



OAK LEAF ENVIRONMENTAL INC.

JEREMY G. HEIKEN

TECHNICAL EXPERTISE

Jeremy G. Heiken, President of Oak Leaf Environmental Inc., has 30+ years' consulting experience completing air quality, emissions, and engineering studies. His technical areas of expertise are as follows.

- **Emission Inventory Development** – Mr. Heiken has prepared emission inventories at all temporal and spatial scales including hundreds of photochemical model-ready inventories. Examples include national planning inventories for Canada; detailed facility-level inventories for roadways, airports, marine ports, railyards, and oil sands mining/extraction operations; US air quality plan development including Federal and State Implementation Plans. Pollutants quantified include criteria pollutants, greenhouse gases and air toxic compounds. Inventory experience includes both geogenic, biogenic and anthropogenic sources; a preponderance of his experience is in the mobile source sector.
- **Regulatory Impact Analyses / Control Program Evaluation** – Mr. Heiken has worked on all phases of regulatory impact analyses: regulatory development, stakeholder review of proposed regulations, costs, cost-effectiveness and post-implementation compliance modeling. He has completed stakeholder review of proposed and final environmental rulemakings for on-road and off-highway vehicle, engine and equipment manufacturers as well as transportation fuel producers. He has evaluated regulatory alternatives for stakeholder consideration, and he has prepared of formal commentary as part of rulemaking process. He has completed independent audits of light and heavy-duty on-road inspection and maintenance programs. He has worked on corporate-level compliance planning for on-road, non-road, and fuel production/marketing industries.
- **Transportation Fuels** – Mr. Heiken has examined the relationship of fuel properties, fuel reformulation, component blending and fuel additives to exhaust and evaporative emission impacts – covering gasoline, diesel, natural gas and renewables. He has also completed lifecycle analyses of transportation fuel development using US, Canadian and EU models to determine criteria pollutant and greenhouse gas impacts. He has completed the technical evaluations to support renewable, low-carbon fuel applications for submissions to California, USEPA and EU.
- **Emissions Software Development and Training** – Mr. Heiken has developed software and electronic modeling platforms for emissions estimation and emissions processing. He has directed on-road and non-road emissions model development for Canada since 2001; he worked on versions of on-road and non-road models for both USEPA and California ARB. He programmed routines for preparing photochemical model inventories; he programmed interfaces between travel demand models and emission factor models; he completed an emission inventory guidance and analysis tool for lead (Pb) emissions from piston-engine aircraft; he completed a database tool for lifecycle modeling of conventional and renewable transportation fuels marketed nationally in Canada. He has developed model training for the use of MOBILE, NONROAD and MOVES.
- **Guidance Methods / Expert Peer Review** – Mr. Heiken has developed of agency guidance methods for inventory preparation of individual mobile source sectors for distribution to air quality planning personnel. He has completed expert peer reviews and independent third-party reviews of agency inventory methods and models used in the commercial marine, on-road vehicle, non-road equipment and fuel production/marketing sectors.
- **Gaussian Dispersion Modeling** – Mr. Heiken is experienced with of steady-state Gaussian dispersion models (CALINE, CAL3QHC, CAL3QHCR, ISC and AERMOD) for modeling roadways and facilities, developing modeling guidance and intersection hot-spot modeling screening tools.



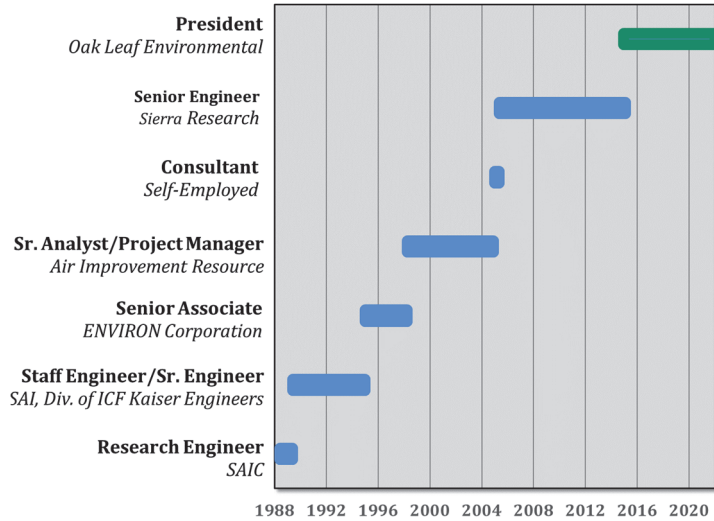
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JEREMY G. HEIKEN

EMPLOYMENT HISTORY

Jeremy G. Heiken is President of Oak Leaf Environmental Inc. – an air quality consultancy founded in 2014. Mr. Heiken brings over 30 years' experience as an emissions and air pollution control engineer. He is a nationally recognized expert in emission inventory development.

Mr. Heiken has worked for multiple consultancies over his professional career, each with its unique technical specialties and clientele. He brings to Oak Leaf Environmental an unparalleled breadth of experience working for the gamut of government agencies, manufacturing & industrial sectors, trade associations and research institutions.



Title(s) / Employer / Dates	Work Highlights
President OAK LEAF ENVIRONMENTAL Dexter, Michigan 12/2014 to Present	<ul style="list-style-type: none"> • Founded new consultancy 12/2014 • Environmental compliance and specialty studies for on-road vehicle, non-road engine, and fuel production/marketing industries in the US • Regulatory impact analyses, regulatory emissions model development and training, and inventory guidance for Canadian federal agencies • 48-state Cleaner Truck Initiative regulatory impact analysis and model-ready emissions inventory for MECA • Non-road sector survey and inventory development for Oregon DEQ • Independent MOVES model reviews, sensitivity analyses and validations for the Coordinating Research Council (E-101, E-116)
Senior Engineer SIERRA RESEARCH* Ann Arbor, Michigan 4/2005 to 2/2015	<ul style="list-style-type: none"> • First employee selected to open a new office in Ann Arbor • New emission inventory guidance methods from airport field studies for general aviation for the Airport Research Cooperative Program. • Quantifying the emissions impact of varying fuel quality and fuel parameters of transportation fuels (gasoline, diesel, and natural gas) • Analyses to support Expert Testimony of product liability lawsuits as related to air quality implications of oxygenate choice (MTBE) • Project-scale to national-scale build-up of non-road emissions from oil sands mining operations for Environment Canada • Costs and emissions consequence of revisions to the US federal O₃ NAAQS

* Currently Trinity Consultants.



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Consultant SELF-EMPLOYED Dexter, Michigan 1/2005 to 5/2005	<ul style="list-style-type: none"> On-road motorcycle regulatory impact analysis and update to the regulatory emissions model for Environment Canada
Senior Analyst, Project Manger AIR IMPROVEMENT RESOURCE Novi, Michigan 4/1998 to 12/2004	<ul style="list-style-type: none"> Hired as a recognized expert in emissions inventory modeling Regulatory emissions model development for EPA, ARB and Canada Gasoline and diesel control program alternatives to replace I/M requirement for SE Michigan SIP. Regulatory impact analyses and regulatory alternatives for US engine/vehicle manufacturing and fuel production industries
Senior Associate ENVIRON CORPORATION* Novato, California 1/1995 to 4/1998	<ul style="list-style-type: none"> Hired as part of a start-up team to open a new air quality office to develop the multi-scale photochemical modeling system (CAMx) Directed all anthropogenic, biogenic and geogenic emissions inventories Inventory support for official air quality management planning for non-attainment regions in Texas, Arizona, California, Oregon, and Nevada Led 3 studies for the mobile source committee of the EPA's Emission Inventory Improvement Program
Staff Engineer, Senior Engineer SYSTEMS APPLICATIONS INTERNATIONAL† San Raphael, California 6/1989 to 1/1995	<ul style="list-style-type: none"> Hired to lead the consultancy's mobile source emission inventory modeling; SAI developed the UAM series of photochemical models Technical lead for the automobile industry & EPA negotiated agreement known as the National LEV Program Developer and user of the Emissions Preprocessing System (EPS2) for the preparation of photochemical model inventories Programmed interfaces between travel demand models and emissions models. Technical lead for the highly resolved on-road inventories of the Auto-Oil Air Quality Improvement Research Program Regulatory emissions model development for EPA and ARB.
Research Engineer SAIC San Diego, California 6/1988 to 6/1989	<ul style="list-style-type: none"> Evaluated innovative technologies for Superfund hazardous waste clean-up; completed research, theoretical effectiveness calculations, validations, and reporting.

* Currently Ramboll Inc.

† Currently ICF Kaiser Engineers.



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JEREMY G. HEIKEN

EDUCATION

DEGREE

1989, B.S., Chemical Engineering, University of California, San Diego

CONTINUING EDUCATION

1995, "Title V Permitting," Air and Waste Management Association

1999, "Combustion and Emissions for Engineers," Society of Automotive Engineers

2015, "Applied Environmental Statistics," Practical Stats

COMPUTER SKILLS

ENVIRONMENTAL SOFTWARE / DATABASES

Experienced user of AEDT, AERMOD, BEIS, Biograce, CAL3QHCR, CALINE, Complex Model, DTIM, EDMS, EMFAC, EGAS, EPS, GHGenius, GREET, ISC, MOVES, MOBILE, MOVES, NMIM, NONROAD, OFFORAD, Predictive Model (ARB), Predictive Models (EPA), SMOKE, SPECIATE, Vision.

Experienced user of electronic databases and resources maintained by USEPA, California ARB, ECCC, USDA, EIA, FAA, BTS, BLS, BEA, FHWA, NREL, ORNL and the US Census.

PROGRAMMING LANGUAGES

Experienced with FORTRAN, Visual Basic and SQL.

OPERATING SYSTEMS

Primarily works on Windows/DOS systems; Mac and Unix experience.

PROJECTS / PUBLICATIONS

PROJECT LISTING

A listing of projects – denoting the emissions source sectors of on-road, non-road, rail, aircraft, marine, stationary and fuels – is located [here](#).

PUBLICATIONS

A listing of publications and presentations is located [here](#).