

Book Chapter

Pederson J.R., Roberts P.T., and Main H.H. (1994) Measuring boundary conditions: initial strategies, field testing, and recommendations. In *Planning and Managing Regional Air Quality Modeling and Measurement Studies: A Perspective Through the San Joaquin Valley Air Quality Study and AUSPEX*, Solomon P.A. and Silver T.A., eds., CRC Press, Inc., Boca Raton, FL, pp. 561-586.

Journal Articles

Brown S.G., Snyder J.L., McCarthy M.C., Pavlovic N., D'Andrea S., Hanson J., Sullivan A.P., and Hafner H.R. (2020) Assessment of ambient air toxics and wood smoke pollution among communities in Sacramento County. *International Journal of Environmental Research and Public Health*, 17(3), doi: 10.3390/ijerph17031080 (STI-7183). Available at <https://www.mdpi.com/1660-4601/17/3/1080>.

Mukherjee A.D., Brown S.G., McCarthy M.C., Pavlovic N.R., Stanton L.G., Snyder J.L., Andrea S.D., and Hafner H.R. (2019) Measuring spatial and temporal PM_{2.5} variations in Sacramento, California, communities using a network of low-cost sensors. *Sensors*, 19(21), 4701, doi: 10.3390/s19214701 (STI-7092). Available at <https://www.mdpi.com/1424-8220/19/21/4701>.

Dye T., Graham A., and Hafner H. (2016) Air sensor study design: details matter. *Air & Waste Management Association's EM Magazine*, November.

Penfold B.M., Hafner H.R., and Brown S.G. (2013) Predicting areas of high diesel particulate matter emissions in Phoenix, Arizona, using spatial analysis techniques. *Journal of Environmental Engineering and Science*, 8(4), 493-504, doi: 10.1680/jees.2013.0050 (STI-3088), November. Available at <http://www.icvirtuallibrary.com/content/article/10.1680/jees.2013.0050;jsessionid=1bh0fwopoonsjx-telford-live-01>.

McCarthy M.C., O'Brien T.E., Charrier J.G., and Hafner H.R. (2009) Characterization of the chronic risk and hazard of hazardous air pollutants in the United States using ambient monitoring data. *Environ. Health Persp.*, 117(5), 790-796, doi: 10.1289/ehp.11861 (STI-3267), May. Available at <http://www.ncbi.nlm.nih.gov/pubmed/19479023>.

Brown S.G., Frankel A., Raffuse S.M., Roberts P.T., Hafner H.R., and Anderson D.J. (2007) Source apportionment of fine particulate matter in Phoenix, AZ, using positive matrix factorization. *J. Air and Waste Manag. Assoc.* 57, 741-752 (STI-2675).

Buzcu-Guven B., Brown S.G., Frankel A., Hafner H.R., and Roberts P.T. (2007) Analysis and apportionment of organic carbon and fine particulate matter sources at multiple sites in the midwestern United States. *J. Air and Waste Manag. Assoc.* 57, 606-619 (STI-2876).

Brown S.G., Frankel A., and Hafner H.R. (2007) Source apportionment of VOCs in the Los Angeles area using positive matrix factorization. *Atmos. Environ.* 41, 227-237 (STI-2725).

McCarthy M.C., Hafner H.R., Chinkin L.R., and Charrier J.G. (2007) Temporal variability of selected air toxics in the United States. *Atmos. Environ.*, doi:10.1016/j.atmosenv.2007.1005.1037 (STI-2894).

MacDonald C.P., McCarthy M.C., Dye T.S., Wheeler N.J.M., Hafner H.R., and Roberts P.T. (2006) Transport and dispersion during wintertime particulate matter episodes in the San Joaquin Valley, California. *J. Air & Waste Manag. Assoc.* 56, 961-976 (STI-902329-2660).

- McCarthy M.C., Hafner H.R., and Montzka S.A. (2006) Background concentrations of 18 air toxics for North America. *J. Air & Waste Manage. Assoc.* 56, 3-11 (STI-903550-2589).
- McCarthy M.C., Eisinger D.S., Hafner H.R., Chinkin L.R., Roberts P.T., Black K.N., Clark N.N., McMurry P.H., and Winer A.M. (2006) Particulate matter: a strategic vision for transportation-related research. *Environ. Sci. Technol.* 40 (18), 5593-5599 (STI-904750-2843). Available at <http://pubs.acs.org/doi/abs/10.1021/es062767i>.
- Kenski D., Koerber M., Hafner H.R., McCarthy M.C., and Wheeler N. (2005) Lessons learned from air toxics data: a national perspective. *Environ. Man. J.*, 19-22.
- Kim E., Brown S.G., Hafner H.R., and Hopke P.K. (2005) Characterization of non-methane volatile organic compounds sources in Houston during 2001 using positive matrix factorization. *Atmos. Environ.* 39, 5934-5946, (STI-5669), doi: 10.1016/j.atmosenv.2005.06.045.
- Chinkin L.R., Coe D.L., Funk T.H., Hafner H.R., Roberts P.T., Ryan P.A., and Lawson D.R. (2003) Weekday versus weekend emissions activity patterns for ozone precursor emissions in California's South Coast Air Basin. *J. Air & Waste Manag. Assoc.* 53, 829-843 (STI-999679-2225).
- MacDonald C.P., Roberts P.T., Main H.H., Dye T.S., Coe D.L., and Yarbrough J. (2001) The 1996 Paso del Norte Ozone Study: phenomena that influence the local ozone concentrations. *Sci. Total Environ.* (Special Issue: U.S.-Mexico Transboundary Air Pollution Studies) 276, Nos. 1-3, 93-110 (STI-1949).
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- Lyons J.M., Venkataraman C., Main H.H., and Friedlander S.K. (1993) Size distributions of trace metals in the Los Angeles atmosphere. *Atmos Environ.* 27B, 237-249.
- Fujita E.M., Croes B.E., Bennett C.L., Lawson D.R., Lurmann F.W., and Main H.H. (1992) Comparison of emission inventory and ambient concentration ratios of CO, NMOG, and NO_x in California's South Coast Air Basin. *J. Air & Waste Manag. Assoc.* 42, 264-276, (STI-5665).
- Friedlander S.K., Koch W., and Main H.H. (1991) Scavenging of a coagulating fine aerosol by a coarse particle mode. *Journal of Aerosol Science*, 22(1), 1-8, doi: 10.1016/0021-8502(91)90088-Y (STI-5663). Available at <http://www.sciencedirect.com/science/article/pii/002185029190088Y>.
- Main H.H. and Friedlander S.K. (1990) Determination of dry deposition of atmospheric aerosols for point and area source by dual tracer method. *Intermedia Pollutant Transport*, 73-83, doi: 10.1007/978-1-4613-0511-8_5 (STI-5666). Available at http://link.springer.com/chapter/10.1007%2F978-1-4613-0511-8_5.
- Main H.H. and Friedlander S.K. (1990) Dry deposition of atmospheric aerosols by dual tracer method, part I. point source. *Atmos. Environ.* 24A, 103-108.

Meeting Presentations, Posters, and Conference Proceedings

- McClure C.D., Kramer S.J., and Hafner H.R. (2022) Two years of CAS Auto-GC PAMS monitoring: successes and challenges in software/hardware implementation, monitoring, and data QC. Presentation given at the 2022 National Ambient Air Monitoring Conference, Pittsburgh, PA, August 25, by Sonoma Technology, Petaluma, CA. 7696.

- Marrero J.E., Hafner H., and MacDonald C.P. (2022) Community-focused monitoring in California: building bridges between community members and industrial facilities. Presentation given at the *Air Sensors International Conference, May 12, 2022, Pasadena, CA 2022*, By Sonoma Technology, Petaluma, CA. STI-7628.
- Mukherjee A., Huang S., Hafner H., and Gorham D. (2021) Examining smoke impacts from major California wildfires in 2017 and 2018 using modeled smoke based on BlueSky Framework and observed smoke data from ground monitors and satellites. Presentation given at the *Air and Waste Management Association Visibility Conference, Bryce Canyon, UT, October 5-8*, by Sonoma Technology, Inc., Petaluma, CA. STI-7389.
- Brown S.G., Ryder O.S., DeWinter J.L., and Hafner H.R. (2020) Apportionment of metals and particulate matter at an environmental justice community in California. Poster presented at the *2020 American Association for Aerosol Research Meeting, Virtual, October 5-9*, Sonoma Technology, Petaluma, CA. STI-7288.
- Hafner H., Minor H., O'Brien T., and Mukherjee A. (2019) Sensor technology. Training presentations prepared for the U.S. Environmental Protection Agency by Sonoma Technology, Inc., Petaluma, CA, STI-915510-7502, November.
- Hafner H., Brown S., and Ryder O. (2019) Air toxics and heavy metals: evaluating air quality at a Maywood, California, elementary school. Presented at the *A&WMA West Coast Section Annual Conference, Diamond Bar, CA, October 17*, by Sonoma Technology, Inc., Petaluma, CA. STI-7180.
- DeWinter J.L., Haderman M.D., Hafner H.R., and Brown S.G. (2019) Mining big data from low-cost air sensors in California. Presentation given at the *Air & Waste Management Association's Air Quality Measurements Conference, Durham, NC, April 2*, by Sonoma Technology Inc., Petaluma, CA. STI-7090.
- Huang S. and Hafner H. (2019) Camp Fire impacts on air quality in California in November 2018. Presentation given at the *A&WMA Impacts of Wildfires on Air Quality and Health Conference, Santa Rosa, CA, February 14*. STI-7062.
- DeWinter J., Hafner H., Papapostolou V., and Polidori A. (2018) Community-based air quality monitoring with low-cost sensors: developing a toolkit, best practices, and lessons learned. Poster presented at the *2018 AGU Fall Meeting, Washington D.C., December 10-14*, by Sonoma Technology, Inc., Petaluma, CA, and the South Coast Air Quality Management District, Diamond Bar, CA. STI-6966.
- Hafner H.R. (2018) Approaches for implementing monitoring and outreach projects in support of AB 617. Presentation given at the *A&WMA West Coast Section Conference, Diamond Bar, CA, November 14*, by Sonoma Technology, Petaluma, CA. STI-7004.
- Chan A.C., Stanton L.G., and Hafner H.R. (2018) Planning your sensor deployment: practical guidance. Presented at the *2018 Better Air Quality Conference, International Action and Cooperation on Air Pollution Management, Kuching, Malaysia, November 12-16*, by Sonoma Technology, Inc., Petaluma, CA. STI-6929.
- Hafner H., Papapostolou V., Hoag K., and DeWinter J. (2018) Community sensor training: best practices and lessons learned. Presented at the *2018 UC Davis Air Sensors International Conference, Oakland, CA, September 14*, by Sonoma Technology, Inc., Petaluma, CA. STI-6909. Available at https://asic.aqrc.ucdavis.edu/sites/g/files/dgvnsk3466/files/inline-files/Hilary%20Hafner%20-%20community%20session%203_Hafner%20%281%29.pdf.

- Stanton L.G., Pavlovic N.R., DeWinter J.L., and Hafner H.R. (2018) Approaches to air sensor calibration. Poster presented at the *2018 UC Davis Air Sensors International Conference, Oakland, CA, September 12-14*, by Sonoma Technology, Petaluma, CA. STI-6908.
- Hafner H., Minor H., Lavezzo T., and Frank J. (2018) Applications of low-cost sensors for youth education in Arizona. Poster presented at the *2018 UC Davis Air Sensors International Conference, Oakland, CA, September 12-14*, by Sonoma Technology, Inc., Petaluma, CA. STI-6914.
- Pavlovic N., Hafner H., Brown S., and McCarthy M. (2018) Using the R statistical language for air quality data analysis and visualization. Presentation given at the *National Ambient Air Monitoring Conference, Portland, OR, August 16*, by Sonoma Technology, Inc., Petaluma, CA. STI-6918.
- Stanton L., Pavlovic N., DeWinter J., and Hafner H. (2018) Approaches to sensor calibration. Presentation given at the *National Ambient Air Monitoring Conference, August 15*, by Sonoma Technology, Petaluma, CA. STI-6917.
- Hafner H. (2018) PAMS level 1 data validation process. Presented at the *National Ambient Air Monitoring Conference, Portland, OR, August 13*, by Sonoma Technology, Inc., Petaluma, CA. STI-6920.
- Hafner H. (2018) DART PAMS training (Data Analysis and Reporting Tool for Photochemical Assessment Monitoring Station data). Presented at the *National Ambient Air Monitoring Conference, Portland, OR, August 13*, by Sonoma Technology, Inc., Petaluma, CA. STI-6919. Available at https://projects.erg.com/conferences/ambientair/conf18/Hafner_Hilary_DARTPAMS_8-13_1115_SalonI_POST_508.pdf.
- Hafner H. and Chan A. (2018) Data quality, validation, and data interpretation. Presented to Shakti Sustainable Energy Foundation, New Delhi, India by Sonoma Technology, Inc., Petaluma, CA, STI-917067-7041, July 26.
- Hafner H.R. and Frank J. (2018) Citizen science: low-cost air quality sensors and their applications. Presented at the *Air and Waste Management Association Meeting, Phoenix, AZ, March 13*, by Sonoma Technology, Inc., Petaluma, CA, and Maricopa County Air Quality Department, Phoenix, AZ. STI-6881.
- Hafner H.R., Roberts P.T., and MacDonald C.P. (2018) Update on new California air monitoring regulations. Presented to the U.S. Environmental Protection Agency, Office of Air Quality Planning & Standards, Research Triangle Park, NC, February 8. STI-6890.
- MacDonald C.P., Roberts P.T., Hafner H.R., Zemek P., Gibbons R., and McEwan S. (2017) Assessment of technology needed to meet refinery fenceline air quality monitoring rules. Presented at the *2017 AWMA Measurements Conference, Long Beach, CA, November 7*, by Sonoma Technology, Inc., Petaluma, CA. STI-6752.
- DeWinter J., Stanton L., Haderman M., Parajon G., Hafner H., and MacDonald C. (2017) Sensor solutions: data management and comprehensive services. Poster presented at the *SCAQMD Making Sense of Sensors Conference, Diamond Bar, CA, September 27-28*. STI-6784.
- Lavezzo T., Huang S., Pavlovic N., and Hafner H. (2017) The Marin Community Wildfire Protection Plan: science-based collaborative planning and implementation. Presented at the *National Cohesive Wildland Fire Management Strategy Workshop, Reno, NV, April 25-27*. STI-6668.

- Reid S., Hafner H., Du Y., Chang S.Y., and French T. (2017) Ozone precursor trends and emissions inventory evaluation in California's South Coast Air Basin. Presented at the *27th CRC Real World Emissions Workshop, Long Beach, CA, March 27*. STI-6691.
- Hafner H. (2016) Exceptional event analysis: dust storms and wildfires. Presented to the California Desert Air Working Group, Las Vegas, NV, November 16, by Sonoma Technology, Inc., Petaluma, CA. STI-6607.
- Reid S., Hafner H., Du Y., and French T. (2016) Emissions reconciliation analyses in California's South Coast Air Basin. Presented at the *15th Annual CMAS Conference, Chapel Hill, NC, October 24*, by Sonoma Technology, Inc., Petaluma, CA, and the Truck and Engine Manufacturers Association, Chicago, IL. STI-620000-6539.
- Hafner H. (2016) Exceptional event analysis: dust storms and wildfires. Presented to the California Desert Air Working Group, Las Vegas, NV, November 16, by Sonoma Technology, Inc., Petaluma, CA. STI-6607.
- DeWinter J., Brown S., and Hafner H. (2016) DART for CSN (Data Analysis and Reporting Tool for Chemical Speciation Network Data). Presented at the *National Ambient Air Monitoring Conference, St. Louis, MO, August 8-11*. STI-6563.
- Hafner H. (2016) Introduction to data validation. Presented at the *National Ambient Air Monitoring Conference, St. Louis, MO, August 8-11*. STI-6550.
- Brown S., Hafner H., and DeWinter J. (2016) DART for PAMS. Presented at the *National Ambient Air Monitoring Conference, St. Louis, MO, August 8*, by Sonoma Technology, Inc., Petaluma, CA, and the U.S. Environmental Protection Agency, Research Triangle Park, NC. STI-6552.
- DeWinter J., Brown S., Hafner H., Landis B., and Cavender K. (2016) DART training for PAMS and CSN. Presented at the *National Ambient Air Monitoring Conference, St. Louis, MO, August 8*, by Sonoma Technology, Inc., Petaluma, CA, and the U.S. Environmental Protection Agency, Research Triangle Park, NC. STI-6561.
- Roberts P.T. and Hafner H.R. (2016) Air quality issues in southern California. Webinar presented to science students at Dana Middle School, San Pedro, CA, May 3, STI-6501.
- Hafner H.R., Brown S.G., Roberts P.T., DeWinter J.L., and Vaughn D.L. (2016) Ultrafine particle measurements at schools next to freeways in Las Vegas and Salt Lake City. Presented at the *AWMA Measurements Conference, Research Triangle Park, NC, March 15-17*. STI-6357.
- Hafner H.R. and Penfold B.M. (2016) Technique for relocating an air quality monitoring site. Presented at the *AWMA Air Quality Measurement Methods and Technology Conference, Chapel Hill, NC, March 15-17*. STI-6468.
- Hafner H., Brown S., Bai S., Du Y., and Reid S. (2016) Introduction to source apportionment modeling and emission inventory development. Presented at the Jiangsu Final Workshop and U.S. Air Pollution Control Technology Exhibition, Nanjing, China, March 4, STI-914021-6478.
- Hafner H.R. (2016) Identifying sources of air pollution. Presented at the Jiangsu Final Workshop and U.S. Air Pollution Control Technology Exhibition, Nanjing, China, March 3, STI-914021-6457.

- DeWinter J. and Hafner H. (2015) EPA's Data Analysis and Reporting Tool (DART). Presented at the *National Air Toxics Monitoring and Data Analysis Workshop, Research Triangle Park, NC, October 26-28*, STI-6389.
- Hafner H.R. (2015) Air quality meteorology training meeting: SO₂ standard, PM_{2.5} characterization, fugitive dust, and data validation insights. Presented to the British Columbia Ministry of Environment, Surrey, BC, October 14, STI-6360.
- Hafner H. (2015) Near-road air quality update. Presented at WESTAR data validation training, Boise, ID, May, STI-915002-6251.
- Dye T., Russell A., MacDonald C., and Hafner H. (2015) What's happening with air sensing. Presented at WESTAR data validation training, Honolulu, HI, May 12, STI-6234.
- Hafner H.R. and Minor H.A. (2015) Mojave data: a validation story. Presented to the Mojave Air Quality Management District, Victorville, CA, February 5, STI-914078-6188.
- Graham A., Eisinger D., Pasch A., Tidd L., Alrick D., Bai S., and Hafner H. (2015) NCHRP 25-25(89): establishing representative background concentrations for quantitative hot-spot analysis for particulate matter. Presented at the *Transportation Research Board 94th Annual Meeting, Project-Level Analysis Subcommittee Meeting, Washington, D.C., January 12*, STI-6156.
- MacDonald C.P., Dye T.S., Gordon B.J., and Hafner H.R. (2014) Using data from small sensors to address air quality issues. Presented at the *California Air Pollution Control Officers Association (CAPCOA) My Air Quality Conference, Oakland and Diamond Bar, CA, November 19-21*, STI-6122.
- Brown S.G., Ekstrand A., Zahn P.H., and Hafner H.R. (2014) Wintertime 2013-2014 ozone levels in Uintah Basin. Presented at the Ute Tribal Offices, Fort Duchesne, UT, October 1. STI-910505-6072.
- Hafner H., Penfold B., and McCarthy M. (2014) Monitoring network assessments: best practices and analysis insights. Webinar presented online, September 30, STI-6077.
- Pasch A., Russell A., Tidd L., Eisinger D., Alrick D., Hafner H., and Bai S. (2014) Establishing representative background concentrations for quantitative hot-spot analyses for particulate matter. Presented to the National Cooperative Highway Research Program, Pittsburg, PA, August 20, by Sonoma Technology, Inc., Petaluma, CA, and The Louis Berger Group, Inc., Morristown, NJ. STI-6051.
- Hafner H.R., Penfold B.M., and McCarthy M.C. (2014) Monitoring network assessments: best practices and lessons learned. Presented at the *National Ambient Air Monitoring Conference, Atlanta, GA, August 11-14*. STI-5967.
- Hafner H. (2014) Lessons learned from the PAMS program. Presented at the *National Ambient Air Monitoring Conference, Atlanta, GA, August 13*, STI-5995.
- Dye T., Raffuse S., Hafner H., and MacDonald C. (2014) Biomass burning's effect on air quality. Presented to EPRI, San Francisco, CA, February 26, STI-5915.
- Alrick D., Hafner H., and Busby B. (2014) Streamlining exceptional events analysis and reporting. Presented at the *National Air Quality Conference, Raleigh, NC, February 11*, STI-5859.
- Pasch A., Bai S., Karner A., Eisinger D., Hafner H., Tidd L., Polidori A., and Niemeier D. (2014) Background and ambient near-road PM concentrations: insights and analysis strategies. Presented at the *Transportation Research Board 93rd annual meeting, Workshop 198, Reconciling Transportation and Air Quality Planning to Promote Sustainable Development, Washington, DC, January 12-16*, by Sonoma

Technology, Inc., Petaluma, CA; Arizona State University, Phoenix, AZ; Louis Berger Group, Inc.; South Coast Air Quality Management Group; and the University of California, Davis. STI-5873.

Hafner H., Reid S., Raffuse S., and MacDonald C. (2013) Available analytical approaches for estimating fire impacts on ozone formation 1. Presented at the *WESTAR Wildfire and Ozone Exceptional Events Workshop, Sacramento, CA, March 6* (STI-910417-5607).

Rutter A.P. and Hafner H.R. (2013) Near-roadway nitrogen dioxide: factors influencing concentrations next to freeways. Presented at the *2013 CRC Mobile Source Air Toxics Workshop, Sacramento, CA, February 4-6* (STI-5480).

Hafner H.R., Eisinger D.S., and Roberts P.T. (2012) Near-road air pollution and implications for smart growth. Poster presented at the *Better Air Quality Conference, Hong Kong, China, December 5-7* (STI-5383).

Hafner H.R., Raffuse S.M., Jumbam L.K., Wiedinmyer C., and Larkin N.K. (2012) Regional air quality impacts from Indonesian fire events. Poster presented at the *Better Air Quality Conference, Hong Kong, China, December 5-7* (STI-5386).

Hafner H.R. and LaGuardia N.M. (2012) Data quality assurance and quality control in EPA's AirNow program. Presented at the *20th AQS Conference, Providence, RI, August 20-24* (STI-910301-5448).

Rutter A.P. and Hafner H.R. (2012) Assessment of near-roadway NO₂ concentrations. Presented to the *2012 Coordinating Research Council Atmospheric Impacts Committee Meeting, August 8* (STI-911076-5434).

Hafner H.R. (2012) Using PAMS data to assess potential control strategies to reduce ozone. Presented at the *National Air Quality Conference–Ambient Monitoring 2012, Denver, CO, May 14-17* (STI-5355).

Hafner H.R., Pasch A.N., and Vaughn D.L. (2011) EPA's near-road NO₂ pilot study: aiding states in selecting monitoring sites to meet new NAAQS requirements. Presented for the U.S. Environmental Protection Agency Region 9's Children's Health Month, San Francisco, CA, STI-4215, October 13.

McCarthy M., Charrier J., Brown S., and Hafner H. (2011) Trends analysis update. Prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, STI-910219-4205, September 8.

Wheeler N., Hafner H., Roberts P., Craig K., MacDonald C., Gray E., and Reid S. (2011) Design recommendations for the three-state pilot study. Presented at the *Federal Leadership Forum, Denver, CO, January 19* (STI-910208-4079).

Hafner H. and McCarthy M. (2010) Examples of community-level risk-weighted air toxics concentrations. Presented at the *Air and Waste Management Association Measurements Conference, Los Angeles, CA, November 2* (STI-3975).

McCarthy M. and Hafner H. (2010) Community-scale air toxics monitoring review. Presentation prepared for U.S. Environmental Protection Agency, STI-910107-3976, September 30.

Hafner H.R. and Wheeler N.J.M. (2010) Pilot project design for the data warehouse and regional air quality modeling effort: monitoring workgroup meeting. Presented to 3-State Monitoring Workgroup, Lakewood, CO, June 30 (STI-910117-3911).

Hafner H., Alrick D., Huang S.M., and Pasch A. (2010) The importance of meteorological data in exceptional events analysis. *National Air Quality Conferences, Raleigh, NC, March 15-18* (STI-3801).

- McCarthy M., Hafner H., Simpson J., and Fauci M. (2009) Air toxics around a pulp and paper mill. Presentation at the *2009 National Ambient Air Monitoring Conference, Nashville, TN, November 2-5*, by Sonoma Technology, Inc., Petaluma, CA, and the Nez Perce Tribe's Environmental Restoration and Waste Management Division, Air Quality Program, Lapwai, ID (STI-3682).
- Hafner H. (2009) Data validation overview. Presented at the *2009 National Ambient Air Monitoring Conference, Nashville, TN, November 2-5* (STI-3726).
- Wade K. and Hafner H. (2009) Air quality management support. Presented to U.S. Environmental Protection Agency and North Carolina Department of Environmental Quality, Division of Air Quality, Raleigh, NC, STI-905515-3656, June.
- Wade K. and Hafner H. (2009) Exceptional events case study. Presented at the *Air and Waste Management Association's 102nd Annual Conference and Exhibition, Detroit, MI, June 16-19* (STI 620000-3519).
- Hafner H., O'Brien T.E., McCarthy M.C., and Brown S.G. (2009) Prescribed analyses of PAMS data collected from 1994 to 2006. Presented to the San Diego Air Pollution Control District, San Diego, CA, STI-908050-3634, June.
- Hafner H. (2009) VOCDat training: Validating, reporting, and analyzing toxics data. Presented to the San Diego Air Pollution Control District, San Diego, CA, STI-908050-3636, June.
- Hafner H.R., Funk T.H., and Penfold B.M. (2009) Monitoring network assessments: lessons learned. Presented at the *National Air Quality Conference, Dallas, TX, March 2-5* (STI-3547). Also presented at the EPA Region 5 State/Local/Tribal Contacts Meeting, Chicago, IL, April 21 (STI-3620).
- Hafner H.R. and McCarthy M.C. (2009) Summary of national air toxics data analyses - 2007. Online webinar presented on behalf of the U.S. Environmental Protection Agency, Research Triangle Park, NC, on November 6, 2008 (STI-908302-3485). Also presented to the Wyoming Dept. of Environmental Quality on March 18, 2009.
- McCarthy M.C. and Hafner H.R. (2008) Relating changes in ambient concentrations to mobile source air toxics controls. Presented at the *CRC Mobile Source Air Toxics Workshop, Phoenix, AZ, December 2* (STI-3407).
- Hafner H.R., McCarthy M.C., and Funk T.H. (2008) Network assessment for the photochemical assessment monitoring stations (PAMS) program: A national overview. Presented at the *Air & Waste Management Association Symposium on Air Quality Measurement Methods and Technology, Chapel Hill, NC, November 3-6* (STI-3409).
- McCarthy M.C. and Hafner H.R. (2008) National picture of risk-weighted concentrations of ambient air toxics. Presented at the *Air & Waste Management Association Symposium on Air Quality Measurement Methods and Technology, Chapel Hill, NC, November 3-6, 2008* (STI-3410).
- Hafner H.R. and Funk T.H. (2008) Southwest Wyoming air monitoring network assessment. Presented to the Southwest Wyoming Network Assessment External Advisory Committee, July 30.
- Hafner H.R. (2008) National air toxics data analysis overview. Presented to the Oregon Department of Environmental Quality, Portland, OR, STI-3400, June.
- Roberts P.T. and Hafner H.R. (2008) Recommendations for data reporting of uncertainty and measurement process characteristics. Presented at the *Air & Waste Management Association's 101st Annual Conference & Exhibition, Portland, OR, June 24-27* (STI-3274).

- Hafner H.R. (2008) Establishing a visibility goal for wilderness and urban areas in British Columbia and Canada. Presented on behalf of the British Columbia Ministry of Environment, Victoria, BC, Building a Visibility Roadmap for Canada, Vancouver, Canada, March 26 by Sonoma Technology, Petaluma, CA.
- McCarthy M.C., O'Brien T.E., and Hafner H.R. (2007) Risk and hazard characterization summary. Presented at the *Air Toxics Data Analysis Workshop, Rosemont, IL, October 4* (STI-905306-3236).
- McCarthy M.C., Charrier J.C., and Hafner H.R. (2007) Trends and accountability. Presented at the *Air Toxics Data Analysis Workshop, Rosemont, IL, October 4* (STI-905306-3236).
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- McCarthy M.C., Wade K.S., and Hafner H.R. (2007) Analysis of ambient air quality after Hurricane Katrina. Presented at the *Symposium on Air Quality Measurement Methods and Technology, Air and Waste Management Association, San Francisco, CA, May 2* (STI-3111).
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Courses Taught

- Hafner H., DeWinter J., McClure C., Brown S., and Schill S.R. (2021) PAMS data validation and analysis training for state and local air agencies. Webinars prepared for Lake Michigan Air Directors Consortium (LADCO), presented on May 18-19, May 25-26, June 1-2, and June 8-9, by Sonoma Technology, Inc., Petaluma, CA. STI-921030-7532.
- Zahn P., Hafner H., Hylton M., and Beamish J. (2020) Air quality forecasting training. Training course presented to the Nevada Department of Environmental Protection by Sonoma Technology, Petaluma, CA, STI-920016-7252, February 11-13.
- Hafner H.R. and Pavlovic N. (2019) VOC data validation and analysis training. Presented to the Hong Kong Environmental Protection Department, Hong Kong, March 6-8, by Sonoma Technology, Inc., Petaluma, CA. STI-919005-7077.

- Hafner H.R. (2019) VOC data analysis: source apportionment overview. Training course presented to the Hong Kong Environmental Protection Department, Hong Kong, March 6-8, by Sonoma Technology, Inc., Petaluma, CA. STI-919005-7079.
- Hafner H. (2019) Best practices on using low-cost sensors with community groups. CHE 750 Air Quality Seminar, presented for Kansas State University by Sonoma Technology, Inc., STI-7031, January 9. Available at https://k-state.instructure.com/courses/75223/files/8264942?module_item_id=1507123.
- Zahn P., Hafner H., and Chan A. (2017) Air quality forecasting training. Training course presented to the Nevada Department of Environmental Protection by Sonoma Technology, Inc., Petaluma, CA, STI-917003-6676, February 28 and March 1.
- Hafner H. and Boyes L. (2017) Kids Making Sense: Two-Day Training. Presented to the Maricopa County Air Quality Department, Phoenix, AZ, by Sonoma Technology, Inc., Petaluma, CA, STI-916074-6664, February 2-3.
- Hafner H.R. (2015) Data validation workshop. Presented to the Arizona Department of Environmental Quality, Phoenix, AZ, June, STI-915035-6298.
- Hafner H.R. (2015) Data validation workshop. Presented to the Western States Air Resources Council, Boise, ID, May, STI-915002-6250.
- Hafner H.R. (2015) Data validation workshop. Presented to the Western States Air Resources Council, Honolulu, HI, May, STI-914003-6213.
- Hafner H.R. and McCarthy M.C. (2012) Air toxics data analysis training course. Presented at the *National Air Quality Conference Ambient Air Monitoring 2012, Denver, Colorado, May 14-17* (STI-910313-4357).
- Hafner H.R. and Brown S.G. (2011) Data validation workshop. Prepared for Lake Michigan Air Directors Consortium; presented in Rockford, IL, and Toledo, OH, October 25-28 (STI-911051-4242).
- Hafner H. and McCarthy M. (2011) How to create a successful air toxics monitoring project. Training prepared for the U.S. Environmental Protection Agency, Research Triangle Park, NC, STI-910219-4112, April. Available at <https://www3.epa.gov/ttnamti1/airtox-daw-2011.html#how>.
- Hafner H., O'Brien T.E., Brown S.G., and DeWinter J.L. (2010) Systat: Statistical visualization software. Presented to the Wyoming Department of Environmental Quality, Cheyenne, WY, STI-910019-3946, August.
- DeWinter J.L., Brown S.G., O'Brien T.E., and Hafner H.R. (2010) Systat: statistical visualization software. Presented to the Michigan Department of Environmental Quality, Lansing, MI, March 31-April 1 (STI-908015-3843).
- Landreneau J.V., Ray A.E., Hafner H.R., Roberts P.T., Chan A., Jackson J.A., and Zell E. (2009) Designing an air quality monitoring network for urban centers. Training course presented at the *Curso Regional sobre Aseguramiento de la Calidad de las Mediciones de Inmisiones y Emisiones de Contaminantes de Aire Universidad Nacional, Costa Rica, March 30-April 3, 2009*, by Sonoma Technology, Inc., Petaluma, CA, and Battelle Memorial Institute, Arlington, VA (STI-908078.03).
- Hafner H.R. and McCarthy M. (2008) Air toxics data analysis training. Presented at the Symposium on Air Quality Measurement Methods and Technology, Chapel Hill, NC, November 3-6, by Sonoma Technology, Inc., Petaluma, CA. STI-908302-3446.

- Hafner H.R. (2003) Data validation workshop. Prepared for the Lake Michigan Air Directors Consortium and U.S. Environmental Protection Agency, Region V, Chicago, IL, STI-903510-2424, October.
- Chinkin L.R., Coe D.L., Hafner H.R., and Tamura T.M. (2003) Air toxics emission inventory training workshop. Sponsored by the U.S. Environmental Protection Agency, Region IX, Richmond, CA, STI-903320-2398, July 15-16.
- Hafner H.R. (2003) VOCDat training: validating, reporting and analyzing toxics data. Presented at EPA Region V Offices, Chicago, IL, May 14-15; Research Triangle Park, NC, June 4; Albany, NY, June 10; and EPA Region IX Offices, San Francisco, CA, June 17, STI-902600-2365.
- Main H.H. (2000) Data analysis workshop: Analysis of PM and ozone data. Presented at a conference co-sponsored by Central States Air Resources Agencies Association (CENSARA), Air Pollution Training Institute (APTI), and the Environmental Protection Agency, Austin, TX, May 16-19.
- Main H.H. (1999) VOCDat training: Chicago, Illinois. Training manual prepared for Lake Michigan Air Directors Consortium, Des Plaines, IL, STI-999070-1877-TM, April.
- Main H.H. (1998) VOCDat training for Ventura County. Training manual prepared for the Ventura County Air Pollution Control District, Ventura, CA, STI-997450-1793-TM, March.
- Main H.H., Roberts P.T., and Chinkin L.R. (1997) PAMS data analysis workshop: illustrating the use of PAMS data to support ozone control programs. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC, presented at California Air Resources Board and EPA Region IX, Sacramento, CA, STI-997100-1719-WD7, May.
- Main H.H., Roberts P.T., Chinkin L.R., and Korc M.E. (1997) PAMS data analysis workshop: illustrating the use of PAMS data to support ozone control programs. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC, presented at Camp Mabry for Texas Natural Resources Conservation Commission, Austin, TX, STI-997160-1704-WD6, April.
- Main H.H., Roberts P.T., and Korc M.E. (1997) PAMS data analysis workshop: illustrating the use of PAMS data to support ozone control programs. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC, presented at the U.S. EPA Region V Headquarters, Chicago, IL, STI-997100-1708-WD5, March.
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- Main H.H., Roberts P.T., and Korc M.E. (1996) PAMS data analysis workshop: illustrating the use of PAMS data to support ozone control programs. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC, presented at EPA Region I Headquarters, Boston, MA, STI-996320-1604-WD3, December.
- Main H.H., Roberts P.T., and Korc M.E. (1996) PAMS data analysis workshop. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC, presented at EPA Region 3 Headquarters, Philadelphia, PA, STI-996170-1589-WD2, July.

Software Documentation

DeWinter J., Brown S., and Hafner H. (2015) Data Analysis and Reporting Tool (DART) user guide. Prepared for the U.S. Environmental Protection Agency, Research Triangle Park, NC, STI-910514-6276-UG, November.

Hafner H.R., Haste T.L., Drury S.A., Banwell E.M., and Penfold B.M. (2012) Interagency Fuels Treatment Decision Support System (IFTDSS) version 1 online documentation. Online user's guide. Sonoma Technology, Inc., Petaluma, CA, STI-910907-4210, February.

Hafner H.R. and Prouty J.D. (2004) VOCDat user's guide. Prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, STI-902620-2015-UG, September.