

Kirk W. Stopenhagen

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PROFILE Conducts wind resource assessment and due diligence studies for wind farm developers and private industry. This requires siting met towers and collecting, reviewing and analyzing meteorological data sets to determine the feasibility of developing wind energy projects. Conducted numerous wind studies using Doppler Sodar to measure vertical wind profiles and compare Sodar data with nearby towers to evaluate wind shear. A meteorologist with more than 25 years experience in meteorological and ambient air quality monitoring, modeling, and permitting. Managed monitoring programs, operated and maintained instrumentation, provided hands-on training and produced data and quality assurance reports for numerous ambient air monitoring networks. Well versed in U.S. Environmental Protection Agency (EPA) and individual states' unique quality assurance requirements. Authored numerous ambient air monitoring and quality assurance plans. Skills include design, site selection, installation, operator training, data analysis, auditing, and maintenance and repair of ambient monitoring networks. Directed quality assurance efforts and conducted systems and performance audits for ongoing ambient monitoring programs.

EDUCATION **North Carolina State University** *Raleigh, NC | May, 1981*
Bachelor of Science, Meteorology

EXPERIENCE **Chinook Wind** *Jan., 2007- present*
Meteorologist
Provides consulting services to clients for meteorological analysis of wind energy projects. Conducts wind resource assessment studies and Sodar vertical wind profiling for wind farm developers and private industry.

CH2M HILL, Inc. *Bellevue, WA | 1988 - 2006*
Air Quality Scientist/Meteorologist
Responsible as Senior Technologist for Ambient Air Monitoring for coordinating Quality Assurance activities for meteorological, wind energy and ambient monitoring clients. Prepared proposals and facilitated project teams to deliver monitoring projects to industrial clients nationally and internationally. Mentored junior staff in project management and technical issues. Other air quality experience included: air quality permit applications including 1990 Clean Air Act Amendments, Title V, PSD, emissions inventories, continuous emissions monitoring equipment specification and RATA, air toxics issues, receptor and dispersion modeling, visibility and regional haze issues, and meteorological and air quality issues of concern in environmental impact statements.

Selective Projects *1988 - 2006*
Senior meteorologist *Remote, rural Alaska*
Multi-year wind resource assessment project to determine the feasibility of an 80-100MW off-grid wind farm at a gold mine site. The project included siting, data analysis and reporting for seven met towers, WAsP and WindLogics modeling and conducting a tower/Sodar study to measure winds and determine shear at hub height.

Lead technologist *Eastern California*
Designed, supervised construction, training and operation of a 13-station network of PM10, wind erosion and 10-meter meteorological stations on a dry lakebed. This multi-year study collected data used for determination of compliance with NAAQS for PM10. Principally involved in interviewing and hiring the three-person monitoring project staff and served as the project's primary technical consultant and quality assurance officer for air monitoring issues.

Project manager *Charlotte, NC*
Managed a project for a consortium of 14 petroleum companies in cooperation with public interest groups and the State of North Carolina's Air Quality Toxics Protection Branch to design, install, train and operate a seven-site meteorological and ambient air toxics monitoring program. The network collected 24-hour SUMMA canister samples of ambient air at each site for a 12-month field study. More than 1000 canisters were analyzed by EPA Method TO-14 for benzene, ethyl-benzene, toluene and m-,p- and o-xylenes.

Project manager *Valdez, AK*
Manager of a meteorological and ambient air toxics monitoring project. The project won National Finalist recognition in the 1992 American Consulting Engineers Council's national award competition. The project included; design, installation, operation, data reporting, QA/QC, and auditing for a five-site ambient air and meteorological monitoring network. Data gathered during this project was used as input for EPA dispersion modeling, risk assessment, and state and federal air quality permit compliance.

Project manager *Seattle, WA*
Managed a meteorological monitoring quality assurance program for a manufacturer, which included training, operational maintenance, troubleshooting and performance audits at two plant locations in the Puget Sound area.

Project manager *Washington, Oregon and Idaho*
Managed projects for forest product, pulp and paper mills to conduct site selection, performance audits, field personnel training in station operations, developed standard operational procedures for field operations and wrote Quality Assurance plans for Nitrogen Oxides, Sulfur Dioxide, Hydrogen Sulfide and meteorological monitoring stations. He managed multi-year projects to collect, report and analyze the data.

GeoResearch, Inc. *Billings, MT | 1984-1988*
Meteorologist

Managed ambient air monitoring projects. Assisted in wind energy studies including preparation of the *Montana Wind Energy Atlas*. Managed four multiple site ambient monitoring networks in Montana and North Dakota. Compiled, analyzed, and validated monitoring data. Responsible for systems and performance audits, as well as providing training and technical assistance to regional clients.

Beak Consultants *Denver, CO | 1982-1983*
Air Quality Meteorologist

Responsible for the operation of a PSD air-monitoring network in remote Southwestern Wyoming. Duties included maintenance and upkeep of meteorological sensors on a 60-meter tower, SO₂ and H₂S ambient air analyzers, and visibility monitoring telephotometry equipment.

Enviro-Test, Ltd. *Lakewood, CO | 1981-1982;*
Air Quality/Meteorological Technician

Work included conducting baseline fugitive dust studies, TSP and PM₁₀ air monitoring and performance audits, air quality and meteorological data reduction, data analysis and data reporting; air quality source emissions testing and reporting at several surface coalmines in the Powder River Basin of Wyoming.

PROFESSIONAL MEMBERSHIP American Meteorological Society
Air and Waste Management Association *Member of the Technical Council*
Plans and peer-reviews manuscripts for presentation at national meetings

- PUBLICATIONS** The Valdez Air Monitoring System (VAMS): *Continuous Monitoring for Volatile Organics, Criteria Pollutants and Meteorological Parameters*. Presented at the 83rd Annual Meeting, Air and Waste Management Association. Pittsburgh, PA, June 1990.
- The Valdez Air Monitoring System (VAMS): *Review of Continuous Monitoring Data for Volatile Organics, Criteria Pollutants and Meteorological Parameters*. Presented at the 84th Annual Meeting. Air and Waste Management Association. Vancouver, BC, Canada, June 1991.
- With Thomas Card and Mark D. Schaaf, Ph.D., *Physical Modeling for Odor Control and Stack Height Determination*, METRO West Point, Seattle, WA. Presented at the 1992 PNWIS Annual Meeting, Bellevue, WA, Nov. 1992
- With Lindsay, Gravley, Boedigheimer, & Graziano, *Monitoring for Hydrogen Chloride in Ambient Air*. 88th Annual Meeting, Air and Waste Management Association. San Antonio, TX, June 1995.
- With Howes et al, *Ambient Lead Measurements in Cairo, Egypt*. 92nd Annual Meeting, Air and Waste Management Association. St. Louis, MO, June 1999
- With Tom Pottberg, *An Optical Particulate Matter Monitor for Extreme Environments*. Presented at 93rd Annual Meeting Air and Waste Management Association, Salt Lake City, UT, June 2000
- With McGregor, Castleberry and Newvine, *On-Lake Air Quality and Dust Control Effectiveness Monitoring on Owens (dry) Lake*. Presented at the 94th Annual Meeting, Air and Waste Management Association, San Diego, CA, June 2003
- With Robert Baker and John Wade, *Calibration of a Mini Sodar and Determination of Shear at the Klondike Wind Farm*. Presented at the American Wind Energy Association Annual Conference, Denver, CO, June 2005