

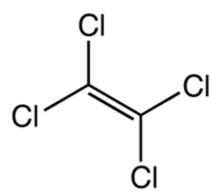
Office of Chemical Safety and Pollution Prevention

## Final Risk Evaluation for Perchloroethylene

## Systematic Review Supplemental File:

## Data Quality Evaluation of Environmental Fate and Transport Studies

CASRN: 127-18-4



December 2020

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Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	Substance	High	The test substance was identified by chemical	1	2	2		
	Identity 2. Test Substance Purity	Medium	name. 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 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. Confounding	High	This metric met the	1	1	1
Variable	Variables		criteria for high			
Control			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	Medium	Some details were	2	1	2
	Methods and		omitted; however, these			
	Kinetic		omissions were not			
	Calculations		likely to have had a			
			substantial impact on			
			the study results.			
Other	17. Verification	High	This metric met the	1	1	1
	or Plausibility		criteria for high			
	of 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:	17	20	22
High	Medium	Low	<b>Overall Score = Sum</b>	1.1	<b>Overall Score</b>	1.1
			of Weighted		(Rounded):	
			Scores/Sum of Metric			
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and $\leq$ 2.3	$\geq 2.3$ and $\leq 3$			Overall	High
					Quality Level:	
The evaluation	is for the aerobic	biodegradation in	water test reported by Lor	ng et al. (19	993).	

Study Reference:	aerobic perchl	oroethylene degrad echnol 40: 7796-780	Sarra, M; Caminal, G; dation by the white-rot f 02. http://dx.doi.org/10.1	fungus Tra	ametes versico	
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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; source and purity of radiolabeled material 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	Inconsistencies were not 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. The organism and culture methods were described.	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	This metric met the	2	1	2
Assessment	Assessment Methodology		criteria for high confidence as expected for this type of study. Assessment and analytical methods			
	12. Sampling Methods	High	were described. This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
Control	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	Details regarding this metric were adequately reported.	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	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:	14	18	19
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.06	Overall Score (Rounded):	1.1
$\geq 1$ and $< 1.7$	$\geq 1.7 \text{ and } \leq 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	and sulfate-ree mixed culture.	ducing bacteria in ( . Bull Environ Con rg/10.1007/s001289	; Fouillet, B; Chambon, the reductive dechlorin tam Toxicol 56: 817-824 900119.	ation of te		
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name and synonyms.	1	2	2
	2. Test Substance Purity	High	Details on this metric were not entirely clear due to a possible typo; however, the source and purity were indicated.	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	Details regarding this metric were not reported but this did not limit 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	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; source and enrichment were described.	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		criteria for high			
	Methodology		confidence as expected			
			for this type of study.			
	12. Sampling	Medium	Details regarding this	2	1	2
	Methods		metric were limited but			
			this did not limit the			
			interpretation of the			
			results.			
Confounding/	13. Confounding	High	Degradation results by	1	1	1
Variable	Variables		various bacteria were			
Control			analyzed and discussed.			
	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. Verification	Not rated	Due to limited	NR	NR	NR
	or Plausibility		information, evaluation			
	of Results		of the reasonableness			
			of the study results was			
	10.004.0	27.4.4.1	not possible.	ND	ND	ND
	18. QSAR Models	Not rated	The metric is not	NR	NR	NR
	wodels		applicable to this study			
			type.	16	10	21
II: -1.	Medium	Low	Sum of scores: Overall Score = Sum	<u>16</u> 1.11	19 Overall Score	21
High	Medium	Low		1.11		1.1
			of Weighted Scores/Sum of Metric		(Rounded):	
			Weighting Factors:			
>1 and <1.7	>1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3	weighting Pactors.		Overall	High
_1 4114 -11.7		_2.5 und _5			Quality Level:	111511

Study Reference:	aliphatic organ 1286-1294. HERO ID: 180	nic compounds und	3). Transformations of ler methanogenic condit	tions. App	l Environ Mic	robiol 45:
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	High	The test substance was identified by common name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported (reagent grade).	1	1	1
Test Design	3. Study Controls	High	Unseeded sterile controls were used for comparison with each haloalkane tested.	1	2	2
	4. Test Substance Stability	High	Samples were kept in the dark although CT is "generally inert" according to toxnet.nlm.nih.gov.	1	1	1
Test Conditions	5. Test Method Suitability	High	Tested at 149 ug/L, well below the experimental water solubility.	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 well 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	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	Concentration of the starting material was measured with GC, which demonstrated the ability (or lack thereof) of the bacteria to transform the test item.	1	1	1

	12. Sampling Methods	High	Degradation rates were not reported for this part of the study, but sampling methods were sufficient for determining the ability of the bacteria to transform the starting material at all.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	Medium	Uncertainties of one standard deviation were given for concentration measurements for the haloalkanes. No variability between tests was noted in the 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	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 data were not provided for this part of the study (the batch study).	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 $< 1.7$	$\geq 1.7 \text{ and } \leq 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study	5Long, JL; Ste	ensel, HD; Ferguso	n, JF; Strand, SE; Ong	erth, JE. (1	1993). Anaerol	oic and			
Reference:	aerobic treatment of chlorinated aliphatic compounds. J Environ Eng 119: 300-320.								
			<u>0733-9372(1993)119:2(</u>	<u>300)</u> .					
	HERO ID: 17								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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 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. Confounding	High	This metric met the	1	1	1
Variable	Variables		criteria for high			
Control			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	Medium	Some details were	2	1	2
	Methods and		omitted; however, these			
	Kinetic		omissions were not			
	Calculations		likely to have had a			
			substantial impact on			
			the study results.			
Other	17. Verification	High	This metric met the	1	1	1
	or Plausibility		criteria for high			
	of 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:	17	20	22
High	Medium	Low	<b>Overall Score = Sum</b>	1.1	<b>Overall Score</b>	1.1
			of Weighted		(Rounded):	
			Scores/Sum of Metric			
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq 2.3$ and $\leq 3$			Overall	High
					Quality Level:	
The evaluation	is for the anaerob	ic biodegradation	in water test reported by L	ong et al.	(1993).	

Study			2). Removal of trace ch			unds by			
Reference:	activated carbon and fixed-film bacteria. Environ Sci Technol 16: 836–843.								
	http://dx.doi.o HERO ID: 199								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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	High	Acceptable; although, the test parameters used were a control for another experiment in the study, the experiment used sodium acetate as a reference.	1	2	2			
	4. Test Substance Stability	Medium	Details regarding this metric were not reported but this did not limit the interpretation of the results.	2	1	2			
Test Conditions	5. Test Method Suitability	High	Volatilization losses were eliminated accordingly.	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	U	criteria for high			
	Methodology		confidence as expected			
			for this type of study.			
	12. Sampling	High	This metric met the	1	1	1
	Methods	8	criteria for high			
			confidence as expected			
			for this type of study.			
Confounding/	13. Confounding	Medium	Tetrachloroethylene	2	1	2
Variable	Variables		was not the sole source			
Control			of carbon for the			
			experiment. The			
			substrate included			
			acetate and a cocktail			
			of chlorinated organic			
			compounds.			
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to	1.0014004	applicable to this study	1.11		1.11
	Exposure		type.			
Data	15. Data	High	This metric met the	1	2	2
Presentation	Reporting	8	criteria for high	-		_
and Analysis			confidence as expected			
····· <i>J</i> ~·~·			for this type of study.			
	16. Statistical	High	This metric met the	1	1	1
	Methods and	8	criteria for high		_	
	Kinetic		confidence as expected			
	Calculations		for this type of study.			
Other	17. Verification	Not rated	Due to limited	NR	NR	NR
	or Plausibility		information, evaluation			
	of Results		of the 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:	17	19	22
High	Medium	Low	Overall Score = Sum	1.16	Overall Score	1.2
0			of Weighted		(Rounded):	
			Scores/Sum of Metric			
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$			Overall	High
					<b>Quality Level:</b>	C

Study Reference:	7Freedman, DL; Gossett, JM. (1989). Biological reductive dechlorination of tetrachloroethylene and trichloroethylene to ethylene under methanogenic conditions. Appl Environ Microbiol 55: 2144-2151.								
	HERO ID: 28		•						
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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	Medium	The test substance stability and preparation were discussed; however, loss of volatiles was noted.	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 design details were not provided; however, omissions were 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	Medium	Sampling methods were described, and losses were noted and attributed to sampling.	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 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, 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:	18	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 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study	8Edwards, EA	; Liang, LN; Duni	a, GG. (1992). Anaerobi	c microbi	al transformat	tion of			
Reference:	aromatic hydrocarbons and mixtures of aromatic hydrocarbons and halogenated solvents.								
			ce Office of Scientific R		0				
	https://ntrl.ntis.gov/NTRL/dashboard/searchResults.xhtml?searchQuery=ADA2604 98.								
	HERO ID: 10	70096			- •				
Domain	Metric	Qualitative	Comments	Metric	Metric	Weighted			
		Determination [i.e.,		Score	Weighting	Score			
		High, Medium,			Factor				
		Low, Unacceptable,							
		or Not rated]							
Test Substance	1. Test	High	The test substance was	1	2	2			
	Substance	6	identified by chemical						
	Identity		name.						
	2. Test	High	The test substance	1	1	1			
	Substance	mgii	source was reported.	1	-	1			
	Purity		source was reported.						
Test Design	3. Study	High	A sterile control was	1	2	2			
r ou proign	Controls	111511	included.	T	2	~			
	4. Test	Medium	The test substance	2	1	2			
	4. Test Substance	wicdfulli	stability, homogeneity,	2	1	2			
	Stability		preparation and storage						
	Stability		conditions were not						
T	5 Test Materia	II'. 1	reported.	1	1	1			
Test Conditions		High	The test method was	1	1	1			
	Suitability		suitable for the test						
			substance and the target						
			chemical was tested at						
			concentrations below						
			its aqueous solubility						
		TT' 1	(206 mg/L at 25 °C).						
	6. Testing	High	This metric met the	1	2	2			
	Conditions		criteria for high						
			confidence as expected						
			for this type of study.						
	7. Testing	High	Test conditions were	1	1	1			
	Consistency		run in duplicate or						
			triplicate.						
	8. System Type	High	This metric met the	1	1	1			
	and Design		criteria for high						
			confidence as expected						
			for this type of study.						
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 study						
	Partitioning		type.						
Outcome	11. Outcome	High	The outcome	1	1	1			
Assessment	Assessment		assessment						
	Methodology		methodology addressed						
			or reported the intended						
			outcomes of interest.						

	12. Sampling Methods	High	Adequate sampling to obtain transformation rates.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	Sources of variability in the study designs (i.e. regarding substrates and microcosms) were 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	Extraction efficiency, percent recovery, and mass balance were not reported. Analytical method was not specifically reported for PCE.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Kinetic calculations were not clearly described for PCE experiments.	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:	18 1.2	20 Overall Score (Rounded):	24 1.2
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study	9Edwards, EA	; Liang, LN; Dunia	a, GG. (1992). Anaerobi	c microbia	al transformat	ion of				
Reference:		aromatic hydrocarbons and mixtures of aromatic hydrocarbons and halogenated solvents.								
			ce Office of Scientific R		8					
			oard/searchResults.xht		Query=ADA2	604 98.				
	HERO ID: 1070096									
Domain	Metric	Qualitative	Comments	Metric	Metric	Weighted				
		Determination [i.e.,		Score	Weighting	Score				
		High, Medium,			Factor					
		Low, Unacceptable,								
		or Not rated]								
Test Substance	1. Test	High	The test substance was	1	2	2				
	Substance	8	identified by chemical	-	_	_				
	Identity		name.							
	2. Test	High	The test substance	1	1	1				
	Substance	ingn	source was reported.		-	-				
	Purity		source was reported.							
Test Design	3. Study	High	A sterile control was	1	2	2				
i cat Design	Controls	111511	included.	1	2	2				
	4. Test	Medium	The test substance	2	1	2				
	Substance	TVICUIUIII	stability, homogeneity,	4	1	4				
	Stability		preparation and storage							
	Stability		conditions were not							
			reported.							
Conditions	5. Test Method	High	The test method was	1	1	1				
Conditions		підп	suitable for the test	1	1	1				
	Suitability		substance and the target							
			chemical was tested at							
			concentrations below							
			its aqueous solubility $(206 \text{ mg/L} \text{ at } 25 ^{\circ}\text{C})$							
	( Testine	II:-1	(206 mg/L at 25 °C). This metric met the	1	2	2				
	6. Testing Conditions	High	criteria for high	1	Z	Z				
	Conditions		confidence as expected							
	7	II'. 1	for this type of study. Test conditions were	1	1	1				
	7. Testing	High		1	1	1				
	Consistency		run in duplicate or							
	8. System Type	High	triplicate. This metric met the	1	1	1				
	<i>v v</i> 1	підп		1	1	1				
	and Design		criteria for high							
			confidence as expected							
Tost	9. Test	IL: -1-	for this type of study.	1	2	2				
Test		High	This metric met the	1	2	Z				
Organisms	Organism		criteria for high							
	Degradation		confidence as expected							
	10. Test	N-4	for this type of study. The metric is not	ND	ND	۸TD				
	10. Test	Not rated		NR	NR	NR				
	Organism Dortition in a		applicable to this study							
0	Partitioning	TT' 1	type.	1	1	1				
Outcome	11. Outcome	High	The outcome	1	1	1				
Assessment	Assessment		assessment							
	Methodology		methodology addressed							
			or reported the intended							
			outcomes of interest.							

	12. Sampling Methods	High	Adequate sampling to obtain transformation rates.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	Sources of variability in the study designs (i.e. regarding substrates and microcosms) were 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	Extraction efficiency, percent recovery, and mass balance were not reported. Analytical method was not specifically reported for PCE.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Kinetic calculations were not clearly described for PCE experiments.	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	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 $< 1.7$	$\geq 1.7 \text{ and } < 2.3$	$\geq 2.3$ and $\leq 3$			Overall Quality Level:	High

Study	10Edwards, E	A; Liang, LN; Dun	ia, GG. (1992). Anaerob	oic microb	ial transforma	tion of			
Reference:		aromatic hydrocarbons and mixtures of aromatic hydrocarbons and halogenated solvents.							
			ce Office of Scientific R		0				
	https://ntrl.nti	s.gov/NTRL/dashb	oard/searchResults.xht	ml?search	Query=ADA2	604 98.			
	HERO ID: 1070096								
Domain	Metric	Qualitative	Comments	Metric	Metric	Weighted			
		Determination [i.e.,		Score	Weighting	Score			
		High, Medium,			Factor				
		Low, Unacceptable,							
		or Not rated]							
Test Substance	1. Test	High	The test substance was	1	2	2			
	Substance	8	identified by chemical						
	Identity		name.						
	2. Test	High	The test substance	1	1	1			
	Substance	11.8.1	source was reported.	-	-	-			
	Purity		source was reported						
Test Design	3. Study	High	A sterile control was	1	2	2			
- our proign	Controls		included.	1	-	-			
	4. Test	Medium	The test substance	2	1	2			
	Substance	TVICUIUIII	stability, homogeneity,	4	1	2			
	Stability		preparation and storage						
	Stability		conditions were not						
			reported.						
Tost Conditions	5 Test Mathed	II: -1	The test method was	1	1	1			
Test Conditions		High		1	1	1			
	Suitability		suitable for the test						
			substance and the target						
			chemical was tested at						
			concentrations below						
			its aqueous solubility						
	( <b>T</b> )		(206 mg/L at 25 °C).						
	6. Testing	High	This metric met the	1	2	2			
	Conditions		criteria for high						
			confidence as expected						
			for this type of study.						
	7. Testing	High	Test conditions were	1	1	1			
	Consistency		run in duplicate or						
			triplicate.						
	8. System Type	High	This metric met the	1	1	1			
	and Design		criteria for high						
			confidence as expected						
			for this type of study.						
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 study						
	Partitioning		type.						
Outcome	11. Outcome	High	The outcome	1	1	1			
Assessment	Assessment		assessment						
	Methodology		methodology addressed						
			or reported the intended						
			outcomes of interest.						

	12. Sampling Methods	High	Adequate sampling to obtain transformation rates.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	Sources of variability in the study designs (i.e. regarding substrates and microcosms) were 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	Extraction efficiency, percent recovery, and mass balance were not reported. Analytical method was not specifically reported for PCE.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Kinetic calculations were not clearly described for PCE experiments.	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	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:	grown mixed o 9372(2000)126 HERO ID: 174	culture. J Environ 1 :10(934). 47865	(2000). Chlorinated sol Eng 126: 934-942. http:/	//dx.doi.or	g/10.1061/(AS	CE)0733-
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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 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/	13. Confounding	High	This metric met the	1	1	1
Variable Control	Variables		criteria for high 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
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 $< 1.7$	$\geq 1.7 \text{ and } \leq 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study	12Bouwer, EJ	; Rittmann, BE; M	cCarty, PL. (1981). Ana	erobic deg	gradation of h	alogenated			
Reference:	1- and 2-carbon organic compounds. Environ Sci Technol 15: 596-599.								
	http://dx.doi.o HERO ID: 981	rg/10.1021/es00087 18	a012.						
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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	Organisms from laboratory scale digester were used in the study; however, the deviation was not likely to have had a substantial impact on the study results.	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	Some sampling details were omitted (sampling frequency was reported but method was not); however, these omissions were unlikely to have	2	1	2
			impacted the study results.			
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:	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:		ty pollutant compo	ni, CI; Barth, EF. (1981 unds. J Water Pollut Co			
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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 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. Confounding	High	This metric met the	1	1	1
Variable	Variables		criteria for high			
Control			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	Medium	Some quantitative	2	2	4
Presentation	Reporting		details were omitted;			
and Analysis			however, overall results			
			were clearly reported.			
	16. Statistical	Medium	Some details were	2	1	2
	Methods and		omitted; however, these			
	Kinetic		omissions were not			
	Calculations		likely to have had a			
			substantial impact on			
			the study results.			
Other	17. Verification	High	This metric met the	1	1	1
	or Plausibility		criteria for high			
	of 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:	18	20	24
High	Medium	Low	<b>Overall Score = Sum</b>	1.2	<b>Overall Score</b>	1.2
			of Weighted		(Rounded):	
			Scores/Sum of 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	14van Eekert.	MHA: Schröder, 7	[J; van Rhee, A; Stams,	AJM: Sch	raa. G: Field.	JA. (2001).
Reference:			lorinated ethenes by a n			
			7: 163-170. http://dx.do			
	8.		-	0		
	HERO ID: 11	66576				
Domain	Metric	Qualitative	Comments	Metric	Metric	Weighted
		Determination [i.e.,		Score	Weighting	Score
		High, Medium,			Factor	
		Low, Unacceptable,				
		or Not rated]				
Test Substance	1. Test	High	The test substance was	1	2	2
	Substance	-	identified definitively			
	Identity		with established			
	2		nomenclature.			
	2. Test	Medium	The source of the test	2	1	2
	Substance	111001010111	substance was reported.	-	-	-
	Purity		The purity of the test			
	1 unity		substance was not			
			reported; however, the			
			test substance was			
			measured analytically.			
Test Design	3. Study	High	This metric met the	1	2	2
i est Design	Controls	nigii	criteria for high	1	2	2
	Controls		confidence as expected			
			-			
			for this type of study.			
			Controls were included			
	4 55 4		in this study.	2		
	4. Test	Medium	The test substance	2	1	2
	Substance		stability, homogeneity,			
	Stability		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.			
<b>Test Conditions</b>	5. Test Method	High	The test method was	1	1	1
	Suitability		suitable for the test			
			substance; the target			
			chemical was tested at			
			concentrations below			
			its aqueous solubility.			
	6. Testing	High	Testing conditions were	1	2	2
	Conditions	Ũ	monitored, reported,			
			and appropriate for the			
			method.			
	7. Testing	High	Test conditions were	1	1	1
	Consistency	8	consistent across	-	-	-
	- subscency		samples or study			
			groups.			
			Stoups.			

	8. System Type	Medium	Some system details	2	1	2
	and Design		were omitted; however, these omissions were not likely to have had a substantial impact on			
			the study results.			
Test Organisms	9. Test Organism Degradation	High	Test organism information and inoculum source were 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	The outcome assessment methodology addressed or reported the intended outcome of interest.	1	1	1
	12. Sampling Methods	Low	Details regarding sampling methods were not fully reported. The omissions were likely to have had a substantial impact on the study results.	3	1	3
Confounding/ Variable Control	13. Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation.	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	The frequency of sampling, target chemical and transformation product(s) concentrations were reported in a graph.	2	2	4
	16. Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).	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	27
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.35	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	15Parsons, F;	Lage, GB; Rice, R.	(1985). Biotransformat	ion of chlo	orinated organ	ic solvents			
Reference:	in static microcosms. Environ Toxicol Chem 4: 739-742.								
	http://dx.doi.o HERO ID: 37	rg/10.1002/etc.5620 97820	0040604.						
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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	Test substance purity was reported.	1	1	1			
Test Design	3. Study Controls	High	Solvent blank on non- viable microcosm controls were 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 from some.	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 Assessment	11. Outcome Assessment Methodology	Medium	Concentration of the test chemical was not monitored but concentrations of biodegradation products were measured throughout the study.	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	There was large uncertainty in the concentrations of the perc degradation products but this likely did not impact the study results.	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	Degradation products were monitored but biodegradation rate information was not reported.	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>19</u> 1.25	20 Overall Score (Rounded):	25 1.3
$\geq 1$ and $< 1.7$	$\geq 1.7 \text{ and } < 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:		trachloroethylene o	bain, SS. (1996). A fresl dehalogenation. Appl Ei			
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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 expected for this type of study.	1	1	1
	12. Sampling Methods	Medium	Limited sampling details but omissions were not likely to have had a substantial impact on the study results.	2	1	2

Confounding/	13. Confounding	Not rated	No confounding	NR	NR	NR
Variable	Variables		variables were noted.			
Control	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	Analytical methods used were suitable for detection and quantification of the target chemical and transformation product(s); detection limits were not reported.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Statistical methods and kinetic calculations details were not reported.	2	1	2
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:	17	18	23
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.28	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		17Wood, PR; Parsons, FZ; DeMarco, J; Harween, HJ; Lang, RF; Payan, IL; Ruiz, MC.								
Reference:	ethene compo Conference an	(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.								
Domain	HERO ID: 988 Metric	31 Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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	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	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	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. Confounding	High	Absorption was	1	1	1
Variable	Variables		discussed.			
Control	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this study			
	Exposure		type.			
Data	15. Data	Medium	Specific chemical	2	2	4
Presentation	Reporting		concentrations were not			
and Analysis			reported.			
	16. Statistical	Medium	Half-life calculation	2	1	2
	Methods and		was not described			
	Kinetic					
	Calculations					
Other	17. Verification	High	This metric met the	1	1	1
	or Plausibility		criteria for high			
	of 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:	20	20	28
High	Medium	Low	Overall Score = Sum	1.4	Overall Score	1.4
			of Weighted		(Rounded):	
			Scores/Sum of Metric			
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall	High
					<b>Quality Level:</b>	

Study Reference:	18DiStefano, TD; Gossett, JM; Zinder, SH. (1991). Reductive dechlorination of high concentrations of tetrachloroethene to ethene by an anaerobic enrichment culture in the								
	absence of met HERO ID: 119	hanogenesis. Appl 06100	Environ Microbiol 57:		•				
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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	Not rated	The study did not require concurrent control groups.	NR	NR	NR			
	4. Test Substance Stability	Medium	Not reported; however, omissions were 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; initial headspace concentration was verified.	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; duplicate cultures were performed similarly.	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	Enrichment culture 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	Medium	This was a non- standard biodegradation test evaluating organism strains and growth conditions.	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	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	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	Calculations for the rate of dechlorination were not explained.	2	1	2
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:	18	17	23
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.35	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 Reference:	reductive deha	alogenation. Enviro rg/10.1021/es98058	99). Chlorinated ethene on Sci Technol 33: 223-2 76.		ity coefficients	s (KS) for
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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 were not reported but were not likely to have impacted results.	2	2	4
	4. Test Substance Stability	High	Not discussed but not likely to have impacted results.	1	1	1
Test Conditions		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 inoculum was not routinely used for similar study types. The deviation may have had a 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	Low	Results provided maximum transformation rates under specific conditions and selected test species.	3	1	3

	12. Sampling Methods	Medium	Sampling methods were not reported; however, these omissions were not likely to have had a substantial impact on 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	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	20Kästner, M.	(1991). Reductive	dechlorination of tri- ar	nd tetrachl	oroethylenes	depends on
Reference:			bic conditions. Appl En	viron Mic	robiol 57: 203	9-2046.
Domain	HERO ID: 23 Metric	10605 Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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	Medium	Stability information about the test substance was not described but was not expected to have impacted 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	Light conditions were not described; however, there omission is not likely to impact 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; however, these omissions were not likely to have had a substantial impact on the study results.	2	1	2
Test Organisms	9. Test Organism Degradation	Low	The study used a non- standard test species that may have been adapted to the test substance. The deviation may have had a 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	11. Outcome	Medium	This study was a	2	1	2
Assessment	Assessment		modified			
	Methodology		biodegradation test.			
			There were adaptive			
			transfers both with and			
			without lactose.			
	12. Sampling Methods	Medium	Some sampling details were omitted but this was unlikely to have	2	1	2
			impacted the study results.			
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 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	Medium	Some details about the	2	1	2
	Methods and		statistical methods and			
	Kinetic		kinetics missing and/or			
	Calculations		only shown in figures.			
Other	17. Verification	High	This metric met the	1	1	1
	or Plausibility		criteria for high			
	of Results		confidence as expected			
			for this type of study.			
	18. QSAR Models	Not rated	The metric is not applicable to this study	NR	NR	NR
	Widdels		type.			
			Sum of scores:	23	20	31
High	Medium	Low	Overall Score = Sum	1.55	Overall Score	1.6
		2011	of Weighted	1.00	(Rounded):	
			Scores/Sum of Metric		(	
			Weighting Factors:			
$\geq 1$ and $< 1.7$	≥1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall	High
					<b>Quality Level:</b>	

Study Reference:			ng, JY. (2015). Occurren industrial wastewater tr			
Kelei ence.		Vater Treat 54: 114	41-1149. http://dx.doi.or			
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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 GC-MS analytical technique.	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 Organisms	9. Test Organism Degradation	Medium	Details regarding the test organisms at each WWTP were not given but their omission did not likely impact the study results.	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	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	Medium	Transformation products were not reported, and volatilization was likely a large factor in the lower effluent concentrations since the removal rates were proportional to air to water ratios.	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:	22	20	31
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.55	Overall Score (Rounded):	1.6
$\geq 1$ and $< 1.7$	≥1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:			35). Biotransformation ( ne, vinyl chloride, and (			
		pl Environ Microb				6-
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

Confounding/	12. Sampling Methods 13. Confounding	Medium Not rated	Some sampling details were omitted but this was unlikely to have impacted the study results. No confounding	2 NR	1 NR	2 NR
Variable Control	Variables 14. Outcomes Unrelated to Exposure	Not rated	variables were noted. 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 Weighted Scores/Sum of Metric Weighting Factors:	<u>17</u> 1.26	19 Overall Score (Rounded):	<u>24</u> 2.3
>1 and <1.7	≥1.7 and <2.3	$\geq 2.3$ and $\leq 3$			Overall Quality Level:	Low <sup>1</sup>

Study	23Vogel, TM;	McCarty, PL. (198	5). Biotransformation of tetrach	loroeth	ylene to				
Reference:	trichloroethylene, dichloroethylene, vinyl chloride, and carbon dioxide under methanogenic								
	conditions. Ap HERO ID: 174		iol 49: 1080-1083.			_			
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 Test	3. Study Controls	Not rated	Control group details were not included; however, this study described a non- standard/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	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	Details between test conditions across samples or study groups were not reported but these omissions were not likely to have had a substantial impact on the study results.	2	1	2			
	8. System Type and Design	Medium	Some system design details were not provided; however, the omissions were not likely to have had a substantial impact on the study results.	2	1	2			
Test Organisms	9. Test Organism Degradation	Medium	Organism information was not detailed for this non- standard test; however, the omission was not likely to have had a substantial impact on interpretation of the results.	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	This non-standard test used continuous-flow fixed-film methanogenic column, applicable to a treatment system.	2	1	2			

Confounding/ Variable Control	<ul> <li>12. Sampling Methods</li> <li>13. Confounding Variables</li> <li>14. Outcomes Unrelated to</li> </ul>	Medium Not rated Not rated	Limited sampling details were described for this non-standard test; however, the omissions were not likely to have had a substantial impact on the results. No confounding variables were noted. The metric is not applicable to this study type.	2 NR NR	1 NR NR	2 NR NR
Data Presentation and Analysis	Exposure 15. Data Reporting	Medium	Some information was not reported (i.e., detailed quantification of degradation products); 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	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
			Sum of scores:	20	17	27
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.59	Overall Score (Rounded):	1.6
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	24Ryoo, D; Shim, H; Canada, K; Barbieri, P; Wood, TK. (2000). Aerobic degradation of tetrachloroethylene by toluene-o-xylene monooxygenase of Pseudomonas stutzeri OX1. Nat Biotechnol 18: 775–778. HERO ID: 4140340								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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	Some details were omitted; however, the omissions were not likely to have had a substantial impact on the interpretation of 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 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	Details regarding this metric were limited or unclear. Pure cultures were evaluated in this study.	3	1	3			

	12. Sampling Methods	Low	Details regarding this metric were limited or unclear.	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 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	Data reported had limited details and/or were unclear.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Low	Details regarding this metric were limited; degradation and chloride concentrations were relative to replicates tested at different conditions.	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
			Sum of scores:	22	19	29
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.53	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:	25DiStefano, TD; Gossett, JM; Zinder, SH. (1992). Hydrogen as an electron donor for dechlorination of tetrachloroethene by an anaerobic mixed culture. Appl Environ Microbiol 58: 3622-3629.							
Domain	HERO ID: 114 Metric	12166 Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		Metric Score	Metric Weighting Factor	Weighted Score		
Test Substance	1. Test Substance Identity	High	The test substance was identified definitively with established nomenclature.	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	High	Concurrent negative controls were 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	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 and reported in detail.	1	2	2		
	7. Testing Consistency	High	Test conditions were consistent across samples or study groups.	1	1	1		
	8. System Type and Design	Medium	Some system details were omitted; however, these omissions were not likely to have had a substantial impact on the study results.	2	1	2		
Test Organisms	9. Test Organism Degradation	High	Testing conditions were monitored, reported, and appropriate for the method.	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	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.	1	1	1		

Confounding/	12. Sampling Methods 13. Confounding	High Not rated	The study reported the use of sampling methods that address the outcome(s) of interest and used widely accepted methods/approaches for the chemical and media being analyzed. No confounding	1 NR	1 NR	1 NR
Variable	Variables	1 of fulled	variables were noted.	1111	1110	1.11
Control	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 and their concentrations were reported, analytical methods were suitable; LOD was not reported.	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:	16	19	22
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.16	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:	26Wakeham, 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. http://dx.doi.org/10.1021/es00116a009. HERO ID: 3797829							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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 use reported; however, no reference substance was 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	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		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 study			
	Partitioning		type.			
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	Medium	Limited details on the	2	1	2
	Methods		sampling methods were			
			reported.			
Confounding/	13. Confounding	Not rated	No confounding	NR	NR	NR
Variable	Variables		variables were noted.			
Control	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this study			
	Exposure		type.			
Data	15. Data	Medium	Details regarding this	2	2	4
Presentation	Reporting		metric were limited;			
and Analysis			some of the data were			
-			inferred from figures.			
	16. Statistical	Low	Rate constants and half-	3	1	3
	Methods and		lives were calculated			
	Kinetic		based on periods during			
	Calculations		the experiments when			
			volatilization appears to			
			be dominant.			
Other	17. Verification	Not rated	Due to limited	NR	NR	NR
	or Plausibility		information, evaluation			
	of Results		of the 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:	23	18	32
High	Medium	Low	<b>Overall Score = Sum</b>	1.78	<b>Overall Score</b>	1.8
			of Weighted		(Rounded):	
			Scores/Sum of Metric			
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall	Medium
					<b>Quality Level:</b>	

Study	27Wakeham,	SG; Davis, AC; Ka	ras, JA. (1983). Mesocosm expo	eriment	s to determi	ne the			
Reference:	fate and persistence of volatile organic compounds in coastal seawater. Environ Sci Technol								
	HERO ID: 37					•			
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	e 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	Control experiment was run on different dates, not correlating with other systems	2	1	2			
	8. System Type and Design	Medium	Some system design details were not provided; however, the omissions were not likely to have had a substantial impact on the study results.	2	1	2			
Test Organisms	9. Test Organism Degradation	Medium	The test organism, 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	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	Limited details on the sampling methods were reported.	2	1	2			

Confounding/	13. Confounding	Not rated	No confounding variables were	NR	NR	NR
Variable	Variables		noted.			
Control	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	Data on the test substance concentration in different media 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	Rate constants and half-lives were calculated based on periods during the experiments when volatilization appears to 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
			Sum of scores:	23	18	32
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.78	Overall Score (Rounded):	1.8
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3	<i>a</i> <b>b</b> <i>th</i> the <i>t</i>		Overall Quality Level:	Medium

Study Reference:	28Dow Chemical (Dow Chemical Company). (1980). Introductory study of the biodegradation of the chlorinated methane, ethane and ethene compounds: Progress report CR806890-01 coop agreement [TSCA Submission]. (OTS: OTS0509177; 8EHQ Num: 47004 F1-2A; DCN: 40-8024098; TSCATS RefID: 200511; CIS: NA). Midland, MI.								
Damaia	HERO ID: 42	15582	· · · · · · · · · · · · · · · · · · ·	-		<b>XX</b> 7.*- <b>1</b> .4.1			
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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 starting material had reported impurities; however, 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	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	Low	Testing conditions were not reported however, sufficient data were reported to determine that the omissions were not likely to have had a substantial impact on 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	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		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. Confounding	High	This metric met the	1	1	1
Variable	Variables		criteria for high			
Control			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. Verification	High	This metric met the	1	1	1
	or Plausibility		criteria for high			
	of 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:	18	20	25
High	Medium	Low	<b>Overall Score = Sum</b>	1.25	<b>Overall Score</b>	1.7
			of Weighted		(Rounded):	
			Scores/Sum of Metric			
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7 \text{ and } \leq 2.3$	$\geq 2.3$ and $\leq 3$			Overall	Medium <sup>1</sup>
					Quality Level:	
<sup>1</sup> The study's ov	verall quality rating	g was downgraded	1. Rationale: The starting r	naterial ha	ad reported impu	rities.

Study Reference:	29Namkung, E; Rittmann, BE. (1987). Estimating Volatile Organic Compound Emissions from Publicly Owned Treatment Works (pp. 670-678). (NIOSH/00172323). HERO ID: 5096530								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		Metric Score	Metric Weighting Factor	Weighted Score			
Test Substance	1. Test Substance Identity	High	The test substance was identified by common name.	1	2	2			
	2. Test Substance Purity	Medium	The test substance purity and source were not reported; however, the omissions were not likely to have impacted study results.	2	1	2			
Test Design	3. Study Controls	Medium	Controls were not used; however, the omissions were not likely to have impacted study results.	2	2	4			
	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	Medium	Some testing conditions were not reported but were unlikely to have impacted the study results.	2	2	4			
	7. Testing Consistency	Not rated	Not applicable; multiple study groups were not reported.	NR	NR	NR			
	8. System Type and Design	Medium	Some system design details were not provided; however, this was not likely to have influenced the interpretation of the results.	2	1	2			
Test Organisms	9. Test Organism Degradation	High	Inoculum source reported.	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	Multiple removal	2	1	2
Assessment	Assessment Methodology		processes using specific WWTP operational conditions were considered in this study that may have caused incomplete reporting of the biodegradation			
	12. Sampling Methods	Medium	outcome. Sampling methods were not clearly reported but were not likely to have had a substantial impact on 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	There was insufficient evidence presented to confirm the processes causing disappearance of perc.	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	Medium	The study results were reasonable; however, little information to evaluate or confirm partitioning or transformation were provided.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	22	18	31
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.72	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:	30Cichocka, D; Nikolausz, M; Haest, PJ; Nijenhuis, I. (2010). Tetrachloroethene conversion to ethene by a Dehalococcoides-containing enrichment culture from Bitterfeld. FEMS Microbiol Ecol 72: 297-310. http://dx.doi.org/10.1111/j.1574- 6941.2010.00845.x.								
Domain	HERO ID: 29 Metric	251908 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	General sources and purity reported for all chemical in the study were reported; however, tetrachloroethene source and purity were not specified.	2	1	2			
Test Design	3. Study Controls	Low	Control did not report 0% loss; 70% loss was reported and attributed to sampling methods and/or adsorption. Details regarding steps to alleviate or account for this in the active tests were not discussed.	3	2	6			
	4. Test Substance Stability	Medium	Details regarding this metric were not discussed; however, this did not hinder the interpretation of the study.	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	Details regarding the test condition were not reported; however, these omissions were not likely to have hindered the interpretation of the results	2	2	4			
	7. Testing Consistency	Medium	Limited details were given for the substrate specific experiment; in the growth assay, one of three test results was negative, yet this appeared to be overlooked in the overall summary, which suggested that the culture invariably grew on tetrachloroethene.	2	1	2			
	8. System Type and Design	Medium	Some system design issues were not reported, but the omissions were not likely to have had a substantial impact on the study results.	2	1	2			
Test Organisms	9. Test Organism Degradation	High	The source of the culture and enrichment methods were described and referenced.	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	Loss of the test material was not well defined with supporting analytical data.	2	1	2			

$\leq 1$ and $\leq 1.7$	-1.7 and ~2.5	<u>~</u> 2.5 and <u>~</u> 5			Quality	wiculuill
High $\geq 1$ and $< 1.7$	Medium ≥1.7 and <2.3	Low $\geq 2.3 \text{ and } \leq 3$	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	2.05	Overall Score (Rounded): Overall	2.1 Medium
	Models		study type. Sum of scores:	29	19	39
Other	17. Verification or Plausibility of Results 18. QSAR	Not rated	Due to limited information, evaluation of the reasonableness of the study results was not possible. The metric is not applicable to this	NR NR	NR	NR NR
	16. Statistical Methods and Kinetic Calculations	Medium	Statistical analysis or kinetic calculations details were not described.	2	1	2
Data Presentation and Analysis	15. Data Reporting	Low	The target chemical initial concentrations, extraction efficiency, percent recovery, and mass balance were not reported and there was insufficient evidence presented to confirm that parent compound disappearance was not likely due to some other process.	3	2	6
Data	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Confounding/ Variable Control	Methods 13. Confounding Variables	Low	methods were attributed to loss during the control, which may also have influenced the experimental study results. It did not appear that steps were taken to account for or assess the possibility that loss during the experiments was not due to adsorption or sampling, and complete loss was attributed to the culture; this may have limited the validity of the results. Although formation of products was observed in the experiments (and not in the control), it was possible that sampling and adsorption may have played a role, yet this uncertainty was not addressed; additionally, one of three growth experiments was negative, suggesting that the culture did not grow invariably on tetrachloroethene.	3	1	3

Study	31Haas, JR; S	hock, EL. (1999). H	Ialocarbons in the envir	onment: <b>F</b>	Estimates of	
Reference:			ueous chloroethylene sp			es in natural
		him Cosmo Act 63:	3429-3441.			
	HERO ID: 190		[]			
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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	This study presents energetic constraints that may have informed possible metabolism and transformation steps 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	15. Data	Not rated	Calculation.	NR	NR	NR
Presentation	Reporting					
and Analysis	16. Statistical	Low	Statistical analysis or	3	1	3
	Methods and		kinetic calculations			
	Kinetic		were not conducted or			
	Calculations		were not described			
			clearly.			
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	<b>Overall Score = Sum</b>	2	<b>Overall Score</b>	2.3
C			of Weighted		(Rounded):	
			Scores/Sum of Metric			
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall	Low <sup>1</sup>
					<b>Quality Level:</b>	
		ng was downgraded	Rationale: Study reports property).	calculated	l estimates with	limited

Study	32Gossett, JM	. (1985). Anaerobic	e degradation of C1 and	C2 chlori	nated hydroca	rbons.
Reference:			L: Air Force Engineerin	ig & Servi	ces Center.	
Domain	HERO ID: 414 Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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	Testing conditions were monitored, reported, and appropriate for the method; results indicated that leakage was a possible mechanism of test substance loss.	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 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 details were not fully reported, but these omissions were 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	Low	Extraction efficiency, percent recovery, and mass balance were not reported; analytical methods were not reported.	3	2	6
	16. Statistical Methods and Kinetic Calculations	Medium	Calculations were summarized, all experimental values were not reported.	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
			Sum of scores:	25	20	33
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.65	Overall Score (Rounded):	2.3
$\geq 1$ and $< 1.7$	$\geq 1.7 \text{ and } \leq 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Low <sup>1</sup>

Study	33Bouwer, EJ	; Rittmann, BE; M	cCarty, PL. (1981). Ana	erobic de	gradation of h	alogenated
Reference:			nds. Environ Sci Techno			0
	http://dx.doi.o HERO ID: 981	rg/10.1021/es00087 18	a012.			
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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	Organisms from laboratory scale digester were used in the study; however, the deviation was not likely to have had a substantial impact on the study results.	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

Confounding/ Variable	<ul> <li>12. Sampling Methods</li> <li>13. Confounding Variables</li> </ul>	Medium High	Some sampling details were omitted (sampling frequency was reported but method was not); however, these omissions were unlikely to have impacted the study results. This metric met the criteria for high	2	1	2
Control			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
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	Low	Greater than 100% remaining relative to the controls after 25 weeks.	3	1	3
	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:	1.25	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>
	verall quality rating controls after 25 w		l. Rationale: Greater than	100% of t	est substance was	remaining

Study Reference:	34Fathepure, BZ; Boyd, SA. (1988). Dependence of tetrachloroethylene dechlorination on methanogenic substrate consumption by Methanosarcina sp. strain DCM. Appl Environ Microbiol 54: 2976-2980. HERO ID: 1168294							
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 definitively with established nomenclature.	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	Some concurrent control group details were not included; however, the lack of data was not likely to have had a substantial impact on study results; the vehicle was not likely to have influenced the study results.	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	0		
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	Medium	There were reported deviations or omissions in testing conditions (incubation temperature, pH) not specified for the test, however, sufficient data were not reported to determine that the deviations and omissions were not likely to have had a substantial impact on the study results.	2	2	4		

	7. Testing	High	Testing conditions	1	1	1
	Consistency	8	were consistent across	-	-	
	5		samples.			
	8. System	Medium	Some system details	2	1	2
	Type and	meanin	were omitted;	-	1	-
	Design		however, these			
	Design		omissions were not			
			likely to have had a			
			substantial impact on			
Test	0. T 1	TTura a su tabla	the study results.	4	2	8
Test	9. Test	Unacceptable	Pure culture study;	4	2	8
Organisms	Organism		Methanosarcina sp.			
	Degradation		strain was used in this			
	10.7		study.			
	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		assessment			
	Methodology		methodology			
			addressed or reported			
			the intended outcome			
			of interest.			
	12. Sampling	High	The study reported the	1	1	1
	Methods	U	use of sampling			
			methods that address			
			the outcome of interest			
			and used widely			
			accepted methods/			
			approaches for the			
			chemical and media			
			being analyzed; no			
			notable uncertainties			
			or limitations were			
			expected to have			
			influenced results.			
Confounding	13.	High		1	1	1
Confounding/		пign	Sources of variability	1	1	1
Variable	Confounding		and uncertainty in the			
Control	Variables		measurements, and			
			statistical techniques			
			and between study			
			groups were			
			considered and			
			accounted for in data			
			evaluation; all			
			reported variability or			
			uncertainty was not			
			likely to have			
			influenced the			
			outcome assessment.			
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			

Data	15. Data	High	Concentration of	1	2	2
Presentation	Reporting		transformation product			
and Analysis			was monitored with			
			suitable analytical			
			methods with sensitive			
			enough detection			
			limits were used.			
	16. Statistical	High	Statistical methods or	1	1	1
	Methods and		kinetic calculations			
	Kinetic		were clearly described			
	Calculations		and address the			
			dataset.			
Other	17. Verification	High	This metric met the	1	1	1
	or Plausibility		criteria for high			
	of Results		confidence as			
			expected for this type			
	10.0017		of study.			
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this			
			study type.	21	10	20
TT' 1		т	Sum of scores:	21	19 0 U.C	30
High	Medium	Low	Overall Score = Sum	1.58	Overall Score	4
			of Weighted		(Rounded):	
			Scores/Sum of Metric			
>1 and <1.7	>1.7 and <2.3	>2.3 and <3	Weighting Factors:		Overall	Unacceptable <sup>1</sup>
$\geq 1$ and $\geq 1.7$	$\geq 1.7$ and $\sim 2.5$	$\geq 2.5$ and $\leq 5$			Quality Level:	Unacceptable
1Spacias spacif	ia biodegradation	a study excluded	Consistent with our Appl	iontion of		view in TSCA
			source receives a score of			
			source receives a score of se, one of the metrics was			
			presented solely to increa			is such, the
study is consid	erea unacceptabl	e and the score is	presented solery to mered	ise transp	areney.	

	chlorofluorocari sediment microc http://dx.doi.org	35Balsiger, C; Holliger, C; Höhener, P. (2005). Reductive dechlorination of chlorofluorocarbons and hydrochlorofluorocarbons in sewage sludge and aquifer sediment microcosms. Chemosphere 61: 361-373. http://dx.doi.org/10.1016/j.chemosphere.2005.02.087. HERO ID: 2773669						
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	Medium	Some details were omitted; however, sufficient data were reported to determine that the deviations and 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		

	Q Ct. T	TT' 1	TTL:	1	1	1
	8. System Type	High	This metric met	1	1	1
	and Design		the criteria for			
			high confidence			
			as expected for			
Test Ores in	0. T. + O.	TT' 1	this type of study.	1	2	2
Test Organisms	9. Test Organism	High	This metric met	1	2	2
	Degradation		the criteria for			
			high confidence			
			as expected for			
	10	NT / / 1	this type of study.	NID		ND
	10. Test	Not rated	The metric is not	NR	NR	NR
	Organism		applicable to this			
	Partitioning	TT . 11	study type.			
Outcome	11. Outcome	Unacceptable	The	4	1	4
Assessment	Assessment		biodegradation of			
	Methodology		perc was not			
			reported.			
	12. Sampling	Medium	Limited sampling	2	1	2
	Methods		method details			
			were reported;			
			however, the			
			omissions were			
			not likely to have			
			had a substantial			
			impact on the			
			study results.			
Confounding/	13. Confounding	High	This metric met	1	1	1
Variable Control	Variables		the criteria for			
			high 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	Unacceptable	The	4	2	8
Presentation and	Reporting		biodegradation of			
Analysis			perc was not			
			reported.			
	16. Statistical	High	The analysis of	1	1	1
	Methods and		data was clearly			
	Kinetic		described.			
	Calculations					
Other	17. Verification or	Not rated	Due to limited	NR	NR	NR
	Plausibility of		information,			
	Results		evaluation of the			
			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:	22	19	31

High	Medium	Low	Overall Score =	1.63	Overall	4
			Sum of		Score	
			Weighted		(Rounded):	
			Scores/Sum of		, ,	
			Metric Weighting			
			Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$			Overall	Unacceptable <sup>1</sup>
					Quality	-
					Level:	

<sup>1</sup>Biodegradation results were not reported for perchloroethylene. 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.

Study Reference:	simulated ana Int 4: 209-216 HERO ID: 17	erobic landfill co 5. http://dx.doi.or /39087	997). Biological degradati onditions in laboratory tes g/10.1007/BF02986348.	st digester	s. Environ Sci	Pollut Res
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	Low	The source and purity of the test substance were not reported nor verified by analytical means.	3	1	3
Test Design	3. Study Controls	Unacceptable	The study did not include or report control groups to validate the system used	4	2	8
	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 (temp); however, sufficient data were presented 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	Unacceptable	The test inoculum was not routinely used for similar study types; degradation capability was not confirmed using controls.	4	2	8
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

$\geq$ 1 and $\leq$ 1./	$\geq 1.7$ and $\geq 2.3$	$\geq 2.5$ and $\leq 5$			Quality Level:	Unacceptable.
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	≥2.3 and ≤3	Weighted Scores/Sum of Metric Weighting Factors:		(Rounded):	Unacceptable <sup>1</sup>
High	Medium	Low	Sum of scores: Overall Score = Sum of	35 2.63	19 Overall Score	50 4
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	of Results	Not roted	of the reasonableness of the study results was not possible.	ND	ND	NID
Other	17. Verification or Plausibility	Not rated	Due to limited information, evaluation	NR	NR	NR
	16. Statistical Methods and Kinetic Calculations	Low	Statistical analysis or kinetic calculations were not fully described, and the omissions may have had a substantial impact on the study results.	3	1	3
Data Presentation and Analysis	15. Data Reporting	Unacceptable	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, and mass balance were not reported.	4	2	8
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Variable Control	Confounding Variables		concentrations of perc initially added were found in the gas phase, attributed to adsorption and rapid decomposition; no validation with quantitative data.			
Confounding/	12. Sampling Methods	Low	sampling and analysis methods of the outcome were not fully reported, and the omissions were likely to have had a substantial impact on the study results. Only very low	3		3
Assessment	Assessment Methodology	Low	unable to be evaluated due to no detail or reference to methods for analysis besides a statement that "standard analytical methods used." Details regarding	3	1	3
Outcome	11. Outcome	Unacceptable	Outcome assessment was	4	1	4

<sup>1</sup>The study did not include or report control groups to validate the system used. 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, four 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:	37Jensen, S; Rosenberg, R. (1975). Degradability of some chlorinated aliphatic hydrocarbons in sea water and sterilized water. Water Res 9: 659-661. HERO ID: 9841							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	,	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 measured analytically.	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.		1	3		
Test Conditions	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 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	Medium	The test system was	2	1	2
	Type and		reported for both			
	Design		open and closed			
	U		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.			
Test	9. Test	Low	The inoculum source	3	2	6
Organisms	Organism		was not routinely	-		-
- <b>B</b>	Degradation		used and was not			
	8		validated for			
			microbial action.			
			The deviation may			
			have had a			
			substantial impact on			
			the study results.			
	10. Test	Not rated	The metric is not	NR	NR	NR
	Organism	1.001.000	applicable to this	1.11	1.11	1.11
	Partitioning		study type.			
Outcome	11. Outcome	Low	This study included	3	1	3
Assessment	Assessment	Low	multiple removal	5	1	5
115505551110110	Methodology		pathways, which			
	Welloadingy		may have limited			
			evaluation of the			
			biodegradation			
			endpoint.			
	12. Sampling	Unacceptable	Serious uncertainties	4	1	4
	Methods	ondeceptuole	or limitations were	•	1	•
	Wiethous		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.			
Confounding/	13.	Low	Leaks were noted;	3	1	3
Variable	Confounding	2011	loss in open systems	5	-	÷
Control	Variables		was attributed to			
			possible			
			volatilization; not			
			controlled or			
			quantified.			
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to	1.0014004	applicable to this	1,11	1.11	1,11
	Exposure		study type.			
			erady type.			

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
			Sum of scores:	32	19	44
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	2.32	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>

<sup>1</sup>Serious uncertainties or limitations were identified in sampling methods of the outcome of interest. In addition, loss from leaks in valves and open test systems were likely to have a substantial impact on the results, making 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:	38ECHA (European Chemicals Agency). (2017). Biodegradation in water: screening tests: Tetrachloroethylene. Helsinki, Finland. Retrieved from https://echa.europa.eu/registration- dossier/-/registered-dossier/14303/5/3/2. HERO ID: 3970784									
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		Metric Score	Metric Weighting Factor	Weighted Score				
Test Substance	1. Test Substance Identity	Medium	Conflicting information about the test substance was provided (unnamed constituent).	2	2	4				
	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	Medium	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				
Conditions	5. Test Method Suitability	Unacceptable	The test method(s) were not well reported. These deviations or lack of information resulted in serious flaws that made the study unusable.	4	1	4				
	6. Testing Conditions	Unacceptable	Modified shake flask study with no details reported to evaluate testing conditions.	4	2	8				
	7. Testing Consistency	Not rated	Not applicable; multiple study groups were not reported.	NR	NR	NR				

	8. System	Unacceptable	Modified shake flask	4	1	4
	Type and Design	onacceptable	study with no system type or design details reported in this	-		-
Test Organisms	9. Test Organism Degradation	Unacceptable	secondary source. The test organism information was not reported in this secondary source; more details may be available in the primary source.	4	2	8
	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	Due to limited information in this secondary source, evaluation of the reasonableness of the outcome assessment methodology was not possible.	NR	NR	NR
	12. Sampling Methods	Unacceptable	Not reported in this secondary source; more details may be available in the primary source.	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	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	Not rated	Not reported.	NR	NR	NR
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:	29 2.8	15 Overall Score (Rounded):	<u>42</u> 4

$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3		Overall	Unacceptable <sup>1</sup>
				<b>Quality Level:</b>	

<sup>1</sup>Testing methods and conditions were not reported and data provided were insufficient to interpret results in this secondary source; citing.

HERO ID 18157, Mudder, T. I. and J. L. Musterman (1982). Abstracts of Papers of the American Chemical Society Development of empirical structure biodegradability relationships and biodegradability testing protocol for volatile and slightly soluble priority pollutants. Kansas City, MO, ACS. 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, five of the metrics were rated as unacceptable. As

such, the study is considered unacceptable and the score is presented solely to increase transparency.

Study	<b>39Dow Chem</b>	Co. (1977). THE IN	HIBITION OF ANAE	ROBIC SI	UDGE GAS					
Reference:			ILOROETHANE, MET			,				
			PERCHLOROETHY			S0517178;				
		8EHQ Num: NA; DCN: 86- 870002089; TSCATS RefID: 309930; CIS: NA).								
	HERO ID: 4213887									
Domain	Metric	Qualitative	Comments	Metric	Metric	Weighted				
		Determination [i.e.,		Score	Weighting	Score				
		High, Medium,			Factor					
		Low, Unacceptable,								
		or Not rated]								
Test Substance		High	The test substance was	1	2	2				
	Substance		identified by chemical							
	Identity		name.							
	2. Test	Low	The source and purity	3	1	3				
	Substance		of the test substance							
	Purity		were not reported or							
			verified by analytical							
			means.							
Test Design	3. Study	High	This metric met the	1	2	2				
	Controls	8	criteria for high	-	_	_				
	0 0111 010		confidence as expected							
			for this type of study.							
	4. Test	High	This metric met the	1	1	1				
	Substance	mgn	criteria for high	1	1	1				
	Stability		confidence as expected							
	Stability		for this type of study.							
Test Conditions	5 Test Method	High	This metric met the	1	1	1				
I est Conditions	Suitability	Ingn	criteria for high	1	1	1				
	Suitability		confidence as expected							
			for this type of study.							
	6. Testing	High	This metric met the	1	2	2				
	Conditions	Ingn	criteria for high	1	2	2				
	Conditions		confidence as expected							
			for this type of study.							
	7 Testing	Iliah	This metric met the	1	1	1				
	7. Testing Consistency	High		1	1	1				
	Consistency		criteria for high							
			confidence as expected							
	0 C	TT' 1	for this type of study.	1	1	1				
	8. System Type	High	This metric met the	1	1	1				
	and Design		criteria for high							
			confidence as expected							
<b>T</b>	0	TT' 1	for this type of study.	1	2	2				
Test	9. Test	High	This metric met the	1	2	2				
Organisms	Organism		criteria for high							
	Degradation		confidence as expected							
	10 5	<b>.</b>	for this type of study.		3.05					
	10. Test	Not rated	The metric is not	NR	NR	NR				
	Organism		applicable to this study							
	Partitioning		type.							
Outcome	11. Outcome	Low	Study described	3	1	3				
Assessment	Assessment		inhibition of gas							
	Methodology		production, not							
			biodegradation.							

	12. Sampling	High	This metric met the	1	1	1
	Methods		criteria for high			
			confidence as expected			
			for this type of study.			
Confounding/	13. Confounding	High	This metric met the	1	1	1
Variable	Variables		criteria for high			
Control			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. Verification	Medium	The extraction recovery	2	1	2
	or Plausibility		was 50%.			
	of Results					
	18. QSAR	Not rated	The metric is not	NR	NR	NR
	Models		applicable to this study			
			type.			
			Sum of scores:	21	20	26
High	Medium	Low	Overall Score = Sum	1.3	<b>Overall Score</b>	2.3
-			of Weighted		(Rounded):	
			Scores/Sum of Metric			
			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:	

Study Reference:	40Cheng, 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	Medium	Purity was not reported but 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	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	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	9. Test		The test inoculum			
Organisms	Organism Degradation		source was reported but was not routinely used for similar study			
		Medium	types; however, the deviation was not likely to have had a substantial impact on the study results.	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	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	Standard deviations were shown in figures but not reported in study.	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	20	26
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:		e in microcosms a	rco, J. (1984). Transfor and groundwater. J Am			
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.	3	1	3
Test Design	3. Study Controls	Medium	A sterile (autoclaved) control group was included in the study.	2	2	4
	4. Test Substance Stability	Medium	The test substance stability and storage 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 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 source of test organisms was 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		Appropriate for identification of			
	Methodology	Medium	potential degradation pathways; however, there may be other pathways.	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 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	Some information was not reported (i.e., mass balance); 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	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	Medium	Loss (at time 0) and gain (at end of study) of test material hindered the validity of the study results.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	30	20	40
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:	42de Bruin, WP; Kotterman, MJ; Posthumus, MA; Schraa, G; Zehnder, AJ. (1992). Complete biological reductive transformation of tetrachloroethene to ethane. Appl Environ Microbiol 58: 1996-2000. HERO ID: 4140300								
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	Low	The study did not include or report control groups; there was no positive or negative control for biodegradation validation.	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	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	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1			
	12. Sampling Methods	Medium	Frequency and timing were omitted; however, the omissions were not likely to have had a substantial impact on the results.	2	1	2			
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR			

<sup>1</sup> The study's o	verall quality rat	ing was downgraded	d. Rationale: No control groups or	validati	on were repor	ted.
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Low <sup>1</sup>
High	Medium	Low	Weighted Scores/Sum of Metric Weighting Factors:	1.42	Score (Rounded):	2.3
			Overall Score = Sum of	19	Overall	21
	18. QSAR Models	Not rated	The metric is not applicable to this study type. Sum of scores:	NR 19	NR 19	NR 27
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
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Data Presentation and Analysis	15. Data Reporting	Medium	The target chemical and transformation product(s) extraction efficiency and percent recovery were not reported; however, these omissions were not likely to have had a substantial impact on the study results	2	2	4
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Study Reference:	43Drzyzga, O; El Mamouni, R; Agathos, SN; Gottschal, JC. (2002). Dehalogenation of chlorinated ethenes and immobilization of nickel in anaerobic sediment columns under sulfidogenic conditions. Environ Sci Technol 36: 2630-2635. http://dx.doi.org/10.1021/es010184x. HERO ID: 1162379								
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 specifically reported; however, a general statement on the chemicals used was made and therefore, the omissions 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	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	Specific results stating degradation rates and/or half- lives were not reported.	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	Low	PCE was not the primary/sole test substance and was added in addition to TCE.	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	Limited analytical data were presented on the specific dehalogenation of PCE.	3	1	3
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	22	20	27
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.35	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:	dechlorinates	tetrachloroethene rg/10.1038/ismej.2 9893	(2010). A Dehalococcoi to trans-1,2-dichloroet 2009.90.			that
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
Test Substance	2. Test Substance Purity	High	The test substance purity and source were reported.	1	1	1
	3. Study Controls	High	Abiotic controls were included in this study.	1	2	2
Test Design	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	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
Test Conditions	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	9. Test Organism Degradation	Medium	The study used enriched cultures.	2	2	4
Organisms	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 regarding this metric; the study described species specific dechlorination.	3	1	3
	12. Sampling Methods	Medium	Limited details were reported regarding this metric.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	High	No confounding variables were noted.	1	1	1

	14. Outcomes Unrelated to	Not rated	The metric is not applicable to this	NR	NR	NR
	Exposure		study type.			
Data	15. Data Reporting	Medium	Limited details were reported regarding this metric.	2	2	4
Presentation and Analysis	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	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
			Sum of scores:	22	20	29
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.45	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>
		ng was downgraded lts was not possibl	d. Rationale: Due to limi e.	ted informat	ion, evaluation	of the

Study Reference:		ene in a continuous	(1998). Biodegradation flow column system. E			
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	Not rated	No controls were reported; however, the basis of this experimental study did not require controls.	NR	NR	NR
	4. Test Substance Stability	Medium	Details regarding this metric were not reported but this did not limit 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	Medium	Some testing conditions were not provided; however, the omissions were not likely to have had a substantial impact on the study results.	2	2	4
	7. Testing Consistency	Not rated	Not applicable; this study evaluated a treatment system.	NR	NR	NR
	8. System Type and Design	Not rated	Not applicable; this study evaluated a treatment system.	NR	NR	NR
Test Organisms	9. Test Organism Degradation	High	The biomass source was 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	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	The sampling was reported and suitable for the study.	1	1	1

Confounding/	13. Confounding		Not applicable; this			
Variable	Variables	Not rated	study evaluated a	NR	NR	NR
Control			treatment system.			
	14. Outcomes		The metric is not			
	Unrelated to	NT / / 1	applicable to this study	ND	ND	ND
	Exposure	Not rated	type; the study	NR	NR	NR
			evaluated a treatment			
D - 4 -	15 D.4		system.			
Data Ducantation	15. Data		This metric met the			
Presentation	Reporting		criteria for high			
and Analysis		High	confidence as expected for this type of study.	1	2	2
			Removal rates were			
			reported.			
	16. Statistical		Kinetic calculations			
	Methods and		were clearly described			
	Kinetic	High	and addressed the	1	1	1
	Calculations		dataset.			
Other	17. Verification		Continuous flow			
Other	or Plausibility		reactor with a sand			
	of Results		column that was fed			
	of Results		PCE and methanol;			
			experiment was more			
			of a treatment system.			
		Low	The study may not be	3	1	3
		Low	relevant to fate and	5	1	5
			environmental			
			degradation and			
			therefore not			
			applicable for a fate			
			assessment.			
	18. QSAR		The metric is not			
	Models	Not rated	applicable to this study	NR	NR	NR
			type.			
			Sum of scores:	15	15	20
			Overall Score = Sum			
Iliah	Madium	Law	of Weighted	1.33	<b>Overall Score</b>	2.2
High	Medium	Low	Scores/Sum of Metric	1.33	(Rounded):	2.3
			Weighting Factors:		, , ,	
$\geq 1$ and $< 1.7$	>1.7 and <2.3	$\geq 2.3$ and $\leq 3$			Overall	Low <sup>1</sup>
$\geq 1$ and $\leq 1.7$	$\geq 1.7$ and $\leq 2.3$	$\geq 2.5$ and $\leq 3$			Quality Level:	LOW
fed PCE and m		it a treatment syste	Rationale: Continuous floem, the study may not be r			

Study Reference:	elimination of Haque (Ed.), E	selected water pol Dynamics, exposur I: Ann Arbor Scie 050	Macek, KJ; Carroll, JJ lutants by bluegill sunf e and hazard assessme nce.	ish (Lepomi	s macrochirus	s). In R
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 Consistency	High	Test conditions were consistent across study groups and aquaria, and exposure conditions were monitored.	1	1	1

Test	<ul><li>8. System Type and Design</li><li>9. Test</li></ul>	High	The test system (modified continual- flow, proportional dilution closed system) was appropriate for the test substance and capable of maintaining the appropriate exposure concentration. The metric is not	1	1	1
Test Organisms	Organism Degradation	Not rated	applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	High	Routine organism was used; details were provided, including source, wet weight and standard length, acclimation details, and physical condition.	1	2	2
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment methodology clearly reported the intended outcome of interest.	1	1	1
	12. Sampling Methods	High	The study used widely accepted methods for the chemical and medium being analyzed; no notable limitations were expected to have influenced the study results.	1	1	1
Confounding/ Variable	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
Control	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	The study reported the mean chemical concentration and the calculated BCF.	1	2	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 $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	$High^1$
<sup>1</sup> This study is re Tetrachloroethy		study, HERO ID 39	970785, Echa. Bioaccum	ulation: aqua	atic/sediment:	

Study Reference:	Determination	of bioconcentratio 33: 865-877. http:/	oe, M; Koshikawa, H; S on potential of tetrachl /dx.doi.org/10.1016/004	oroethylene	in marine alg	
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	Source and purity of the test chemical were reported.	1	1	1
Test Design	3. Study Controls	High	The study employed negative controls, as well as solvent controls, appropriately.	1	2	2
	4. Test Substance Stability	Medium	Limited details were included describing test substance stability; 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	Medium	Target chemical concentrations were greater than the aqueous solubility, but these deviations were not likely to have had a substantial impact on the results.	2	1	2
	6. Testing Conditions	Medium	Limited details were provided describing test conditions, although temperature and light:dark cycles were provided.	2	2	4
	7. Testing Consistency	High	Test conditions were consistent across sample groups, and exposure conditions were documented.	1	1	1
	8. System Type and Design	High	The system design was capable of maintaining appropriate test substance concentrations.	1	1	1

Test	9. Test		The metric is not			
Organisms	Organism Degradation	Not rated	applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	High	The strains and source of the test organism (algae) were provided.	1	2	2
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment methodology addressed the intended outcomes of interest.	1	1	1
	12. Sampling Methods	High	Sampling methods were adequately described and employed standard approaches for the chemical and media addressed.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	Not rated	Sources of uncertainty and variability were 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	High	Data were adequately reported, including measurement precision, algae growth curves compared to controls, concentrations, and BCFs.	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	Medium	Value in text (101) and table (118) did not match.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	18	19	24
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.26	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:	Determination	of bioconcentratio 33: 865-877. http:/	oe, M; Koshikawa, H; S on potential of tetrachl /dx.doi.org/10.1016/004	oroethylene	in marine alg	
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	Source and purity of the test chemical were reported.	1	1	1
Test Design	3. Study Controls	High	The study employed negative controls, as well as solvent controls, appropriately.	1	2	2
	4. Test Substance Stability	Medium	Limited details were included describing test substance stability; 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	Medium	Target chemical concentrations were greater than the aqueous solubility, but these deviations were not likely to have a substantial impact on results.	2	1	2
	6. Testing Conditions Medium	Limited details were provided describing test conditions, although temperature and light:dark cycles were provided.	2	2	4	
	7. Testing Consistency	High	Test conditions were consistent across sample groups, and exposure conditions were documented.	1	1	1
	8. System Type and Design	High	The system design was capable of maintaining appropriate test substance concentrations.	1	1	1

Test	9. Test		The metric is not			
Organisms	Organism	Not rated	applicable to this study	NR	NR	NR
-	Degradation		type.			
	10. Test		The strains and source			
	Organism	High	of the test organism	1	2	2
	Partitioning		(algae) were provided.			
Outcome	11. Outcome		The outcome			
Assessment	Assessment		assessment			
	Methodology	High	methodology	1	1	1
			addressed the intended			
			outcomes of interest.			
	12. Sampling		Sampling methods			
	Methods		were adequately			
			described and			
		High	employed standard	1	1	1
			approaches for the			
			chemical and media			
			addressed.			
Confounding/	13. Confounding		Sources of uncertainty			
Variable	Variables	Not rated	and variability were	NR	NR	NR
Control		Not lated	not applicable to this			
			study type.			
	14. Outcomes		The metric is not			
	Unrelated to	Not rated	applicable to this study	NR	NR	NR
	Exposure		type.			
Data	15. Data		Data were adequately			
Presentation	Reporting		reported, including			
and Analysis			measurement			
		High	precision, algae	1	2	2
		ing.	growth curves	-	_	-
			compared to controls,			
			concentrations, and			
	16 0 1 1		BCFs.			
	16. Statistical		This metric met the			
	Methods and	High	criteria for high	1	1	1
	Kinetic	•	confidence as expected			
Other	Calculations 17. Verification		for this type of study. This metric met the		+	
other	or Plausibility					
	of Results	High	criteria for high confidence as expected	1	1	1
	of Results	-				
	18. QSAR		for this type of study. The metric is not		+ +	
	Nodels	Not rated	applicable to this study	NR	NR	NR
	widdeis	INOI TAICU	type.	INK	INK	INK
	+ +		Sum of scores:	17	19	23
			Overall Score = Sum	1/	17	23
			of Weighted		<b>Overall Score</b>	
High	Medium	Low	Scores/Sum of Metric	1.21	(Rounded):	1.2
			Weighting Factors:		(Itounucu).	
$\geq 1$ and $< 1.7$			, englishing i detorist		Overall	
	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$				High

Study Reference:	Japan: An app http://dx.doi.or	roach to structur rg/10.1016/0147-6	nces with the test scher e-activity correlations. 513(80)90046-9.			
Domain	HERO ID: 194 Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	Not rated] High	The test substance was identified by chemical name and CASRN.	1	2	2
	2. Test Substance Purity	Medium	Not reported; however, this was not expected to have had a substantial impact on the interpretation of the results.	2	1	2
Test Design       3. Study Controls         4. Test         Substance         Stability		Medium	Not reported; however, the book source for this test method indicates appropriate use of controls.	2	2	4
	Substance	Medium	Not reported; however, this omission was not likely 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	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 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	High	This metric met the criteria for high confidence as	1	2	2

$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High <sup>1</sup>
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.39	Overall Score (Rounded):	1.4
			Sum of scores:	18	18	25
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Other	17. Verification or Plausibility of Results	High	Reliable source; test details can be found in referenced book.	1	1	1
	16. Statistical Methods and Kinetic Calculations	Not rated	No statistical methods or kinetic calculations were reported.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Limited details were reported; however, further investigation of original book source provided details.	2	2	4
Control	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Confounding/ Variable	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	12. Sampling Methods	Medium	Not reported; however, this omission was not likely to have influenced the results.	2	1	2
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
			expected for this type of study. The organism was routinely used for this method.			

Study Reference:	50Dow Chem Co. (1973). UPTAKE, CLEARANCE AND BIOCONCENTRATION OF DOW-PER (PERCHLOROETHYLENE) IN RAINBOW TROUT, SALMO GAIRDNERI RICHARDSON. (OTS: OTS0517166; 8EHQ Num: NA; DCN: 86-870002077; TSCATS RefID: 309906; CIS: NA). HERO ID: 4214291							
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	Test substance identified by chemical name and CASRN.	1	2	2		
	2. Test Substance Purity	High	The test substance source was reported.	1	1	1		
Test Design 3. Stud	3. Study Controls	Medium	A concurrent negative control group was included in the study; however, control data were not reported.	2	2	4		
	4. Test Substance Stability Medium	Medium	The test substance stability and storage conditions were not reported; however, these factors were not likely to have had a substantial impact on the test results.	2	1	2		
Test Conditions	5. Test Method Suitability	High	Test method was suitable for the test substance.	1	1	1		
	6. Testing Conditions	High	Test conditions were monitored and reported, including temperature and dissolved oxygen.	1	2	2		
<ul><li>7. Testing Consistency</li><li>8. System Type and Design</li></ul>	High	Test conditions were consistent across samples/study groups. Exposure conditions were documented.	1	1	1			
		High	The test system and design (proportional dilution apparatus) was capable of appropriately maintaining substance concentration.	1	1	1		
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR		

$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.53	Overall Score (Rounded):	1.6
	Models	Not rated	applicable to this study type. Sum of scores:	NR 20	NR 19	NR 29
Other	17. Verification or Plausibility of Results 18. QSAR	Medium	No analytical details were provided; therefore, it was hard to interpret the results. The metric is not	2	1	2
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Data Presentation and Analysis	15. Data Reporting	Low	Analytical method was not reported; lipid content or lipid normalized BCF was not reported. Chemical concentrations in water were reported for each time period.	3	2	6
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Confounding/ Variable Control	13. Confounding Variables	Not rated	Not applicable; uncertainty and variability were not addressed in the study.	NR	NR	NR
	12. Sampling Methods	High	Sampling methods used addressed the outcome of interest and were widely accepted.	1	1	1
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment methodology addressed the intended outcome of interest.	1	1	1
-	10. Test Organism Partitioning	Medium	The test organism was a routine species commonly used in similar studies; however, minimal details were provided aside from length.	2	2	4

Study Reference:	bioconcentrati http://dx.doi.or	51Neely, WB; Branson, DR; Blau, GE. (1974). Partition coefficient to measure bioconcentration potential of organic chemicals in fish. Environ Sci Technol 8: 1113- 1115. http://dx.doi.org/10.1021/es60098a008. HERO ID: 18737								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score				
	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2				
	2. Test Substance Purity	High	The purity of the test substance was confirmed by analytical methods.	1	1	1				
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 not reported but this did not limit the interpretation of the results.	2	1	2					
Test Conditions	5. Test Method Suitability	Medium	Test method was described elsewhere; additional investigation would need to be performed to accurately rate this metric.	2	1	2				
	6. Testing Conditions	Medium	Information regarding this metric was limited; the method was described elsewhere; omissions were not likely to have had an impact on the study results. Concentration of test material not reported, may be in the test method source.	2	2	4				
	7. Testing Consistency	High	Duplicate/consistent tests were run for two concentrations.	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		The metric is not			
Organisms	Organism	Not rated	applicable to this study	NR	NR	NR
9.1	Degradation		type.			
	10. Test		Information was			
	Organism	High	reported; routine test	1	2	2
	Partitioning	U	organism was used.			
Outcome	11. Outcome		The outcome of			
Assessment	Assessment		interest and its basis			
	Methodology		were reported; the			
	0.		final BCF was			
			calculated from two			
			separate experiments	2		2
		Medium	at two different	2	1	2
			exposure			
			concentrations that			
			were not reported.			
			Results were			
		interpretable.				
	12. Sampling		Details regarding this			
	Methods		metric were limited			
		Medium	but not likely to have	2	1	2
			had a substantial			
			impact on the results.			
Confounding/	13. Confounding		Sources of variability			
Variable	Variables	Not rated	and uncertainty in the	NR	NR	NR
Control		Not fated	measurements were	INIX	INIX	MX
			not reported.			
	14. Outcomes		The metric is not			
	Unrelated to	Not rated	applicable to this study	NR	NR	NR
	Exposure		type.			
Data	15. Data		Lipid normalized BCF			
Presentation	Reporting		was not reported;			
and Analysis			concentration-specific			
		Low	endpoint data were not	3	2	6
			included; precise			
			interpretation of the			
	16 0		results may be limited.			
	16. Statistical		Average of two			
	Methods and		different exposure			
	Kinetic		levels were reported.			
	Calculations	Medium	Some details were	2	1	2
		Medium	omitted; however, these omissions were	2	1	2
			not likely to have had			
			a substantial impact on			
Other	17. Verification		the study results. This metric met the			
Other			criteria for high			
	or Plausibility of Results	High	confidence as expected	1	1	1
	of Results		for this type of study.			
			for this type of study.			

	18. QSAR Models	Not rated	The experimental data in this paper was used to create a linear regression between log Kow and log BCF for use in estimating BCF.	NR	NR	NR
			Sum of scores:	23	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:	organic chemi chemicals in t	icals: an experimen he ecoshpere by m 14: 1589-1616.	r, H; Korte, F. (1985). I ntal method for the asso eans of simple laborato	essment of t	he behaviour	of organic
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 a statement indicating that some test substances were bought, and some were synthesized in the lab.	3	2	6
	2. Test Substance Purity	Low	The source and purity of the test substance 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	Medium	The test organism was a routine species commonly used in similar studies; however, minimal details were provided.	2	2	4

Outcome	11. Outcome		Little to no			
Assessment	Assessment		information was			
	Methodology	Not rated	provided but may be	NR	NR	NR
			available in referenced			
			sources.			
	12. Sampling		No information was			
	Methods	Not rated	provided but may be	NR	NR	NR
		1.0014004	available in referenced	1.11	1.11	1.11
			sources.			
Confounding/	13. Confounding	Not rated	No confounding	NR	NR	NR
Variable	Variables		variables were noted.			
Control	14. Outcomes	Not usted	No information was	ND	ND	ND
	Unrelated to	Not rated	provided.	NR	NR	NR
Data	Exposure 15. Data		A single data point			
Data Presentation	Reporting	Medium	(BCF = 90) was	2	2	4
and Analysis	Reporting	Medium	provided.	2	2	4
and 7 mary 515	16. Statistical		Little to no			
	Methods and		information was			
	Kinetic	Not rated	provided.	NR	NR	NR
	Calculations		provident			
Other	17. Verification		Little to no			
	or Plausibility		information was			
	of Results	Not rated	provided; therefore, it	NR	NR	NR
			was difficult to			
			interpret the results.			
	18. QSAR		The metric is not			
	Models	Not rated	applicable to this study	NR	NR	NR
			type.	10		
			Sum of scores:	18	11	33
			Overall Score = Sum		Overall	
High	Medium	Low	of Weighted	3	Score	4
U			Scores/Sum of Metric		(Rounded):	
			Weighting Factors:		Overall	
≥1 and <1.7	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$			Quality	Unacceptable
<u>_1 and &lt;1.</u> /	<u>_1.7 and </u> _2.3	<u>~</u> 2.5 and <u>~</u> 5			Level:	Chaeceptable
						1

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:	hydrocarbons http://dx.doi.c	53Dickson, AG; Riley, JP. (1976). The distribution of short-chain halogenated aliphatic hydrocarbons in some marine organisms. Mar Pollut Bull 7: 167-169. http://dx.doi.org/10.1016/0025-326X(76)90212-5. HERO ID: 58130							
Domain	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	Medium	Source and purity were not reported or verified; 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	Data for study controls were not included.	NR	NR	NR			
	4. Test Substance Stability	Not rated	The test substance preparation and storage conditions were not reported; however, these factors were not likely to have had a substantial impact on the study results.	NR	NR	NR			
Test Conditions	5. Test Method Suitability	Medium	The test method was not suited well for precise understanding/measurement of bioconcentration.	2	1	2			
	6. Testing Conditions	Unacceptable	Test substance concentration in sea water was not detailed.	4	2	8			
	7. Testing Consistency	Not rated	The metric is not applicable to this study type (monitoring study).	NR	NR	NR			
	8. System Type and Design	Medium	Concentrations were measured in biota only and not in waters where biota were collected.	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	Test organisms were reported; however, this metric is not applicable to this study type (monitoring study).	NR	NR	NR			
Outcome Assessment	11. Outcome Assessment Methodology	Low	BAF/BCF were not reported.	3	1	3			

$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Unacceptable <sup>1</sup>
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	2.75	Overall Score (Rounded):	4
			Sum of scores:	24	12	33
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Other	17. Verification or Plausibility of Results	Not rated	Omitted details hindered the evaluation of the validity of the results.	NR	NR	NR
	16. Statistical Methods and Kinetic Calculations	Not rated	Statistical analysis or kinetic calculations were not described.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Unacceptable	substantial impact on the results, resulting in serious flaws that made the study unusable.	4	2	8
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Confounding/ Variable Control	13. Confounding Variables	Medium	Sources of variability and uncertainty in the measurements were reported in the study and were not likely to have had a substantial impact on the study results.	2	1	2
	12. Sampling Methods	Unacceptable	Serious uncertainties or limitations were identified in sampling methods were likely to have had a substantial impact on the results.	4	1	4

determine the study to be unacceptable. In this case, three 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:		Acconnell, G. (1975 Proc Biol Sci 189: 3 62		and C2 hy	drocarbons in	the marine
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 purity and source 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	Low	The study did not include or report control groups.	3	2	6
	4. Test Substance Stability	Medium	Details regarding this metric were not reported.	2	1	2
Test Conditions	5. Test Method Suitability	Unacceptable	The test method was not described.	4	1	4
	6. Testing Conditions	Low	Details regarding this metric were very limited if present at all.	3	2	6
	7. Testing Consistency	Medium	Test conditions were consistent; however, all conditions were not clearly reported.	2	1	2
	8. System Type and Design	Medium	Details regarding this metric were not reported and said to be similar to acute toxicity studies.	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	Unacceptable	Details regarding this metric were not reported.	4	2	8
Outcome Assessment	11. Outcome Assessment Methodology	Low	Details regarding this metric were limited or unclear.	3	1	3

	12. Sampling Methods	Unacceptable	Details regarding this metric were not reported.	4	1	4
Confounding/ Variable Control	13. Confounding Variables	Low	Details regarding this metric were limited or unclear.	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	Lipid normalized BCF was not reported.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Low	Details regarding this metric were limited or unclear.	3	1	3
Other	17. Verification or Plausibility of Results	Low	Details regarding this metric were limited or unclear.	3	1	3
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	41	20	54
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	2.7	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>
Systematic Rev Unacceptable (s	iew in TSCA Risk score = 4), EPA wi	Evaluations docur Il determine the stu	sampling and organis nent, if a metric for udy to be unacceptable ed unacceptable and	a data sourcole. In this c	stent with our A ce receives a sc case, three of th	ore of e metrics were

Study Reference:	volatile chlorina latipes]. Jpn J T http://dx.doi.org	54Saisho, K; Hasegawa, Y; Saeki, M; Toyoda, M; Saito, Y. (1994). [Bioaccumulation of volatile chlorinated hydrocarbons in blue mussel, Mytilus edulis and killifish, Oryzias latipes]. Jpn J Toxicol Environ Health 40: 274-278. http://dx.doi.org/10.1248/jhs1956.40.274. HERO ID: 2803478							
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	Not rated	Not applicable, foreign language paper.	NR	NR	NR			
	2. Test Substance Purity	Not rated	Not applicable, foreign language paper.	NR	NR	NR			
Test Design	3. Study Controls	Not rated	Not applicable, foreign language paper.	NR	NR	NR			
	4. Test Substance Stability	Not rated	Not applicable, foreign language paper.	NR	NR	NR			
Test Conditions	5. Test Method Suitability	Not rated	Not applicable, foreign language paper.	NR	NR	NR			
	6. Testing Conditions	Not rated	Not applicable, foreign language paper.	NR	NR	NR			
	7. Testing Consistency	Not rated	Not applicable, foreign language paper.	NR	NR	NR			
	8. System Type and Design	Not rated	Not applicable, foreign language paper.	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	Details regarding this metric were not reported.	NR	NR	NR			
Outcome Assessment	11. Outcome Assessment Methodology	Not rated	Details regarding this metric were limited or unclear.	NR	NR	NR			
	12. Sampling Methods	Not rated	Details regarding this metric were not reported.	NR	NR	NR			
Confounding/ Variable Control	13. Confounding Variables	Not rated	Details regarding this metric were limited or unclear.	NR	NR	NR			
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR			

Data	15. Data		Lipid normalized			
Presentation	Reporting	Not rated	BCF was not	NR	NR	NR
and Analysis			reported.			
	16. Statistical Methods and Kinetic Calculations	Not rated	Details regarding this metric were limited or unclear.	NR	NR	NR
Other	17. Verification or Plausibility of Results	Not rated	Details regarding this metric were limited or unclear.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	0	0	0
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:		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>

<sup>1</sup>Foreign language paper with abstract and data tables in English. Full text article review needed when available in English. 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, all of the metrics were not able to be rated. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

Study	U.S. EPA (U.S.	<b>Environmental Prot</b>	ection Agency). (1987). Atm	ospheri	c persistence	of eight				
Reference:	air toxics [EPA Report]. (EPA-600/3-87/004). Research Triangle Park, NC.									
		HERO ID: 17582								
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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; this study reported a calculation.	NR	NR	NR				
Test Design	3. Study Controls	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR				
	4. Test Substance Stability		Not applicable; this study reported a calculation.	NR	NR	NR				
Test Conditions	5. Test Method Suitability	High	Appropriate calculation method was applied.	1	1	1				
	6. Testing Conditions	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR				
	7. Testing Consistency	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR				
	8. System Type and Design	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR				
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	Appropriate results based on a calculation.	1	1	1				
	12. Sampling Methods	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR				
Confounding/ Variable	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR				
Control	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	Results were based on a calculation. The Arrhenius rate constant equation was not measured or calculated in this report but was obtained from a reputable source.	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	Not rated	The metric is not applicable	NR	NR	NR
	Models		to this study type.			
			Sum of scores:	7	8	9
High	Medium	Low	<b>Overall Score = Sum of</b>	1.12	Overall	1.1
			Weighted Scores/Sum of		Score	
			<b>Metric Weighting Factors:</b>		(Rounded):	
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$			Overall	High
					Quality	-
					Level:	

Study Reference:	55Pearson, CR; Mcconnell, G. (1975). Chlorinated C1 and C2 hydrocarbons in the marine environment. Proc Biol Sci 189: 305-332.							
Reference:	HERO ID: 750		005-332.					
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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 purity and source of the test substance was not provided.	2	1	2		
Test Design	3. Study Controls	Unacceptable	Study controls were not reported.	4	2	8		
	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	Low	The test method was not well described.	3	1	3		
	6. Testing Conditions	Unacceptable	Testing conditions were not reported, and data provided were very general; concentration of test material was not specified. Ambient air used for experiment was not subject to any pretreatment or analysis; climate and conditions were not controlled.	4	2	8		
	7. Testing Consistency	Low	Tests were consistent, yet results would be hard to reproduce based on test method.	3	1	3		
	8. System Type and Design	Medium	Details were omitted regarding the test system and design; however, this was not likely to have influenced the results.	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	11. Outcome	Low	The assessment	3	1	3
Assessment	Assessment		methodology did not			
	Methodology		address or report the			
			outcome of interest;			
			analytical methods			
			were not reported.			
	12. Sampling	Unacceptable	Sampling methods	4	1	4
	Methods		were not reported.			
Confounding/	13. Confounding	Medium	Author noted that	2	1	2
Variable Control	Variables		reproducibility was			
			very low due to			
			climate variations.			
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
	Exposure		study type.			
Data	15. Data	Low	There was insufficient	3	2	6
Presentation	Reporting		evidence presented to			
and Analysis			confirm that parent			
			compound			
			disappearance was not			
			likely due to some			
			other process.			
	16. Statistical	Not rated	Statistical analysis or	NR	NR	NR
	Methods and		kinetic calculations			
	Kinetic		were not reported.			
	Calculations		_			
Other	17. Verification	Not rated	Due to limited	NR	NR	NR
	or Plausibility		information,			
	of Results		evaluation of the			
			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.			
						15
			Sum of scores:	33	16	45
High	Medium	Low	Sum of scores: Overall Score = Sum	33 2.81	16 Overall Score	45
High	Medium	Low				
High	Medium	Low	Overall Score = Sum		<b>Overall Score</b>	
High	Medium	Low	Overall Score = Sum of Weighted		<b>Overall Score</b>	
High 1 and <1.7	Medium ≥1.7 and <2.3	Low $\geq 2.3 \text{ and } \leq 3$	Overall Score = Sum of Weighted Scores/Sum of Metric		<b>Overall Score</b>	
			Overall Score = Sum of Weighted Scores/Sum of Metric		Overall Score (Rounded):	4
1 and <1.7	≥1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3	Overall Score = Sum of Weighted Scores/Sum of Metric	2.81	Overall Score (Rounded): Overall Quality Level:	4 Unacceptable <sup>1</sup>
1 and <1.7 <sup>1</sup> Testing condition	$\geq$ 1.7 and $<$ 2.3	$\geq$ 2.3 and $\leq$ 3 ted, and data provide	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	2.81	Overall Score (Rounded): Overall Quality Level: ation of test ma	4 Unacceptable <sup>1</sup> terial not
1 and <1.7 <sup>1</sup> Testing condition specified. Ambien	$\geq$ 1.7 and <2.3 is were not report at air used for exp	$\geq$ 2.3 and $\leq$ 3 ted, and data provide periment was not su	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors: ded were very general; co	2.81	Overall Score (Rounded): Overall Quality Level: ation of test ma ilysis; climate a	4 Unacceptable <sup>1</sup> terial not nd conditions
1 and <1.7 <sup>1</sup> Testing condition specified. Ambien were not controlle	$\geq$ 1.7 and <2.3 as were not report at air used for exp ed. Consistent wit	$\geq$ 2.3 and $\leq$ 3 ted, and data provide periment was not such our Application	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors: ded were very general; co ibject to any pretreatmen of Systematic Review in	2.81 oncentr t or ana TSCA	Overall Score (Rounded): Overall Quality Level: ation of test ma ilysis; climate a Risk Evaluation	4 Unacceptable <sup>1</sup> terial not ind conditions ins document, if
1 and <1.7 <sup>1</sup> Testing condition specified. Ambien were not controlle a metric for a data	$\geq$ 1.7 and $<$ 2.3 ns were not report at air used for exp ed. Consistent wit a source receives	$\geq$ 2.3 and $\leq$ 3 ted, and data provident was not such our Application of a score of Unacception of the score	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors: ded were very general; co ibject to any pretreatmen	2.81 oncentr t or ana TSCA rill dete	Overall Score (Rounded): Overall Quality Level: ation of test ma ilysis; climate a Risk Evaluation rmine the study	4 Unacceptable <sup>1</sup> terial not ind conditions ins document, if t to be

Study Reference:	56Chodola, GR; Biswas, N; Bewtra, JK; St. Pierre, CC; Zytner, RG. (1989). Fate of selected volatile organic substances in aqueous environment. Water Pollut Res J Can 24: 119-142. HERO ID: 4140427							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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	A control for error evaluation was performed at 40 °C.	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	Not rated	This metric met the criteria for high confidence as expected for this type of study.	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	Medium	An experimental error of 5% was determined from data gathered at 40 degrees C.	2	1	2		

	12. Sampling Methods	Medium	Some details regarding this metric were not reported; however, the omissions were unlikely to have hindered the interpretation of	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Not rated	results. 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 data were not reported (i.e., mean values 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	Experimental error of 5% determined from data gathered at 40 °C; however, the data were not included.	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	16	23
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.44	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
The evaluation	is for the hydrolys	is study reported b	y Chodola et al. 1989.			

Study Reference:	57Shirayama, 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.								
Domain	HERO ID: 35 Metric	44747 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 study did not include or report control groups; 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	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. I 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	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):	1.3
$\geq 1$ and $< 1.7$	$\geq 1.7 \text{ and } \leq 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	methylene chl tetrachloroeth Sci Technol 9 HERO ID: 58	oride, chloroform, ylene, and other cl : 833-838. http://dx 054	Kallos, GJ. (1975). Evap 1,1,1-trichloroethane, t 1lorinated compounds i .doi.org/10.1021/es6010	richloroet n dilute ac 7a008.	hylene, queous solutio	ns. Environ
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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	Test substance purity and source not reported; however, MS analysis performed at start of study, m/z corresponds to tetrachloroethylene.	2	1	2
Test Design	3. Study Controls	Not rated	Study controls were not reported for the hydrolysis study. Methanol was used as a co-solvent.	NR	NR	NR
	4. Test Substance Stability	High	The test substance preparation was reported, and MS analysis was performed at start 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	Water was purged 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.	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		Not rated	The metric is not	NR	NR	NR
	Organism		applicable to this study			
	Degradation		type.			
	10. Test	Not rated	The metric is not	NR	NR	NR
	Organism		applicable to this study			
	Partitioning		type.			
Outcome	11. Outcome	High	The outcome of	1	1	1
Assessment	Assessment		interest and its basis			
	Methodology		were reported.			
	12. Sampling	Medium	Details regarding this	2	1	2
	Methods		metric were limited but			
			this did not limit the			
			interpretation of the			
			results.			
Confounding/	13.	Medium	Transformation	2	1	2
Variable	Confounding		products were			
Control	Variables		assumed; however,			
			they were never			
			determined			
			experimentally.			
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this study			
	Exposure		type.			
Data	15. Data	Medium	Transformation	2	2	4
Presentation	Reporting		products were not			
and Analysis			identified.			
	16. Statistical	Medium	Statistical methods or	2	1	2
	Methods and		kinetic calculations			
	Kinetic		were not reported.			
	Calculations					
Other	17. Verification	High	This metric met the	1	1	1
	or Plausibility		criteria for high			
	of 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:	18	16	22
High	Medium	Low	<b>Overall Score = Sum</b>	1.38	<b>Overall Score</b>	1.4
			of Weighted		(Rounded):	
			Scores/Sum of 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:	59Doong, RA; Wu, SC. (1992). Reductive dechlorination of chlorinated hydrocarbons in aqueous solutions containing ferrous and sulfide ions. Chemosphere 24: 1063-1075. http://dx.doi.org/10.1016/0045-6535(92)90197-Y. HERO ID: 3561878								
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	Medium	Details regarding this metric were not reported but this did not limit 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	There were omissions in the test condition reporting (light source not specified).	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			

	12. Sampling Methods	Medium	Limited details regarding this metric were reported; however, the omissions were unlikely to have hindered the interpretation of 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	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	17	22
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.29	Overall Score (Rounded):	1.3
$\geq 1$ and $\leq 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	60Chodola, GR; Biswas, N; Bewtra, JK; St. Pierre, CC; Zytner, RG. (1989). Fate of selected volatile organic substances in aqueous environment. Water Pollut Res J Can 24: 119-142. HERO ID: 4140427							
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 Assessment	11. Outcome Assessment Methodology	Medium	Details regarding this metric were limited; all data points were not reported; however, this did not hinder the interpretation of the study results.	2	1	2		

	12. Sampling	Medium	Sampling methods were	2	1	2
	Methods		not reported.			
Confounding/	13.	Not rated	No confounding variables	NR	NR	NR
Variable Control			were noted.			
	Variables					
	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 for			
	Calculations		this type of study.			
Other	17. Verification	High	This metric met the	1	1	1
	or Plausibility		criteria for high			
	of 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:	15	17	19
High	Medium	Low	Overall Score = Sum of	1.12	Overall	1.1
			Weighted Scores/Sum of		Score	
			Metric Weighting		(Rounded):	
			Factors:			
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq 2.3$ and $\leq 3$			Overall	High
					Quality	
					Level:	
The evaluation is f	or the photolysis	in water study repor	ted by Chodola et al. 1989.			

Study Reference:	methylene chl tetrachloroeth Environ Sci T HERO ID: 58	61Dilling, 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							
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.	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	Not rated	The metric is not	NR	NR	NR
	Organism		applicable to this study			
	Partitioning		type.			
Outcome	11. Outcome	High	The outcome of interest	1	1	1
Assessment	Assessment	-	and its basis were			
	Methodology		reported.			
	12. Sampling	Medium	Sampling methods were	2	1	2
	Methods		omitted. Sampling timing was suitable.			
Confounding/	13.	High	This metric met the	1	1	1
Variable Control	Confounding	e	criteria for high			
	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	Medium	Transformation products	2	2	4
Presentation	Reporting		were not identified.			
and Analysis	16. Statistical	Medium	Statistical methods or	2	1	2
	Methods and		kinetic calculations were			
	Kinetic		not reported.			
	Calculations					
Other	17. Verification	High	This metric met the	1	1	1
	or Plausibility		criteria for high			
	of 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:	18	18	25
High	Medium	Low	Overall Score = Sum of	1.33	Overall	1.3
			Weighted Scores/Sum of		Score	
			Metric Weighting		(Rounded):	
			Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall	High <sup>1</sup>
					Quality	
1					Level:	
<sup>1</sup> Related HERO II	D 3970783, Echa	1. Phototransforma	tion in water: Tetrachloroeth	ylene. 2	017.	

Study Reference:	62Jeffers, PM; Ward, LM; Woytowitch, LM; Wolfe, NL. (1989). Homogeneous Hydrolysis Rate Constants for Selected Chlorinated Methanes Ethanes Ethenes and Propanes.								
		echnol 23: 965-969	. http://dx.doi.org/10.10						
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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	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	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
			Sum of scores:	22	18	30
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.67	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:	of VOCs and B	3OM: Oxic and an ·g/10.1016/0043-13	uidan, MT; Speth, T oxic environments. 854(94)90166-X.			
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 (reagent grade) were reported.	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	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	High	Testing conditions were reported and appropriate for the method.	1	2	2
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1

Test Organisms	9. Test		The metric is not			
	Organism Degradation	Not rated	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 assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	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	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	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:	17	18	23

High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.28	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:	degradation pr	oducts on natural g/10.1016/j.chemo	nolm, MM. (2011). Sorp clayey tills. Chemospho sphere.2011.03.007.			nts and
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 not reported, although it may be available in the supplemental information.	2	1	2
	3. Study Controls	Medium	Control group details were not included; however, it may be found in the Supp Info.	2	2	4
	4. Test Substance Stability	High	The test substance preparation was reported.	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	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 Type and Design	High	The system type and design were capable of appropriately maintaining substance concentrations.	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 assessment was appropriate for this study.	1	1	1

$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.35	Overall Score (Rounded):	1.4
			Sum of scores:	17	17	23
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
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
	16. Statistical Methods and Kinetic Calculations	Not rated	No statistical methods or kinetic calculations (due to rapid equilibration) were reported.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Some details were in the supporting document, which was not readily available.	2	2	4
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Confounding/ Variable Control	13. Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	12. Sampling Methods	Medium	Limited details regarding this metric were reported; however, the omissions were unlikely to have hindered interpretation of the results.	2	1	2

Study Reference:	practical measured	urement strategy t Ground Water Mo 3.x.	oung, S; Feenstra, S; W o estimate nonlinear ch onit Remediat 33: 87-96	lorinated so	olvent sorption	n in low
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	Control experiments were performed.	1	2	2
	4. Test Substance Stability	High	The test substance stability was considered in this study and test substance preparation was reported.	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	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 Type and Design	High	The system type and design were capable of appropriately maintaining substance concentrations.	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 assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	The sampling was suitable for the study.	1	1	1

Confounding/	13.		Sources of variability			
Variable Control	Confounding Variables	High	and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation	15. Data Reporting	High	A sorption data set (foc, kd) was reported.	1	2	2
and Analysis	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:	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:	wastewater sol	ids: Correlation wi .doi.org/10.1021/es 0494	R. (1989). Sorption of t ith fundamental proper 00067a004.			
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 test substance specific source and purity not clearly reported.	2	1	2
Test Design	3. Study Controls	Medium	Minor loss was indicated in concentrations reported for equilibration experiments with standards and whole samples; the discussion indicated that no significant loss was due to volatilization or biodegradation and differences were discussed.		2	4
	4. Test Substance Stability	High	The test substance stability was considered in this 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	Testing conditions were reported and appropriate for the method.	1	2	2
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	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		The outcome			
Assessment	Assessment Methodology	High	assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	Medium	Some details were limited; however, this did not limit the interpretation of the results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	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 for PCE over time 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	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 Reference:	sediments, and	soil under unsatu bi.org/10.1021/es00 3271	Desorption of haloger rated conditions. 1. Isot 050a009.			
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	The study did not require concurrent control groups.	NR	NR	NR
	4. Test Substance Stability	High	Test substance stability was considered in this 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	Medium	Some details were limited; however, this did not limit the interpretation of the results.	2	2	4
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	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 assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	Medium	Some details were limited; however, this did not limit the interpretation of the results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Not rated	Not applicable; this study evaluated an experimental system.	NR	NR	NR

$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.2	Overall Score (Rounded):	1.2
			Sum of scores:	14	15	18
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
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
and Analysis	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Data Presentation	15. Data Reporting	High	Desorption isotherms were reported.	1	2	2
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Study Reference:	sediments, and	soil under unsatu bi.org/10.1021/es00 3271	). Desorption of haloger rated conditions. 1. Isot 050a009.			
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	The study did not require concurrent control groups.	NR	NR	NR
	4. Test Substance Stability	High	Test substance stability was considered in this 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	Medium	Some details were limited; however, this did not limit the interpretation of the results.	2	2	4
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	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 assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	Medium	Some details were limited; however, this did not limit the interpretation of the results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Not rated	Not applicable; this study evaluated an experimental system.	NR	NR	NR

	14. Outcomes		The metric is not			
	Unrelated to	Not rated	applicable to this study	NR	NR	NR
	Exposure		type.			
Data	15. Data	High	Desorption isotherms	1	2	2
Presentation	Reporting	riigii	were reported.	1	2	Z
and Analysis	16. Statistical		The analysis of data			
	Methods and	High	was clearly described.	1	1	1
	Kinetic	rigii		1	1	1
	Calculations					
Other	17. Verification		This metric met the			
	or Plausibility	Iliah	criteria for high	1	1	1
	of Results	High	confidence as expected			1
			for this type of study.			
	18. QSAR		The metric is not			
	Models	Not rated	applicable to this study	NR	NR	NR
			type.			
			Sum of scores:	14	15	18
			<b>Overall Score = Sum</b>		Overall	
High	Medium	Low	of Weighted	1.2	Score	1.2
111gii	iviourum	1011	Scores/Sum of Metric	1.2	(Rounded):	1.2
			Weighting Factors:		````	
					Overall	
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$			Quality	High
					Level:	

Study Reference:	Tetrachloroethy	bean Chemicals Ag lene. Helsinki, Fin ed-dossier/14303/5/ 786	land. Retrieved f			u/registration-
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	Test substance reported as unnamed constituent.	4	2	8
	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	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	Unacceptable	The test method was not reported.	4	1	4

	6. Testing Conditions		Testing conditions were not reported, and			
		Unacceptable	data provided were insufficient to interpret results.	4	2	8
	7. Testing Consistency	Unacceptable	Critical exposure details across samples or study groups were not reported.	4	1	4
	8. System Type and Design	Unacceptable	The system type and design were not reported.	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	High	Adsorption coefficient values were reported.	1	1	1
	12. Sampling Methods	Low	Details regarding sampling methods were not fully reported, and the omissions were likely to have had a substantial impact on the study results.	3	1	3
Confounding/ Variable Control		Not rated	Sources of variability and uncertainty in the measurements were not reported.	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		Low	Insufficient data were reported to evaluate.	3	2	6
	16. Statistical Methods and Kinetic Calculations	Low	Statistical analysis or kinetic calculations were not described.	3	1	3
Other	17. Verification or Plausibility of Results	Low	No information was reported to evaluate results.	3	1	3

	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	40	17	53
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	3.12	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>

<sup>1</sup>The study's overall quality rating was downgraded. Rationale: Limited information reported in this secondary source and unable to confirm study results with cited reference.

HERO ID 3839195, ECB (2005). European Union risk assessment report: Tetrachloroethylene. Part 1 -Environment. United Kingdom, European Commission – Joint Research Centre Institute for Health and Consumer Protection European Chemicals Bureau. 57. 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, five 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:	69Roose, P; Dewulf, J; Brinkman, UAT; Van Langenhove, H. (2001). Measurement of volatile organic compounds in sediments of the Scheldt Estuary and the Southern North Sea. Water Res 35: 1478-1488. http://dx.doi.org/10.1016/S0043-1354(00)00410-3. HERO ID: 1937708							
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	Medium	Monitoring study; analytical method development was reported.	2	1	2		
	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	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	C	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.	High	Limitations of results	1	1	1
Variable	Confounding		were discussed.			
Control	Variables	NT ( ) 1	TT1 ( · · · )	ND	ND	ND
	14. Outcomes	Not rated	The metric is not	NR	NR	NR
	Unrelated to		applicable to this			
Data	Exposure 15. Data	Ціah	study type. This metric met the	1	2	2
Data Presentation	-	High	criteria for high	1	۷ ک	2
and Analysis	Reporting		confidence as			
anu Anaiysis			expected for this type			
			of study.			
	16. Statistical	High	This metric met the	1	1	1
	Methods and	mgn	criteria for high	1	1	1
	Kinetic		confidence as			
	Calculations		expected for this type			
			of study.			
Other	17. Verification	High	This metric met the	1	1	1
	or Plausibility	6	criteria for high			
	of Results		confidence as			
			expected for this type			
			of study; noted that			
			upon comparison of			
			calculation of mass			
			fractions in situ,			
			partitioning into the			
			sediment layer and the			
			water column was			
			higher than expected			
			from equilibrium			
			partitioning			
			calculations from			
			measured monitoring			
		Not rated	data. The metric is not	ND	ND	ND
	18. QSAR Models	not rated		NR	NR	NR
	WIGUEIS		applicable to this study type.			
			Sum of scores:	16	18	21
High	Medium	Low	Overall Score = Sum	1.17	Overall	1.2
mgn	wiedłum	LOW	of Weighted	1.1/	Score	1.2
			Scores/Sum of Metric		(Rounded):	
			Weighting Factors:		(Itounucu).	
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$	treisnenig Factors.		Overall	High
_1 and .1.7		_2.5 and _5			Quality	111511
					Level:	

Study Reference:	70Keefe, 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								
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. Verification	Medium	The study results were	2	1	2
	or Plausibility		reasonable.			
	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 = Sum	1.2	Overall	1.2
			of Weighted		Score	
			Scores/Sum of Metric		(Rounded):	
			Weighting Factors:			1
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall	High
					Quality	
					Level:	

Study	71Long, JL; S	tensel, HD; Fergus	on, JF; Strand, SE; Ong	gerth, JE.	(1993). Anaero	bic and				
Reference:		aerobic treatment of chlorinated aliphatic compounds. J Environ Eng 119: 300-320.								
			0733-9372(1993)119:2(3	300).						
	HERO ID: 17									
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable,		Metric Score	Metric Weighting Factor	Weighted Score				
		or Not rated]								
Test Substance	Substance	High	The test substance was identified by chemical	1	2	2				
	Identity 2. Test Substance	Medium	name. The test substance source and purity were	2	1	2				
	Purity		not reported.							
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 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. Confounding	High	This metric met the	1	1	1
Variable	Variables		criteria for high			
Control			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	Medium	Some details were	2	1	2
	Methods and		omitted; however, these			
	Kinetic		omissions were not			
	Calculations		likely to have had a			
			substantial impact on			
			the study results.			
Other	17. Verification	High	This metric met the	1	1	1
	or Plausibility		criteria for high			
	of 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:	17	20	22
High	Medium	Low	<b>Overall Score = Sum</b>	1.1	<b>Overall Score</b>	1.1
			of Weighted		(Rounded):	
			Scores/Sum of Metric			
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and $\leq$ 2.3	$\geq 2.3$ and $\leq 3$			Overall	High
					Quality Level:	
The evaluation	is for the anaerob	oic batch fed reacto	r test reported by Long et	al. (1993).		

Study Reference:	72Long, 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]		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 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. Confounding	High	This metric met the	1	1	1
Variable	Variables		criteria for high			
Control			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	C	criteria for high			
and Analysis			confidence as expected			
·			for this type of study.			
	16. Statistical	Medium	Some details were	2	1	2
	Methods and		omitted; however,			
	Kinetic		these omissions were			
	Calculations		not likely to have had a			
			substantial impact on			
			the study results.			
Other	17. Verification	High	This metric met the	1	1	1
	or Plausibility	-	criteria for high			
	of 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:	17	20	22
High	Medium	Low	Overall Score = Sum	1.1	<b>Overall Score</b>	1.1
			of Weighted		(Rounded):	
			Scores/Sum of Metric			
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and $\leq$ 2.3	$\geq$ 2.3 and $\leq$ 3			Overall	High
					Quality Level:	
The evaluation	is for the aerobic	batch fed reactor t	est reported by Long et al.	(1993).		

Study Reference:	73Stubin, 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	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 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	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	Not rated	The analysis of data was clearly described.	NR	NR	NR
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:	13	16	18
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.12	Overall Score (Rounded):	1.1
≥1 and <1.7	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	compounds fr 1111). (BIOSI HERO ID: 10	om showers: I. Analy S/92/15798). Tancred 23248	ilson, R. (1992). Volatil tical method and quant e, M; Yanagisawa, Y; V	itative as Vilson, R.	sessment (pp.	1103-
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 mean.	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 Assessment	11. Outcome Assessment Methodology	Low	Study investigated volatilization from shower water; this is	3	1	3
			an uncommon study type for a fate endpoint.			
	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	Sources of variability were addressed in the 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	Limited details were reported; data were mainly reported in figures.	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:	17	18	22
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.22	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	75Li, J: Wert	h. CJ. (2004). Slow de	sorption mechanisms o	f volatile (	organic chem	ical
Reference:	mixtures in so	il and sediment micro	opores. Environ Sci Tec			
	HERO ID: 21	org/10.1021/es034830z 73000	•			
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score
Fest Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	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	Some details were 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	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	Some details omitted	2	1	2

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	Some details were	1	2	2
Presentation	Reporting	-	omitted.			
and Analysis	16. Statistical	High	Some details were	1	1	1
	Methods and	-	omitted.			
	Kinetic					
	Calculations					
Other	17. Verification	High	This metric met the	1	1	1
	or Plausibility		criteria for high			
	of 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:	15	17	18
High	Medium	Low	<b>Overall Score = Sum</b>	1.18	Overall	1.2
			of Weighted		Score	
			Scores/Sum of Metric		(Rounded):	
			Weighting Factors:			
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and $\leq$ 2.3	$\geq$ 2.3 and $\leq$ 3			Overall	High
					Quality	
					Level:	

Study Reference:	compounds at f 708-716. http://	76Bell, 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.								
Domain	HERO ID: 6580 Metric	661 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	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/	13. Confounding	Not rated	The study noted	NR	NR	NR
Variable Control			that design			
			parameters may			
			have impacted the			
			results.			
	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 and	Reporting		criteria for high			
Analysis			confidence as			
			expected for this			
			type of study.			
	16. Statistical	Medium	Emission rates	2	1	2
	Methods and		were estimated by			
	Kinetic		multiplying the			
	Calculations		average VOC			
			concentrations by			
			the appropriate			
			airflow rates.			
Other	17. Verification	Medium	The study results	2	1	2
	or Plausibility of		were reasonable;			
	Results		however, due to			
			limited			
			information,			
			evaluation of the			
			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:	12	11	16
High	Medium	Low	Overall Score =	1.27	<b>Overall Score</b>	1.3
			Sum of Weighted		(Rounded):	
			Scores/Sum of			
			Metric Weighting			
			Factors:			
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			<b>Overall Quality</b>	High
					Level:	

Study			Busetti, F; Devine, B;						
Reference:	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.	1	2	2			
	2. Test Substance Purity	High	The test substance was identified by analytical means.	1	1	1			
Test Design	3. Study Controls	Low	Limited details about the analytical standard were reported.	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	Medium	WWTP monitoring study, could be considered site specific data.	2	1	2			

	12. Sampling Methods	Medium	Some details were limited; however, this did not limit the interpretation of the results.	2	1	2
Confounding/ Variable	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
Control	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 details were lacking, but this was not likely to have affected interpretation of the 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	17	25
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.47	Overall Score (Rounded):	1.5
≥1 and <1.7	$\geq$ 1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High

Study Reference:	78Chiou, 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							
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 was identified by analytical means; however, limited data were reported about the analysis.	3	1	3		
Test Design	3. Study Controls	Low	Study controls were not reported.	3	2	6		
	4. Test Substance Stability	Medium	Test substance stability not discussed.	2	1	2		
Test Conditions		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	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:	20	18	26
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.44	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 Reference:	79Smith, 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 had an impact on the study results.	2	1	2			
Test Design	3. Study Controls	Medium	Standard results were not reported; but were not likely to have had an impact on the study results.	2	2	4			
	4. Test Substance Stability	Medium	Not discussed, but not likely to have had an 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	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	Some details were omitted; however, these omissions were not likely to have had a substantial impact interpretation of 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:	80Chen, 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; however, other study controls 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 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	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	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	Concentrations of the target chemical were not 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 interpretation of study results.	2	1	2
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
High	Medium	Low	Sum of scores: Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	<u>21</u> 1.45	20 Overall Score (Rounded):	<u>29</u> 1.5
$\geq 1$ and $< 1.7$	≥1.7 and <2.3	$\geq$ 2.3 and $\leq$ 3	wegning rations.		Overall Quality Level:	High

Study Reference:	dehalogenatio http://dx.doi.o HERO ID: 19	n of tetrachloroeth rg/10.1016/S0043-1 63430			: 2390-2396	•
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		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 or verified by analytical methods.	3	1	3
Test Design		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	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 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. Confounding	Low	Loss of material in control was	3	1	3
Variable	Variables		not addressed.			
Control	14. Outcomes	Not rated	The metric is not applicable to	NR	NR	NR
	Unrelated to		this study type.			
	Exposure					
Data	15. Data	High	This metric met the criteria for	1	2	2
Presentation	Reporting		high confidence as expected for			
and Analysis			this type of study.			
	16. Statistical	High	This metric met the criteria for	1	1	1
	Methods and	-	high confidence as expected for			
	Kinetic		this type of study.			
	Calculations					
Other	17. Verification	High	This metric met the criteria for	1	1	1
	or Plausibility		high confidence as expected for			
	of Results		this type of study.			
	18. QSAR	Not rated	The metric is not applicable to	NR	NR	NR
	Models		this study type.			
			Sum of scores:	22	20	29
High	Medium	Low	<b>Overall Score = Sum of</b>	1.45	Overall	1.5
-			Weighted Scores/Sum of Metric		Score	
			Weighting Factors:		(Rounded):	
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall	High
					Quality	•
					Level:	

Study Reference:	82He, Z; Yang, G; Lu, X; Zhang, H. (2013). Distributions and sea-to-air fluxes of chloroform, trichloroethylene, tetrachloroethylene, chlorodibrommethane and bromoform								
	http://dx.doi.o HERO ID: 21	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 Exposure		applicable to this study type.			
Data Presentation and Analysis	15. Data Reporting	Medium	Some data were reported only in figures.	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:	14	11	17
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 $\leq 3$	<b>a b</b> 400 b		Overall Quality Level:	High

Study	83Dilling, WL	. (1977). Interphase	e transfer processes. II. Evapora	tion rat	tes of chloro	)			
Reference:	methanes, ethanes, ethylenes, propanes, and propylenes from dilute aqueous solutions.								
	Comparisons	with theoretical pre	dictions. Environ Sci Technol 1	1: 405-4	409.				
		http://dx.doi.org/10.1021/es60127a009. HERO ID: 18370							
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable,		Metric Score	Metric Weighting Factor	Weighted Score			
		or Not rated							
Test Substance	e 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 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	Low	Sampling was not described and may have influenced the test results.	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 were not considered or accounted for in data evaluation.	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	High	This metric met the criteria for	1	2	2
Presentation	Reporting		high confidence as expected for			
and Analysis			this type of study.			
	16. Statistical	Medium	Statistics were not	2	1	2
	Methods and		conducted/reported for the			
	Kinetic		experimental study.			
	Calculations					
Other	17. Verification	High	This metric met the criteria for	1	1	1
	or Plausibility		high confidence as expected for			
	of Results		this type of study.			
	18. QSAR	Not rated	The metric is not applicable to	NR	NR	NR
	Models		this study type.			
			Sum of scores:	23	18	28
High	Medium	Low	<b>Overall Score = Sum of</b>	1.56	Overall	1.6
			Weighted Scores/Sum of Metric		Score	
			Weighting Factors:		(Rounded):	
1 and <1.7	$\geq 1.7$ and $< 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall	High
					Quality	
					Level:	

Study Reference:	iron and man	ganese powders in tp://dx.doi.org/10.1	994). Transformation of chloring buffered water and in landfill lea 016/0045-6535(94)90320-4.			
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]		Metric Score	Metric Weighting Factor	Weighted Score
Test Substance	1. Test Substance Identity	Low	There was uncertainty regarding the radiolabeling and source of the test substance.	3	2	6
	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	Medium	Protection from light/photolysis was not addressed; however, not likely to have been a concern.	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 Assessment	11. Outcome Assessment Methodology	Low	Incomplete reporting of outcome assessment methods; however, such differences or absence of details were not likely to have been severe or have a substantial impact on the study results. Could be considered hydrolysis study but buffer was used.	3	1	3
	12. Sampling Methods	Medium	Sampling time and frequency were not reported in method; they were inferred from figure.	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	Not rated	The metric is not applicable to	NR	NR	NR
	Unrelated to		this study type.			
	Exposure					
Data	15. Data	Medium	Quantitative data for PCE was	2	2	4
Presentation	Reporting		not fully reported or discussed			
and Analysis			beyond figures.			
	16. Statistical	Medium	Quantitative calculations for PCE	2	1	2
	Methods and		were not fully reported or			
	Kinetic		discussed beyond figures.			
	Calculations					
Other	17. Verification	High	This metric met the criteria for	1	1	1
	or Plausibility		high confidence as expected for			
	of Results		this type of study.			
	18. QSAR	Not rated	The metric is not applicable to	NR	NR	NR
	Models		this study type.			
			Sum of scores:	24	18	31
High	Medium	Low	<b>Overall Score = Sum of</b>	1.72	Overall	1.7
			Weighted Scores/Sum of Metric		Score	
			Weighting Factors:		(Rounded):	
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$			Overall	Medium
					Quality	
					Level:	

Study Reference:	85Blaney, 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	Not rated	The test substance was identified by analytical means.	NR	NR	NR			
	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 a had 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 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	Low	Details regarding 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.	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 Presentation and Analysis	15. Data Reporting	Low	There was insufficient evidence presented to confirm that parent compound disappearance was not likely to have been due to some other process. Analytical details were not well reported.	3	2	6
	16. Statistical Methods and Kinetic Calculations	Medium	Statistical analysis or kinetic calculations were not conducted or were not described clearly.	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:	24	16	33
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	2.06	Overall Score (Rounded):	2.1
$\geq 1$ and $< 1.7$	$\geq 1.7 \text{ and } \leq 2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	Medium

Study Reference:		e Wastewater and Ai /00165921).	ee, SS; Hertzberg, VS; rspaces of Three Waste			
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 a	3	1	3
Variable	Confounding		mixture and may have			
Control	Variables		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. Verification	High	This metric met the	1	1	1
	or Plausibility		criteria for high			
	of 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:	18	17	22
High	Medium	Low	Overall Score = Sum	1.29	Overall	2.3
			of Weighted		Score	
			Scores/Sum of Metric		(Rounded):	
			Weighting Factors:			- 1
$\geq 1$ and $< 1.7$	$\geq 1.7$ and $< 2.3$	$\geq 2.3$ and $\leq 3$			Overall	Low <sup>1</sup>
					Quality	
1					Level:	
<sup>1</sup> The study's ov	erall quality ratin	g was downgraded. F	Rationale: The volatility is	reported	for 3 sites in op	en systems.

Study Reference:	87Brüggemann, 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 16. Statistical	Unacceptable High	The analytical method used for detection of the test substance was not reported. The analysis of	4	2	8
	Methods and Kinetic Calculations		data was clearly described.			
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
			Sum of scores:	10	6	15
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	2.5	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>
Systematic Rev Unacceptable (s	iew in TSCA Ris score = 4), EPA v	detection of the test subs k Evaluations document vill determine the study he study is considered u	t, if a metric for a d to be unacceptable.	lata sourc . In this c	e receives a sc ase, two of the	ore of metrics were

Study	88Matienzo, I	<b>. . . . . . . . . .</b>	eport on development o	f treatme	ent standards	for non-RCRA
Reference:			: Toxic Substances Cont			
		se.p2ric.org/ref/1	7/16884.pdf.	_		
Domain	HERO ID: 39 Metric	Qualitative	Comments	Metric	Metric	Weighted Score
		Determination [i.e., High, Medium, Low,		Score	Weighting Factor	
		Unacceptable, or Not rated]				
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	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	15. Data	Unacceptable	Study and data details	4	2	8
Presentation	Reporting		were not reported in			
and Analysis			this study.			
	16. Statistical	High	The metric is not	1	1	1
	Methods and		applicable to this study			
	Kinetic		type.			
	Calculations					
Other	17. Verification	Unacceptable	Due to limited	4	1	4
	or Plausibility		information, evaluation			
	of Results		of the 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:	33	13	42
High	Medium	Low	<b>Overall Score = Sum</b>	3.23	Overall	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	Unacceptable <sup>1</sup>
					Quality	
					Level:	
<sup>1</sup> Due to limited	information, eva	luation of the reas	onableness of the study re	esults was	s not possible.	Consistent with
our Application	of Systematic R	eview in TSCA Ri	isk Evaluations document	t, if a met	ric for a data s	ource receives a
score of Unacce	eptable (score = 4	), EPA will deterr	nine the study to be unac	ceptable.	In this case. se	even of the

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

Study		LV. (1989). Staff repo				or non-			
Reference:	RCRA solvent waste. Sacramento, CA: Toxic Substances Control Program. http://infohouse.p2ric.org/ref/17/16884.pdf.								
	http://infoho HERO ID: 3		<b>884.pdf</b> .						
Domain	Metric	Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]	Comments	Metric Score	Metric Weighting Factor	Weighted Score			
Fest 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			
Fest 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 treatment process were not reported.	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			
Fest 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			
Dutcome 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			
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	15. Data	Unacceptable	Study and data	4	2	8
Presentation and Analysis	Reporting		details were not reported in this study.			
	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 $< 1.7$	$\geq 1.7 \text{ and}$ < 2.3	$\geq 2.3$ and $\leq 3$			Overall Quality Level:	Unacceptable <sup>1</sup>
our Application score of Unacce	of Systematic H ptable (score =	Review in TSCA Risk 4), EPA will determin	ableness of the study re Evaluations document he the study to be unacce y is considered unacce	, if a metr ceptable. I	ic for a data so in this case, sev	urce receives a ven of the

to increase transparency.

Study	90Parker, WJ	; Thompson, DJ; Bel	l, JP; Melcer, H. (1993	). Fate of	volatile organ	nic
Reference:	compounds in HERO ID: 28		sludge plants. Water E	Environ R	es 65: 58-65.	
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	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 was 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
			Sum of scores:	22	17	27
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1.88	Overall Score (Rounded):	4
$\geq 1$ and $< 1.7$	$\geq$ 1.7 and <2.3	$\geq 2.3$ and $\leq 3$	e extent of air stripping is a		Overall Quality Level:	Unacceptable <sup>1</sup>

<sup>1</sup>Study evaluates removal based on air stripping. The extent of air stripping is a function of the compound p-chem properties and a function of WWTP design and operation. 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.

Study Reference:	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: 2347246								
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 (SAR).	NR	NR	NR			
Test Design	3. Study Controls	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR			
	4. Test Substance Stability	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR			
Test Conditions	5. Test Method Suitability	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR			
	6. Testing Conditions	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR			
	7. Testing Consistency	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR			
	8. System Type and Design	Not rated	The metric is not applicable to this study type (SAR).	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 (SAR).	NR	NR	NR			
	12. Sampling Methods	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR			
Confounding/ Variable Control	13. Confounding Variables	Not rated	The metric is not applicable to this study type (SAR).	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 (SAR).	NR	NR	NR			

	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 ( $r^2$ , $q^2$ ) 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). <b>Sum of scores:</b>	2	1	1
High	Medium	Low	Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:	1	Overall Score (Rounded):	1
$\geq 1$ and $< 1.7$	$^{7} \geq 1.7 \text{ and } <2.3$	$\geq$ 2.3 and $\leq$ 3			Overall Quality Level:	High