

References: Printed from Interstate Technology & Regulatory Council (ITRC). 2018. TPH Risk Evaluation at Petroleum-Contaminated Sites. THPRisk-1. Washington, D.C.: Interstate Technology & Regulatory Council, TPH Risk Evaluation Team. <https://tphrisk-1.itrcweb.org>

## References

- Adams, J., K. Charboneau, D. Tuori, S. Brown, and P. V. Hodson. 2017. Review of methods for measuring the toxicity to aquatic organisms of water-accommodated fraction (WAF) and chemically-enhanced water accommodated fraction (CEWAF) of petroleum. Edited by Research Document Fisheries and Oceans Canada.
- Adams, R. H., F. J. Guzman Osorio, and J. Zavala Cruz. 2008. "Water Repellency in Oil Contaminated Sandy and Clayey Soils." *International Journal of Environmental Science and Technology* no. 5 (4):445-454.
- ADEC. 2016. Contamination Sites Program, Cleanup Levels Calculator, Alaska Department of Environmental Conservation (ADEC), 2016, November 2016, <http://dec.alaska.gov/applications/spar/webcalc/>.
- Agrawal, Akhil, and Lisa M. Gieg. 2013. "In situ detection of anaerobic alkane metabolites in subsurface environments." *Front Microbiol* no. 4:140. doi: 10.3389/fmicb.2013.00140.
- Aitken, C. M., D. M. Jones, and S. R. Larter. 2004. "Anaerobic Hydrocarbon Biodegradation in Deep Surface Oil Reservoirs." *Nature* no. 431:291-294.
- Albers, R. 2003. "Petroleum and Individual Polycyclic Aromatic Hydrocarbons." In *Handbook of Ecotoxicology 2nd edition*, edited by Hoffman et al.: CRC Press.
- Alvarez, P. J. J., R. C. Heathcote, and S. E. Powers. 1998. "Caution Against Interpreting Gasoline Release Dates Based on BTEX Ratios in Ground Water." *Groundwater Monitoring & Remediation* no. 18 (4):69-76. doi: 10.1111/j.1745-6592.1998.tb00166.x.
- ANZECC. 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality.
- API. 1998. Bulletin 8. Characteristics of Dissolved Petroleum Hydrocarbon Plumes Results from Four Studies. C. A. Newell, and J. A. Connor.
- API. 2001. Frequently Asked Questions about TPH Analytical Methods for Crude Oil.
- API. 2008. "TPH RBSL calculator, American Petroleum Institute (API), 2008, [http://www.api.org/Environment-Health-and-Safety/Environmental-Performance/~/\\_link.aspx?\\_id=91E6E08273F24CE9B88D71A477DF85AB&\\_z=z](http://www.api.org/Environment-Health-and-Safety/Environmental-Performance/~/_link.aspx?_id=91E6E08273F24CE9B88D71A477DF85AB&_z=z)."
- API. 2011. A Guide to Understanding, Assessment, and Regulation of PAHs in the Aquatic Environment. Publication 4776.
- API. 2012. Technical Bulletin #25, Remediation Progress at California LUFT Sites: Insights from the GeoTracker Database. Thomas E. McHugh, Roopa Kamath, Poonam R. Kulkarni, Charles J. Newell, and John A. Connor, GSI Environmental, Houston, Texas, Sanjay Garg, Shell Global Solutions (US) Inc, Houston, Texas.
- API. 2013. Net Environmental Benefit Analysis for Oil Spill Preparedness and Response.
- ASTM. 2014a. Standard Guide for Developing Conceptual Site Models for Contaminated Sites.
- ASTM. 2014b. Standard Guide for Risk-Based Corrective Action for Protection of Ecological Resources.
- ASTM. 2015a. Standard Guide for Risk-Based Corrective Action.
- ASTM. 2015b. Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites.
- ASTM. 2016. Standard E2993-16. Standard Guide for Evaluating Potential Hazard as a Result of Methane in the Vadose Zone, ASTM International, West Conshohocken, PA, 2003, doi: 10.1520/E2993-16. [www.astm.org](http://www.astm.org).
- ASTM. 2017. Standard Test Method for dimer/trimer of chlorotrifluoroethylene (S-316) Recoverable Oil and Grease and

Nonpolar Material by Infrared Determination.

- Atlantic PIRI. 2012a. Atlantic RBCA, Version 3, Ecological Screening Protocol for Petroleum Impacted Sites in Atlantic Canada, Scientific Rationale, July 2012.
- Atlantic PIRI. 2012b. "Scientific Rationale to support the Adoption/Development of Tier 1 Ecological Screening Levels for Soil, Surface Water, Groundwater and Sediment. July 2012."
- Atlas, R. M. 1981. "Microbial Degradation of Petroleum Hydrocarbons: An Environmental Perspective." *Microbial Reviews* no. 45 (1):180-209.
- ATSDR. 1996. ToxFAQs for Automotive Gasoline CAS#8006-619-9. Edited by Agency for Toxic Substances and Disease Registry. Atlanta, GA: Centers for Disease Control. US Department of Health and Human Services.
- ASTDR. 1999. Toxicological Profile for Total Petroleum Hydrocarbons. Edited by Agency for Toxic Substances and Disease Registry. Atlanta, GA: Centers for Disease Control. US Department of Health and Human Services.
- ASTDR. 2013. ToxFAQs. Atlanta, GA: Centers for Disease Control. US Department of Health and Human Services.
- ASTDR. 2017. Toxicological Profile for JP-5, JP-8, and Jet A Fuels. Edited by Agency for Toxic Substances and Disease Registry.
- Aurand, D., and G. Coelho. 2005. Cooperative Aquatic Toxicity Testing of Dispersed Oil and the "Chemical Response to Oil Spills: Ecological Effects Research Forum (CROSERF). Lusby, MD: Ecosystem Management & Associates, Inc.
- Barron, M., and L. Ka'aihue. 2003. "Critical evaluation of CROSERF test methods for oil dispersant toxicity testing under subarctic conditions." *Marine Pollution Bulletin* no. 46 (9):1191-1199.
- Barron, M., T. Podrabsky, R. S. Ogle, J. E. Dugan, and R. W. Ricker. 1999. "Sensitivity of the Mysid *Mysidopsis bahia* to a Weathered Oil." *Bulletin of Environmental Contamination and Toxicology* no. 62 (3):266-271. doi: 10.1007/s001289900869.
- Battelle. 2007. Sediment Toxicity of Petroleum Hydrocarbon Fractions. Prepared for Massachusetts Department of Environmental Protection. September 2007.
- Baussant, T., M. Ortiz-Zarragoitia, M.P. Cajaraville, R.K. Bechmann, I.C. Taban, and S. Sanni. 2011. "Effects of chronic exposure to dispersed oil on selected reproductive processes in adult blue mussels (*Mytilus edulis*) and the consequences for the early life stages of their larvae." *Marine Pollution Bulletin* no. 62 (7):1437-1445.
- BCMoE. 1995. Recommendations to B.C. Environment for Development of Remediation Criteria for Petroleum Hydrocarbons in Soil and Groundwater. Volumes I and II. Victoria, BC.
- BCMoE. 2018. Contaminated Sites Regulation. July.
- Bekins, B. A., I. M. Cozzarelli, M. L. Erickson, R. A. Steenson, and K. A. Thorn. 2016. "Crude Oil Metabolites in Groundwater at Two Spill Sites." *Ground Water* no. 54 (5):681-691. doi: 10.1111/gwat.12419.
- Bekins, B. A., E. M. Goodsy, and E. Warren. 1999. "Distribution of microbial physiologic types in an Aquifer contaminated by crude oil." *Microbial Ecology* no. 37 (4):263-275.
- Beller, Harry R., Wang-Hsien Ding, and Martin Reinhard. 1995. "Byproducts of Anaerobic Alkylbenzene Metabolism Useful as Indicators of in Situ Bioremediation." *Environmental Science & Technology* no. 29 (11):2864-2870. doi: 10.1021/es00011a024.
- Beyer, J., H. C. Trannum, T. Bakke, P. V. Hodson, and T. K. Collier. 2016. "Environmental effects of the Deepwater Horizon oil spill: A review." *Marine Pollution Bulletin* no. 110 (1):28-51.
- Bleeker, E. A. J., and E. M. J. Verbruggen. 2009. Bioaccumulation of Polycyclic Aromatic Hydrocarbons in Aquatic Organisms. National Institute for Public Health and the Environment.
- Bobra, M. 1992. Solubility Behaviour of Petroleum Oils in Water. Study Funded by United States Minerals Management Service and Environment Canada, Emergencies Science Division. Ottawa: Consultchem.

- Boese, B., R. J. Ozretich, J. O. Lamberson, R. C. Swartz, F. A. Cole, J. Pelletier, and J. Jones. 1999. "Toxicity and Phototoxicity of Mixtures of Highly Lipophilic PAH Compounds in Marine Sediments: Can the  $\Sigma$ PAH Model be Extrapolated?" *Archives of Environmental Contamination and Toxicology* no. 36 (3):270-280.
- Borden, R. C., M. J. Hunt, M. B. Shafer, and M. S. Barlaz. 1997. *Anaerobic biodegradation of BTEX in aquifer material. USEPA Environmental Research Brief.*
- Bornstein, J. M., J. Adams, B. Hollebone, T. King, P. V. Hodson, and R. S. Brown. 2014. "Effects-driven chemical fractionation of heavy fuel oil to isolate compounds toxic to trout embryos." *Environ Toxicol Chem* no. 33 (4):814-824.
- Brewer, R., J. Nagashima, M. Kelley, M. Heskett, and M. Rigby. 2013. "Risk-based evaluation of total petroleum hydrocarbons in vapor intrusion studies." *Int J Environ Res Public Health* no. 10 (6):2441-67. doi: 10.3390/ijerph10062441.
- Brewer, R., J. Peard, and M. Heskett. 2017a. "A Critical Review of Discrete Soil Sample Data Reliability: Part 1—Field Study Results." *Soil and Sediment Contamination: An International Journal* no. 26 (1):1-22. doi: 10.1080/15320383.2017.1244171.
- Brewer, R., J. Peard, and M. Heskett. 2017b. "A Critical Review of Discrete Soil Sample Data Reliability: Part 2—Implications." *Soil and Sediment Contamination: An International Journal* no. 26 (1):23-44. doi: 10.1080/15320383.2017.1244172.
- Bruya, J. E., and A. J. Friedman. 1992. "Don't make waves: Analysis of water samples for total petroleum hydrocarbons." *Soils* no. January-February: 6-7:46-47.
- Bursian, S. J., C.R. Alexander, D. Cacula, F.L. Cunningham, K.M. Dean, B.S. Dorr, C.K. Ellis, C.A. Godard-Codding, C.G. Guglielmo, K.C. Hanson-Dorr, K.E. Harr, K.A. Healy, M.J. Hooper, K.E. Horak, J.P. Isanhart, L.V. Kennedy, J.E. Link, I. Maggini, J.K. Moyer, C.R. Perez, C.A. Pritsos, S.A. Shriner, K.A. Trust, and P.L. Tuttle. 2017. "Reprint of: Overview of avian toxicity studies for the Deepwater Horizon Natural Resource Damage Assessment." *Ecotoxicology and Environmental Safety* no. 146:4-10.
- Bursian, S. J., K. M. Dean, K. E. Harr, Kennedy L, J. E. Link, I. Maggini, C. Pritsos, K. L. Pritsos, R. E. Schmidt, and C. G. Guglielmo. 2017. "Effect of oral exposure to artificially weathered Deepwater Horizon crude oil on blood chemistries, hepatic antioxidant enzyme activities, organ weights and histopathology in western sandpipers (*Calidris mauri*)." *Ecotoxicology and Environmental Safety* no. 146:91-97. doi: <https://doi.org/10.1016/j.ecoenv.2017.03.045>.
- CAEPA-DTSC. 2001. Public Participation Manual, Chapter 6, "Public Participation Tasks and Techniques.
- CAEPA-DTSC. 2005. "Advisory on methane assessment and common remedies at school sites, school property evaluation and cleanup division, department of toxic substances control (DTSC)."
- CAEPA-DTSC. 2012a. "Evaluation of biogenic methane. A Guidance Prepared for the Evaluation of Biogenic Methane in Constructed Fills and Dairy Sites. Prepared By: California Environmental Protection Agency, Department of Toxic Substances Control. March 28, 2012."
- CAEPA-DTSC. 2012b. Vapor Intrusion Public Participation Advisory.
- CAOEHHA (California Office of Environmental Health Hazard Assessment). November 2013 (Updated March 2015). "Protocol for Seafood Risk Assessment to Support Fisheries Re-Opening Decisions for Aquatic Oil Spills in California." <https://oehha.ca.gov/media/downloads/fish/document/2015updatesseafoodoilspills.pdf>
- CASWB-SFBR. 2016a. Environmental Screening Levels. February 2016 (Revision 3).
- CASWB-SFBR. 2016b. Petroleum Metabolites, Literature Review and Assessment Framework.
- CASWB. 2015. Leaking Underground Fuel Tank Guidance Manual. September 2012 (Revised December 2015). Edited by State Water Resources Control Board.
- CCME. 2007. "Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Summary Tables. Update 7.0."

- CCME. 2008. Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale.
- CCME. 2010. Canadian Environmental Quality Guidelines.
- Chakrabarti, A. 2018. Re-Assessment of Ecological Risk at a Mature Near-Bay Petroleum Site Due to Emerging Polar Degradation Metabolite Contaminants. Paper read at Groundwater Resources Association of California 26th Annual Meeting and Conference, October 3, 2017, at Sacramento, California.
- Chaplin, B. P., G. N. Delin, R. J. Baker, and M. A. Lahvis. 2002. "Long-Term Evolution of Biodegradation and Volatilization Rates in a Crude Oil-Contaminated Aquifer." *Bioremediation Journal* no. 6 (3):237-255. doi: 10.1080/10889860290777594.
- Chen, C. S-H., J. J. Delfino, and P. S. C. Rao. 1994. "Partitioning of organic and inorganic components from motor oil into water." *Chemosphere* no. 28 (7):1385-1400. doi: [https://doi.org/10.1016/0045-6535\(94\)90080-9](https://doi.org/10.1016/0045-6535(94)90080-9).
- CL:AIRE. 2014. An Illustrated Handbook of LNAPL Transport and Fate in the Subsurface.
- Clark, J., G.E. Bragin, E.J. Febbo, and D.J. Letinski. 2001. "Toxicity of Physically and Chemically Dispersed Oils Under Continuous and Environmental Realistic Exposure Conditions: Applicability to Dispersant Use Decisions in Spill Response Planning." *International Oil Spill Conference Proceedings* no. 2001 (2):1249-1255.
- Coleman, W. Emile, Jean W. Munch, Robert P. Streicher, H. Paul Ringhand, and Frederick C. Kopfler. 1984. "The identification and measurement of components in gasoline, kerosene, and no. 2 fuel oil that partition into the aqueous phase after mixing." *Archives of Environmental Contamination and Toxicology* no. 13 (2):171-178. doi: 10.1007/bf01055874.
- Comber, M.I.H., J.A. de Ferrer, N. Djemel, C.V. Eadsforth, A. Lescrauwaet, M. Léon Paumen, S. Linington, A. Redman, S.A. Villalobos, and K. den Haan. 2016. Assessing the aquatic toxicity of petroleum products: comparison of PETROTOX calculations and SPME-GC screening.
- CONCAWE. *Petrorisk* 2017. Available from <https://www.concawe.eu/reach/petrorisk/>.
- Connor, J.A., R. Kamath, K.L. Walker, and T.E. McHugh. 2015. "Review of Quantitative Surveys of the Length and Stability of MTBE, TBA, and Benzene Plumes in Groundwater at UST Sites." *Groundwater* no. 53 (2):195-206. doi: 10.1111/gwat.12233.
- Cox, B.A., J.W. Anderson, and J.C. Parker. 1975. "An experimental oil spill: The distribution of aromatic hydrocarbons in the water, sediment, and animal tissues within a shrimp pond." In: Proceedings of the Conference on the Prevention and Control of Oil Pollution 607-612. <https://doi.org/10.7901/2169-3358-1975-1-607>
- CRC CARE. 2017. Weathered Petroleum Hydrocarbons (Silica Gel Cleanup), CRC CARE Technical Report no. 40, page 32. Newcastle, Australia.
- Curiale, Joseph, and Eugene B. Frolov. 1998. *Occurrence and Origin of Olefins in Crude Oils. A Critical Review*. Vol. 29.
- Dalton, H., and D. I. Stirling. 1982. "Co-metabolism." *Philosophical transactions of the Royal Society of London. Series B, Biological sciences* no. 297 (1088):481-96.
- Das, Nilanjana, and Preethy Chandran. 2011. "Microbial Degradation of Petroleum Hydrocarbon Contaminants: An Overview." *Biotechnology Research International* no. 2011. doi: 10.4061/2011/941810.
- DeLaune, R.D., and A. Wright. 2011. "Projected Impact of Deepwater Horizon Oil Spill on U.S. Gulf Coast Wetlands." *Soil Science Society of America Journal* no. 75 (5):1602-1612.
- DENREC. 2013. Facts About Vapor Intrusion.
- Di Toro, Dominic M., and Joy A. McGrath. 2000. "Technical basis for narcotic chemicals and polycyclic aromatic hydrocarbon criteria. II. Mixtures and sediments." *Environmental Toxicology and Chemistry* no. 19 (8):1971-1982. doi: 10.1002/etc.5620190804.
- Di Toro, Dominic M., Joy A. McGrath, and David J. Hansen. 2000. "Technical basis for narcotic chemicals and polycyclic

- aromatic hydrocarbon criteria. I. Water and tissue." *Environmental Toxicology and Chemistry* no. 19 (8):1951-1970. doi: 10.1002/etc.5620190803.
- Diamond, S.A. 2003. "Photoactivated toxicity in aquatic environments." In *UV Effects in Aquatic Organisms and Ecosystems*, edited by E.W. Helbling and H. Zagarese, 219-250. Cambridge, UK: The Royal Society of Chemistry.
- ECHA. 1994-2007. Information from Existing Substances Regulation (ESR).
- Eisler, R. 2000. "Polycyclic aromatic hydrocarbons," in *Handbook of Chemical Risk Assessment, Vol. 2*, Chapter 25. Lewis Publishers, Boca Raton, FL. <https://www.cabdirect.org/cabdirect/abstract/20023090447>
- Efroymsen, Rebecca A., Bradley E. Sample, and Mark J. Peterson. 2004. "Ecotoxicity Test Data for Total Petroleum Hydrocarbons in Soil: Plants and Soil-Dwelling Invertebrates." *Human and Ecological Risk Assessment: An International Journal* no. 10 (2):207-231. doi: 10.1080/10807030490438175.
- eHow. *What Products Have High Levels of Benzene?* 2013. Available from [www.ehow.com/list\\_7441123\\_products-high-levels-benzene\\_.html](http://www.ehow.com/list_7441123_products-high-levels-benzene_.html).
- Engelhardt, F. R. 1983. "Petroleum Effects on Marine Mammals." *Aquatic Toxicology* no. 4 (3):199-217. doi: 10.1016/0166-445X(83)90018-8).
- EU. 2008. Directives: on Environmental Quality Standards in the Field of Water Policy.
- Farrington, J.W., A.C. Davis, N.M. Frew, and K.S. Rabin. 1982. "No. 2 fuel oil compounds in *Mytilus edulis*: Retention and release after an oil spill." *Marine Biology* 66: 15-26. <https://doi.org/10.1007/BF00397250>
- Foght, J. 2008. "Anaerobic Biodegradation of Aromatic Hydrocarbons: Pathways and Prospects." *Journal of Molecular Microbiology and Biotechnology* no. 15 (2-3):93-120.
- Franks, N. P., and W. R. Lieb. 1990. "Mechanisms of general anesthesia." *Environmental Health Perspectives* no. 87:199-205.
- Fucik, K., K. A. Carr, and B. J. Balcom. 1994. *Dispersed oil toxicity tests with biological species indigenous to the Gulf of Mexico [microform] / Kenneth W. Fucik, Kelly A. Carr, and Brian J. Balcom*. Edited by Kelly A. Carr, Brian J. Balcom, O. C. S. Region United States. Minerals Management Service. Gulf of Mexico and Associates Continental Shelf, OCS study. New Orleans, La. (1201 Elmwood Park Blvd., New Orleans 70123- 2394): U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region.
- Gardiner, W. W., J. Q. Word, J. D. Word, R. A. Perkins, K. M. McFarlin, B. W. Hester, L. S. Word, and C. M. Ray. 2013. "The acute toxicity of chemically and physically dispersed crude oil to key arctic species under arctic conditions during the open water season." *Environmental Toxicology and Chemistry* no. 32 (10):2284-2300. doi: 10.1002/etc.2307.
- Garg, S., C. J. Newell, P. R. Kulkarni, D. C. King, D. T. Adamson, M. I. Renno, and T. Sale. 2017. "Overview of Natural Source Zone Depletion: Processes, Controlling Factors, and Composition Change." *Groundwater Monitoring & Remediation* no. 37 (3):62-81. doi: 10.1111/gwmr.12219.
- Gilmer, E. M. 2017. "EPA to Consider Updating Drilling Waste Regs." January 3, 2017.
- GSI. 2018. *RBCA Tool Kit for Chemical Releases v 2.6* [20182018]. Available from <https://www.gsi-net.com/en/software/rbca-software-tool-kit-for-chemical-releases-version-2-6.html>.
- Gy, P. 1998. *Sampling for Analytical Purposes*: John Wiley & Sons Ltd.
- Heider, J., A. M. Spormann, H. R. Beller, and F. Widdel. 1999. "Anaerobic bacterial metabolism of hydrocarbons." *FEMS Microbiology Reviews* no. 22 (5):459-473. doi: 10.1111/j.1574-6976.1998.tb00381.x.
- Helm, R. C., D. P. Costa, T. D. DeBruyn, T. J. O'Shea, R. S. Wells, and T. M. Williams. 2014. "Overview of Effects of Oil Spills on Marine Mammals." In *Handbook of Oil Spill Science and Technology (ed M. Fingas)*, edited by Spill Science. Hoboken, NJ: John Wiley & Sons, INC.
- Hemmer, M. J., M. G. Barron, and R. M. Greene. 2011. "Comparative Toxicity of Eight Oil Dispersants, Louisiana Sweet

Crude Oil (LSC), and Chemically Dispersed LSC to Two Aquatic Test Species." *Environmental Toxicology and Chemistry* no. 30 (10):2244-2252. doi: 10.1002/etc.619.

Hewitt, A. D. . 1998. "Comparison of Sample Preparation Methods for the Analysis of Volatile Organic Compound in Soil Samples: Solvent Extraction vs Vapor Partitioning." *Environmental Science and Technology* no. 32 (1):143-149.

HIDOH. 2016. Technical Guidance Manual.

HIDOH. 2017. Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater – Tropical Pacific Edition (Fall 2017 and Updates).

HIDOH. 2018. Collection and Use of Total Petroleum Hydrocarbon Data for the Risk-Based Evaluation of Petroleum Releases, Example Case Studies.

Hoffman, D.J., B.A. Rattner, G.A. Burton, and J. Cairns, eds. 2003. "Petroleum and individual polycyclic aromatic hydrocarbons," in *Handbook of Ecotoxicology*, 2nd ed. Chapter 14. Lewis Publishers, Boca Raton, FL.  
<https://doi.org/10.1201/9781420032505.ch14>

Hokstad, J. N., L. G. Faksness, P. S. Daling, and Melania Buffagni. 2000. Chemical and Toxicological Characterisation of Water Accommodated Fractions Relevant for Oil Spill Situations. In *SPE International Conference on Health, Safety and Environment in Oil and Gas Exploration and Production*. Stavanger, Norway: Society of Petroleum Engineers.

Hostettler, Frances D., Yi Wang, Yongsong Huang, Weihuan Cao, Barbara A. Bekins, Colleen E. Rostad, Charles F. Kulpa, and Andrew Laursen. 2007. "Forensic Fingerprinting of Oil-Spill Hydrocarbons in a Methanogenic Environment-Mandan, ND and Bemidji, MN." *Environmental Forensics* no. 8 (1-2):139-153. doi: 10.1080/15275920601180685.

Hurdle, J. 2016. "Court tells EPA to review its rules on oil and gas waste." *StateImpact*, December 29, 2016.

ILDOH. 2009. Fact Sheet: Vapor Intrusion.

ITRC. 2005. Examination of Risk-Based Screening Values and Approaches of Selected States. RISK-1. Washington, DC: Interstate Technology & Regulatory Council, Risk Assessment Resources Team.

ITRC. 2006. Technology Overview of Passive Sampler Technologies. DSP-4. Washington, D.C.: Interstate Technology and Regulatory Council, Diffusion Sampler Team.

ITRC. 2007. Triad Implementation Guide. SCM-3. Washington, D.C.: Interstate Technology and Regulatory Council, Site Characterization and Monitoring Team.

ITRC. 2008. Use of Risk Assessment in Management of Contaminated Sites. RISK-2. Washington, DC: Interstate Technology & Regulatory Council.

ITRC. 2009a. Evaluating LNAPL Remedial Technologies for Achieving Project Goals. LNAPL-2. Washington, D.C.: Interstate Technology and Regulatory Council, LNAPL Team.

ITRC. 2009b. Evaluating Natural Source Zone Depletion at Sites with LNAPL. Washington, D.C.: Interstate Technology and Regulatory Council, LNAPL Team.

ITRC. 2012. "Incremental Sampling Methodology: Interstate Technology Regulatory Council, February 2012."

ITRC. 2013. Environmental Molecular Diagnostics, New Site Characterization & Remediation Enhancement Tools. EMD-2. Washington, D.C.: Interstate Technology and Regulatory Council, Environmental Molecular Diagnostics Team.

ITRC. 2014. "Petroleum Vapor Intrusion: Fundamentals of Screening, Investigation, and Management. Interstate Technology & Regulatory Council. Washington, D.C. January 2015."

ITRC. 2015. Decision Making at Contaminated Sites: Issues and Options in Human Health Risk Assessment. RISK-3. Washington, D.C.: Interstate Technology & Regulatory Council.

ITRC. 2016a. Geospatial Analysis for Optimization at Environmental Sites. GRO-1. Washington, D.C.: Interstate Technology and Regulatory Council, Geostatistics for Remediation Optimization Team.

- ITRC. 2016b. Long-term Contaminant Management Using Institutional Controls. IC-1. Washington, D.C.: Interstate Technology and Regulatory Council, Long-Term Contaminant Management Using Institutional Controls Team.
- ITRC. 2018. LNAPL Site Management: LCSM Evolution, Decision Process, and Remedial Technologies. LNAPL-3. Washington, D.C.: Interstate Technology and Regulatory Council, LNAPL Update Team.
- Ivens, E. 2010. Risk Communication and Risk Management at Vapor Intrusion Sites – Ignore at Your Own Risk. In *Air and Waste Management Association Specialty Conference: Vapor Intrusion*. Chicago, IL.
- Jenssen, B. M. 1994. "Review article: effects of oil pollution, chemically treated oil, and cleaning on the thermal balance of birds." *Environmental Pollution* no. 86 (2):207-215.
- Jonker, Michiel T. O., Angelica Candido, Cozmina M. Vrabie, Alan G. Scarlett, and Steven J. Rowland. 2016. "Synergistic androgenic effect of a petroleum product caused by the joint action of at least three different types of compounds." *Chemosphere* no. 144:1142-1147. doi: <https://doi.org/10.1016/j.chemosphere.2015.09.094>.
- Jorge, Celeste. 2001. *Soil Gasoline Contamination / Decontamination – The Influence of Soil Characteristics*.
- Jury, W. A., W. J. Farmer, and W. F. Spencer. 1984. "Behavior Assessment Model for Trace Organics in Soil: II. Chemical Classification and Parameter Sensitivity." *Journal of Environmental Quality* no. 13 (4):567-572. doi: 10.2134/jeq1984.00472425001300040012x.
- Kaplan, I. R., and Y. Galperin. 1996. "How to Recognize a Hydrocarbon Fuel in the Environment and Estimate Its Age of Release." In *Groundwater and Soil Contamination: Technical Preparation and Litigation Management*, edited by Eds. T. J. Bois and B. J. Luther. John Wiley & Sons.
- Kazunga, Chikoma, and Michael D. Aitken. 2000. "Products from the Incomplete Metabolism of Pyrene by Polycyclic Aromatic Hydrocarbon-Degrading Bacteria." *Applied and Environmental Microbiology* no. 66 (5):1917-1922.
- Kim, Sunghwan, Paul A. Thiessen, Evan E. Bolton, Jie Chen, Gang Fu, Asta Gindulyte, Lianyi Han, Jane He, Siqian He, Benjamin A. Shoemaker, Jiyao Wang, Bo Yu, Jian Zhang, and Stephen H. Bryant. 2016. "PubChem Substance and Compound databases." *Nucleic Acids Research* no. 44 (Database issue):D1202-D1213. doi: 10.1093/nar/gkv951.
- Kirby, M.F., B.P. Lyons, J. Barry, and R.J. Law. 2007. "The toxicological impacts of oil and chemically dispersed oil: UV mediated phototoxicity and implications for environmental effects, statutory testing and response strategies." *Marine Pollution Bulletin* no. 54 (4):472-475.
- Knap, A., N.R. Turner, G. Bera, D. Abigail Renegar, T. Frank, J. Sericano, and B.M. Riegl. 2017. "Short-term toxicity of 1-methylnaphthalene to *Americamysis bahia* and 5 deep-sea crustaceans." *Environmental Toxicology and Chemistry* no. 36 (12):3415-3423.
- Kreitinger, J. P., E. F. Neuhauser, F. G. Doherty, and S. B. Hawthorne. 2007. "Greatly reduced bioavailability and toxicity of polycyclic aromatic hydrocarbons to *Hyalella azteca* in sediments from manufactured-gas plant sites." *Environmental Toxicology and Chemistry* no. 26 (6):1146-1157.
- Labinger, Jay A., and John E. Bercaw. 2002. "Understanding and exploiting C-H bond activation." *Nature* no. 417:507. doi: 10.1038/417507a.
- Lahvis, M. A., I. Hers, R. V. Davis, J. Wright, and G. E. DeVaul. 2013. "Vapor Intrusion Screening at Petroleum UST Sites." *Groundwater Monitoring & Remediation* no. 33 (2):53-67. doi: 10.1111/gwmmr.12005.
- Lahvis, Matthew A. 2017. "Vertical screening distances for total petroleum hydrocarbon for vapour intrusion risk assessment at petroleum underground storage tank sites." *Quarterly Journal of Engineering Geology and Hydrogeology*. doi: 10.1144/qjgeh2017-009.
- Landmeyer, J. E., P. M. Bradley, D. A Trego, K. G. Hale, and J. E. Haas. 2010. "MTBE, TBA, and TAME Attenuation in Diverse Hyporheic Zones." *Groundwater* no. 48 (1):30-41. doi: 10.1111/j.1745-6584.2009.00608.x.
- Leahy, J. G., and R. R. Colwell. 1990. "Microbial degradation of hydrocarbons in the environment." *Microbiological Reviews* no. 54 (3):305-315.

- Lee, K., M. Boufadel, B. Chen, J. Foght, P. Hodson, S. Swanson, and A. Venosa. 2015. Expert Panel Report on the Behaviour and Environmental Impacts of Crude Oil Released into Aqueous Environments. Ottawa, ON: Royal Society of Canada.
- Lewis, M., and R. Pryor. 2013. "Toxicities of oils, dispersants and dispersed oils to algae and aquatic plants: Review and database value to resource sustainability." *Environmental Pollution* no. 180:345-367.
- Lueders, Tillmann. 2017. "The ecology of anaerobic degraders of BTEX hydrocarbons in aquifers." *FEMS Microbiology Ecology* no. 93 (1):fiw220-fiw220. doi: 10.1093/femsec/fiw220.
- Luna-Acosta, A., R. Kanan, S. Le Floch, V. Huet, P. Pineau, P. Bustamante, and H. Thomas-Guyon. 2011. "Enhanced immunological and detoxification responses in Pacific oysters, *Crassostrea gigas*, exposed to chemically dispersed oil." *Water Research* no. 45 (14):4103-4118.
- Lundegard, P.D., and J.R. Knott. 2001. Polar Organics in Crude Oil and their Potential Impacts on Water Quality. In *Conference on Petroleum Hydrocarbons and Organic Chemicals in Groundwater*. Westerville, Ohio: National Ground Water Association.
- Lundegard, Paul D., and Robert E. Sweeney. 2004. "Total Petroleum Hydrocarbons in Groundwater—Evaluation of Nondissolved and Nonhydrocarbon Fractions." *Environmental Forensics* no. 5 (2):85-95. doi: 10.1080/15275920490454346.
- Lutcavage, M.E., P.L. Lutz, G.D. Bossart, and D.M. Hudson. 1995. "Physiologic and clinicopathologic effects of crude oil on loggerhead sea turtles." *Environmental Contamination and Toxicology* no. 28 (4):417-422.
- Mackay, D., C. Paradis, T. Buscheck, E. Daniels, E. Hathaway, N. de Sieyes, E. Rasa, R. Schmidt, and J. Peng. 2018. "Methods to Estimate Source Zone Depletion of Fuel Releases by Groundwater Flow." *Groundwater Monitoring & Remediation* no. 38 (1):26-41. doi: 10.1111/gwmr.12256.
- MADEP. 1994. Interim Final Petroleum Report: Development of Health-Based Alternative to the Total Petroleum Hydrocarbon (TPH) Parameter. edited by Massachusetts Department of Environmental Protection. Boston, MA.
- MADEP. 2002a. Characterizing Risks Posed by Petroleum Contaminated Sites: Implementation of the MADEP VPH/EPH Approach. Final Policy #WSC-02-411. Boston, MA.
- MADEP. 2002b. Characterizing Risks Posed by Petroleum Contaminated Sites: Implementation of the MADEP VPH/EPH Approach. Policy #WSC-02-411. Background/Support Documentation for the Development of Publication Guidelines & Rules of Thumb.
- MADEP. 2003. Updated Petroleum Hydrocarbon Fraction Toxicity Values for the VPH/EPH/EPH Methodology: Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup. November 2003.
- MADEP. 2009. Method for the Determination of Air-Phase Petroleum Hydrocarbons (APH). Massachusetts Department of Environmental protection, Office of Research and Standards, Revision 1. edited by Office of Research and Standards Massachusetts Department of Environmental protection.
- MADEP. 2013. Fact Sheet: Vapor Intrusion & Indoor Air Contamination from Waste Sites.
- MADEP. 2014. "Massachusetts Contingency Plan (MCP) Numerical Standards Spreadsheets, Massachusetts Department of Environmental Protection (MADEP), 2014, [www.mass.gov/eea/agencies/massdep/cleanup/regulations/mcp-numerical-standards.html](http://www.mass.gov/eea/agencies/massdep/cleanup/regulations/mcp-numerical-standards.html)."
- Mallakin, Ali, Brendan J. McConkey, Goubin Miao, Brian McKibben, Victor Snieckus, D. George Dixon, and Bruce M. Greenberg. 1999. "Impacts of Structural Photomodification on the Toxicity of Environmental Contaminants: Anthracene Photooxidation Products." *Ecotoxicology and Environmental Safety* no. 43 (2):204-212. doi: <https://doi.org/10.1006/eesa.1999.1764>.
- Mao, D., R. Lookman, H. Van De Weghe, R. Weltens, G. Vanermen, N. De Brucker, and L. Diels. 2009a. "Combining HPLC-GCXGC, GCXGC/ToF-MS, and selected ecotoxicity assays for detailed monitoring of petroleum hydrocarbon degradation in soil and leaching water." *Environ Sci Technol* no. 43 (20):7651-7. doi: 10.1021/es9015603.



- Mao, D., R. Lookman, H. Van De Weghe, R. Weltens, G. Vanermen, N. De Brucker, and L. Diels. 2009b. "Estimation of ecotoxicity of petroleum hydrocarbon mixtures in soil based on HPLC-GCXGC analysis." *Chemosphere* no. 77 (11):1508-1513. doi: <https://doi.org/10.1016/j.chemosphere.2009.10.004>.
- McCoy, Kevin, Julio Zimbron, Tom Sale, and Mark Lyverse. 2015. "Measurement of Natural Losses of LNAPL Using CO<sub>2</sub> Traps." *Groundwater* no. 53 (4):658-667. doi: 10.1111/gwat.12240.
- McDonough, K. M., N. A. Azzolina, S. B. Hawthorne, D. V. Nakles, and E. F. Neuhauser. 2010. "An evaluation of the ability of chemical measurements to predict polycyclic aromatic hydrocarbon-contaminated sediment toxicity to *Hyalella azteca*." *Environmental Toxicology and Chemistry* no. 29 (7):1545-1550.
- McGrath, J.A., and D.M. Di Toro. 2009. "Validation of the Target Lipid Model for Toxicity Assessment of Residual Petroleum Hydrocarbons." *Environmental Toxicology and Chemistry* no. 28 (6):1130-1148.
- McGrath, J.A., T.F. Parkerton, and D.M. Di Toro. 2004. "Application of the narcosis target lipid model to algal toxicity and deriving predicted-no-effect concentrations." *Environmental Toxicology and Chemistry* no. 23 (10):2503-2517.
- McGrath, J.A., T.F. Parkerton, F.L. Hellweger, and D.M. Di Toro. 2005. "Validation of the Narcosis Target Lipid Model for Petroleum Products: Gasoline as a case study." *Environmental Toxicology and Chemistry* no. 24 (9):2382-2394.
- McHugh, T. E., P. R. Kulkarni, C. J. Newell, J. A. Connor, and S. Garg. 2014. "Progress in Remediation of Groundwater at Petroleum Sites in California." *Groundwater* no. 52 (6):898-907. doi: 10.1111/gwat.12136.
- McMillen, Sara J., Renae I. Magaw, and Rebecca L. Carovillano. 2001. *Risk-based decision-making for assessing petroleum impacts at exploration and production sites*. [Washington, D.C.]: U.S. Dept. of Energy.
- Meador, James, John Stein, W. L. Reichert, and U. Varanasi. 1995. "Bioaccumulation of Polycyclic Aromatic Hydrocarbons by Marine Organisms." In *Reviews of Environmental Contamination and Toxicology*, 79-165.
- Meckenstock, R. U., F. von Netzer, C. Stumpp, T. Lueders, A. M. Himmelberg, N. Hertkorn, P. Schmitt-Kopplin, M. Harir, R. Hosein, S. Haque, and D. Schulze-Makuch. 2014. "Oil biodegradation. Water droplets in oil are microhabitats for microbial life." *Science* no. 345 (6197):673-6. doi: 10.1126/science.1252215.
- Meckenstock, Rainer U., Martin Elsner, Christian Griebler, Tillmann Lueders, Christine Stumpp, Jens Aamand, Spiros N. Agathos, Hans-Jørgen Albrechtsen, Leen Bastiaens, Poul L. Bjerg, Nico Boon, Winnie Dejonghe, Wei E. Huang, Susanne I. Schmidt, Erik Smolders, Sebastian R. Sørensen, Dirk Springael, and Boris M. van Breukelen. 2015. "Biodegradation: Updating the Concepts of Control for Microbial Cleanup in Contaminated Aquifers." *Environmental Science & Technology* no. 49 (12):7073-7081. doi: 10.1021/acs.est.5b00715.
- MEDEP. 2012. Standard Operating Procedure: Compendium of Field Testing of Soil Samples for Gasoline and Fuel Oil.
- MEDEP. 2016. Risk Evaluation & Clean-up Standards.
- Melbye, Alf G., O. G. Brakstad, J. N. Hokstad, I. K. Gregersen, B. H. Hansen, A. M. Booth, S. J. Rowland, and K. E. Tollefsen. 2009. "Chemical and toxicological characterization of an unresolved complex mixture-rich biodegraded crude oil." *Environmental Toxicology and Chemistry* no. 28 (9):1815-1824. doi: 10.1897/08-545.1.
- Mendelssohn, I.A, Andersen, G.L., Baltz, D.M., Caffey, R.H., Carman, K.R., Fleeger, J.W., Joye, S.B., Lin, Q., Maltby, E., Overton, E.B., Rozas, L.P. 2012. "Oil Impacts on Coastal Wetlands: Implications for the Mississippi River Delta Ecosystem after the Deepwater Horizon Oil Spill." *BioScience* no. 62 (6):562-574.
- Mohler, Rachel E., Kirk T. O'Reilly, Dawn A. Zemo, Asheesh K. Tiwary, Renae I. Magaw, and Karen A. Synowiec. 2013. "Non-Targeted Analysis of Petroleum Metabolites in Groundwater Using GCxGC-TOFMS." *Environmental Science & Technology* no. 47 (18):10471-10476. doi: 10.1021/es401706m.
- Moody, J. D., J. P. Freeman, D. R. Doerge, and C. E. Cerniglia. 2001. "Degradation of phenanthrene and anthracene by cell suspensions of *Mycobacterium* sp. strain PYR-1." *Applied and Environmental Microbiology* no. 67 (4):1476-83.
- Neff, J.M., S. Ostazeski, W. Gardiner, and I. Stejska. 2000. "Effects of Weathering on the Toxicity of Three Offshore Australian Crude Oils and Diesel Fuel to Marine Animals." *Environmental Toxicology and Chemistry* no. 19 (7):1809-1821.

- NHDES. 2013. What is Vapor Intrusion?
- NIPHE. 2001. Technical Evaluation of the Intervention Values for Soil/Sediment and Groundwater.
- NIST. 2017. NIST 17/GC Method/Retention Index Library.
- NJDEP. 2008. Fact Sheet: Evaluating Indoor Air Near VOC Contaminated Sites.
- NJDEP. 2017a. "EPH Calculator, New Jersey Department of Environmental Protection (NJDEP) 2017."
- NJDEP. 2017b. Natural Resource Injury Assessment.
- NOAA. (National Oceanic and Atmospheric Administration). 2001. Guidance on Sensory Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill. NOAA Technical Memorandum NOS OR&R9. August, 2001. <https://response.restoration.noaa.gov/sites/default/files/guidance-sensory-testing.pdf>
- Nordtug, T., A. J. Olsen, I. Salaberria, I. B. Øverjordet, D. Altin, I. F. Størdal, and B. H. Hansen. 2015. "Oil droplet ingestion and oil fouling in the copepod *Calanus finmarchicus* exposed to mechanically and chemically dispersed crude oil." *Environ Toxicol Chem* no. 34 (8):1899-1906.
- NRC. 2005. Understanding Oil Spill Dispersants: Efficacy and Effects.
- NYDOH. 2004. Soil Vapor Intrusion Frequently Asked Questions.
- NYDOH. 2007. Volatile Organic Compounds (VOCs) in Commonly Used Products.
- OECD. 2017. Guidelines for the Testing of Chemicals.
- OHEPA. 2014. Reduction-Oxidation (Redox) Control in Ohio's Ground Water Quality.
- ORDEQ. 2011. Risk-Based Decision Making for the Remediation of Contaminated Sites Guidance, Table of Generic Risk-Based Concentrations for Petroleum Constituents and Total Petroleum Hydrocarbons and Generic Remedy for Simple Risk Based Sites.
- OSHA. 1989. Air Contaminants. In *54 Fed Reg 2332*, edited by Occupational Safety and Health Administration.
- OSHA. *Petroleum Distillates (Naphtha) (Rubber Solvent)*. Occupational Safety & Health Administration 2012. Available from [https://www.osha.gov/dts/chemicalsampling/data/CH\\_260900.html](https://www.osha.gov/dts/chemicalsampling/data/CH_260900.html).
- Pattanayek, M., and B. DeShields. 2004. Risk-based Screening Levels for the Protection of Livestock Exposed to Petroleum Hydrocarbons. Petaluma, California: American Petroleum Institute (API).
- Pitard, F. F. 1993. *Pierre Gy's Sampling Theory and Sampling Practice*. 2nd edition ed: CRC Press, Inc.
- Potter, T. L. 1996. "Analysis of Petroleum-Contaminated Water by GC/FID with Direct Aqueous Injection." *Groundwater Monitoring & Remediation* no. 16 (3):157-162. doi: 10.1111/j.1745-6592.1996.tb00145.x.
- Prince, Roger C., Kelly M. McFarlin, Josh D. Butler, Eric J. Febbo, Frank C. Y. Wang, and Tim J. Nedwed. 2013. "The primary biodegradation of dispersed crude oil in the sea." *Chemosphere* no. 90 (2):521-526. doi: <https://doi.org/10.1016/j.chemosphere.2012.08.020>.
- Prince, Roger C., Thomas F. Parkerton, and Carolyn Lee. 2007. "The Primary Aerobic Biodegradation of Gasoline Hydrocarbons." *Environmental Science & Technology* no. 41 (9):3316-3321. doi: 10.1021/es062884d.
- Rabus, R., M. Boll, J. Heider, R. U. Meckenstock, W. Buckel, O. Einsle, U. Ermler, B. T. Golding, R. P. Gunsalus, P. M. H. Kroneck, M. Krüger, T. Lueders, B. M. Martins, F. Musat, H. H. Richnow, B. Schink, J. Seifert, M. Szalaniec, T. Treude, G. M. Ullmann, C. Vogt, M. von Bergen, and H. Wilkes. 2016. "Anaerobic Microbial Degradation of Hydrocarbons: From Enzymatic Reactions to the Environment." *Journal of Molecular Microbiology and Biotechnology* no. 26 (1-3):5-28.
- Redman, A.D., T.F. Parkerton, M.H. Comber, M.L. Paumen, C.V. Eadsforth, B. Dmytrasz, D. King, C.S. Warren, K. den Haan, and N. Djemel. 2014. "PETRORISK: A risk assessment framework for petroleum substances." *Integrated*

*Environmental Assessment and Management* no. 10 (3):437-448.

- Redman, A.D., T.F. Parkerton, M. Leon Paumen, J.D. Butler, D.J. Letinski, and K. den Haan. 2017. "A re-evaluation of PETROTOX for predicting acute and chronic toxicity of petroleum substances." *Environmental Toxicology and Chemistry* no. 36 (8):2245-2252.
- Redman, A.D., T.F. Parkerton, J.A McGrath, and D.M. Di Toro. 2012. "Petrotox: An Aquatic Toxicity Model for Petroleum Hydrocarbons." *Environmental Toxicology and Chemistry* no. 31 (11):2498-2506.
- Redman, A.D., T.F. Parkerton, M.L. Paumen, J.A. McGrath, K. den Haan, and D.M. Di Toro. 2014. "Extension and validation of the target lipid model for deriving predicted no-effect concentrations for soils and sediments." *Environmental Toxicology and Chemistry* no. 33 (12):2679-2687.
- Redman, Aaron D., and Thomas F. Parkerton. 2015. "Guidance for improving comparability and relevance of oil toxicity tests." *Marine Pollution Bulletin* no. 98 (1):156-170. doi: <https://doi.org/10.1016/j.marpolbul.2015.06.053>.
- Reilly, T.I., and York, R.K. 2001. Guidance on Sensory Testing and Monitoring of Seafood for Presence of Petroleum Taint following an Oil Spill. NOAA Technical Memorandum NOS  
<https://response.restoration.noaa.gov/sites/default/files/guidance-sensory-testing.pdf>
- Reisinger, H. J., J. M. Kerr, R. E. Hinchee, D. R. Burris, R. S. Dykes, and G. L. Simpson. 1989. "Using Soil Vapor Contaminant Assessment as a Tool in Developing Remedial Approaches at Hydrocarbon Contaminated Sites." In *Petroleum Contaminated Sites*, edited by E. Calabrese, P. Kosteci, 303-317. Lewis Publishers, Inc.
- Renzone, A. 1975. "Toxicity of three oils to bivalve gametes and larvae." *Marine Pollution Bulletin* no. 6 (8):125-128.
- Rhodes, Ileana A. 2017. Site Characterization Integration with Environmental Forensics -Overview of Petroleum Hydrocarbon Chemistry and Environmental Forensics.
- Roberts, D.W, and J.F. Costello. 2003. "Mechanisms of action for general and polar narcosis: a difference in dimension." *Molecular Informatics* no. 22 (2):226-233.
- Rogers, Vincent V., Mark Wickstrom, Karsten Liber, and Michael D. MacKinnon. 2002. "Acute and Subchronic Mammalian Toxicity of Naphthenic Acids from Oil Sands Tailings." *Toxicological Sciences* no. 66 (2):347-355. doi: 10.1093/toxsci/66.2.347.
- Rojo, F. 2009. "Degradation of alkanes by bacteria." *Environmental Microbiology* no. 11 (10):2477-2490. doi: 10.1111/j.1462-2920.2009.01948.x.
- Salanitro, Joseph P., Philip B. Dorn, Michael H. Huesemann, Keith O. Moore, Ileana A. Rhodes, Lesa M. Rice Jackson, Tim E. Vipond, Margaret M. Western, and Halina L. Wisniewski. 1997. "Crude Oil Hydrocarbon Bioremediation and Soil Ecotoxicity Assessment." *Environmental Science & Technology* no. 31 (6):1769-1776. doi: 10.1021/es960793i.
- Schink, B. 1997. *Schink B.. Energetics of syntrophic cooperation in methanogenic degradation. Microbiol Mol Biol Rev* 61: 262-280. Vol. 61.
- Schmidt & Clark, LLP. 2013. *List of Products Containing Benzene* 20132013].
- Schultz, T.W. 1989. "Non-polar narcosis: a review of the mechanism of action for baseline aquatic toxicity." *American Society for Testing and Materials*.
- SETAC. 2004. Whole Effluent Toxicity Testing. SETAC Technical Issue Paper. Pensacola, Florida.
- Shafer, L. M., and T. Edwards. 2011. Speciated Naphthalene Analysis in Liquid Transportation Fuels. Paper read at The 12th International Conference on Stability, Handling and Use of Liquid Fuels, October 2011, at Sarasota, FL.
- Shiu, Wan Ying, Mark Bobra, Alice M. Bobra, Aila Maijanen, Leena Suntio, and Donald Mackay. 1990. "The water solubility of crude oils and petroleum products." *Oil and Chemical Pollution* no. 7 (1):57-84. doi: [https://doi.org/10.1016/S0269-8579\(05\)80034-6](https://doi.org/10.1016/S0269-8579(05)80034-6).
- Singer, M. M., D. Aurand, G. E. Bragin, J. R. Clark, G. M. Coelho, M. L. Sowby, and R. S. Tjeerdema. 2000. "Standardization

- of the Preparation and Quantitation of Water-accommodated Fractions of Petroleum for Toxicity Testing." *Marine Pollution Bulletin* no. 40 (11):1007-1016. doi: [https://doi.org/10.1016/S0025-326X\(00\)00045-X](https://doi.org/10.1016/S0025-326X(00)00045-X).
- Spence, L. R, J.T Walden, and , and R.E. Roy, 2017, . 2017. "RISC5, Risk-Integrated Software for Clean-Ups, Version 5.0. The user's guide (available for free download) and the software are available from [www.GroundwaterSoftware.com](http://www.GroundwaterSoftware.com), May 2017."
- Stankey, G. H., R. N. Clark, and B. T. Bormann. 2005. Adaptive Management of Natural Resources: Theory, Concepts, and Management Institutions. edited by Forest Service US Department of Agriculture, Pacific Northwest Research Station.
- Sweeney, Robert E., and T. G. Ririe. 2014. "Temperature as a Tool to Evaluate Aerobic Biodegradation in Hydrocarbon Contaminated Soil." *Groundwater Monitoring & Remediation* no. 34 (3):41-50. doi: 10.1111/gwmmr.12064.
- Swigert, J.P., C. Lee, D.C. Wong, and P. Podhasky. 2014. "Aquatic hazard and biodegradability of light and middle atmospheric distillate petroleum streams." *Chemosphere* no. 108:1-9.
- TCEQ. 2001. Total Petroleum Hydrocarbons TNRCC Method 1005.
- TCEQ. 2010. Development of Human Health PCLs for Total Petroleum Hydrocarbon Mixtures.
- TCEQ. *Texas Risk Reduction Program* 2017a. Available from <https://www.tceq.texas.gov/remediation/trrp/trrp.html>.
- TCEQ. 2017b. TPH Spreadsheets for Calculating Protective Concentration Levels (PCLs), Texas Commission on Environmental Quality, 2017 (March 2017), <https://www.tceq.texas.gov/remediation/trrp/trrppcls.html>.
- TCEQ. Undated. Characterization of Nc6 to Nc35 Petroleum Hydrocarbons in Environmental Samples. Texas Natural Resource Conservation Commission Method 1006. Draft.
- Teal, J.M., and R.W. Howarth. 1984. "Oil spill studies: A review of ecological effects." *Environmental Management* no. 8 (1):27-43.
- Thomas, D. H., and J. J. Delfino. 1991. "A Gas Chromatographic/Chemical Indicator Approach to Assessing Ground Water Contamination by Petroleum Products." *Groundwater Monitoring & Remediation* no. 11 (4):90-100. doi: 10.1111/j.1745-6592.1991.tb00398.x.
- Thomas, K. V., P. Donkin, and S. J. Rowland. 1995. "Toxicity enhancement of an aliphatic petrogenic unresolved complex mixture (UCM) by chemical oxidation." *Water Research* no. 29 (1):379-382. doi: [https://doi.org/10.1016/0043-1354\(94\)E0111-I](https://doi.org/10.1016/0043-1354(94)E0111-I).
- Thorn, K. A., and G. R. Aiken. 1998. "Biodegradation of crude oil into nonvolatile organic acids in a contaminated aquifer near Bemidji, Minnesota." *Organic Geochemistry* no. 29 (4):909-931. doi: [http://dx.doi.org/10.1016/S0146-6380\(98\)00167-3](http://dx.doi.org/10.1016/S0146-6380(98)00167-3).
- Tissot, B. P., and D. H. Welte. 1984. "Petroleum Formation and Occurrence. Second Revised and Enlarged Edition." In: Springer-Verlag. <https://raregeologybooks.files.wordpress.com/2014/12/b-p-tissot-and-d-h-welte-petroleum-formation-and-occurrence.pdf>
- Tomlinson, Priscilla, and Michael V. Ruby. 2016. "State and federal cleanup levels for petroleum hydrocarbons in soil: State of the states and implications for the future." *Human and Ecological Risk Assessment: An International Journal* no. 22 (4):911-926. doi: 10.1080/10807039.2015.1120151.
- Torres, Ronaldo J., Augusto Cesar, Camilo D. S. Pereira, Rodrigo B. Choueri, Denis M. S. Abessa, Marcos R. L. do Nascimento, Pedro S. Fadini, and Antonio A. Mozeto. 2012. "Bioaccumulation of Polycyclic Aromatic Hydrocarbons and Mercury in Oysters (*Crassostrea rhizophorae*) from Two Brazilian Estuarine Zones." *International Journal of Oceanography* no. 2012:8. doi: 10.1155/2012/838320.
- ToxStrategies. 2016. Review of the Scientific Basis of USEPA's Provisional Peer-Review Toxicity Values for Total Petroleum Hydrocarbon Fractions.

- TPHCWG. 1997a. A Risk-based Approach for the Management of Total Petroleum Hydrocarbons in Soil. In *A Technical Overview of the Petroleum Hydrocarbon Risk Assessment Approach of the TPH Criteria Working Group*.: Total Petroleum Hydrocarbon Criteria Working Group.
- TPHCWG. 1997b. Total Petroleum Hydrocarbon Criteria Working Group Series, Volume 3: Selection of Representative TPH Fractions Based on Fate and Transport Considerations. Amherst, MA: Total Petroleum Hydrocarbon Criteria Working Group.
- TPHCWG. 1997c. Total Petroleum Hydrocarbon Criteria Working Group Series, Volume 4: Development of Fraction Specific Reference Doses (RfDs) and Reference Concentrations (RfCs) for Total Petroleum Hydrocarbons (TPH). Amherst, MA: Total Petroleum Hydrocarbon Criteria Working Group.
- TPHCWG. 1998a. Total Petroleum Hydrocarbon Criteria Working Group Series, Volume 1: Analysis of Petroleum Hydrocarbons in Environmental Media. Amherst, MA: Total Petroleum Hydrocarbon Criteria Working Group.
- TPHCWG. 1998b. "Total Petroleum Hydrocarbon Criteria Working Group Series. Volume 2. Composition of Petroleum Mixtures (Thomas L. Potter, Kathleen E. Simmons). May 1998."
- TPHCWG. 1999. Total Petroleum Hydrocarbon Criteria Working Group Series, Volume 5: Human Health Risk-Based Evaluation of Petroleum Release Sites: Implementing the Working Group Approach. Amherst, MA: Total Petroleum Hydrocarbon Criteria Working Group.
- UDEQ. 2015. "UDEQ, Leaking Underground Storage Tank Program, 2015, Cleanup Level Calculator: Site-Specific, <https://documents.deq.utah.gov/environmental-response-and-remediation/ust-lust/leaking-underground-storage-tank-s-remedial-assistance/site-specific-cleanup-level-calculator-v-1-2.xls>."
- Uhler, A. D., S. A. Stout, and K. J. McCarthy. 1998. "Increase Success of Assessments at Petroleum Sites in 5 Steps." *Soil & Groundwater Cleanup* no. Dec/Jan:13-19.
- US Navy. 2011. Navy and Marine Corps Public Health Center. Risk Communication, Appendix H. Two Tools for Responding to Any Difficult Question/Statement on Any Issue from Any Stakeholder in Any Setting.: Fulton, K., and S. Martinez, Fulton Communications.
- USDOD. 2018. Consolidated Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1.1.
- USEPA. 1984. Method TO-3, Revision 1.0. "Method for the determination of volatile organic compounds in ambient air using cryogenic preconcentration techniques and gas chromatography with flame ionization and electron capture detection."
- USEPA. 1986. Guidelines for the Health Risk Assessment of Chemical Mixtures. Fed. Reg. 51(185):34014–34025.
- USEPA. 1989. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part A).
- USEPA. 1991. Technical Support Document for Qater Quality-based Toxics Control. edited by Office of Water. Washington, D.C.
- USEPA. 1992. Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA.
- USEPA. 1994. Catalogue of Standard Toxicity Tests for Ecological Risk Assessment.
- USEPA. 1996. Soil Screening Guidance: Technical Background Document. Second Edition.
- USEPA. 1997a. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological risk Assessments.
- USEPA. 1997b. Rules of Thumb for Superfund Remedy Selection.
- USEPA. 1998. Seven Cardinal Rules of Risk Communication.
- USEPA. 1999. Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites, U.S. Environmental Protection Agency (USEPA).

USEPA. 2000a. Bioaccumulation Testing and Interpretation for the Purpose of Sediment Quality Assessment. Status and Needs.

USEPA. 2000b. Data Quality Objectives Process for Hazardous Waste Site Investigations.

USEPA. 2000c. Supplementary Guidance for Conducting Health Risk Assessment of Chemical Mixtures. Washington, DC: Risk Assessment Forum.

USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. U.S. Environmental Protection Agency, Solid Waste and Emergency Response.

USEPA. 2003. Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: PAH Mixtures. edited by Office of Research and Development. Washington, D.C.

USEPA. 2004. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final. Washington, DC.

USEPA. 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process.

USEPA. 2006a. *Freshwater Net Environmental Benefit Analysis Exercises. Region V.*

USEPA. 2007a. Ecological Soil Screening Levels for Polycyclic Aromatic Hydrocarbons. Interim Final.

USEPA. 2007b. Guidance for Developing Ecological Soil Screening Levels; Attachment 4-1: Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSLs.

USEPA. 2007c. What You Should Know About Vapor Intrusion.

USEPA. *Community Involvement Plan: Hudson River PCBs Superfund Site* 2009a. Available from [www3.epa.gov/hudson/cip.htm](http://www3.epa.gov/hudson/cip.htm).

USEPA. *Community Involvement Plan: Iron King Mine - Humboldt Smelter Site* 2009b. Available from [https://response.epa.gov/site/site\\_profile.aspx?site\\_id=11828](https://response.epa.gov/site/site_profile.aspx?site_id=11828).

USEPA. *Lockheed West Seattle and Harbor Island/East Waterway Community Involvement Plan* 2009c. Available from [http://yosemite.epa.gov/r10/cleanup.nsf/sites/LockheedWest/\\$FILE/lockheed\\_harbor\\_island\\_cip.pdfUS](http://yosemite.epa.gov/r10/cleanup.nsf/sites/LockheedWest/$FILE/lockheed_harbor_island_cip.pdfUS).

USEPA. 2009d. "Provisional Peer-Reviewed Toxicity Values for Complex Mixtures of Aliphatic and Aromatic Hydrocarbons: U.S. Environmental Protection Agency, Superfund Health Risk Technical Support Center, National Center for Environmental Assessment, Office of Research and Development, September 30, 2009."

USEPA. *Community Involvement Plan: Foster Wheeler Energy Corp. Church Road TCE Superfund Alternative Approach Site* 2010. Available from [cumulis.epa.gov/supercpad/cursites/csinfo.cfm?id=0300671](http://cumulis.epa.gov/supercpad/cursites/csinfo.cfm?id=0300671).

USEPA. 2011. Environmental Cleanup Best Management Practices: Effective Use of the Project Life Cycle Conceptual Site Model.

USEPA. 2012a. A Citizen's Guide to Bioremediation.

USEPA. 2012b. Equilibrium partitioning sediment benchmarks (ESBs) for the protection of benthic organisms: procedures for the determination of the freely dissolved interstitial water concentrations of nonionic organics.

USEPA. 2013a. *Office of Underground Storage Tanks Glossary of Technical Terms*. Available from <http://www2.epa.gov/ust>.

USEPA. 2013b. Portland Harbor RI/FS, Final Remedial Investigation Report. Appendix G Baseline Ecological Risk Assessment. Final.

USEPA. *Superfund Community Involvement Toolkit* 2013c. Available from <https://www.epa.gov/superfund/superfund-community-involvement-tools-and-resources>.

USEPA. 2014. Memorandum: Determining Groundwater Exposure Point Concentrations, Supplemental Guidance.

- USEPA. 2015a. OSWER technical guide for assessing and mitigating the vapor intrusion pathway from subsurface vapor sources to indoor air. Washington D.C.: U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response.
- USEPA. 2015b. Region 4 Ecological Risk Assessment Supplemental Guidance Interim Draft.
- USEPA. 2015c. Technical Guide For Addressing Petroleum Vapor Intrusion At Leaking Underground Storage Tank Sites. Washington, D.C.: U.S. Environmental Protection Agency, Office of Underground Storage Tanks.
- USEPA. *Clean Air Act Requirements and History* 2017a. Available from <https://www.epa.gov/clean-air-act-overview/clean-air-act-requirements-and-history#congress>.
- USEPA. *Estimating Toxicity of Industrial Chemicals to Aquatic Organisms Using Ecological Structure-Activity Relationship Model (ECOSAR)*. October 2017 2017b. Available from <https://www.epa.gov/tsca-screening-tools/ecological-structure-activity-relationships-ecosar-predictive-model>.
- USEPA. *Human Health Risk Assessment* 2017c. Available from <http://www2.epa.gov/risk/human-health-risk-assessment>.
- USEPA. 2017d. National Functional Guidelines for Organic Superfunds Methods Data Review. Edited by [https://www.epa.gov/sites/production/files/2017-01/documents/national\\_functional\\_guidelines\\_for\\_organic\\_superfund\\_methods\\_data\\_review\\_013072017.pdf](https://www.epa.gov/sites/production/files/2017-01/documents/national_functional_guidelines_for_organic_superfund_methods_data_review_013072017.pdf).
- USEPA. *Proper Management of Oil and Gas Exploration and Production Waste* 2017e. Available from <https://www.epa.gov/hw/proper-management-oil-and-gas-exploration-and-production-waste>.
- USEPA. *EcoTox Database*, Last update June 7, 2018 2018a. Available from <https://cfpub.epa.gov/ecotox/>.
- USEPA. Accessed 2018. *Exposure Parameters* 2018b Accessed 2018. Available from Exposure Parameters. <https://www.epa.gov/risk/exposure-parameters>.
- USEPA. *Regional Screening Levels (RSL) calculator* 2018c. Available from <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016>.
- USEPA. 2018d. Regional Screening Levels (RSLs) -Generic Tables (May 2018).
- USEPA. *Regional Screening Levels Frequent Questions*. #48. *How are total petroleum hydrocarbons (TPH) considered in calculating the RSLs?* 2018e. Available from <https://www.epa.gov/risk/regional-screening-levels-frequent-questions#FQ49>.
- USGS. *National Water-Quality Assessment (NAWQA) Program Glossary* 2013. Available from <http://water.usgs.gov/nawqa/glos.html>.
- Valentine, Marla M., and Mark C. Benfield. 2013. "Characterization of epibenthic and demersal megafauna at Mississippi Canyon 252 shortly after the Deepwater Horizon Oil Spill." *Marine Pollution Bulletin* no. 77 (1):196-209. doi: <https://doi.org/10.1016/j.marpolbul.2013.10.004>.
- Van Metre, Peter C., Barbara J. Mahler, and Edward T. Furlong. 2000. "Urban Sprawl Leaves Its PAH Signature." *Environmental Science & Technology* no. 34 (19):4064-4070. doi: 10.1021/es991007n.
- Vedagiri, U. K., and C. Curren. 2014. A critical review of USEPA's RSLs for petroleum hydrocarbons. In *the Annual AEHS Conference*. San Diego, CA.
- Veith, G. D., and S. J. Broderius. 1990. "Rules for distinguishing toxicants that cause type I and type II narcosis syndromes." *Environmental Health Perspectives* no. 87:207-211.
- WADOE. 1997. Analytical Methods for Petroleum Hydrocarbons, Publication No. ECY-97-602.
- WADOE. 2015. *Cleanup Levels and Risk Calculations (CLARC)* 2015. Available from <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
- WADOE. 2016a. Guidance for Remediation of Petroleum Contaminated Sites. Department of Ecology Toxics Cleanup Program Publication No. 10-09-057.

- WADOE. 2016b. Toxicity Testing of Soils Contaminated with Gasoline, Diesel, and Heavy Oil, Toxicity Testing of Washington Soils, Toxics Studies Unit, Environmental Assessment Program, Washington State Department of Ecology, Publication No. 16-03-038.
- Whale, G., M.I.H. Comber, N. Djemel, I. Keresztyeni, S.A. Villalobos, B. Seljestokken, A. Redman, M. Leon Paumen, V. Michalopoulou, D. King, C.V. Eadsforth, and Thomas F. Parkerton. 2013. Predicting refinery effluent toxicity of the basis of hydrocarbon composition determined by GC x GC Analysis.
- Widdel, Friedrich, and Ralf Rabus. 2001. "Anaerobic biodegradation of saturated and aromatic hydrocarbons." *Current Opinion in Biotechnology* no. 12 (3):259-276. doi: [https://doi.org/10.1016/S0958-1669\(00\)00209-3](https://doi.org/10.1016/S0958-1669(00)00209-3).
- WIDHS. *Vapor Intrusion* 2013. Available from <https://www.dhs.wisconsin.gov/library/P-45053.htm>.
- Wiedemeier, T. H., H. S. Rifai, C. J. Newell, and J. T. Wilson. 1999. *Natural Attenuation of Fuels and Chlorinated Solvents in the Subsurface*: John Wiley & Sons.
- Williams, Byron K. 2011. "Adaptive management of natural resources—framework and issues." *Journal of Environmental Management* no. 92 (5):1346-1353. doi: <https://doi.org/10.1016/j.jenvman.2010.10.041>.
- Williams, U.P., J.W. Kiceniuk, L.L. Fancey, and J.R. Botta. 1989. "Tainting and depuration of taint by lobsters (*Homarus americanus*) exposed to water contaminated with a No. 2 fuel oil: Relationship with aromatic hydrocarbon content in tissue." *Journal of Food Science* 54(2): 240-243. <https://doi.org/10.1111/j.1365-2621.1989.tb03052.x>
- Wolfe, Douglas A., K. John Scott, John R. Clayton, John Lunz, James R. Payne, and Timothy A. Thompson. 1995. "Comparative Toxicities of Polar and Non-Polar Organic Fractions From Sediments Affected By the Exxon Valdez Oil Spill in Prince William Sound, Alaska." *Chemistry and Ecology* no. 10 (1-2):137-156. doi: 10.1080/02757549508035337.
- Yender, R., J. Michel, and C. Lord. 2002. *Managing Seafood Safety After an Oil Spill*. Seattle: Hazardous Materials Response Division, Office of Response and Restoration, National Oceanic and Atmospheric Administration. <http://www.imo.org/en/OurWork/Environment/PollutionResponse/OilPollutionResources/Documents/Platform%20for%20inforamtion%20sharing/Seafood%20safety/Managing%20Seafood%20safety%20after%20oil%20spill.pdf>
- Young, L. Y., and C. D. Phelps. 2005. "Metabolic biomarkers for monitoring in situ anaerobic hydrocarbon degradation." *Environmental Health Perspectives* no. 113 (1):62-7.
- Zemo, D. A. 2016. White Paper: Analytical Methods for Total Petroleum Hydrocarbons (TPH). Washington, D.C.: Prepared for American Petroleum Institute (API).
- Zemo, D. A., K. T. O'Reilly, R. E. Mohler, A. K. Tiwary, R. I. Magaw, and K. A. Synowiec. 2013. "Nature and Estimated Human Toxicity of Polar Metabolite Mixtures in Groundwater Quantified as TPHd/DRO at Biodegrading Fuel Release Sites." *Groundwater Monitoring & Remediation* no. 33 (4):44-56. doi: 10.1111/gwmmr.12030.
- Zemo, D. A., K. T. O'Reilly, R. E. Mohler, R. I. Magaw, C. E. Devine, K. S. Ahn, and A. K. Tiwaryk. 2017. "Life Cycle of Petroleum Biodegradation Metabolite Plumes, and Implications for Risk Management at Fuel Release Sites. Integrated Environmental Assessment and Management. doi: 10.1002/ieam.1848." *Integrated Environmental Assessment and Management* no. 13 (4):714-727.
- Zemo, D. A., K. A. Synowiec, R. I. Magaw, and R. E. Mohler. 2013. "Comparison of Shake and Column Silica Gel Cleanup Methods for Groundwater Extracts to Be Analyzed for TPHd/DRO." *Groundwater Monitoring & Remediation* no. 33 (4):108-112. doi: 10.1111/gwmmr.12032.
- Zemo, D.A., J.E. Bruya, and T.E. Graf. 1995. "The Application of Petroleum Hydrocarbon Fingerprint Characterization in Site Investigation and Remediation." *Groundwater Monitoring & Remediation* no. 15 (2):147-156. doi: 10.1111/j.1745-6592.1995.tb00526.x.
- Zemo, Dawn A., and Gary R. Foote. 2003. "The Technical Case for Eliminating the Use of the TPH Analysis in Assessing and Regulating Dissolved Petroleum Hydrocarbons in Ground Water." *Ground Water Monitoring & Remediation* no. 23 (3):95-104. doi: 10.1111/j.1745-6592.2003.tb00687.x.



Zielinska-Park, Joanna, Jun Nakamura, James A. Swenberg, and Michael D. Aitken. 2004. "Aldehydic DNA lesions in calf thymus DNA and HeLa S3 cells produced by bacterial quinone metabolites of fluoranthene and pyrene." *Carcinogenesis* no. 25 (9):1727-1733. doi: 10.1093/carcin/bgh174.

Zobell, Claude E. 1946. "ACTION OF MICROÖRGANISMS ON HYDROCARBONS." *Bacteriological Reviews* no. 10 (1-2):1-49.

Zychowski, G. V., and C. A. J. Godard-Codding. 2017. "Reptilian exposure to polycyclic aromatic hydrocarbons and associated effects." *Environmental Toxicology and Chemistry* no. 36 (1):25-35.