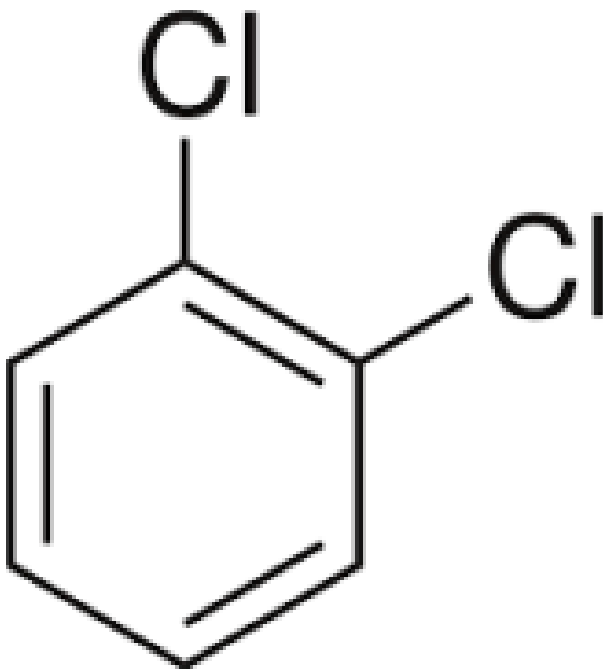

**Draft Data Quality Evaluation Information for
General Population, Consumer, and Environmental Exposure for
o-Dichlorobenzene (oDCB)**

Systematic Review Support Document for the Draft Risk Evaluation

CASRN: 95-50-1



June 2026

This supplemental file contains information regarding the data quality evaluation results for data sources that met the PECO screening criteria for the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene*. EPA conducted data quality evaluation and extraction based on author-reported descriptions and results; additional analyses (e.g., statistical analyses) potentially conducted by EPA are not contained in this supplemental file. EPA performs data quality evaluation as a part of the TSCA systematic review process described in the *Draft Systematic Review Protocol Supporting TSCA Risk Evaluations for Chemical Substances*. The systematic review steps are further described in the *Draft Systematic Review Protocol for o-Dichlorobenzene*.

Additionally, the overall quality determination (OQD) for each reference represents the data as a whole for each evidence stream, not for individual scenarios described within a study. For example, a reference that has both monitoring and experimental data would have OQDs using the data quality evaluation metrics for monitoring and experimental data, respectively. An OQD utilizing the data quality evaluation metrics for monitoring data, or any other single evidence stream, would consider all data pertinent to that evidence stream in the reference. Acronyms and abbreviations used within this supplemental file are defined in the table at the end of this file. This supplemental file may also be referred to as the *Draft Data Quality Evaluation Information for General Population, Consumer, and Environmental Exposure for o-Dichlorobenzene*.

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Glossary of Select Terms for Data Evaluation Tables		210

Study Citation:		Pellizzari, E. D., Perritt, K., Hartwell, T. D., Michael, L. C., Whitmore, R., Handy, R. W., Smith, D., Zelon, H. (1987.0). The total exposure assessment methodology (TEAM) study: Selected communities in northern and southern California: Volume III.		
HERO ID:		22428		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Well described sampling methodology
	Metric 2:	Analytical Methodology	High	Well described analytical methods, reported LOD
	Metric 3:	Biomarker Selection	N/A	Biomarkers not used
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	USA
	Metric 5:	Currency	Low	Sampling in 1984
	Metric 6:	Spatial and Temporal Variability	Low	118 study participants (52 with duplicates)
	Metric 7:	Exposure Scenario	High	Data closely represent relevant exposure scenarios
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Limited summary statistics
	Metric 9:	Quality Assurance	High	Described QA/QC techniques, analyzed control samples
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Did not characterize variability of concentrations, discussed uncertainties and limitations
Overall Quality Determination			Medium	

Study Citation:		Wallace, L. A. (1986.0). Personal exposures, indoor and outdoor air concentrations, and exhaled breath concentrations of selected volatile organic compounds measured for 600 residents of New Jersey, North Dakota, North Carolina, and California. Toxicological and Environmental Chemistry 12(3-4):215-236.		
HERO ID:		23081		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Well described sampling methodology
	Metric 2:	Analytical Methodology	Medium	Limited description of analytical methods, LOD mentioned but not reported
	Metric 3:	Biomarker Selection	N/A	Selection of biomarker of exposure not applicable for monitoring study
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	USA
	Metric 5:	Currency	Low	Sampling began in 1981
	Metric 6:	Spatial and Temporal Variability	Medium	700 samples from 600 study participants, EPA: Duplicate sampling conducted but unclear how many of 30% were duplicates, blanks or spikes.
	Metric 7:	Exposure Scenario	High	Data closely represents relevant exposure scenarios
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Only summary statistics
	Metric 9:	Quality Assurance	High	QA/QC techniques were described, analyzed control samples
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Variability was not characterized, uncertainties were discussed. EPA: coefficients of variation assessed for duplicate analysis
Overall Quality Determination			Medium	

Study Citation:		Wallace, L., Pellizzari, E., Hartwell, T., Zelon, H., Sparacino, C., Perritt, R., Whitmore, R. (1986.0). Concentrations of 20 volatile organic compounds in the air and drinking water of 350 residents of New Jersey compared with concentrations in their exhaled breath. Journal of Occupational Medicine 28(8):603-608.		
HERO ID:		24793		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Scientifically sound sampling methods
	Metric 2:	Analytical Methodology	Low	Analytical methods only briefly described, reported a general LOD for all compounds (footnote in table 2)
	Metric 3:	Biomarker Selection	N/A	the study is testing for the parent chemical in an environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	NJ, USA
	Metric 5:	Currency	High	Published in 1980
	Metric 6:	Spatial and Temporal Variability	Low	705 personal air samples, 183 outdoor air samples, 358 breath samples, with 200 duplicates
	Metric 7:	Exposure Scenario	High	Data closely represent relevant exposure scenarios
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Only summary statistics
	Metric 9:	Quality Assurance	High	Described QA/QC techniques, analyzed control samples
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Characterized variability, did not discuss uncertainties and limitations
Overall Quality Determination			Medium	

Study Citation:		Hartwell, T. D., Pellizzari, E. D., Perritt, R. L., Whitmore, R. W., Zelon, H. S., Sheldon, L. S., Sparacino, C. M., Wallace, L. (1987.0). Results from the total exposure assessment methodology (TEAM) study in selected communities in northern and southern California. Atmospheric Environment 21(9):1995-2004.		
HERO ID:		25107		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Good description of sampling methodology
	Metric 2:	Analytical Methodology	Medium	Limited description of analytical methods, cited previous work, LOD was not reported
	Metric 3:	Biomarker Selection	N/A	Biomarkers of interest were not addressed in this reference.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	USA
	Metric 5:	Currency	Low	Sampling in 1984
	Metric 6:	Spatial and Temporal Variability	Low	117 sampling sites, 81 with duplicates
	Metric 7:	Exposure Scenario	High	Data closely represent relevant exposure scenarios
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Limited summary statistics
	Metric 9:	Quality Assurance	High	Described QA/QC techniques, analyzed control samples
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Did not characterize variability, or discussed uncertainties and study limitations
Overall Quality Determination			Medium	

Study Citation:	Westrick, J. J., Mello, J. W., Thomas, R. F. (1984.0). The groundwater supply survey. Journal of the American Water Works Association 76(5):52-59.			
HERO ID:	29196			
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	sampling equipment, log procedure, and map included
	Metric 2:	Analytical Methodology	High	USEPA methods 502.1 and 503.1; quantitation limits in tables
	Metric 3:	Biomarker Selection	N/A	groundwater
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	U.S.
	Metric 5:	Currency	Low	published 1984
	Metric 6:	Spatial and Temporal Variability	High	n = ~500 broken into groups, replicates for a percent of samples
	Metric 7:	Exposure Scenario	Medium	groundwater
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	median and max
	Metric 9:	Quality Assurance	High	QA discussed
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	variability discussed
Overall Quality Determination			High	

Study Citation:		Field, R. A., Phillips, J. L., Goldstone, M. E., Lester, J. N., Perry, R. (1992.0). Indoor/outdoor interactions during an air pollution event in central London. Environmental Technology 13(4):391-408.		
HERO ID:		44391		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	The sampling methodology was adequately described.
	Metric 2:	Analytical Methodology	Low	Limits of detection or quantification were not reported.
	Metric 3:	Biomarker Selection	N/A	This metric is not applicable for this study.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	This study was conducted in London, UK.
	Metric 5:	Currency	Low	The data was collected in 1991.
	Metric 6:	Spatial and Temporal Variability	Medium	The samples were collected for 25 minutes every hour. No replicates were utilized.
	Metric 7:	Exposure Scenario	High	Indoor and outdoor dynamics (vapor intrusion) were described in ventilated offices and close to roadsides.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	No raw data was reported, but data summary statistics were adequately presented.
	Metric 9:	Quality Assurance	Low	Limited information was provided on quality assurance.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Limited information was provided on gaps and limitations
Overall Quality Determination			Medium	

Study Citation:		Lindstrom, A. B., Proffitt, D., Fortune, C. R. (1995.0). Effects of modified residential construction on indoor air quality. Indoor Air 5(4):258-269.		
HERO ID:		78782		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	The air sampling methodology was described in detail and is scientifically sound.
	Metric 2:	Analytical Methodology	Medium	The analytical methods were described, including instrumentation and LOD but recoveries were not reported.
	Metric 3:	Biomarker Selection	N/A	The authors analyzed air samples.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	United States
	Metric 5:	Currency	Low	The study took place in 1993.
	Metric 6:	Spatial and Temporal Variability	Low	24-h air sampling was done in 9 homes, twice.
	Metric 7:	Exposure Scenario	Medium	The data likely represent a relevant exposure scenario related to indoor air in Colorado, but the sample size limits the study results generalizability.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Limited summary statistics were reported per study site (geometric means).
	Metric 9:	Quality Assurance	Low	QA/QC techniques were not described.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Variability was not characterized. Uncertainties were briefly discussed.
Overall Quality Determination			Medium	

Study Citation:		Bouhamra, W. S., Buhamra, S. S., Thomson, M. S. (1997.0). Determination of volatile organic compounds in indoor and ambient air of residences in Kuwait. Environment International 23(2):197-204.		
HERO ID:		83230		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Low	Limited information reported about sampling methodology (such as sampling procedures, performance of the sampler)
	Metric 2:	Analytical Methodology	Low	LOD nor LOQ reported
	Metric 3:	Biomarker Selection	N/A	Biomarkers of interest were not addressed in this reference.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Kuwait
	Metric 5:	Currency	Low	Data collected December 1994 to January 1995
	Metric 6:	Spatial and Temporal Variability	Medium	no replicates
	Metric 7:	Exposure Scenario	High	Indoor and ambient air
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	no raw data provided
	Metric 9:	Quality Assurance	Low	Limited QA/QC reported
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Limited information provided on gaps and limitations
Overall Quality Determination			Medium	

Study Citation:		Odabasi, M., Ongan, O., Cetin, E. (2005.0). Quantitative analysis of volatile organic compounds (VOCs) in atmospheric particles. Atmospheric Environment 39(20):3763-3770.		
HERO ID:		120063		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	The sampling procedure, equipment, matrix characterizations were included.
	Metric 2:	Analytical Methodology	High	Sample preparation and analysis were described. GC-MS was used to analyze the chemicals. LOD was reported for analytes.
	Metric 3:	Biomarker Selection	N/A	Biomarkers of interest were not addressed in this reference.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Izmir, Turkey
	Metric 5:	Currency	Low	Sampling took place in 2004.
	Metric 6:	Spatial and Temporal Variability	Medium	Most chemicals have 10 samples with number of samples ranging from 2 to 10.
	Metric 7:	Exposure Scenario	High	The exposure scenario was well described (ambient air).
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Supplementary or raw data (i.e., individual data points) are not reported, and therefore summary statistics cannot be reproduced.
	Metric 9:	Quality Assurance	High	Quality assurance measures were applied. Blanks were used, and overall average recoveries were high (80+).
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	The report had discussion about sampling artifact of how it affect the results. It lacked discussion on other variability of data.
Overall Quality Determination			Medium	

Study Citation:		Huang, H., Ou, W. H., Wang, L. S. (2006.0). Semivolatile organic compounds, organochlorine pesticides and heavy metals in sediments and risk assessment in Huaihe River of China. Journal of Environmental Sciences 18(2):236-241.		
HERO ID:		359918		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling methods and materials reported. Location of sampling stations Fig 1; sediment collected using stainless steel dredge; duplicate samples taken; 20-g freeze-dried and homogenized.
	Metric 2:	Analytical Methodology	Medium	Analytical methods and instrument reported. Extracted by acetone: n-hexane using Soxhlet; GC coupled with FID and ECD dectector (p.237); used blanked filters as controls; recoveries conducted, although individual recoveries not reported; LOD was 0.025-0.130 ug/mL.
	Metric 3:	Biomarker Selection	N/A	Study conducted in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Study conducted in Jiangsu reach of Huaihe River, China.
	Metric 5:	Currency	Low	Sampling conducted in summer 2002.
	Metric 6:	Spatial and Temporal Variability	Low	Samples taken during summer when river flow was high. There were three sampling stations with duplicate samples taken at each.
	Metric 7:	Exposure Scenario	High	The study sampled a polluted river in China that is heavily populated with rapidly developing industrial and agricultural activities.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Table 1 presents mean concentration by study location. Raw data not reported.
	Metric 9:	Quality Assurance	High	Recoveries ranged from 56% to 113%; most relative std are <15%; control samples used; samples measured in triplicate.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Variability accounted by different locations sampled. Uncertainty not discussed.
Overall Quality Determination			Medium	

Study Citation:		Rumchev, K., Spickett, J., Bulsara, M., Phillips, M., Stick, S. (2004.0). Association of domestic exposure to volatile organic compounds with asthma in young children. Thorax 59(9):746-751.		
HERO ID:		626606		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	The sampling methodology is clear and appropriate but brief. Information about sampler calibration is not provided.
	Metric 2:	Analytical Methodology	Low	The analytical methodology is described as gas chromatography, but specific details about the analytical method are not provided. No LOD is given.
	Metric 3:	Biomarker Selection	N/A	Study is testing for the parent chemical in an environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Samples were collected in homes in Australia.
	Metric 5:	Currency	Low	Samples were collected from 1997 to 1999.
	Metric 6:	Spatial and Temporal Variability	High	Samples were collected in the homes of 88 cases and 104 controls.
	Metric 7:	Exposure Scenario	High	The exposure scenario is DCB in the indoor air of homes of children with or without asthma. This scenario is of interest for the chemical, and details about the exposure scenario are provided.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Median, range, 25th, 75th, and 90th percentiles are provided in Table 2. Raw data is not provided.
	Metric 9:	Quality Assurance	High	The use of control subjects is documented throughout the report. No QA/QC issues were identified.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Variability is characterized by the percentiles given in Table 2. Uncertainty is not characterized, but some limitations are described.
Overall Quality Determination			Medium	

Study Citation:		Fan, C., Wang, G. S., Chen, Y. C., Ko, C. H. (2009.0). Risk assessment of exposure to volatile organic compounds in groundwater in Taiwan. Science of the Total Environment 407(7):2165-2174.		
HERO ID:		631540		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	The authors did not describe the sampling procedure in detail, but cited protocols from the Taiwan EPA.
	Metric 2:	Analytical Methodology	High	The analytical methods and instrument were described, including recoveries and LOD. Analytical methods conducted by TEPA (NIEA W785.54B).
	Metric 3:	Biomarker Selection	N/A	The authors analyzed environmental samples.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Taiwan
	Metric 5:	Currency	Medium	The samples were collected in 2005.
	Metric 6:	Spatial and Temporal Variability	High	n=54, with samples collected on three separate occasions in duplicates.
	Metric 7:	Exposure Scenario	High	The data closely represent relevant exposure scenarios related to o-DCB present in groundwater samples from remediation sites in Taiwan.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Only individual sample concentrations were reported. Summary statistics not reported.
	Metric 9:	Quality Assurance	Medium	QA/QC techniques were briefly described, including the use of control samples. Recoveries between 90%-110%.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability was not characterized. Uncertainties and limitations were briefly discussed.
Overall Quality Determination			Medium	

Study Citation:		Wu, T., Bhanegaonkar, A. J., Flowers, J. W. (2006.0). Blood concentrations of selected volatile organic compounds and neurobehavioral performance in a population-based sample. Archives of Environmental & Occupational Health 61(1):17-25.		
HERO ID:		632720		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Blood specimen collection procedures briefly described, but NHANES methodology with known validated publicly available methods.
	Metric 2:	Analytical Methodology	High	Blood specimen sample analysis procedures briefly described, but NHANES methodology with known validated publicly available methods.
	Metric 3:	Biomarker Selection	N/A	Sampling for parent chemicals of interest in blood samples.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	NHANES III US sampling
	Metric 5:	Currency	Low	Dates of samples not specifically stated, but NHANES III sampling 1988-1994.
	Metric 6:	Spatial and Temporal Variability	Medium	Spatial variability across NHANES nationwide sampling, however single blood samples provided by each participant for 1,018 participants.
	Metric 7:	Exposure Scenario	Medium	Participant characteristics summarized for nationwide NHANES sample.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Most key criteria met. Lack of frequency of detection and raw data.
	Metric 9:	Quality Assurance	Medium	NHANES Q/A methodologies, although not detailed within study.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Most key criteria met, authors briefly discussed study limitations of lack of accounting for complex sampling design of NHANES due to random sample of NHANES participants.
Overall Quality Determination			Medium	

Study Citation:		Götz, R., Bauer, O., Friesel, P., Roch, K. (1998.0). Organic trace compounds in the water of the River Elbe near Hamburg: Part I. Chemosphere 36(9):2085-2101.		
HERO ID:		644836		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling procedure, sample storage, site characteristics are described in detail.
	Metric 2:	Analytical Methodology	High	analytical methods well described. LOD reported.
	Metric 3:	Biomarker Selection	N/A	Study measured parent chemical in surface water.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The two locations of sampling in Germany are well described.
	Metric 5:	Currency	Low	Samples were collected in 1992-1993.
	Metric 6:	Spatial and Temporal Variability	Medium	20 samples were collected over the two year period in each of the two locations. No replicates
	Metric 7:	Exposure Scenario	High	The River Elbe is an appropriate site for environmental exposures.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	The median, minimum and maximum concentrations are provided. The raw data is not provided.
	Metric 9:	Quality Assurance	High	The study provided QA/QC measures.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Some variability discussed in Tables 2a, 2b, and 5, but limited discussion of uncertainties.
Overall Quality Determination			High	

Study Citation:		Kawata, K., Tanabe, A., Saito, S., Sakai, M., Yasuhara, A. (1997.0). Screening of volatile organic compounds in river sediment. Bulletin of Environmental Contamination and Toxicology 58(6):893-900.		
HERO ID:		644898		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Low	Sampling details lacking. Sample storage described but no description of how sediment samples were collected.
	Metric 2:	Analytical Methodology	High	GC/MS method described and LODs reported with results.
	Metric 3:	Biomarker Selection	N/A	River sediment
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Niigata, Japan
	Metric 5:	Currency	Low	Samples collected in September 1995.
	Metric 6:	Spatial and Temporal Variability	Medium	7 samples were prepared per sediment.
	Metric 7:	Exposure Scenario	Medium	VOCs from sediment were measured in headspace.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Raw data not provided but summary data is adequate.
	Metric 9:	Quality Assurance	High	Recoveries listed in detail.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Limitations were discussed briefly.
Overall Quality Determination			Medium	

Study Citation:		Rockwell, D. C., Claff, R. E., Kuehl, D. W. (1984.0). 1981 Buffalo, New York, area sediment survey (Bass).		
HERO ID:		645755		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	The sediment sampling methodology was well described.
	Metric 2:	Analytical Methodology	Medium	The analytical methods were described, including the LOD but not recoveries.
	Metric 3:	Biomarker Selection	N/A	The authors analyzed environmental samples.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	United States.
	Metric 5:	Currency	Low	Samples were collected in 1981.
	Metric 6:	Spatial and Temporal Variability	Low	Over 150 samples were collected from different sites along the river bank sites were rarely sampled more than once. Not all site samples were analyzed. The data reported used 77 samples from 65 sites.
	Metric 7:	Exposure Scenario	High	The data closely represent relevant exposure scenarios related to polluted sediments.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	The raw data is presented in the supplemental materials in table 1 (Appendix C). Summary statistics were not reported.
	Metric 9:	Quality Assurance	High	Methods detailed in Appendix F.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability was not characterized, nor is uncertainty discussed or characterized.
Overall Quality Determination			Medium	

Study Citation:		Yamamoto, K., Fukushima, M., Kakutani, N., Kuroda, K. (1997.0). Volatile organic compounds in urban rivers and their estuaries in Osaka, Japan. Environmental Pollution 95(1):135-143.		
HERO ID:		645789		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Site description was provided in details. But the sampling process lacked the description about calibration of sampler.
	Metric 2:	Analytical Methodology	Low	Analytical method was described (GC-MS). MDLs were reported in Figure 1 for select chemicals. However, no MDLs were available for 1,2-dichlorobenzene, 1,4-dichlorobenzene, trans-1,2-dichloroethene (TDCE), and 1,1,2-trichloroethane.
	Metric 3:	Biomarker Selection	N/A	Study measured parent chemicals in urban rivers and their estuaries.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Osaka, Japan
	Metric 5:	Currency	Low	August 1993 to February 1995
	Metric 6:	Spatial and Temporal Variability	Medium	30 sites all over the rivers and their estuaries. No replicates
	Metric 7:	Exposure Scenario	High	The data closely represent relevant exposure scenario: drinking water and wastewater were identified.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Supplementary or raw data were not reported.
	Metric 9:	Quality Assurance	Low	Quality assurance/quality control techniques and results were not directly discussed, but can be implied through the study's method and protocol.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	The study has limited characterization of variability in the population/media studied and discussion of uncertainties, limitations, or gaps.
Overall Quality Determination			Medium	

Study Citation:		Wang, M. J., Jones, K. C. (1991.0). Analysis of chlorobenzenes in sewage sludge by capillary gas chromatography. Chemosphere 23(5):677-692.		
HERO ID:		647185		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling Methodology	Critically Deficient	The sampling methodology is only briefly discussed and is missing information such as location, methods and equipment.
	Metric 2:	Analytical Methodology	High	The analytical methodology and instrument is clear, detailed, and appropriate. The LOD is provided on page 685.
	Metric 3:	Biomarker Selection	N/A	Study is testing for the parent chemical in an environmental media.
Domain 2: Representativeness	Metric 4:	Geographic Area	High	The location is not specified in the paper but samples were collected in the UK.
	Metric 5:	Currency	Low	Publication date is 1991. No sample collection date provided.
	Metric 6:	Spatial and Temporal Variability	Low	2 Sludge samples were tested, with 3 or 4 subsamples taken, as shown in Table 6. No replicates taken.
	Metric 7:	Exposure Scenario	Low	The study is testing for chlorobenzenes in sewage sludge. This scenario is of interest for the chemical and is well characterized. However, many of the site details are missing.
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Medium	Table 6 provides the mean and coefficient of variation. No raw data is given.
	Metric 9:	Quality Assurance	Medium	QA/QC measures are not discussed and QA/QC issues were not identified. Recoveries above 80%.
Domain 4: Variability and Uncertainty	Metric 10:	Variability and Uncertainty	Medium	The coefficient of variation is provided in Table 6. No other characterization of variability or uncertainty is provided. Limitations not discussed.
Overall Quality Determination			Uninformative	

Study Citation:		Wang, M. J., Mcgrath, S. P., Jones, K. C. (1995.0). Chlorobenzenes in field soil with a history of multiple sewage sludge applications. Environmental Science & Technology 29(2):356-362.		
HERO ID:		647190		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	The soil was sampled with a semicylinder auger from plough layer (0-23cm) before, during, and after sewage sludge applied to study plot; 9 cores bulked for each sample, air-dried, sieved, and stored in sealed glass bottles.
	Metric 2:	Analytical Methodology	High	20-25 g soils Soxhlet extracted with hexane; GC with ECD; recovery samples; DL provided in Table 2.
	Metric 3:	Biomarker Selection	N/A	The study measured chemicals in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The study was conducted in Harpenden, UK.
	Metric 5:	Currency	Low	The samples were collected in 1942, 1952, 1960, 1967, 1967, 1972, 1980, 1984, and 1991
	Metric 6:	Spatial and Temporal Variability	Medium	Sludge-amended plot sampled 9 times - before, during, and after application. Control plot also sampled, no replicates.
	Metric 7:	Exposure Scenario	High	The soil was sampled before, during, and after sewage sludge and represents exposure to the general population.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Tables 2 and 3 provided mean concentration and std in soil by year(control plot and sludge-amended plot respectively). No other stats provided or raw data not provided.
	Metric 9:	Quality Assurance	Medium	Data corrected for recoveries; recovery % by chemical not provided; control concentrations provided in Table 2.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Std provide; discusses variability over time between control, sludge, and amended soil (Fig 2). Limitations not reported.
Overall Quality Determination			Medium	

Study Citation: Chen, W., Kan, A. T., Fu, G., Vignona, L. C., Tomson, M. B. (1999.0). Adsorption-desorption behaviors of hydrophobic organic compounds in sediments of Lake Charles, Louisiana, USA. Environmental Toxicology and Chemistry 18(8):1610-1616.

HERO ID: 652333

Domain	Metric	Rating	Comments
Domain 1: Reliability			
Metric 1:	Sampling Methodology	High	Sampling methods, equipment and storage were reported.
Metric 2:	Analytical Methodology	Low	Extraction and analytical process were described, but LOD was not provided.
Metric 3:	Biomarker Selection	N/A	Study is measuring chemical in environmental media.
Domain 2: Representativeness			
Metric 4:	Geographic Area	High	The study was conducted at Lake Charles, Louisiana.
Metric 5:	Currency	Low	Sampling took place in 1995.
Metric 6:	Spatial and Temporal Variability	Critically Deficient	The study did not specify the amount of samples that were analyzed. Table 1 reported that for each chemical there were 3 replicates.
Metric 7:	Exposure Scenario	High	The exposure scenario was closely relevant (sediments) in Lake Charles.
Domain 3: Accessibility/Clarity			
Metric 8:	Reporting of Results	Medium	Mean levels were reported in Table 1. It's uncertain of the total sample size.
Metric 9:	Quality Assurance	Low	Quality assurance techniques and results were not directly discussed, but can be implied through the study's use of standard field and laboratory protocols.
Domain 4: Variability and Uncertainty			
Metric 10:	Variability and Uncertainty	Low	The study does not discuss variability of the data or limitations.

Overall Quality Determination

Uninformative

Study Citation:		Bell, J., Melcer, H., Monteith, H., Osinga, I., Steel, P. (1993.0). Stripping of volatile organic compounds at full-scale municipal wastewater treatment plants. Water Environment Research 65(6):708-716.		
HERO ID:		658661		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Appropriate methodology and clearly described
	Metric 2:	Analytical Methodology	High	Appropriate methodology and clearly described
	Metric 3:	Biomarker Selection	N/A	Testing for parent chemical in environmental media
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Geographic area clearly reported
	Metric 5:	Currency	Low	Sampling date not reported, but likely between 1988 and 1993.
	Metric 6:	Spatial and Temporal Variability	Medium	8 (4 in duplicate) samples, each 24-hour composites, at each of 4 sampling locations to account for variability.
	Metric 7:	Exposure Scenario	Medium	Primarily addresses air pathway, additional monitoring of wastewater effluent, both routes of potential exposure.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Raw data not reported
	Metric 9:	Quality Assurance	Medium	More thorough QA documentation previously published (Bell et al. 1988)
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	More thorough QA documentation previously published (Bell et al. 1988)
Overall Quality Determination			Medium	

Study Citation:		Stubin, A. I., Brosnan, T. M., Porter, K. D., Jimenez, L., Lochan, H. (1996.0). Organic priority pollutants in New York City municipal wastewaters: 1989-1993. Water Environment Research 68(6):1037-1044.		
HERO ID:		658797		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling procedure was well described (sampling condition, equipment, storage, study site description).
	Metric 2:	Analytical Methodology	Low	Analytical method was described, however, method detection limit was not provided.
	Metric 3:	Biomarker Selection	N/A	the study is testing for the parent chemical in an environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	New York City water pollution control plants
	Metric 5:	Currency	Low	Sampling was performed from 1989 to 1993.
	Metric 6:	Spatial and Temporal Variability	High	Volatile samples were collected 3 times within the same 24-hr period. Semi-volatile samples were collected 8 times within the course of 24-hr.
	Metric 7:	Exposure Scenario	Medium	The data likely represent the relevant exposure scenario.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Supplementary or raw data were not reported.
	Metric 9:	Quality Assurance	Medium	The study applied and documented quality assurance/quality control measures.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	The study has limited characterization of variability in the population/media studied.
Overall Quality Determination			Medium	

Study Citation:		Yasuhara, A., Shiraishi, H., Nishikawa, M., Yamamoto, T., Nakasugi, O., Okumura, T., Kenmotsu, K., Fukui, H., Nagase, M., Kawagoshi, Y. (1999.0). Organic components in leachates from hazardous waste disposal sites. Waste Management & Research 17(3):186-197.		
HERO ID:		659131		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Key sampling methods for landfill leachate samples were reported. Some details, such as duration of sample storage prior to analysis, were lacking.
	Metric 2:	Analytical Methodology	Medium	Analytic methodology was described in detail. Some details, such as recovery percentages, were not described.
	Metric 3:	Biomarker Selection	N/A	The chemicals of interest were measured in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The samples were described as collected in Japan.
	Metric 5:	Currency	Low	Samples were collected in 1995.
	Metric 6:	Spatial and Temporal Variability	Medium	Samples were collected from 11 landfills in 1995. Two types of landfills (open landfills and controlled landfills) were described, as authors noted that sampling from closed landfills was not permitted. Replicate sampling was not conducted.
	Metric 7:	Exposure Scenario	Medium	Exposure sources were not well characterized. Table 1 describes landfill and waste type, but no information about microenvironment was provided. Use of exposure controls was lacking.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data and median concentrations were reported in Table 3 of the manuscript. Results in Table 3 were described as presented for chemicals in the order of frequency of detection, however individual chemical-specific detection frequencies were not reported.
	Metric 9:	Quality Assurance	Low	Other than use of laboratory blanks, limited QA/QC procedures were reported, however samples were reported as analyzed at the National Institute for Environmental Studies which would utilize standard methodologies.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	This study did not report standard deviations or other measures of variance. Only a few gaps and limitations were reported.
Overall Quality Determination			Medium	

Study Citation:		Assmuth, T. W., Strandberg, T. (1993.0). Ground water contamination at Finnish landfills. Water, Air, and Soil Pollution 69(1-2):179-199.		
HERO ID:		659768		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	The groundwater sampling methods were described but did not include details about the sampler calibration.
	Metric 2:	Analytical Methodology	Medium	The analytical methods were discussed but did not include LOD or recoveries.
	Metric 3:	Biomarker Selection	N/A	The authors analyzed groundwater samples.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The study was conducted in Finland.
	Metric 5:	Currency	Low	The study was published in 1992.
	Metric 6:	Spatial and Temporal Variability	Medium	No replicate samples were collected (n=16 sampling sites).
	Metric 7:	Exposure Scenario	High	The data closely represent relevant exposure scenarios related polluted groundwater in Southern and Central Finland.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Only summary statistics were reported. Raw data was not provided.
	Metric 9:	Quality Assurance	Low	QA/QC techniques were not described.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Variability was characterized (max, CV) Uncertainties and limitations were not discussed.
Overall Quality Determination			Medium	

Study Citation:		Brack, W., Rottler, H., Frank, H. (1998.0). Volatile fractions of landfill leachates and their effect on Chlamydomonas reinhardtii: In vivo chlorophyll a fluorescence. Environmental Toxicology and Chemistry 17(10):1982-1991.		
HERO ID:		659838		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sampling methodology is discussed and is generally appropriate for the chemical and media of interest, however, one or more pieces of sampling information is not described such as sample filtration. The missing information is unlikely to have a substantial impact on results.
	Metric 2:	Analytical Methodology	Low	Analytical methodology including equipment and reagents is discussed in detail and is clear and appropriate for the chemical and media of interest; however, one or more pieces of analytical information is not described such as LOQ, LOD, detection limits, and/or reporting limits is not reported.
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical in leachates from three hazardous waste sites.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Geographic location is reported; Germany.
	Metric 5:	Currency	Low	Collection date not reported but publication date provided (1997).
	Metric 6:	Spatial and Temporal Variability	Low	Sampling approach poorly captures variability of environmental contamination in population/scenario/media of interest. For example, the study used a low sample size (n= 4), and replicate samples were collected only from one hazardous waste site.
	Metric 7:	Exposure Scenario	Medium	The data likely represent the relevant exposure scenario. A few key pieces of information such as use of exposure controls, microenvironment may not be described but the deficiencies are unlikely to have a substantial impact on the characterization of the exposure scenario.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	Individual sample concentrations reported in the study (Table 4) allowing summary statistics to be reproduced.
	Metric 9:	Quality Assurance	Low	Quality assurance/quality control techniques and results were not directly discussed, but can be implied through the study’s use of standard field and laboratory protocols.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability and uncertainty not discussed.
Overall Quality Determination			Medium	

Study Citation:		Chen, C. S., Zoltek, J., Jr (1995.0). Organic priority pollutants in wetland-treated leachates at a landfill in central Florida. Chemosphere 31(6):3455-3464.		
HERO ID:		659873		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sampling methodology is only briefly discussed, lacking essential information about equipment, conditions, and storage.
	Metric 2:	Analytical Methodology	Low	GC/MS was used for the analysis; however, LOD was not provided.
	Metric 3:	Biomarker Selection	N/A	Study measured parent chemical in groundwater, surface water, and sediment.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Orange County, Orlando, Florida
	Metric 5:	Currency	Low	The study provided the first year sampling date as 1989-1990, and second year sampling occurred April 1992 to March 1993.
	Metric 6:	Spatial and Temporal Variability	Low	Study reported on the number of monitoring wells (n=4), surface water (n=7), and wetland sampling stations (n=7). However, it is unclear how many samples were collected from each.
	Metric 7:	Exposure Scenario	Medium	The data likely represent the relevant exposure scenario (surface water/groundwater).
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Supplementary or raw data were not reported.
	Metric 9:	Quality Assurance	Medium	The study provided quality control measures; however, one or more pieces of QA/QC information was not described.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Key uncertainties, limitations, and data gaps were not discussed.
Overall Quality Determination			Low	

Study Citation:		Dyer, M. (1995.0). The water quality at Lago Di Vico during 1992-1993. Science of the Total Environment 171(1-3):77-83.		
HERO ID:		659943		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Standard sampling methods were referenced, but some details about sample storage, repeat sampling, and season are lacking.
	Metric 2:	Analytical Methodology	High	Some details are not reported, but standard analytical methods were referenced.
	Metric 3:	Biomarker Selection	N/A	Measured parent chemical in a lake used for drinking water
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	A description and map (Figure 1) of the sampling locations were provided. Lake is located in Italy.
	Metric 5:	Currency	Low	Samples were collected in 1992-1993.
	Metric 6:	Spatial and Temporal Variability	Low	The total sample size for all parameters was 500. While the initial reviewer correctly noted that the sample size for specific analyses (including those shown in Table 1) is not reported, authors did report something about the sample size albeit unclear. Unclear if there were duplicate samples
	Metric 7:	Exposure Scenario	Medium	1-m and 30-m sampling depths are likely relevant to drinking water and recreational uses as described in the introduction.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	For table 1 (volatile chlorohydrocarbons), the number of samples and type of estimate (e.g., point) are not specified. Only date and location are given.
	Metric 9:	Quality Assurance	Low	Quality assurance methods are not specified; standard methods were referenced so it can implied that QA/QC techniques were applied.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	The results are only provided for two lake depths at one of nine sampling locations on one day in August. The analysis is unlikely to have captured spatiotemporal variability (e.g., spikes following rain events). There is also no characterization of variance or discussion of limitations and uncertainties.
Overall Quality Determination			Medium	

Study Citation:		Huybrechts, T., Dewulf, J., Van Langenhove, H. (2005.0). Priority volatile organic compounds in surface waters of the southern North Sea. Environmental Pollution 133(2):255-264.		
HERO ID:		660096		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sample method and equipment, sample storage, and site characteristics are well described.
	Metric 2:	Analytical Methodology	High	Analytical methods well described. LOD provided. Replicate samples analyzed.
	Metric 3:	Biomarker Selection	N/A	Surface water sampling
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Details of the sampling sites in the North Sea are provided.
	Metric 5:	Currency	Low	Samples were collected 1998-2000.
	Metric 6:	Spatial and Temporal Variability	Medium	Samples were collected from 10 locations over two years for a total of 47 samples. No indication of replicate analysis of samples.
	Metric 7:	Exposure Scenario	High	Location is relevant for environmental exposures.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data are not provided. The mean, median, maximum, 25th percentile and 75th percentile are provided.
	Metric 9:	Quality Assurance	High	QA/QC methods were described in detail.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Variability is discussed but limited discussion of uncertainties.
Overall Quality Determination			High	

Study Citation:		Huybrechts, T., Dewulf, J., Van Langenhove, H. (2004.0). Spatial and temporal variability of priority volatile organic compounds in the Scheldt estuary. Water Research 38(14-15):3241-3250.		
HERO ID:		660097		
Domain		Metric	Rating	Comments
Domain 1: Reliability		Metric 1: Sampling Methodology	High	The authors reported study site characteristics, sampling equipment, procedure, design, and storage conditions.
		Metric 2: Analytical Methodology	High	The authors report the extraction method, analytical instruction, recovery results and LODs.
		Metric 3: Biomarker Selection	N/A	Water samples
Domain 2: Representativeness		Metric 4: Geographic Area	High	The authors report the study location.
		Metric 5: Currency	Low	Samples were collected between 1998-2000.
		Metric 6: Spatial and Temporal Variability	High	The authors collected 84 samples total over different sites and different sampling years. The authors collected multiple samples from the same estuary at the same time point (replicates).
		Metric 7: Exposure Scenario	Medium	The authors describe the microenvironment.
Domain 3: Accessibility/Clarity		Metric 8: Reporting of Results	Medium	The authors reported summary statistics including minimums, maximums, mean, standard deviation, median, 25th and 75th percentile, detection frequency and the number of samples. The authors did not report individual sample data.
		Metric 9: Quality Assurance	High	The authors reported following standard European QA methods. They reported recovery results, they analyzed reference materials,
Domain 4: Variability and Uncertainty		Metric 10: Variability and Uncertainty	Low	The authors discussed the variability in the concentrations across the sampling locations and time, but they did not discuss the uncertainty of the study, data gaps, or limitations.
Overall Quality Determination			Medium	

Study Citation:		Jay, K., Stieglitz, L. (1995.0). Identification and quantification of volatile organic components in emissions of waste incineration plants. Chemosphere 30(7):1249-1260.		
HERO ID:		660112		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Low	The study did not elaborate on sampling procedure.
	Metric 2:	Analytical Methodology	Low	Analytical and extraction method were described; however, the LOD was not provided. QC: change to low
	Metric 3:	Biomarker Selection	N/A	Biomarkers of interest were not addressed in this reference.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	German
	Metric 5:	Currency	Low	No sampling date is provided, but a publication date is available.
	Metric 6:	Spatial and Temporal Variability	Low	The study reported that measures were taken at one municipal waste incineration plant without the exact sample size.
	Metric 7:	Exposure Scenario	Medium	Air emission around a incineration plant.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Average concentrations were reported in Table 1.
	Metric 9:	Quality Assurance	Low	Quality assurance techniques and results were not directly discussed, but can be implied through the study’s use of standard field and laboratory protocols.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	The study has limited discussion of key uncertainties and limitations.
Overall Quality Determination			Low	

Study Citation:		Fast, T., Kliet, J., Boleij, J. S. M., Slingerland, P. (1988.0). The influence of soil pollution on the indoor air quality. 1:441-449.		
HERO ID:		664403		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Low	Multiple information missing- equipment details used for soil and air sampling, storage, procedure, calibration. More methodology information might be in the referenced study- (Fast et.al. ,1983).
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methodology not described- instrumentation only listed in table 1. LOD/LOQ not reported
	Metric 3:	Biomarker Selection	N/A	Chemical measured in soil
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The Netherlands
	Metric 5:	Currency	Low	May 1984 to November 1985
	Metric 6:	Spatial and Temporal Variability	Medium	Measurements were carried out in 77 houses on 11 locations with different types of soil pollution and in 20 houses on two reference locations. Some replicates- "In 12 houses the program of measurements was repeated 2 to 6 times to examine seasonal variation."
	Metric 7:	Exposure Scenario	High	Samples were taken from homes. Sites well described.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Individual data points are not reported. Missing multiple summary statistics.
	Metric 9:	Quality Assurance	Low	QA/QC techniques were not directly discussed- unclear if this would interfere with study.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Some characterization of variability in seasons. No limitations mentioned.
Overall Quality Determination			Uninformative	

Study Citation:		Loscutoff, W. V., Poore, M. V. (1993.0). Ambient air toxics data from California's toxic air contaminant monitoring program. :191-203.		
HERO ID:		666747		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Methodology is briefly described as adaptation of NIOSH or other environmental methods. It's noted at CARB contracted with Batelle to QA/QC/evaluate sampling, analysis and quality control procedures of this study.
	Metric 2:	Analytical Methodology	Medium	LOD provided but methodology is briefly described as adaptation of NIOSH or other environmental methods. It's noted at CARB contracted with Batelle to QA/QC/evaluate sampling, analysis and quality control procedures of this study.
	Metric 3:	Biomarker Selection	N/A	Parent chemical only.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	California.
	Metric 5:	Currency	Low	1989-1990
	Metric 6:	Spatial and Temporal Variability	High	20 sites
	Metric 7:	Exposure Scenario	High	Ambient air exposure pathway
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data not provided, stats include min, max, mean and figures of trends
	Metric 9:	Quality Assurance	Medium	QA processes are discussed.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Discussed seasonality of sampling
Overall Quality Determination			Medium	

Study Citation:		Paxéus, N., Robinson, P., Balmér, P. (1992.0). Study of organic pollutants in municipal wastewater in Göteborg, Sweden. Water Science and Technology 25(11):249-256.		
HERO ID:		667025		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Low	Site characteristics provided. Only one sentence is available for sampling methodology, which doesn't mention any widely accepted protocols.
	Metric 2:	Analytical Methodology	Low	Instrument calibration and recovery samples missing. Detection limits also missing, except for PAHs were an estimate was provided.
	Metric 3:	Biomarker Selection	N/A	Parent chemicals measured in wastewater
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Goteborg, Sweden
	Metric 5:	Currency	Low	1989-1991
	Metric 6:	Spatial and Temporal Variability	Medium	No replicate samples and fewer than 10 samples per scenario
	Metric 7:	Exposure Scenario	High	Samples taken from municipal wastewater
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Individual data points not reported
	Metric 9:	Quality Assurance	Low	QA/QC procedures not discussed. Can infer that some techniques were applied through citations
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	No discussion of the uncertainties and limitations
Overall Quality Determination			Low	

Study Citation:		Heroux, M. E., Gauvin, D., Gilbert, N. L., Guay, M., Dupuis, G., Legris, M., Levesque, B. (2008.0). Housing characteristics and indoor concentrations of selected volatile organic compounds (VOCs) in Quebec City, Canada. Indoor and Built Environment 17(2):128-137.		
HERO ID:		694700		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Storage conditions not described.
	Metric 2:	Analytical Methodology	Medium	Limited discussion of analytical methodology.
	Metric 3:	Biomarker Selection	N/A	Environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Quebec City, Canada.
	Metric 5:	Currency	Medium	2005
	Metric 6:	Spatial and Temporal Variability	Medium	Replicate samples were not collected at all sites.
	Metric 7:	Exposure Scenario	High	Setting and potential sources well characterized.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data not reported.
	Metric 9:	Quality Assurance	Low	Quality assurance results not reported.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	High	Variability and uncertainty well characterized.
Overall Quality Determination			Medium	

Study Citation:		Cai, Q., Mo, C., Wu, Q., Zeng, Q., Katsoyiannis, A. (2007.0). Occurrence of organic contaminants in sewage sludges from eleven wastewater treatment plants, China. Chemosphere 68(9):1751-1762.		
HERO ID:		698313		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	sludge from 11 WWTPs; grab samples of sludge collected and stored in aluminum containers; samples dried at room temp, ground, sieved, and refrigerated. Missing description or mention of sampling contamination and care of cross contamination and prevention
	Metric 2:	Analytical Methodology	High	extraction performed according to USEPA 340C methods; Soxhlet-extractor; GC-MS; detection limits and recoveries presented in Table 1
	Metric 3:	Biomarker Selection	N/A	Wastewater, no biomarker needed
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	9 different cities throughout China (Beijing, Xi'an, Lanzhou, Wuxi,Guangzhou, Foshan, Shenzhen, Zhuhai and Hong Kong)
	Metric 5:	Currency	Low	between 1998 and 1999
	Metric 6:	Spatial and Temporal Variability	Medium	11 WWTPs sampled around China; Fig 1 provides locations; number of samples per location and duration of sampling not provided, replicates unknown
	Metric 7:	Exposure Scenario	High	sewage sludge from WWTPs in China; Table 2 provides sources of the sludge and their characteristics
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	average concentrations by WWTP is presented in Table 4; percentage of total concentration provided; all other parameters/stats not provided
	Metric 9:	Quality Assurance	Medium	quality assurance/quality control (QA/QC) have been presented elsewhere (Cai et al., 2007a); % recoveries provided in Table 1
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	discusses variance by plant
Overall Quality Determination			Medium	

Study Citation:		Cai, Q., Mo, C., Wu, Q., Zeng, Q., Katsoyiannis, A. (2007.0). Quantitative determination of organic priority pollutants in the composts of sewage sludge with rice straw by gas chromatography coupled with mass spectrometry. Journal of Chromatography A 1143(1-2):207-214.		
HERO ID:		698352		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	The sampling methodology is clear, detailed, and appropriate. Details such as sampler calibration and sample storage are provided.
	Metric 2:	Analytical Methodology	High	The analytical methodology is clear, detailed, and appropriate; detection limits are provided in Table 1.
	Metric 3:	Biomarker Selection	N/A	Study is testing for the parent chemical in an environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Samples were collected in China.
	Metric 5:	Currency	Low	Publication date is 2007. No sample collection date provided.
	Metric 6:	Spatial and Temporal Variability	Low	Only four samples were collected (1 per compost type) as shown in Table 2.
	Metric 7:	Exposure Scenario	High	The study is testing for chlorobenzenes and phthalates in compost materials. This scenario is of interest for the chemical and is well characterized.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	Raw data is provided in Table 3.
	Metric 9:	Quality Assurance	Medium	QA/QC measures are discussed, including the use of blanks and controls. QA/QC issues were not identified.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	No characterization of variability or uncertainty is provided.
Overall Quality Determination			Medium	

Study Citation:		Sabel, G. V., Clark, T. P. (1984.0). Volatile organic compounds as indicators of municipal solid waste leachate contamination. Waste Management & Research 2(2):119-130.		
HERO ID:		724484		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Leachate and groundwater from 20 MSW landfills and two dumps (Fig 1 shows location of sampling sites) that described in detail. Section 2 - Methods; samples collected in 40-ml glass vials without head space; 4 vials per sample; samples iced and analyzed within 48 hr; P.122 describes collection of leachate and groundwater samples.
	Metric 2:	Analytical Methodology	Low	Analyses followed USEPA Method 601. Detection limits not provided.
	Metric 3:	Biomarker Selection	N/A	Parent chemical in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Minnesota, USA (Fig 1)
	Metric 5:	Currency	Low	Study published in 1984.
	Metric 6:	Spatial and Temporal Variability	Medium	6 leachate samples; 45 groundwater wells at 13 landfills; 21 groundwater at 8 landfills and 2 dumps. Replicate samples.
	Metric 7:	Exposure Scenario	High	Leachate and groundwater contamination at MSW landfill sites in MN. Table 3 indicates if area is urban or rural.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Table 2 provides DF and range for leachate and groundwater. No individual data reported.
	Metric 9:	Quality Assurance	Medium	Field blank carried out at all times. Recoveries not discussed.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	The study mentions that the data is limited. There is comparison of results to other leachate data.
Overall Quality Determination			Medium	

Study Citation:		Ligocki, M. P., Leuenberger, C., Pankow, J. F. (1985.0). Trace organic compounds in rain{\textemdash}II. Gas scavenging of neutral organic compounds. Atmospheric Environment 19(10):1609-1617.		
HERO ID:		724845		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	The sampling method was sound.
	Metric 2:	Analytical Methodology	Low	Detection limits were not reported.
	Metric 3:	Biomarker Selection	N/A	the study is testing for the parent chemical in an environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Portland, Oregon
	Metric 5:	Currency	Low	Study was conducted in the winter and spring of 1984.
	Metric 6:	Spatial and Temporal Variability	Medium	The study reported 7 rain events during which samples were collected.
	Metric 7:	Exposure Scenario	Medium	The data likely represent the relevant exposure scenario.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	Individual sample concentrations were reported. One rain event represented one sample.
	Metric 9:	Quality Assurance	Medium	The study applied and documented quality assurance/quality control measures; however, one or more pieces of QA/QC information is not described.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	The study has limited discussion of key uncertainties, limitations, and data gaps.
Overall Quality Determination			Medium	

Study Citation:		Blount, B. C., Mcelprang, D. O., Chambers, D. M., Waterhouse, M. G., Squibb, K. S., Lakind, J. S. (2010.0). Methodology for collecting, storing, and analyzing human milk for volatile organic compounds. Journal of Environmental Monitoring 12(6):1265-1273.		
HERO ID:		737432		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Breast milk sampling procedures and equipment described in detail as manual expression directly into pre-cleaned Vacutainer with immediate replacement of stopper following collection or manual expression into pre-cleaned wide-mouth glass jars with subsequent transfer to low headspace Vacutainer for storage and shipment. Samples stored at 4°C for less than two weeks prior to analysis for most samples. Insufficient information on number of samples expressed into Vacutainer versus those expressed into wide-mouth glass jars. Insufficient information on number of samples stored for longer than two weeks prior to analyses.
	Metric 2:	Analytical Methodology	Low	Method detection limit calculations described, however chemical-specific limits of detection not reported or referenced. Analytical and extraction methodology noted as modified from existing SPME-GC-MS methodology and referenced (Blount et al., 2006) and described in detail. Authors noted a full set of eight calibrators, including one blank, was analyzed with each set of samples to generate calibration curves for each analytical run. Authors report concentrations for the 10 of the 36 original chemicals with median concentrations higher than the lowest reportable level (LRL), but chemical-specific LRL’s and recoveries not reported.
	Metric 3:	Biomarker Selection	N/A	Sampling for parent chemical of interest.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Samples collected from participants in Baltimore, MD.
	Metric 5:	Currency	Low	Insufficient information on dates of sample collection, 2010 publication date.
	Metric 6:	Spatial and Temporal Variability	Low	Single samples from 12 participating women for reported total of twelve samples from a convenience, non-statistical sampling approach at single time.
	Metric 7:	Exposure Scenario	Medium	Data likely represent relevant, non-occupational exposure scenario—authors note participants completed questionnaire, however insufficient information on whether data on occupation was collected.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Median reported as below the lowest reportable level (LRL). Insufficient information regarding chemical-specific frequency of detection, dates of sampling, raw data and lipid-adjustment for breast milk samples.
	Metric 9:	Quality Assurance	Medium	Chemical-specific recoveries not detailed, however extensive details on quality control measures for sampling, extraction and analyses—characterized control human milk sample described as left exposed to room air while breast milk sample expressed with final sample concentrations corrected for the background air VOC levels derived from the control open-air sample. Each analysis batch described as evaluated at two blind QC-concentration levels and evaluated by an independent, blinded QC officer. Lab blanks utilized with blanks described as prepared from VOC-free blank water.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Study characterized sample variability in terms of concentration range, with detailed discussion regarding potential uncertainties derived from sampling, extraction and analysis procedures. Authors discussed differences in reported concentrations between this pilot study and previous reports, however additional potential limitations, such as sample size, not discussed (although this was noted as a pilot study).
Overall Quality Determination			Low	

Study Citation:		Mes, J. (1992.0). Organochlorine residues in human blood and biopsy fat and their relationship. Bulletin of Environmental Contamination and Toxicology 48(6):815-820.		
HERO ID:		787323		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sampling methodology, equipment and procedures described and referenced. Biopsy samples described as from abdominal region mainly, with one or two samples from buttocks/breast. Insufficient information on performance or calibration of sampling procedures or instrumentation, as well as sample storage conditions and duration of sample storage prior to analyses.
	Metric 2:	Analytical Methodology	High	Extraction methodology and instrumentation (GC/MS) described. Procedures utilized laboratory blank samples and reported minimum detectable levels (MDL) within Table 1. Mean recoveries reported.
	Metric 3:	Biomarker Selection	High	Biomarker selected is blood and fatty tissue.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Sampling conducted in Canada.
	Metric 5:	Currency	Low	Dates of sampling not reported. Study published in 1992.
	Metric 6:	Spatial and Temporal Variability	Medium	Paired single blood and biopsy samples obtained from each of 25 patients. Insufficient information on sampling approach, assumed non-statistical sampling of volunteers with lack of duplicate samples.
	Metric 7:	Exposure Scenario	Medium	Participants described in terms of gender. Data likely represent relevant, non-occupational exposure scenario, however insufficient information on whether data on occupation was collected.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Summary statistics reported only as mean with maximum concentrations within Tables 2 and 4, with no reporting of range or measure of variation. Authors noted removal of outliers for correlations within Table 5. Table 2 notes concentration median < limits of detection. Insufficient information on raw data, range of concentrations, and number of samples less than (or greater than) limit of detection. Raw data not reported.
	Metric 9:	Quality Assurance	Medium	Samples described as immediately frozen until analysis. Laboratory control or blank samples utilized along with quadruplicate and triplicate determinations of blood and adipose tissue samples with recovery ranges reported. Insufficient information on blank-correction of concentrations.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Low—Lack of summary statistics on sample variability as results presented only as median and maximum concentrations, as well as lack of discussion of potential limitations.
Overall Quality Determination			Medium	

Study Citation:		Jang, Y. C., Townsend, T. G. (2001.0). Occurrence of organic pollutants in recovered soil fines from construction and demolition waste. Waste Management 21(8):703-715.		
HERO ID:		789748		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	The authors mentioned using a standard sampling method, (US EPA SW-846 Chapter nine), the authors also report sampling equipment, procedures, storage conditions.
	Metric 2:	Analytical Methodology	High	Authors reported LODs, standard EPA methods were used for analysis and extraction.
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical in an environmental media (soil)
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Authors reference visiting and collecting samples from 14 construction and demolition sites in Florida.
	Metric 5:	Currency	Low	No sampling date is provided, but a publication date is available (2000). The timing is not consistent with when current exposures (>15 years old) may be expected and likely to have a substantial impact on results.
	Metric 6:	Spatial and Temporal Variability	High	They collected duplicate samples, a total of >40 samples from different sample sites over a period of time to capture temporal trends.
	Metric 7:	Exposure Scenario	High	The authors described that samples were collected from construction and demolition sites, so they describe the setting.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data is not reported, only the ranges of concentrations, number of samples, detection frequencies, and there is no reporting of measure of variation.
	Metric 9:	Quality Assurance	Medium	Authors report collecting field blanks and analyzing lab blanks. The authors mentioned recoveries however it was related to the leaching experiments. There were no mentions of recoveries for extraction analysis.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	No standard deviation is reported and there is no discussion on limitations or uncertainties.
Overall Quality Determination			Medium	

Study Citation:		Martí, N., Aguado, D., Segovia-Martínez, L., Bouzas, A., Seco, A. (2011.0). Occurrence of priority pollutants in WWTP effluents and Mediterranean coastal waters of Spain. Marine Pollution Bulletin 62(3):615-625.		
HERO ID:		1002160		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sampling procedures were well described- some information missing such as equipment.
	Metric 2:	Analytical Methodology	High	Analytical method (GC-FID or GC-ECD) was used. LOD was reported for each of the pollutant.
	Metric 3:	Biomarker Selection	N/A	Parent chemical in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Spain
	Metric 5:	Currency	Medium	Sampling took place from 2008 to 2009.
	Metric 6:	Spatial and Temporal Variability	Medium	160 surface water samples were analyzed. 84 wastewater effluent samples were analyzed. No replicates.
	Metric 7:	Exposure Scenario	High	The data closely represent relevant exposure scenario (surface water/wastewater).
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Supplementary or individual data points were not reported.
	Metric 9:	Quality Assurance	Low	Quality assurance/quality control techniques and results were not directly discussed, but can be implied through the study’s use of standard field and laboratory protocols.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	The study has limited characterization of variability. No limitations reported.
Overall Quality Determination			Medium	

Study Citation:		Yun, S. H., Kannan, K. (2011.0). Distribution of mono- through hexa-chlorobenzenes in floodplain soils and sediments of the Tittabawassee and Saginaw Rivers, Michigan. Environmental Science and Pollution Research 18(6):897-907.		
HERO ID:		1002163		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Low	Soil and sediment grab samples were collected with a stainless steel Ponar grab sampler using methods described elsewhere: (Hilscherova et al. 2003;Kannan et al. 2008; Yun et al. 2008). Map of sample locations were provided. No information was provided on storage conditions.
	Metric 2:	Analytical Methodology	Medium	Concentrations were determined as described previously, with some modifications (Lee and Fang 1997). The method was briefly described however and is appropriate for the chemical and media (GC/MS monitored by SIM mode). Chlorobiphenyl congeners, CB-30 and CB-204, were spiked as surrogate standards into every sample. External calibration was conducted including 1,3-DCB, but did not include 1,4 DCB or 1,2-DCB.The LOQ was not specifically reported, but assumed to be <0.02 ng/g DW for 1,2 DCB based on Table 1 results. 1,4-DCB concentrations were above the LOQ.
	Metric 3:	Biomarker Selection	N/A	Biomarkers of interest were not addressed in this reference.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Samples were collected in the Tittabawassee and Saginaw Rivers, Michigan in the U.S.
	Metric 5:	Currency	Low	Samples were collected in 2002 and 2004.
	Metric 6:	Spatial and Temporal Variability	Medium	Samples were collected from 7 bodies of water, with 1 to 13 samples for soil and 1 to 28 samples for surface sediment.
	Metric 7:	Exposure Scenario	High	Soils and sediments from 7 rivers upstream and downstream of Dow Chemical Company in Midland, Michigan which produced chlorobenzenes for several decades. Wastewater treatment plants were also noted.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Mean and range provided for each site, but no raw data. Only dry weight results provided.
	Metric 9:	Quality Assurance	Low	QA not described. Recoveries of the two surrogate standards were acceptable.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Range provided to described variability, but no standard deviation. Uncertainty not discussed. Multiple rivers wee sampled.
Overall Quality Determination			Low	

Study Citation:		Mo, C. H., Cai, Q. Y., Li, Y. H., Zeng, Q. Y. (2008.0). Occurrence of priority organic pollutants in the fertilizers, China. Journal of Hazardous Materials 152(3):1208-1213.		
HERO ID:		1003896		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Low	The sampling procedures were not reported. The study only mentioned they collected 22 samples from widely-used fertilizers in China from different factories/companies. It is unclear how they chose those fertilizers or how they selected the factories to obtain the samples. Storage conditions and storage duration time was not reported but they referenced another paper in describing precautions taken during sampling.
	Metric 2:	Analytical Methodology	Medium	LODs and recoveries were reported by authors. They used a modified standard EPA method for extraction and analysis. Authors did not report any instrument calibration.
	Metric 3:	Biomarker Selection	N/A	Study measured parent compounds in fertilizers.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Authors collected samples from China
	Metric 5:	Currency	Low	No sampling data reported, but the publication date is 2007.
	Metric 6:	Spatial and Temporal Variability	Medium	Study reports collecting 22 different fertilizers across China. I am assuming this is 22 different samples. No replicates were reportedly collected. Timing on data collection was not reported so it is unclear the temporal nature of the study.
	Metric 7:	Exposure Scenario	Medium	Study measured concentration of key chemicals in a consumer product, fertilizer. The actual scenario of use was not described, the authors looked at chemical concentration in the product.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	The text mentioned five chlorobenzene compounds were below detection limits, which includes 1,4 and 1,2-dichlobenzene.
	Metric 9:	Quality Assurance	Low	The authors reported, "The detailed quantification method, the details of the quality assurance/quality control(QA/QC) have been presented elsewhere;" but they did not mention collecting and analyzing control samples.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	The authors did not report on variance (though that is less applicable in this case when the compounds were below the detection limits) and have a limited discussion of data gaps and uncertainties.
Overall Quality Determination			Medium	

Study Citation:		Leach, J., Blanch, A., Bianchi, A. C. (1999.0). Volatile organic compounds in an urban airborne environment adjacent to a municipal incinerator, waste collection centre and sewage treatment plant. Atmospheric Environment 33(26):4309-4325.		
HERO ID:		1010015		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	The sampling procedure and equipment were described in detail, and lacked a few details on storage conditions.
	Metric 2:	Analytical Methodology	Low	The extraction and analysis were described, but no limit of detection (LOD) was provided.
	Metric 3:	Biomarker Selection	N/A	Air samples were collected within this study so this metric is not applicable.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The sampling took place in Marchwood, England.
	Metric 5:	Currency	Low	The samples were collected during the years 1996-1997.
	Metric 6:	Spatial and Temporal Variability	Medium	The samples came from 3 facilities and were sampled in duplicate.
	Metric 7:	Exposure Scenario	Medium	The exposure scenario was adequately described.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Airborne concentrations were reported as a range in Table 3.
	Metric 9:	Quality Assurance	Medium	The study applied and documented quality assurance measures.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	The study had some discussions about variance.
Overall Quality Determination			Medium	

Study Citation:		Bouhamra, W. S. (1995.0). Estimation of volatile organic compounds in Kuwaiti houses after the Gulf war. Environmental Pollution 90(1):121-125.		
HERO ID:		1038311		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling methods, survey details, equipment and storage conditions reported. Missing some information such as calibration.
	Metric 2:	Analytical Methodology	Low	Analytical methods and instrument described, however, no LOD or LOQ reported.
	Metric 3:	Biomarker Selection	N/A	The study is sampling in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The study was conducted in Kuwait.
	Metric 5:	Currency	Low	Date of study not reported. Study published in 1994.
	Metric 6:	Spatial and Temporal Variability	Medium	21 indoor samples. No replicates samples.
	Metric 7:	Exposure Scenario	High	Exposure to indoor and outdoor air from potential destruction of oil wells.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Mean and SD reported in Table 6. Raw data not reported.
	Metric 9:	Quality Assurance	Low	QA/QC measures and results were not directly discussed but are implied through the study's use of standard field and laboratory protocols.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Limitations and variability were not reported.
Overall Quality Determination			Medium	

Study Citation:		Zhang, Y., Li, C., Wang, X., Guo, H., Feng, Y., Chen, J. (2012.0). Rush-hour aromatic and chlorinated hydrocarbons in selected subway stations of Shanghai, China. Journal of Environmental Sciences 24(1):131-141.		
HERO ID:		1057342		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sampling methodology is discussed and is generally appropriate (i.e., scientifically sound), however, one or more pieces of sampling information is not described such as the sample storage conditions/duration and calibration of sampler.
	Metric 2:	Analytical Methodology	Medium	Analytical methodology is discussed in detail and is clear and appropriate, however, recovery samples are not discussed.
	Metric 3:	Biomarker Selection	N/A	Study tested for the parent chemical in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Shanghai, China
	Metric 5:	Currency	Medium	Samples collected July 25, 2007.
	Metric 6:	Spatial and Temporal Variability	Medium	Total forty-five air samples were collected from the campaign. No replicate samples reported.
	Metric 7:	Exposure Scenario	High	The data closely represent relevant/realistic exposure scenario (i.e., the population/scenario/media of interest).
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data were not reported. Summary statistics are missing some parameters.
	Metric 9:	Quality Assurance	Low	QA/QC techniques and results were discussed, however, some key measures were not reported such as recovery samples.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	The study has limited discussion of key uncertainties, limitations, and data gaps.
Overall Quality Determination			Medium	

Study Citation:		Deleon, I. R., Byrne, C. J., Peuler, E. A., Antoine, S. R., Schaeffer, J., Murphy, R. C. (1986.0). Trace organic and heavy metal pollutants in the Mississippi River USA. Chemosphere 15(6):795-805.		
HERO ID:		1267509		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling method was described in details, including equipment, storage, and study site characteristics.
	Metric 2:	Analytical Methodology	Low	GC/MS was used for the analysis. LOQ or reporting limits were not reported.
	Metric 3:	Biomarker Selection	N/A	Parent chemical in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Mississippi River
	Metric 5:	Currency	Low	Sampling took place in summer of 1984.
	Metric 6:	Spatial and Temporal Variability	Medium	Sampling took place at 11 stations along the Mississippi River. Only few samples had replicates.
	Metric 7:	Exposure Scenario	High	The data closely represent relevant exposure scenario (surface water).
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Individual data were provided in the main article but a lot of summary statistics are missing.
	Metric 9:	Quality Assurance	Low	Quality assurance was not directly discussed.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	The study has limited discussion of key uncertainties, limitations, and data gaps. There is variation in the sites sampled along the river.
Overall Quality Determination			Medium	

Study Citation:		Burgess & Niple, (1981.0). Chemical and biological sampling program on Scippo Creek. 870002032:#86-870002032.		
HERO ID:		1269709		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Low	The sampling procedure was generally described, lacking important information.
	Metric 2:	Analytical Methodology	Medium	GC/MS was used for analysis. LOQ was reported to be less than 0.01 ug/L. No information on other parameters like extraction method.
	Metric 3:	Biomarker Selection	N/A	Measured parent chemicals in creek
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Scippo Creek, Ohio
	Metric 5:	Currency	Low	Sampling took place in July 1980.
	Metric 6:	Spatial and Temporal Variability	Low	Sampling size was not clearly provided, but at least 3 stations were reported in the study.
	Metric 7:	Exposure Scenario	High	The data represents a relevant exposure scenario with the chemicals' possible harm to aquatic life.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Individual data for the stations reported were available for some of the stations, but lacked standard deviation and a few other important summary statistics. However, for the two dichlorobenzenes, authors noted that Table 22 did not list their concentration data because it was assumed to be not present in the samples.
	Metric 9:	Quality Assurance	Low	No quality assurance measure was directly provided, but can be implied based on the study.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	The study has limited discussion of key uncertainties, limitations, and data gap. No characterization of variance
Overall Quality Determination			Low	

Study Citation:		AT&T, (1990.0). Letter from AT{\&}T to USEPA submitting enclosed initial submission concerning the preliminary soil contamination study with attachments.		
HERO ID:		1270143		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Critically Deficient	Sampling methodology not reported
	Metric 2:	Analytical Methodology	High	Methodology summary reported in page 7
	Metric 3:	Biomarker Selection	N/A	Parent chemical in soils
Domain 2: Representativeness				
	Metric 4:	Geographic Area	Critically Deficient	Geographic location not reported
	Metric 5:	Currency	Low	Samples collected in 1990
	Metric 6:	Spatial and Temporal Variability	Low	4 samples
	Metric 7:	Exposure Scenario	Critically Deficient	Exposure scenario not reported
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data reported in page 24
	Metric 9:	Quality Assurance	High	The study used standardized EPA methods
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Critically Deficient	Variability and uncertainty can't be assessed
Overall Quality Determination			Uninformative	

Study Citation:		De Vault, D. S. (1985.0). Contaminants in fish from great lakes harbors and tributary mouths. Archives of Environmental Contamination and Toxicology 14(5):587-594.		
HERO ID:		1315838		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	sampling described in detail
	Metric 2:	Analytical Methodology	Low	GC method described. detection limit for compound of interest not reported
	Metric 3:	Biomarker Selection	N/A	parent chemical in environmental media
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	harbor and tributary mouth sites in the Great Lakes basin
	Metric 5:	Currency	Low	1980/1981
	Metric 6:	Spatial and Temporal Variability	Medium	between 1-15 samples per fish in the different river locations
	Metric 7:	Exposure Scenario	Medium	pesticides in runoff into the waters of the Great Lakes Harbours and Tributaries
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	individual sample concentrations and raw data reported
	Metric 9:	Quality Assurance	Low	QA/QC not discussed but implied
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	variability shown in samples but not explicitly identified or discussed
Overall Quality Determination			Medium	

Study Citation:		Atwater, J. W., Jasper, S. E., Parkinson, P. D., Mavinic, D. S. (1990.0). Organic contaminants in Canadian coal wastewaters and associated sediments. Water Pollution Research Journal of Canada 25(2):187-200.		
HERO ID:		1315873		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling methodology is fully explained
	Metric 2:	Analytical Methodology	Medium	Detection limits were somewhat reported, but are overall unclear. Authors noted that for wastewater, a lower limit LOQ of 10ug/L was established, as well as a practical detection limit of 5ug/L (pg 192). For sediment, a detection limit of 0.1ug/g was established (pg 192). It is unclear if these limits apply to all chemicals analyzed.
	Metric 3:	Biomarker Selection	N/A	Parent chemical measured in sediment and wastewater
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Canada
	Metric 5:	Currency	Low	Samples were collected from 1982 to 1984
	Metric 6:	Spatial and Temporal Variability	Low	Samples were grab samples. No replicates.
	Metric 7:	Exposure Scenario	High	Samples taken from coal operations
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Individual data points not reported
	Metric 9:	Quality Assurance	Low	Study has a quality control section. Recoveries ranged from 46 to 132% and not specified by individual chemicals. Authors did assert that this is an acceptable range.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Limited characterization of variance and some discussion of limitations.
Overall Quality Determination			Medium	

Study Citation:		Camanzo, J., Rice, C. P., Jude, D. J., Rossmann, R. (1987.0). Organic priority pollutants in nearshore fish from 14 Lake Michigan USA tributaries and embayments 1983. Journal of Great Lakes Research 13(3):296-309.		
HERO ID:		1315876		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling methodology is discussed and pertinent sampling information is provided in the data source such as sampling equipment, sampling procedures, sample storage conditions and sampling sites.
	Metric 2:	Analytical Methodology	High	Samples were extracted according to publicly available US EPA SOP. Analytical instrumentation is described. Detection limits provided.
	Metric 3:	Biomarker Selection	N/A	The study is testing the parent chemical in fish.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Geographic location is reported and discussed. Figure 1 also shows all 14 collection sites throughout Michigan, U.S.
	Metric 5:	Currency	Low	Timing of sample collection is not consistent with current or recent exposures may be expected (> 15 years). Sampling period was in 1983.
	Metric 6:	Spatial and Temporal Variability	Medium	Sampling approach accurately captures variability. The study used a large sample size (14 sites, 3 to 11 fish per composite sample), and sampling occurred over a sufficient period of time (fall of one year). Some replicate samples are used.
	Metric 7:	Exposure Scenario	High	The data represent the relevant exposure scenario (i.e., fish exposure in Lake Michigan). The study describes the setting (location).
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Some of the raw data i.e., individual data points are not reported (some of raw data are means of replicates), and therefore summary statistics cannot be reproduced.
	Metric 9:	Quality Assurance	Low	The study applied quality assurance/quality control measures; however, one or more pieces of QA/QC information is not described. Recoveries are on the low side 67 to 76% (<70%) but they didn't correct for recovery.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability shown in 14 locations and 2 different fish species per site. Minimal quantitative analysis of variability is discussed such as SD of replicate samples and there is no uncertainty discussion in the study.
Overall Quality Determination			Medium	

Study Citation:		Hall, L. W., Jr, Pinkney, A. E., Horseman, L. O., Finger, S. E. (1985.0). Mortality of striped bass larvae in relation to contaminants and water-quality in a Chesapeake Bay tributary. Transactions of the American Fisheries Society 114(6):861-868.		
HERO ID:		1315913		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sampling methodology was discussed in the data source, but lacked a few details.
	Metric 2:	Analytical Methodology	Low	Analytic method was provided but no LOD/LOQ was reported.
	Metric 3:	Biomarker Selection	N/A	Parent chemical in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Chesapeake Bay Tributary
	Metric 5:	Currency	Low	April, 1984
	Metric 6:	Spatial and Temporal Variability	Low	3 river locations were sampled. Replicate samples taken.
	Metric 7:	Exposure Scenario	Medium	The data likely represent the relevant exposure scenario.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Individual data were not reported in the main article or SI. Little summary statistics given.
	Metric 9:	Quality Assurance	Medium	The study mentioned that quality assurance measures were applied but no details were elaborated.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	The study has limited discussion of key uncertainties, limitations, variation, and data gaps.
Overall Quality Determination			Medium	

Study Citation:		TDH, (1982.0). Study plan and data on hexachlorocyclopentadiene from 8 fish samples analyzed by GC/MS with cover letter dated 082082.		
HERO ID:		1316227		
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Sampling Methodology	Low	Sampling methods only briefly described
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methods are not described
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical.
Domain 2: Representativeness	Metric 4:	Geographic Area	High	USA
	Metric 5:	Currency	Low	Published in 1982
	Metric 6:	Spatial and Temporal Variability	Medium	6 samples from 12 sampling sites
	Metric 7:	Exposure Scenario	Medium	Data likely represent relevant exposure scenarios, missing details about the population of interest
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Medium	Only individual sample concentrations, no summary statistics
	Metric 9:	Quality Assurance	Low	QA/QC techniques only briefly discussed
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability only briefly discussed, uncertainties and study limitations not discussed

Overall Quality Determination	Uninformative
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Study Citation:		Hazleton Labs, (1986.0). Pollutant analyses on effluent discharge - phenol - with cover letter dated 072387.		
HERO ID:		1316229		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling Methodology	Critically Deficient	Sampling methods not described
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methods not described
	Metric 3:	Biomarker Selection	N/A	The authors analyzed environmental media.
Domain 2: Representativeness	Metric 4:	Geographic Area	High	Wisconsin, USA
	Metric 5:	Currency	Low	Sampling in 1986
	Metric 6:	Spatial and Temporal Variability	Critically Deficient	Sample size is not reported
	Metric 7:	Exposure Scenario	Low	Data lacks key pieces of information and this impacts the exposure scenario characterization
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Medium	Only individual sample concentrations, no summary statistics
	Metric 9:	Quality Assurance	Low	QA/QC techniques were not discussed
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability was not characterized, uncertainties and limitations were not discussed
Overall Quality Determination		Uninformative		

Study Citation:		Ciba-Geigy, (1987.0). Briefing for the assistant administrator - Record for decision on the Lone Pine Landfill.		
HERO ID:		1316232		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling Methodology	Critically Deficient	Sampling methodology not described
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methodology not described
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical in an environmental media.
Domain 2: Representativeness	Metric 4:	Geographic Area	High	New Jersey
	Metric 5:	Currency	Low	Published in 1987
	Metric 6:	Spatial and Temporal Variability	Critically Deficient	Sample size is not reported
	Metric 7:	Exposure Scenario	Low	Data may represent a relevant exposure scenario but lacks key data details to support its validity
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Low	Only reported maximum concentrations detected, no summary statistics
	Metric 9:	Quality Assurance	Low	QA/QC details not discussed
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability, uncertainties and limitations were not characterized
Overall Quality Determination		Uninformative		

Study Citation:		Geraghty & Miller Inc, (1990.0). Phase II - Site investigation: Borden site Carson, California (volume I) with attached appendices and cover letter dated 032790.		
HERO ID:		1316237		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling Methodology	Low	Sampling methodology only briefly described
	Metric 2:	Analytical Methodology	Critically Deficient	Not described
	Metric 3:	Biomarker Selection	N/A	the study is testing for the parent chemical in an environmental media.
Domain 2: Representativeness	Metric 4:	Geographic Area	High	California
	Metric 5:	Currency	Low	Sampling began in 1987
	Metric 6:	Spatial and Temporal Variability	Low	10 soil samples, 15 water samples
	Metric 7:	Exposure Scenario	High	Provided an exposure assessment
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Medium	Individual sample concentrations, no summary statistics
	Metric 9:	Quality Assurance	High	Detailed QA/QC description
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability was not characterized, uncertainties were briefly discussed
Overall Quality Determination		Uninformative		

Study Citation:		Ecology and Environment, (1991.0). Letter from Vulcan Chemicals to USEPA submitting enclosed final report concerning RCRA facility assessment with tetrachloroethylene and trichloromethane with attachments.		
HERO ID:		1316245		
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Sampling Methodology	High	Well described sampling methods
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methodology was not described
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical.
Domain 2: Representativeness	Metric 4:	Geographic Area	High	Samples collected in USA
	Metric 5:	Currency	Low	Published in 1991
	Metric 6:	Spatial and Temporal Variability	Low	n=15, no replicates
	Metric 7:	Exposure Scenario	Medium	Limited description about the population of interest
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Medium	Only individual sample concentrations, no summary statistics
	Metric 9:	Quality Assurance	Low	Only briefly described
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Did not characterize variability or discussed uncertainties and limitations
Overall Quality Determination		Uninformative		

Study Citation:		Roy F. Weston Inc, (1980.0). Characterization and fate of the discharge of priority pollutants from the Rohm and Haas Philadelphia plant into the Delaware low level collector of the Philadelphia sewer.		
HERO ID:		1333014		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling performed according to an EPA protocol from 1977 - Sampling and Analysis Procedures for Screening of Industrial Effluents for Priority Pollutants.
	Metric 2:	Analytical Methodology	High	Four standard protocols were followed - three from EPA and one from the American Public Health Association.
	Metric 3:	Biomarker Selection	N/A	Measured parent chemicals in wastewater
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Philadelphia, PA
	Metric 5:	Currency	Low	April 1979 and December 1979
	Metric 6:	Spatial and Temporal Variability	Medium	No replicate samples
	Metric 7:	Exposure Scenario	High	Samples collected from contaminated effluent, city water, and river water
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Individual data points are not reported.
	Metric 9:	Quality Assurance	Low	QA/QC techniques are not directly discusses. Can be implied through study's use of standard protocols.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Characterization of variability is absent
Overall Quality Determination			Medium	

Study Citation:		Versar, (1983.0). Final report on existing environmental conditions of the upper Manasquan River, New Jersey.		
HERO ID:		1335589		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling Methodology	Critically Deficient	Sampling methods not described
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methods not described
	Metric 3:	Biomarker Selection	N/A	the study is testing for the parent chemical in an environmental media.
Domain 2: Representativeness	Metric 4:	Geographic Area	High	New Jersey
	Metric 5:	Currency	Low	Report from 1983
	Metric 6:	Spatial and Temporal Variability	Critically Deficient	Sample size not reported
	Metric 7:	Exposure Scenario	Low	Missing sufficient details about methods, sample size, limiting the reliability of the data to represent an exposure scenario of interest
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Low	Only individual sample concentrations, no summary statistics
	Metric 9:	Quality Assurance	Low	QA/QC was not described
Domain 4: Variability and Uncertainty	Metric 10:	Variability and Uncertainty	Low	Variability was not characterized, limited discussion on uncertainties and limitations
Overall Quality Determination		Uninformative		

Study Citation: Hargis, (1986.0). Phase III: Investigation of groundwater quality and hydrogeologic conditions, Summa Corporation Facility, Culver City, California (final report) with attach and letter dated 013192.
HERO ID: 1356129

Domain	Metric	Rating	Comments
Domain 1: Reliability			
Metric 1:	Sampling Methodology	Low	Sampling methods briefly described
Metric 2:	Analytical Methodology	Medium	Cited EPA method 624, included LOD, did not describe the method
Metric 3:	Biomarker Selection	N/A	Did not test for biomarkers
Domain 2: Representativeness			
Metric 4:	Geographic Area	High	California, USA
Metric 5:	Currency	Low	Samples from 1985
Metric 6:	Spatial and Temporal Variability	Critically Deficient	Sample size was not reported
Metric 7:	Exposure Scenario	Medium	Data may represent a relevant exposure scenario but the report doesn't have details about the population or microenvironment of interest
Domain 3: Accessibility/Clarity			
Metric 8:	Reporting of Results	Medium	Individual sample concentrations, no summary statistics
Metric 9:	Quality Assurance	Medium	Limited description of QA/QC techniques
Domain 4: Variability and Uncertainty			
Metric 10:	Variability and Uncertainty	Low	Variability and uncertainty were not characterized

Overall Quality Determination

Uninformative

Study Citation:		van De Meent, D., Den Hollander, H. A., Pool, W. G., Vredenburg, M. J., van Oers, H. A. M., de Greef, E., Luijten, J. A. (1986.0). Organic micropollutants in Dutch coastal waters. Water Science and Technology 18(4-5):73-81.		
HERO ID:		1441544		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sampling method, analytical method, site characteristics are well described. Some information, like storage is missing.
	Metric 2:	Analytical Methodology	Medium	Analytical methods well described- some details missing, like equipment and procedure. LODs provided.
	Metric 3:	Biomarker Selection	N/A	Parent chemical in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Details on the sampling locations are provided- Dutch costal waters.
	Metric 5:	Currency	Low	Samples were collected in 1983-1984.
	Metric 6:	Spatial and Temporal Variability	High	Total of 108 observations (6 cruises x 9 locations x 2 samples) over 2 years
	Metric 7:	Exposure Scenario	High	The scenario is relevant for environmental exposures during that time period
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data is not reported. But the mean, median, minimum and maximum are reported.
	Metric 9:	Quality Assurance	Low	Quality assurance/quality control techniques and results were not directly discussed, but can be implied through the study's use of standard field and laboratory protocols."However, not all locations could be sampled at all cruises due to heavy weather, and some samples were lost during transportation. This resulted in 21% missing values."
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	High	There is a detailed analysis of spatial and temporal variability and discussion of uncertainties.
Overall Quality Determination			Medium	

Study Citation: Cancilla, D. A., Fang, X. (1996.0). Evaluation and quality control of environmental analytical data from the Niagara River using multiple chemometric methods. Journal of Great Lakes Research 22(2):241-253.

HERO ID: 1441633

Domain	Metric	Rating	Comments
Domain 1: Reliability			
Metric 1:	Sampling Methodology	Medium	The sampling method was implied to be appropriate since it was operated under the permanent sampling stations, though details were not given.
Metric 2:	Analytical Methodology	Medium	GC-MS was used to analyze the extracts. LOD was not reported.
Metric 3:	Biomarker Selection	N/A	Parent in environmental media.
Domain 2: Representativeness			
Metric 4:	Geographic Area	High	Niagara River
Metric 5:	Currency	Low	The study did not give a specific date of sampling, but can be inferred from the article that it occurred before the publishing date which was in 1996.
Metric 6:	Spatial and Temporal Variability	High	Samples were taken in three stations along the river. They each reported 42, 52 and 55 data points.
Metric 7:	Exposure Scenario	Medium	The data likely represent the relevant exposure scenario.
Domain 3: Accessibility/Clarity			
Metric 8:	Reporting of Results	Critically Deficient	Individual data were not provided. Units are unclear.
Metric 9:	Quality Assurance	Medium	The study followed the Niagara River analytical methodology and its quality control procedures. It was assumed that quality assurance measures were conducted.
Domain 4: Variability and Uncertainty			
Metric 10:	Variability and Uncertainty	High	The study had a robust discussion of variability and limitations.

Overall Quality Determination

Uninformative

Study Citation:		Juang, D. F., Yuan, C. S., Hsueh, S. C., Chiou, L. J. (2009.0). Distribution of volatile organic compounds around a polluted river. International Journal of Environmental Science and Technology 6(1):91-104.		
HERO ID:		1444237		
Domain		Metric	Rating	Comments
Domain 1: Reliability		Metric 1: Sampling Methodology	High	Sampling procedure, equipment, and matrix characterization of the VOC chemicals were discussed.
	Metric 2:	Analytical Methodology	Medium	Analytical methodology is discussed in detail and is clear and appropriate, however, instrument calibration and recovery samples are not discussed.
	Metric 3:	Biomarker Selection	N/A	Study tested for the parent chemical in environmental media.
Domain 2: Representativeness		Metric 4: Geographic Area	High	Taiwan
	Metric 5:	Currency	Medium	Study was conducted from August 2004 to July 2005.
	Metric 6:	Spatial and Temporal Variability	High	Sample size is 40. Ten locations along the river were sampled during four seasons. Duplicates were collected for each sample.
	Metric 7:	Exposure Scenario	Medium	Ambient air near water surface. The data likely represent the relevant exposure scenario. Routes of exposure and exposure source not characterized.
Domain 3: Accessibility/Clarity		Metric 8: Reporting of Results	Medium	No raw data reported. Average concentrations with standard deviation were reported in Table 3.
	Metric 9:	Quality Assurance	Low	QA/QC control techniques and results were not thoroughly discussed. Field blanks and system blanks were taken for each sampling. Recoveries were not reported.
Domain 4: Variability and Uncertainty		Metric 10:	Variability and Uncertainty	Medium
				Discussion of variability and limitation was limited. Seasonal and temporal variability were reported.
Overall Quality Determination			Medium	

Study Citation: U.S. EPA, (1988.0). Preliminary results summary: Indoor air monitoring phase II {\&} data for warehouse and navy yard {\&} evaluation of selected heating, ventilation {\&} air conditioning system with attachments.

HERO ID: 1481714

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Sampling Methodology	High	Samples were collected according to NISOH method and/or EPA TO-1. Table I reports sampling locations.
	Metric 2: Analytical Methodology	Low	Samples were analyzed according to NISOH method and/or EPA TO-1. LOD or LOQ were not reported. Appendix A reports the analytical methods.
	Metric 3: Biomarker Selection	N/A	The study tested for the parent chemical in environmental media (air).
Domain 2: Representativeness	Metric 4: Geographic Area	High	The samples were collected in Washington, DC.
	Metric 5: Currency	Low	The samples were collected in May 1988.
	Metric 6: Spatial and Temporal Variability	Critically Deficient	The collection of replicates was not reported and sample size is not reported and cannot be inferred.
	Metric 7: Exposure Scenario	Medium	Data may represent relevant exposure scenarios related to indoor air collected in offices, but the use of exposure controls is not reported.
Domain 3: Accessibility/Clarity	Metric 8: Reporting of Results	Low	Data is reported in Tables I and III as an isomer mixture. Additional data may be reported in Table 5A, but the table is illegible.
	Metric 9: Quality Assurance	Low	QA/QC techniques and results were not directly discussed, but can be implied through the study's use of standard field and laboratory protocols.
Domain 4: Variability and Uncertainty	Metric 10: Variability and Uncertainty	Low	The characterization of variability is absent (no measure of variance reported). Key uncertainties, limitations, and data gaps are not discussed.

Overall Quality Determination

Uninformative

Study Citation:		ICI Americas Inc, (1990.0). Letter from ICI Americas Inc to USEPA submitting initial submission concerning phenol in groundwater with attachments.		
HERO ID:		1481739		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Low	No aspects of sampling methodology are described, but field and trip blanks are reported.
	Metric 2:	Analytical Methodology	Low	September samples show method of analysis as "EPA, GC." EPA method 624, LOD reported in page 10, for November samples. January samples list method of analysis as "EPA." Instrument calibration and recoveries are not discussed.
	Metric 3:	Biomarker Selection	N/A	They analyzed parent chemical in water.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Hopewell, Virginia
	Metric 5:	Currency	Low	1990
	Metric 6:	Spatial and Temporal Variability	Low	Samples were collected in September (11 samples reported; results from 4 are shown, but none were analyzed for this chemical), December (of the 8 samples reported, 4 appear to have been analyzed for this chemical, along with 2 blanks), and January (4 samples, all analyzed for this chemical, along with 2 blanks). No replicates identified.
	Metric 7:	Exposure Scenario	High	Primarily groundwater monitoring at ICI Americas, Inc., along with monitoring for VOCs in a potable water tank and water from a water fountain.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Only individual data reported for the 3 monitoring surveys, no summary statistics.
	Metric 9:	Quality Assurance	Low	The report doesn't include any QA/QC parameter for sample analysis, but does mention they followed an EPA method.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability is shown in the concentrations across three monitoring studies, but it is not discussed. There is not information regarding key limitations.
Overall Quality Determination			Low	

Study Citation:		Lebel, G. L., Williams, D. T., Benoit, F. M. (1987.0). Use of large-volume resin cartridges for the determination of organic contaminants in drinking water derived from the great lakes. Advances in Chemistry 214(ED.):309-326.		
HERO ID:		1487184		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	The sampling methods were briefly described, citing previously published literature.
	Metric 2:	Analytical Methodology	Low	the analytical methods were described, including recoveries but detection limits were not reported.
	Metric 3:	Biomarker Selection	N/A	The authors analyzed water samples.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Great Lakes, Canada.
	Metric 5:	Currency	Low	The article was published in 1986.
	Metric 6:	Spatial and Temporal Variability	Low	The sample size was not reported but can be inferred to a total of 4 samples (2 for each season) taken at each of the 6 sites.
	Metric 7:	Exposure Scenario	Low	The data may represent relevant exposure scenarios related to raw and treated water from the Great Lakes, but the uncertain sample size limits the study's validity.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Individual sample concentrations seem to be reported in the manuscript. Summary statistics were not reported.
	Metric 9:	Quality Assurance	Medium	QA/QC techniques were briefly described, including the use of blanks.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Variability was not characterized. Some discussion of intra laboratory uncertainties.
Overall Quality Determination			Low	

Study Citation:		Eklund, B., Anderson, E. P., Walker, B. L., Burrows, D. B. (1998.0). Characterization of landfill gas composition at the Fresh Kills municipal solid-waste landfill. Environmental Science & Technology 32(15):2233-2237.		
HERO ID:		1487387		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Surface emission sampling was described as utilizing standard EPA sampling methods. Sampling methodology was described in detail regarding sampling equipment, procedures and study site characteristics, with additional sampling details noted as presented in referenced work (EPA, 1995; not available) for surface emission sampling, and passive vents and gas collection systems representing all four sections of municipal solid waste (MSW) landfill. Insufficient information was provided within the main text regarding sample storage conditions and time prior to analysis as well as calibration of sampling equipment, however it can be assumed that standard EPA methods were utilized.
	Metric 2:	Analytical Methodology	Low	Analytical methodology was reported for sampling of VOCs from three landfill emission sources: passive vents, soil surface flux, and gas collection systems and was described in terms of analytical instrumentation parameters and operation for VOC analysis. Insufficient information was provided regarding instrument calibration, recovery samples and limits of detection within the main text, however the missing information was unlikely to have had a substantial impact on results as analytical methodologies can be assumed to follow standard EPA protocols. Limit of detection was not reported.
	Metric 3:	Biomarker Selection	N/A	Environmental media sampling (landfill gas) was conducted, thus this metric is not relevant for this study.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Sampling was conducted within the Fresh Kills landfill in New York City, NY.
	Metric 5:	Currency	Low	Dates of sampling were not provided. Study publication date was noted as 1998.
	Metric 6:	Spatial and Temporal Variability	High	Characterization of spatial and temporal variability of landfill gas composition was cited as a specific objective of the current study. Spatial variability was characterized within sampling of all four sections of the landfill. Spatial variability within passive vent sampling was considered within procedures for sampling of every vent with functional flow in the three landfill sections that had passive vents. Authors noted that 10% of the vents did not have flow and were not sampled. Temporal variability in terms of short-term and diurnal variability was evaluated within passive vent sampling of five vents over three days with morning and afternoon sampling on one day. Duplicate canisters were collected at each of the four vents sampled for speciated VOCs. For flux chamber surface emission sampling, spatial variability was limited as sampling was conducted mainly within one area that did not have a surface liner but was thus expected to have the highest landfill air emissions. However, within this area, four sampling points were sampled three to four times each during the three days of sampling. Landfill gas collection spatial variability was characterized as both of the two landfill gas collection headers were sampled, representing the north and south fields, with short-term variability characterized in sampling the headers for VOC's six times each during the monitoring program days. Coefficients of variation (CV) for overall flow rate data were noted as approximately 8%, however CV's for individual VOCs were within the range of 70%. Additionally, 25 individual gas extraction wells were sampled to further assess spatial variability. Authors noted that seasonal variability was not addressed as sampling was conducted during summer only.
	Metric 7:	Exposure Scenario	Medium	The source of exposures within landfill was characterized as each major emission source was sampled, and the microenvironment was characterized in terms of the composition of landfill gas sampled through passive vents, surface emissions and gas collection headers. However, it is unclear what populations would be affected.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Only mean concentrations were reported. Insufficient information was provided regarding raw data and most additional summary statistic measures of variability.
	Metric 9:	Quality Assurance	Low	Quality assurance and control parameters were discussed and referenced (EPA, 1995; not available). Duplicate field canisters for passive vent sampling were described. Additional quality parameters were assumed to have been provided within the standard EPA methodologies which were utilized and referenced (EPA, 1995). However, recoveries are not reported.

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Study Citation: Eklund, B., Anderson, E. P., Walker, B. L., Burrows, D. B. (1998.0). Characterization of landfill gas composition at the Fresh Kills municipal solid-waste landfill. Environmental Science & Technology 32(15):2233-2237.
HERO ID: 1487387

Domain	Metric	Rating	Comments
Domain 4: Variability and Uncertainty			
Metric 10:	Variability and Uncertainty	Medium	Statistical summary measure variability was lacking as results were presented only as sample means. Authors discussed factors potentially influencing landfill gas composition characterization. Authors noted that short-term variability, but not seasonal, was addressed.

Overall Quality Determination **Medium**

Study Citation:		Bi, E., Liu, Y., He, J., Wang, Z., Liu, F. (2012.0). Screening of emerging volatile organic contaminants in shallow groundwater in East China. Ground Water Monitoring and Remediation 32(1):53-58.		
HERO ID:		1488836		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling methodology and sites described.
	Metric 2:	Analytical Methodology	High	Analytical methods mentioned, described and briefly summarized.
	Metric 3:	Biomarker Selection	N/A	Ground water samples no biomarker needed.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The study was conducted in China
	Metric 5:	Currency	Medium	The study took place in 2008 and 2009
	Metric 6:	Spatial and Temporal Variability	Medium	n=130 samples (from Table 2). No replicate samples.
	Metric 7:	Exposure Scenario	High	The data closely represent relevant exposure scenarios related to polluted ground water in China.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Maximum concentrations reported, no raw data.
	Metric 9:	Quality Assurance	High	QA/QC was described, including MDLs and recoveries.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability and uncertainty sources were not discussed or attributed to anything.
Overall Quality Determination			High	

Study Citation:		Shell Oil, (1986.0). Fate of some specific compounds in the Norco chemical biotreater and their effect on the outcome of effluent bioassays.		
HERO ID:		1629033		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Low	There is limited description included. It says water samples were daily composites, but there is little other information about water sampling protocol. Missing information includes sampling equipment for water, sampling procedures, sample storage, and performance/calibration of sampler. Page 35 explains in some detail sampling and analysis procedures for the vapor samples collected with TENAX traps, including calibration information.
	Metric 2:	Analytical Methodology	Medium	There is limited description included. They used GC/MS. MDLs listed for water samples listed as 10 ppb. Analytical methodologies for water samples were EPA-approved. It appears standards were used, but their use is not well-explained. Recoveries are only mentioned for SVOCs. Spiking is only mentioned for the June 1984 samples. Although MDLs are not listed for air samples, p. 35 explains in some detail sampling and analysis procedures for the vapor samples collected with TENAX traps, including calibration information. Medium applies to water, the primary medium analyzed; low applies to air samples due to missing MDLs and generally limited information.
	Metric 3:	Biomarker Selection	N/A	Samples were from environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	USA
	Metric 5:	Currency	Low	Sampling began in 1984
	Metric 6:	Spatial and Temporal Variability	Low	Sampling approach poorly captures variability of environmental contamination. Samples collected from 8 locations on June 11, 1984 (see p. 44) were analyzed for this chemical. For results, see pp. 49 and 51. However, there were no replicates/duplicates.
	Metric 7:	Exposure Scenario	Medium	Data may represent a relevant exposure scenario, but come from "pilot plants," with different aeration methods and temperatures to actual WWTPs. Data are missing details about the population of interest, the climate, and contextual information such as what types of manufacturing facilities the wastewater treated is coming from.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Only individual sample concentrations are provided, no summary statistics.
	Metric 9:	Quality Assurance	Low	There was only one blank water sample, from June 1984. Spiking of a blank air sample for calibration is mentioned too. Recoveries are only discussed for samples analyzed for SVOCs but were from 11 to 38 percent. They did not correct for low recoveries.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability was not characterized, and there was minimal discussion of uncertainties. No standard deviations were reported.
Overall Quality Determination			Low	

Study Citation:		Westinghouse Savannah River Company, (1997.0). Sanitary landfill groundwater monitoring report. Fourth quarter 1996 and 1996 summary. 14(GRA and I):506.		
HERO ID:		1740826		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Some sampling methods not reported such as sample storage conditions and sampler calibration
	Metric 2:	Analytical Methodology	High	Key analytical methods reported
	Metric 3:	Biomarker Selection	N/A	the study is testing for the parent chemical in an environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	USA
	Metric 5:	Currency	Low	Samples collected in 1996
	Metric 6:	Spatial and Temporal Variability	Medium	>10 samples; no replicates
	Metric 7:	Exposure Scenario	High	Exposure source characterized
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	Raw data reported
	Metric 9:	Quality Assurance	High	Key QA reported
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Few gaps and limitations reported
Overall Quality Determination			Medium	

Study Citation:		Westinghouse Savannah River Company, (1992.0). Sanitary Landfill 1991 annual groundwater monitoring report.		
HERO ID:		1740870		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling Methodology	Low	Sampling methodology is only briefly discussed, therefore, most sampling information is missing and likely to have a substantial impact on results. The type of monitoring wells are reported.
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methodology was not described, including analytical instrumentation.
	Metric 3:	Biomarker Selection	N/A	The study tested for the parent chemical in environmental media (groundwater).
Domain 2: Representativeness	Metric 4:	Geographic Area	High	The samples were collected in Savannah River Site, Aiken, SC.
	Metric 5:	Currency	Low	The samples were collected in 1991.
	Metric 6:	Spatial and Temporal Variability	Low	The collection of replicates was not reported. Fifty-seven wells were sampled, but sample size is not reported. It's inferred that at least one sample was collected from each well.
	Metric 7:	Exposure Scenario	Medium	Groundwater samples were collected from monitoring wells beneath a sanitary landfill. The use of exposure controls are not described.
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Low	Raw data is reported in tables for each monitoring well starting on page 168. Summary statistics are not reported.
	Metric 9:	Quality Assurance	Low	QA/QC techniques and results were not directly discussed and recoveries were not reported.
Domain 4: Variability and Uncertainty	Metric 10:	Variability and Uncertainty	Low	The characterization of variability is absent (no measure of variance reported). Key uncertainties, limitations, and data gaps are not discussed.
Overall Quality Determination		Uninformative		

Study Citation:		Harkov, R., Kebbekus, B., Bozzelli, J. W. (1987.0). Volatile organic compounds at urban sites in New Jersey. :69-90.		
HERO ID:		1742362		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Followed a sampling protocol and described the sample medium, flow rate, etc. Did not discuss sample storage
	Metric 2:	Analytical Methodology	Medium	Used GC with FID. Limits not provided.
	Metric 3:	Biomarker Selection	N/A	NA - air samples biomarker not needed.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	US
	Metric 5:	Currency	Low	1982
	Metric 6:	Spatial and Temporal Variability	Medium	>24 samples, multiple seasons.
	Metric 7:	Exposure Scenario	High	Described possible sources nearby.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Only mean value provided.
	Metric 9:	Quality Assurance	Medium	QA QC discussed, although no specific recoveries provided.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	No standard deviation but did assess variability.
Overall Quality Determination			Medium	

Study Citation:		Ciba-Geigy, (1987.0). Annual report on results of water quality monitoring water year 1985-86 with cover letter dated 082887.		
HERO ID:		1745597		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling Methodology	High	Monitoring methods reported in appendix A
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methods not reported
	Metric 3:	Biomarker Selection	N/A	Parent chemical in water samples
Domain 2: Representativeness	Metric 4:	Geographic Area	High	Montebello Forebay, California
	Metric 5:	Currency	Low	Water quality data 1985-1986
	Metric 6:	Spatial and Temporal Variability	High	Samples collected in 20 wells in Montebello Bay, 170 wells for basin wide ground water
	Metric 7:	Exposure Scenario	High	Water quality data from Montebello Bay
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Medium	Table 4 reports raw data, no statistics calculated
	Metric 9:	Quality Assurance	Low	No information on analytical methods, but sampling program well described
Domain 4: Variability and Uncertainty	Metric 10:	Variability and Uncertainty	Medium	Variability reported in ranges in page 49
Overall Quality Determination		Uninformative		

Study Citation:		CA State Dept of Health Services, (1986.0). Organic chemical contamination of large public water systems in California April 1986 on seven chemicals with attachments.		
HERO ID:		1745610		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Low	Sampling methodology is not described, but the report is from the California State Department of Health Services.
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methodology was not described, including analytical instrumentation.
	Metric 3:	Biomarker Selection		N/A
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The samples were collected in several locations across California.
	Metric 5:	Currency	Low	The samples were collected in 1984 and 1985.
	Metric 6:	Spatial and Temporal Variability	Medium	The collection of replicates was not reported. 2947 groundwater wells were sampled. The report lists only positive test results and Table E-1 lists how many wells tested positively for the contaminant. Negative test results are on file at the SEB district offices.
	Metric 7:	Exposure Scenario	Medium	Groundwater samples were collected from light industrial/residential, heavy industrial, agricultural and contamination free settings in California. The use of exposure controls are not described.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	Raw data is reported in Table II-26 (pg 115). Summary statistics (concentration range and median concentration) are reported in the text on pg 20.
	Metric 9:	Quality Assurance	Low	QA/QC techniques and results were not directly discussed, but can be implied through the study’s use of standard field and laboratory protocols. Certified laboratories analyzed the samples (pg 6).
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	The characterization of variability is absent (no measure of variance reported).Key uncertainties, limitations, and data gaps are not discussed.
Overall Quality Determination			Uninformative	

Study Citation:		SC DHEC, (1987.0). Investigation of groundwater at South Carolina Recycling and Disposal Company Bluff Road site, Richland County, South Carolina.		
HERO ID:		1745613		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Low	Sampling methodology only briefly described missing details about storage conditions, volume of sample.
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methodology not described
	Metric 3:	Biomarker Selection	N/A	Biomarkers of interest were not addressed in this reference.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	South Carolina, USA
	Metric 5:	Currency	Low	Sampling in 1980
	Metric 6:	Spatial and Temporal Variability	Critically Deficient	Sample size not reported
	Metric 7:	Exposure Scenario	Medium	Missing details about the population and microenvironment of interest
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Only presence/absence
	Metric 9:	Quality Assurance	Low	QA/QC techniques were not discussed
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability not characterized, limitations were briefly described
Overall Quality Determination			Uninformative	

Study Citation:		Geraghty & Miller Inc, (1988.0). Results of the second phase of a hydrogeologic investigation at the Allied-Signal Inc facility, Morristown, New Jersey with cover letter dated 012089.		
HERO ID:		1745619		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling Methodology	Critically Deficient	The study did not report storage conditions, sampling equipment or procedures.
	Metric 2:	Analytical Methodology	Low	The study did not describe analytical methods or reported LODs however it cited EPA Method 601.
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical in an environmental media (water).
Domain 2: Representativeness	Metric 4:	Geographic Area	High	Geographic location is reported; New Jersey, USA.
	Metric 5:	Currency	Low	Timing of sample collection for monitoring data is not consistent with when current exposures (sampling occurred in 1987; >15 years old) may be expected and likely to have a substantial impact on results.
	Metric 6:	Spatial and Temporal Variability	Low	Sampling approach does not captures variability of environmental contamination in population/scenario/media of interest. The study used 20 samples and no replicates.
	Metric 7:	Exposure Scenario	Medium	The study did not provide details about the population of interest or exposure assessment.
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Medium	Individual sample concentrations (raw data) reported but there is no summary statistics.
	Metric 9:	Quality Assurance	Medium	Limited description of QA/QC techniques.
Domain 4: Variability and Uncertainty	Metric 10:	Variability and Uncertainty	Low	Did not characterize variability, or discussed uncertainties and limitations.
Overall Quality Determination		Uninformative		

Study Citation:		Dames & Moore, (1989.0). Ground water and soils data summary report with attachments, appendices, cover sheets and letter dated 080989.		
HERO ID:		1745621		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling Methodology	Medium	Limited description of sampling methodology
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methods not described
	Metric 3:	Biomarker Selection	N/A	Did not sample for biomarkers
Domain 2: Representativeness	Metric 4:	Geographic Area	High	Illinois, USA
	Metric 5:	Currency	Low	Samples from 1987
	Metric 6:	Spatial and Temporal Variability	Low	5 samples, no replicates
	Metric 7:	Exposure Scenario	Medium	Data likely represents a relevant exposure scenario, missing details about the population of interest and microenvironment
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Medium	Only individual sample concentrations, no summary statistics
	Metric 9:	Quality Assurance	Medium	Limited description of QA/QC techniques, analyzed control samples
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability and uncertainty were not characterized or described
Overall Quality Determination		Uninformative		

Study Citation: HSWMR, (1993.0). Toxicological evaluation of sampling data for Little Rocky Creek, Greenville, South Carolina with cover letter dated 050793.
HERO ID: 1745693

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Sampling Methodology	Low	Only briefly described
	Metric 2: Analytical Methodology	Critically Deficient	Analytical methods were not described
	Metric 3: Biomarker Selection	N/A	Did not test for biomarkers
Domain 2: Representativeness	Metric 4: Geographic Area	High	USA
	Metric 5: Currency	Low	Samples taken in 1990
	Metric 6: Spatial and Temporal Variability	Low	82 samples from 20 locations, <5 samples per site
	Metric 7: Exposure Scenario	Medium	Data likely represents relevant exposure scenarios, missing methodological details
Domain 3: Accessibility/Clarity	Metric 8: Reporting of Results	Medium	Only summary statistics
	Metric 9: Quality Assurance	Low	QA/QC techniques were not described
Domain 4: Variability and Uncertainty	Metric 10: Variability and Uncertainty	Medium	Limited characterization of variability, did not discuss uncertainties and limitations

Overall Quality Determination **Uninformative**

Study Citation:		ERM-Northeast, (1994.0). Hydrogeologic investigation (including ground water quality) north of Husky Brook Eatontown, New Jersey, with cover letter dated 011894.		
HERO ID:		1745841		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling methodology followed NJDEPE’s (NJ Department of Environmental Protection) Field Sampling Procedures Manual published in 1992.
	Metric 2:	Analytical Methodology	High	Followed EPA 624+15. Detection limits reported on page 80.
	Metric 3:	Biomarker Selection	N/A	Study measured parent chemical in ground water.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Study was performed in Eatontown, New Jersey, USA.
	Metric 5:	Currency	Low	Sampling was performed in 1993.
	Metric 6:	Spatial and Temporal Variability	Medium	Samples were collected from six new and existing monitoring wells. While the number of samples collected from each well was not reported, we can infer that there were at least 12 samples. Surface water samples collected from 3 wells. No replicates were collected.
	Metric 7:	Exposure Scenario	Medium	On-site ground and surface water quality was assessed for the conditions AlliedSignal Aerospace Company. The population of interest is not described.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Only individual data points and no statistics were provided.
	Metric 9:	Quality Assurance	Medium	Some QA/QC parameters reported in the laboratory reports. Through the use of EPA methods, QA/QC was also implied.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	There is no characterization of variance or report of uncertainties, limitations, and gaps.
Overall Quality Determination			Medium	

Study Citation: Aquatec, (1989.0). Fish study of the Hudson River near Glens Fall, New York with attachments and cover letter dated 062989.
HERO ID: 1874170

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Sampling Methodology	Medium	Limited description of sampling methodology
	Metric 2: Analytical Methodology	Critically Deficient	Did not describe analytical methods
	Metric 3: Biomarker Selection	N/A	Did not test for biomarkers
Domain 2: Representativeness	Metric 4: Geographic Area	High	NY, USA
	Metric 5: Currency	Low	Sampling in 1988
	Metric 6: Spatial and Temporal Variability	Critically Deficient	Did not report sample size
	Metric 7: Exposure Scenario	High	Data closely represent relevant exposure scenarios
Domain 3: Accessibility/Clarity	Metric 8: Reporting of Results	Medium	Individual sample concentrations only, no summary statistics
	Metric 9: Quality Assurance	High	Well described QA/QC techniques
Domain 4: Variability and Uncertainty	Metric 10: Variability and Uncertainty	Low	Did not characterize variability and uncertainty

Overall Quality Determination **Uninformative**

Study Citation:		Oldaker G B, III, Taylor, W. D., Parrish, K. B. (1995.0). Investigations of ventilation rate, smoking activity and indoor air quality at four large office buildings. Environmental Technology 16(2):173-180.		
HERO ID:		1946147		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Detailed description of Sampling methodology provided.
	Metric 2:	Analytical Methodology	High	Detailed description of analytical methodology provided.
	Metric 3:	Biomarker Selection	N/A	the study is testing for the parent chemical in an environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	It may be inferred that the location of the four buildings studies is in the US including the Midwest.
	Metric 5:	Currency	Low	Data collected in 1991
	Metric 6:	Spatial and Temporal Variability	Critically Deficient	Sample size not reported
	Metric 7:	Exposure Scenario	High	the exposure scenario discussed in the monitored study represents the exposure scenario of interest for the chemical.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	no raw data reported
	Metric 9:	Quality Assurance	Low	Limited QA/QC information reported
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Little information provided on gaps and limitations and variability of results
Overall Quality Determination			Uninformative	

Study Citation:		Bookman-Edmonston, (1985.0). Annual report on results of water quality monitoring water year 1983-84 on seven chemicals with attachments.		
HERO ID:		1973144		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Sampling Methodology	Critically Deficient	Sampling methods were not described.	
	Metric 2: Analytical Methodology	Critically Deficient	Analytical methods were not described.	
	Metric 3: Biomarker Selection	N/A	They did not test for biomarkers, but rather for parent chemicals in water.	
Domain 2: Representativeness	Metric 4: Geographic Area	High	California, USA	
	Metric 5: Currency	Low	Sampling was conducted in 1983 and 1984.	
	Metric 6: Spatial and Temporal Variability	Low	I found it difficult to ascertain the total number of samples analyzed for this chemical, but it was more than 10, as there were more than 10 locations (wells) sampled, some "intensively." There were no replicates.	
	Metric 7: Exposure Scenario	Low	Data likely represents a relevant exposure scenario, but methodological details are missing to describe the reliability of the data. Exposure sources are not well-characterized. It's a bit unclear whether the samples analyzed for this chemical came from ground water or drinking water wells.	
Domain 3: Accessibility/Clarity	Metric 8: Reporting of Results	Medium	For 16 samples from October 1984, Table B-4 shows individual sample concentrations from Montebello Forebay, without summary statistics. Table IV-6 summarizes the range of detections in samples of local storm water, reclaimed water, imported water, unchlorinated well water, and chlorinated well water, respectively. It says there were 57 samples of reclaimed water, but the number of samples of water in other categories is not specified.	
	Metric 9: Quality Assurance	Low	Little to no discussed of QA/QC techniques was included.	
Domain 4: Variability and Uncertainty	Metric 10: Variability and Uncertainty	Low	Uncertainty and gaps were not characterized, and there was minimal discussion of variability (see p. 15, which is the 25th page of the PDF, and the tables with data on this chemical).	

Overall Quality Determination**Uninformative**

Study Citation:		Muszkat, L., Raucher, D., Magaritz, M., Ronen, D. (1994.0). Groundwater contamination by organic pollutants. Environmental Science and Pollution Control, vol. 11 11:257-271.		
HERO ID:		1992405		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling Methodology	Critically Deficient	The sampling methodology is not reported.
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methodology is not described.
	Metric 3:	Biomarker Selection	N/A	Testing parent chemical in environmental media.
Domain 2: Representativeness	Metric 4:	Geographic Area	High	The geographic areas are reported in figures 1 and 6.
	Metric 5:	Currency	Low	Sampling from 1988 to 1991
	Metric 6:	Spatial and Temporal Variability	Critically Deficient	Sample size is not reported.
	Metric 7:	Exposure Scenario	High	Groundwater contamination by prolonged irrigation by sewage effluents.
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Low	Individual data points are not reported and there is no information of the data corresponding to a single point or an average.
	Metric 9:	Quality Assurance	Critically Deficient	There is no report of QA/QC applications for the study.
Domain 4: Variability and Uncertainty	Metric 10:	Variability and Uncertainty	Low	Variability or uncertainty is not reported in the study.
Overall Quality Determination		Uninformative		

Study Citation:		Buhamra, S. S., Bouhamra, W. S., Elkilani, A. S. (1998.0). Assessment of air quality in ninety-nine residences of Kuwait. Environmental Technology 19(4):357-368.		
HERO ID:		1992664		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	no inconsistencies in the reporting of sampling information
	Metric 2:	Analytical Methodology	Low	No LOD or LOQ reported
	Metric 3:	Biomarker Selection	N/A	the study is testing for the parent chemical in an environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Kuwait
	Metric 5:	Currency	Low	Data collected December 1994 to June 1996
	Metric 6:	Spatial and Temporal Variability	Medium	no replicates collected
	Metric 7:	Exposure Scenario	High	the exposure scenario discussed in the monitored study does represent the exposure scenario of interest for the chemical.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Good reporting of results.
	Metric 9:	Quality Assurance	Low	Limited QA/QC information provided
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Limited gaps and limitations reported
Overall Quality Determination			Medium	

Study Citation:		Monsanto Chemical Company, (1995.0). Whole effluent and chemical specific evaluation (o-dichlorobenzene) of Monsanto’s Antwerp plant aqueous discharge, with cover letter dated 07/10/95.		
HERO ID:		2048254		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Critically Deficient	Sampling method was not described
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methods not described
	Metric 3:	Biomarker Selection	N/A	The authors analyzed environmental samples.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	St. Louis Missouri
	Metric 5:	Currency	Low	1995
	Metric 6:	Spatial and Temporal Variability	Critically Deficient	Sample size is not reported
	Metric 7:	Exposure Scenario	Low	Data may represent relevant exposure scenario but lacks sufficient details about methods, population of interest, exposure characteristics
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Individual sample concentrations, no summary statistics
	Metric 9:	Quality Assurance	Low	QA/QC details were not provided
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability, uncertainties and limitations were not characterized
Overall Quality Determination			Uninformative	

Study Citation:		Martin Marietta Chems, (1981.0). Letter from Martin Marietta Chemicals to USEPA regarding information on groundwater contamination with attachments.		
HERO ID:		2048328		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling Methodology	Critically Deficient	Did not describe sampling methods
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methods were not described
	Metric 3:	Biomarker Selection	N/A	Did not test for biomarkers
Domain 2: Representativeness	Metric 4:	Geographic Area	High	USA
	Metric 5:	Currency	Low	Document from 1981
	Metric 6:	Spatial and Temporal Variability	Critically Deficient	Did not report sample size
	Metric 7:	Exposure Scenario	Low	Missing details about the population of interest, microenvironment and methodological approach
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Medium	Individual sample concentrations only, no summary statistics
	Metric 9:	Quality Assurance	Low	QA/QC techniques were not described
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability and uncertainty were not characterized
Overall Quality Determination		Uninformative		

Study Citation:		Martin Marietta Chems, (1980.0). Letter to USEPA regarding information on the detection of small quantities of certain organic compounds in the well water serving at the plant sites in Charlotte, NC w/ attachments.		
HERO ID:		2048331		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Limited description of sampling methods
	Metric 2:	Analytical Methodology	Medium	Limited description of analytical methods
	Metric 3:	Biomarker Selection	N/A	Did not test for biomarkers
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	USA
	Metric 5:	Currency	Low	Earliest data of the report is 1980
	Metric 6:	Spatial and Temporal Variability	Low	Did not report sample size but there are 14 sampling dates
	Metric 7:	Exposure Scenario	Medium	Data closely represent relevant exposure scenarios
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Independent sample concentrations only, no summary statistics
	Metric 9:	Quality Assurance	Low	QA/QC techniques only briefly described
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability and uncertainty were not characterized
Overall Quality Determination			Medium	

Study Citation:		Dames & Moore, (1988.0). Report of hydrogeologic and environmental assessment for sixteen chemicals at the former Allied Automotive Plant with cover letter dated 033188.		
HERO ID:		2048351		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Samples were collected according to publicly available SOPs that are scientifically sound and widely accepted. VOCs were collected according to EPA Analytical Methods 601 and 602. Base/neutral extractable organic compounds were collected according to EPA Analytical Method 625 for groundwater and Method 8270 for soil. Sampling methodology described in section 1.1, groundwater sampling methods in section 1.1.2, and soil in section 1.1.3.
	Metric 2:	Analytical Methodology	High	Samples were analyzed according to publicly available analytical methods. VOCs were analyzed according to EPA Analytical Methods 601 and 602. Base/neutral extractable organic compounds were analyzed according to EPA Analytical Method 625 for groundwater and Method 8270 for soil. The detection level used is specified in the standard methods, but the values are listed in the report.
	Metric 3:	Biomarker Selection	N/A	The study tested for the parent chemical in environmental media (groundwater and soil).
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The samples were collected in Port Huron, Michigan.
	Metric 5:	Currency	Low	The samples were collected in 1987.
	Metric 6:	Spatial and Temporal Variability	Medium	The collection of replicates was not reported. Composite soil samples were collected from five sites at three different depths. One sample was collected from three different monitoring wells.
	Metric 7:	Exposure Scenario	Medium	Groundwater and soil samples were collected from monitoring wells and the land on the site of a former automotive plant with previous contamination. The use of exposure controls are not described.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data is reported in Appendix C for groundwater and Appendix D for soil samples. Summary statistics are not reported.
	Metric 9:	Quality Assurance	Low	The study applied QA/QC measures like preventing cross contamination while collecting samples; however, recoveries and baseline samples are not reported. It's implied that QA/QC techniques were used through the study's use of standard field and laboratory protocols.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	The characterization of variability is absent (no measure of variance reported). Key uncertainties, limitations, and data gaps are not discussed.

Overall Quality Determination**Medium**

Study Citation:		Liu, L., Zhou, H. (2011.0). Investigation and assessment of volatile organic compounds in water sources in China. Environmental Monitoring and Assessment 173(1-4 (Feb 2011)):825-836.		
HERO ID:		2129986		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling methodology, sample storage, analytical methods, and site characteristics are described in detail.
	Metric 2:	Analytical Methodology	High	Analytical method is described in detail. Followed USEPA Method 524.2. LODs are provided.
	Metric 3:	Biomarker Selection	N/A	measured parent metabolite in water sources
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Sampling locations in China are described in detail.
	Metric 5:	Currency	Medium	Samples were collected in 2006.
	Metric 6:	Spatial and Temporal Variability	Medium	152 water sources were sampled including 54 reservoirs or lakes, 79 rivers and 19 groundwaters. Three sampling points for each water source. Duplicate samples were collected. Samples were only for one time point so no measure of temporal variability.
	Metric 7:	Exposure Scenario	High	The water sources sampled are all sources for drinking water.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	The data are pooled and the data for each water source is not provided. The raw data is not provided. The minimum and maximum values are reported,
	Metric 9:	Quality Assurance	High	The study applied quality assurance/quality control measures and all pertinent quality assurance information is provided.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	The data are analyzed in several ways to gain an understanding of the distribution of the chemicals. Variability and uncertainties are discussed somewhat
Overall Quality Determination			High	

Study Citation:		Bentzen, T. W., Muir, D. C. G., Amstrup, S. C., O’Hara, T. M. (2008.0). Organohalogen concentrations in blood and adipose tissue of Southern Beaufort Sea polar bears. Science of the Total Environment 406(1-2):352-367.		
HERO ID:		2153818		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Equipment, regime, storage, and study site were described. Sampler performance and matrix characteristics are not applicable for this biomonitoring study. Sampling methods were similar to those reported in Bentzen et al. (2007).
	Metric 2:	Analytical Methodology	Medium	Samples were analyzed by the National Laboratory for Environmental Testing (Environment Canada). Samples were quantified by GC–ECD using a series of external standards based on a five-point calibration curve. Internal recovery surrogates of 1,3,5-bromobenzene, 1,2,4,5-tetra-bromobenzene, delta-HCH, endrin ketone, PCB-30 and PCB204 were added at the extraction step. DL range is 0.01-0.10 ng/g. Sample preparation and equipment are described. Lipid normalization is described.
	Metric 3:	Biomarker Selection	N/A	Biomarkers of interest were not addressed in this reference.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Samples collected along the Alaskan Beaufort Sea coast.
	Metric 5:	Currency	Low	Samples collected in spring of 2003.
	Metric 6:	Spatial and Temporal Variability	Medium	57 polar bears, fat and blood; no replicates
	Metric 7:	Exposure Scenario	Medium	The exposure scenario is relevant for ecological endpoints.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Summary data include mean, SD, and range.
	Metric 9:	Quality Assurance	High	Internal recovery surrogates included. Quality assurance is discussed.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Variability is captured through SD and range, but is not discussed otherwise.
Overall Quality Determination			Medium	

Study Citation:		Reichrtová, E., Ciznár, P., Prachar, V., Palkovicová, L., Veningerová, M. (1999.0). Cord serum immunoglobulin E related to the environmental contamination of human placentas with organochlorine compounds. Environmental Health Perspectives 107(11):895-899.		
HERO ID:		2167273		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Placental sampling described in terms of most parameters such as sample storage conditions and duration of storage prior to sample extraction not described. Study noted as approved by Research Ethics Committee of the Institute of Preventive and Clinical Medicine in Bratislava, Slovakia.
	Metric 2:	Analytical Methodology	Medium	Medium—Analytical methodology described in terms of extraction methods, analytical instrumentation; procedures noted as based upon previously published methods (Prachar et al., 1994, 1995). Detection limit reported. Insufficient information regarding instrument calibration, recovery samples.
	Metric 3:	Biomarker Selection	N/A	N/A: (o-DCB)—sampling for parent chemical of interest.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	High—Sampling conducted with participant residents of urban and rural areas of Slovakia.
	Metric 5:	Currency	Low	Low—Dates of sample collection not reported; publication date 1999.
	Metric 6:	Spatial and Temporal Variability	Medium	Medium—57 placental samples participants residing in urban areas, 63 samples from participants residing within rural areas; spatial variability in terms of rural vs urban, however single samples from each participant with dates of sampling not reported; non-statistical sampling approach however volunteer selection criteria reported. No replicates.
	Metric 7:	Exposure Scenario	Medium	Medium—Population described in terms of questionnaire demographic characteristics; authors note restricting volunteers to those reportedly not having potential for occupational exposure to chemicals of interest. It is unlikely that parameters and conditions would differ between industrial and rural participant samples or have substantial impact on results.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Medium—Summary statistics of placental concentration data reported in terms of number of samples, median, minimum, maximum and percentage of samples less than the limit of detection for samples of participants residing in rural or urban areas. Insufficient information on raw concentration data results, additional standard deviation/error measures of variation.
	Metric 9:	Quality Assurance	Low	Low—Quality assurance/quality control procedures of sampling and analysis not discussed, however analyses procedures reported as conducted according to previously published methods and study approval gained through Research Ethics Committee of the Institute of Preventive and Clinical Medicine in Bratislava, Slovakia.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Medium—Authors discussed placental exposure result differences between urban and rural participants, however additional discussion in terms of study limitations not robust and insufficient information regarding sampling variability in terms of results stratified by age, year of sampling or other measures of sampling variability.
Overall Quality Determination			Medium	

Study Citation:		Heck, J. E., Park, A. S., Qiu, J., Cockburn, M., Ritz, B. (2015.0). Retinoblastoma and ambient exposure to air toxics in the perinatal period. Journal of Exposure Science & Environmental Epidemiology 25(2):182-186.		
HERO ID:		2369182		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	The air sampling monitoring was briefly described, but the instrumentation and sampling procedure lacked details. Additional information may be in the referenced citations.
	Metric 2:	Analytical Methodology	Low	The analytical methods were briefly described, indicating that the CARB Air Toxics Program provided the data (suggesting proper analytical methods had been used). Detection limit not reported, although it might be in the referenced sources.
	Metric 3:	Biomarker Selection	N/A	The authors analyzed secondary environmental monitoring data.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The study was conducted in California, USA.
	Metric 5:	Currency	Low	The authors used data that was collected from 1990 to 2007.
	Metric 6:	Spatial and Temporal Variability	Low	The sample size was not reported (but it could be estimated using the range of years and the 24-h sampling interval of 12 days). Sample size may be given in the referenced citations.
	Metric 7:	Exposure Scenario	Medium	The data likely represents relevant exposure scenarios to air toxics to children, but the lack of sample size limits the results’ generalizability.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Only summary statistics were reported (mean, SD, IQR). Individual points not reported.
	Metric 9:	Quality Assurance	Low	QA/QC techniques were not described, but can be inferred from the study’s use of official protocols.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	High	Variability was characterized (SD, IQR). Uncertainties and study limitations were discussed.
Overall Quality Determination			Low	

Study Citation:		Chin, J. Y., Godwin, C., Parker, E., Robins, T., Lewis, T., Harbin, P., Batterman, S. (2014.0). Levels and sources of volatile organic compounds in homes of children with asthma. Indoor Air 24(4):403-415.		
HERO ID:		2443355		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Storage conditions not described. Study referenced several peer-reviewed papers for its sampling protocol, which may contain more information.
	Metric 2:	Analytical Methodology	High	Analytical methodology fully described.
	Metric 3:	Biomarker Selection	N/A	Study measured parent chemicals in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Detroit, Michigan.
	Metric 5:	Currency	Medium	2009-2010.
	Metric 6:	Spatial and Temporal Variability	High	Study used large sample size (about 1300), duplicate samples, and continuous monitoring methods.
	Metric 7:	Exposure Scenario	Medium	Includes some characterization of setting and potential sources.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Summary statistics are detailed, though no raw data are reported.
	Metric 9:	Quality Assurance	Medium	Recoveries not reported.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	High	Characterizes variability and identifies data gaps.
Overall Quality Determination			High	

Study Citation:		Ras-Mallorqui, M. R., Marce-Recasens, R. M., Borrull-Ballarín, F. (2007.0). Determination of volatile organic compounds in urban and industrial air from Tarragona by thermal desorption and gas chromatography-mass spectrometry. Talanta 72(3):941-950.		
HERO ID:		2443817		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	air samples by active collection on multisorbent tubes; air sampling pump; tubes transported in glass jars; analyzed as soon as possible or kept refrigerated during storage and analyzed day after sampling (Section 2.1)
	Metric 2:	Analytical Methodology	High	thermal desorption and GC-MS; compounds quantified by a target ion and identified by qualifier ions and retention time; Table 1 provides MDL and MQL; recoveries
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Tarragona, Spain
	Metric 5:	Currency	Medium	December 2005 and January 2006
	Metric 6:	Spatial and Temporal Variability	High	urban samples (4sites) taken every 2 hrs from 8AM-8PM; industrial samples (3 sites) taken in morning, mid-day, and afternoon;
	Metric 7:	Exposure Scenario	High	samples in urban and industrial areas
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Table 1 provides MDL and MQL; only chemicals detected were presented; this chemical was not one of the chemicals detected; chemical not listed in Table 2
	Metric 9:	Quality Assurance	High	recoveries higher than 98.9%; linearity I the responses and the repeatability was also good; analyzed blanks
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	discussed variability throughout the day and between urban and industrial areas
Overall Quality Determination			High	

Study Citation:		Martí, V., Jubany, I., Pérez, C., Rubio, X., De Pablo, J., Giménez, J. (2014.0). Human health risk assessment of a landfill based on volatile organic compounds emission, immission and soil gas concentration measurements. Applied Geochemistry 49:218-224.		
HERO ID:		2517712		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	The air sampling methodology, sites and equipment was well described. Some information missing such as storage conditions.
	Metric 2:	Analytical Methodology	Medium	The analytical methods and equipment were described, but the LOD were only reported as a range and not for each chemical.
	Metric 3:	Biomarker Selection	N/A	The authors analyzed air samples.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The study was conducted in Barcelona, Spain.
	Metric 5:	Currency	Medium	The samples were collected in 2012.
	Metric 6:	Spatial and Temporal Variability	Medium	36 samples for RH2. No replicates taken.
	Metric 7:	Exposure Scenario	Medium	The data likely represent relevant exposure scenarios at a landfill and affected populations, but the small sample size limited the results' generalizability.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	The authors only reported summary statistics. Point values not reported.
	Metric 9:	Quality Assurance	Medium	QA/QC techniques were discussed by the authors. Recoveries were not reported.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Variability was characterized (SD) and different scenarios tested. The uncertainties were briefly discussed. Limitations were not reported.
Overall Quality Determination			Medium	

Study Citation:		Kuo, M. C. T., Chen, C. M., Lin, C. H., Fang, H. C., Lee, C. H. (2000.0). Surveys of volatile organic compounds in soil and groundwater at industrial sites in Taiwan. Bulletin of Environmental Contamination and Toxicology 65(5 (Nov 2000)):654..		
HERO ID:		2529812		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	30 sites (fig 1 shows locations); 3-6 soil sampling points randomly selected within each site at 3 depths (0.5, 1.5, and 3 m); direct push sampling method; gw samples from existing monitoring wells at each site; each soil and gw sample taken twice at two different times; samples stored at 4C
	Metric 2:	Analytical Methodology	Low	analyzed according to EPA SW846 Method 5035 using purge and trap and Method 8260B using GC/MD reported- references could provide more information on methodology; LOD not provided.
	Metric 3:	Biomarker Selection	N/A	Parent chemical in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Taiwan
	Metric 5:	Currency	Low	Table 1 indicates gw samples taken 1999
	Metric 6:	Spatial and Temporal Variability	High	30 industrial sites (8 chemical and petrochemical districts, 2 technology industrial parks, 11 general industrial districts, 2 metal processing areas, 2 oil refinery plants, 1 pesticide manufacturing, and 4 landfills); 3 to 6 sampling points within each site
	Metric 7:	Exposure Scenario	High	soil and groundwater samples from various industrial sites in Taiwan
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Fig 2 and 3 show DF; Table 1 show concentrations in gw wells; soil concentrations not reported
	Metric 9:	Quality Assurance	Low	QA/QC is not discussed but can be implied through the study's use of EPA analysis methods
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	discusses variability in gw by location; no apparent correlation of chemicals in gw and soil samples from a particular site; may be due to large areas studies and relatively small sample sizes within a site. No limitation discussion.
Overall Quality Determination			Medium	

Study Citation:		Wallace, L. A., Pellizzari, E. D., Hartwell, T. D., Davis, V., Michael, L. C., Whitmore, R. W. (1989.0). The influence of personal activities on exposure to volatile organic compounds. Environmental Research 50(1):37-55.		
HERO ID:		2799216		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sampling methodology, equipment detailed with additional details noted within referenced EPA standard operating procedures study (Handy et al., 1987) for personal, indoor, outdoor air and breath monitoring. Insufficient information in text regarding sample storage, transport conditions as well as sample storage prior to analyses.
	Metric 2:	Analytical Methodology	Medium	Analytical methodology described in detail in terms of extraction methods, analytical instrumentation, with recoveries and limits of detection reported as ranges. Additional details noted within referenced EPA protocols (Handy et al., 1987).
	Metric 3:	Biomarker Selection	N/A	(o-DCB, p-DCB): sampling for parent chemical of interest.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Samples noted as taken within employees of NC lab.
	Metric 5:	Currency	Low	Dates of sampling not specified, publication date 1989.
	Metric 6:	Spatial and Temporal Variability	High	Detailed EPA standard procedures for monitoring noted as within referenced study (Handy et al., 1987). Sample sizes adequate for personal air (n=60), indoor (n=36), outdoor (n=33), and breath (n=68) samples. Sampling conducted over three days for each participant, with 24-hour personal samples. Samples for indoor and outdoor sampling described as concurrent, but unclear if 24-hour sampling conducted for indoor and outdoor samples. Breath sampling conducted at regular intervals throughout each day of sampling for each participant. Insufficient information on spatial variability in placement of indoor and outdoor exposure sampling pumps. Strategy for selection of participants assumed non-statistical. Results for duplicate and triplicate sampling reported for all sample media.
	Metric 7:	Exposure Scenario	Medium	Occupations of participants reported in Table 1 and activities associated with work in chem lab or lab technician noted in Table 7, but data likely represent scenarios of interest. Unclear if sampling conducted on work days only or included off-work days.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Summary statistics in terms of mean personal exposures per participant reported in Table 6, median and maximum personal exposures in Table 7 and mean household indoor and outdoor exposures reported in Table 5. Individual results of breath sampling following placement of toilet deodorizer by hour presented in Fig. 1 and Table 8. Insufficient information regarding raw data and measure of variation in terms of standard deviation, standard error or range for samples other than summary personal sampling results in Table 6.
	Metric 9:	Quality Assurance	High	Field, laboratory control and blank sampling with results noted as blank-corrected. Baseline, pre-exposure sampling (considered for personal and indoor monitoring while subjects were sleeping) conducted for personal and indoor sampling. Performance audit sampling of nine control and one blank sample conducted by outside agency. Duplicate air and breath sampling conducted.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability in terms of standard error only provided for summary personal air sampling in Table 7, insufficient characterization of variability for remaining results reported only as means or mean and maximum concentrations. Lack of robust discussion of potential study limitations.
Overall Quality Determination			Medium	

Study Citation: Connecticut Dept Of Health, (1987.0). Laboratory reports on methyl tert-butyl ether from various locations with cover letter dated 090887.
HERO ID: 8713368:#40-8713368.
 2799717

Domain	Metric	Rating	Comments
Domain 1: Reliability			
	Metric 1: Sampling Methodology	Critically Deficient	Sample type reported, but no additional details.
	Metric 2: Analytical Methodology	Critically Deficient	No methods described. Detection limit included.
	Metric 3: Biomarker Selection	N/A	environmental samples
Domain 2: Representativeness			
	Metric 4: Geographic Area	Critically Deficient	Probably U.S. but not stated.
	Metric 5: Currency	Low	samples collected 1987
	Metric 6: Spatial and Temporal Variability	Critically Deficient	Sample size not reported.
	Metric 7: Exposure Scenario	Low	tap water
Domain 3: Accessibility/Clarity			
	Metric 8: Reporting of Results	Medium	Individual sample reported.
	Metric 9: Quality Assurance	Critically Deficient	No supporting text.
Domain 4: Variability and Uncertainty			
	Metric 10: Variability and Uncertainty	Critically Deficient	No supporting text.

Overall Quality Determination

Uninformative

Study Citation:		Wei, X., Gu, P., Zhang, G., Huang, J. (2015.0). Occurrence of emerging and priority pollutants in municipal reverse osmosis concentrates. Environmental Science: Processes & Impacts 17(2):488-494.		
HERO ID:		2816370		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	The sampling methods were described in detail.
	Metric 2:	Analytical Methodology	High	Analytical methods were sufficiently described. LOD was reported in Table 2.
	Metric 3:	Biomarker Selection	N/A	Study measured parent chemical in environment.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Samples were collected in Tianjin, China.
	Metric 5:	Currency	Medium	Samples were collected in 2011-2013
	Metric 6:	Spatial and Temporal Variability	Low	There were 4 samples collected. There were no replicates mentioned.
	Metric 7:	Exposure Scenario	Medium	The sources of exposures were explained and measured in wastewater treatment. There was little information on the population of exposure.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Tables 2 and 4 report individual concentrations. Only a few summary statistics were reported.
	Metric 9:	Quality Assurance	High	The QC techniques were explained in detail. They discussed recoveries and blanks.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Limitations and uncertainties were not discussed.
Overall Quality Determination			Medium	

Study Citation:		Nikolaou, A. D., Golfinopoulos, G., Kostopoulou, M. N., Kolokythas, G. A., Lekkas, T. D. (2002.0). Determination of volatile organic compounds in surface waters and treated wastewater in Greece. Water Research 36(11):2883-2890.		
HERO ID:		2859218		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling was performed seasonally at 10 rivers, 2 sampling points in each river. Three sampling points were established in seawater areas. Samples were also collected from three municipal wastewater treatment plants and in wastewater from two industries.
	Metric 2:	Analytical Methodology	High	Samples were analyzed using a Hewlett Packard Purge and Trap Concentrator 7695 and a Hewlett Packard Gas Chromatograph 5890 Series II FMass Spectrometer HP 5971. QA/QC described, reported, including detection limits.
	Metric 3:	Biomarker Selection	N/A	NA - water samples no biomarker needed.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Greece
	Metric 5:	Currency	Low	Data collected from October 1998 to September 1999
	Metric 6:	Spatial and Temporal Variability	High	Sampling was performed seasonally, from October 1998 to September 1999, at 10 rivers. Duplicate samples for VOCs measurement were collected (sample size is unclear).
	Metric 7:	Exposure Scenario	High	The data closely represent exposure scenarios from various water bodies in Greece.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	no raw data reported. Limited summary statistics were reported.
	Metric 9:	Quality Assurance	Medium	Some analytical QA reported in Table 2, missing information about blanks
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability among locations was not addressed, only providing range of concentrations. Uncertainty sources were not identified.
Overall Quality Determination			Medium	

Study Citation:		Cesar, A., Lia, L. R. B., Pereira, C. D. S., Santos, A. R., Cortez, F. S., Choueri, R. B., De Orte, M. R., Rachid, B. R. F. (2014.0). Environmental assessment of dredged sediment in the major Latin American seaport (Santos, Sao Paulo - Brazil): An integrated approach. Science of the Total Environment 497:679-687.		
HERO ID:		2922317		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	The study authors reported most necessary sampling methods, including equipment, procedure, site and sample storage conditions.
	Metric 2:	Analytical Methodology	High	Analytical methods for chlorinated hydrocarbons were determined by gas chromatography with the chlorines determined using an electron capture detector (USEPA 5021 CG/ECD method). Phthalates were determined by gas chromatography coupled to mass spectrometry (GC/MS) according to the US EPA 8270 method after ultrasonic extraction by the US EPA 3550C method. Detection limits reported in Table S1.
	Metric 3:	Biomarker Selection	N/A	Measuring chemicals in environmental setting.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The study was conducted in in Brazil (Sao Paulo and Santos).
	Metric 5:	Currency	Medium	The study was conducted in 2007.
	Metric 6:	Spatial and Temporal Variability	Medium	There were nine samples collected and no replicates collected.
	Metric 7:	Exposure Scenario	Medium	The study measured concentrations in sediment disposal area in a bay. There is little information on the exposed populations.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data were reported by the study authors. Summary statistics not reported.
	Metric 9:	Quality Assurance	Low	QA not directly reported but can be inferred from the protocol.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability, gaps, limitations and uncertainties not reported.
Overall Quality Determination			Medium	

Study Citation:		Wallace, L. A., Pellizzari, E. P., Hartwell, T. D., Whitmore, R., Zelon, H., Perritt, C., Sheldon, L. (1988.0). The California TEAM study: Breath concentrations and personal exposures to 26 volatile compounds in air and drinking water of 188 residents of Los Angeles, Antioch, and Pittsburg, CA. Atmospheric Environment 22(10):2141-2164.		
HERO ID:		2952692		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Concise but scientifically sound sampling methods
	Metric 2:	Analytical Methodology	Medium	Limited description of analytical methods, LOD mentioned but not reported
	Metric 3:	Biomarker Selection	N/A	Not applicable.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	USA
	Metric 5:	Currency	Low	Samples from 1984
	Metric 6:	Spatial and Temporal Variability	Low	117 study participants, 55 had a follow up visit
	Metric 7:	Exposure Scenario	High	Data closely represent relevant exposure scenarios
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Only summary statistics
	Metric 9:	Quality Assurance	High	QA/QC techniques were described, analyzed control samples
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Characterized variability, did not discuss uncertainties and limitations
Overall Quality Determination			Medium	

Study Citation:		Liu, B., Chen, L., Huang, L., Wang, Y., Li, Y. (2015.0). Distribution of volatile organic compounds (VOCs) in surface water, soil, and groundwater within a chemical industry park in Eastern China. Water Science and Technology 71(2):259-267.		
HERO ID:		2956688		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Authors reported sampling collection procedures, storage conditions and storage duration. They cited following standard Chinese Geological Survey sampling procedures. They also described the study site characteristics.
	Metric 2:	Analytical Methodology	Medium	The authors described the extraction method, analytical instrumentation, recovery experiments, but they did not mention calibration. MDLs are listed in the supporting information
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Authors described the study site. China
	Metric 5:	Currency	Medium	Authors reported collecting samples in 2014.
	Metric 6:	Spatial and Temporal Variability	Medium	Authors collected 4 soil samples, 7 surface water samples, 9 groundwater samples. Duplicate sample collected.
	Metric 7:	Exposure Scenario	Medium	Authors describe the study site.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Detection frequencies were reported, it appears maximum concentrations are reported in Table 2 but it is not fully clear. No measure of variation or central tendency is reported. Individual sample concentrations are not reported.
	Metric 9:	Quality Assurance	High	Duplicate samples were collected in the field, QA/QC controls outlined by EPA methods were followed. They used spiked samples to measure recoveries, lab blanks. Recovery results were above 70%.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	The authors did not report a measure of variation and did not discuss limitations, uncertainties or data gaps.
Overall Quality Determination			Medium	

Study Citation:		Dohoo, C., Read Guernsey, J., Gibson, M. D., Vanleeuwen, J. (2015.0). Impact of biogas digesters on cookhouse volatile organic compound exposure for rural Kenyan farmwomen. Journal of Exposure Science & Environmental Epidemiology 25(2):167-174.		
HERO ID:		3024658		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sampling equipment, procedure, calibration and study site characteristics specified but sample storage duration not specified.
	Metric 2:	Analytical Methodology	Medium	LOD reported but recoveries not reported.
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Kenya
	Metric 5:	Currency	Medium	2010
	Metric 6:	Spatial and Temporal Variability	High	31 biogas farms, 31 referent farms with replicate.
	Metric 7:	Exposure Scenario	High	VOCs exposure while cooking
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	The result and statistics reported but raw data not provided.
	Metric 9:	Quality Assurance	Medium	Recovery not reported. Graphical evaluation and the Shapiro–Wilk test conducted and t-test used for variability.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	SD, limited information on limitations and gaps reported
Overall Quality Determination			Medium	

Study Citation:		Wallace, L., Zweidinger, R., Erickson, M., Cooper, S., Whitaker, D., Pellizzari, E. (1982.0). Monitoring individual exposure. Measurements of volatile organic compounds in breathing-zone air, drinking water, and exhaled breath. Environment International 8(1/6):269-282.		
HERO ID:		3227643		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sample storage and instrument calibration not detailed, but study site characteristics described as campus near-industrial site and non-industrial campus area with sampling conducted for 5-9 hour/day as participants had normal daily activities with spirometry conducted at end of day when returning personal air and drinking water samples; sampling equipment/procedures for personal exposure monitoring (MSA Model C-200 pump w/Tenax cartridge), drinking water and spirometry breath samples described.
	Metric 2:	Analytical Methodology	Medium	Instrument calibration not described, but analytical instrumentation (GC/MS) described and methodology referenced (unknown if standard, accepted methods); LOD's (Table 7) and recoveries (Table 3) detailed.
	Metric 3:	Biomarker Selection	High	The authors measured o-DCB as parent chemical in human breath.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Lamar University campus near industrial site and UNC campus areas.
	Metric 5:	Currency	Low	March 4-5, 1980 (Lamar Univ) and June 10-11, 1980 (UNC)
	Metric 6:	Spatial and Temporal Variability	Low	Acceptable moderate sample size with 11 Lamar Univ samples and 6 UNC samples for personal air (5-9 hours for one day) and spirometry breath (single sample, for each of 11 Lamar Univ and 6 UNC participants), similar number with drinking water as samples provided for each time participant drank water during sampling day. Non-statistical sampling approach and no duplicate samples. Sampling conducted for one day for each participant.
	Metric 7:	Exposure Scenario	Medium	Exposure source/scenario described as industrial and non-industrial, field and laboratory blanks and controls described, however unable to distinguish between indoor/outdoor (ambient) sampling for breathing-zone personal air monitoring, indoor/ outdoor sampling scenario not described (building characteristics, climate, etc.), although questionnaire noting residence on/off campus, etc. administered to subjects.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	Raw data from each participant noted within Tables 7-8, summary data Tables 13-14 with range, percent detected, SD, mean and sample size.
	Metric 9:	Quality Assurance	Medium	No baseline pre-exposure samples, but field and lab controls and percent recoveries detailed.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Key uncertainties and data gaps not discussed but variability characterized in summary statistics and limited discussion. Discussion of contribution to variance within regression modeling, and discrepancies between personal air monitoring and spirometry breath samples taken after personal air monitoring. Measurement of non-specific chemical isomers. Authors discuss need for additional studies to validate concentrations reported in various media.
Overall Quality Determination			Medium	

Study Citation:		Kingsbury, J. A., Delzer, G. C., Hopple, J. A. (2008.0). Anthropogenic organic compounds in source water of nine community water systems that withdraw from streams, 2002{\textendash}05. Scientific Investigations Report 2008-5208 :68.		
HERO ID:		3364193		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	The sampling methods followed standard USGS sampling protocols.
	Metric 2:	Analytical Methodology	Medium	Analyzed using USGS approved analytical methods, but recoveries and LOD were not reported.
	Metric 3:	Biomarker Selection	N/A	The authors analyzed water samples.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Samples were collected in United States.
	Metric 5:	Currency	Medium	Samples were collected between 2002-2005.
	Metric 6:	Spatial and Temporal Variability	High	n=12-17 source-water samples collected at each site over 12-month period; variety of flow conditions; field blanks and replicates.
	Metric 7:	Exposure Scenario	High	The data likely represent relevant exposure scenarios related to stream water collected prior to water treatment and then finished water tested at nine community water systems.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Limited summary statistics were reported DF, n, max concentration reported in appendices.
	Metric 9:	Quality Assurance	High	QA/QC techniques were described in detail, including the use of field blanks and replicates.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Variability was not characterized. Section "Changes in Concentration" address uncertainties and need for additional information.
Overall Quality Determination			High	

Study Citation:		Dai, H., Jing, S., Wang, H., Ma, Y., Li, L., Song, W., Kan, H. (2017.0). VOC characteristics and inhalation health risks in newly renovated residences in Shanghai, China. Science of the Total Environment 577(Elsevier):73-83.		
HERO ID:		3453725		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Canister sampling. Followed the national standard TechnicalSpecifications for Monitoring of Indoor Air Quality (HJ/T167-2004), however, info such as storage conditions and duration is not provided. Blanks were collected in field.
	Metric 2:	Analytical Methodology	Medium	Analysis via GC-MS/FID. Only range of LOD provided. Calibrations were linear.
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	China
	Metric 5:	Currency	High	2015
	Metric 6:	Spatial and Temporal Variability	Medium	8 homes sampled in only one month in one city.
	Metric 7:	Exposure Scenario	Medium	Condition of homes only briefly described - renovated in last year
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	DF, min, max, mean, median provided, but no raw data.
	Metric 9:	Quality Assurance	Medium	No QC issues specifically identified, but QC results not well described. Did use field blanks.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	High	Monte Carlo and sensitivity assessment conducted.
Overall Quality Determination			Medium	

Study Citation:		Ma, H., Zhang, H., Wang, L., Wang, J., Chen, J. (2014.0). Comprehensive screening and priority ranking of volatile organic compounds in Daliao River, China. Environmental Monitoring and Assessment 186(5):2813-2821.		
HERO ID:		3488897		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	The sampling method, sample storage, site characteristics are well described.
	Metric 2:	Analytical Methodology	High	The analytical methods are well described. LODs are reported (in supplemental file).
	Metric 3:	Biomarker Selection	N/A	Study measured parent chemical in river water.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The site locations in China are well described.
	Metric 5:	Currency	Medium	Samples were collected in October 2011.
	Metric 6:	Spatial and Temporal Variability	High	Triplicate samples were collected from 20 sites in the river for target VOCs and duplicates for non-target VOCs.
	Metric 7:	Exposure Scenario	High	Sampling from the river is relevant for environmental exposures.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	The data are pooled and the mean and maximum are provided, as well as the frequency of detection. The raw data are not provided and there is no measure of variability.
	Metric 9:	Quality Assurance	High	QA/QC procedures were described and are provided in the supplemental file.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	There is limited discussion of variability and uncertainty.
Overall Quality Determination			High	

Study Citation:		Ellis, P. A., Rivett, M. O. (2007.0). Assessing the impact of VOC-contaminated groundwater on surface water at the city scale. Journal of Contaminant Hydrology 91(1-2):107-127.		
HERO ID:		3544475		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sampling method was generally described, lacking some details but expected to have no major impacts on the results.
	Metric 2:	Analytical Methodology	Medium	Method was generally described (GC-MS); Detection limits reported as a range- more information on DL referenced in another study (Ellis 2003).
	Metric 3:	Biomarker Selection	N/A	Study measured parent chemical in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Sampling was conducted in Birmingham, UK.
	Metric 5:	Currency	Medium	Specific sampling through piezometers was conducted in summer and fall of 2001.
	Metric 6:	Spatial and Temporal Variability	Medium	The study reported that "samples were taken at up to 35 river sites over a day" for 3 days. Unclear if there are replicates.
	Metric 7:	Exposure Scenario	High	The exposure scenario was relevant (surface water).
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	The data were reported as mean and maximum. No individual data were reported.
	Metric 9:	Quality Assurance	Low	Quality assurance was not directly discussed.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	High	The study discussed variability about the different methods used to estimate the environmental concentrations.
Overall Quality Determination			Medium	

Study Citation:		Zeng, Y., Zhou, J., Zhou, Y., Jia, R. (2016.0). Assessment and causes of groundwater organic pollution in typical plain areas in Xinjiang, China. Exposure and Health 8(3):401-417.		
HERO ID:		3606977		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Some sampling methods not reported such as sampler calibration
	Metric 2:	Analytical Methodology	Medium	Some analytical methods not reported, such as recovery samples. LOD reported
	Metric 3:	Biomarker Selection	N/A	Parent chemical in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	China
	Metric 5:	Currency	Medium	Data collected in 2014
	Metric 6:	Spatial and Temporal Variability	Medium	Unclear if replicates collected
	Metric 7:	Exposure Scenario	High	Sites described in detail. Chemical sources discussed in results section.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	Table 2 shows individual points. It is mentioned that there are chemicals that are under detection limits. Summary statistics provided.
	Metric 9:	Quality Assurance	High	QC section described in detail.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Limited gaps and limitations reported. Spatial distribution analyzed.
Overall Quality Determination			High	

Study Citation:		Hopple, J. A., Delzer, G. C., Kingsbury, J. A. (2009.0). Anthropogenic organic compounds in source water of selected community water systems that use groundwater, 2002-05. SIR 2009-5200 :76.		
HERO ID:		3975066		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling methods for source groundwater and finished drinking water samples prior to distribution were described in detail.
	Metric 2:	Analytical Methodology	High	Analytical methods were described and detailed as using USGS approved analytical methods. Laboratory reporting limits were provided within tables.
	Metric 3:	Biomarker Selection	N/A	Study tested parent chemicals in selected community water systems.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Sampling was conducted across the U.S. (Fig 1).
	Metric 5:	Currency	Medium	Sampling was conducted October 2002 through July 2005.
	Metric 6:	Spatial and Temporal Variability	High	Sampling was conducted within 12 principal aquifers across the United States within about 15 wells in each SWQA study with 221 well samples. Replicate sampling was conducted.
	Metric 7:	Exposure Scenario	High	Exposure sources were described for contamination in source water (groundwater) and finished water (drinking water) across the U.S.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Summary statistic data was provided in Table 5, Appendix 1, and Appendix 3 and included detection frequency, number of samples, maximum concentration in source water (groundwater) and finished water (drinking water). Raw data was not provided.
	Metric 9:	Quality Assurance	Medium	Quality assurance was detailed within descriptions of use of field blanks, replicate samples, and recoveries. Recoveries were generally within acceptable limits for most compounds but actual numbers were not provided.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Authors did not provide measures of variance within statistical summary measures of results, but maximum groundwater concentrations were presented. There was little discussion of limitations, uncertainties, or data gaps.
Overall Quality Determination			High	

Study Citation:		Bozzelli, J. W., Kebbekus, B. B. (1982.0). A study of some aromatic and halocarbon vapors in the ambient atmosphere of New Jersey. Journal of Environmental Science and Health, Part A: Environmental Science and Engineering 17(5):693-711.		
HERO ID:		4154002		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	The sampling description included the details of sampling procedure, equipment, and calibration.
	Metric 2:	Analytical Methodology	Low	Analytical procedure was briefly mentioned (GC/MS) and LOD was not reported.
	Metric 3:	Biomarker Selection	N/A	Parent chemical in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	New Jersey
	Metric 5:	Currency	Low	Published date is 1982.
	Metric 6:	Spatial and Temporal Variability	Medium	3 sites were chosen for sampling; each site was sampled at least 6 times a day and in 3 days. Unclear if any replicates.
	Metric 7:	Exposure Scenario	Medium	ambient air
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Average chemical concentrations were reported for each site, though no individual data were reported. Summary statistics reported.
	Metric 9:	Quality Assurance	Medium	The study mentioned that collection and recovery efficiency tests, along with other quality assurance studies made in the laboratories for this study are included in reference (reference 18).
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	High	The study discussed limitation and variability about the results and gave explanations for possible variability and future research direction.
Overall Quality Determination			Medium	

Study Citation:		ERM-Northeast, (1992.0). ECRA sampling and analysis plan report - AlliedSignal Aerospace Company Bendix Electric Power Division with cover letter dated 111693.		
HERO ID:		4213973		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Critically Deficient	Sampling methodology was not described
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methodology was not discussed
	Metric 3:	Biomarker Selection	N/A	Not applicable
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	NJ, USA
	Metric 5:	Currency	Low	Published in 1992
	Metric 6:	Spatial and Temporal Variability	Critically Deficient	Sample size was not reported
	Metric 7:	Exposure Scenario	Medium	Did not describe the population of interest
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Only individual sample concentrations, no summary statistics
	Metric 9:	Quality Assurance	High	Analyzed control samples, described QA/QC techniques
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Limited description of uncertainties, no characterization of variability
Overall Quality Determination			Uninformative	

Study Citation:		Allied Signal, (1990.0). Letter from Allied-Signal Inc notifying USEPA of their intentions to conduct an environmental assessment pursuant to the Environment Cleanup Responsibility Act with attachments.		
HERO ID:		4214323		
Domain		Metric	Rating	Comments
Domain 1: Reliability		Metric 1: Sampling Methodology	High	Sampling and analytical plan are described across the document from 1983 (page 168) -1986 (page 455)
		Metric 2: Analytical Methodology	Medium	Sampling and analytical plan are described across the document from 1983 (page 168) -1986 (page 455). LOD or LOQ reported in most of the data tables
		Metric 3: Biomarker Selection	N/A	Parent chemical in ground water and soil samples
Domain 2: Representativeness		Metric 4: Geographic Area	High	Eatontown, New Jersey
		Metric 5: Currency	Low	1983-1986
		Metric 6: Spatial and Temporal Variability	High	Sample size in total is not reported, but the report has sampling data from 1983-1986
		Metric 7: Exposure Scenario	High	Organic compounds contamination in ground water and solids from the Bendix- Electric Power Division facility
Domain 3: Accessibility/Clarity		Metric 8: Reporting of Results	Low	Only individual data points, no summary of statistics
		Metric 9: Quality Assurance	High	QA/QC reported for most of the sampling periods
Domain 4: Variability and Uncertainty		Metric 10: Variability and Uncertainty	Medium	Sampling from 1983-1986, no report on key limitations
Overall Quality Determination			Medium	

Study Citation:		ICI Americas Inc, (1991.0). Letter from ICI Americas Inc to USEPA submitting follow-up information concerning phenol and other chemicals in groundwater at the facility in Hopewell, Virgina with attachments.		
HERO ID:		4214419		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Critically Deficient	Sampling methods were not described
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methods were not described
	Metric 3:	Biomarker Selection	N/A	The authors analyzed environmental samples.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Virginia, USA
	Metric 5:	Currency	Low	Sampling in 1990
	Metric 6:	Spatial and Temporal Variability	Critically Deficient	Sample size is not reported
	Metric 7:	Exposure Scenario	Low	Data lacks key pieces of information and this impacts the exposure scenario characterization
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	No summary statistics
	Metric 9:	Quality Assurance	Low	Analyzed control samples, did not describe QA/QC techniques
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Did not characterize variability, did not discuss uncertainties or study limitations
Overall Quality Determination			Uninformative	

Study Citation:		Battelle Ocean Sciences, (1987.0). Draft final report on the fate and effects of produced water discharges in nearshore marine waters (volume I {\& } II) with cover letter dated 091187.		
HERO ID:		4214480		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling Methodology	Medium	Limited description of sampling methods
	Metric 2:	Analytical Methodology	Critically Deficient	No description of analytical methods
	Metric 3:	Biomarker Selection	N/A	Does not measure biomarkers
Domain 2: Representativeness	Metric 4:	Geographic Area	High	United States
	Metric 5:	Currency	Low	Published in 1987
	Metric 6:	Spatial and Temporal Variability	N/A	Sample size not reported
	Metric 7:	Exposure Scenario	Medium	Data may represent relevant exposure scenarios, missing details about the population of interest
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Medium	Individual sample concentrations, no summary statistics
	Metric 9:	Quality Assurance	Low	Techniques only briefly described
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability and uncertainty were not characterized

Overall Quality Determination	Uninformative
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Study Citation:		Dow Chemical, (2000.0). Introductory study of the biodegradation of the chlorinated methane, ethane and ethene compounds: Progress report CR806890-01 coop agreement.		
HERO ID:		4215582		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling Methodology	Critically Deficient	The sampling methodology is not discussed
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methodology not described
	Metric 3:	Biomarker Selection	N/A	parent chemical in water
Domain 2: Representativeness	Metric 4:	Geographic Area	High	Miami, Florida
	Metric 5:	Currency	Low	1982
	Metric 6:	Spatial and Temporal Variability	Medium	No sample replicates, 116 samples at the water treatment plants
	Metric 7:	Exposure Scenario	High	Volatile organic compounds in raw, lime softened and finished water
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Low	No individual data points reported, only average concentrations
	Metric 9:	Quality Assurance	Critically Deficient	QA/QC procedures not mentioned in the document
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	No sample variability or discussion of key limitations
Overall Quality Determination		Uninformative		

Study Citation:		Buszka, P. M., Barber, L. B., Schroeder, M. P., Becker, L. D. (1994.0). Organic compounds downstream from a treated-wastewater discharge near Dallas, Texas, March 1987.		
HERO ID:		4506342		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	water samples collected at 4 sites (Fig 1 and Table 1); collected in glass bottles by submerging the bottles and allowing them to fill completely; refrigerated
	Metric 2:	Analytical Methodology	Low	purge-and-trap, closed-loop stripping, and pH-adjusted solvent extraction methods used for water samples; GC/MS; All compound identities were confirmed by matching sample mass spectra and retention indices with those of authentic standards; detection limit not provided
	Metric 3:	Biomarker Selection	N/A	environmental media
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Rowlett Creek near Dallas, Texas
	Metric 5:	Currency	Low	March 9 and 10,1987
	Metric 6:	Spatial and Temporal Variability	Low	1 site upstream; 3 sites downstream; no replicates
	Metric 7:	Exposure Scenario	High	streambed sediments from upstream and downstream of discharge from a WWTP
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Table 4 provides the concentrations from water samples by purge-and-trap extraction per sites; no further statistics provided; this chemical was found in the water, but concentration not reported
	Metric 9:	Quality Assurance	Low	no discussion on recoveries for pure-and-trap extraction with GC/MS; Site 1 was the upstream control site representing background conditions
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	no discussion on variability or uncertainty for this specific chemical
Overall Quality Determination			Low	

Study Citation:		Xing, L., Wang, L., Zhang, R. (2018.0). Characteristics and health risk assessment of volatile organic compounds emitted from interior materials in vehicles: a case study from Nanjing, China. Environmental Science and Pollution Research 25(15):14789-14798.		
HERO ID:		4697151		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling described in detail. Additional information reported in reference (USEPA 1999) and an associated reference (Xu et al. 2016).
	Metric 2:	Analytical Methodology	Medium	Detection limits reported as a range and not for each chemical.
	Metric 3:	Biomarker Selection	N/A	Parent chemical in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Nanjing, China
	Metric 5:	Currency	High	April 2015
	Metric 6:	Spatial and Temporal Variability	Medium	Ten sets of samples. Unclear if there are replicates.
	Metric 7:	Exposure Scenario	Medium	Relevant scenario of car interiors. Missing information of car details- such as model, condition.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Summary statistics provided. Raw data not provided
	Metric 9:	Quality Assurance	Low	QA/QC not directly discussed but can be interpreted.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	No discussion of limitations or variability.
Overall Quality Determination			Medium	

Study Citation:		Grosjean, E., Rasmussen, R. A., Grosjean, D. (1999.0). Toxic air contaminants in Porto Alegre, Brazil. Environmental Science & Technology 33(12):1970-1978.		
HERO ID:		4697228		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	The sampling procedure, equipment, and matrix characterization were discussed.
	Metric 2:	Analytical Methodology	Medium	The extraction and analytical method (GC/MS) were described. The limit of detection (LOD) was not reported, but the method detection limit (MDL) was reported as 0.1 ppbv.
	Metric 3:	Biomarker Selection	N/A	This metric is not applicable for this study which conducted sampling within environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The study was conducted in Porto Alegre, Brazil.
	Metric 5:	Currency	Low	The study was conducted during the years 1996-1997.
	Metric 6:	Spatial and Temporal Variability	Medium	Most compounds have more than 23 sample points.
	Metric 7:	Exposure Scenario	Medium	The exposure scenario was adequately described for ambient air samples.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Range and average of the concentrations were reported with standard deviation and background concentration.
	Metric 9:	Quality Assurance	Low	Quality assurance measures were not described in detail.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	High	The study discussed in details the variability from one urban area to the next area.
Overall Quality Determination			Medium	

Study Citation:		Wallace, L., Nelson, W., Ziegenfus, R., Pellizzari, E., Michael, L., Whitmore, R., Zelon, H., Hartwell, T., Perritt, R., Westerdahl, D. (1991.0). The Los Angeles TEAM Study: personal exposures, indoor-outdoor air concentrations, and breath concentrations of 25 volatile organic compounds. Journal of Exposure Analysis and Environmental Epidemiology 1(2):157-192.		
HERO ID:		4727403		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Well described sampling methods. Missing sampler storage and handling.
	Metric 2:	Analytical Methodology	Medium	Limited description of analytical methods
	Metric 3:	Biomarker Selection	N/A	Study is primarily focused on air measurements although they do collect breath samples to see if it can be an appropriate biomarker.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	USA
	Metric 5:	Currency	Low	Sampling in 1987
	Metric 6:	Spatial and Temporal Variability	High	51 sampling sites (43 re-visited at follow-up in different season)
	Metric 7:	Exposure Scenario	High	Data closely represent relevant exposure scenarios
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Only summary statistics
	Metric 9:	Quality Assurance	High	Described QA/QC techniques, analyzed control samples
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Limited characterization of variability and uncertainties
Overall Quality Determination			Medium	

Study Citation:		Deng, Y., Bonilla, M., Ren, H., Zhang, Y. (2018.0). Health risk assessment of reclaimed wastewater: A case study of a conventional water reclamation plant in Nanjing, China. Environment International 112:235-242.		
HERO ID:		4728647		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling collection details are reported in section 2.1.1, including sampling methods, equipment, volume, transport, and storage.
	Metric 2:	Analytical Methodology	Medium	Analytical methods including sample extraction and quantification methods are reported in section 2.1.2. Detection limits are reported in section 2.1.4. Calibration information is missing.
	Metric 3:	Biomarker Selection	N/A	This metric is not applicable for this study as the study tested for the parent chemical in an environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Samples were collected in a water reclamation plant in Nanjing China.
	Metric 5:	Currency	Medium	Samples were collected from October 2013 to September 2014.
	Metric 6:	Spatial and Temporal Variability	High	A total of 48 samples were collected in 12 locations.
	Metric 7:	Exposure Scenario	High	The study evaluates the concentration of pollutants in reclaimed wastewater and the potential health risks.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data is not reported, but table 1 reports mean and standard deviation concentrations.
	Metric 9:	Quality Assurance	High	Quality assurance methods included blanks, standard reference material, and samples replicates.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	High	Variability is reported as the standard deviation of each treatment process, and uncertainty is discussed in section 3.5.
Overall Quality Determination			High	

Study Citation:		van Drooge, B. L., Marco, E., Perez, N., Grimalt, J. O. (2018.0). Influence of electronic cigarette vaping on the composition of indoor organic pollutants, particles, and exhaled breath of bystanders. Environmental Science and Pollution Research 26(5):4654-4666.		
HERO ID:		5018334		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Key sampling methods reported
	Metric 2:	Analytical Methodology	High	Key analytical methods reported
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical in an environmental media (air).
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Spain
	Metric 5:	Currency	High	Samples collected in 2016
	Metric 6:	Spatial and Temporal Variability	High	>10 samples; replicates
	Metric 7:	Exposure Scenario	High	Exposure source characterized
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data not reported
	Metric 9:	Quality Assurance	Medium	Key QA reported
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Few gaps and limitations reported
Overall Quality Determination			High	

Study Citation: Assmuth, T. W. (1996.0). Comparative risk analysis of waste site toxicants by indices based on concentration distributions, fluxes, environmental fate and critical effects. Journal of Hazardous Materials 48(1-3):121-135.

HERO ID: 5066259

Domain	Metric	Rating	Comments
Domain 1: Reliability			
Metric 1:	Sampling Methodology	High	Some sampling methods were not reported such as sample storage conditions and sampler calibration
Metric 2:	Analytical Methodology	Critically Deficient	Recovery samples were not reported; analytical methodology not described in this paper. The study simply states that "Standardized and established analytical methods were used."
Metric 3:	Biomarker Selection	N/A	Biomarkers of interest were not addressed in this reference.
Domain 2: Representativeness			
Metric 4:	Geographic Area	High	Finland
Metric 5:	Currency	Low	Study was published in 1995
Metric 6:	Spatial and Temporal Variability	Medium	>10 samples were collected but there were no replicates collected.
Metric 7:	Exposure Scenario	High	The exposure source was well characterized
Domain 3: Accessibility/Clarity			
Metric 8:	Reporting of Results	Medium	Raw data were not reported
Metric 9:	Quality Assurance	Low	Limited QA was reported
Domain 4: Variability and Uncertainty			
Metric 10:	Variability and Uncertainty	Low	Few gaps and limitations were reported

Overall Quality Determination

Uninformative

Study Citation:		Sauer, P. A., Tyler, E. J. (1996.0). Heavy metal and volatile organic chemical removal and treatment in on-site wastewater infiltration systems: I. Catch basins and septic tanks. Water, Air, and Soil Pollution 89(3-4):221-232.		
HERO ID:		5095439		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	No sampling protocol identified, but sampling methodology is described. Catch basin wastewater collected beneath floating layer and above grit layer using bottle or weighted tube and pump; septic tank effluent from mid-depth (15–30 cm below surface crust); sludge from 5 cm above tank bottom; samples collected with hand pump and glass flask. Wastewater refrigerated at 4°C until analysis.
	Metric 2:	Analytical Methodology	Medium	VOCs analyzed by EPA methods: GC-MS Method 624 (pre-August 1991), GC Methods 601, 602, or 8021 (post-August 1991). Details on the methods were not provided, such as extraction method, calibration, recovery, method validation, and specific analytical limits.
	Metric 3:	Biomarker Selection	N/A	Chemical measured in wastewater.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Wisconsin
	Metric 5:	Currency	Low	Samples were collected from the catch basin and septic tank (effluent and sludge) at each site quarterly over a one year period from July 1991 to August 1992.
	Metric 6:	Spatial and Temporal Variability	Medium	The study captures spatial variability by sampling four distinct facilities in different counties and covers temporal variability through quarterly sampling over a full year. As such, 16 samples were collected per media type. Replicate samples at each site do not appear to have been collected.
	Metric 7:	Exposure Scenario	High	Samples were taken from motor vehicle service stations. The study provides detailed information the facility microenvironment and the operational context (routine vehicle maintenance, mixing with domestic wastewater, discharge to soil infiltration systems).
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Individual data points are not reported. Table V contains concentration ranges, mean and standard deviation as well as the frequency of detection.
	Metric 9:	Quality Assurance	Low	QA/QC techniques are not directly discussed, but can be implied through the study’s use of protocols.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Limited discussion of the key uncertainties and limitations. The mean and standard variation are reported in table V. Data gaps mentioned include differences between privately- and publicly owned sites and variability in disposal practices.

Overall Quality Determination

Medium

Study Citation:		Kostiainen, R. (1995.0). Volatile organic compounds in the indoor air of normal and sick houses. Atmospheric Environment 29(6):693-702.		
HERO ID:		5239408		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling Methodology	Medium	Selection criteria for air sampling and equipment was described, but methodology was missing information about storage conditions and sampler calibration.
	Metric 2:	Analytical Methodology	Medium	Detection limits were only reported as a range for all VOCs combined.
	Metric 3:	Biomarker Selection	N/A	Study measured parent compounds in indoor air.
Domain 2: Representativeness	Metric 4:	Geographic Area	Critically Deficient	Country of study not mentioned. Finland is assumed based on author information
	Metric 5:	Currency	Low	Timing of sample collection for monitoring data is not reported, discussed, or referenced. Paper was published in 1994.
	Metric 6:	Spatial and Temporal Variability	Medium	No replicates
	Metric 7:	Exposure Scenario	High	Exposure to VOCs in the indoor air and its association with sick building syndrome is relevant.
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Medium	No raw data reported
	Metric 9:	Quality Assurance	Low	Limited, if any, information provided on QA/QC.
Domain 4: Variability and Uncertainty	Metric 10:	Variability and Uncertainty	Low	Limited, if any, information reported on gaps and limitations
Overall Quality Determination		Uninformative		

Study Citation:		Kliest, J., Fast, T., Boley, J. S. M., van de Wiel, H., Bloemen, H. (1989.0). The relationship between soil contaminated with volatile organic compounds and indoor air pollution. Environment International 15(1-6):419-426.		
HERO ID:		5239410		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sample storage not described
	Metric 2:	Analytical Methodology	Low	Detection limits are not reported
	Metric 3:	Biomarker Selection	N/A	Study measured parent chemical in soil.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The Netherlands
	Metric 5:	Currency	Low	May 1984 to November 1985
	Metric 6:	Spatial and Temporal Variability	Medium	Samples were collected from 77 houses, but there were no replicate samples
	Metric 7:	Exposure Scenario	High	Samples were collected from homes
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Individual data points are not provided
	Metric 9:	Quality Assurance	Low	QA/QC techniques were not directly discussed, but can be implied
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Limited characterization, if any, of variance and discussion of limitations, uncertainties, or data gaps
Overall Quality Determination			Medium	

Study Citation:		Conn, K. E., Barber, L. B., Brown, G. K., Siegrist, R. L. (2006.0). Occurrence and fate of organic contaminants during onsite wastewater treatment. Environmental Science & Technology 40(23):7358-7366.		
HERO ID:		5244909		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	30 onsite WWT systems; sites include 22 tank-based treatment systems, 7 biofilter-based treatment systems, and 1 subsurface-flow constructed wetland; sampled twice; grab samples from clarified layer of each tank; unfiltered samples stored in glass bottles at 4C
	Metric 2:	Analytical Methodology	Medium	Analytical procedures discussed on p. 7359; discusses multiple extraction and analytical methods for both unfiltered and filtered samples; method also identified in Tables SI-2; confusing; reporting limits provided in Table SI-2 and SI-3;
	Metric 3:	Biomarker Selection	N/A	Biomarkers of interest were not addressed in this reference.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Summit and Jefferson Counties, CO
	Metric 5:	Currency	Low	August to October 2003 and March to May 2004
	Metric 6:	Spatial and Temporal Variability	High	30 onsite treatment systems; sampled twice; replicate samples
	Metric 7:	Exposure Scenario	High	Effluent from wastewater treatment systems; 16 serve residential sources and 14 serve nonresidential sources (food establishments,convenience stores, retail centers, a church, elementary schools, veterinary hospitals)
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Table 1 provides DF, max, and median; raw data not provided
	Metric 9:	Quality Assurance	Medium	Extensive quality assurance program was conducted; Field blanks, field replicates, lab blanks, lab replicates, and field and laboratoryduplicate matrix spikes - data per chemical not provided.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability in occurrence and concentrations between treatment systems (Figure 3) was likely due to differences in water andchemical use activities contributing to the wastewater; no measure of variance or discussion of uncertainties.
Overall Quality Determination			Medium	

Study Citation:		Harkov, R., Gianti, S. J., Bozzelli, J. W., Laregina, J. E. (1985.0). Monitoring volatile organic compounds at hazardous and sanitary landfills in New Jersey. Journal of Environmental Science and Health, Part A: Environmental Science and Engineering 20(5):491-502.		
HERO ID:		5245498		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	air sampled at abandoned hazardous waste sits and sanitary landfills (see Table 1 for details) using 5 low flow (10-15ml/min) samplers for 24 hr/day for three consecutive days; p. 493 Sampling explained further. No discussion of storage and transportation of sampler after sampling
	Metric 2:	Analytical Methodology	High	Varian 3700 gas chromatograph equipped with a fused silica SP2100 column; quadrupole mass spectrometer equipped with a fused silica SP2100 GC column and a liquid nitrogen cold trap; detection limits provided in footnote C of Table 4
	Metric 3:	Biomarker Selection	N/A	Air sampling
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	New Jersey (Table 1 for townships/city of sites)
	Metric 5:	Currency	Low	1984
	Metric 6:	Spatial and Temporal Variability	Medium	7 sites sampled for 3 days each; 5 sampling locations per site for each day of sampling
	Metric 7:	Exposure Scenario	High	examine ambient air contamination at a cross-section of abandoned hazardous waste sites
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Table 4 provides the mean per site; Tables 6-9 provide the mean per day
	Metric 9:	Quality Assurance	Medium	QA discussed p.495; included spikes, duplicates, and blanks.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	compared results to those from an urban/industrial site in Newark (Table 5) and daily variations per site (Table 6-9)
Overall Quality Determination			Medium	

Study Citation:		Purtymun, W. D., Ferenbaugh, R. W., Maes, M. (1988.0). Quality of surface and ground water at and adjacent to the Los Alamos National Laboratory: Reference organic compounds.		
HERO ID:		5255865		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sampling methodology not described, but followed the USEPA guidelines USEPA 1983 and USEPA 1985.
	Metric 2:	Analytical Methodology	High	Analytical methods described in Appendix B. DL reported
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical in an environmental media (water).
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Geographic location is reported; Alamos National Laboratory, USA.
	Metric 5:	Currency	Low	Timing of sample collection for monitoring data is not consistent with current or recent exposures may be expected (> 15years). The water samples were collected in late September and early October of 1986.
	Metric 6:	Spatial and Temporal Variability	High	Sampling approach accurately captures variability. The study used a large sample size (43 surface and ground water stations and a total of 5,676 individual analytical results), and sampling occurred over a sufficient period of time (fall of one year). Replicate samples are used.
	Metric 7:	Exposure Scenario	High	Surface and ground water samples adjacent to the Los Alamos National Laboratory.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data (i.e., individual data points) are not reported , and therefore summary statistics cannot be reproduced.
	Metric 9:	Quality Assurance	Low	QA/QC describes in page 9 in QA/QC section. Recoveries are on the low side (<70%) and it is unclear if they correct for recovery.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability or uncertainty not reported.
Overall Quality Determination			Medium	

Study Citation:		Zimmerman, M. J., Massey, A. J., Campo, K. W. (2005.0). Pushpoint sampling for defining spatial and temporal variations in contaminant concentrations in sediment pore water near the ground-water / surface-water interface. :1-75.		
HERO ID:		5258475		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Low	The study detailed a validation study of a new sampler, a push point sampler. The method was not compared to standard methods within this study. The sampling procedures and storage conditions were reported by the authors. Storage duration times were not reported.
	Metric 2:	Analytical Methodology	Low	The authors refer to analytical methods listed in an appendix that was not part of the pdf. The article refers to the samples being analyzed by an USEPA laboratory so one could assume that standard analytical methods were used but it is unclear from the main text. Reporting level was reported by authors.
	Metric 3:	Biomarker Selection	N/A	Biomarkers of interest were not addressed in this reference.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The authors report the study location.
	Metric 5:	Currency	Low	Data was collected in 2002 and 2003.
	Metric 6:	Spatial and Temporal Variability	High	The authors collected replicate samples, at two different sampling sites and over multiple time points. The reported total sample size for location A was 148 and for location B 159.
	Metric 7:	Exposure Scenario	Medium	The study site was a river where ground-water discharge of pollutants was known.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	The authors provide the individual samples concentrations, range of concentration, detection frequency, number of samples within the dataset. They did not report a standard deviation or measure of central tendency.
	Metric 9:	Quality Assurance	Medium	The authors reported detailed results of trip blanks, replicates, and equipment blanks. Recovery tests were not reported. Chemical of interest was not detected in trip or laboratory blanks.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	The authors do not report a standard deviation. The authors discussed variability in the data, but did not discuss gaps or limitations.
Overall Quality Determination			Medium	

Study Citation:		Pellizzari, E. D., Hartwell, T. D., Perritt, R. L., Sparacino, C. M., Sheldon, L. S., Zelon, H. S., Whitmore, R. W., Breen, J. J., Wallace, L. (1986.0). Comparison of indoor and outdoor residential levels of volatile organic chemicals in five usa geographical areas. Environment International 12(6):619-624.		
HERO ID:		5276359		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Not all details of the sampling methodology are reported in the methods (e.g., storage conditions/duration). The analytical methods were discussed, but LOD and recoveries were not reported. The authors analyzed air samples.
	Metric 2:	Analytical Methodology	Medium	
	Metric 3:	Biomarker Selection	N/A	
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The samples were from U.S. locations.
	Metric 5:	Currency	Low	Data were collected between 1981-1984.
	Metric 6:	Spatial and Temporal Variability	Medium	Replicates were not collected, n=281 in total (estimated from Table 1).
	Metric 7:	Exposure Scenario	High	The data closely represent relevant indoor and outdoor air exposure scenarios in the U.S.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data was not reported. Only summary statistics were reported.
	Metric 9:	Quality Assurance	High	QA/QC techniques were described, including the use of blank and control samples.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Limited characterization of variability was reported (maximum values). Little information on gaps and limitations was provided.
Overall Quality Determination			Medium	

Study Citation:		Bethune, D. N., Farvolden, R. N., Ryan, M. C., Guzman, A. L. (1996.0). Industrial contamination of a municipal water-supply lake by induced reversal of ground-water flow, Managua, Nicaragua. Groundwater 34(4):699-708.		
HERO ID:		5349379		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	QC: field methods section describes sampling- piezometers, groundwater sampling
	Metric 2:	Analytical Methodology	Medium	Some methods not reported such as recoveries
	Metric 3:	Biomarker Selection	N/A	Biomarkers of interest were not addressed in this reference.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	QC: maps of lake managua provided figure 1
	Metric 5:	Currency	Low	Data collected between 1989 and 1992
	Metric 6:	Spatial and Temporal Variability	Medium	no replicates
	Metric 7:	Exposure Scenario	High	QC: gw/dw important exposure scenario
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	no raw data reported
	Metric 9:	Quality Assurance	High	QC: validation of field and modeling results
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	High	QC: discussion of recharge of Lake Managua to the aquifer in the vicinity of the waste canal (p 701 and elsewhere)
Overall Quality Determination			High	

Study Citation:		Qin, P.,an, Cao, F., Lu, S., Li, L., Guo, X., Zhao, B.,in, Wan, Z., Bi, B.,in (2019.0). Occurrence and health risk assessment of volatile organic compounds in the surface water of Poyang Lake in March 2017. RSC Advances 9(39):22609-22617.		
HERO ID:		5419284		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	The water sampling methodology was described and is scientifically sound. Sampling site, procedures, equipment and storage reported.
	Metric 2:	Analytical Methodology	High	The analytical methods, instrument, LOD and recoveries were reported.
	Metric 3:	Biomarker Selection	N/A	The authors analyzed water samples.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The study was conducted in China.
	Metric 5:	Currency	High	The samples were collected in 2017.
	Metric 6:	Spatial and Temporal Variability	Medium	n=28 samples were taken, without replicates.
	Metric 7:	Exposure Scenario	Medium	The data likely represent relevant exposure scenarios related to Poyang Lake’s water and population affected, but the small sample size and time window (March 2017) limit the study’s generalizability.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Only summary statistics were reported (range, mean). Individual points not reported.
	Metric 9:	Quality Assurance	High	QA/QC techniques were described in detail and included solvent and procedural blanks. Recoveries between 82.3–120.5%.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Variability was characterized (range). Uncertainties were briefly discussed.
Overall Quality Determination			High	

Study Citation:		Huang, Y., Su, T., Wang, L., Wang, N., Xue, Y., Dai, W., Lee, S. C., Cao, J., Ho, S. S. H. (2019.0). Evaluation and characterization of volatile air toxics indoors in a heavy polluted city of northwestern China in wintertime. Science of the Total Environment 662:470-480.		
HERO ID:		5431563		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Field blanks were used. Storage temp provided. Equipment calibration and flow rates provided. Detailed sampling procedures in other publications (Spaulding et al., 1999; Ho et al., 2011).
	Metric 2:	Analytical Methodology	Medium	Details on method shown in Dai et al., 2012, but relatively robust description provided. Limits only provided as a range.
	Metric 3:	Biomarker Selection	N/A	Paper reports chemical concentrations in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	China
	Metric 5:	Currency	High	2016-2017
	Metric 6:	Spatial and Temporal Variability	High	44 samples from 11 homes.
	Metric 7:	Exposure Scenario	High	Questionnaire provided details to characterize the building and activity patterns of occupants. No known pollution sources near buildings.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	Mean and sd in main report. Individual samples appear o have been provided in SI. Conducted source apportionment for indoor sources.
	Metric 9:	Quality Assurance	Medium	Calibration curve was established. Precision was <25%. Recoveries not discussed.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Variability assessed via factor analysis. No discussion of uncertainties.
Overall Quality Determination			High	

Study Citation:		Glass, R. L. (1996.0). Hydrologic and water-quality data for U.S. Coast Guard Support Center Kodiak, Alaska, 1987-89. :1-73.		
HERO ID:		5438106		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Key sampling methods reported. Samples were collected according to publicly available SOPs that are scientifically sound and widely accepted (i.e., USEPA methods).
	Metric 2:	Analytical Methodology	High	Key analytical methods reported. Samples were analyzed according to publicly available analytical methods that are scientifically sound and widely accepted. MCLG/MCLs provided.
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical in an environmental media (water).
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Kodiak, Alaska
	Metric 5:	Currency	Low	Samples collected in 1987 to 1989
	Metric 6:	Spatial and Temporal Variability	High	Sampling approach accurately captures variability of environmental contamination in media of interest. Used large sample size (Large sample size (i.e., > 10 samples for a single scenario). Used replicates.
	Metric 7:	Exposure Scenario	Medium	Exposure source not well characterized
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Supplementary or raw data (i.e., individual data points) are not reported , and therefore summary statistics cannot be reproduced.
	Metric 9:	Quality Assurance	High	Acceptable QA
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Few gaps and limitations reported
Overall Quality Determination			Medium	

Study Citation:		Guimaraes, W. B. (1995.0). Water quality in the Withers Swash Basin, with emphasis on enteric bacteria, Myrtle Beach, South Carolina, 1991-93.		
HERO ID:		:1-102. 5438210		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	The water sampling methods were discussed but didn’t include procedure details. The authors cited previously published articles.
	Metric 2:	Analytical Methodology	Medium	The analytical methods were reported, including instrumentation, LOD but did not include recoveries.
	Metric 3:	Biomarker Selection	N/A	The authors analyzed water samples.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The study was conducted in South Carolina, USA.
	Metric 5:	Currency	Low	The samples were taken in 1991 and 1992.
	Metric 6:	Spatial and Temporal Variability	High	n≥ 10 samples for a single scenario. The sample size was not explicitly reported but the results throughout the report suggest a large sample collection from 51 sites in total.
	Metric 7:	Exposure Scenario	Medium	The data likely represent relevant exposure scenarios related to water contamination in Withers Swash and its two tributaries in Myrtle Beach, S.C, USA.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Only summary statistics were reported (median, min, max).
	Metric 9:	Quality Assurance	Low	QA/QC techniques were not discussed.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	The authors provided a limited characterization of variability (range). Uncertainties and limitations were not discussed.
Overall Quality Determination			Medium	

Study Citation:		Heck, B. A., Myers, N. C., Hargadine, D. A. (1992.0). Hydrogeology and ground-water quality conditions at the Reno County Landfill, South-Central Kansas, 1990-91.		
HERO ID:		5438509		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Some sampling methods not reported such as sampler calibration
	Metric 2:	Analytical Methodology	Low	LOD nor LOQ reported
	Metric 3:	Biomarker Selection	N/A	Biomarkers of interest were not addressed in this reference.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Reno County, Kansas
	Metric 5:	Currency	Low	Data collected in 1991
	Metric 6:	Spatial and Temporal Variability	Medium	>10 samples; no replicates
	Metric 7:	Exposure Scenario	Medium	Exposure source not well characterized. Further investigation needed to determine usefulness of information.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	Raw data reported. Most summary statistics provided.
	Metric 9:	Quality Assurance	Low	Limited QA reported
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Few gaps and limitations reported
Overall Quality Determination			Medium	

Study Citation:		Mack, T. J. (1997.0). Design of monitoring wells, hydrogeology, and ground-water quality beneath Country Pond, Kingston, New Hampshire.		
HERO ID:		5440304		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling Methodology	Critically Deficient	Limited sampling methods were discussed.
	Metric 2:	Analytical Methodology	Critically Deficient	The analytical methods were not described.
	Metric 3:	Biomarker Selection	N/A	The authors analyzed water samples.
Domain 2: Representativeness	Metric 4:	Geographic Area	High	The study was conducted in New Hampshire, USA.
	Metric 5:	Currency	Low	The samples were collected in 1993.
	Metric 6:	Spatial and Temporal Variability	Low	n=17 samples were collected (two samples per location). Estimated from Table 4.
	Metric 7:	Exposure Scenario	Low	The data may represent relevant water exposure scenarios in New Hampshire, but the lack of methodological details limits the study's results.
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Medium	Only individual sample concentrations were reported, without summary statistics.
	Metric 9:	Quality Assurance	Low	QA/QC techniques were not reported.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability was not characterized. Limitations were not reported.
Overall Quality Determination		Uninformative		

Study Citation:		Miermans, C. J. H., Van Der Velde, L. E., Frintrop, P. C. M. (2000.0). Analysis of volatile organic compounds, using the purge and trap injector coupled to a gas chromatograph ion-trap mass spectrometer review of the results in Dutch surface water of the Rhine, Meuse, Northern Delta area and Westerscheldt, over the period 1992-1997. Chemosphere 40(1):39-48.		
HERO ID:		5440660		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Automatic online sampling system takes composite samples on a daily basis, supplemented by manual sampling if values are high. The authors noted grab samples of volatile compounds needs to be improved.
	Metric 2:	Analytical Methodology	High	Both onsite and lab samples were analyzed with (novel) purge and trap injection (PTI) coupled to a chromatograph/ion trap mass spectrometer. Detection limits are reported.
	Metric 3:	Biomarker Selection	N/A	Environmental media
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	River sampling locations in the Netherlands are named.
	Metric 5:	Currency	Low	1992-1997
	Metric 6:	Spatial and Temporal Variability	Medium	13-14 samples per year at 11 sites. No replicates
	Metric 7:	Exposure Scenario	Medium	Timing of sampling (e.g., season) is missing. Figure 4 implies the samples may have been taken monthly.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Only maximum values are reported. No raw data
	Metric 9:	Quality Assurance	Medium	Method validation study; discussed standards, reliability, and recovery to some extent.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Quantitative and qualitative descriptions of variability are lacking for most chemicals (some have greater spatiotemporal detail in the discussion).
Overall Quality Determination			Medium	

Study Citation:		Van Luin, A. B., Van Starkenburg, W. (1985.0). Hazardous Substances in Waste Water. Water Science and Technology 17(6-7):843–853.		
HERO ID:		5443237		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Low	Sampling methodology is only briefly discussed
	Metric 2:	Analytical Methodology	Low	Analytical methodology only briefly discussed
	Metric 3:	Biomarker Selection	N/A	Chemical measured in wastewater
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The Netherlands
	Metric 5:	Currency	Low	1980-1983
	Metric 6:	Spatial and Temporal Variability	Medium	No replicate samples
	Metric 7:	Exposure Scenario	Medium	Samples collected from a wastewater treatment plant
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Individual data points are not reported
	Metric 9:	Quality Assurance	Low	QA/QC techniques are not directly discussed
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Limited characterization of variability
Overall Quality Determination			Low	

Study Citation:		Watts, K. R., Ortiz, R. F. (1990.0). Geohydrology and ground-water quality at the pueblo depot activity landfill near Pueblo, Colorado.		
HERO ID:		5443405		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sample storage missing
	Metric 2:	Analytical Methodology	Medium	Some analytical methods not reported, such as recovery samples
	Metric 3:	Biomarker Selection	N/A	NA - Water samples no biomarker needed.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Colorado, USA
	Metric 5:	Currency	Low	Data collected in 1988
	Metric 6:	Spatial and Temporal Variability	Medium	Multiple wells sampled about 3-5 times each, unclear if there are replicates
	Metric 7:	Exposure Scenario	High	Proximity to landfill water. Can be used in general population, and environmental exposure scenarios.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	Table 10 start after page 95 while some ranges can be found within text too.
	Metric 9:	Quality Assurance	Low	QA/QC implied
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Few limitations reported
Overall Quality Determination			Medium	

Study Citation:		Bigsby, P. R., Myers, N. C. (1989.0). Hydrogeology and ground-water-quality conditions at the Geary County landfill, northeast Kansas, 1988.		
HERO ID:		5449639		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	USGS conducted study; 7 monitoring wells sampled (MW- to MW-2); samples retrieved with a Teflon-bottom check-valve bailer and immediately put on ice; samples filtered; also samples of Smoky Hill River collected by dipping bottles into the stream and allowing to fill
	Metric 2:	Analytical Methodology	Low	Performed by Kansas Department of Health and Environment laboratory, no discussion of analytical methodology. Although missing analytical description and other QA and uncertainties in this report they have references in which this information can be found. Most of the used methodology are accepted methods performed by accredited labs.
	Metric 3:	Biomarker Selection	N/A	NA - water samples no biomarker needed.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Geary County, northeast Kansas
	Metric 5:	Currency	Low	Sept 20-22, 1988
	Metric 6:	Spatial and Temporal Variability	Medium	7 wells sampled Sept 20-22; also 3 samples from the river; no replicate samples indicated
	Metric 7:	Exposure Scenario	High	groundwater quality conditions at a county landfill
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	Table 8 provides concentration per site
	Metric 9:	Quality Assurance	Low	QA/QC not reported but implied as it is a USGS investigation
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	no discussion of variability or uncertainty
Overall Quality Determination			Medium	

Study Citation:		Westinghouse Savannah River Company, (1993.0). Mixed Waste Management Facility (MWMF) groundwater monitoring report (U): Fourth quarter 1992 and 1992 summary.		
HERO ID:		5452031		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling Methodology	Low	Sampling methodology is only briefly discussed. Described sampling locations and study site characteristics. Did not report sample storage conditions/duration or sampling equipment and procedure.
	Metric 2:	Analytical Methodology	Critically Deficient	Analytical methodology is not described, including analytical instrumentation.
	Metric 3:	Biomarker Selection	N/A	Study tested for the parent chemical in environmental media.
Domain 2: Representativeness	Metric 4:	Geographic Area	High	Savannah River Site, Aiken, SC
	Metric 5:	Currency	Low	Samples collected throughout second quarter 1992.
	Metric 6:	Spatial and Temporal Variability	Medium	>10 samples were collected but there no replicate samples collected. Several wells sampled, but only one sample per well.
	Metric 7:	Exposure Scenario	Medium	The report provides extensive background information about the sites and wells. The data likely represent the relevant exposure scenario. Routes of exposure and populations of interest not described.
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	High	Raw data were reported.
	Metric 9:	Quality Assurance	Low	Quality assurance/quality control techniques and results were not discussed.
Domain 4: Variability and Uncertainty	Metric 10:	Variability and Uncertainty	Low	The characterization of variability is absent and key uncertainties, limitations, and data gaps are not discussed.
Overall Quality Determination		Uninformative		

Study Citation:		Tahboub, Y. R., Zaater, M. F., Khater, D. F. (2017.0). Semi-volatile organic pollutants in Jordanian surface water. Arabian Journal of Chemistry 10:S3318-S3323.		
HERO ID:		5469387		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling was performed according to USEPA (1982) handbook for sampling and sample preservation of water and wastewater. details of the sampling method, sample storage, analytical method, and site characteristics were provided.
	Metric 2:	Analytical Methodology	Low	Thee analytical method, extraction and instrument were described in detail. LODs were not provided.
	Metric 3:	Biomarker Selection	N/A	Study tests chemical in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The sampling locations in Jordan were described in detail.
	Metric 5:	Currency	Medium	The samples were collected in 2010.
	Metric 6:	Spatial and Temporal Variability	Medium	Monthly samples from April to August 2010 were collected from 4 sites between April and August.
	Metric 7:	Exposure Scenario	High	The purpose of the study was to monitor reservoir water which is the main water source.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	The mean concentration and SD wre provided. Raw data were not provided.
	Metric 9:	Quality Assurance	Low	Quality assurance/quality control techniques and results were not directly discussed, but can be implied through the study's use of standard field and laboratory protocols.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Means and SDs were provided and there was limited discussion of uncertainty.
Overall Quality Determination			Medium	

Study Citation:		Campbell, T. R. (1997.0). Soil, water, and streambed quality at a demolished asphalt plant, Fort Bragg, North Carolina, 1992-94.		
HERO ID:		5489294		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	samples were collected and handled according to procedures outlined in the work plan for Ft. Bragg SWMU's and approved by local government and EPA (p.17)
	Metric 2:	Analytical Methodology	High	samples were analyzed in accordance with the USEPA methods or ASTM standards; Table 4 provides LODs
	Metric 3:	Biomarker Selection	N/A	The authors analyzed environmental samples.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Ft. Bragg, Fayetteville, NC
	Metric 5:	Currency	Low	December 1992-April 1994
	Metric 6:	Spatial and Temporal Variability	Medium	7 wells for groundwater sampling; 22 soil samples at various depths; several sub-samples of streambed sediment at various locations; soil samples collected at 7 locations across the site.
	Metric 7:	Exposure Scenario	Medium	soil, ground water, surface water, and sediments in the area of a demolished asphalt plant at Ft. Bragg; aim to determine if site should added to list of solid-waste management units under the RCRA permit; p. 12-16 contains information on the area of contamination.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Table 7 provides concentrations in soil samples; no results specific to this chemical; only data is for LOD
	Metric 9:	Quality Assurance	Low	QA/QC not directly discussed but implied through standard methods and lab protocols
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	characterization of variability and uncertainties are absent
Overall Quality Determination			Medium	

Study Citation:		Soh, S. C., Abdullah, M. P. (2007.0). Determination of volatile organic compounds pollution sources in Malaysian drinking water using multivariate analysis. Environmental Monitoring and Assessment 124(1-3):39-50.		
HERO ID:		5554035		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling methodology and approaches described.
	Metric 2:	Analytical Methodology	High	Analytical methods described, MDLs reported, QA/QC described and reported.
	Metric 3:	Biomarker Selection	N/A	Biomarkers of interest were not addressed in this reference.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Malaysia
	Metric 5:	Currency	Low	Data collected in 2003 and 2004
	Metric 6:	Spatial and Temporal Variability	High	12 samples at each site (collected monthly).
	Metric 7:	Exposure Scenario	High	water treatment plants
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	no raw data provided
	Metric 9:	Quality Assurance	High	QA/QC reported and described.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Limitations
Overall Quality Determination			High	

Study Citation:		Coiner, R. L., Pope, L. M., Mehl, H. E. (2010.0). Assessment of energetic compounds, semi-volatile organic compounds, and trace elements in streambed sediment and stream water from streams draining munitions firing points and impact areas, Fort Riley, Kansas, 2007-08. :55.		
HERO ID:		5676787		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	sediment and surface water sampling performed by USGS in cooperation with the US Army; sediment samples collected from top 2.0cm using stainless steel or plastic scoop and sieved onsite; freeze dried and placed in storage; water samples manually collected equal-width increment method and stored in glass jar; water processed unfiltered
	Metric 2:	Analytical Methodology	High	conducted by USACE contract laboratory according to USEPA Method 8330 for nitroaromatic and nitramine compounds, USEPA Method 8332 for nitroglycerin, USEPA Method 8321 (modified) for perchlorate, and USEPA Method 8270C/8270D for SVOCs (table 4)
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Fort Riley, northeast Kansas
	Metric 5:	Currency	Medium	June 2007-June 2008
	Metric 6:	Spatial and Temporal Variability	High	16 streambed sediment sampling sites and 5 stream-water sampling sites (17 samples collected during run-off); 3 streams water samples collected during base-flow conditions; replicate samples collected
	Metric 7:	Exposure Scenario	Medium	streambed sediment and stream water from streams draining munitions firing points and impact areas
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	Table 15 and 16 provide raw data
	Metric 9:	Quality Assurance	High	QA discussed on p.13-16; QA measures part of lab analytical protocols
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	High	discussed variability (p.17 and 22) and uncertainty
Overall Quality Determination			High	

Study Citation:		Li, Y., Cakmak, S., Zhu, J. (2019.0). Profiles and monthly variations of selected volatile organic compounds in indoor air in Canadian homes: Results of Canadian national indoor air survey 2012-2013. Environment International 126:134-144.		
HERO ID:		5736601		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sampling storage not described. More information may be in the following: Indoor air VOC samples were collected as part of the Canadian Health Measures Survey (Statistics Canada, 2016) using the same methodology as previously described for the 2009–2011 survey (Zhu et al., 2013; Patry-Parisien et al., 2013).
	Metric 2:	Analytical Methodology	High	Analytical methods described in detail. LOD provided in S1.
	Metric 3:	Biomarker Selection	N/A	Parent chemical in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Canada
	Metric 5:	Currency	Medium	Data collected from 2009 to 2013
	Metric 6:	Spatial and Temporal Variability	High	3524 homes including duplicates.
	Metric 7:	Exposure Scenario	High	Measuring VOC in residential homes.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data not reported in the study. Summary statistics provided in detail.
	Metric 9:	Quality Assurance	High	QA reported in detail, including field quality control samples which included 133 field blanks and recoveries (in S1).
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Limited information on limitations and gaps reported. Standard errors, coefficients of variation and 95%confidence intervals were calculated. Monthly variation also calculated.
Overall Quality Determination			High	

Study Citation:		Nilsen, E. B., Alvarez, D. (2011.0). Water-quality monitoring for a pilot piling removal field evaluation, Coal Creek Slough, Washington, 2008-09.		
HERO ID:		:26. 5919173		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Composite piling shaving samples collected from pilings using a hand drill with augur bit. Each sample comprised shavings from two boreholes from two pilings (four bore holes total, homogenized)
	Metric 2:	Analytical Methodology	Low	wood analyzed at USGS NWQL; GC-MS but not include multistep clean-up/not rigorous quantification using standardized method; no detection limits reported
	Metric 3:	Biomarker Selection	N/A	Biomarkers of interest were not addressed in this reference.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Coal Creek Slough, Washington (Fig 1)
	Metric 5:	Currency	Medium	2008 (before piling removal) and 2009 (after piling removal)
	Metric 6:	Spatial and Temporal Variability	Low	each piling sample from two boreholes from two pilings (4 bore holes total, homogenized); further discussion on sampling approach not provided for wood pilings
	Metric 7:	Exposure Scenario	Medium	pilot monitoring before and after removal of a piling field; concentrations at piling removal site and at a comparison site
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Appendix A provides concentration and % recovery in wood tailings; no further data reported
	Metric 9:	Quality Assurance	Low	QA/QC pertaining to sampling of wood pilings not discussed
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	variability and uncertainty discussed very limited
Overall Quality Determination			Low	

Study Citation:		Schwarzbauer, J., Littke, H. (2004.0). Quantitative evaluation of elbe river-derived organic marker compounds in sediment samples from the german bight. Journal of Soils and Sediments 4(3):177-183.		
HERO ID:		5919271		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling locations and details provided in Table 1 and Fig 1a; van Veen grab; stored in glass flasks at 4C in dark; filtered
	Metric 2:	Analytical Methodology	High	extracted with mixture of acetone and n-hexane using high-speed dispersion tool; GC/MS; 4-pt calibration; LOQ was 0.01 ug/kg; recoveries determined in duplicate
	Metric 3:	Biomarker Selection	N/A	Biomarkers of interest were not addressed in this reference.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	German Bight (southeastern part of North Sea)
	Metric 5:	Currency	Low	1998
	Metric 6:	Spatial and Temporal Variability	Medium	7 sediment samples; examines spatial distribution within the German Bight (Fig 1); specific dates within 1998 not provided
	Metric 7:	Exposure Scenario	High	various industrial and municipal sources of pollution to German Bight
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	concentration of each sample provided in Table 3; summary statistics not provided
	Metric 9:	Quality Assurance	Medium	procedural blanks processed; no preselected compounds detected in the blanks; recovery 43%
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	results limited due to restricted number of samples; no further discussion or details
Overall Quality Determination			Medium	

Study Citation:		Bechtel Environmental, (1988.0). Final site investigation report for the Rohm and Haas Redwood City Facility.		
HERO ID:		6307465		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling methodology is discussed and is generally appropriate (i.e., scientifically sound) for the chemical and media of interest. Details regarding soil sampling page 18-23, 28; groundwater sampling page 37-38, 41-47; monitoring well sampling page 48-58; concrete and asphalt sampling page 60-64.
	Metric 2:	Analytical Methodology	High	Samples were analyzed according to EPA Methods. Table 2-2 reports EPA methods followed for each contaminant.
	Metric 3:	Biomarker Selection	N/A	Study tested for the parent chemical in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Samples were collected in California, USA.
	Metric 5:	Currency	Low	Samples were collected in 1986-1987.
	Metric 6:	Spatial and Temporal Variability	High	Duplicate samples were collected for all media types; 95 soil samples, 53 groundwater samples, 26 monitoring well samples, and 55 concrete and asphalt samples.
	Metric 7:	Exposure Scenario	Medium	The data likely represent relevant/realistic exposure scenario, but the use of exposure controls was not described.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data reported in Tables 4-1, 5-2, 8-1, A-1, A-3, B-1, C-1, C-2. No summary statistics reported.
	Metric 9:	Quality Assurance	Medium	The use of QA/QC techniques were described such as the use of standards, blanks, laboratory duplicates, field duplicates, and spikes. However, recovery values and baseline samples were not reported.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	The study has limited characterization of variability and no measure of variance is provided. Key uncertainties, limitations, and data gaps are not discussed.
Overall Quality Determination			Medium	

Study Citation:		McKesson Environmental Services, (1984.0). Priority pollutant analysis.		
HERO ID:		6574972		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling Methodology	Critically Deficient	The groundwater sampling methodology was not described.
	Metric 2:	Analytical Methodology	Critically Deficient	The analytical methodology was not described.
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical in groundwater.
Domain 2: Representativeness	Metric 4:	Geographic Area	High	The study was conducted in California, USA.
	Metric 5:	Currency	Low	The analysis is from 1984.
	Metric 6:	Spatial and Temporal Variability	Critically Deficient	The sample size is not reported.
	Metric 7:	Exposure Scenario	Low	The data may represent a relevant exposure scenario, but the document lacks sufficient details about sampling and analytical methods, population of interest and microenvironment characteristics.
Domain 3: Accessibility/Clarity	Metric 8:	Reporting of Results	Medium	The authors only reported individual sample concentrations, without summary statistics.
	Metric 9:	Quality Assurance	Low	QA/QC techniques were not described, control samples were not analyzed.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	Variability was not characterized. Uncertainties and limitations were not described.
Overall Quality Determination			Uninformative	

Study Citation:		Vu, D. C., Ho, T., Vo, P. H., Bayati, M., Davis, A. N., Gulseven, Z., Carlo, G., Palermo, F., McElroy, J. A., Nagel, S. C., Lin, C. H. (2019.0). Assessment of indoor volatile organic compounds in Head Start child care facilities. Atmospheric Environment 215:116900.		
HERO ID:		6952657		
Domain		Metric	Rating	Comments
Domain 1: Reliability		Metric 1: Sampling Methodology	High	Sampling methods described, including study site characteristics, procedures, equipment, and storage.
		Metric 2: Analytical Methodology	High	The analytical methodology is sufficiently described. LOD and LOQ reported in Table S2.
		Metric 3: Biomarker Selection	N/A	Study measured parent chemical in indoor air.
Domain 2: Representativeness		Metric 4: Geographic Area	High	Samples were collected in Kansas City, Missouri.
		Metric 5: Currency	High	Samples collected from mid-October in 2014 to late January in 2015.
		Metric 6: Spatial and Temporal Variability	Medium	50 indoor air samples collected from 10 classrooms in four facilities and across multiple microenvironments. No replicate samples were collected.
		Metric 7: Exposure Scenario	High	Samples collected indoor air from child care facilities, including playrooms and learning rooms.
Domain 3: Accessibility/Clarity		Metric 8: Reporting of Results	Medium	All samples were ND. Raw data are not reported.
		Metric 9: Quality Assurance	Medium	Key QA reported, including the use of field blanks, laboratory blanks, and reference standards. Analytical method also included acceptable correlation coefficients (R ² = 0.982–0.999). However, recoveries not reported.
Domain 4: Variability and Uncertainty		Metric 10: Variability and Uncertainty	High	Characterizes spatial differences across buildings and rooms, and seasonal differences between fall and winter. SD also reported. Several uncertainties are noted including temporal replication, lack of ventilation data, absence of outdoor comparison samples, and facility-level generalizability.
Overall Quality Determination			High	

Study Citation:		Han, F., Chen, J., Jiang, Z., Chen, L., Ji, W. (2013.0). Volatile and semi-volatile organic compounds in the lower Yangtze River and surface waters of three Chinese provinces. Polish Journal of Environmental Studies 22(3):683-690.		
HERO ID:		6968122		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sampling procedure lacked a few details including sampling procedure and equipment.
	Metric 2:	Analytical Methodology	High	Analytical method of the pollutants were described (GC-MS) and LOD was reported for each chemical.
	Metric 3:	Biomarker Selection	N/A	The study is testing for the parent chemical in an environmental media (water).
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Yangtze River, China
	Metric 5:	Currency	Medium	Sampling date was from April to May 2008.
	Metric 6:	Spatial and Temporal Variability	Medium	Sampling approach accurately captures variability of environmental contamination in population/scenario/media of interest. The study used a large sample size (21 samples) and replicate samples. However, sampling did not occurred over a sufficient period of time (only during Apr-May) to characterize seasonal trends.
	Metric 7:	Exposure Scenario	High	Exposure scenario was highly relevant (surface water).
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Statistics were described. Individual data were not reported.
	Metric 9:	Quality Assurance	High	The study conducted quality control measures.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	The study reported standard deviation to measure variability, but lacked discussion about its limitation.
Overall Quality Determination			High	

Study Citation:		U.S. EPA, (1977.0). Evaluation and wastewater characterization: Northeast Philadelphia water pollution control plant, Philadelphia, Pennsylvania (September 16-23, 1976).		
HERO ID:		6985025		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Samples were collected according to publicly available SOPs that are scientifically sound and widely accepted (i.e., procedures approved by EPA for monitoring of industrial effluents). See Page 11, Appendix E - Analytical Procedures and Quality Control, and Appendix F - Organics Analytical Methodology.
	Metric 2:	Analytical Methodology	Medium	Analytical methodology is discussed in detail (Appendices E, F, and G) and is clear and appropriate (i.e., scientifically sound) for the chemical and media of interest; however, one or more pieces of analytical information is not described (LOQ, LOD, detection limits, and/or reporting limits not provided). The missing information is unlikely to have a substantial impact on results.
	Metric 3:	Biomarker Selection	N/A	The study is testing in an environmental media (water).
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Geographic location is reported; Northeast Philadelphia
	Metric 5:	Currency	Low	Timing of sample collection for monitoring data is not consistent with when current exposures (September 1976; >15 years old) may be expected and likely to have a substantial impact on results.
	Metric 6:	Spatial and Temporal Variability	High	Sampling approach accurately captures variability of environmental contamination in population/scenario/media of interest. The study used a large sample size; >10 samples were collected as part of a compliance program and replicates were collected.
	Metric 7:	Exposure Scenario	High	The exposure scenario is relevant (Influent and effluent of wastewater treatment plant). Microenvironment data (location, time, climate) provided.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Supplementary or raw data (i.e., individual data points) are not reported, and therefore summary statistics cannot be reproduced.
	Metric 9:	Quality Assurance	Low	Quality assurance/quality control techniques and results were not directly discussed, but can be implied through the study's use of standard field and laboratory protocols.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	The report had limited discussion on the characterization of variability and uncertainty.
Overall Quality Determination			Medium	

Study Citation:		Bohlin-Nizzetto, P., Aas, W., Nikiforov, V. (2019.0). Monitoring of Environmental Contaminants in Air and Precipitation, 2018.		
HERO ID:		6994279		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Air samples were collected using high volume air samplers. All important details were reported and the methodology was scientifically sound.
	Metric 2:	Analytical Methodology	Low	Samples were spiked with internal standards, extracted, and quantified using UPLC-MSMS. All important details were reported and the methodology is scientifically sound. However, while LOD and LOQ were referenced throughout the report, the specific values of these limits were not reported.
	Metric 3:	Biomarker Selection	N/A	This study was testing for the chemical of interest in environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Samples were collected in Norway.
	Metric 5:	Currency	High	Samples were collected in 2017-2018.
	Metric 6:	Spatial and Temporal Variability	Medium	Active air samples were collected over on a weekly basis over the course of a year. The number of samples per year was reported to be compound and site specific, between 12 and 52, but not explicitly reported for each compound. Further, use of replicates was not reported.
	Metric 7:	Exposure Scenario	High	Air samples were well characterized and highly relevant for possible exposure.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Low	Raw data were not reported. Summary statistics included the range of concentrations only.
	Metric 9:	Quality Assurance	Medium	Analyses were carried out by NILU laboratories, which were accredited in accordance with NS-EN ISO/IEC 17025. QC measures included field and lab blank samples, but were not further explained.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Variability was characterized qualitatively over time. There was brief discussion of uncertainty inherent in the more newly developed procedures for "organic contaminants of emerging concern," but was not further explained.
Overall Quality Determination			Medium	

Study Citation:		NYIEQ, (2005.0). Indoor environmental quality: Assessing and mitigating the impact of exposure to multiple indoor contaminants. Phase I: Collection of multiple pollutants from indoor and laboratory evaluated sources (compiles). Final report.. :0-0.		
HERO ID:		7002239		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	The study authors reported their sample equipment, collection regimen, storage condition and duration, as well as location characteristics. Sampling information provided in the Summary of Research Project Activities and on pg 18. Serum and urine samples were also collected, but the compounds measured in these matrices are not relevant. Pg 18 describes indoor air sample collection.
	Metric 2:	Analytical Methodology	Low	Recoveries and LODs/LOQs/MDLs were not reported. MDLs were only reported for particulate matter, nitrogen dioxide, and allergens.
	Metric 3:	Biomarker Selection	N/A	The study measured the parent chemical in the indoor air.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	The study was conducted in Syracuse, New York.
	Metric 5:	Currency	Low	Samples were collected between 2001 and 2004.
	Metric 6:	Spatial and Temporal Variability	High	Samples were collected from 150 homes, as reported on pg 37. Table B-3 only reports summary statistics for VOCs with high occurrence ratios (i.e., gather than 0.06).
	Metric 7:	Exposure Scenario	Medium	This was a monitoring study but there was limited linkages between the sources of exposures and concentrations.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Raw data were not reported by study authors. Median, mean, min and max were reported.
	Metric 9:	Quality Assurance	Low	Some QA/QC methods were discussed, including a QAPP that was submitted to an EPA project officer to review which "conforms to EPA requirements for Quality Management Plans for organizations that receive funding from EPA." However, no recoveries were mentioned.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Some gaps, limitations, and uncertainties were reported throughout the document. Min and max were provided to characterize variance.
Overall Quality Determination			Medium	

Study Citation:		COWI AS, (2018.0). Screening programme 2017: Suspected PBT compounds. :0-0.		
HERO ID:		7303021		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	The sampling methodology is clear and appropriate. Details such as sample storage, sampling protocol, and sampling personnel were described.
	Metric 2:	Analytical Methodology	Low	The analytical methodology is clear and appropriate; however, the LOQ is not provided. The calculation to obtain the LOQ is described, but the LOQ itself is not given.
	Metric 3:	Biomarker Selection	N/A	Study is testing for parent chemical in an environmental media.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Samples were collected in Norway.
	Metric 5:	Currency	High	Samples were collected in 2017.
	Metric 6:	Spatial and Temporal Variability	Critically Deficient	Samples size is not provided for all media.
	Metric 7:	Exposure Scenario	Medium	The exposure scenario is the parent chemical in marine and freshwater environments. Although this is a scenario of interest, the exposure pathway is not well characterized.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	Data are provided in the attachments section. Some of the data is clearly raw data; while other data are unclear.
	Metric 9:	Quality Assurance	Medium	The use of controls and blanks is reported in the methods and results section. QA/QC issues were not identified.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Low	The characterization of variability is absent. No standard deviations were provided.
Overall Quality Determination			Uninformative	

Study Citation:		CTEH, (2021.0). Shell Puget Sound Refinery 9-29-2020 flaring event: Supplemental report.		
HERO ID:		11273432		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling was completed using 1.4 L MiniCans(TM). Sample sites are also reported.
	Metric 2:	Analytical Methodology	High	Samples were analyzed via the USEPA Method TO-15 by a third-party analytical laboratory. Reported detection limit range is referenced in each sample results.
	Metric 3:	Biomarker Selection	N/A	The parent chemical was tested in ambient air.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Samples were collected in Anacortes, Washington, USA.
	Metric 5:	Currency	High	Samples were collected in October 2020.
	Metric 6:	Spatial and Temporal Variability	Medium	Six samples were collected for a 24h period
	Metric 7:	Exposure Scenario	High	This study measures air concentrations after a flare event at a refinery.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	High	Individual data is reported in attachment B.
	Metric 9:	Quality Assurance	High	Attachment B reports a range of laboratory quality controls.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	Medium	Variability is not reported but the chemical data is all reported as ND, the study also reports qualifier of the results for uncertainty.
Overall Quality Determination			High	

Study Citation:		Hsiao, B. Y., Huang, C. S., Wu, C. F., Chien, K. L., Yang, H. Y. (2025.0). Residential proximity land use characteristics and exhaled volatile organic compounds’ impact on pulmonary function in asthmatic children. Journal of Xenobiotics 15(1):27.		
HERO ID:		12830425		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Sampling method described including procedures, equipment, and storage.
	Metric 2:	Analytical Methodology	High	Analytical method described. Analysis was performed following EPA TO-15 method.
	Metric 3:	Biomarker Selection	N/A	Study measured parent chemical in breath.
Domain 2: Representativeness				
	Metric 4:	Geographic Area	High	Samples collected in Changhua County, Taiwan.
	Metric 5:	Currency	High	Sample collection occurred from April to November 2019.
	Metric 6:	Spatial and Temporal Variability	Medium	Study enrolled 97 children from multiple schools across a county.
	Metric 7:	Exposure Scenario	High	Breath collected from asthmatic children living in urban environments. Characterization of residential proximity to roads and land use provided.
Domain 3: Accessibility/Clarity				
	Metric 8:	Reporting of Results	Medium	Study provides summary statistics, including mean, SD, median, range, and IQR. Raw data not provided.
	Metric 9:	Quality Assurance	Low	QC not discussed in detail but implied through use of EPA TO-15 method. Calibration mentioned.
Domain 4: Variability and Uncertainty				
	Metric 10:	Variability and Uncertainty	High	Variability is characterized through statistical analysis, including SD and IQR. Uncertainties/limitations are discussed (sample size, cross-sectional design, potential confounders).
Overall Quality Determination			High	

Study Citation:		Won, D., Corsi, R. L., Rynes, M. (2000). New indoor carpet as an adsorptive reservoir for volatile organic compounds. Environmental Science & Technology 34(19):4193-4198.		
HERO ID:		12793		
Domain		Metric	Rating	Comments
Domain 1: Reliability		Metric 1: Sampling Methodology and Conditions	Medium	Sampling methodology is discussed but was not referenced from a source. However, the sampling equipment, conditions and diagram of the sampling was reported.
		Metric 2: Analytical Methodology	Low	Analytical methods were described including analytical instrumentation but these methods were not referenced and some information was missing. No LOD was found reported.
		Metric 3: Biomarker Selection	N/A	Study is measuring concentrations in carpet.
Domain 2: Representative		Metric 4: Testing Scenario	High	DCB sorption parameters were found in six different carpet scenarios.
		Metric 5: Sample Size and Variability	High	Three experiments were conducted for DCB with multiple concentrations samples taken over time.
		Metric 6: Temporality	Low	Testing conditions based on exposure scenario over 15 years ago.
Domain 3: Accessibility/Clarity		Metric 7: Reporting of Results	Medium	Raw data is not reported therefore the summary statistics are not able to be reproduced. Summary is included in Table 2.
		Metric 8: Quality Assurance	Low	Table includes data points that failed quality assurance protocols, but these protocols were not described.
Domain 4: Variability and Uncertainty		Metric 9: Variability and Uncertainty	Medium	Study includes sections characterizing the effects of chemical properties and relative humidity. Limited discussion mentioning variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:		Wallace, L. A., Pellizzari, E., Leaderer, B., Zelon, H., Sheldon, L. (1987). Emissions of volatile organic compounds from building materials and consumer products. Atmospheric Environment 21(2):385-393.		
HERO ID:		23126		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology and Conditions	Medium	A sampling description is provided as well as reference to an EPA document. It is not clear if the reference applies to chamber testing.
	Metric 2:	Analytical Methodology	Medium	The analytical description provided as well as reference to EPA document. Detection limits are not provided in paper.
	Metric 3:	Biomarker Selection	N/A	No biomarkers of interest were addressed in this reference.
Domain 2: Representative				
	Metric 4:	Testing Scenario	Medium	Building materials and consumer products for chamber emissions testing were selected to correspond to those found in a new office building. Experiments were conducted under typical building conditions.
	Metric 5:	Sample Size and Variability	Low	The table says n=3 for building materials or consumer product. It is not clear if this applies to every material or product tested.
	Metric 6:	Temporality	Low	This paper was published in the mid-1980s.
Domain 3: Accessibility/Clarity				
	Metric 7:	Reporting of Results	Medium	Raw data was not provided. An average and standard deviation were reported for concentrations and emission rates.
	Metric 8:	Quality Assurance	Medium	There was limited discussion of QA/QC measures but experiments were performed in conjunction with reputable organizations. There might be more details in references. Background samples collected.
Domain 4: Variability and Uncertainty				
	Metric 9:	Variability and Uncertainty	Medium	The standard deviation was reported. There was some discussion of study limitations.
Overall Quality Determination			Medium	

Study Citation:		Hodgson, A. T., Wooley, J. D., Daisey, J. M. (1993). Emissions of volatile organic compounds from new carpets measured in a large-scale environmental chamber. Journal of the Air and Waste Management Association 43(3):316-324.		
HERO ID:		76255		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology and Conditions	High	Sampling methods did not reference a publicly available SOP but methodology was described and included all pertinent information.
	Metric 2:	Analytical Methodology	Low	Analytical methods are more fully described in a different article. Analytical methods are briefly discussed with some information missing. The detection limit was not found to be reported.
	Metric 3:	Biomarker Selection	N/A	Not applicable.
Domain 2: Representative				
	Metric 4:	Testing Scenario	High	Testing conditions closely represent relevant exposure scenarios, study also included four different typical carpet products.
	Metric 5:	Sample Size and Variability	High	Four different carpets; with 10 different samples taken at different time points.
	Metric 6:	Temporality	Low	Sources of tested items are not current (over 15 years ago).
Domain 3: Accessibility/Clarity				
	Metric 7:	Reporting of Results	Medium	All data appears to be reported, but some is reported in a graphical format making exact numerical value difficult to interpret.
	Metric 8:	Quality Assurance	Low	QA/QC techniques and results were not directly discussed, but can be implied through the study’s use of replicate samples.
Domain 4: Variability and Uncertainty				
	Metric 9:	Variability and Uncertainty	High	Uncertainties, limitations, and data gaps have been identified (see discussion in the conclusion).
Overall Quality Determination			Medium	

Study Citation:		Mo, C. H., Cai, Q. Y., Li, Y. H., Zeng, Q. Y. (2008). Occurrence of priority organic pollutants in the fertilizers, China. Journal of Hazardous Materials 152(3):1208-1213.		
HERO ID:		1003896		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling Methodology and Conditions	High	Fertilizer samples collected from Chinese factories and companies; Sample extraction following USEPA methods 3540C and 3630C with some modifications, explained in the study
	Metric 2:	Analytical Methodology	High	GCMS analysis with modified USEPA 8270C method, all instrumentation details and detection limits provided
	Metric 3:	Biomarker Selection	N/A	Biomarker not used
Domain 2: Representative	Metric 4:	Testing Scenario	Medium	Exposure to chemicals in fertilizers may be reasonable consumer scenario, but the fertilizers tested were selected due to their wide use in China rather than USA
	Metric 5:	Sample Size and Variability	High	22 samples of fertilizers
	Metric 6:	Temporality	Medium	Study from 2007, no indication of samples or fertilizers being older
Domain 3: Accessibility/Clarity	Metric 7:	Reporting of Results	Medium	Concentration by weight reported for each chemical for all samples; some summary data in text
	Metric 8:	Quality Assurance	Low	Recoveries reported; QA/QC procedures discussed as being presented in previous studies
Domain 4: Variability and Uncertainty				
	Metric 9:	Variability and Uncertainty	Low	Limited discussion on variability in fertilizers and detected concentrations; no real discussion on uncertainties
Overall Quality Determination		Medium		

Study Citation:		Kim, S., Kim, J. A., An, J. Y., Kim, H. J., Kim, S. D., Park, J. C. (2007). TVOC and formaldehyde emission behaviors from flooring materials bonded with environmental-friendly MF/PVAc hybrid resins. Indoor Air 17(5):404-415.		
HERO ID:		1512515		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
Metric 1:	Sampling Methodology and Conditions	High	The paper provided adequate discussion of sampling methodology of engineered flooring bonded with MF/PVAc hybrid resin to determine and compare the effect of PVAc content. There were five different composition blends with MF resin/PVAc content ratios of 0%, 30%, 50%, 70% and 100%, by weight of MF resin. There were three species of fancy veneers, beech, oak, and walnut, were bonded by cold and hot press.	
Metric 2:	Analytical Methodology	High	More than adequate discussion/variety of analytical methods used in the study. Discussion included 20-L chamber, field and laboratory emission cell (FLEC), VOC analyzer and standard formaldehyde emission test (desiccator method).	
Metric 3:	Biomarker Selection	N/A	A biomarker was not used in this study.	
Domain 2: Representative				
Metric 4:	Testing Scenario	Medium	A 20-L chamber was used in this study because it has been standardized in Korea. Testing was not conducted under a broad range of conditions but adequate based on multiple techniques utilized to measure emissions.	
Metric 5:	Sample Size and Variability	Low	There were five different composition blends with MF resin/PVAc content ratios of 0%, 30%, 50%, 70% and 100%, by weight of MF resin, across three fancy veneer types: beech, oak and walnut. No mention of replicate tests.	
Metric 6:	Temporality	Medium	The paper was published in 2007.	
Domain 3: Accessibility/Clarity				
Metric 7:	Reporting of Results	Medium	Satisfactory discussion of results but mainly for TVOC. Table 8 lists the chemical specifically with the 20 L chamber method, as detected by GC/MS analysis. There were multiple results due to sampling types and techniques, analysis of emissions and emissions rate, graph of emission with SD bars, raw data may be assessed by graph. TVOC was defined as a peak area and under 10 was defined as the limit of detection.	
Metric 8:	Quality Assurance	Medium	Multiple techniques have been covered with varying degree of quality assurance or control. The 20-L chamber has the most quality control measures in place to maintain constant conditions.	
Domain 4: Variability and Uncertainty				
Metric 9:	Variability and Uncertainty	Medium	Adequate discussion about high level of variability of emissions across analytical techniques. The formaldehyde emission results by the 20-L small-chamber and FLEC methods showed a similar tendency.	
Overall Quality Determination			Medium	

Study Citation:		Komilis, D. P., Ham, R. K., Park, J. K. (2004). Emission of volatile organic compounds during composting of municipal solid wastes. Water Research 38(7):1707-1714.		
HERO ID:		1618136		
Domain		Metric	Rating	Comments
Domain 1: Reliability		Metric 1: Sampling Methodology and Conditions	Medium	Experimental procedures and sampling appear scientifically sound but do not seem to be using a standard or widely-available methodology (for instance, the digesters are described as being custom-built.)
		Metric 2: Analytical Methodology	Low	VOC samples analyzed using GC/MS. However, LODs or other detection limits are not reported.
		Metric 3: Biomarker Selection	N/A	No biomarkers are used in this study.
Domain 2: Representative		Metric 4: Testing Scenario	Medium	Experimental design included a variety of likely substrates. Seeded scenarios used municipal solid waste from a site in Wisconsin. Full range of microenvironmental factors not described in paper.
		Metric 5: Sample Size and Variability	High	Samples include 11 runs under various conditions. There is a reference to duplicate runs at least for unseeded paper scenarios.
		Metric 6: Temporality	Low	Paper dates back more than 15 years.
Domain 3: Accessibility/Clarity		Metric 7: Reporting of Results	Medium	Raw data points are reported in Table 4, but minimal summary statistics are included.
		Metric 8: Quality Assurance	Low	No specific discussion of quality assurance or control methods, but no indication of QA/QC issues.
Domain 4: Variability and Uncertainty		Metric 9: Variability and Uncertainty	Low	No specific discussion of variability or uncertainty.
Overall Quality Determination			Low	

Study Citation:		Kowalska, J., Gierczak, T. (2013). Qualitative and quantitative analyses of the halogenated volatile organic compounds emitted from the office equipment items. Indoor and Built Environment 22(6):920-931.		
HERO ID:		2655630		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology and Conditions	Medium	Sampling methodology was discussed. A list of 16 plastic samples from office equipment items were described and sample weights were provided. A small test cell was used instead of a testing chamber and a schematic of the experimental setup was provided.
	Metric 2:	Analytical Methodology	High	Analytical methodology was discussed. Operating conditions of the thermal desorber (TD) and GC/MS were provided. Calibration procedures were described. LODs are reported in Table 2.
	Metric 3:	Biomarker Selection	N/A	Biomarker is not used.
Domain 2: Representative				
	Metric 4:	Testing Scenario	High	Testing conditions represent a relevant exposure scenario that addressed emissions from plastic items into the indoor air of an office environment.
	Metric 5:	Sample Size and Variability	Low	Sample size is large (n=16), but could not determine if replicate tests were performed.
	Metric 6:	Temporality	Medium	The paper was published in 2012.
Domain 3: Accessibility/Clarity				
	Metric 7:	Reporting of Results	Medium	Summary statistics reported in Table 2 including LOD and mass concentrations (min, max, & mean) for o-DCB and p-DCB. Supplementary data reported in Table S1 includes mass concentrations and Table S2 includes mass specific emission rates of o-DCB and p-DCB emitted from plastic samples.
	Metric 8:	Quality Assurance	Low	QA/QC techniques and results were not directly discussed, but can be implied. Cell and sorption tubes cleaned and conditioned prior to every measurement; blank tests were performed.
Domain 4: Variability and Uncertainty				
	Metric 9:	Variability and Uncertainty	Low	Key uncertainties, limitations, and data gaps are not discussed
Overall Quality Determination			Medium	

Study Citation:	Kim, S., Park, J. C. (2010). Environment-friendly Hwangtoh composite materials using water soluble resin for indoor air quality and human health. Journal of Composite Materials 44(8):905-913.
HERO ID:	5967010

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Sampling Methodology and Conditions	Medium	Adequate description of the samples' components and materials blending ratio.
	Metric 2: Analytical Methodology	Low	Some description of the approved analytical methodology utilizing TDS-GC/MS. Gives description for total VOCs but TVOC was defined by conversion of all areas of the peaks between C6 and C16 to concentrations using the toluene response factor. Not chemical-specific, no replicate trials explained, and sample specimens were removed from the 20 L small chamber after 7 days for adequate testing.
	Metric 3: Biomarker Selection	N/A	A biomarker was not used in this study.
Domain 2: Representative	Metric 4: Testing Scenario	Low	There is a very local geographic region impact of the study.
	Metric 5: Sample Size and Variability	Low	Four sampling scenarios were used. The total number of replicates for each scenario was not reported.
	Metric 6: Temporality	Medium	The paper was published in 2010.
Domain 3: Accessibility/Clarity	Metric 7: Reporting of Results	Low	Table 3 may be the raw data as no replicates were described or average calculations were reported. Any peak area under ten was defined as the limit of detection, but LODs not reported. Emission factor equation described but the individual inputs were not given for the samples.
	Metric 8: Quality Assurance	Critically Deficient	There were no replicates described, no blanks reported, and no internal standards for the GC/MS. The gas was sampled according to the regulation from the Ministry of the Environment, Korea but no specific citation given.
Domain 4: Variability and Uncertainty	Metric 9: Variability and Uncertainty	Critically Deficient	No description of variation or comparison across other related studies, or uncertainty was given.

Overall Quality Determination**Uninformative**

Study Citation:		Cao, S., Wen, Y., Xi, C., Li, X., Zhang, L., Wang, G., Shang, J. (2019). Development of a method based on thermal desorption-gas chromatography/mass spectrometry for the determination of 103 volatile organic compounds in mattresses. International Journal of Environmental Analytical Chemistry 100(9):1044-1065.		
HERO ID:		5973810		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology and Conditions	Medium	New method. Sampling details clearly defined. Chamber conditions provided.
	Metric 2:	Analytical Methodology	High	Auto thermal desorption with GC-MS analysis. Calibration curve, LOD, LOQ, MDL all provided. Breakthrough evaluated. Method validated.
	Metric 3:	Biomarker Selection	N/A	No biomarkers
Domain 2: Representative				
	Metric 4:	Testing Scenario	Medium	Commercial mattress samples used but testing procedure not necessarily representative of exposure scenario as the focus of paper is on new method development.
	Metric 5:	Sample Size and Variability	Medium	Ten samples. Various manufacturers and made from a variety of materials. No replicates mentioned.
	Metric 6:	Temporality	High	Paper published in 2019. Study is very recent.
Domain 3: Accessibility/Clarity				
	Metric 7:	Reporting of Results	Medium	Raw data not provided. Paper provides area-specific emission rates for each mattress sample tested. No summary statistics.
	Metric 8:	Quality Assurance	High	The method was validated prior to sample analysis. Breakthrough analysis was studied.
Domain 4: Variability and Uncertainty				
	Metric 9:	Variability and Uncertainty	Medium	The samples used represented a variety of manufacturers and materials. However, testing appeared to only represent one scenario. No other parameters tested. Uncertainty was not addressed in this paper.
Overall Quality Determination			High	

Study Citation:		Integral Consulting, (2024). Final study report: o-Dichlorobenzene consumer product emission rate testing.		
HERO ID:		12136954		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling Methodology and Conditions	High	Details of the products tested, including SDS are provided. Samples collected with EPA Method TO-17 or NIOSH Method 1003, information about chamber conditions (temperature, humidity), equipment, procedures provided. Performance and pump calibration were also detailed.
	Metric 2:	Analytical Methodology	High	Analytical method was performed with the TO-17 analysis and the NIOSH 1003 method. Detection limits reported. Although some information about the extraction, instrument, and calibration were missing, the methods used scientifically sound and widely accepted methods.
	Metric 3:	Biomarker Selection	N/A	Analyte present in environmental media.
Domain 2: Representative	Metric 4:	Testing Scenario	High	The amount of essence and glaze were described as well as the weight fractions of o-DCB in the products. The method of application replicates how a user would apply the product. Chamber conditions reported.
	Metric 5:	Sample Size and Variability	High	A total of 48 samples (2 samples per trial over 3 trials and 8 sample intervals) were taken.
	Metric 6:	Temporality	High	Testing was conducted from April 16 to May 23, 2024. SDS of samples were from 2022 and 2023.
Domain 3: Accessibility/Clarity	Metric 7:	Reporting of Results	High	Raw data and 24 hour average AUC calculation methods reported in Appendix N. Equation to calculate average AUC concentrations to AUC emission rates provided. o-DCB air concentrations with descriptive statistics also provided.
	Metric 8:	Quality Assurance	High	QA program consistent with GLP specifications, including testing facilities, personnel, quality assurance unit, equipment, test substances, recordkeeping. QAPP plan with developed with EPA guidance.
Domain 4: Variability and Uncertainty	Metric 9:	Variability and Uncertainty	High	The study describes deviations from the plan and reasoning, they were all considered inconsequential. Variability accounted for the different products tested.
Overall Quality Determination		High		

Study Citation:		U.S. EPA, (2019). Air Quality System (AQS) [database]: CASRNs 106-99-0, 75-34-3, 78-87-5, 106-93-4, 50-00-0, 106-46-7, and 79-00-5.		
HERO ID:		6514358		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling Methodology	Medium	The data were collected by EPA, state, local, and tribal air pollution control agencies from over thousands of monitors. No specific sampling procedures provided but assumed to be collected using standard methodologies.
	Metric 2:	Analytical Methodology	Medium	The data were collected by EPA, state, local, and tribal air pollution control agencies from over thousands of monitors. The data sheets provide sampling instruments, MDL, and qualifiers.
Domain 2: Representative	Metric 3:	Geographic Area	High	Samples were collected in the US.
	Metric 4:	Temporal	High	The data was collected in 2017.
	Metric 5:	Exposure Scenario	Medium	The monitors were located throughout the US. Information characterizing monitoring conditions or position relative to chemical releases is not provided.
Domain 3: Accessibility/Clarity	Metric 6:	Availability of Database and Supporting Documents	High	Extensive User Guide and other supporting materials are available at https://www.epa.gov/aqs/aqs-manuals-and-guides .
	Metric 7:	Reporting Results	High	Hourly, daily, and annual concentrations are available in the database.
Domain 4: Variability and Uncertainty	Metric 8:	Variability and Uncertainty	Low	Key uncertainties, limitations, and data gaps have not been identified. Variability is not characterized.
Overall Quality Determination			High	

Study Citation:		U.S. EPA, U.,S.G.S. and National Water Quality Monitoring Council (2022). o-Dichlorobenzene (o-DCB) (CAS RN: 95-50-1): WQP Output (NWIS, STEWARDS {\&} STORET), Site data {\&} sample results (physical/chemical metadata).		
HERO ID:		10709394		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Medium	Sampling methodology information is provided in columns AF to AJ, including the sampling method code and the equipment used. No information was provided on transportation or storage conditions for any sample. Note that for a large portion of the samples the sampling methodology was reported as "UNKNOWN".
	Metric 2:	Analytical Methodology	High	Description of the methods reported in column BQ and detection limit in column BY. A detection limit was not provided for all samples. While there is heterogeneity in the information provided, the confidence rating of high is based on the samples with the most complete data.
Domain 2: Representative				
	Metric 3:	Geographic Area	High	Column X reports the location identifier code. All samples are from the U.S. The station.xlsx file included as part of the HERO reference provides detailed information on the sites sampled. The information of each code can be found at https://waterdata.usgs.gov/nwis/si
	Metric 4:	Temporal	High	Data was collected from 1980 to 2022. The date is reported in column G.
	Metric 5:	Exposure Scenario	Medium	Media are reported in column E and F; location and time are also reported. The station.xlsx file included as part of the HERO reference provides, for some samples, more detailed information on the sites sampled, such as sample depth. There is no information provided on sources of chemicals.
Domain 3: Accessibility/Clarity				
	Metric 6:	Availability of Database and Supporting Documents	High	The database is widely accepted, and a user guide is available which describes all of the data fields.
	Metric 7:	Reporting Results	Medium	The database does not report summary of statistics, only point values. While the data are well organized, since the data originates from numerous different entities (states) and monitoring programs, some data may be difficult to interpret due to the lack of populated data fields or discrepancies between columns.
Domain 4: Variability and Uncertainty				
	Metric 8:	Variability and Uncertainty	Medium	Uncertainty is characterized by the inclusion of data qualifier column AR; however, it was not expected for all rows to have a data qualifier code. Column AS reports the results status identifier that indicates the acceptability of the result with respect to QA/QC criteria.
Overall Quality Determination			High	

Study Citation:		Centers for Disease Control and Prevention : CDC (2022). o-Dichlorobenzene (o-DCB) (CAS RN: 95-50-1): NHANES Biomonitoring Data (Blood; Cigarette smoke).		
HERO ID:		10709918		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	High	Widely accepted sampling methodology from a source known to use sound approaches. Information on sampling design can be found at https://wwwn.cdc.gov/nchs/nhanes/tutorials/SampleDesign.aspx .
	Metric 2:	Analytical Methodology	High	Widely accepted analytical methodology, outlined at https://www.cdc.gov/exposurereport/data_sources_analysis.html . Additional detail is listed in references listed at https://www.cdc.gov/exposurereport/biomonitoring_references.html .
Domain 2: Representative				
	Metric 3:	Geographic Area	High	Samples were collected from the US population.
	Metric 4:	Temporal	High	Data reported from 2003 to 2018.
	Metric 5:	Exposure Scenario	Medium	Exposure to o-DCB for the civilian, noninstitutionalized population in the United States based on age, gender, and race/ethnicity. There is no information provided on sources of exposure to the chemical, amount of exposure, or microenvironments. Data is provided for smokers only.
Domain 3: Accessibility/Clarity				
	Metric 6:	Availability of Database and Supporting Documents	High	The database is widely accepted and well known. There is an abundance of information online about the database.
	Metric 7:	Reporting Results	High	The database reports summary statistics (geometric mean, 50th/75th/90th/95th percentiles). The years of collection and sample size is reported for each row. Raw data can be downloaded from the CDC website https://wwwn.cdc.gov/nchs/nhanes/default.aspx
Domain 4: Variability and Uncertainty				
	Metric 8:	Variability and Uncertainty	High	There is no characterization of uncertainty. Variability reported as summary of statistics and the analysis of data by age, gender, and race/ethnicity. NHANES does not include state-level data. Considerations related to the data are discussed at https://www.cdc.gov/exposurereport/data_interpretation.html
Overall Quality Determination			High	

Study Citation:		U.S. EPA, (2016). Six-Year Review 3 compliance monitoring data (2006-2011): o-Dichlorobenzene.		
HERO ID:		11145492		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling Methodology	Low	Limited sampling methodology information is provided in columns L to O, but does not include sampling method code or the equipment used. No information was provided on transportation or storage conditions for any sample. Note that for a large portion of the samples the sampling point type did not have data.
	Metric 2:	Analytical Methodology	Low	Analytical method information is reported in column P, Q, R. Analytical method codes were not included. Detection limit value, units and code reported in columns T, U, V. A detection limit was not provided for over 1000 samples.
Domain 2: Representative				
	Metric 3:	Geographic Area	High	All samples are from the U.S. Columns C, D, E and J include location data, including State Code, Public Water System ID, System name and the Water Facility ID.
	Metric 4:	Temporal	Medium	The data is from 2006-2011. The sample collection date is reported in column S.
	Metric 5:	Exposure Scenario	Medium	Media are not reported but it is implied that the media is water; location and time are also reported. There is no information provided on sources of chemicals.
Domain 3: Accessibility/Clarity				
	Metric 6:	Availability of Database and Supporting Documents	High	The database is widely accepted, and a user guide is available which describes all of the data fields.
	Metric 7:	Reporting Results	Medium	The database does not report summary of statistics, only point values in column X. While the data are well organized, since the data originates from numerous different entities (states) and monitoring programs, some data may be difficult to interpret due to the lack of populated data fields or discrepancies between columns.
Domain 4: Variability and Uncertainty				
	Metric 8:	Variability and Uncertainty	Low	Variability and Uncertainty details were not included.
Overall Quality Determination			Medium	

Study Citation:		U.S. EPA, (1987). Occurrence of synthetic organic chemicals in drinking water, food and air: Revised draft report.		
HERO ID:		18900		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Literature search strategies were not documented. Simple dose equations were used, with input provided (drinking water intake and inhalation rate).
Domain 2: Representative	Metric 2:	Exposure Scenario	Medium	Chemical and media of interest investigated, and relevant population (U.S.). However, data is older (1980s and before).
Domain 3: Accessibility/Clarity	Metric 3:	Documentation of References	High	References provided and appear to be publicly available.
Domain 4: Variability and Uncertainty	Metric 4:	Variability and Uncertainty	Low	Range for intake provided, but little characterization of variability and uncertainty.
Overall Quality Determination			Medium	

Study Citation: Chung, Y., Shin, D., Park, S., Lim, Y., Choi, Y., Cho, S., Yang, J., Hwang, M., Park, Y., Lee, H. (1997). Risk assessment and management of drinking water pollutants in Korea. Water Science and Technology 36(12):309-323.

HERO ID: 625736

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Critically Deficient	This study determined risks from pollutants in drinking water in Korea. While the methodology is standard, information is lacking on the monitoring data used to calculate risks, which makes this metric uninformative. For example, the article did not report sample collection techniques or number of samples.
Domain 2: Representative	Metric 2: Exposure Scenario	Medium	Drinking water is a media of interest, however, the data is older and limited data on the characterization of the water source.
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	Low	Did not provide
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Low	Limited characterization of variability (range). Uncertainties and study limitations were not discussed.

Overall Quality Determination

Uninformative

Study Citation:		PRC Environmental Management, (1995). Final baseline risk assessment for the Jayhawk Plant in Jayhawk, Kansas, with cover letter dated 02/22/95.		
HERO ID:		666891		
Domain		Metric	Rating	Comments
Domain 1: Reliability		Metric 1: Methodology	Medium	The assessment uses techniques that are from reliable sources and are generally accepted by the scientific community; however, a discussion of sampling methodology for data previously collected is limited.
Domain 2: Representative		Metric 2: Exposure Scenario	Medium	Characterization of geographic area with maps provided of site exposure sources, details and modeling of potential exposure, media of interest described, summary statistics and number of samples lacking within most tables, although raw data printouts provided. Data printout tables difficult to read at times.
Domain 3: Accessibility/Clarity		Metric 3: Documentation of References	Medium	References are available and provided, however some references may not be publicly available or are not from peer reviewed sources.
Domain 4: Variability and Uncertainty		Metric 4: Variability and Uncertainty	Low	Statistical summary measures of variability for concentration data lacking, robust discussion of limitations lacking, however model and exposure data uncertainties discussed.
Overall Quality Determination			Medium	

Study Citation:		Monsanto, (1988). Monsanto Pensacola plant ground water assessment feasibility study on nineteen chemicals with attachments and cover letter dated 02/03/1989.		
HERO ID:		1316231		
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Sampling and analytic methodologies reported as following state of Florida regulations.
Domain 2: Representative	Metric 2:	Exposure Scenario	Medium	Characterization of geographic area with maps provided of site exposure sources, media of interest described, sample sizes not noted, temporal variability limited.
Domain 3: Accessibility/Clarity	Metric 3:	Documentation of References	Medium	References are available and provided, however some references may not be publicly available or are not from peer reviewed sources.
Domain 4: Variability and Uncertainty	Metric 4:	Variability and Uncertainty	Low	Statistical summary measures of variability for concentration data lacking for most concentration data reported (some data reports concentration range). Robust discussion of uncertainties and limitations lacking.
Overall Quality Determination			Medium	

Study Citation:		Woodward-Clyde Consultants, (1993). BFGoodrich Akron plant risk assessment with cover letter dated 01/06/1994.		
HERO ID:		1333013		
Domain		Metric	Rating	Comments
Domain 1: Reliability		Metric 1: Methodology	Medium	Standard EPA methodology for modeled concentration data and risk described and referenced. Sampling methods for primary sampling data not detailed, however quality assurance review conducted.
Domain 2: Representative		Metric 2: Exposure Scenario	High	The exposure activity assessed likely represents the population/scenario/media of interest. Characterization of geographic area with maps provided of site exposure sources, characterization of residential population at risk, and temporality consideration for risk estimations of future residential exposures.
Domain 3: Accessibility/Clarity		Metric 3: Documentation of References	Medium	References are available and provided, however some references may not be publicly available or are not from peer reviewed sources.
Domain 4: Variability and Uncertainty		Metric 4: Variability and Uncertainty	Medium	The study characterizes variability in the population/media studied for most reported result tables, key uncertainties in risk assessment and exposure data identified that are unlikely to have a substantial impact on results.
Overall Quality Determination			Medium	

Study Citation:		Wehran-New York,, Inc., (1990). Risk assessment for Buffalo Color area D.		
HERO ID:		1335671		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment describes sampling methodology in detail and uses technical approaches generally accepted by the scientific community with assumptions, measurements and models documented and described and no perceived errors in logic.
Domain 2: Representative	Metric 2:	Exposure Scenario	Medium	The exposure activity assessed likely represents the population/scenario/media of interest. Characterization of geographic area with maps provided of site exposure sources, characterization of residential population at risk lacking in terms of demographics however detailed discussion of potential pathways of exposure.
Domain 3: Accessibility/Clarity	Metric 3:	Documentation of References	Medium	References are available and provided, however some references may not be publicly available or are not from peer reviewed sources.
Domain 4: Variability and Uncertainty	Metric 4:	Variability and Uncertainty	Medium	The study characterizes variability in the population/media studied for some reported result tables, key uncertainties in risk assessment and exposure data identified that are unlikely to have a substantial impact on results.
Overall Quality Determination			Medium	

Study Citation:	Chemical Manufacturers Association, (1988). Petitioners and exhibits to petitioners memorandums in support of their motion for a remand with attachments and cover letter dated 012389 (Part b).
HERO ID:	1481091

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The assessment methodology is described
Domain 2: Representative	Metric 2: Exposure Scenario	High	The data represent the exposure scenario of interest
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	Critically Deficient	the reported data is not legible
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Low	No summary of statistics or report of key limitations

Overall Quality Determination**Uninformative**

Study Citation:		Radian Corp, (1995). Initial submission: Baseline risk assessment for the Jayhawk site Galena, Kansas with attachments and cover letter dated 030195.		
HERO ID:		1482017		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The methodology is well described across the document, equations reported inside tables
Domain 2: Representative	Metric 2:	Exposure Scenario	High	Exposure to contaminants from the Jayhawk chemical site
Domain 3: Accessibility/Clarity	Metric 3:	Documentation of References	High	Reported data well documented
Domain 4: Variability and Uncertainty	Metric 4:	Variability and Uncertainty	Medium	Section 2.4.5 reports uncertainty. No statistics of variability reported
Overall Quality Determination			High	

Study Citation:		Rohm and Haas, (1988). Biological risk assessment for the Redwood City facility {\&} final site investigation report for the Rohm and Haas Redwood City facility with attachments {\&} cover letter dated 092588 (Part a).		
HERO ID:		1745617		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The methodology for the risk assessment is well described. Soil and groundwater monitoring methods in sections 2.1 and 2.2. Air quality methodology in section 6
Domain 2: Representative	Metric 2:	Exposure Scenario	High	Fish and wildlife exposure to selected contaminants in the groundwater beneath the Rohm and Hass facility in Redwood City
Domain 3: Accessibility/Clarity	Metric 3:	Documentation of References	High	Data inputs, references all reported in the study
Domain 4: Variability and Uncertainty	Metric 4:	Variability and Uncertainty	Medium	Variability across matrices not reported in terms of summary of statistics . Limitations reported in the text
Overall Quality Determination			High	

Study Citation:		RIVM, (1991). Integrated criteria document chlorobenzenes. :281.		
HERO ID:		5159927		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Low	Only "rough estimates" of intake are provided. Inhalation rate is provided, but detailed equations are not provided.
Domain 2: Representative	Metric 2:	Exposure Scenario	Low	Media and population of interest are relevant, but the data is old (from 1980's).
Domain 3: Accessibility/Clarity	Metric 3:	Documentation of References	High	The authors did an excellent job of reporting the references for relevant values and information without any issues apparent.
Domain 4: Variability and Uncertainty	Metric 4:	Variability and Uncertainty	Medium	Description of concentrations relative pollution sources provided some characterization of variability. Uncertainty was not explicitly discussed but modeled and measured concentrations were compared.
Overall Quality Determination			Medium	

Study Citation:		EC, (2003). Follow-up report on five PSL1 substances for which there was insufficient information to conclude whether the substances constitute a danger to the environment: 1,2-dichlorobenzene; 1,4-dichlorobenzene; trichlorobenzenes; tetrachlorobenzenes; pentachlorobenzene.		
HERO ID:		5176389		
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Appendix 2 provides only a very brief explanation of general search terms. Explanation provided for selection of sediment concentrations for risk estimates.
Domain 2: Representative	Metric 2:	Exposure Scenario	High	The assessed exposure scenarios are relevant to human and ecological exposure scenarios relevant to the associated risk evaluation for this chemical.
Domain 3: Accessibility/Clarity	Metric 3:	Documentation of References	High	Authors do an excellent job of reporting references with no apparent issues.
Domain 4: Variability and Uncertainty	Metric 4:	Variability and Uncertainty	High	Discussion of variability and uncertainty with respect to exposure data provided in section 5.5.
Overall Quality Determination			High	

Study Citation:		SCCWRP, (1977). Coastal water research project. Annual report for the year ended 30 June 1977.		
HERO ID:		5251048		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Low	This paper is an annual report from the Coastal Water project and contains 28 professional papers related to their research plan. One chapter is on wastewater (page 25) and another on sludge effluent (page 61). Sampling equipment and procedures are brief (page 25). Storage is not reported. Analytical methods are referenced in another study. LOD not reported.
Domain 2: Representative	Metric 2:	Exposure Scenario	N/A	Data is older (from 1976), so not as applicable.
Domain 3: Accessibility/Clarity	Metric 3:	Documentation of References	Medium	References are available for all reported data, inputs, and defaults; however, some references may not be publicly available or are not from peer reviewed sources.
Domain 4: Variability and Uncertainty	Metric 4:	Variability and Uncertainty	Medium	Samples collected in multiple locations and season so limited variability addressed, but no discussion of uncertainties.
Overall Quality Determination			Low	

Study Citation:		Anderson, D., Dicianna, D., Yance, J., Tarnay, A. (1989). Preliminary data summary for the solvent recycling industry.		
HERO ID:		5478191		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Sampling are referenced in other sources for each plant in section 5.3.1. Analytical methods and instrument are reported, including detection limit range. Simple standard dilution model used to calculate effluent concentrations in Section 6, although effluent concentrations don't appear to reported.
Domain 2: Representative	Metric 2:	Exposure Scenario	Medium	The study measured chemicals in wastewater. However, the study and sampling dates are old (1986 and 1987).
Domain 3: Accessibility/Clarity	Metric 3:	Documentation of References	Low	Document is well referenced, but many references don't appear to be published.
Domain 4: Variability and Uncertainty	Metric 4:	Variability and Uncertainty	Medium	Data specifically examined for three facilities. Some discussions of analytical uncertainties provided.
Overall Quality Determination			Medium	

Study Citation:		Macleod, M., Mackay, D. (1999). An assessment of the environmental fate and exposure of benzene and the chlorobenzenes in Canada. Chemosphere 38(8):1777-1796.		
HERO ID:		660263		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Mathematical Equations	Medium	Equations provided and/or calculation methods described for concentration estimation and intake, though not from an authoritative source. Approach appears scientifically sound.
	Metric 2:	Model Evaluation	Low	Some comparison of modeled values to measured values from other studies; assumption of some evaluation due to peer review
Domain 2: Representative	Metric 3:	Exposure Scenario	Medium	General population exposure to modeled chemicals through multiple exposure pathways (air, water, fish, etc) is a relevant scenario; the data are based in Ontario, so may not be entirely suitable for US populations
Domain 3: Accessibility/Clarity	Metric 4:	Model and Model Documentation Availability	Low	Most equations are provided and citations provided where needed; EQC and ChemCAN model can be downloaded by the public
	Metric 5:	Model Inputs and Defaults	Medium	Concentration and intake modeling inputs provided, most with citations; not all inputs to EQC or ChemCAN model are listed (though they may not be needed)
Domain 4: Variability and Uncertainty	Metric 6:	Variability and Uncertainty	Medium	Discussion of uncertainties and variabilities in the fugacity values modeled vs. measured; suggestions of missing data or factors in the model
Overall Quality Determination		Low		

Study Citation:		Monsanto Chemical Company, (1995). Whole effluent and chemical specific evaluation (o-dichlorobenzene) of Monsanto's Antwerp plant aqueous discharge, with cover letter dated 07/10/95.		
HERO ID:		2048254		
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Mathematical Equations	Critically Deficient	Equations are not provided for the extrapolation between measured concentration and concentration in the receiving stream. Paper only mentions a computerized Lotus spreadsheet was used.
	Metric 2:	Model Evaluation	Critically Deficient	There is unknown if the model has undergone evaluation.
Domain 2: Representative	Metric 3:	Exposure Scenario	Low	Paper appears to originate in 1995.
	Metric 4:	Model and Model Documentation Availability	Low	No model documentation is available.
Domain 3: Accessibility/Clarity	Metric 5:	Model Inputs and Defaults	Medium	There is some description on what the inputs were in the estimated concentration of the receiving stream.
	Metric 6:	Variability and Uncertainty	Low	There is little discussion on variability and uncertainty.
Overall Quality Determination		Uninformative		

Study Citation:		Rizk, M., Guo, F., Verrielle, M., Ward, M., Dusanter, S., Blond, N., Locoge, N., Schoemaecker, C. (2018). Impact of Material Emissions and Sorption of Molatile Organic Compounds on Indoor Air Quality in a Low Energy Building: Field Measurements and Modeling. Indoor Air 28(6):924-935.		
HERO ID:		4729544		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Mathematical Equations	High	Description of modeling methods used by the INCA-Indoor was included. INCA-indoor developed as part of larger French national project - from a trusted source.
	Metric 2:	Model Evaluation	High	The INCA-indoor model is an accepted model that has undergone peer-review.
Domain 2: Representative	Metric 3:	Exposure Scenario	Medium	Exposure data was collected in 2014; between 5-15 years ago.
	Metric 4:	Model and Model Documentation Availability	Low	Documentation found online that fully describes the model but the model itself was not found to be available freely to the public.
Domain 3: Accessibility/Clarity	Metric 5:	Model Inputs and Defaults	High	Modeling inputs were all included, described, and referenced when applicable. Additional details for the conditions used for the scenarios can be found in Table S6 in the supplemental material.
	Metric 6:	Variability and Uncertainty	High	Text was included describing the variability and uncertainty. Section 3.4 includes description comparing modeling profiles along with uncertainties due to emission rate. Paper include spatial and temporal variability of certain parameters.
Overall Quality Determination		High		

Study Citation:		Watts, C. D., Moore, K. (1988). Fate and transport of organic compounds in rivers. Commission of the European Communities Water Pollution Research Reports, 4 :154-168.		
HERO ID:		4933297		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Mathematical Equations	Low	Some equations provided for intermediate values (eg Kp) but not all are cited; equations are not directly provided for estimated concentrations but could be determined from all intermediate equations
	Metric 2:	Model Evaluation	Low	Predicted concentrations are compared to measured concentrations, but no external evaluation
Domain 2: Representative	Metric 3:	Exposure Scenario	Low	Concentrations in particles and/or sediment from water are relevant, but "standard methods" cited are from 1979
	Metric 4:	Model and Model Documentation Availability	Low	Not all sources used for data/models are easily accessible
Domain 3: Accessibility/Clarity	Metric 5:	Model Inputs and Defaults	Low	Some partition coefficient inputs given but not all have clear cited source
	Metric 6:	Variability and Uncertainty	Low	Some discussed of uncertainties, like downstream dilution, but very little
Overall Quality Determination		Low		

Study Citation:		Integral Consulting, (2024). Final study report: o-Dichlorobenzene consumer product emission rate testing.		
HERO ID:		12136954		
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Mathematical Equations	High	The model, key mathematical equations to calculate concentrations or uptakes are provided in the CEM user guide. Equations are described in detail and correctness can be assessed as the model has been peer reviewed.
	Metric 2:	Model Evaluation	High	The model has gone through the EPA peer review process and a report has been published.
Domain 2: Representative	Metric 3:	Exposure Scenario	High	The report was published in 2024 and SDS are from 2022-2023.
Domain 3: Accessibility/Clarity	Metric 4:	Model and Model Documentation Availability	High	The model and documentation (user guide, user appendices) and publicly available.
	Metric 5:	Model Inputs and Defaults	Medium	All the inputs are documented in Appendix M, however, some of the inputs are not explained, such as air exchange rate and use environment volume which deviates from the defaults.
Domain 4: Variability and Uncertainty	Metric 6:	Variability and Uncertainty	Low	The model measured both 1 and 8 hour time. There is mention of uncertainties such as the model assumes constant emission at each time interval. However, could not replicate the results and there is uncertainty in how the calculated emission rates were produced by the study's runs.
Overall Quality Determination			High	

Study Citation:		Hubbard, H. F., Ring, C. L., Hong, T., Henning, C. C., Vallero, D. A., Egeghy, P. P., Michael-Rock, G. (2022). Exposure Prioritization (Ex Priori): A screening-level high-throughput chemical prioritization tool. Toxics 10(10):569.		
HERO ID:		12952530		
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Mathematical Equations	High	All equations were provided in the spreadsheet and methodologies were discussed in the paper. Sound methods were used for purpose of developing a screening level prioritization model.
	Metric 2:	Model Evaluation	Medium	The paper is published in the peer reviewed journal "toxics". the paper evaluated the model by comparing to NHANES-Inferred Exposures. The results showed that the estimates are biased high. However, Ex Priori appears to perform comparably to another rapid exposure model (SEEM3) when the predictions of both models are evaluated by examining their correlation to median aggregate exposure rates for the U.S. population inferred from NHANES urine biomonitoring data.
Domain 2: Representative	Metric 3:	Exposure Scenario	High	By default, Ex Priori models the baseline exposure scenario of an average adult consumer, including average consumer habits and practices. Ex Priori considers multi-chemical exposures from consumer products and articles accounting for product formulation and use; physical-chemical properties, such as partition coefficients; and user exposure factors and activity patterns. Product composition data were collected from the Consumer Product Chemical Profiles database (CPCPdb). Habits and practices data for each of the consumer products are harmonized with SHEDS-HT as presented in Isaacs et al.
Domain 3: Accessibility/Clarity	Metric 4:	Model and Model Documentation Availability	High	The model is available in spreadsheet format with all equations transparent. All sources are described in the paper.
	Metric 5:	Model Inputs and Defaults	High	Model inputs are clearly described and sources cited. Commonly accepted inputs were used.
Domain 4: Variability and Uncertainty	Metric 6:	Variability and Uncertainty	High	Uncertainties and limitations are noted and implications discussed. Authors suggest the tool should be used as a screening level prioritization tool. Limitations include the use of constant emissions rate rather than time-dependent emission rate, assumptions that products are liquids, over simplified dermal uptake, and use of older product data gathered in 2015.
Overall Quality Determination			High	

Glossary of Select Terms for Data Evaluation Tables

Table 197: Glossary of Select Terms for Data Evaluation

Term	Definition
AC	Acute concentrations
ACC	American Chemistry Council
ADC	Average daily concentrations
ADME	Absorption, distribution, metabolism, and elimination
APF	Assigned protection factor
APR	Air-purifying respirator
AF	Assessment factor
AMTIC	Ambient Monitoring Technology Information Center
AQS	Air Quality System
atm· /mol	Atmospheres
BAF	Bioaccumulation factor
BCF	Bioconcentration factor
BLS	Bureau of Labor Statistics
C	Celsius
CAA	Clean Air Act
CASRN	Chemical Abstract Service registry number
CDF	Cumulative distribution function
CDR	Chemical Data Reporting
CEHD	OSHA Chemical Exposure Health Database
CEM	Consumer Exposure Model
COU	Conditions of Use
cP	Centipoise
EPA	Environmental Protection Agency
DMR	Discharge Monitoring Report
DOD	Department of Defense
DRE	Destruction removal efficiency
ECHO	Enforcement and Compliance History Online
EIS	Emissions Inventory System
EPA	Environmental Protection Agency (U.S.)
ESD	Emission Scenario Document
HAP	Hazardous Air Pollutant
HEC	Human Equivalent Concentration
HEM	Human Exposure Model
HLC	Henry's Law constant
ICR	Information Collection Request
IECCU	Indoor Environmental Concentrations in Buildings with Conditioned and Unconditioned Zones
IIOAC	Integrated Indoor Outdoor Air Calculation
IUR	Inhalation unit risk

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Glossary of Select Terms for Data Evaluation Tables

Table 197 ...continued from previous page

Term	Definition
KOA	Octanol-air partition coefficient
KOC	Organic carbon-water partition coefficient
KOW	Octanol-water partition coefficient
LADC	Lifetime average daily concentrations
LCD	Life cycle diagram
LOD	Limit of detection
MOE	Margin of exposure
MDL	Method detection limit
MLE	Maximum likelihood estimation
NADP	National Atmospheric Deposition Program
NAAQS	National Ambient Air Quality Standard
NAICS	North American Industry Classification System (codes)
ND	Non-detect
NEI	National Emissions Inventory
NESHAP	National Emission Standard for Hazardous Air Pollutants
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NLM	National Library of Medicine
NPDES	National Pollutant Discharge Elimination System
OCSPP	Office of Chemical Safety and Pollution Prevention (EPA)
OECD	Organisation for Economic Co-operation and Development
OEL	Occupational exposure limits
OES	Occupational exposure scenario
ONU	Occupational non-user
OPPT	Office of Pollution Prevention and Toxics (EPA)
OSHA	Occupational Safety and Health Administration (U.S)
POD	Point of Departure
PBZ	Personal Breathing Zone
PEL	Permissible Exposure Limits
POTW	Publicly owned treatment works
PPE	Personal protective equipment
PV	Production volume
Q-Q	Quantile-quantile
RCRA	Resource Conservation and Recovery Act
RfC	Reference concentration
RL	Reporting limit
SCC	Source Classification Code
SDS	Safety Data Sheet
SIC	Standard Industrial Classification (codes)
SOC	Standard Occupational Classification (codes)
TLV	Threshold Limit Values
TRFID	TRI identification number

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Glossary of Select Terms for Data Evaluation Tables

Table 197 ...continued from previous page

Term	Definition
TRI	Toxics Release Inventory
TSCA	Toxic Substance Control Act
TWA	Time-weighted average
U.S.	United States
VOC	Volatile organic compound
VP	Vapor pressure
WQP	Water Quality Portal
WWTP	Wastewater treatment plant
WQX	Water Quality Exchange