JEREMY G. HEIKEN

TECHNICAL EXPERTISE

Jeremy G. Heiken, President of Oak Leaf Environmental Inc., has 35+ years' consulting experience completing air quality, emissions, and engineering studies. His technical areas of expertise include the following.
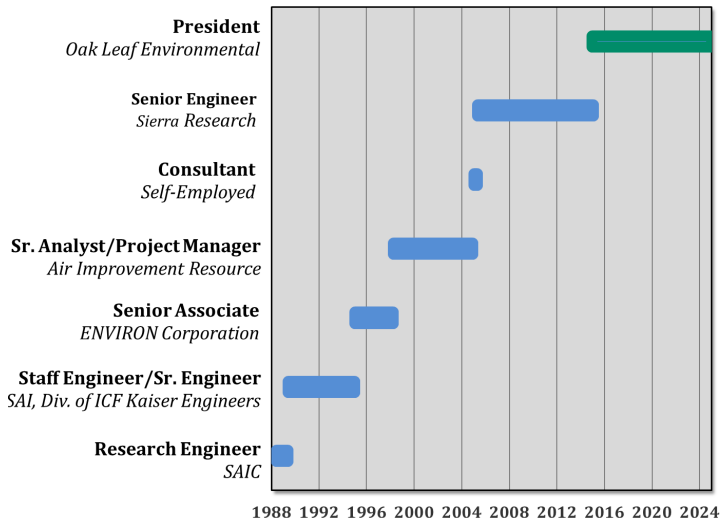
- **Emission Inventory Development** – Preparation of pollutant emission inventories at all temporal and spatial scales including hundreds of photochemical model-ready inventories. Examples include national planning inventories for Canada; facility-level inventories for roadways, airports, marine ports, 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.

- **Regulatory Impact Analyses / Control Program Evaluation** – Completion of 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. Evaluation of regulatory alternatives for stakeholder consideration. Preparation of formal commentary as part of rulemaking process.

- **Data Analysis** – Analysis of emissions test data (laboratory, certification, product line and in-use field testing) in support of compliance validation and identifying key modeling variables of significance. Development of the interface between emissions test data and emission inventory software development.

- **Transportation Fuels** – Application of lifecycle analyses of transportation fuel development using GREET, Biograce and GHGenius models to determine criteria pollutant and greenhouse gas impacts. Technical evaluations to support renewable, low-carbon fuel applications for California, U.S. EPA and European Union. Statistical analysis of fuel parameters and fuel additives to evaluate environmental impact.

- **Software Development / Training** – Design of emission inventory estimation and processing software; review of data sources used to populate regulatory inventory models. Platforms/languages include FORTRAN, Visual Basic, database (SQL/Access/SPSS) and spreadsheet. Examples of software developed include MOVES, NONROAD, MOBILE, OFFROAD and EPS. Spreadsheet example includes a "best-practices" emission inventory analysis tool for lead (Pb) emissions from piston-engine aircraft. Developed model training programs for the use of MOBILE, NONROAD and MOVES.

- **Guidance Methods / Expert Peer Review** – Development 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. Most recently provided an independent review of proposed updates to MOVES5 national fuel properties for USEPA.

- **Compliance Planning** – Development of environmental compliance and product planning for on-road and off-highway vehicle/engine manufacturers (new sales) and fleet owners (in-use).

- **Gaussian Dispersion Modeling** – 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.

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 35 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 environmental 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*	• 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; implementation and evaluation of laboratory and in-use field testing programs • Regulatory impact analyses, regulatory emissions model development and training, and inventory guidance for Canadian federal agencies • National impact of proposed federal US rulemaking analyses for MECA Clean Mobility • Facility level inventory evaluations (airport, seaport, minerals mining and railyard).
Senior Engineer **SIERRA RESEARCH**[*] Ann Arbor, Michigan *4/2005 to 2/2015*	• 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) • 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 O_3 NAAQS

---

[*] Currently Trinity Consultants.

EMPLOYMENT HISTORY

Consultant **SELF-EMPLOYED** Dexter, Michigan *1/2005 to 5/2005*	• On-road motorcycle regulatory impact analysis and update to the regulatory on-road emissions model for Environment Canada
Senior Analyst, Project Manger **AIR IMPROVEMENT RESOURCE** Novi, Michigan *4/1998 to 12/2004*	• 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*	• 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 in support of photochemical model applications • 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*	• 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*	• Evaluated innovative technologies for Superfund hazardous waste clean-up; completed research, theoretical effectiveness calculations, validations, and reporting.

[*] Currently Ramboll Inc.
[†] Currently ICF Kaiser Engineers.

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, SPSS and SQL.