	Assessment	8	criteria for high	-	-	-
	Methodology		confidence as			
			expected for this type			
	10.0	TT' - 1.	of study.	1	1	1
	12. Sampling Methods	High	This metric met the criteria for high	1	1	1
	Wethous		confidence as			
			expected for this type			
			of study.			
Confounding/	13.	High	This metric met the	1	1	1
Variable	Confounding		criteria for high			
Control	Variables		confidence as			
			expected for this type			
	14. Outcomes	Not rated	of study. The metric is not	NR	NR	ND
	Unrelated to	Not rated	applicable to this	INK	INK	NR
	Exposure		study type.			
Data	15. Data	High	This metric met the	1	2	2
Presentation	Reporting	0	criteria for high			
and Analysis			confidence as			
			expected for this type			
			of study.	-		-
	16. Statistical	Medium	Some details were	2	1	2
	Methods and Kinetic		omitted; however, these omissions were			
	Calculations		not likely to have had			
	Culculations		a substantial impact			
			on the study results.			
Other	17.	High	This metric met the	1	1	1
	Verification or		criteria for high			
	Plausibility of		confidence as			
	Results		expected for this type			
	18. QSAR	Not rated	of study. The metric is not	NR	NR	NR
	Models	INOT TAICU	applicable to this			INIX
	110000		study type.			
			Sum of scores:	17	20	22
High	Medium	Low	Overall Score = Sum	1.1	Overall	1.1
			of Weighted		Score	
			Scores/Sum of Metric		(Rounded):	
>1 1 1 7			Weighting Factors:		0	TT: 1
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$			Overall Opelity	High
					Quality Level:	

Study Reference:	trichloroethyl conditions. Aj	Vogel, TM; McCarty, PL. (1985). Biotransformation of tetrachloroethylene to trichloroethylene, dichloroethylene, vinyl chloride, and carbon dioxide under methanogenic conditions. Appl Environ Microbiol 49: 1080-1083. HERO ID: 1744339								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score				
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2				
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1				
Test Design	3. Study Controls	Low	Control groups/details were not included; however, the lack of data was not likely to have had a substantial impact on the study results.	3	2	6				
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1				
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1				
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2				
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1				
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1				
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2				

	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Low	Mixture was used to evaluate biodegradation removal; difficulty in interpreting removal because TCE was an intermediate for PCE (a component of mixture) degradation.	3	1	3
	12. Sampling Methods	Medium	Some sampling details were omitted but this was unlikely to have impacted the study results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	19	19	26
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.37	Overall Score (Rounded):	2.3
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Low <sup>1</sup>

Study Reference:	trichloroethy	ene, dichloroethyle ppl Environ Microb	Biotransformation of tan ne, vinyl chloride, and c biol 49: 1080-1083.			thanogenic
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The source and purity of the test substance were reported.	1	1	1
Test Design	3. Study Controls	Not rated	Control group details were not included; however, this study described a non- standard or non- guideline test.	NR	NR	NR
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Medium	No information was provided on pH, dark and light conditions or duration of the test.	2	2	4
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	Medium	Sampling time interval was not provided. The only sampling data reported was the height of the column at which the samples were taken.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
High	Medium	Low	Sum of scores:Overall Score = Sum of WeightedScores/Sum of Metric Weighting Factors:	15 1.18	17 Overall Score (Rounded):	20 1.2
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	Kim, Y; Arp, DJ; Semprini, L. (2000). Chlorinated solvent cometabolism by butane- grown mixed culture. J Environ Eng 126: 934-942. <u>http://dx.doi.org/10.1061/(ASCE)0733-9372(2000)126:10(934).</u>							
Domain	HERO ID: 17 Metric	447865 Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2		
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1		
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	6. Testing Conditions	Medium	There were some omissions in the reporting of test conditions.	2	2	4		
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR		

Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Medium	Kinetic calculations were not clearly described.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	17	20	23
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.15	Overall Score (Rounded):	1.2
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	Bouwer, EJ; McCarty, PL. (1983). Transformations of 1- and 2-carbon halogenated aliphatic organic compounds under methanogenic conditions. Appl Environ Microbiol 45: 1286-1294. HERO ID: 18060								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1			
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	7. Testing Consistency	High	No inconsistencies were reported across studies. Conditions were reported.	1	1	1			
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Organisms	9. Test Organism Degradation	High	Inoculum source was clearly described. Inoculum concentration was reported (10 mL/L).	1	2	2			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR			

Outcome	11. Outcome	High	This metric met the	1	1	1
Assessment	Assessment	8	criteria for high	-	-	-
	Methodology		confidence as			
	0.7		expected for this type			
			of study.			
	12. Sampling	High	Degradation rates	1	1	1
	Methods	e	were not reported for			
			this part of the study,			
			but sampling methods			
			were sufficient for			
			determining the			
			ability of the bacteria			
			to degrade the starting			
			material.			
Confounding/	13.	Medium	Uncertainties of one	2	1	2
Variable	Confounding		standard deviation			
Control	Variables		were given for			
			concentration			
			measurements for the			
			haloalkanes. No			
			variability between			
			tests was noted in the			
			study.			
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	High	Sufficient evidence	1	2	2
Presentation	Reporting		was provided to			
and Analysis			confirm that sorption			
			to the column was not			
			the reason for the			
			disappearance of the			
	16. Statistical	Medium	starting material. Some details and	2	1	2
	Methods and	Medium	kinetic data for the	Z	1	2
	Kinetic					
	Calculations		batch study were omitted; however,			
	Calculations		these omissions were			
			not likely to have had			
			a substantial impact			
			on the study results.			
Other	17.	High	This metric met the	1	1	1
	Verification or	8	criteria for high	-	-	-
	Plausibility of		confidence as			
	Results		expected for this type			
			of study.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this			
			study type.			
			Sum of scores:	17	20	22
High	Medium	Low	Overall Score = Sum	1.1	Overall	1.1
			of Weighted		Score	
			Scores/Sum of Metric		(Rounded):	
			Weighting Factors:			

$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$		Overall	High
				Quality	
				Level:	

Study Reference:	sequential red 1137-1145. htt HERO ID: 19	luctive/oxidative bio tp://dx.doi.org/10.2 41207		osm studie	es. Water Sci T	Fechnol 58:
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Not rated	Not applicable; test substance was measured analytically at a polluted site.	NR	NR	NR
Test Design	3. Study Controls	Medium	Sterile controls were mentioned but not fully described.	2	2	4
	4. Test Substance Stability	Not rated	Not applicable for this site-specific test at a polluted site.	NR	NR	NR
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Low	Details of the testing conditions were not reported.	3	2	6
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Details regarding this metric were limited; however, concentrations of test substance and degradation products were reported.	2	2	4
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17. Verification or Plausibility of Results	Not rated	Due to limited information, evaluation of the reasonableness of the study results was not possible.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	15	16	24
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.5	Overall Score (Rounded):	1.5
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	thermodynan	nic properties for a gs. Geochim Cosm	alocarbons in the enviro aqueous chloroethylene ao Act 63: 3429-3441.			ies in
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
Test Design	3. Study Controls	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
	4. Test Substance Stability	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
Test Conditions	5. Test Method Suitability	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
	6. Testing Conditions	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
	7. Testing Consistency	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
	8. System Type and Design	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Low	Presents energetic constraints to inform possible metabolism under natural conditions.	3	1	3

	12. Sampling Methods	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
Confounding/ Variable Control	13. Confounding Variables	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
	16. Statistical Methods and Kinetic Calculations	Low	Statistical analysis or kinetic calculations were not described clearly.	3	1	3
Other	17. Verification or Plausibility of Results	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
			Sum of scores:	7	4	8
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	2	Overall Score (Rounded):	2.3
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Low <sup>1</sup>

Study Reference:	Bielefeldt, AR; Stensel, HD; Strand, SE. (1995). Cometabolic degradation of TCE and DCE without intermediate toxicity. J Environ Eng 121: 791-797.									
	http://dx.doi.o	http://dx.doi.org/10.1061/(ASCE)0733-9372(1995)121:11(791). HERO ID: 2303792								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score				
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2				
	2. Test Substance Purity	High	The test substance source and purity were not reported; however, the test substance was detected by analytical technique.	1	1	1				
	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2				
	4. Test Substance Stability	Medium	The test substance stability, homogeneity, preparation and storage conditions were not reported.	2	1	2				
Test Conditions	5. Test Method Suitability	Medium	The test method was suitable for the test substance with minor deviations.	2	1	2				
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2				
	7. Testing Consistency	High	Some test conditions across samples or study groups were not reported.	1	1	1				
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1				
Test Organisms	9. Test Organism Degradation	Low	The test organism, species, and inoculum source were not routinely used for similar study types (phenol feeding).	3	2	6				

	10. Test Organism Partitioning	Not rated	The metric is not applicable to this	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Medium	study type.There were minordifferences betweenthe assessmentmethodology and theintended outcomeassessment - possibleadaption of inoculum.	2	1	2
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	Medium	Volatilization was not discussed.	2	1	2
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Extraction efficiency or recovery was no reported.		2	4
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	22	20	30
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:		Overall Score (Rounded	1.2
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High
Study Reference:		n aerobic to anaer	echlorination of tri- and obic conditions. Appl F		loroethylenes	
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score

Test	1. Test	High	The test substance	1	2	2
Substance	Substance	ing.i	was identified by	1	-	_
540000000	Identity		chemical name.			
	2. Test	High	The test substance	1	1	1
	Substance	mgn	source and purity	1	1	1
	Purity		were reported.			
Test Design	3. Study	High	This metric met the	1	2	2
rest Design	Controls	mgn	criteria for high	1	2	2
	Controls		confidence as			
			expected for this type			
			of study.			
	4. Test	High	This metric met the	1	1	1
	Substance	Ingn	criteria for high	1	1	1
	Stability		confidence as			
	Stability		expected for this type			
			of study.			
Test	5. Test	Unacceptable	The test method was	4	1	4
Conditions	Method	Unacceptable	not suitable for the	+	1	+
Conditions	Suitability		test substance since			
	Suitability		TCE was also a			
			degradation product			
			of another compound			
			being tested it is			
			difficult to			
			confirm/determine			
			TCE removal. This			
			deviation and lack of			
			information resulted			
			in serious flaws that			
			make the study			
	( Testing	Medium	unusable.	2	2	4
	6. Testing Conditions	Medium	Some testing conditions were not	Z	Z	4
	Conditions					
			reported (such as			
			light conditions);			
			however, sufficient			
			data were reported to			
			determine that the			
			omissions were not			
			likely to have had a			
			substantial impact on			
	7 Testing	TT' - 1.	the study results. This metric met the	1	1	1
	7. Testing	High		1	1	1
	Consistency		criteria for high confidence as			
			expected for this type			
	Q Quetom	High	of study. This metric met the	1	1	1
	8. System	пıgn		1	1	1
	Type and		criteria for high			
	Design		confidence as			
			expected for this type			
			of study.			

Test	9. Test	Medium	Non-standard test	2	2	4
Organisms	Organism Degradation		species used that may have been adapted to the test substance.			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Medium	Degradation products and pathways were proposed based on the study results.	2	1	2
	12. Sampling Methods	Medium	Some sampling details were omitted but this was unlikely to have impacted the study results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Medium	Some details about the statistical methods and kinetics were missing and/or only shown in figures.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
High	Medium	Low	Sum of scores: Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	23 1.5	20 Overall Score (Rounded):	<u>30</u> 4
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and $<$ 2.3	$\geq$ 2.3 and $\leq$ 3	Treigning Factors.		Overall Quality Level:	Unacceptable <sup>1</sup>

<sup>1</sup>The test method was not suitable for the test substance since TCE was also a degradation product of another compound being tested it is difficult to confirm or determine TCE removal. 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 was rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

Study Reference:	hydrocarbon Hydrol 170: ( HERO ID: 25	s by methane oxid 58-75. http://dx.do 533464	al, A. (2014). Degradati izers naturally-associat i.org/10.1016/j.jconhyd.	ed with w .2014.10.0	etland plant 1 01.	roots. J Contam
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	The test substance source and purity were not reported; however, the omissions were not likely to have had a substantial impact on the study results.	2	1	2
Test Design	3. Study Controls	Not rated	Study details for TCE were reported in separate study.	NR	NR	NR
	4. Test Substance Stability	Not rated	Study details for TCE reported in separate study.	NR	NR	NR
Test Conditions	5. Test Method Suitability	Not rated	Study details for TCE reported in separate study.	NR	NR	NR
	6. Testing Conditions	Not rated	Study details for TCE were reported in separate study.	NR	NR	NR
	7. Testing Consistency	Not rated	Study details for TCE were reported in separate study.	NR	NR	NR
	8. System Type and Design	Not rated	Study details for TCE were reported in separate study.	NR	NR	NR
Test Organisms	9. Test Organism Degradation	Not rated	Study details for TCE were reported in separate study.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	Not rated	Study details for TCE were reported in separate study.	NR	NR	NR

Confounding/	13.	Not rated	No confounding	NR	NR	NR
Variable	Confounding		variables were noted.			
Control	Variables					
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	Unacceptable	This reference cited	4	2	8
Presentation	Reporting		an earlier work for			
and Analysis			the TCE study			
			results.			
	16. Statistical	Not rated	Study details for TCE	NR	NR	NR
	Methods and		were reported in			
	Kinetic		separate study.			
	Calculations					
Other	17.	Not rated	Due to limited	NR	NR	NR
	Verification		information,			
	or		evaluation of the			
	Plausibility		reasonableness of the			
	of Results		study results was not			
			possible.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this			
			study type.			
			Sum of scores:	8	6	13
High	Medium	Low	Overall Score =	2.17	Overall	4
			Sum of Weighted		Score	
			Scores/Sum of Metric		(Rounded):	
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and	$\geq 2.3$ and $\leq 3$			Overall	Unacceptable <sup>1</sup>
	<2.3				Quality	
					Level:	
			(not available in HERO:			
			ethane oxidizers naturall			
			virens. Wetlands 31 (1),			
			document, if a metric for			
			study to be unacceptabl			
	eptable. As such	, the study is consid	lered unacceptable and t	he score is	s presented sole	ely to increase
transparency.						

Study Reference:	potential of tr microorganis http://dx.doi. HERO ID: 25	richoloroethene in w ms. Chemosphere 1 org/10.1016/j.chemo 534473	sphere.2014.09.040.	e of native	ammonium- o	oxidizing
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	Medium	The test substance was identified, but characterization details were omitted that could have affected interpretation of the study results.	2	2	4
	2. Test Substance Purity	Low	The source and purity of the test substance were not reported or verified by analytical means.	3	1	3
Test Design	3. Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have had a substantial impact on the study results.	2	2	4
	4. Test Substance Stability	Low	The test substance stability, homogeneity, preparation, and storage conditions were not reported, and these factors likely influenced the test substance or were likely to have had a substantial impact on the study results.	3	1	3
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Medium	There were reported deviations or omissions in testing conditions (pH).	2	2	4

	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type	1	1	1
	8. System Type and Design	Medium	of study. There were omissions in the description of the study type and design, but this was not likely to have had a substantial impact on the study results.	2	1	2
Test Organisms	9. Test Organism Degradation	Low	The test organism, species, and inoculum source were reported, but were not routinely used for similar study types; and the deviation may have a had substantial impact on the study results.	3	2	6
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Medium	There were minor differences between the assessment methodology and the intended outcome assessment. Not a typical biodegradation study because chemical and media were replenished in batches.	2	1	2
	12. Sampling Methods	Low	Details regarding sampling methods of the outcome(s) were not fully reported.	3	1	3
Confounding/ Variable Control	13. Confounding Variables	Low	Sources of variability and uncertainty in the measurements and statistical techniques and between study groups (if applicable) were not considered or accounted for in data evaluation resulting in some uncertainty.	3	1	3
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Data	15. Data	Medium	The transformation	2	2	4
Presentation and Analysis	Reporting	Medium	product concentrations, extraction efficiency, percent recovery, and mass balance were not reported; however, these omissions were not likely to have had	2	2	4
			a substantial impact on the study results.			
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	31	20	42
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	2.1	Overall Score (Rounded):	2.1
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Medium

Study Reference:	reductive deh	alogenation. Enviro org/10.1021/es98058	). Chlorinated ethene ha on Sci Technol 33: 223-2 876.		v coefficients ()	KS) for
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Medium	Controls not reported but were not likely to have impacted the results.	2	2	4
	4. Test Substance Stability	High	Not discussed but not likely to have impacted the results.	1	1	1
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	Low	The test organism, species, and inoculum source were not routinely used for similar study types.	3	2	6
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome	11. Outcome	Low	Results provided	3	1	3
Assessment	Assessment Methodology		maximum transformation rates under specific conditions and selected test species.			
	12. Sampling Methods	Medium	Method not reported but not likely to impact results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	21	20	29
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.45	Overall Score (Rounded):	1.5
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq 2.3$ and $\leq 3$			Overall Quality Level:	High

Study Reference:	tetrachloroet	ylene and trichloro obiol 55: 2144-2151 02294				
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	Medium	System Type and Design details (i.e., protection from light or use of amber bottles) were not reported.	2	1	2
Test Organisms	9. Test Organism Degradation	Medium	The test organism was an inoculum that was pre- adapted with (multiple generation studies) to the test substance.	2	2	4

	10. Test	Not rated	The metric is not	NR	NR	NR
	Organism Partitioning		applicable to this study type.			
Outcome Assessment	11. Outcome Assessment Methodology	Low	Deficiencies in the outcome assessment methodology of the assessment or reporting were likely to have had a substantial impact on the results. This non- standard biodegradation test indicated the potential for biodegradation and biodegradation product information but did not give biodegradation rates.	3	1	3
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
High	Medium	Low	Sum of scores:Overall Score = Sum of WeightedScores/Sum of Metric Weighting Factors:	<u>19</u> 1.25	20 Overall Score (Rounded):	25 1.3

$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$		Overall	High
				Quality	_
				Level:	

Study Reference:	and trichloro	ethylene oxidation t n a groundwater aqu	1). Influence of endogen oxicity on trichloroethy iifer. Appl Environ Mic	lene oxida	tion by metha	
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Low	Some concurrent control groups (blanks) were not included and may have had a substantial impact on the study results.	3	2	6
	4. Test Substance Stability	Medium	The test substance stability, homogeneity, preparation and storage conditions were not reported; however, these factors were not likely to have influenced the Test substance or were not likely to have had a substantial impact on the study results.	2	1	2
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Medium	There were omissions in the reporting for Testing conditions; however, these were not likely to have a substantial impact on study results.	2	2	4
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

	Q Crustom	Madium	There were emissions	2	1	2
	8. System	Medium	There were omissions	2	1	2
	Type and		in the reporting for			
	Design		System Type and			
			Design; however,			
			these were not likely			
			to have had a			
			substantial impact on			
			the study results.			
Test	9. Test	Medium	The test organism,	2	2	4
Organisms	Organism		species, and inoculum			
	Degradation		source were reported,			
			but were not routinely			
			used for similar study			
			types; however, the			
			deviation was not			
			likely to have had a			
			substantial impact on			
			the study results.			
	10. Test	Not rated	The metric is not	NR	NR	NR
	Organism		applicable to this			
	Partitioning		study type.			
Outcome	11. Outcome	Low	Biodegradation study	3	1	3
Assessment	Assessment	2011	provided reaction rate	C	-	C
	Methodology		information under			
	inculouology		specific conditions			
			with methane			
			starvation.			
	12. Sampling	Medium	There were omissions	2	1	2
	Methods	Medium	in the reporting for	2	1	2
	Wiethous		sampling method;			
			however, the			
			omissions were not			
			likely to have had a			
			substantial impact on			
			-			
Confounding/	13.	High	the study results. This metric met the	1	1	1
Variable		nign		1	1	1
	Confounding		criteria for high confidence as			
Control	Variables					
			expected for this type			
	14 Outromes	Net usted	of study. The metric is not	ND	ND	ND
	14. Outcomes	Not rated		NR	NR	NR
	Unrelated to		applicable to this			
Data	Exposure	TT' 1	study type.	1		2
Data	15. Data	High	This metric met the	1	2	2
Presentation	Reporting		criteria for high			
and Analysis			confidence as			
			expected for this type			
			of study.			
	16. Statistical	High	This metric met the	1	1	1
	Methods and		criteria for high			
	Kinetic		confidence as			
	Calculations		expected for this type			
			of study.			

Other	17.	High	This metric met the	1	1	1
	Verification or		criteria for high			
	Plausibility of		confidence as			
	Results		expected for this type			
			of study.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this			
			study type.			
			Sum of scores:	24	20	33
High	Medium	Low	<b>Overall Score = Sum</b>	1.65	Overall	1.7
			of Weighted		Score	
			Scores/Sum of Metric		(Rounded):	
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall	Medium
					Quality	
					Level:	

Study Reference:	compounds at	t a municipal solid x.doi.org/10.2175/1 02998	; Armstrong, DE. (1995 waste cocomposting fac 106143095X133284.			es 67: 1044-
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The source and purity of the test substance were not reported; however, the test substance was identified by analytical means.	1	1	1
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	Not rated	The metric is not applicable to this study type (monitoring).	NR	NR	NR
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	High	Inoculum source was reported.	1	2	2
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

hodology Sampling hods founding iables Dutcomes elated to osure Data orting	High High Not rated Unacceptable	confidence as expected for this type of study.This metric met the criteria for high confidence as expected for this type of study.This metric met the criteria for high confidence as expected for this type of study.The metric is not applicable to this study type.Results reported for TCE were not sufficient to evaluate removal pathways (>0 % removal efficiency for volatilization, biodegradation and	1 1 NR 4	1 1 NR 2	1 1 NR 8
hods founding iables Dutcomes elated to osure Data orting	High Not rated	<ul> <li>criteria for high confidence as expected for this type of study.</li> <li>This metric met the criteria for high confidence as expected for this type of study.</li> <li>The metric is not applicable to this study type.</li> <li>Results reported for TCE were not sufficient to evaluate removal pathways (&gt;0 % removal efficiency for volatilization, biodegradation and</li> </ul>	1 NR	1 NR	1 NR
Dutcomes elated to osure Data orting	Not rated	<ul> <li>criteria for high</li> <li>confidence as</li> <li>expected for this type</li> <li>of study.</li> <li>The metric is not</li> <li>applicable to this</li> <li>study type.</li> <li>Results reported for</li> <li>TCE were not</li> <li>sufficient to evaluate</li> <li>removal pathways</li> <li>(&gt;0 % removal</li> <li>efficiency for</li> <li>volatilization,</li> <li>biodegradation and</li> </ul>	NR	NR	NR
elated to osure Data orting		applicable to this study type. Results reported for TCE were not sufficient to evaluate removal pathways (>0 % removal efficiency for volatilization, biodegradation and			
orting	Unacceptable	TCE were not sufficient to evaluate removal pathways (>0 % removal efficiency for volatilization, biodegradation and	4	2	8
		residuals).			
Statistical hods and etic sulations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
fication or sibility of ılts	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
QSAR lels	Not rated	applicable to this study type.	NR	NR	NR
					25
Iedium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.32	Overall Score (Rounded):	4
/ and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Unacceptable <sup>1</sup>
	sibility of ilts QSAR lels fedium 7 and <2.3 nt data report re not suffic	fication or sibility of llts QSAR lels Mot rated lels Mot rated Low $2^{\prime}$ and $<2.3$ $\geq 2.3$ and $\leq 3$ nt data reported for TCE. Rep	HighThis metric met the criteria for high confidence as expected for this type of study.QSAR lelsNot ratedThe metric is not applicable to this study type.IdiumLowOverall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:I and <2.3	HighThis metric met the criteria for high confidence as expected for this type of study.1QSAR lelsNot ratedThe metric is not applicable to this study type.NRIdiumLowOverall Scores: of Weighted Scores/Sum of Metric Weighting Factors:1.32Idia <	HighThis metric met the criteria for high confidence as expected for this type of study.11QSAR lelsNot ratedThe metric is not applicable to this study type.NRNRMediumLowOverall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:1.32Overall Score (Rounded):I deta reported for TCE. Removal efficiency for volatilization, biodegradation re not sufficient to evaluate study results. Consistent with our Application of Sy0

= 4), EPA will determine the study to be unacceptable. In this case, one of the metrics was rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

Study Reference:	Tobajas, M; Verdugo, V; Polo, AM; Rodriguez, JJ; Mohedano, AF. (2016). Assessment of toxicity and biodegradability on activated sludge of priority and emerging pollutants. Environ Technol 37: 713-721. http://dx.doi.org/10.1080/09593330.2015.1079264. HERO ID: 3070754								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1			
Test Design	3. Study Controls	Medium	The use of blank controls was not reported in this study; however, they were a requirement of the method cited, OECD Test Guideline 302B.	2	2	4			
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	8. System Type and Design	Medium	There were omissions in the description of the study type and design, but this was not likely to have had a substantial impact on the study results.	2	1	2			
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			

	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Percent recovery was not reported but was unlikely to have impacted results.	2	2	4
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	18	20	25
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.25	Overall Score (Rounded):	1.3
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq 2.3$ and $\leq 3$			Overall Quality Level:	High

Study Reference:	(1991). Biodeg recycle expan HERO ID: 35	gradation of mixed ded-bed bioreactor 43307	chowsky, KJ; Schram, -organic wastes by micr s. Environ Sci Technol	robial cons	ortia in contin 465.	iuous-
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	Medium	The test inoculum source was reported to be enriched; the deviation was not likely to have had a substantial impact on the study results.	2	2	4

			of Weighted Scores/Sum of Metric		Score (Rounded):	
High	Medium	Low	Overall Score = Sum	1.25	Overall	1.3
			Sum of scores:	19	20	25
	ļļ.		study type.			
	Models		applicable to this			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
			of study.			
	Results		expected for this type			
	Plausibility of		confidence as			
Jun	Verification or	mgn	criteria for high	1	1	1
Other	17.	High	This metric met the	1	1	1
	Calculations		expected for this type of study.			
	Kinetic		confidence as			
	Methods and		criteria for high			
	16. Statistical	High	This metric met the	1	1	1
			of study.			
			expected for this type			
and Analysis			confidence as			
Presentation	Reporting	0	criteria for high			
Data	15. Data	High	This metric met the	1	2	2
	Exposure		study type.			
	Unrelated to	1101 14100	applicable to this	111		1 111
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
			of study.			
Control	Variables		confidence as expected for this type			
Variable	Confounding		criteria for high			
Confounding/	13.	High	This metric met the	1	1	1
<u>()</u>	12	<b>TT' 1</b>	study results.	1	1	1
			interpretation of the			
			influenced the			
			likely to have			
			however, this was not			
			reference substances;			
			poorly biodegradable			
			result of readily and			
			omitted such as the			
	Meulous		regarding the sampling were			
	12. Sampling Methods	Medium	Some details	2	1	2
	10.0 1		biodegradation.		1	
			environmental			
			relevant to			
			is not likely to be			
			outcome assessment			
	Methodology		technique; this			
Assessment	Assessment		bioremediation			
Outcome	11. Outcome	Low	This study evaluated a	3	1	3
	Partitioning		study type.			
	Organism		applicable to this			
	10. Test	Not rated	The metric is not	NR	NR	NR

$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3		Overall	High
				Quality	
				Level:	

Study Reference:	chemicals an	d toxic metals in 27 Water Treat 54: 114 580141	JY. (2015). Occurrence industrial wastewater t 41-1149. http://dx.doi.or	reatment p	olants in Korea /19443994.2014	n. 4.935810.
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The source and purity of the test substance were not reported; however, the test substance was identified by analytical means.	1	1	1
Test Design	3. Study Controls	Medium	The use of controls was not reported but likely did not impact the study results.	2	2	4
	4. Test Substance Stability	Medium	Sample storage conditions were not reported but were unlikely to have influenced the study results.	2	1	2
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Medium	As this was a screening study looking at several WWTPs, specific conditions were not reported but were not critical to the study results.	2	2	4
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	Medium	Some system details were omitted but these omissions were unlikely to have impacted the study results.	2	1	2

Test	9. Test	Medium	Details regarding the	2	2	4
Organisms	Organism	mearann	test organisms at each	-	-	
C	Degradation		WWTP were not			
	0		given but their			
			omission did not			
			likely impact the			
			study results.			
	10. Test	Not rated	The metric is not	NR	NR	NR
	Organism		applicable to this			
	Partitioning		study type.			
Outcome	11. Outcome	High	This metric met the	1	1	1
Assessment	Assessment	8	criteria for high			
	Methodology		confidence as			
	05		expected for this type			
			of study.			
	12. Sampling	Medium	Some sampling details	2	1	2
	Methods		were omitted but this		-	_
			was unlikely to			
			impact the study			
			results.			
Confounding/	13.	High	This metric met the	1	1	1
Variable	Confounding	8	criteria for high			
Control	Variables		confidence as			
			expected for this type			
			of study.			
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	Medium	Transformation	2	2	4
Presentation	Reporting		products were not			
and Analysis			reported, and			
-			volatilization was			
			likely a large factor in			
			the lower effluent			
			concentrations since			
			the removal rates			
			were proportional to			
			air to water ratios.			
	16. Statistical	High	This metric met the	1	1	1
	Methods and		criteria for high			
	Kinetic		confidence as			
	Calculations		expected for this type			
			of study.			
Other	17.	High	This metric met the	1	1	1
	Verification or		criteria for high			
	Plausibility of		confidence as			
	Results		expected for this type			
			of study.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this			
			study type.			
			Sum of scores:	22	20	31

High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.55	Overall Score (Rounded):	1.6
≥1 and <1.7	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	Parsons, F; Lage, GB; Rice, R. (1985). Biotransformation of chlorinated organic solvents in static microcosms. Environ Toxicol Chem 4: 739-742. http://dx.doi.org/10.1002/etc.5620040604. HERO ID: 3797820								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	High	The test substance purity was reported (ultrapure).	1	1	1			
Test Design	3. Study Controls	High	Solvent blank on non- viable microcosm controls was used.	1	2	2			
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	7. Testing Consistency	Medium	The authors noted subtle inconsistencies between the microcosms that may have caused extended lag periods.	2	1	2			
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR			

Outcome	11. Outcome	Medium	Biodegradation	2	1	2
Assessment	Assessment		products were			
	Methodology		measured throughout			
			the study although			
			rate information was			
			not reported.			
	12. Sampling	High	This metric met the	1	1	1
	Methods		criteria for high			
			confidence as			
			expected for this type			
			of study.			
Confounding/	13.	Medium	There was high	2	1	2
Variable	Confounding		uncertainty in the			
Control	Variables		concentrations of the			
			TCE degradation			
	14 Outromas	Not noted	products. The metric is not	NR	NR	ND
	14. Outcomes Unrelated to	Not rated	applicable to this	INK	INK	NR
	Exposure		study type.			
Data	15. Data	Low	Select degradation	3	2	6
Presentation	Reporting	LOW	products were	5	2	0
and Analysis	Reporting		monitored; however,			
und minuryois			quantitative			
			degradation results			
			were not presented for			
			TCE.			
	16. Statistical	Medium	This metric met the	2	1	2
	Methods and		criteria for high			
	Kinetic		confidence as			
	Calculations		expected for this type			
			of study.			
Other	17.	Low	Loss due to abiotic	3	1	3
	Verification or		processes and/or			
	Plausibility of		adsorption were not			
	Results		controlled.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this			
			study type.		20	20
TT: - 1.	Mal	T	Sum of scores:	23 1.5	20 Omenall	30
High	Medium	Low	Overall Score = Sum	1.5	Overall Score	2.3
			of Weighted Scores/Sum of Metric		(Rounded):	
			Weighting Factors:		(Noundeu):	
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$	ricignung Factors.		Overall	Low <sup>1</sup>
_1 unu <1.7	_1.7 und \$2.5	und			Quality	
					Level:	
<sup>1</sup> The study's ov	verall quality ratin	g was downgrade	d. Rationale: Loss due to a	abiotic pro		sorption
			ime, degradation rate or ha			
evaluation of th					1 ,	0
Study		Davis, AC; Kara	s, JA. (1983). Mesocosm	experime	nts to determin	e the fate
Reference:			ic compounds in coastal			
		dx.doi.org/10.102				
	<b>HERO ID: 379</b>					

Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The source and purity of the test substance were not reported; however, the test substance was identified by analytical means.	1	1	1
Control: 4. Test Substan	3. Study Controls	Medium	Sterile control used; however, use of a reference substance was not reported.	2	2	4
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Conditions	5. Test Method Suitability	Medium	Limited detail was reported on the test method.	2	1	2
	6. Testing Conditions	Medium	There were omissions in testing conditions; however, sufficient data were reported to determine that the omissions were not likely to have had a substantial impact on the study results.	2	2	4
	7. Testing Consistency	Medium	The control experiment was run on different dates, not correlating with other systems.	2	1	2
	8. System Type and Design	Medium	Details regarding the System Type and Design were limited; however, the omissions were not likely to have had a substantial impact on the study results.	2	1	2

Test	9. Test	Medium	The test organism,	2	2	4
Organisms	Organism Degradation	Medium	species, and inoculum source were reported, but were not routinely used for similar study types; however, the deviation was not likely to have had a substantial impact on the study results.	2		
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	Medium	Some sampling details were omitted but this was unlikely to have impacted the study results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Details regarding this metric were limited; some of the data were inferred from figures.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Low	Rate constants and half-lives were calculated based on periods during the experiments when volatilization appears to be dominant.	3	1	3
Other	17. Verification or Plausibility of Results	Not rated	Due to limited information, evaluation of the reasonableness of the study results was not possible.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
High	Medium	Low	Sum of scores: Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	<u>23</u> 1.78	18OverallScore(Rounded):	<u>32</u> 1.8

$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$		Overall	Medium
				Quality	
				Level:	

Study Reference:	and persisten 611-617. http HERO ID: 3'	ce of volatile organi ://dx.doi.org/10.102 797829	•	seawater.	Environ Sci T	echnol 17:
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The source and purity of the test substance were not reported; however, the test substance was identified by analytical means.	1	1	1
Test Design	3. Study Controls	Medium	Sterile control used; however, use of a reference substance was not reported.	2	2	4
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Conditions	5. Test Method Suitability	Medium	Limited detail was reported on the test method.	2	1	2
	6. Testing Conditions	Medium	There were omissions in testing conditions; however, sufficient data were reported to determine that the omissions were not likely to have had a substantial impact on the study results.	2	2	4
	7. Testing Consistency	Medium	The control experiment was run on different dates, not correlating with other systems.	2	1	2
	8. System Type and Design	Medium	Details regarding the System Type and Design were limited; however, the omissions were not likely to have had a substantial impact on the study results.	2	1	2

Test	9. Test	Medium	The test organism,	2	2	4
Organisms	Organism Degradation	Medium	species, and inoculum source were reported, but were not routinely used for similar study types; however, the deviation was not likely to have had a substantial impact on the study results.	2		
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	Medium	Some sampling details were omitted but this was unlikely to have impacted the study results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Details regarding this metric were limited; some of the data were inferred from figures.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Low	Rate constants and half-lives were calculated based on periods during the experiments when volatilization appears to be dominant.	3	1	3
Other	17. Verification or Plausibility of Results	Not rated	Due to limited information, evaluation of the reasonableness of the study results was not possible.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
High	Medium	Low	Sum of scores: Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	23 1.78	18OverallScore(Rounded):	<u>32</u> 1.8

$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$		Overall	Medium
				Quality	
				Level:	

Study Reference:		yndal AFB, FL: A	degradation of C1 and ir Force Engineering &			carbons. (ESL-
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Low	The test substance source and purity were not reported.	3	1	3
Test Design	3. Study Controls	Medium	Limited detail was provided on control results.	2	2	4
	4. Test Substance Stability	Medium	The test substance stability, homogeneity, preparation and storage conditions were not reported; however, these factors were not likely to have influenced the test substance or were not likely to have had a substantial impact on the study results.	2	1	2
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

Test	9. Test	High	This metric met the	1	2	2
Organisms	Organism	Ingn	criteria for high	1	2	2
0	Degradation		confidence as			
			expected for this type			
			of study.			
	10. Test	Not rated	The metric is not	NR	NR	NR
	Organism		applicable to this			
Outeense	Partitioning 11. Outcome	II: al	study type. This metric met the	1	1	1
Outcome Assessment	Assessment	High	criteria for high	1	1	1
Assessment	Methodology		confidence as			
	Methodology		expected for this type			
			of study.			
	12. Sampling	Medium	Sampling details	2	1	2
	Methods		were not fully			
			reported; alternate			
			sampling of duplicate			
	12	TT' 1	tests run side by side.	4		1
Confounding/ Variable	13. Confounding	High	This metric met the	1	1	1
Variable	Confounding Variables		criteria for high confidence as			
Control	v arrables		expected for this type			
			of study.			
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	Unacceptable	Extraction efficiency,	4	2	8
Presentation	Reporting		percent recovery, and			
and Analysis			mass balance were			
			not reported. In			
			addition, analytical methods were not			
			reported and there			
			was an unaccounted-			
			for loss of test			
			material.			
	16. Statistical	Medium	Calculations	2	1	2
	Methods and		summarized and			
	Kinetic		experimental values			
Other	Calculations	Lett	were not reported.	3	1	3
Other	17. Verification	Low	Due to limited information,	3	1	3
	or		evaluation of the			
	Plausibility		reasonableness of the			
	of Results		study results was not			
			possible.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this			
			study type.			
TT' 1		<b>T</b>	Sum of scores:	26	20	35
High	Medium	Low	Overall Score =	1.75	Overall	4
			Sum of Weighted Scores/Sum of Metric		Score (Rounded):	
			Weighting Factors:		(Koundeu):	
			weighting ractors:			

$\geq 1$ and $< 1.7$	$\geq 1.7$ and	$\geq 2.3$ and $\leq 3$			Overall	Unacceptable <sup>1</sup>		
	<2.3				Quality			
					Level:			
<sup>1</sup> Extraction efficiency, percent recovery, and mass balance were not reported; analytical methods were not								
reported, and lo	reported, and loss of test material was not accounted for which limits the evaluation of the study. Consistent with							
our Application	n of Systematic	Review in TSCA R	isk Evaluations documer	nt, if a met	tric for a data s	source receives		
a score of Unac	ceptable (score	= 4), EPA will dete	ermine the study to be un	nacceptabl	e. In this case,	one of the		
metrics was rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely								
to increase tran	sparency.					_		

Study Reference:		thylene transformat : 228-235. 140406	(1991). Effects of toxici ion by a mixed methan			nviron
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	Medium	Variable degradation rates were observed and some test conditions across samples were not reported, but these discrepancies were not likely to have had a substantial impact on the study results.	2	1	2
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	High	Mixed methanotrophic culture.	1	2	2

	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	Medium	Some sampling details were omitted but this was unlikely to have impacted the study results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Low	Variation in transformation rates indicated that loss was affected by factors other than strictly biotic processes.	3	1	3
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17. Verification or Plausibility of Results	Low	Variation in transformation rates indicated that loss was affected by factors other than strictly biotic processes.	3	1	3
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	21	20	26
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.3	Overall Score (Rounded):	2.3
$\geq 1$ and $< 1.7$	≥1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Low <sup>1</sup>

Study Reference:	trichloroethau (OTS: OTS05 NA).	Dow Chem Co. (1977). The Inhibition of Anaerobic Sludge Gas Production By 1,1,1- trichloroethane, Methylene Chloride, Trichloroethylene and Perchloroethylene, Part 2. (OTS: OTS0517178; 8EHQ Num: NA; DCN: 86- 870002089; TSCATS RefID: 309930; CIS: NA). HERO ID: 4213887							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	Low	The source and purity of the test substance were not reported or verified by analytical means.	3	1	3			
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			

	10. Test Organism	Not rated	The metric is not applicable to this	NR	NR	NR
	Partitioning		study type.			
Outcome Assessment	11. Outcome Assessment Methodology	Unacceptable	Study describes inhibition of gas production not biodegradation.	4	1	4
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	Medium	The extraction recovery was 50%.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	21	20	26
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.3	Overall Score (Rounded):	2.3
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Low <sup>1</sup>

<sup>1</sup>The study's overall quality rating was downgraded. Rationale: Study describes inhibition of gas production not biodegradation rates or transformation pathways. 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 was rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

Study Reference:	Kao, CM; Prosser, J. (1999). Intrinsic bioremediation of trichloroethylene and chlorobenzene: field and laboratory studies. J Hazard Mater 69: 67-79. HERO ID: 660136								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	Medium	The test substance source and purity were not reported; however, the omissions or identified impurities were not likely to have had a substantial impact on the study results.	2	1	2			
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	4. Test Substance Stability	Medium	The test substance stability, preparation and storage conditions were not reported; however, these factors were not likely to have had a substantial impact on the study results.	2	1	2			
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	Medium	Some details limited; however, this did not limit the interpretation of the results.	2	2	4			
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	8. System Type and Design	Medium	Some details limited; however, this did not limit the interpretation of the results.	2	1	2			

Test	9. Test	High	This metric met the	1	2	2
Organisms	Organism Degradation		criteria for high confidence as expected for this type of study.			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Low	This study evaluated co-metabolism; the use of different substrates was likely to have had a substantial impact on results.	3	1	3
	12. Sampling Methods	Low	Information regarding this metric was not reported.	3	1	3
Confounding/ Variable Control	13. Confounding Variables	Medium	Limited information was presented regarding this metric; variability and uncertainty in the measurements between triplicate tests were not reported; an average of the tests was reported.	2	1	2
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Some information was not reported; however, these omissions were not likely to have had a substantial impact on the study results.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Some details were omitted; however, these omissions were not likely to have had a substantial impact on the study results.	2	1	2
Other	17. Verification or Plausibility of Results	Not rated	Due to limited information for this site-specific study, evaluation of the reasonableness of the study results was not possible.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR

			Sum of scores:	25	19	32
High	Medium	Low	Overall Score = Sum	1.68	Overall	1.7
			of Weighted Scores/Sum of Metric		Score (Rounded):	
			Weighting Factors:		(Rounded).	
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and $\leq$ 2.3	$\geq$ 2.3 and $\leq$ 3			Overall	Medium
					Quality	
					Level:	

Study Reference:		ne: field and laborate	insic bioremediation of ory studies. J Hazard M			
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	The test substance source and purity were not reported; however, the omissions or identified impurities were not likely to have had a substantial impact on the study results.	2	1	2
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	Medium	The test substance stability, preparation and storage conditions were not reported; however, these factors were not likely to have had a substantial impact on the study results.	2	1	2
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Medium	Some testing condition details were not reported; however, these factors were not likely to have had a substantial impact on the study results.	2	2	4

	7 Testing	Medium	Come test conditions	2	1	2
	7. Testing	Medium	Some test conditions	2	1	2
	Consistency		across samples or			
			study groups were not			
			reported, but these			
			discrepancies were			
			not likely to have had			
			a substantial impact			
			on the study results			
	8. System	High	Testing conditions	1	1	1
	Type and		were monitored,			
	Design		reported, and			
			appropriate for the			
			method.			
Test	9. Test	High	This metric met the	1	2	2
Organisms	Organism		criteria for high			
	Degradation		confidence as			
			expected for this type			
			of study.			
	10. Test	Not rated	The metric is not	NR	NR	NR
	Organism		applicable to this			
	Partitioning		study type.			
Outcome	11. Outcome	Low	This study evaluated	3	1	3
Assessment	Assessment		intrinsic	_		_
	Methodology		bioremediation; this			
	intenno dono gy		outcome assessment			
			not likely to be			
			relevant to			
			environmental			
			biodegradation.			
	12. Sampling	Low	Information regarding	3	1	3
	Methods	LOW	this metric was not	5	1	5
	Wiethous		reported.			
Confounding/	13.	Medium	Limited information	2	1	2
Variable	Confounding	Wiedium	was presented	2	1	2
Control	Variables		regarding this metric;			
Control	v arrables		variability and			
			uncertainty in the			
			measurements			
			between triplicate			
			tests were not			
			reported, however, an			
			average of the tests			
	14.0		was reported.			
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	Medium	Some information was	2	2	4
Presentation	Reporting		not reported;			
and Analysis			however, these			
			omissions were not			
			likely to have had a			
			substantial impact on			
			the study results.			

	16. Statistical Methods and Kinetic Calculations	Medium	Some details were omitted; however, these omissions were not likely to have had a substantial impact on the study results.	2	1	2
Other	17. Verification or Plausibility of Results	Not rated	Due to limited information for this site-specific study, evaluation of the reasonableness of the study results was not possible.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	25	19	32
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.68	Overall Score (Rounded):	1.7
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq 2.3$ and $\leq 3$			Overall Quality Level:	Medium

Study Reference:	Freitag, D; Ballhorn, L; Geyer, H; Korte, F. (1985). Environmental hazard profile of organic chemicals: an experimental method for the assessment of the behaviour of organic chemicals in the ecosphere by means of simple laboratory tests with 14C labelled chemicals. Chemosphere 14: 1589-1616. HERO ID: 85251								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	Unacceptable	No information was provided about the test substance other than a general statement that some test substances were bought, and some were synthesized in the lab.	4	2	8			
	2. Test Substance Purity	Unacceptable	No information was provided about the test substance other than a general statement that some test substances were bought, and some were synthesized in the lab.	4	1	4			
Test Design	3. Study Controls	Not rated	No information was provided.	NR	NR	NR			
	4. Test Substance Stability	Unacceptable	No information was provided about the test substance.	4	1	4			
Test Conditions	5. Test Method Suitability	Unacceptable	No details about the test method were provided.	4	1	4			
	6. Testing Conditions	Unacceptable	No information regarding the testing conditions were provided.	4	2	8			
	7. Testing Consistency	Unacceptable	Critical exposure details across samples were not reported and these omissions resulted in serious flaws that had a substantial impact on the overall confidence, consequently making the study unusable.	4	1	4			
	8. System Type and Design	Not rated	No information was provided.	NR	NR	NR			

9. Test	Low	The inoculum was	3	2	6
Organism		identified as adapted			
Degradation					
10. Test	Not rated	The metric is not	NR	NR	NR
Organism		applicable to this			
Partitioning		study type.			
11. Outcome	Not rated		NR	NR	NR
		provided.			
	Not rated		NR	NR	NR
	Nat wate d		ND	ND	ND
	Not rated	-	INK	INK	NR
		variables were noted.			
	Not rated	No information was	NR	NR	NR
Unrelated to					
Exposure		1			
15. Data	Low	A single data point,	3	2	6
Reporting		3.4% degradation,			
	Not rated		NR	NR	NR
		provided.			
	Notratad	Due to limited	ND	ND	NR
	Not rated		INK	INK	INK
		possible.			
18. QSAR	Not rated	The metric is not	NR	NR	NR
Models		applicable to this			
	•				44
Medium	Low		3.67		4
				(Koundeu):	
>1.7 and <2.3	>2.3 and <3	The second secon		Overall	Unacceptable
	and				Chacceptable
				Level:	
on was provided a	about the test subs	tance other that a statemer	nt saying		ances were
-			• •		
	Organism         Degradation         10. Test         Organism         Partitioning         11. Outcome         Assessment         Methodology         12. Sampling         Methods         13.         Confounding         Variables         14. Outcomes         Unrelated to         Exposure         15. Data         Reporting         16. Statistical         Methods and         Kinetic         Calculations         17.         Verification or         Plausibility of         Results         18. QSAR         Models	Organism DegradationNot rated10. Test Organism PartitioningNot rated11. Outcome Assessment MethodologyNot rated12. Sampling MethodsNot rated13.Not ratedConfounding VariablesNot rated14. Outcomes Unrelated to ExposureNot rated15. Data ReportingLow16. Statistical Methods and Kinetic CalculationsNot rated17. Verification or Plausibility of ResultsNot rated18. QSAR ModelsNot rated18. QSAR ModelsNot rated17. and <2.3	Organism Degradationidentified as adapted activated sludge. No further information regarding the source of the sludge was provided.10. Test Organism PartitioningNot ratedThe metric is not applicable to this study type.11. Outcome AssessmentNot ratedNo information was provided.12. Sampling MethodsNot ratedNo information was provided.13. Unrelated to ExposureNot ratedNo confounding variables were noted.14. Outcomes Unrelated to ExposureNot ratedNo information was provided.15. Data Methods and Kinetic CalculationsLowA single data point, 3.4% degradation, was provided.17. Not rated Not ratedNo information was provided.18. QSAR ModelsNot ratedDue to limited information, evaluation of the reasonableness of the study results was not possible.18. QSAR ModelsLowOverall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:≥1.7 and <2.3	Organism Degradationidentified as adapted activated sludge. No further information regarding the source of the sludge was provided.10. Test Organism PartitioningNot ratedThe metric is not applicable to this study type.11. Outcome Assessment MethodologyNot ratedNo information was provided.12. Sampling MethodsNot ratedNo information was provided.NR methodology13. Unrelated to ExposureNot ratedNo information was provided.NR methods14. Outcomes Unrelated to ExposureNot ratedNo information was provided.NR methods15. Data ReportingLow No trated Methods and Kinetic CalculationsNot rated No information was provided.NR methods17. Not rated Not rated Methods and Kinetic CalculationsNot rated No information was provided.NR methods17. Not rated Plausibility of ResultsNot rated mot ratedDue to limited information, evaluation of the reasonableness of the study results was not possible.NR applicable to this study type.18. QSAR ModelsNot rated LowThe metric is not applicable to this study type.NR applicable to this study type.18. QSAR ModelsLowOverall Scores: Sum of scores:30 30MediumLowOverall Score = Sum of Scores/Sum of Metric Weighting Factors:3.67 ao 3012. 1. and <2.3	Organism Degradationidentified as adapted activated sludge. No further information regarding the source of the sludge was provided.NR10. Test Organism PartitioningNot ratedThe metric is not applicable to this study type.NR11. Outcome Assessment MethodologyNot ratedNo information was provided.NR12. Sampling VariablesNot ratedNo information was provided.NR13. Confounding VariablesNot ratedNo information was provided.NR14. Outcomes Lunclated to ExposureNot ratedNo information was provided.NR15. Data ReportingLowA single data point, 3.4% degradation, was provided.3216. Statistical Kinetic CalculationsNot ratedNo information was provided.NRNR17. Verification or Plausibility of ResultsNot ratedDue to limited information, evaluation of the reasonableness of the study results was not possible.NRNR18. QSAR ModelsNot ratedThe metric is not applicable to this study type.3.67Overall Scores18. QSAR ModelsLowOverall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:3.67Overall Score (Rounded):

determine the study to be unacceptable. In this case, six of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

Study	Bouwer, EJ;	Rittmann, BE; McC	arty, PL. (1981). Anaero	bic degrae	lation of halog	genated 1-				
Reference:	and 2-carbon	and 2-carbon organic compounds. Environ Sci Technol 15: 596-599.								
	http://dx.doi.o HERO ID: 98	org/10.1021/es00087; 18	a012.							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score				
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2				
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1				
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2				
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1				
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1				
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2				
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1				
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1				
Test Organisms	9. Test Organism Degradation	Medium	Nonstandard organism from laboratory scale digester was used in this study.	2	2	4				
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR				
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1				
	12. Sampling Methods	Medium	Sampling frequency was reported but method was not documented.	2	1	2				

Confounding/	13.	High	This metric met the	1	1	1
Variable	Confounding		criteria for high			
Control	Variables		confidence as expected			
			for this type of study.			
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this study			
	Exposure		type.			
Data	15. Data	High	This metric met the	1	2	2
Presentation	Reporting		criteria for high			
and Analysis			confidence as expected			
			for this type of study.			
	16. Statistical	High	This metric met the	1	1	1
	Methods and		criteria for high			
	Kinetic		confidence as expected			
	Calculations		for this type of study.			
Other	17.	High	This metric met the	1	1	1
	Verification or		criteria for high			
	Plausibility of		confidence as expected			
	Results		for this type of study.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this study			
			type.			
			Sum of scores:	17	20	23
High	Medium	Low	<b>Overall Score = Sum</b>	1.15	Overall	1.2
			of Weighted		Score	
			Scores/Sum of Metric		(Rounded):	
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$			Overall	High
					Quality	
					Level:	

Study	Bouwer, EJ; Rittmann, BE; McCarty, PL. (1981). Anaerobic degradation of halogenated 1-								
Reference:	and 2-carbon organic compounds. Environ Sci Technol 15: 596-599. http://dx.doi.org/10.1021/es00087a012. HERO ID: 9818								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1			
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Organisms	9. Test Organism Degradation	Medium	Nonstandard organism from laboratory scale digester was used in this study.	2	2	4			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR			

Outcome	11. Outcome	High	This metric met the	1	1	1
Assessment	Assessment	-	criteria for high			
	Methodology		confidence as			
			expected for this type			
	10.0 1	N 1	of study.	2	1	2
	12. Sampling Methods	Medium	Sampling frequency	2	1	2
	Methods		was reported but method was not			
			documented.			
Confounding/	13.	High	This metric met the	1	1	1
Variable	Confounding	mgn	criteria for high	1	1	1
Control	Variables		confidence as			
0011101	,		expected for this type			
			of study.			
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	High	This metric met the	1	2	2
Presentation	Reporting		criteria for high			
and Analysis			confidence as			
			expected for this type			
			of study.			
	16. Statistical	High	This metric met the	1	1	1
	Methods and		criteria for high			
	Kinetic		confidence as			
	Calculations		expected for this type			
0.0	17	<b>.</b>	of study.		1	2
Other	17.	Low	Greater than 100%	3	1	3
	Verification or		remaining relative to the controls after 25			
	Plausibility of Results		weeks.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models	Not fateu	applicable to this	INIX	INK	INIX
	Models		study type.			
			Sum of scores:	19	20	25
High	Medium	Low	Overall Score = Sum	1.25	Overall	2.3
0			of Weighted		Score	
			Scores/Sum of Metric		(Rounded):	
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$			Overall	Low <sup>1</sup>
					Quality	
					Level:	
<sup>1</sup> The study's ov	verall quality ratir	ng was downgraded	d. Rationale: Greater than	100% of t	est substance wa	s
remaining relat	tive to the control	s after 25 weeks.				

Study Reference:		and sterilized water	. Degradability of some r. Water Res 9: 659-661		ed aliphatic hy	drocarbons
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	The test substance source and purity were not reported; however, the test substance was detected by analytical technique.	2	1	2
Test Design	3. Study Controls	Low	Appropriate negative control but no positive or toxicity controls reported in this study.	3	2	6
	4. Test Substance Stability	Low	The test substance stability, preparation, and storage conditions were not reported, and these factors were likely to have had an impact on the study results.	3	1	3
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Medium	Test conditions were reported with some details omitted.	2	2	4
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

	8. System Type and Design	Medium	The test system was reported for both open and closed systems each under light and dark condition with some details omitted; however, omissions were not likely to have had a substantial impact on the study results.	2	1	2
Test Organisms	9. Test Organism Degradation	Low	Inoculum source was not routinely used and was not validated for microbial action.	3	2	6
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Low	This study used a continuous-flow methanogenic fixed- film laboratory-scale column.	3	1	3
	12. Sampling Methods	Unacceptable	Serious uncertainties or limitations were identified in sampling methods of the outcome of interest (leaks in valves) and these were likely to have had a substantial impact on the results, resulting in serious flaws, which made the study unusable.	4	1	4
Confounding/ Variable Control	13. Confounding Variables	Low	Leaks were noted; loss in open systems attributed to possible volatilization; not controlled or quantified.	3	1	3
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Data Presentation and Analysis	15. Data Reporting	Low	There was insufficient evidence presented to confirm that parent compound disappearance was not likely due to some other process; this was noted by the authors and concluded that closed systems should be used to assess degradation.	3	2	6
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17. Verification or Plausibility of Results	Not rated	Due to limited information, evaluation of the reasonableness of the study results was not possible (i.e., reference substance not used; loss was not confined to one process).	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
High	Medium	Low	Sum of scores: Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	<u>32</u> 2.32	19 Overall Score (Rounded):	44 4
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$			Overall Quality Level:	Unacceptable <sup>1</sup>
loss from leaks serious flaws r	s in valves and op nake the study up	pen test systems w	ed in sampling methods o ere likely to have a substa t with our Application of	antial imp	act on the resul	ts. These

serious flaws make the study unusable. 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 was rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

Study Reference:	Tabak, HH; Quave, SA; Mashni, CI; Barth, EF. (1981). Biodegradability studies with organic priority pollutant compounds. J Water Pollut Control Fed 53: 1503-1518.HERO ID: 9861								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	Medium	The test substance source and purity were not reported.	2	1	2			
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR			

Outcome	11. Outcome	High	This metric met the	1	1	1
Assessment	Assessment Methodology		criteria for high confidence as expected for this type of study.			-
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Some quantitative details were omitted; however, overall results were clearly reported.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Some details were omitted; however, these omissions were not likely to have had a substantial impact on the study results.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
TT' 1		¥	Sum of scores:	18	20	24
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.2	Overall Score (Rounded):	1.2
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	<ul> <li>Wood, PR; Parsons, FZ; DeMarco, J; Harween, HJ; Lang, RF; Payan, IL; Ruiz, MC. (1981).</li> <li>Introductory study of the biodegradation of the chlorinated methane, ethane and ethene compounds. Paper presented at American Water Works Association Annual Conference and Exposition, June 7-11, 1981, St. Louis, MO.</li> <li>HERO ID: 9881</li> </ul>							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2		
	2. Test Substance Purity	Medium	The test substance source and purity were not reported; however, the test substance was detected by GC-MS analytical technique.	2	1	2		
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	4. Test Substance Stability	Not rated	Trichloroethylene was a transformation product from carbon tetrachloride in this study	NR	NR	NR		
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	6. Testing Conditions	Low	There were some omissions in the reporting of test conditions. pH, specific temperature and light control were not reported.	3	2	6		
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		

Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study	1	2	2
	10. Test Organism Partitioning	Not rated	of study. The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	Absorption was discussed.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Specific chemical concentrations were not reported.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Half-life calculation was not described.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	19	19	27
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.42	Overall Score (Rounded):	1.7
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Medium <sup>1</sup>

Study			os, GJ. (1975). Evapora			ies of			
Reference:	methylene chloride, chloroform, 1,1,1-trichloroethane, trichloroethylene, tetrachloroethylene, and other chlorinated compounds in dilute aqueous solutions. Environ								
					ueous solutio	ns. Environ			
	Sci Technol 9: 833-838. http://dx.doi.org/10.1021/es60107a008. HERO ID: 58054								
Domain	Metric	Qualitative	Comments	Metric	Metric	Weighted			
Domani	Methe	Determination	Comments	Score	Weighting	Score			
		[i.e., High,		BCOIC	Factor	beore			
		Medium, Low,			i actor				
		Unacceptable, or							
		Not rated]							
Test Substance	1. Test	High	The test substance	1	2	2			
	Substance	C C	was identified by						
	Identity		chemical name.						
	2. Test	Medium	Purity not reported;	2	1	2			
	Substance		however, MS analysis						
	Purity		performed at start of						
			study, m/z						
			corresponds to						
			trichloroethylene.						
Test Design	3. Study	Not rated	Not reported for the	NR	NR	NR			
	Controls		hydrolysis study.						
	4. Test	High	MS analysis	1	1	1			
	Substance	_	performed at start of						
	Stability		study.						
Test	5. Test	High	Methanol was used as	1	1	1			
Conditions	Method		a co-solvent.						
	Suitability								
	6. Testing	High	Water was purged	1	2	2			
	Conditions		with air 15 min prior						
			to initiation of study;						
			the authors appeared						
			to be assuming that						
			hydrolysis was						
			followed by						
			oxidation; thus, by						
			having an abundance						
			of oxygen, they						
			ensured that the rate-						
			determining step was hydrolysis.						
	7. Testing	High	This metric met the	1	1	1			
	Consistency	Ingn	criteria for high	1	1	1			
	Consistency		confidence as						
			expected for this type						
			of study.						
	8. System	High	This metric met the	1	1	1			
	Type and		criteria for high			· ·			
	Design		confidence as						
	8		expected for this type						
			of study.						
Test	9. Test	Not rated	The metric is not	NR	NR	NR			
Organisms	Organism		applicable to this						
-	Degradation		study type.						

	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome of interest and its basis were reported.	1	1	1
	12. Sampling Methods	Medium	Sampling methods were omitted. Sampling timing was suitable.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Medium	Dichloroacetic acid and hydrogen chloride were assumed to be the degradation products; however, they were never determined experimentally.	2	1	2
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Transformation products not identified.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Statistical methods or kinetic calculations were not reported.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
TT' 1		•	Sum of scores:	18	16	22
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.38	Overall Score (Rounded):	1.4
$\geq 1$ and $< 1.7$	≥1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study	Jeffers, PM; V	Vard, LM; Woytov	vitch, LM; Wolfe, NL. (	1989). Ho	mogeneous Hy	drolysis			
Reference:	Rate Constants for Selected Chlorinated Methanes Ethanes Ethenes and Propanes.								
	Environ Sci T HERO ID: 66		http://dx.doi.org/10.10	)21/es0006	6a006.				
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name and CASRN.	1	2	2			
	2. Test Substance Purity	Medium	The source and purity of the test substance were stated in a general manner relating to all materials in the study.	2	1	2			
Test Design	3. Study Controls	Medium	Study controls were not included but this did not limit the interpretation of the results.	2	2	4			
	4. Test Substance Stability	Medium	Details regarding this metric were limited but this did not limit the interpretation of the results.	2	1	2			
Test Conditions	5. Test Method Suitability	High	The method was suitable for the substance; test substance concentration was no higher than 10% of its water solubility limit.	1	1	1			
	6. Testing Conditions	Medium	Details regarding this metric were general but this did not limit the interpretation of the results.	2	2	4			
	7. Testing Consistency	Medium	Details regarding this metric were general but this did not limit the interpretation of the results.	2	1	2			
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR			

	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	Medium	Details regarding this metric were not reported but this did not limit the interpretation of the results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	Details regarding the analytical procedure were very general; this may limit meaningful/precise interpretation of the results.	3	2	6
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
High	Medium	Low	Sum of scores: Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	22 1.67	18 Overall Score (Rounded):	<u>30</u> 1.7
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Medium

Study Reference:	Rodriguez, C; Linge, K; Blair, P; Busetti, F; Devine, B; Van Buynder, P; Weinstein, P; Cook, A. (2012). Recycled water: potential health risks from volatile organic compounds and use of 1,4-dichlorobenzene as treatment performance indicator. Water Res 46: 93-106. http://dx.doi.org/10.1016/j.watres.2011.10.032. HERO ID: 1008978							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name and CASRN.	1	2	2		
	2. Test Substance Purity	High	The test substance was identified by analytical means.	1	1	1		
Test Design3. St Cont4. Te Subs	3. Study Controls	Medium	Not applicable to the field/monitoring studies. Source and purity of analytical standard were not reported.	2	2	4		
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR		
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR		

Outcome Assessment	11. Outcome Assessment Methodology	Medium	WWTP monitoring study; could be considered site- specific data.	2	1	2
	12. Sampling Methods	Medium	Minor limitations were identified in sampling methods; however, the limitations were not likely to have had a substantial impact on results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Some target chemical concentrations were reported only in a figure; however, these omissions were not likely to have had a substantial impact on the study results.	2	2	4
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
High	Medium	Low	Sum of scores: Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	<u>17</u> 1.35	17 Overall Score (Rounded):	<u>23</u> 1.4
$\geq 1$ and $< 1.7$	≥1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:						
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	The test substance was identified by analytical means.	2	1	2
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome	11. Outcome	Low	Study investigated	3	1	3
Assessment	Assessment		volatilization from			
	Methodology		shower water; this is			
			an uncommon study			
			type for a fate			
		*** 1	endpoint.			
	12. Sampling	High	This metric met the	1	1	1
	Methods		criteria for high			
			confidence as			
			expected for this			
Confounding/	13.	High	type of study. Sources of variability	1	1	1
Variable	Confounding	Ingn	were addressed in	1	1	1
Control	Variables		the study.			
Control	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to	Not fated	applicable to this	INK	INIX	INIX
	Exposure		study type.			
Data	15. Data	Medium	Data were mainly	2	2	4
Presentation	Reporting	meanann	reported in figures.	-	2	·
and Analysis	16. Statistical	High	This metric met the	1	1	1
	Methods and	8	criteria for high	-	_	-
	Kinetic		confidence as			
	Calculations		expected for this			
			type of study.			
Other	17.	High	This metric met the	1	1	1
	Verification or	-	criteria for high			
	Plausibility of		confidence as			
	Results		expected for this			
			type of study.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this			
			study type.			
			Sum of scores:	18	18	23
High	Medium	Low	Overall Score =	1.28	Overall	2.3
			Sum of Weighted		Score	
			Scores/Sum of		(Rounded):	
			Metric Weighting			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and	$\geq 2.3 \text{ and } \leq 3$	Factors:		Overall	Low <sup>1</sup>
$\geq 1$ and $\leq 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$				LOW
	<2.5				Quality Level:	
This studeds as	orall quality ratin	a was downgradad	Rationale: Study investiga	ted volat		ower

Study		reed, VH; Peters, LJ; H				om water.			
Reference:	Environ Int 3: 231-236. http://dx.doi.org/10.1016/0160-4120(80)90123-3. HERO ID: 18077								
Domain	HERO ID: 18 Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	Low	Source and purity were not reported.	3	1	3			
Test Design	3. Study Controls	Low	Study controls not reported.	3	2	6			
	4. Test Substance Stability	Medium	Test substance stability was not discussed.	2	1	2			
Test 2 Conditions 2	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	7. Testing Consistency	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Confounding/ Variable	13. Confounding	High	This metric met the criteria for high	1	1	1			

Control	Variables		confidence as expected for this type of study.			
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data15.Presentation and AnalysisRep16. Met Kin	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
High	Medium	Low	Sum of scores:Overall Score =Sum of WeightedScores/Sum ofMetric WeightingFactors:	<u>18</u> 1.41	17 Overall Score (Rounded):	23 1.4
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	Dilling, WL. (1977). Interphase transfer processes. II. Evaporation rates of chloro methanes, ethanes, ethylenes, propanes, and propylenes from dilute aqueous solutions. Comparisons with theoretical predictions. Environ Sci Technol 11: 405-409. http://dx.doi.org/10.1021/es60127a009. HERO ID: 18370							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2		
	2. Test Substance Purity	Low	There were possible mixture concerns since two to five compounds were run together.	3	1	3		
Test Design	3. Study Controls	Medium	A series of compounds were run, but no mention of controls.	2	2	4		
	4. Test Substance Stability	Medium	Not discussed but were not likely to have influenced the test results.	2	1	2		
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2		
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR		
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR		

Outcome	11. Outcome	High	This metric met the	1	1	1
Assessment	Assessment		criteria for high			
	Methodology		confidence as			
			expected for this			
	12 Compliant	I	type of study.	3	1	3
	12. Sampling Methods	Low	Sampling was not described and may	3	1	3
	Methods		have influenced the			
			test results.			
Confounding/	13.	Low	Sources of variability	3	1	3
Variable	Confounding	Low	and uncertainty in	5	1	5
Control	Variables		the measurements			
control	v unuores		and statistical			
			techniques and			
			between study			
			groups were not			
			considered or			
			accounted for in data			
			evaluation.			
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	High	This metric met the	1	2	2
Presentation	Reporting		criteria for high			
and Analysis			confidence as			
			expected for this			
			type of study.			
	16. Statistical	Medium	Statistics were not	2	1	2
	Methods and		conducted/reported			
	Kinetic		for the experimental			
	Calculations		study.			
Other	17.	High	This metric met the	1	1	1
	Verification or		criteria for high			
	Plausibility of		confidence as			
	Results		expected for this			
	19.0040	Not rated	type of study. The metric is not	NR	NR	NR
	18. QSAR Models	Not rated		INK	INK	NK
	widdels		applicable to this study type.			
			Sum of scores:	23	18	28
High	Medium	Low	Overall Score =	1.56	Overall	1.6
mgn	meanin	Low	Sum of Weighted	1.50	Score	1.0
			Scores/Sum of		(Rounded):	
			Metric Weighting		().	
			Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and	$\geq 2.3$ and $\leq 3$			Overall	High
	<2.3				Quality	0
					Level:	

Study Reference:	Dunovant, VS; Clark, CS; Que Hee, SS; Hertzberg, VS; Trapp, JH. (1986). Volatile Organics in the Wastewater and Airspaces of Three Wastewater Treatment Plants (pp. 886-895). (NIOSH/00165921). Dunovant, VS; Clark, CS; Que Hee, SS; Hertzberg, VS; Trapp, JH. HERO ID: 1993670						
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score	
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2	
	2. Test Substance Purity	High	The test substance was identified by analytical means.	1	1	1	
Test Design	3. Study Controls	High	Control was used to determine detection limit	1	2	2	
	4. Test Substance Stability	Not rated	This is a field type study were stability was not considered.	NR	NR	NR	
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1	
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2	
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1	
	8. System Type and Design	Medium	Equilibrium was not established or reported. This was an open system.	2	1	2	
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR	
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR	
Outcome Assessment	11. Outcome Assessment Methodology	Low	Study may have reported site- specific results.	3	1	3	
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1	

Confounding/	13.	Low	The WWTP water is	3	1	3
Variable	Confounding		a mixture and may			
Control	Variables		have impacted			
			volatility of the test			
			substance. Other			
			variables may have			
			possibly influenced			
			volatility besides			
			those reported.			
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	High	This metric met the	1	2	2
Presentation	Reporting	-	criteria for high			
and Analysis			confidence as			
-			expected for this			
			type of study.			
	16. Statistical	High	This metric met the	1	1	1
	Methods and	-	criteria for high			
	Kinetic		confidence as			
	Calculations		expected for this			
			type of study.			
Other	17.	High	This metric met the	1	1	1
	Verification or		criteria for high			
	Plausibility of		confidence as			
	Results		expected for this			
			type of study.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this			
			study type.			
			Sum of scores:	18	17	22
High	Medium	Low	Overall Score =	1.29	Overall	2.3
			Sum of Weighted		Score	
			Scores/Sum of		(Rounded):	
			Metric Weighting			
			Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and	$\geq 2.3$ and $\leq 3$			Overall	Low <sup>1</sup>
	<2.3				Quality	
					Level:	
<sup>1</sup> The study's ov	erall quality rating	g was downgraded.	Rationale: The volatility i	s reported	for 3 sites in o	pen
systems.			2			

Study Reference:	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. Environ Pollut 177: 28-37. http://dx.doi.org/10.1016/j.envpol.2013.02.008. HERO ID: 2128010							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2		
	2. Test Substance Purity	High	The test substance was identified by analytical means.	1	1	1		
Test Design	3. Study Controls	Not rated	The metric is not applicable to this study type.	NR	NR	NR		
	4. Test Substance Stability	Not rated	The metric is not applicable to this study type.	NR	NR	NR		
Test Conditions	5. Test Method Suitability	Low	Many possible variables impacted the study results in this field study.	3	1	3		
	6. Testing Conditions	Not rated	The metric is not applicable to this study type.	NR	NR	NR		
	7. Testing Consistency	Not rated	The metric is not applicable to this study type.	NR	NR	NR		
	8. System Type and Design	Not rated	The metric is not applicable to this study type.	NR	NR	NR		
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR		
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR		
Outcome Assessment	11. Outcome Assessment Methodology	Low	Flux from a field study was not specifically a fate outcome of interest.	3	1	3		
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		

	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	Medium	Some data were	2	2	4
Presentation	Reporting		reported only in			
and Analysis			figures.			
	16. Statistical	High	This metric met the	1	1	1
	Methods and		criteria for high			
	Kinetic		confidence as			
	Calculations		expected for this			
			type of study.			
Other	17. Verification or	High	This metric met the criteria for high	1	1	1
	Plausibility of		confidence as			
	Results		expected for this			
	Results		type of study.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models	Not fateu	applicable to this	INK	INK	INK
	widdels		study type.			
			Sum of scores:	14	11	17
High	Medium	Low	Overall Score =	1.55	Overall	1.6
Ingn	Wiedium	LOW	Sum of Weighted	1.55	Score	1.0
			Scores/Sum of		(Rounded):	
			Metric Weighting		(Rounded).	
			Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and	>2.3 and <3	1 400151		Overall	High
_1	<2.3				Quality	Bii
					Level:	

Study	U.S. EPA (U.	S. Environmental Pro	tection Agency). (201	2). Estimat	ion Programs	Interface			
<b>Reference:</b>	Suite <sup>™</sup> for Microsoft <sup>®</sup> Windows, v 4.11 [Computer Program]. Washington, DC. Retrieved from https://www.epa.gov/tsca-screening-tools/epi-suitetm-estimation-program- interface.								
			ening-tools/epi-suitet	m-estimation	on-program-	interface.			
<b>D</b> '	HERO ID: 23		<u> </u>	M	<b>.</b>	*** • 1 4 1			
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test	1. Test	High	The test substance	1	2	2			
Substance	Substance	8	was identified by	-	-	-			
	Identity		chemical name.						
	2. Test	Not rated	The metric is not	NR	NR	NR			
	Substance		applicable to this						
	Purity		study type (SAR).						
Test Design	3. Study	Not rated	The metric is not	NR	NR	NR			
_	Controls		applicable to this						
			study type (SAR).						
	4. Test	Not rated	The metric is not	NR	NR	NR			
	Substance		applicable to this						
	Stability		study type (SAR).						
Test	5. Test	Not rated	The metric is not	NR	NR	NR			
Conditions	Method		applicable to this						
	Suitability		study type (SAR).						
	6. Testing	Not rated	The metric is not	NR	NR	NR			
	Conditions		applicable to this						
			study type (SAR).						
	7. Testing	Not rated	The metric is not	NR	NR	NR			
	Consistency		applicable to this						
			study type (SAR).						
	8. System	Not rated	The metric is not	NR	NR	NR			
	Type and		applicable to this						
	Design		study type (SAR).						
Test	9. Test	Not rated	The metric is not	NR	NR	NR			
Organisms	Organism		applicable to this						
	Degradation		study type.	ND	NID	ND			
	10. Test	Not rated	The metric is not	NR	NR	NR			
	Organism Doutition in a		applicable to this						
0	Partitioning 11. Outcome	Not noted	study type.	ND	ND	ND			
Outcome Assessment	Assessment	Not rated	The metric is not applicable to this	NR	NR	NR			
A395391115111	Methodology		study type (SAR).						
	12. Sampling	Not rated	The metric is not	NR	NR	NR			
	Methods	Not fated	applicable to this	INK					
	memous		study type (SAR).						
Confounding/	13.	Not rated	The metric is not	NR	NR	NR			
Variable	Confounding	1.0014000	applicable to this						
Control	Variables		study type (SAR).						
	14. Outcomes	Not rated	The metric is not	NR	NR	NR			
	Unrelated to	- 100 1000	applicable to this						
	Exposure		study type.						
Data	15. Data	Not rated	The metric is not	NR	NR	NR			
Presentation	Reporting		applicable to this						
and Analysis			study type (SAR).						

	16. Statistical Methods and Kinetic Calculations	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR
Other	17. Verification or Plausibility of Results	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR
	18. QSAR Models	High	The models in EPI Suite <sup>TM</sup> have defined endpoints. Chemical Domain and performance statistics for each model are known, and unambiguous algorithms are available in the EPI Suite <sup>TM</sup> documentation and/or cited references to establish their scientific validity. Many EPI Suite <sup>TM</sup> models have correlation coefficients >0.7, cross-validated correlation coefficients >0.5, and standard error values <0.3; however, correlation coefficients (r2, q2) for the regressions of some environmental fate models (i.e. BIOWIN) are lower, as expected, compared to regressions which have specific experimental values such as water solubility or log Kow (octanol-water partition coefficient).	1		1
TT' 1		<b>T</b>	Sum of scores:	2	3	1
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1	Overall Score (Rounded):	1

$\geq 1$ and $< 1.7$	$\geq 1.7$ and	$\geq$ 2.3 and $\leq$ 3	Overall	High
	<2.3		Quality	_
			Level:	

Study			odeling of air stripping			compounds
Reference:	in biological ( HERO ID: 25		nt J Environ Sci Tech 5	5: 353-360	•	
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Test Design	3. Study Controls	Medium	Study control not reported but not likely to have had a substantial impact on the study results.	2	2	4
	4. Test Substance Stability	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Test Conditions	5. Test Method Suitability	High	The test method measured influent, effluent and VOCs.	1	1	1
	6. Testing Conditions	Low	Some test conditions were reported but not all (i.e. unnamed facilities).	3	2	6
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	Medium	Retention time and temperature were not reported.	2	1	2
Test Organisms	9. Test Organism Degradation	Low	Not clear of test organism source (domestic or industrial sewage).	3	2	6
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Low	May have given site- /WWTP-specific results.	3	1	3
	12. Sampling Methods	Low	Sample timing was not well described.	3	1	3
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes	Not rated	The metric is not	NR	NR	NR

	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	Low	Sampling results	3	2	6
Presentation	Reporting		were not clearly			
and Analysis			reported.			
	16. Statistical	High	This metric met the	1	1	1
	Methods and		criteria for high			
	Kinetic		confidence as			
	Calculations		expected for this			
			type of study.			
Other	17.	High	This metric met the	1	1	1
	Verification or		criteria for high			
	Plausibility of		confidence as			
	Results		expected for this			
			type of study.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this			
			study type.			
			Sum of scores:	25	18	38
High	Medium	Low	Overall Score =	2.06	Overall	2.3
			Sum of Weighted		Score	
			Scores/Sum of		(Rounded):	
			Metric Weighting			
			Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and	$\geq 2.3$ and $\leq 3$			Overall	$Low^1$
	<2.3				Quality	
					Level:	
<sup>1</sup> The study's ov experimental de		ng was downgraded. R	ationale: Modeling stud	y that did 1	not report the r	elated

Study Reference:	organic com	Chen, WH; Yang, WB; Yuan, CS; Yang, JC; Zhao, QL. (2014). Fates of chlorinated volatile organic compounds in aerobic biological treatment processes: the effects of aeration and sludge addition. Chemosphere 103: 92-98.								
	http://dx.doi.org/10.1016/j.chemosphere.2013.11.039. HERO ID: 2799543									
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score				
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2				
	2. Test Substance Purity	High	The test substance was identified by analytical means.	1	1	1				
Test Design	3. Study Controls	Medium	Analytical blanks were included; biodegradation controls were not included. Source and purity of analytical standard were not included.	2	2	4				
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1				
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1				
	6. Testing Conditions	Medium	Some details were omitted; however, sufficient data were reported to determine that the omissions were not likely to have had a substantial impact on the study results.	2	2	4				
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1				
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1				

Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this	1	2	2
	10. Test Organism Partitioning	Not rated	type of study. The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Medium	There was incomplete reporting of measured concentrations in the media analyzed.	2	1	2
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	None identified.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Concentrations of the target chemical were not reported.	2	2	4
-	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17. Verification or Plausibility of Results	Medium	There was incomplete reporting of measured concentrations in the media analyzed; mass distributions were reported, no serious study deficiencies were identified, and the value was plausible.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	20	20	28
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.4	Overall Score (Rounded):	1.4
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and $<$ 2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study			JP; Melcer, H. (1993).			c compounds
<b>Reference:</b>	in municipal HERO ID: 2		ts. Water Environ Res	s 65: 58-6	5.	
Domain	Metric Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance was identified by analytical means.	1	1	1
Test Design	3. Study Controls	Medium	Chemical name(s) of external control(s) not reported.	2	2	4
	4. Test Substance Stability	Not rated	This is a field type study where stability was not considered.	NR	NR	NR
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Unacceptable	Testing conditions were not well reported (pH, temperature, sludge concentrations).	4	2	8
	7. Testing Consistency	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	8. System Type and Design	Medium	Likely an open system where test material could have been lost.	2	1	2
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Unacceptable	The extent of air stripping is a function of the compound physical- chemical properties and a function of WWTP design and operation.	4	1	4

	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	Medium	This metric met the criteria for high confidence as expected for this type of study.	2	1	2
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Some information was not reported; however, these omissions were not likely to have had a substantial impact on the study results.	2	2	4
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	Not rated	Due to limited information, evaluation of the reasonableness of the study results was not possible.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
High	Medium	Low	Sum of scores: Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	22 1.88	17 Overall Score (Rounded):	<u>27</u> 4
$\geq 1$ and $< 1.7$	≥1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Unacceptable <sup>1</sup>
physical-chemi Systematic Rev	ical properties a view in TSCA R	nd a function of WWT tisk Evaluations docur	extent of air stripping i TP design and operation nent, if a metric for a da ady to be unacceptable.	. Consiste ata source	nt with our A receives a sco	pplication of ore 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.

Study Reference:	factors on tri	n, M; Cai, Y; Jayachar chloroethylene evapor o://dx.doi.org/10.1007/s 543365	ation from surface wa			
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome	11. Outcome	High	This metric met the	1	1	1
Assessment	Assessment Methodology		criteria for high confidence as expected for this type of study.			
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	14	18	18
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1	Overall Score (Rounded):	1
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and $<$ 2.3	$\geq 2.3$ and $\leq 3$			Overall Quality Level:	High

Study Reference:	in constructe		nt wetlands. Environ S		1 38: 2209-221	16.
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance was identified by analytical means.	1	1	1
Test Design	3. Study Controls	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	4. Test Substance Stability	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	7. Testing Consistency	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	Medium	The test organisms were reported but were not routinely used.	2	2	4
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This is primarily a modeling study based on field samples.	1	1	1
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

Confounding/	13.	High	This metric met the	1	1	1
Variable	Confounding	-	criteria for high			
Control	Variables		confidence as			
			expected for this			
			type of study.			
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	High	This metric met the	1	2	2
Presentation	Reporting		criteria for high			
and Analysis			confidence as			
			expected for this			
			type of study.			
	16. Statistical	High	This metric met the	1	1	1
	Methods and		criteria for high			
	Kinetic		confidence as			
	Calculations		expected for this			
			type of study.			
Other	17.	Medium	The study results	2	1	2
	Verification or		were reasonable.			
	Plausibility of					
	Results					
	18. QSAR	High	This metric met the	1	1	1
	Models		criteria for high			
			confidence as			
			expected for this			
			type of study.			
			Sum of scores:	14	15	18
High	Medium	Low	Overall Score =	1.2	Overall	1.2
			Sum of Weighted		Score	
			Scores/Sum of		(Rounded):	
			Metric Weighting			
			Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and	$\geq 2.3$ and $\leq 3$			Overall	High
	<2.3				Quality	
					Level:	

Study Reference:	Brüggemann, R; Trapp, S. (1988). Release and fate modelling of highly volatile solvents in the river Main. 17: 2029-2041. HERO ID: 3629597								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The chemical of interest was identified by name.	1	2	2			
	2. Test Substance Purity	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Test Design	3. Study Controls	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	4. Test Substance Stability	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Test Conditions	5. Test Method Suitability	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	6. Testing Conditions	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	7. Testing Consistency	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	8. System Type and Design	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Outcome Assessment	11. Outcome Assessment Methodology	Not rated	The metric is not applicable to this study type.	NR	NR	NR			

	12. Sampling Methods	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Confounding/ Variable Control	13. Confounding Variables	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Unacceptable	Only estimated data were reported; no analytical method nor measured data for detection of the test substance was reported.	4	2	8
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17. Verification or Plausibility of Results	Unacceptable	Unable to evaluate and verify results based on the data reported.	4	1	4
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
High	Medium	Low	Sum of scores: Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	<u>10</u> 2.5	6 Overall Score (Rounded):	<u>15</u> 4
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and $<$ 2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Unacceptable

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.

Study Reference:	Culver, TB; Shoemaker, CA; Lion, LW. (1991). Impact of vapor sorption on the subsurface transport of volatile organic compounds: A numerical model and analysis. Water Resour Res 27: 2259-2270. http://dx.doi.org/10.1029/91WR00223.								
Domain	HERO ID: 38 Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable,	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	or Not rated] High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Test Design	3. Study Controls	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	4. Test Substance Stability	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	7. Testing Consistency	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			

Confounding/	13.	Not rated	No confounding	NR	NR	NR
Variable	Confounding		variables were noted.			
Control	Variables					
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	High	This metric met the	1	2	2
Presentation	Reporting		criteria for high			
and Analysis			confidence as			
			expected for this			
			type of study.			
	16. Statistical	High	This metric met the	1	1	1
	Methods and	c	criteria for high			
	Kinetic		confidence as			
	Calculations		expected for this			
			type of study.			
Other	17.	High	This metric met the	1	1	1
	Verification or	C	criteria for high			
	Plausibility of		confidence as			
	Results		expected for this			
			type of study.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this			
			study type.			
			Sum of scores:	9	12	12
High	Medium	Low	Overall Score =	1	Overall	1
-			Sum of Weighted		Score	
			Scores/Sum of		(Rounded):	
			Metric Weighting			
			Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and	$\geq 2.3$ and $\leq 3$			Overall	High
	<2.3				Quality	-
					Level:	

Study Reference:	Matienzo, LV. (1989). Staff report on development of treatment standards for non-RCRA solvent waste. Sacramento, CA: Toxic Substances Control Program.								
	http://infohouse.p2ric.org/ref/17/16884.pdf. HERO ID: 3982116								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	Low	The test substance source and purity were not reported or verified by analytical means.	3	1	3			
Test Design	3. Study Controls	Not rated	Study controls were not reported in this study.	NR	NR	NR			
	4. Test Substance Stability	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Test Conditions	5. Test Method Suitability	Unacceptable	Details regarding the treatment process test method were not reported in this study.	4	1	4			
	6. Testing Conditions	Unacceptable	Testing conditions were not reported in this study.	4	2	8			
	7. Testing Consistency	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	8. System Type and Design	Unacceptable	System Type and Design details were not reported in this study.	4	1	4			
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Outcome Assessment	11. Outcome Assessment Methodology	Unacceptable	Study details were not reported to evaluate methodology.	4	1	4			
	12. Sampling Methods	Unacceptable	Sampling details were not reported in this study.	4	1	4			
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR			

	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Unacceptable	Study and data details were not reported in this study.	4	2	8
	16. Statistical Methods and Kinetic Calculations	High	The metric is not applicable to this study type.	1	1	1
Other	17. Verification or Plausibility of Results	Unacceptable	Due to limited information, evaluation of the reasonableness of the study results was not possible.	4	1	4
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
High	Medium	Low	Sum of scores: Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	<u>33</u> 3.23	13 Overall Score (Rounded):	42 4
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Unacceptable <sup>1</sup>
our Application a score of Unac metrics were ra to increase tran document, if a to be unaccepta	n of Systematic cceptable (score tted as unaccept sparency. Cons metric for a dat able. In this case	Review in TSCA Risk $x = 4$ ), EPA will determ able. As such, the studistent with our Applicate a source receives a sco	ableness of the study re Evaluations document nine the study to be una ly is considered unaccep ation of Systematic Rev ore of Unacceptable (sco were rated as unacceptable	, if a metric cceptable. ptable and iew in TS pre = 4), E	ic for a data se In this case, the score is p CA Risk Eva PA will deter	ource receives five of the oresented solely luations mine the study

Study Reference:	Matienzo, LV. (1989). Staff report on development of treatment standards for non-RCRA solvent waste. Sacramento, CA: Toxic Substances Control Program.								
	http://infohouse.p2ric.org/ref/17/16884.pdf. HERO ID: 3982116								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	Low	The test substance source and purity were not reported or verified by analytical means.	3	1	3			
Test Design	3. Study Controls	Not rated	Study controls were not reported in this study.	NR	NR	NR			
	4. Test Substance Stability	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Test Conditions	5. Test Method Suitability	Unacceptable	Details regarding the treatment process test method were not reported in this study.	4	1	4			
	6. Testing Conditions	Unacceptable	Testing conditions were not reported in this study.	4	2	8			
	7. Testing Consistency	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	8. System Type and Design	Unacceptable	System Type and Design details were not reported in this study.	4	1	4			
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Outcome Assessment	11. Outcome Assessment Methodology	Unacceptable	Study details were not reported to evaluate methodology.	4	1	4			
	12. Sampling Methods	Unacceptable	Sampling details were not reported in this study.	4	1	4			
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR			

	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Unacceptable	Study and data details were not reported in this study.	4	2	8
	16. Statistical Methods and Kinetic Calculations	High	The metric is not applicable to this study type.	1	1	1
Other	17. Verification or Plausibility of Results	Unacceptable	Due to limited information, evaluation of the reasonableness of the study results was not possible.	4	1	4
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	33	13	42
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	3.23	Overall Score (Rounded):	4
$\geq 1$ and $< 1.7$	≥1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Unacceptable <sup>1</sup>
our Application a score of Unac	n of Systematic ecceptable (score ited as unaccept	Review in TSCA Risk = 4), EPA will determ	ableness of the study re c Evaluations document nine the study to be una ly is considered unaccep	, if a metr cceptable.	ic for a data set. In this case,	ource receives seven of the

Study Reference:	Blaney, BL. (1989). Applicability of steam stripping to organics removal from wastewater streams. (EPA/600/9-89/072). Cincinnati, OH: Blaney, BL. http://infohouse.p2ric.org/ref/23/22522.pdf. HERO ID: 3986884								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	High	The test substance was identified by analytical means.	1	1	1			
Test Design	3. Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have had a substantial impact on the study results.	2	2	4			
	4. Test Substance Stability	Not rated	This is a field type study were stability was not considered.	NR	NR	NR			
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	Low	There were reported deviations or omissions in testing conditions, and these were likely to have had a substantial impact on the results (temperature).	3	2	6			
	7. Testing Consistency	Medium	There were omissions in the reporting across study groups, but these not likely to have had a substantial impact on the study results.	2	1	2			
	8. System Type and Design	Medium	The system designs were not described well but the omission was not likely to have had a substantial impact on the study results.	2	1	2			

Test	9. Test	Not rated	The metric is not	NR	NR	NR
Organisms	Organism		applicable to this			
	Degradation		study type.			
	10. Test	Not rated	The metric is not	NR	NR	NR
	Organism		applicable to this			
	Partitioning		study type.			
Outcome	11. Outcome	High	This metric met the	1	1	1
Assessment	Assessment		criteria for high			
	Methodology		confidence as			
			expected for this			
	10.0 1	т	type of study.	2	1	2
	12. Sampling Methods	Low	Details regarding	3	1	3
	Methods		sampling methods of the outcome(s) were			
			not fully reported,			
			and the omissions			
			were likely to have			
			had a substantial			
			impact on the study			
			results.			
Confounding/	13.	Low	Sources of variability	3	1	3
Variable	Confounding		and uncertainty in	-		_
Control	Variables		the measurements			
			and statistical			
			techniques and			
			between study			
			groups (if applicable)			
			were not considered			
			or accounted for in			
			data evaluation			
			resulting in some			
	14. Outcomes	Not rated	uncertainty. The metric is not	NR	NR	NR
	Unrelated to	Not faleu	applicable to this	INK	INK	INK
	Exposure		study type.			
Data	15. Data	Low	There was	3	2	6
Presentation	Reporting		insufficient evidence	5	-	0
and Analysis			presented to confirm			
·			that parent			
			compound			
			disappearance was			
			not likely to have			
			been due to some			
			other process.			
			Analytical details			
			were not well			
	16 Statistical	M - 1:	reported.	2	1	1
	16. Statistical Methods and	Medium	Statistical analysis or kinetic calculations	2	1	2
	Kinetic		were not conducted			
	Calculations		or were not			
	Calculations		described clearly.			
	1		ucscriben creatly.			

Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	25	17	34
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	2	Overall Score (Rounded):	2
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and $<$ 2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Medium

Study Reference:	Smith, JH; Bomberger, DC, Jr; Haynes, DL. (1980). Prediction of the volatilization rates of high-volatility chemicals from natural water bodies. Environ Sci Technol 14: 1332-1337. http://dx.doi.org/10.1021/es60171a004. HERO ID: 58132								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	Medium	Source and purity were not reported; but were not likely to have impacted the study results.	2	1	2			
_	3. Study Controls	Medium	Standard results were not reported but were not likely to have impacted the study results.	2	2	4			
	4. Test Substance Stability	Medium	Not discussed, but not likely to have impacted the study results.	2	1	2			
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	7. Testing Consistency	Medium	There were minor inconsistencies in test conditions across samples or study groups, but these discrepancies were not likely to have had a substantial impact on the study results.	2	1	2			
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR			

	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	Medium	Not well reported; but not likely to have impacted the study results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Medium	Not well reported, but not likely to have impacted the study results.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	20	18	25
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.39	Overall Score (Rounded):	1.4
$\geq 1$ and $< 1.7$	≥1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	Bell, J; Melcer, H; Monteith, H; Osinga, I; Steel, P. (1993). Stripping of volatile organic compounds at full-scale municipal wastewater treatment plants. Water Environ Res 65:								
	708-716. http://dx.doi.org/10.2175/WER.65.6.2. HERO ID: 658661								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	High	The test substance was identified by analytical means.	1	1	1			
Test Design	3. Study Controls	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	4. Test Substance Stability	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Conditions M	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	7. Testing Consistency	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	8. System Type and Design	Medium	Open system where test substance may have been lost.	2	1	2			
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Confounding/ Variable Control	13. Confounding Variables	Not rated	The study noted that design parameters may have impacted the results.	NR	NR	NR			

	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Medium	Emission rates were estimated by multiplying the average VOC concentrations by the appropriate airflow rates.	2	1	2
Other	17. Verification or Plausibility of Results	Medium	The study results were reasonable; however, due to limited information, evaluation of the reasonableness of the study results was not possible.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
High	Medium	Low	Sum of scores: Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	<u>12</u> 1.27	11 Overall Score (Rounded):	<u>14</u> 1.3
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	Stubin, AI; Brosnan, TM; Porter, KD; Jimenez, L; Lochan, H. (1996). Organic priority pollutants in New York City municipal wastewaters: 1989-1993. Water Environ Res 68: 1037-1044. http://dx.doi.org/10.2175/106143096X128108. HERO ID: 658797								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	High	The test substance was identified by analytical means.	1	1	1			
Test Design       3. Study Controls         4. Test       Substance	3. Study Controls	Medium	Source and purity of analytical standard were not reported; however, a guideline analytical method was used.	2	2	4			
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR			

Outcome	11. Outcome	High	This metric met the	1	1	1
Assessment	Assessment	-	criteria for high			
	Methodology		confidence as			
			expected for this			
			type of study.			
	12. Sampling	High	This metric met the	1	1	1
	Methods		criteria for high			
			confidence as			
			expected for this			
			type of study.			
Confounding/	13.	Not rated	No confounding	NR	NR	NR
Variable	Confounding		variables were noted.			
Control	Variables					
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	High	This metric met the	1	2	2
Presentation	Reporting		criteria for high			
and Analysis			confidence as			
			expected for this			
			type of study.			
	16. Statistical	Not rated	The analysis of data	NR	NR	NR
	Methods and		was clearly			
	Kinetic		described.			
_	Calculations					
Other	17.	High	This metric met the	1	1	1
	Verification or		criteria for high			
	Plausibility of		confidence as			
	Results		expected for this			
			type of study.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this			
			study type.			
		-	Sum of scores:	13	16	18
High	Medium	Low	Overall Score =	1.12	Overall	1.1
			Sum of Weighted		Score	
			Scores/Sum of		(Rounded):	
			Metric Weighting			
			Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and	$\geq 2.3$ and $\leq 3$			Overall	High
	<2.3				Quality	
					Level:	

Study Reference:	Gay, BW, Jr; Hanst, PL; Bufalini, JJ; Noonan, RC. (1976). Atmospheric oxidation of chlorinated ethylenes. Environ Sci Technol 10: 58-67. http://dx.doi.org/10.1021/es60112a005. HERO ID: 59310							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2		
	2. Test Substance Purity	High	The test substance purity was reported as research grade. The test substance source was not reported.	1	1	1		
Test Design	3. Study Controls	Low	Blanks controls were not reported for the test system.	3	2	6		
	4. Test Substance Stability	Medium	Details were omitted regarding the test substance stability and preparation; however, this was not likely to have influenced the results.	2	1	2		
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1		
	6. Testing Conditions	Medium	Some details were omitted regarding testing conditions; however, this was not likely to have influenced the results.	2	2	4		
	7. Testing Consistency	Not rated	The metric is not applicable to this study; multiple samples were not run.	NR	NR	NR		
	8. System Type and Design	High	Details were omitted regarding the test system and design; however, this was not likely to have influenced the results.	1	1	1		
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR		
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR		

Outcome	11. Outcome	High	This metric met the	1	1	1
Assessment	Assessment	11.8.1	criteria for high	-	-	-
	Methodology		confidence as expected			
	0.		for this type of study.			
	12. Sampling	High	This metric met the	1	1	1
	Methods	U U	criteria for high			
			confidence as expected			
			for this type of study.			
Confounding/	13.	Not rated	No confounding	NR	NR	NR
Variable	Confounding		variables were noted.			
Control	Variables					
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this study			
	Exposure		type.			
Data	15. Data	Medium	Some information was	2	2	4
Presentation	Reporting		not reported (or reported			
and Analysis			in a figure); however,			
			these omissions were not			
			likely to have had a			
			substantial impact on the			
			study results.			
	16. Statistical	Not rated	Statistical analysis or	NR	NR	NR
	Methods and		kinetic calculations were			
	Kinetic		not reported.			
	Calculations					
Other	17.	High	The study results were	1	1	1
	Verification or		reasonable. This metric			
	Plausibility of		met the criteria for high			
	Results		confidence as expected			
			for this type of study.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this study			
			type.			
			Sum of scores:	16	15	24
High	Medium	Low	<b>Overall Score = Sum of</b>	1.6	Overall	1.6
			Weighted Scores/Sum of		Score	
			Metric Weighting		(Rounded):	
			Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and	$\geq 2.3$ and $\leq 3$			Overall	High
	<2.3				Quality	
					Level:	

Study	Park, J; Choi	, E; Cho, IH; Kim	ı, YG. (2003). Solar light in	nduced d	egradation of	f
Reference:			<b>FiO2: effects of solar light</b>			
			h A Tox Hazard Subst Env	viron Eng	g 38: 1915-19	26.
	http://dx.doi.c HERO ID: 14	org/10.1081/ESE-1 97906	120022889.			
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, on Net rotal	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	or Not rated] High	The test substance identified by name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Medium	Negative controls were not included; however, this omission was not likely to have hindered the interpretation of the results.	2	2	4
	4. Test Substance Stability	Medium	Details regarding this metric were omitted; however, this was not likely to have hindered the interpretation of the results.	2	1	2
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Medium	Some details were limited; temperature was not reported.	2	2	4
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

Confounding/	12. Sampling Methods	Medium	Details regarding this metric were limited; however, this was not likely to have hindered the interpretation of the results. This metric met the	2	1	2
Variable Control	Confounding Variables	High	criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	18	18	24
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.33	Overall Score (Rounded):	1.3
$\geq 1$ and <1.7	$\geq$ 1.7 and $<$ 2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study	Park, J; Choi	E; Cho, IH; Kim,	, YG. (2003). Solar light in	duced de	gradation of	
Reference:			TiO2: effects of solar light i			variations.
	J Environ Sci	Health A Tox Haz	zard Subst Environ Eng 38	8: 1915-19	926.	
	http://dx.doi.c HERO ID: 14	org/10.1081/ESE-1 97906	20022889.			
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Medium	Negative controls were not included; however, this omission was not likely to have hindered the interpretation of the results.	2	2	4
	4. Test Substance Stability	Medium	Details regarding this metric were omitted; however, this was not likely to have hindered the interpretation of the results.	2	1	2
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Medium	Some details were limited; temperature was not reported.	2	2	4
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

Confounding/ Variable	12. Sampling Methods 13. Confounding	Medium High	Minor limitations involving loss of test material due to sampling; however, this was minimal and not likely to have had substantial influence on the results. This metric met the criteria for high	2	1	2
Control	Variables 14. Outcomes Unrelated to Exposure	Not rated	confidence as expected for this type of study. The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	18	18	24
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.33	Overall Score (Rounded):	1.3
≥1 and <1.7	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$			Overall Quality Level:	High

Study Reference:	Nazmara, S;	Zarei, S. (2012). K notochemical proces	Mahvi, AH; Noroozi, A; Y inetic and degradation effi ss from contaminated wate	ciency of	trichloroeth	ylene
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source was reported.	1	1	1
Test Design	3. Study Controls	Low	No details about a dark control were provided; hydrolysis was not considered.	3	2	6
	4. Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to have influenced the test substance or were to have had a substantial impact on the study results.	2	1	2
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Medium	There were omissions in testing conditions; however, sufficient data were reported to determine that the omissions were not likely to have had a substantial impact on the study results.	2	2	4
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

High	Medium	Low	Overall Score         Sum of           Weighted Scores/Sum of         Metric Weighting           Factors:         Factors:	1.72	Overall Score (Rounded):	1.7
	18. QSAR Models	Not rated	The metric is not applicable to this study type. Sum of scores:	NR 22	NR 18	NR 31
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
0.7	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Data Presentation and Analysis	15. Data Reporting	Low	Data for well water samples were only presented in figures.	3	2	6
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Variable Control	Confounding Variables		uncertainty in the measurements and statistical techniques and between study groups (if applicable) were reported in the study and minor deviations or omissions were not likely to have had a substantial impact on the study results.			
Confounding/	13.	Medium	confidence as expectedfor this type of study.Sources of variability and	2	1	2
	12. Sampling Methods	High	for this type of study. This metric met the criteria for high	1	1	1
Outcome Assessment	Partitioning 11. Outcome Assessment Methodology	High	type. This metric met the criteria for high confidence as expected	1	1	1
	Degradation 10. Test Organism Partitioning	Not rated	type. The metric is not applicable to this study	NR	NR	NR
Test Organisms	9. Test Organism	Not rated	The metric is not applicable to this study	NR	NR	NR
	Type and Design	hichan	system details; however, sufficient data were reported to determine that the omissions were not likely to have had a substantial impact on the study results.	2		2
	8. System	Medium	There were omissions in	2	1	2

Γ	$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$		Overall	Medium
					Quality	
					Level:	

Study Reference:	Shirayama, H; Tohezo, Y; Taguchi, S. (2001). Photodegradation of chlorinated hydrocarbons in the presence and absence of dissolved oxygen in water. Water Res 35: 1941-1950. http://dx.doi.org/10.1016/S0043-1354(00)00480-2. HERO ID: 3544747								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	High	The test substance source was reported.	1	1	1			
Test Design	3. Study Controls	Low	The control substance was not reported; however, the lack of this data was not likely to influence the study results.	3	2	6			
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2			
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR			
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			

	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	Not rated	This metric met the criteria for high confidence as expected for this type of study.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Medium	Some details were omitted; however, these omissions were not likely to have had a substantial impact on the study results.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	16	17	22
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.29	Overall Score (Rounded):	1.1
≥1 and <1.7	≥1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	methylene ch tetrachloroet	loride, chloroform hylene, and other c	allos, GJ. (1975). Evaporati , 1,1,1-trichloroethane, tric chlorinated compounds in (	hloroeth lilute aqu	ylene, ueous solutio				
	Environ Sci Technol 9: 833-838. http://dx.doi.org/10.1021/es60107a008. HERO ID: 58054								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2			
	2. Test Substance Purity	High	The test substance purity and source were not reported; however, MS analysis was performed at start of study. The detection method was specifically at the m/z of the desired compound, so the purity was not likely to have affected the results.	1	1	1			
Test Design	3. Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have had a substantial impact on the study results.	2	2	4			
	4. Test Substance Stability	High	Mass spectra analysis was performed at start of study.	1	1	1			
Test Conditions	5. Test Method Suitability	High	Methanol was used as a co-solvent.	1	1	1			
	6. Testing Conditions	High	Water was purged with air 15 min prior to initiation of study; the authors appear to be assuming that hydrolysis is followed by oxidation; thus, by having an abundance of oxygen, they ensure that the rate- determining step is hydrolysis.	1	2	2			
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1			
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			

Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome of interest and its basis were reported.	1	1	1
	12. Sampling Methods	Medium	Sampling methods were omitted. Sampling timing was suitable.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and	15. Data Reporting	Medium	Transformation products were not identified.	2	2	4
Analysis	16. Statistical Methods and Kinetic Calculations	Medium	Statistical methods or kinetic calculations were not reported.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	18	18	24
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.33	Overall Score (Rounded):	1.3
≥1 and <1.7	≥1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High <sup>1</sup>
<sup>1</sup> Related HERO I	D: 3970783, EC	HA. Phototransfor	mation in water: Tetrachloro	ethylene	. 2017.	

Study Reference:			, H; Korte, F. (1985). Env								
Reference:	chemicals in t chemicals. Cl	organic chemicals: an experimental method for the assessment of the behaviour of organic chemicals in the ecosphere by means of simple laboratory tests with 14C labelled chemicals. Chemosphere 14: 1589-1616. HERO ID: 85251									
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score					
Test Substance	1. Test Substance Identity	Low	No information was provided about the test substance other than stating that some test substances were bought, and some were synthesized in the lab.	3	2	6					
	2. Test Substance Purity	Low	The test substance source and purity were not explicitly reported or verified by analytical means.	3	1	3					
Test Design	3. Study Controls	Unacceptable	No information was provided regarding this metric.	4	2	8					
	4. Test Substance Stability	Not rated	No information was provided regarding this metric.	NR	NR	NR					
Test Conditions	5. Test Method Suitability	Not rated	No information was provided but may be available in referenced sources.	NR	NR	NR					
	6. Testing Conditions	Unacceptable	No information was provided regarding this metric.	4	2	8					
	7. Testing Consistency	Not rated	No information was provided regarding this metric.	NR	NR	NR					
	8. System Type and Design	Not rated	No information was provided but may be available in referenced sources.	NR	NR	NR					
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR					
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR					
Outcome Assessment	11. Outcome Assessment Methodology	Not rated	Little to no information was provided but may be available in referenced sources.	NR	NR	NR					

	12. Sampling Methods	Not rated	Little to no information was provided but may be available in referenced sources.	NR	NR	NR
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	A single data point (36% degradation) was provided. More information may be available in the study report; however, it is illegible.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Not rated	Little to no information was provided.	NR	NR	NR
Other	17. Verification or Plausibility of Results	Not rated	Little to no information was provided; therefore, it is difficult to interpret the results.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	16	9	29
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	3.22	Overall Score (Rounded):	4
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Unacceptable <sup>1</sup>

A single data point (36% degradation) was provided. More info may be available in the report; however, the document is illegible. 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.