United States
Environmental Protection Agency

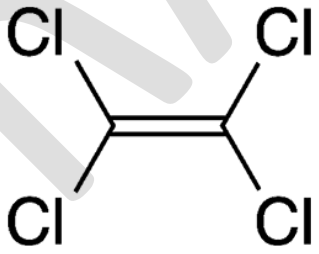
Office of Chemical Safety and
Pollution Prevention

Draft Risk Evaluation for Perchloroethylene

Systematic Review Supplemental File:

Data Quality Evaluation of Environmental Fate and Transport Studies

CASRN: 127-18-4



April 2020

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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 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	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Farrell, J; Reinhard, M. (1994). Desorption of halogenated organics from model solids, sediments, and soil under unsaturated conditions. 1. Isotherms. Environ Sci Technol 28: 53-62. http://dx.doi.org/10.1021/es00050a009 HERO ID: 2803271					
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 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	Desorption isotherms were 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	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	15	18
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.2	**Overall Score (Rounded):**	1.2
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Farrell, J; Reinhard, M. (1994). Desorption of halogenated organics from model solids, sediments, and soil under unsaturated conditions. 1. Isotherms. Environ Sci Technol 28: 53-62. http://dx.doi.org/10.1021/es00050a009 HERO ID: 2803271					
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 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	Desorption isotherms were 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	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	15	18
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.2	**Overall Score (Rounded):**	1.2
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Wang, G; Allen-King, RM; Choung, S; Feenstra, S; Watson, R; Kominek, M. (2013). A practical measurement strategy to estimate nonlinear chlorinated solvent sorption in low foc sediments. Ground Water Monit Remediat 33: 87-96. http://dx.doi.org/10.1111/j.1745-6592.2012.01413.x HERO ID: 3564246					
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/ 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	High	A sorption data set (foc, kd) was 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	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	ECHA (European Chemicals Agency). (2017). Adsorption/desorption: Tetrachloroethylene. Helsinki, Finland. Retrieved from https://echa.europa.eu/registration-dossier/-/registered-dossier/14303/5/5/2# HERO ID: 3970786					
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	Unacceptable	Testing conditions were not reported, and 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	13. Confounding Variables	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	15. Data Reporting	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

[1]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 HEROID 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:	Dobbs, RA; Wang, L; Govind, R. (1989). Sorption of toxic organic compounds on wastewater solids: Correlation with fundamental properties. Environ Sci Technol 23: 1092-1097. http://dx.doi.org/10.1021/es00067a004 HERO ID: 4140494					
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	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 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	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Lu, C; Bjerg, PL; Zhang, F; Broholm, MM. (2011). Sorption of chlorinated solvents and degradation products on natural clayey tills. Chemosphere 83: 1467-1474. http://dx.doi.org/10.1016/j.chemosphere.2011.03.007 HERO ID: 733896					
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
Test Design	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
	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
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	Some details were in the supporting document, which was not readily available.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Not rated	No statistical methods or kinetic calculations (due to rapid equilibration) were reported.	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:	17	17	23
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.35	**Overall Score (Rounded):**	1.4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

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

	7. Testing Consistency	High	Test conditions were consistent across study groups and aquaria, and exposure conditions were monitored.	1	1	1
	8. System Type and Design	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.	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	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 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	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High[1]

[1]This study is related to another study, HERO ID 3970785, Echa. Bioaccumulation: aquatic/sediment: Tetrachloroethylene. 2017.

Study Reference:	Neely, 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**
Test Substance	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 Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	High	Information was reported; routine test organism was used.	1	2	2
Outcome Assessment	11. Outcome Assessment Methodology	Medium	The outcome of interest and its basis were reported; the final BCF was calculated from two separate experiments at two different exposure concentrations that were not reported. Results were interpretable.	2	1	2
	12. Sampling Methods	Medium	Details regarding this metric were limited but not likely to have had a substantial impact on the results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	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	15. Data Reporting	Low	Lipid normalized BCF was not reported; concentration-specific endpoint data were not included; precise interpretation of the results may be limited.	3	2	6

	16. Statistical Methods and Kinetic Calculations	Medium	Average of two different exposure levels were reported. 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 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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Medium

Study Reference:	Kawasaki, M. (1980). Experiences with the test scheme under the chemical control law of Japan: An approach to structure-activity correlations. Ecotoxicol Environ Saf 4: 444-454. http://dx.doi.org/10.1016/0147-6513(80)90046-9 HERO ID: 194312					
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	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	Medium	Not reported; however, the book source for this test method indicates appropriate use of controls.	2	2	4
	4. Test Substance Stability	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	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 expected for this type of study. The organism was routinely used for this method.	1	2	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
	12. Sampling Methods	Medium	Not reported; however, this omission was not likely to have influenced the results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Limited details were reported; however, further investigation of original book source provided details.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Not rated	No statistical methods or kinetic calculations were reported.	NR	NR	NR
Other	17. Verification or Plausibility of Results	High	Reliable source; test details can be found in referenced book.	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	25
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.39	**Overall Score (Rounded):**	1.4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High[1]

[1]The BCF study is also available from the NITE website (https://www.nite.go.jp/en/chem/chrip/chrip_search/srhInput).

Study Reference:	Saisho, 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 Presentation and Analysis	15. Data Reporting	Not rated	Lipid normalized BCF was not reported.	NR	NR	NR
	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

[1]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 Reference:	Wang, X; Harada, S; Watanabe, M; Koshikawa, H; Sato, K; Kimura, T. (1996). Determination of bioconcentration potential of tetrachloroethylene in marine algae by 13C. Chemosphere 33: 865-877. http://dx.doi.org/10.1016/0045-6535(96)00230-5 HERO ID: 3572691					
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 Organisms	9. Test Organism Degradation	Not rated	The metric is not 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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Wang, X; Harada, S; Watanabe, M; Koshikawa, H; Sato, K; Kimura, T. (1996). Determination of bioconcentration potential of tetrachloroethylene in marine algae by 13C. Chemosphere 33: 865-877. http://dx.doi.org/10.1016/0045-6535(96)00230-5 HERO ID: 3572691					
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 Organisms	9. Test Organism Degradation	Not rated	The metric is not 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	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	19	23
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.21	**Overall Score (Rounded):**	1.2
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Dow 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. 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	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
	7. Testing Consistency	High	Test conditions were consistent across samples/study groups. Exposure conditions were documented.	1	1	1
	8. System Type and Design	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
	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
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment methodology addressed the intended outcome of interest.	1	1	1
	12. Sampling Methods	High	Sampling methods used addressed the outcome of interest and were widely accepted.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	Not rated	Not applicable; uncertainty and variability were not addressed in the study.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	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
	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	No analytical details were provided; therefore, it was hard to interpret the results.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	20	19	29

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.53	**Overall Score (Rounded):**	1.6
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Dickson, 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, 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 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
	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
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
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Unacceptable	Serious uncertainties or limitations were identified in analytical and sampling methods of the outcome of interest and these were likely to have had a substantial impact on the results, resulting in serious flaws that made the study unusable.	4	2	8
	16. Statistical Methods and Kinetic Calculations	Not rated	Statistical analysis or kinetic calculations were not described.	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
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	24	12	33
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	2.75	**Overall Score (Rounded):**	4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

[1]The test substance concentration in seawater was not reported. Results provided are a range of BCF (2-25X) that are not test compound or organism specific. 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, 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:	**Pearson, CR; Mcconnell, G. (1975). Chlorinated C1 and C2 hydrocarbons in the marine environment. Proc Biol Sci 189: 305-332.** **HERO ID: 75062**					
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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

[1]The study did not report crucial details on method, sampling and organisms. 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, 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:	**Freitag, D; Ballhorn, L; Geyer, H; Korte, F. (1985). Environmental hazard profile of organic chemicals: an experimental method for the assessment of the behaviour of organic chemicals in the ecoshpere by means of simple laboratory tests with 14C labelled chemicals. Chemosphere 14: 1589-1616.** **HERO ID: 85251**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	Low	No information was provided about the test substance other than 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 Assessment	11. Outcome Assessment Methodology	Not rated	Little to no information was provided but may be available in referenced sources.	NR	NR	NR
	12. Sampling Methods	Not rated	No information was provided but may be available in referenced sources.	NR	NR	NR
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	No information was provided.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	A single data point (BCF = 90) was provided.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Not rated	Little to no information was provided.	NR	NR	NR
Other	17. Verification or Plausibility of Results	Not rated	Little to no information was provided; therefore, it was difficult to interpret the results.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	18	11	33
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	3	**Overall Score (Rounded):**	4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

[1]Limited study information provided (i.e. study controls not reported). 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:	**Drzyzga, 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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]
[1]The study's overall quality rating was downgraded. Rationale: Specific results stating degradation rates and/or half-lives were not reported.						

Study Reference:	Cheng, D; Chow, WL; He, J. (2010). A Dehalococcoides-containing co-culture that dechlorinates tetrachloroethene to trans-1,2-dichloroethene. ISME J 4: 88-97. http://dx.doi.org/10.1038/ismej.2009.90 HERO ID: 379893					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance purity and source were reported.	1	1	1
Test Design	3. Study Controls	High	Abiotic controls were included in this 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	Medium	The study used enriched cultures.	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	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 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 regarding this metric.	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	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]

[1]The study's overall quality rating was downgraded. Rationale: Due to limited information, evaluation of the reasonableness of the study results was not possible.

Study Reference:	**Cheng, D; Chow, WL; He, J. (2010). A Dehalococcoides-containing co-culture that dechlorinates tetrachloroethene to trans-1,2-dichloroethene. ISME J 4: 88-97. http://dx.doi.org/10.1038/ismej.2009.90** **HERO ID: 379893**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	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 Organisms	9. Test Organism Degradation	Medium	The test inoculum source was reported but was 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	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

≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	de 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
	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) 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
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	19	19	27

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.42	**Overall Score (Rounded):**	2.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]
[1]The study's overall quality rating was downgraded. Rationale: No control groups or validation were reported.						

Study Reference:	**Parsons, F; Wood, PR; Demarco, J. (1984). Transformations of tetrachloroethene and trichloroethene in microcosms and groundwater. J Am Water Works Assoc 762: 56-59.** **HERO ID: 75110**					
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 Methodology	Medium	Appropriate for identification of 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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Medium

Study Reference:	**Isalou, M; Sleep, BE; Liss, SN. (1998). Biodegradation of high concentrations of tetrachloroethene in a continuous flow column system. Environ Sci Technol 32: 3579- 3585.** **HERO ID: 1166109**					
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/ Variable Control	13. Confounding Variables	Not rated	Not applicable; this study evaluated a treatment system.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type; the study evaluated a treatment system.	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. Removal rates were reported.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	Kinetic calculations were clearly described and addressed the dataset.	1	1	1
Other	17. Verification or Plausibility of Results	Low	Continuous flow reactor with a sand column that was fed PCE and methanol; experiment was more of a treatment system. The study may not be relevant to fate and environmental degradation and therefore not applicable for a fate assessment.	3	1	3
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	15	15	20
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.33	**Overall Score (Rounded):**	2.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]

[1]The study's overall quality rating was downgraded. Rationale: Continuous flow reactor with a sand column that's fed PCE and methanol; experiment a treatment system, the study may not be relevant to fate and environmental degradation and therefore not applicable to fate assessment.

Study Reference:	Edwards, EA; Liang, LN; Dunia, GG. (1992). Anaerobic microbial transformation of aromatic hydrocarbons and mixtures of aromatic hydrocarbons and halogenated solvents. (CE319). Arlington, VA: Air Force Office of Scientific Research. https://ntrl.ntis.gov/NTRL/dashboard/searchResults.xhtml?searchQuery=ADA260498 HERO ID: 1070096					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source was reported.	1	1	1
Test Design	3. Study Controls	High	A sterile control was included.	1	2	2
	4. Test Substance Stability	Medium	The test substance stability, homogeneity, preparation and storage conditions were not reported.	2	1	2
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance and the target chemical was tested at concentrations below its aqueous solubility (206 mg/L at 25 °C).	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	Test conditions were run in duplicate or triplicate.	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	The outcome assessment methodology addressed or reported the intended outcomes of interest.	1	1	1
	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Edwards, EA; Liang, LN; Dunia, GG. (1992). Anaerobic microbial transformation of aromatic hydrocarbons and mixtures of aromatic hydrocarbons and halogenated solvents. (CE319). Arlington, VA: Air Force Office of Scientific Research. https://ntrl.ntis.gov/NTRL/dashboard/searchResults.xhtml?searchQuery=ADA260498** **HERO ID: 1070096**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source was reported.	1	1	1
Test Design	3. Study Controls	High	A sterile control was included.	1	2	2
	4. Test Substance Stability	Medium	The test substance stability, homogeneity, preparation and storage conditions were not reported.	2	1	2
Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance and the target chemical was tested at concentrations below its aqueous solubility (206 mg/L at 25 °C).	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	Test conditions were run in duplicate or triplicate.	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	The outcome assessment methodology addressed or reported the intended outcomes of interest.	1	1	1
	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Edwards, EA; Liang, LN; Dunia, GG. (1992). Anaerobic microbial transformation of aromatic hydrocarbons and mixtures of aromatic hydrocarbons and halogenated solvents. (CE319). Arlington, VA: Air Force Office of Scientific Research. https://ntrl.ntis.gov/NTRL/dashboard/searchResults.xhtml?searchQuery=ADA260498** **HERO ID: 1070096**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source was reported.	1	1	1
Test Design	3. Study Controls	High	A sterile control was included.	1	2	2
	4. Test Substance Stability	Medium	The test substance stability, homogeneity, preparation and storage conditions were not reported.	2	1	2
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance and the target chemical was tested at concentrations below its aqueous solubility (206 mg/L at 25 °C).	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	Test conditions were run in duplicate or triplicate.	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	The outcome assessment methodology addressed or reported the intended outcomes of interest.	1	1	1
	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	DiStefano, 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. HERO ID: 1142166					
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 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
	12. Sampling Methods	High	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.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	van Eekert, MHA; Schröder, TJ; van Rhee, A; Stams, AJM; Schraa, G; Field, JA. (2001). Constitutive dechlorination of chlorinated ethenes by a methanol degrading methanogenic consortium. Bioresour Technol 77: 163-170. http://dx.doi.org/10.1016/S0960-8524(00)00149-8 HERO ID: 1166576					
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	Medium	The source of the test substance was reported. The purity of the test substance was not reported; however, the test substance was measured analytically.	2	1	2
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study. Controls were included in this study.	1	2	2
	4. Test Substance Stability	Medium	The test substance stability, homogeneity, preparation and storage conditions were not reported; however, these factors were not likely to have influenced the test substance or were not likely to have had a substantial impact on the study results.	2	1	2
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance; the target chemical was tested at concentrations below its aqueous solubility.	1	1	1

	6. Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.	1	2	2
	7. Testing Consistency	High	Test conditions were consistent across samples or study groups.	1	1	1
	8. System 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	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Fathepure, 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 Consistency	High	Testing conditions were consistent across samples.	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	Unacceptable	Pure culture study; Methanosarcina sp. strain was used in this study.	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	High	The outcome assessment methodology addressed or reported the intended outcome of interest.	1	1	1

	12. Sampling Methods	High	The study reported the 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.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	Sources of variability and uncertainty in the 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.	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	Concentration of transformation product was monitored with suitable analytical methods with sensitive enough detection limits were used.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.	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	19	30
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.58	**Overall Score (Rounded):**	4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

[1]Species specific biodegradation study excluded. 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:	DiStefano, TD; Gossett, JM; Zinder, SH. (1991). Reductive dechlorination of high concentrations of tetrachloroethene to ethene by an anaerobic enrichment culture in the absence of methanogenesis. Appl Environ Microbiol 57: 2287-2292. HERO ID: 1196100					
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	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

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

Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as 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:	17	20	22
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.1	**Overall Score (Rounded):**	1.1
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

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

Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as 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:	17	20	22
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.1	**Overall Score (Rounded):**	1.1
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

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

Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as 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:	17	20	22
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.1	**Overall Score (Rounded):**	1.1
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

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

	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as 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:	17	20	22
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.1	**Overall Score (Rounded):**	1.1
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Deipser, A; Stegmann, R. (1997). Biological degradation of VCCs and CFCs under simulated anaerobic landfill conditions in laboratory test digesters. Environ Sci Pollut Res Int 4: 209-216. http://dx.doi.org/10.1007/BF02986348 HERO ID: 1739087					
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
Outcome Assessment	11. Outcome Assessment Methodology	Unacceptable	Outcome assessment was unable to be evaluated due to no detail or reference to methods for analysis besides a statement that "standard analytical methods used."	4	1	4
	12. Sampling Methods	Low	Details regarding 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.	3	1	3
Confounding/ Variable Control	13. Confounding Variables	Low	Only very low concentrations of perc initially added were found in the gas phase, attributed to adsorption and rapid decomposition; no validation with quantitative data.	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	Unacceptable	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, and mass balance were not reported.	4	2	8
	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

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:	35	19	50
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	2.63	**Overall Score (Rounded):**	4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

[1]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:	**Krumholz, LR; Sharp, R; Fishbain, SS. (1996). A freshwater anaerobe coupling acetate oxidation to tetrachloroethylene dehalogenation. Appl Environ Microbiol 62: 4108-4113.** **HERO ID: 1743881**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	The test substance source and purity were not reported.	2	1	2
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as 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/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Vogel, TM; McCarty, PL. (1985). Biotransformation of tetrachloroethylene to trichloroethylene, dichloroethylene, vinyl chloride, and carbon dioxide under methanogenic conditions. Appl Environ Microbiol 49: 1080-1083.** **HERO ID: 1744339**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	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
	12. Sampling Methods	Medium	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.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Some 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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

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

	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	Medium	Some sampling details were omitted but this was unlikely to have impacted the study results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	17	19	24
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.26	**Overall Score (Rounded):**	2.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]

[1]The study's overall quality rating was downgraded. Rationale: Control groups were not reported, limiting study evaluation.

Study Reference:	Kim, Y; Arp, DJ; Semprini, L. (2000). Chlorinated solvent cometabolism by butane-grown mixed culture. J Environ Eng 126: 934-942. http://dx.doi.org/10.1061/(ASCE)0733-9372(2000)126:10(934) HERO ID: 1747865					
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	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/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Medium	Kinetic calculations were not clearly described.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	17	20	23
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.15	**Overall Score (Rounded):**	1.2
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Bouwer, EJ; McCarty, PL. (1983). Transformations of 1- and 2-carbon halogenated aliphatic organic compounds under methanogenic conditions. Appl Environ Microbiol 45: 1286-1294.** **HERO ID: 18060**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by 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

≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Haas, JR; Shock, EL. (1999). Halocarbons in the environment: Estimates of thermodynamic properties for aqueous chloroethylene species and their stabilities in natural settings. Geochim Cosmo Act 63: 3429-3441.** **HERO ID: 1960428**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
Test Design	3. Study Controls	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
	4. Test Substance Stability	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
Test Conditions	5. Test Method Suitability	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
	6. Testing Conditions	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
	7. Testing Consistency	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
	8. System Type and Design	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type (calculation).	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Low	This study presents energetic constraints that may have informed possible metabolism and transformation steps	3	1	3

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

[1]The study's overall quality rating was downgraded. Rationale: Study reports calculated estimates with limited details for endpoints related to fate (thermodynamic property).

Study Reference:	**Bouwer, EJ; McCarty, PL. (1982). Removal of trace chlorinated organic compounds by activated carbon and fixed-film bacteria. Environ Sci Technol 16: 836–843. http://dx.doi.org/10.1021/es00106a003** **HERO ID: 1993341**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	The test substance source and purity were not reported; however, the omissions were not likely to have had a substantial impact on the study results.	2	1	2
Test Design	3. Study Controls	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 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	Medium	Tetrachloroethylene was not the sole source of carbon for the experiment. The substrate included acetate and a cocktail of chlorinated organic compounds.	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	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:	17	19	22
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.16	**Overall Score (Rounded):**	1.2

≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Kästner, M. (1991). Reductive dechlorination of tri- and tetrachloroethylenes depends on transition from aerobic to anaerobic conditions. Appl Environ Microbiol 57: 2039-2046.** **HERO ID: 2310605**					
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	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 Assessment	11. Outcome Assessment Methodology	Medium	This study was a modified biodegradation test. There were adaptive transfers both with and without lactose.	2	1	2
	12. Sampling Methods	Medium	Some sampling details were omitted but this was unlikely to have impacted the study results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Medium	Some details about the statistical methods and kinetics missing and/or only shown in figures.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	23	20	31
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.55	**Overall Score (Rounded):**	1.6

≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Balsiger, 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
	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	Unacceptable	The biodegradation of perc was not reported.	4	1	4
	12. Sampling Methods	Medium	Limited sampling method details were reported; however, the 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	Unacceptable	The biodegradation of perc was not reported.	4	2	8

	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17. Verification or Plausibility of Results	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	31
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.63	**Overall Score (Rounded):**	4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

[1]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:	**Haston, ZC; McCarty, PL. (1999). Chlorinated ethene half-velocity coefficients (KS) for reductive dehalogenation. Environ Sci Technol 33: 223-226. http://dx.doi.org/10.1021/es9805876** **HERO ID: 2777471**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Medium	Controls 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	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	Low	The 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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Namkung, E; Rittmann, BE. (1987). Estimating Volatile Organic Compound Emissions from Publicly Owned Treatment Works (pp. 670-678). (NIOSH/00172323). HERO ID: 2800806					
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 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 Assessment	11. Outcome Assessment Methodology	Medium	Multiple removal processes using specific WWTP operational conditions were considered in this study that may have caused incomplete reporting of the biodegradation outcome.	2	1	2
	12. Sampling Methods	Medium	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Medium

Study Reference:	**Freedman, DL; Gossett, JM. (1989). Biological reductive dechlorination of tetrachloroethylene and trichloroethylene to ethylene under methanogenic conditions. Appl Environ Microbiol 55: 2144-2151.** **HERO ID: 2802294**					
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	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Cichocka, 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 HERO ID: 2951908					
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	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
	12. Sampling Methods	Low	Not reported; however, the sampling methods were attributed to loss during the control, which may also have influenced the experimental study results.	3	1	3

Confounding/ Variable Control	13. Confounding Variables	Low	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
	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	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
	16. Statistical Methods and Kinetic Calculations	Medium	Statistical analysis or kinetic calculations details were not described.	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:	29	19	39
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	2.05	**Overall Score (Rounded):**	2.1
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Medium

Study Reference:	**Cabirol, N; Perrier, J; Jacob, F; Fouillet, B; Chambon, P. (1996). Role of methanogenic and sulfate-reducing bacteria in the reductive dechlorination of tetrachloroethylene in mixed culture. Bull Environ Contam Toxicol 56: 817-824. http://dx.doi.org/10.1007/s001289900119** **HERO ID: 3568089**					
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 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 Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	Medium	Details regarding this metric were limited but this did not limit the interpretation of the results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	High	Degradation results by various bacteria were analyzed and 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	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	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:	16	19	21
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.11	**Overall Score (Rounded):**	1.1
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Marco-Urrea, E; Gabarrell, X; Sarra, M; Caminal, G; Vicent, T; Reddy, CA. (2006). Novel aerobic perchloroethylene degradation by the white-rot fungus Trametes versicolor. Environ Sci Technol 40: 7796-7802. http://dx.doi.org/10.1021/es0622958** **HERO ID: 3572948**					
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; 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 Assessment	11. Outcome Assessment Methodology	Medium	This metric met the criteria for high confidence as expected for this type of study. Assessment and analytical methods were described.	2	1	2
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Lee, W; Park, SH; Kim, J; Jung, JY. (2015). Occurrence and removal of hazardous chemicals and toxic metals in 27 industrial wastewater treatment plants in Korea. Desalination Water Treat 54: 1141-1149. http://dx.doi.org/10.1080/19443994.2014.935810** **HERO ID: 3580141**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were not reported; however, the test substance was detected by 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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Parsons, F; Lage, GB; Rice, R. (1985). Biotransformation of chlorinated organic solvents in static microcosms. Environ Toxicol Chem 4: 739-742. http://dx.doi.org/10.1002/etc.5620040604** **HERO ID: 3797820**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	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
			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):**	1.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Wakeham, SG; Davis, AC; Karas, JA. (1983). Mesocosm experiments to determine the fate and persistence of volatile organic compounds in coastal seawater. Environ Sci Technol 17: 611-617. http://dx.doi.org/10.1021/es00116a009** **HERO ID: 3797829**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The source and purity of the test substance were not reported; however, the test substance was identified by analytical means.	1	1	1
Test Design	3. Study Controls	Medium	Sterile control 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 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/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Details regarding this metric were limited; some of the data were inferred from figures.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Low	Rate constants and half-lives were calculated based on periods during the experiments when volatilization appears to be dominant.	3	1	3
Other	17. Verification or Plausibility of Results	Not rated	Due to limited information, evaluation of the reasonableness of the study results was not possible.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			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

≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Medium

Study Reference:	Wakeham, SG; Davis, AC; Karas, JA. (1983). Mesocosm experiments to determine the fate and persistence of volatile organic compounds in coastal seawater. Environ Sci Technol 17: 611-617. http://dx.doi.org/10.1021/es00116a009 HERO ID: 3797829					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The source and purity of the test substance were not reported; however, the test substance was identified by analytical means.	1	1	1
Test Design	3. Study Controls	Medium	Sterile control used; however, use of a reference substance was not reported.	2	2	4
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Conditions	5. Test Method Suitability	Medium	Limited detail was reported on the test method.	2	1	2
	6. Testing Conditions	Medium	There were omissions in testing conditions; however, sufficient data were reported to determine that the omissions were not likely to have had a substantial impact on the study results.	2	2	4
	7. Testing Consistency	Medium	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/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Medium

Study Reference:	ECHA (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]**	**Comments**	**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
Test 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 Type and Design	Unacceptable	Modified shake flask study with no system type or design details reported in this secondary source.	4	1	4
Test Organisms	9. Test Organism Degradation	Unacceptable	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
			Sum of scores:	29	15	42
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	2.8	**Overall Score (Rounded):**	4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

[1]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 Reference:	**Ryoo, 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]**	**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, 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	1	2	2

			type of study.			
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Low	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Gossett, JM. (1985). Anaerobic degradation of C1 and C2 chlorinated hydrocarbons. (ESL-TR-85-38). Tyndal AFB, FL: Air Force Engineering & Services Center. HERO ID: 4140341					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Low	The test substance source and purity were not reported.	3	1	3
Test Design	3. Study Controls	Medium	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]
[1]The study's overall quality rating was downgraded. Rationale: Due to limited information, evaluation of the reasonableness of the study results was not possible.						

Study Reference:	Dow Chem Co. (1977). THE INHIBITION OF ANAEROBIC SLUDGE GAS PRODUCTION BY 1,1,1-TRICHLOROETHANE, METHYLENE CHLORIDE, TRICHLOROETHYLENE AND PERCHLOROETHYLENE, Part 2. (OTS: OTS0517178; 8EHQ Num: NA; DCN: 86-870002089; TSCATS RefID: 309930; CIS: NA). HERO ID: 4213887					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Low	The source and purity of the test substance were not reported or verified by analytical means.	3	1	3
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2

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

Study Reference:	**Dow 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. HERO ID: 4215582**					
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 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 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	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	18	20	25
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.25	**Overall Score (Rounded):**	1.7

≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Medium[1]
[1]The study's overall quality rating was downgraded. Rationale: The starting material had reported impurities.						

Study Reference:	**Bouwer, EJ; Rittmann, BE; McCarty, PL. (1981). Anaerobic degradation of halogenated 1- and 2-carbon organic compounds. Environ Sci Technol 15: 596-599. http://dx.doi.org/10.1021/es00087a012** **HERO ID: 9818**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	Medium	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 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	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

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

Test Organisms	9. Test Organism Degradation	Medium	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 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	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]
[1]The study's overall quality rating was downgraded. Rationale: Greater than 100% of test substance was remaining relative to the controls after 25 weeks.						

Study Reference:	**Jensen, S; Rosenberg, R. (1975). Degradability of some chlorinated aliphatic hydrocarbons in sea water and sterilized water. Water Res 9: 659-661.** **HERO ID: 9841**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	The test substance source and purity were not reported; however, the test substance was 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.	3	1	3
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Medium	Test conditions reported with some details omitted.	2	2	4
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

	8. System Type and Design	Medium	The test system was reported for both open and closed systems each under light and dark condition with some details omitted; however, omissions were not likely to have had a substantial impact on the study results.	2	1	2
Test Organisms	9. Test Organism Degradation	Low	The inoculum source was not routinely used and was not validated for microbial action. 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	This study included multiple removal pathways, which may have limited evaluation of the biodegradation endpoint.	3	1	3
	12. Sampling Methods	Unacceptable	Serious uncertainties or limitations were identified in sampling methods of the outcome of interest (leaks in valves) and these were likely to have had a substantial impact on the results, resulting in serious flaws which made the study unusable.	4	1	4

Confounding/ Variable Control	13. Confounding Variables	Low	Leaks were noted; loss in open systems was attributed to possible volatilization; not controlled or quantified.	3	1	3
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	There was insufficient evidence presented to confirm that parent compound disappearance was not likely due to some other process; this was noted by the authors and concluded that closed systems should be used to assess degradation.	3	2	6
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17. Verification or Plausibility of Results	Not rated	Due to limited information, evaluation of the reasonableness of the study results was not possible (i.e., reference substance not used; loss was not confined to one process).	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

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

Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Some quantitative details were omitted; however, overall results were clearly reported.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Some details were omitted; however, these omissions were not likely to have had a substantial impact on the study results.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Wood, PR; Parsons, FZ; DeMarco, J; Harween, HJ; Lang, RF; Payan, IL; Ruiz, MC. (1981). Introductory study of the biodegradation of the chlorinated methane, ethane and ethene compounds. Paper presented at American Water Works Association Annual Conference and Exposition, June 7-11, 1981, St. Louis, MO.** **HERO ID: 9881**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	The test substance source and purity were not reported; however, the test substance was detected by GC-MS analytical technique.	2	1	2
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	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 Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	Absorption was discussed.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Specific chemical concentrations were not reported.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Half-life calculation was not described	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	20	20	28
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.4	**Overall Score (Rounded):**	1.4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Chodola, 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	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 results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Some 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	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Dilling, WL; Tefertiller, NB; Kallos, GJ. (1975). Evaporation rates and reactivities of methylene chloride, chloroform, 1,1,1-trichloroethane, trichloroethylene, tetrachloroethylene, and other chlorinated compounds in dilute aqueous solutions. Environ Sci Technol 9: 833-838. http://dx.doi.org/10.1021/es60107a008** **HERO ID: 58054**					
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	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	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome of interest and its basis were reported.	1	1	1
	12. Sampling Methods	Medium	Details regarding this metric were limited but this did not limit the interpretation of the results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Medium	Transformation products were assumed; however, they were never determined experimentally.	2	1	2
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Transformation products were not identified.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Statistical methods or kinetic calculations were not reported.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	18	16	22
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.38	**Overall Score (Rounded):**	1.4

≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Jeffers, PM; Ward, LM; Woytowitch, LM; Wolfe, NL. (1989). Homogeneous Hydrolysis Rate Constants for Selected Chlorinated Methanes Ethanes Ethenes and Propanes. Environ Sci Technol 23: 965-969. http://dx.doi.org/10.1021/es00066a006 HERO ID: 661098					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name and CASRN.	1	2	2
	2. Test Substance Purity	Medium	The source and purity of the test substance were stated in a general manner relating to all materials in the study.	2	1	2
Test Design	3. Study Controls	Medium	Study controls were not included but this did not limit the interpretation of the results.	2	2	4
	4. Test Substance Stability	Medium	Details regarding this metric were limited but this did not limit the interpretation of the results.	2	1	2
Test Conditions	5. Test Method Suitability	High	The method was suitable for the substance; test substance concentration was no higher than 10% of its water solubility limit.	1	1	1
	6. Testing Conditions	Medium	Details regarding this metric were general but this did not limit the interpretation of the results.	2	2	4
	7. Testing Consistency	Medium	Details regarding this metric were general but this did not limit the interpretation of the results.	2	1	2
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	Medium	Details regarding this metric were not reported but this did not limit the interpretation of the results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	Details regarding the analytical procedure were very general; this may limit meaningful/precise interpretation of the results.	3	2	6
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Medium

Study Reference:	Rodriguez, C; Linge, K; Blair, P; Busetti, F; Devine, B; Van Buynder, P; Weinstein, P; Cook, A. (2012). Recycled water: potential health risks from volatile organic compounds and use of 1,4-dichlorobenzene as treatment performance indicator. Water Res 46: 93-106. http://dx.doi.org/10.1016/j.watres.2011.10.032 HERO ID: 1008978					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	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 Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Some 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	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Tancrede, M; Yanagisawa, Y; Wilson, R. (1992). Volatilization of volatile organic compounds from showers: I. Analytical method and quantitative assessment (pp. 1103- 1111). (BIOSIS/92/15798). Tancrede, M; Yanagisawa, Y; Wilson, R. HERO ID: 1023248					
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 an uncommon study type for a fate endpoint.	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	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]
[1]The study's overall quality rating was downgraded. Rationale: Study investigated volatilization from shower water. Study results may not be relevant to a specific/designated Fate endpoint.						

Study Reference:	**Schreier, CG; Reinhard, M. (1994). Transformation of chlorinated organic compounds by iron and manganese powders in buffered water and in landfill leachate. Chemosphere 29: 1743-1753. http://dx.doi.org/10.1016/0045-6535(94)90320-4** **HERO ID: 1740898**					
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	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 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	Quantitative data for PCE was not fully reported or discussed beyond figures.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Quantitative calculations for PCE were not fully reported or discussed beyond figures.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	24	18	31

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.72	**Overall Score (Rounded):**	1.7
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Medium

Study Reference:	Chiou, CT; Freed, VH; Peters, LJ; Kohnert, RL. (1980). Evaporation of solutes from water. Environ Int 3: 231-236. http://dx.doi.org/10.1016/0160-4120(80)90123-3 HERO ID: 18077					
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	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

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

Outcome 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 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	Statistics were not conducted/reported for the experimental 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:	23	18	28
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.56	**Overall Score (Rounded):**	1.6
1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Roose, 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 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	Limitations of results 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	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; 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 data.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	16	18	21

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.17	**Overall Score (Rounded):**	1.2
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Leahy, JG; Shreve, GS. (2000). The effect of organic carbon on the sequential reductive dehalogenation of tetrachloroethylene in landfill leachates. Water Res 34: 2390-2396. http://dx.doi.org/10.1016/S0043-1354(99)00389-9 HERO ID: 1963430					
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	Source and purity were not reported or verified by analytical methods.	3	1	3
Test Design	3. Study Controls	Low	Appropriate use of sterile control, no positive control; analysis of the graphs showed that some loss appeared to occur in autoclaved samples; however, this was not discussed.	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/ Variable Control	13. Confounding Variables	Low	Loss of material in control was not addressed.	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	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	29

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.45	**Overall Score (Rounded):**	1.5
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

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

Confounding/ Variable Control	13. Confounding Variables	Low	The WWTP water is a mixture and may have impacted volatility of the test substance. Other variables may have possibly influenced volatility besides those reported.	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	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	22
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.29	**Overall Score (Rounded):**	2.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]
[1]The study's overall quality rating was downgraded. Rationale: The volatility is reported for 3 sites in open systems.						

Study Reference:	He, Z; Yang, G; Lu, X; Zhang, H. (2013). Distributions and sea-to-air fluxes of chloroform, trichloroethylene, tetrachloroethylene, chlorodibromomethane and bromoform in the Yellow Sea and the East China Sea during spring. Environ Pollut 177: 28-37. http://dx.doi.org/10.1016/j.envpol.2013.02.008 HERO ID: 2128010					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance was identified by analytical means.	1	1	1
Test Design	3. Study Controls	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	4. Test Substance Stability	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Test Conditions	5. Test Method Suitability	Low	Many possible variables impacted the study results in this field study.	3	1	3
	6. Testing Conditions	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	7. Testing Consistency	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	8. System Type and Design	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Low	Flux from a field study was not specifically a fate outcome of interest.	3	1	3
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes 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 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	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Li, J; Werth, CJ. (2004). Slow desorption mechanisms of volatile organic chemical mixtures in soil and sediment micropores. Environ Sci Technol 38: 440-448. http://dx.doi.org/10.1021/es034830z HERO ID: 2173000					
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 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/ 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	Some details were omitted.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	Some details were omitted.	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:	15	17	18
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.18	**Overall Score (Rounded):**	1.2
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	U.S. EPA (U.S. Environmental Protection Agency). (2012). Estimation Programs Interface Suite™ 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™ have defined endpoints. Chemical domain and performance statistics for each model are known, and unambiguous algorithms are available in the EPI Suite™ documentation and/or cited references to establish their scientific validity. Many EPI Suite™ 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).	1	1	1
			Sum of scores:	2	3	1

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1	**Overall Score (Rounded):**	1
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Chen, WH; Yang, WB; Yuan, CS; Yang, JC; Zhao, QL. (2014). Fates of chlorinated volatile organic compounds in aerobic biological treatment processes: the effects of aeration and sludge addition. Chemosphere 103: 92-98. http://dx.doi.org/10.1016/j.chemosphere.2013.11.039** **HERO ID: 2799543**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance was identified by analytical means.	1	1	1
Test Design	3. Study Controls	Medium	Analytical blanks were included; 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
			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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Parker, WJ; Thompson, DJ; Bell, JP; Melcer, H. (1993). Fate of volatile organic compounds in municipal activated sludge plants. Water Environ Res 65: 58-65. HERO ID: 2803053					
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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

[1]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:	Keefe, SH; Barber, LB; Runkel, RL; Ryan, JN. (2004). Fate of volatile organic compounds in constructed wastewater treatment wetlands. Environ Sci Technol 38: 2209-2216. http://dx.doi.org/10.1021/es034661i HERO ID: 3566693					
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/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	Medium	The study results were reasonable.	2	1	2
	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:	14	15	18
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.2	**Overall Score (Rounded):**	1.2
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

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

	12. Sampling Methods	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Confounding/ Variable Control	13. Confounding Variables	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Unacceptable	The analytical method used for detection of the test substance was not reported.	4	2	8
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17. Verification or Plausibility of Results	Unacceptable	Unable to evaluate and verify results based on the data reported.	4	1	4
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

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

	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Unacceptable	Study and data details were not reported in this study.	4	2	8
	16. Statistical Methods and Kinetic Calculations	High	The metric is not applicable to this study type.	1	1	1
Other	17. Verification or Plausibility of Results	Unacceptable	Due to limited information, evaluation of the reasonableness of the study results was not possible.	4	1	4
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	33	13	42
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	3.23	**Overall Score (Rounded):**	4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

[1]Due to limited information, evaluation of the reasonableness of the study results was not possible. 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, 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 Reference:	Matienzo, LV. (1989). Staff report on development of treatment standards for non-RCRA solvent waste. Sacramento, CA: Toxic Substances Control Program. http://infohouse.p2ric.org/ref/17/16884.pdf HERO ID: 3982116					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Low	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 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
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Unacceptable	Study details were not reported to evaluate methodology.	4	1	4
	12. Sampling Methods	Unacceptable	Sampling details were not reported in this study.	4	1	4

Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Unacceptable	Study and data details were not reported in this study.	4	2	8
	16. Statistical Methods and Kinetic Calculations	High	The metric is not applicable to this study type.	1	1	1
Other	17. Verification or Plausibility of Results	Unacceptable	Due to limited information, evaluation of the reasonableness of the study results was not possible.	4	1	4
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	33	13	42
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	3.23	**Overall Score (Rounded):**	4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

[1]Due to limited information, evaluation of the reasonableness of the study results was not possible. 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, 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 Reference:	Blaney, BL. (1989). Applicability of steam stripping to organics removal from wastewater streams. (EPA/600/9-89/072). Cincinnati, OH: Blaney, BL. http://infohouse.p2ric.org/ref/23/22522.pdf HERO ID: 3986884					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Not rated	The test substance was identified by analytical means.	NR	NR	NR
Test Design	3. Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have had a substantial impact on the study results.	2	2	4
	4. Test Substance Stability	Not rated	This is a field type study were stability was not considered.	NR	NR	NR
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Low	There were reported deviations or omissions in testing conditions, and these were likely to have 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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Medium

Study Reference:	Smith, JH; Bomberger, DC, Jr; Haynes, DL. (1980). Prediction of the volatilization rates of high-volatility chemicals from natural water bodies. Environ Sci Technol 14: 1332-1337. http://dx.doi.org/10.1021/es60171a004 HERO ID: 58132					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	Source and purity were not reported but were not likely to have 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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Bell, J; Melcer, H; Monteith, H; Osinga, I; Steel, P. (1993). Stripping of volatile organic compounds at full-scale municipal wastewater treatment plants. Water Environ Res 65: 708-716. http://dx.doi.org/10.2175/WER.65.6.2 HERO ID: 658661					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance was identified by analytical means.	1	1	1
Test Design	3. Study Controls	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	4. Test Substance Stability	Not rated	The metric is not applicable to this study type.	NR	NR	NR
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/ Variable Control	13. Confounding Variables	Not rated	The study noted that design parameters may have impacted the results.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Medium	Emission rates were estimated by multiplying the average VOC concentrations by the appropriate airflow rates.	2	1	2
Other	17. Verification or Plausibility of Results	Medium	The study results were reasonable; however, due to limited information, evaluation of the reasonableness of the study results was not possible.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	12	11	16
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.27	**Overall Score (Rounded):**	1.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Stubin, AI; Brosnan, TM; Porter, KD; Jimenez, L; Lochan, H. (1996). Organic priority pollutants in New York City municipal wastewaters: 1989-1993. Water Environ Res 68: 1037-1044. http://dx.doi.org/10.2175/106143096X128108 HERO ID: 658797					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance was identified by analytical means.	1	1	1
Test Design	3. Study Controls	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 Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	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	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Cupitt, L. T Atmospheric persistence of eight air toxics. 1987. HERO ID: 4140353					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Not rated	Not applicable; 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 rated	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
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	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 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	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 Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	7	8	9
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	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Pearson, CR; Mcconnell, G. (1975). Chlorinated C1 and C2 hydrocarbons in the marine environment. Proc Biol Sci 189: 305-332.** **HERO ID: 75062**					
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 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 Assessment	11. Outcome Assessment Methodology	Low	The assessment methodology did not address or report the outcome of interest; analytical methods were not reported.	3	1	3
	12. Sampling Methods	Unacceptable	Sampling methods were not reported.	4	1	4
Confounding/ Variable Control	13. Confounding Variables	Medium	Author noted that reproducibility was very low due to climate variations.	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	Low	There was insufficient evidence presented to confirm that parent compound disappearance was not likely due to some other process.	3	2	6
	16. Statistical Methods and Kinetic Calculations	Not rated	Statistical analysis or kinetic calculations were 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
			Sum of scores:	33	16	45

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	2.81	**Overall Score (Rounded):**	4
1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

[1]Testing conditions were not reported, and data provided were very general; concentration of test material not specified. Ambient air used for experiment was not subject to any pretreatment or analysis; climate and conditions were not controlled. 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, 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:	Shirayama, H; Tohezo, Y; Taguchi, S. (2001). Photodegradation of chlorinated hydrocarbons in the presence and absence of dissolved oxygen in water. Water Res 35: 1941-1950. http://dx.doi.org/10.1016/S0043-1354(00)00480-2 HERO ID: 3544747					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source was reported.	1	1	1
Test Design	3. Study Controls	Low	The 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. 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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Doong, 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
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Chodola, 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 Methods	Medium	Sampling methods were not reported.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	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:	15	17	19
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	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

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

Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome of interest and its basis were reported.	1	1	1
	12. Sampling Methods	Medium	Sampling methods were omitted. Sampling timing was suitable.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Transformation products were not identified.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Statistical methods or kinetic calculations were not reported.	2	1	2
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	18	18	25
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.33	**Overall Score (Rounded):**	1.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High[1]
[1]Related HERO ID 3970783, Echa. Phototransformation in water: Tetrachloroethylene. 2017.						