

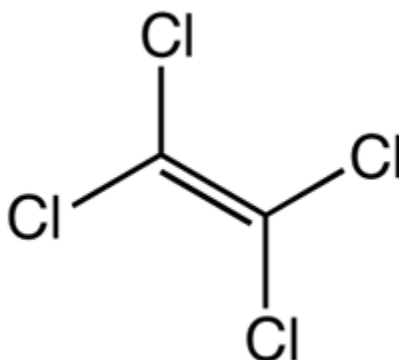


Final Risk Evaluation for Perchloroethylene

Systematic Review Supplemental File:

Data Quality Evaluation of Environmental Fate and Transport Studies

CASRN: 127-18-4



December 2020

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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 203

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|---------------------------|--|--|--|---------------------|--------------------------------|-----------------------|
| 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 |

The evaluation is for the aerobic biodegradation in water test reported by Long et al. (1993).

| | | | | | | |
|-------------------------|--|--|---|---------------------|--------------------------------|-----------------------|
| Study Reference: | 2Marco-Urrea, E; Gabarrell, X; Sarra, M; Caminal, G; Vicent, T; Reddy, CA. (2006). Novel aerobic perchloroethylene degradation by the white-rot fungus <i>Trametes versicolor</i> . <i>Environ Sci Technol</i> 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: | 3Cabirol, 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 |

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|---------------------------------------|--|-------------|--|------|---------------------------------|------|
| 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: | 4Bouwer, 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: | 5Long, 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 |
| The evaluation is for the anaerobic biodegradation in water test reported by Long et al. (1993). | | | | | | |

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|-------------------------|---|--|---|---------------------|--------------------------------|-----------------------|
| Study Reference: | 6Bouwer, 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: | 7Freedman, DL; Gossett, JM. (1989). Biological reductive dechlorination of tetrachloroethylene and trichloroethylene to ethylene under methanogenic conditions. Appl Environ Microbiol 55: 2144-2151. HERO ID: 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: | 8Edwards, 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: | 9Edwards, 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=ADA2604 98. 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: | 10Edwards, 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=ADA2604 98. 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: | 11Kim, 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: | 12Bouwer, 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: | 13Tabak, 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: | 14van Eckert, 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: | 15Parsons, 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: | 16Krumholz, 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: | 17Wood, 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: | 18DiStefano, TD; Gossett, JM; Zinder, SH. (1991). Reductive dechlorination of high concentrations of tetrachloroethene to ethene by an anaerobic enrichment culture in the absence of 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: | 19Haston, 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: | | 20Kästner, 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: | 21Lee, 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: | 22Vogel, 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 |

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

| | | | | | | |
|---------------------------|--|--|---|---------------------|--------------------------------|-----------------------|
| Study Reference: | 23Vogel, 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: | 24Ryoo, D; Shim, H; Canada, K; Barbieri, P; Wood, TK. (2000). Aerobic degradation of tetrachloroethylene by toluene-o-xylene monooxygenase of <i>Pseudomonas stutzeri</i> OX1. <i>Nat Biotechnol</i> 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 type of study. | 1 | 2 | 2 |
| | 10. Test Organism Partitioning | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Outcome Assessment | 11. Outcome Assessment Methodology | Low | Details regarding this metric were limited or unclear. Pure cultures were evaluated in this study. | 3 | 1 | 3 |

| | | | | | | |
|---|--|-------------|---|------|---------------------------------|------|
| | 12. Sampling Methods | Low | Details regarding this metric were limited or unclear. | 3 | 1 | 3 |
| Confounding/ Variable Control | 13. Confounding Variables | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 14. Outcomes Unrelated to Exposure | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Data Presentation and Analysis | 15. Data Reporting | Medium | Data reported had limited details and/or were unclear. | 2 | 2 | 4 |
| | 16. Statistical Methods and Kinetic Calculations | Low | Details regarding this metric were limited; degradation and chloride concentrations were relative to replicates tested at different conditions. | 3 | 1 | 3 |
| Other | 17. Verification or Plausibility of Results | Not rated | Due to limited information, evaluation of the reasonableness of the study results was not possible. | NR | NR | NR |
| | 18. QSAR Models | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | | | Sum of scores: | 22 | 19 | 29 |
| High | Medium | Low | Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors: | 1.53 | Overall Score (Rounded): | 1.5 |
| ≥1 and <1.7 | ≥1.7 and <2.3 | ≥2.3 and ≤3 | | | Overall Quality Level: | High |

| | | | | | | |
|---------------------------|--|--|---|---------------------|--------------------------------|-----------------------|
| Study Reference: | 25DiStefano, TD; Gossett, JM; Zinder, SH. (1992). Hydrogen as an electron donor for dechlorination of tetrachloroethene by an anaerobic mixed culture. Appl Environ Microbiol 58: 3622-3629. 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: | 26Wakeham, SG; Davis, AC; Karas, JA. (1983). Mesocosm experiments to determine the fate and persistence of volatile organic compounds in coastal seawater. Environ Sci Technol 17: 611-617. http://dx.doi.org/10.1021/es00116a009. HERO ID: 3797829 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | 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: | 27Wakeham, 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: | 28Dow Chemical (Dow Chemical Company). (1980). Introductory study of the biodegradation of the chlorinated methane, ethane and ethene compounds: Progress report CR806890-01 coop agreement [TSCA Submission]. (OTS: OTS0509177; 8EHQ Num: 47004 F1-2A; DCN: 40-8024098; TSCATS RefID: 200511; CIS: NA). Midland, MI. 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 |

¹The study's overall quality rating was downgraded. Rationale: The starting material had reported impurities.

| Study Reference: 29Namkung, E; Rittmann, BE. (1987). Estimating Volatile Organic Compound Emissions from Publicly Owned Treatment Works (pp. 670-678). (NIOSH/00172323). HERO ID: 5096530 | | | | | | |
|--|--------------------------------|--|--|---------------------|--------------------------------|-----------------------|
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | 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: | 30Cichocka, D; Nikolausz, M; Haest, PJ; Nijenhuis, I. (2010). Tetrachloroethene conversion to ethene by a Dehalococcoides-containing enrichment culture from Bitterfeld. FEMS Microbiol Ecol 72: 297-310. http://dx.doi.org/10.1111/j.1574-6941.2010.00845.x . 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: | 31Haas, JR; Shock, EL. (1999). Halocarbons in the environment: Estimates of thermodynamic properties for aqueous chloroethylene species and their stabilities in natural settings. Geochim Cosmo Acta 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 under natural conditions. | 3 | 1 | 3 |
| | 12. Sampling Methods | Not rated | The metric is not applicable to this study type (calculation). | NR | NR | NR |
| Confounding/ Variable Control | 13. Confounding Variables | Not rated | The metric is not applicable to this study type (calculation). | NR | NR | NR |
| | 14. Outcomes Unrelated to Exposure | Not rated | The metric is not applicable to this study type. | NR | NR | NR |

| | | | | | | |
|--|--|-------------|--|----|---------------------------------|------------------|
| Data Presentation and Analysis | 15. Data Reporting | Not rated | 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: 32Gossett, 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 |

¹The 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: | 33Bouwer, 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: | 34Fathepure, BZ; Boyd, SA. (1988). Dependence of tetrachloroethylene dechlorination on methanogenic substrate consumption by Methanosarcina sp. strain DCM. Appl Environ Microbiol 54: 2976-2980. HERO ID: 1168294 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The test substance was identified definitively with established nomenclature. | 1 | 2 | 2 |
| | 2. Test Substance Purity | High | The test substance source and purity were reported. | 1 | 1 | 1 |
| Test Design | 3. Study Controls | Medium | Some concurrent control group details were not included; however, the lack of data was not likely to have had a substantial impact on study results; the vehicle was not likely to have influenced the study results. | 2 | 2 | 4 |
| | 4. Test Substance Stability | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 0 |
| Test Conditions | 5. Test Method Suitability | High | The test method was suitable for the test substance; the target chemical was tested at concentrations below its aqueous solubility. | 1 | 1 | 1 |
| | 6. Testing Conditions | Medium | There were reported deviations or omissions in testing conditions (incubation temperature, pH) not specified for the test, however, sufficient data were not reported to determine that the deviations and omissions were not likely to have had a substantial impact on the study results. | 2 | 2 | 4 |

| | | | | | | |
|--------------------------------------|------------------------------------|--------------|---|----|----|----|
| | 7. Testing 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 |

¹Species 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.

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|-------------------------|--|--|---|---------------------|--------------------------------|-----------------------|
| Study Reference: | 35Balsiger, C; Holliger, C; Höhener, P. (2005). Reductive dechlorination of chlorofluorocarbons and hydrochlorofluorocarbons in sewage sludge and aquifer sediment microcosms. Chemosphere 61: 361-373. http://dx.doi.org/10.1016/j.chemosphere.2005.02.087. HERO ID: 2773669 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The test substance was identified by chemical name. | 1 | 2 | 2 |
| | 2. Test Substance Purity | High | The test substance source and purity were reported. | 1 | 1 | 1 |
| Test Design | 3. Study Controls | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 2 | 2 |
| | 4. Test Substance Stability | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Conditions | 5. Test Method Suitability | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 6. Testing Conditions | Medium | Some details were omitted; however, sufficient data were reported to determine that the deviations and omissions were not likely to have had a substantial impact on the study results. | 2 | 2 | 4 |
| | 7. Testing Consistency | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |

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|--|--|--------------|--|----|----|----|
| | 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 |

¹Biodegradation 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.

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|-------------------------|--|--|--|---------------------|--------------------------------|-----------------------|
| Study Reference: | 36Deipser, 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 |

¹The study did not include or report control groups to validate the system used. Consistent with our Application of Systematic Review in TSCA Risk Evaluations document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, four of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

| | | | | | | |
|-------------------------|---|--|--|---------------------|--------------------------------|-----------------------|
| Study Reference: | 37Jensen, S; Rosenberg, R. (1975). Degradability of some chlorinated aliphatic hydrocarbons in sea water and sterilized water. Water Res 9: 659-661. HERO ID: 9841 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | 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 |

¹Serious uncertainties or limitations were identified in sampling methods of the outcome of interest. In addition, loss from leaks in valves and open test systems were likely to have a substantial impact on the results, making the study unusable. Consistent with our Application of Systematic Review in TSCA Risk Evaluations document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics was rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

| | | | | | | |
|-------------------------|---|--|---|---------------------|--------------------------------|-----------------------|
| Study Reference: | 38ECHA (European Chemicals Agency). (2017). Biodegradation in water: screening tests: Tetrachloroethylene. Helsinki, Finland. Retrieved from https://echa.europa.eu/registration-dossier/-/registered-dossier/14303/5/3/2. HERO ID: 3970784 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | 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: | 39Dow 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 |

¹Study describes inhibition of gas production not biodegradation rates or transformation pathways.

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|-------------------------|---|--|--|---------------------|--------------------------------|-----------------------|
| Study Reference: | 40Cheng, D; Chow, WL; He, J. (2010). A Dehalococcoides-containing co-culture that dechlorinates tetrachloroethene to trans-1,2-dichloroethene. ISME J 4: 88-97. http://dx.doi.org/10.1038/ismej.2009.90. HERO ID: 379893 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The test substance was identified by chemical name. | 1 | 2 | 2 |
| | 2. Test Substance Purity | Medium | Purity was not reported but the omissions or identified impurities were not likely to have had a substantial impact on the study results. | 2 | 1 | 2 |
| Test Design | 3. Study Controls | Medium | Some concurrent control group details were not included; however, the lack of data was not likely to have had a substantial impact on the study results. | 2 | 2 | 4 |
| | 4. Test Substance Stability | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Conditions | 5. Test Method Suitability | High | The test method was suitable for the test substance. | 1 | 1 | 1 |
| | 6. Testing Conditions | High | The conditions were suitable for the test substance. | 1 | 2 | 2 |
| | 7. Testing Consistency | High | No inconsistencies were reported or identified. | 1 | 1 | 1 |
| | 8. System Type and Design | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |

| | | | | | | |
|---------------------------------------|--|-------------|--|-----|---------------------------------|------|
| Test 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: | | 41Parsons, 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: | 42de Bruin, WP; Kotterman, MJ; Posthumus, MA; Schraa, G; Zehnder, AJ. (1992). Complete biological reductive transformation of tetrachloroethene to ethane. Appl Environ Microbiol 58: 1996-2000. HERO ID: 4140300 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The test substance was identified by chemical name. | 1 | 2 | 2 |
| | 2. Test Substance Purity | High | The test substance purity and source were reported. | 1 | 1 | 1 |
| Test Design | 3. Study Controls | Low | The study did not include or report control groups; there was no positive or negative control for biodegradation validation. | 3 | 2 | 6 |
| | 4. Test Substance Stability | Medium | The test substance stability, homogeneity, preparation and storage conditions were not reported; however, these factors were not likely to have influenced the test substance or were not likely to have had a substantial impact on the study results. | 2 | 1 | 2 |
| Test Conditions | 5. Test Method Suitability | High | The test method was suitable for the test substance. | 1 | 1 | 1 |
| | 6. Testing Conditions | High | The conditions were suitable for the test substance. | 1 | 2 | 2 |
| | 7. Testing Consistency | High | No inconsistencies were reported or identified. | 1 | 1 | 1 |
| | 8. System Type and Design | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Organisms | 9. Test Organism Degradation | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 2 | 2 |
| | 10. Test Organism Partitioning | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Outcome Assessment | 11. Outcome Assessment Methodology | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 12. Sampling Methods | Medium | Frequency and timing were omitted; however, the omissions were not likely to have had a substantial impact on the results. | 2 | 1 | 2 |
| Confounding/ Variable Control | 13. Confounding Variables | Not rated | No confounding variables were noted. | NR | NR | NR |

| | | | | | | |
|---------------------------------------|--|-------------|--|------|---------------------------------|------------------|
| | 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 |

¹The study's overall quality rating was downgraded. Rationale: No control groups or validation were reported.

| | | | | | | |
|-------------------------|--|--|--|---------------------|--------------------------------|-----------------------|
| Study Reference: | 43Drzyzga, O; El Mamouni, R; Agathos, SN; Gottschal, JC. (2002). Dehalogenation of chlorinated ethenes and immobilization of nickel in anaerobic sediment columns under sulfidogenic conditions. Environ Sci Technol 36: 2630-2635. http://dx.doi.org/10.1021/es010184x . HERO ID: 1162379 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The test substance was identified by chemical name. | 1 | 2 | 2 |
| | 2. Test Substance Purity | Medium | The test substance source and purity were not specifically reported; however, a general statement on the chemicals used was made and therefore, the omissions were not likely to have had a substantial impact on the study results. | 2 | 1 | 2 |
| Test Design | 3. Study Controls | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 2 | 2 |
| | 4. Test Substance Stability | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Conditions | 5. Test Method Suitability | High | The test method was suitable for the test substance. | 1 | 1 | 1 |
| | 6. Testing Conditions | High | The conditions were suitable for the test substance. | 1 | 2 | 2 |
| | 7. Testing Consistency | High | No inconsistencies were reported or identified. | 1 | 1 | 1 |
| | 8. System Type and Design | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Organisms | 9. Test Organism Degradation | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 2 | 2 |

| | | | | | | |
|---------------------------------------|--|-------------|--|------|---------------------------------|------------------|
| | 10. Test Organism Partitioning | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Outcome Assessment | 11. Outcome Assessment Methodology | Low | Specific results stating degradation rates and/or half- lives were not reported. | 3 | 1 | 3 |
| | 12. Sampling Methods | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Confounding/ Variable Control | 13. Confounding Variables | Low | PCE was not the primary/sole test substance and was added in addition to TCE. | 3 | 1 | 3 |
| | 14. Outcomes Unrelated to Exposure | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Data Presentation and Analysis | 15. Data Reporting | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 2 | 2 |
| | 16. Statistical Methods and Kinetic Calculations | High | The analysis of data was clearly described. | 1 | 1 | 1 |
| Other | 17. Verification or Plausibility of Results | Low | Limited analytical data were presented on the specific dehalogenation of PCE. | 3 | 1 | 3 |
| | 18. QSAR Models | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | | | Sum of scores: | 22 | 20 | 27 |
| High | Medium | Low | Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors: | 1.35 | Overall Score (Rounded): | 2.3 |
| ≥1 and <1.7 | ≥1.7 and <2.3 | ≥2.3 and ≤3 | | | Overall Quality Level: | Low ¹ |

¹The study's overall quality rating was downgraded. Rationale: Specific results stating degradation rates and/or half-lives were not reported.

| | | | | | | |
|--------------------------------------|---|--|---|---------------------|--------------------------------|-----------------------|
| Study Reference: | 44Cheng, 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: 45Isalou, 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. | | | | | | |

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|-------------------------|--|--|---|---------------------|--------------------------------|-----------------------|
| Study Reference: | 46Barrows, ME; Petrocelli, SR; Macek, KJ; Carroll, JJ. (1980). Bioconcentration and elimination of selected water pollutants by bluegill sunfish (<i>Lepomis macrochirus</i>). 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: 47Wang, 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: 48Wang, 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: | 49Kawasaki, 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 | 1 | 2 | 2 |

| | | | | | | |
|---|--|-------------|---|------|---------------------------------|-------------------|
| | | | expected for this type of study. The organism was routinely used for this method. | | | |
| 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: 50Dow Chem Co. (1973). UPTAKE, CLEARANCE AND BIOCONCENTRATION OF DOW-PER (PERCHLOROETHYLENE) IN RAINBOW TROUT, SALMO GAIRDNERI RICHARDSON. (OTS: OTS0517166; 8EHQ Num: NA; DCN: 86-870002077; TSCATS RefID: 309906; CIS: NA). HERO ID: 4214291 | | | | | | |
|--|------------------------------|--|---|---------------------|--------------------------------|-----------------------|
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | Test substance identified by chemical name and CASRN. | 1 | 2 | 2 |
| | 2. Test Substance Purity | High | The test substance source was reported. | 1 | 1 | 1 |
| Test Design | 3. 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: | | 51Neely, WB; Branson, DR; Blau, GE. (1974). Partition coefficient to measure bioconcentration potential of organic chemicals in fish. Environ Sci Technol 8: 1113- 1115. http://dx.doi.org/10.1021/es60098a008. HERO ID: 18737 | | | | |
|-------------------------|-----------------------------|---|---|---------------------|--------------------------------|-----------------------|
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| 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: | 52Freitag, 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: 53Dickson, AG; Riley, JP. (1976). The distribution of short-chain halogenated aliphatic hydrocarbons in some marine organisms. Mar Pollut Bull 7: 167-169. http://dx.doi.org/10.1016/0025-326X(76)90212-5 . HERO ID: 58130 | | | | | | |
|---|------------------------------------|--|--|---------------------|--------------------------------|-----------------------|
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, 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 |

¹The 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: | 54Saisho, K; Hasegawa, Y; Saeki, M; Toyoda, M; Saito, Y. (1994). [Bioaccumulation of volatile chlorinated hydrocarbons in blue mussel, <i>Mytilus edulis</i> and killifish, <i>Oryzias latipes</i>]. <i>Jpn J Toxicol Environ Health</i> 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: U.S. EPA (U.S. Environmental Protection Agency). (1987). Atmospheric persistence of eight air toxics [EPA Report]. (EPA-600/3-87/004). Research Triangle Park, NC. HERO ID: 17582 | | | | | | |
|---|--|--|---|---------------------|--------------------------------|-----------------------|
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | 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: | | 55Pearson, 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: | 56Chodola, GR; Biswas, N; Bewtra, JK; St. Pierre, CC; Zytner, RG. (1989). Fate of selected volatile organic substances in aqueous environment. Water Pollut Res J Can 24: 119-142. HERO ID: 4140427 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | 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 |

The evaluation is for the hydrolysis study reported by Chodola et al. 1989.

| | | | | | | |
|---------------------------|--|--|---|---------------------|--------------------------------|-----------------------|
| Study Reference: | 57Shirayama, H; Tohezo, Y; Taguchi, S. (2001). Photodegradation of chlorinated hydrocarbons in the presence and absence of dissolved oxygen in water. Water Res 35: 1941-1950. http://dx.doi.org/10.1016/S0043-1354(00)00480-2 . 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: | 58Dilling, 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: | 59Doong, RA; Wu, SC. (1992). Reductive dechlorination of chlorinated hydrocarbons in aqueous solutions containing ferrous and sulfide ions. Chemosphere 24: 1063-1075. http://dx.doi.org/10.1016/0045-6535(92)90197-Y. HERO ID: 3561878 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The test substance was identified by chemical name. | 1 | 2 | 2 |
| | 2. Test Substance Purity | High | The test substance source and purity were reported. | 1 | 1 | 1 |
| Test Design | 3. Study Controls | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 2 | 2 |
| | 4. Test Substance Stability | Medium | Details regarding this metric were not reported but this did not limit the interpretation of the results. | 2 | 1 | 2 |
| Test Conditions | 5. Test Method Suitability | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 6. Testing Conditions | Medium | There were omissions in the test condition reporting (light source not specified). | 2 | 2 | 4 |
| | 7. Testing Consistency | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 8. System Type and Design | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Organisms | 9. Test Organism Degradation | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | 10. Test Organism Partitioning | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Outcome Assessment | 11. Outcome Assessment Methodology | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |

| | | | | | | |
|---|--|-------------|---|------|---------------------------------|------|
| | 12. Sampling Methods | Medium | Limited details regarding this metric were reported; however, the omissions were unlikely to have hindered the interpretation of results. | 2 | 1 | 2 |
| Confounding/ Variable Control | 13. Confounding Variables | Not rated | No confounding variables were noted. | NR | NR | NR |
| | 14. Outcomes Unrelated to Exposure | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Data Presentation and Analysis | 15. Data Reporting | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 2 | 2 |
| | 16. Statistical Methods and Kinetic Calculations | Medium | Some details were omitted; however, these omissions were not likely to have had a substantial impact on the study results. | 2 | 1 | 2 |
| Other | 17. Verification or Plausibility of Results | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 18. QSAR Models | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | | | Sum of scores: | 17 | 17 | 22 |
| High | Medium | Low | Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors: | 1.29 | Overall Score (Rounded): | 1.3 |
| ≥1 and <1.7 | ≥1.7 and <2.3 | ≥2.3 and ≤3 | | | Overall Quality Level: | High |

| | | | | | | |
|---------------------------|--|--|--|---------------------|--------------------------------|-----------------------|
| Study Reference: | 60Chodola, GR; Biswas, N; Bewtra, JK; St. Pierre, CC; Zytner, RG. (1989). Fate of selected volatile organic substances in aqueous environment. Water Pollut Res J Can 24: 119-142. HERO ID: 4140427 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The test substance was identified by chemical name. | 1 | 2 | 2 |
| | 2. Test Substance Purity | High | The test substance source and purity were reported. | 1 | 1 | 1 |
| Test Design | 3. Study Controls | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 2 | 2 |
| | 4. Test Substance Stability | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Conditions | 5. Test Method Suitability | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 6. Testing Conditions | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 2 | 2 |
| | 7. Testing Consistency | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 8. System Type and Design | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Organisms | 9. Test Organism Degradation | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | 10. Test Organism Partitioning | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Outcome Assessment | 11. Outcome Assessment Methodology | Medium | Details regarding this metric were limited; all data points were not reported; however, this did not hinder the interpretation of the study results. | 2 | 1 | 2 |

| | | | | | | |
|--|--|-------------|--|------|---------------------------------|------|
| | 12. Sampling 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 |
| The evaluation is for the photolysis in water study reported by Chodola et al. 1989. | | | | | | |

| | | | | | | |
|-------------------------|--|--|--|---------------------|--------------------------------|-----------------------|
| Study Reference: | 61Dilling, WL; Tefertiller, NB; Kallos, GJ. (1975). Evaporation rates and reactivities of methylene chloride, chloroform, 1,1,1-trichloroethane, trichloroethylene, tetrachloroethylene, and other chlorinated compounds in dilute aqueous solutions. Environ Sci Technol 9: 833-838. http://dx.doi.org/10.1021/es60107a008. HERO ID: 58054 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The test substance was identified by chemical name. | 1 | 2 | 2 |
| | 2. Test Substance Purity | High | The test substance purity and source were not reported; however, MS analysis was performed at start of study. The detection method was specifically at the m/z of the desired compound, so the purity was not likely to have affected the results. | 1 | 1 | 1 |
| Test Design | 3. Study Controls | Medium | Some concurrent control group details were not included; however, the lack of data was not likely to have had a substantial impact on the study results. | 2 | 2 | 4 |
| | 4. Test Substance Stability | High | Mass spectra analysis was performed at start of study. | 1 | 1 | 1 |
| Test Conditions | 5. Test Method Suitability | High | Methanol was used as a co-solvent. | 1 | 1 | 1 |
| | 6. 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 |

¹Related HERO ID 3970783, Echa. Phototransformation in water: Tetrachloroethylene. 2017.

| | | | | | | |
|-------------------------|--|--|---|---------------------|--------------------------------|-----------------------|
| Study Reference: | 62Jeffers, 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 | 11. Outcome | High | This metric met the | 1 | 1 | 1 |

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

| Study Reference: 63Sorial, GA; Papadimas, SP; Suidan, MT; Speth, TF. (1994). Competitive adsorption of VOCs and BOM: Oxic and anoxic environments. Water Res 28: 1907-1919. http://dx.doi.org/10.1016/0043-1354(94)90166-X . HERO ID: 1741892 | | | | | | |
|---|-----------------------------|--|---|---------------------|--------------------------------|-----------------------|
| 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: 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: | 64Wang, 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: 65Dobbs, 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: 66Farrell, 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: 67Farrell, 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: | 68ECHA (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. HERO ID 3839195, ECB (2005). European Union risk assessment report: Tetrachloroethylene. Part 1 - Environment. United Kingdom, European Commission – Joint Research Centre Institute for Health and Consumer Protection European Chemicals Bureau. 57. Consistent with our Application of Systematic Review in TSCA Risk Evaluations document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, five of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency. | | | | | | |

| | | | | | | |
|-------------------------|--|--|--|---------------------|--------------------------------|-----------------------|
| Study Reference: | 69Roose, P; Dewulf, J; Brinkman, UAT; Van Langenhove, H. (2001). Measurement of volatile organic compounds in sediments of the Scheldt Estuary and the Southern North Sea. Water Res 35: 1478-1488. http://dx.doi.org/10.1016/S0043-1354(00)00410-3. HERO ID: 1937708 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The test substance was identified by chemical name. | 1 | 2 | 2 |
| | 2. Test Substance Purity | High | The test substance source and purity were reported. | 1 | 1 | 1 |
| Test Design | 3. Study Controls | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 2 | 2 |
| | 4. Test Substance Stability | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Conditions | 5. Test Method Suitability | Medium | Monitoring study; analytical method development was reported. | 2 | 1 | 2 |
| | 6. Testing Conditions | Medium | Some details were omitted; however, sufficient data were reported to determine that the omissions were not likely to have had a substantial impact on the study results. | 2 | 2 | 4 |
| | 7. Testing Consistency | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 8. System Type and Design | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Organisms | 9. Test Organism Degradation | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | 10. Test Organism Partitioning | Not rated | The metric is not applicable to this study type. | NR | NR | NR |

| | | | | | | |
|---------------------------------------|--|-------------|--|------|---------------------------------|------|
| Outcome 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: | 70Keefe, SH; Barber, LB; Runkel, RL; Ryan, JN. (2004). Fate of volatile organic compounds in constructed wastewater treatment wetlands. Environ Sci Technol 38: 2209-2216. http://dx.doi.org/10.1021/es034661i . HERO ID: 3566693 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The test substance was identified by chemical name. | 1 | 2 | 2 |
| | 2. Test Substance Purity | High | The test substance was identified by analytical means. | 1 | 1 | 1 |
| Test Design | 3. Study Controls | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | 4. Test Substance Stability | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Test Conditions | 5. Test Method Suitability | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 6. Testing Conditions | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | 7. Testing Consistency | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | 8. System Type and Design | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Organisms | 9. Test Organism Degradation | Medium | The test organisms were reported but were not routinely used. | 2 | 2 | 4 |
| | 10. Test Organism Partitioning | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Outcome Assessment | 11. Outcome Assessment Methodology | High | This is primarily a modeling study based on field samples. | 1 | 1 | 1 |
| | 12. Sampling Methods | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |

| | | | | | | |
|---|--|-------------|--|-----|---------------------------------|------|
| Confounding/ 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: | 71Long, 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 |
| The evaluation is for the anaerobic batch fed reactor test reported by Long et al. (1993). | | | | | | |

| | | | | | | |
|---------------------------|--|--|--|---------------------|--------------------------------|-----------------------|
| Study Reference: | 72Long, JL; Stensel, HD; Ferguson, JF; Strand, SE; Ongerth, JE. (1993). Anaerobic and aerobic treatment of chlorinated aliphatic compounds. J Environ Eng 119: 300-320. http://dx.doi.org/10.1061/(ASCE)0733-9372(1993)119:2(300) . HERO ID: 1717600 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | 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 |
| The evaluation is for the aerobic batch fed reactor test reported by Long et al. (1993). | | | | | | |

| | | | | | | |
|-------------------------|---|--|--|---------------------|--------------------------------|-----------------------|
| Study Reference: | 73Stubin, AI; Brosnan, TM; Porter, KD; Jimenez, L; Lochan, H. (1996). Organic priority pollutants in New York City municipal wastewaters: 1989-1993. Water Environ Res 68: 1037-1044. http://dx.doi.org/10.2175/106143096X128108 . HERO ID: 658797 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The test substance was identified by chemical name. | 1 | 2 | 2 |
| | 2. Test Substance Purity | High | The test substance was identified by analytical means. | 1 | 1 | 1 |
| Test Design | 3. Study Controls | Medium | Source and purity of analytical standard were not reported; however, a guideline analytical method was used. | 2 | 2 | 4 |
| | 4. Test Substance Stability | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Conditions | 5. Test Method Suitability | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 6. Testing Conditions | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 2 | 2 |
| | 7. Testing Consistency | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 8. System Type and Design | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Organisms | 9. Test Organism Degradation | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | 10. Test Organism Partitioning | Not rated | The metric is not applicable to this study type. | NR | NR | NR |

| | | | | | | |
|---------------------------------------|--|-------------|--|------|---------------------------------|------|
| Outcome 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: | 74Tancrede, 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 |

¹The 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: | 75Li, 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: | 76Bell, J; Melcer, H; Monteith, H; Osinga, I; Steel, P. (1993). Stripping of volatile organic compounds at full-scale municipal wastewater treatment plants. Water Environ Res 65: 708-716. http://dx.doi.org/10.2175/WER.65.6.2 . 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 |

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|---------------------------|--|--|--|---------------------|--------------------------------|-----------------------|
| Study Reference: | 77Rodriguez, 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 |

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|---|--|-------------|--|------|---------------------------------|------|
| | 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: | 78Chiou, CT; Freed, VH; Peters, LJ; Kohnert, RL. (1980). Evaporation of solutes from water. Environ Int 3: 231-236. http://dx.doi.org/10.1016/0160-4120(80)90123-3 . HERO ID: 18077 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The test substance was identified by chemical name. | 1 | 2 | 2 |
| | 2. Test Substance Purity | Low | The test substance was identified by analytical means; however, limited data were reported about the analysis. | 3 | 1 | 3 |
| Test Design | 3. Study Controls | Low | Study controls were not reported. | 3 | 2 | 6 |
| | 4. Test Substance Stability | Medium | Test substance stability not discussed. | 2 | 1 | 2 |
| Test Conditions | 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: | 79Smith, JH; Bomberger, DC, Jr; Haynes, DL. (1980). Prediction of the volatilization rates of high-volatility chemicals from natural water bodies. Environ Sci Technol 14: 1332-1337. http://dx.doi.org/10.1021/es60171a004 . HERO ID: 58132 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The test substance was identified by chemical name. | 1 | 2 | 2 |
| | 2. Test Substance Purity | Medium | Source and purity were not reported but were not likely to have had an impact on the study results. | 2 | 1 | 2 |
| Test Design | 3. Study Controls | Medium | Standard results were not reported; but were not likely to have had an impact on the study results. | 2 | 2 | 4 |
| | 4. Test Substance Stability | Medium | Not discussed, but not likely to have had an impact on the study results. | 2 | 1 | 2 |
| Test Conditions | 5. Test Method Suitability | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 6. Testing Conditions | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 2 | 2 |
| | 7. Testing Consistency | Medium | There were minor inconsistencies in test conditions across samples or study groups, but these discrepancies were not likely to have had a substantial impact on the study results. | 2 | 1 | 2 |
| | 8. System Type and Design | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Organisms | 9. Test Organism Degradation | Not rated | The metric is not applicable to this study type. | NR | NR | NR |

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

| | | | | | | |
|-------------------------|--|--|--|---------------------|--------------------------------|-----------------------|
| Study Reference: | 80Chen, WH; Yang, WB; Yuan, CS; Yang, JC; Zhao, QL. (2014). Fates of chlorinated volatile organic compounds in aerobic biological treatment processes: the effects of aeration and sludge addition. Chemosphere 103: 92-98. http://dx.doi.org/10.1016/j.chemosphere.2013.11.039. HERO ID: 2799543 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The test substance was identified by chemical name. | 1 | 2 | 2 |
| | 2. Test Substance Purity | High | The test substance was identified by analytical means. | 1 | 1 | 1 |
| Test Design | 3. Study Controls | Medium | Analytical blanks were included; however, other study controls were not included. | 2 | 2 | 4 |
| | 4. Test Substance Stability | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Conditions | 5. Test Method Suitability | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 6. Testing Conditions | Medium | Some details were omitted; however, sufficient data were reported to determine that the omissions were not likely to have had a substantial impact on the study results. | 2 | 2 | 4 |
| | 7. Testing Consistency | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 8. System Type and Design | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Test Organisms | 9. Test Organism Degradation | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 2 | 2 |

| | | | | | | |
|---------------------------------------|--|-------------|--|------|---------------------------------|------|
| | 10. Test Organism Partitioning | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Outcome Assessment | 11. Outcome Assessment Methodology | Medium | There was incomplete reporting of measured concentrations in the media analyzed | 2 | 1 | 2 |
| | 12. Sampling Methods | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| Confounding/ Variable Control | 13. Confounding Variables | High | This metric met the criteria for high confidence as expected for this type of study. | 1 | 1 | 1 |
| | 14. Outcomes Unrelated to Exposure | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Data Presentation and Analysis | 15. Data Reporting | Medium | Concentrations of the target chemical were not reported. | 2 | 2 | 4 |
| | 16. Statistical Methods and Kinetic Calculations | Medium | Some details were omitted; however, these omissions were not likely to have had a substantial impact interpretation of study results. | 2 | 1 | 2 |
| Other | 17. Verification or Plausibility of Results | Medium | There was incomplete reporting of measured concentrations in the media analyzed; mass distributions were reported, no serious study deficiencies were identified, and the value was plausible. | 2 | 1 | 2 |
| | 18. QSAR Models | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | | | 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: | 81Leahy, 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: | 82He, 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: | 83Dilling, 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: | 84Schreier, 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: | 85Blaney, BL. (1989). Applicability of steam stripping to organics removal from wastewater streams. (EPA/600/9-89/072). Cincinnati, OH: Blaney, BL. http://infohouse.p2ric.org/ref/23/22522.pdf. HERO ID: 3986884 | | | | | |
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The test substance was identified by chemical name. | 1 | 2 | 2 |
| | 2. Test Substance Purity | Not rated | The test substance was identified by analytical means. | NR | NR | NR |
| 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: | 86Dunovant, 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 |

¹The study's overall quality rating was downgraded. Rationale: The volatility is reported for 3 sites in open systems.

| Study Reference: | | 87Brüggemann, R; Trapp, S. (1988). Release and fate modelling of highly volatile solvents in the river Main. 17: 2029-2041. HERO ID: 3629597 | | | | |
|--------------------------------------|------------------------------------|---|--|---------------------|--------------------------------|-----------------------|
| Domain | Metric | Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated] | Comments | Metric Score | Metric Weighting Factor | Weighted Score |
| Test Substance | 1. Test Substance Identity | High | The chemical of interest was identified by name. | 1 | 2 | 2 |
| | 2. Test Substance Purity | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Test Design | 3. Study Controls | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | 4. Test Substance Stability | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Test Conditions | 5. Test Method Suitability | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | 6. Testing Conditions | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | 7. Testing Consistency | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | 8. System Type and Design | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Test Organisms | 9. Test Organism Degradation | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | 10. Test Organism Partitioning | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Outcome Assessment | 11. Outcome Assessment Methodology | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | 12. Sampling Methods | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| Confounding/ Variable Control | 13. Confounding Variables | Not rated | The metric is not applicable to this study type. | NR | NR | NR |
| | 14. Outcomes Unrelated to Exposure | Not rated | The metric is not applicable to this study type. | NR | NR | NR |

| | | | | | | |
|---------------------------------------|--|--------------|--|-----|---------------------------------|---------------------------|
| Data Presentation and Analysis | 15. Data Reporting | 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 |

¹The 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: | 88Matienzo, 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 |

¹Due 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: | 89Matienzo, 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 |

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|---------------------------------------|--|--------------|---|------|---------------------------------|---------------------------|
| 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 |

¹Due 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: | 90Parker, 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 |

¹Study 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.

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|---------------------------------------|--|--|--|---------------------|--------------------------------|-----------------------|
| 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 |