

**CYNTHIA F. LOOMIS  
SENIOR SCIENTIST  
ALPINE GEOPHYSICS, LLC**

**EDUCATION:**

B.S. Mathematics and Computer Science, California State University, Sacramento, 1987.

**PROFESSIONAL EXPERIENCE:**

Senior Scientist, Alpine Geophysics, LLC, Arvada, CO, 1992 – Present.

Staff Scientist, Radian Corporation, Denver, CO, 1991-1992.

Group Leader, Radian Corporation, Sacramento, CA, 1988-1991.

Scientist, Radian Corporation, Sacramento, CA, 1987-1988.

**FIELDS OF EXPERIENCE:**

Ms. Loomis specializes in emissions inventory preparation and emissions modeling for regional and urban scale photochemical, haze and particulate modeling applications, environmental database design and implementation, and the statistical analysis of sampling data. She has experience using all of the major emissions modeling systems, including SMOKE, CONCEPT, EMS-2001, EMS-95, EMS-95/PM, GEMAP, EPS and FREDs. She also has extensive experience with a variety of emissions development software packages used to support emissions modeling, including MOVES2010a, MOBILE6.2, MOBILE5, NONROAD, NMIM, BEIS3, EGAS4, and SPECIATE.

Ms. Loomis has developed emissions modeling inventories for use in a wide variety of projects over all areas of the United States, and internationally. These inventories were assembled from a variety of sources, including emissions inventories developed by national, state and local agencies, Regional Planning Organizations (RPOs), and industrial groups. Currently, she is utilizing a number of data sources, including the EPA National Emissions Inventory (NEI) 2011, 2014, and 2016(beta) inventories, for development of base and future year modeling platforms for modeling on a variety of grid domains and episodes. This includes extensive experience integrating and reconciling emissions data files from multiple sources; supplementing, altering, and re-combining emissions inputs for CAMx and CMAQ; and development of tagged emissions files for OSAT and PSAT applications.

Her extensive experience includes the integration of mobile source modeling methodologies into emissions modeling systems, including the development of the on-road mobile source modeling components of both CONCEPT and EMS-2003. She was the project manager for the CONCEPT emissions modeling system development project, sponsored by LADCO, and one of the original developers of the EMS modeling systems. Ms. Loomis has prepared PM-10 and ammonia emissions inventories in support of particulate modeling and research in the state of California. These inventories were prepared for the San Joaquin Valley modeling region, and have required the synthesis of emissions data from a variety of sources, including the NAPAP emission inventories, NEI, California state inventories of air toxics and criteria pollutants (CEIDARS), and other modeling inventories (SARMAP); and the calculation of emissions from available emissions factors and activity data.

Ms. Loomis has developed and presented a number of training sessions on emissions modeling systems, including training on CONCEPT, EMS-95 and EPS 2.0. Clients include U.S. EPA, California Air Resources Board, Lake Michigan Air Directors, Missouri DNR, Kansas DNR, private industry, and other consultants. These training sessions include lecture and hands-on application of the selected models, discussion of various approaches and pitfalls common in emissions modeling, discussion of the available modeling

alternatives, and selection criteria for appropriate emissions models given project requirements and restrictions.

### **Selected Project Experience**

North Slope Regional Air Quality Modeling. Client: Bureau of Land Management, 2018 – Ongoing. Alpine is reviewing the BOEM Arctic study and updating the modeling platform for use by BLM reviewing projects in Northern Alaska.

Ozone NAAQS Analysis. Client: Midwest Ozone Group, 2000 – Ongoing. Generate a base and projection year modeling platform and execute CAMx for ozone in order to provide input on potential technical activities available to support interested parties in the review, analysis, and planning for NAAQS attainment in the Midwestern and eastern U.S. Develop a future year culpability assessment using OSAT/APCA and prepare incremental studies on source apportionment and emissions and air quality trends for domestic and international sources.

Denver/Northern Front Range State Implementation Plan. Client: ENVIRON/Regional Air Quality Council, 2008 – Present. Alpine is conducting SMOKE emissions and CAMx photochemical modeling in support of the Denver/Northern Front Range 8-hour ozone State Implementation Plan (SIP). This SIP modeling includes development of baseline photochemical modeling databases for multiple years, future year emissions development, emissions sensitivity testing to assist in developing candidate control strategies and detailed control strategy emissions development and photochemical modeling.

Houston Stakeholder Modeling. Client: Consortium of Industrial Groups in Greater Houston Area, 2010-Present. Using the WRF Mesoscale meteorological model, the SMOKE emissions model and the CMAQ and CAMx air quality models, Alpine is exploring ensemble meteorological and air quality modeling to develop potential air quality control options in the Houston, TX area.

Greater Monument Buttes Oil and Gas Project. Client: Newfield Exploration, 2014. Alpine used the CMAQ air quality model and SMOKE emissions model to examine the impacts of a proposed oil and gas project in the Uintah Basin of Utah.

Moneta Divide Environmental Impact Statement. Client: BLM Lander Field Office, 2013. Alpine and a team of other consultants are using photochemical modeling to examine the air quality impacts of the Moneta Divide project emissions in central Wyoming.

BLM Carlsbad Field Office – Permian Basin Air Quality Impacts Analysis, Client: URS/BLM. 2012. Alpine applied the SMOKE emissions model and CAMx photochemical model over the Permian Basin to assist in air quality planning the basin.

Western Regional Air Partnership (WRAP) West-wide Jump Start Air Quality Modeling Study (WestJumpAQMS). Client: Western Regional Air Partnership, 2011. Using the WRF mesoscale meteorological model, the SMOKE emissions model and the CAMx photochemical model, Alpine conducted photochemical modeling in the Western United States to assist in air quality planning.

Allegheny County PM2.5 State Implementation Plan. Client: Allegheny County Health Department, 2011. Using the WRF mesoscale meteorological model, the SMOKE emissions model and the CAMx photochemical model, Alpine conducted both regional and local scale modeling to assess the impact of local and regional scale emissions on the residual non-attainment at monitors in the Liberty/Clairton area.

Single Source Ozone Impact Analysis in the Gulf Coast. Client: Trinity Consultants/Cheniere Energy, Inc., 2011 Using the Baton Rouge Louisiana SIP photochemical modeling system Alpine assessed the potential ozone impacts of a proposed natural gas liquefaction facility in Cameron Parish, Louisiana.

Chapita Wells Oil and Gas Project. Client: EOG Resources, 2009. Alpine is using CMAQ air quality model and SMOKE emissions model to examine the impacts of a proposed oil and gas project in the Uintah Basin of Utah.

SEMAP MOVES Emissions Inventory Development. Client: Mactech. 2010-2012. Alpine coordinated the development of mobile source emissions for ten southeastern US states. This effort included the development of appropriate MOVES2010a input files, assisting the states in the development of the appropriate input data, and execution of the SMOKE-MOVES integration tools.

Pennsylvania Biofuels. Client: E.H. Pechan/Pennsylvania DEP, 2009. Alpine developed an ambient air quality study to determine if the mandated volumes of biofuel sold or offered for sale in the Pennsylvania Commonwealth will achieve and maintain the NAAQS for ozone and fine particulate matter (PM<sub>2.5</sub>). SMOKE, MOBILE6.2, and CMAQ were used to develop and evaluate alternate scenarios for biodiesel penetration for 2008 and 2012 to determine the impact of ethanol and biodiesel fuel sales and alternatives on air quality.

Hong Kong Air Quality Modeling System. Client :Hong Kong EPD/ENVIRON, 2010-2011. Ms Loomis was the Alpine Geophysics Project Manager for the development of an enhanced air quality modeling system for the Hong Kong Environmental Protection Department (EPD). As a subcontractor to ENVIRON, AG was responsible for the incorporation of the emissions modeling systems, including both CONCEPT and SMOKE alternatives. The modeling system options include MEGAN and BEIS capability, generation of emissions inputs for the CBM4, CB05 and SAPRC99 chemical mechanisms, and motor vehicle emission factor options generated by EMFAC and MOBILE6. Geophysical data used for spatial allocation of emissions, temporal allocation factors and speciation profile data were also reviewed, updated and incorporated into the modeling systems.

Visibility Improvement - State and Tribal Association of the Southeast (VISTAS) regional planning organization (RPO) . Client: VISTAS, 2003 - 2009. Alpine developed, modeled and reviewed emissions inventories in support of VISTAS air quality modeling programs. This assignment encompassed the development of 2002, 2009, and 2018 inventories for VISTAS, including the development of national, annual on-road motor vehicle inventories utilizing MOBILE6 and SMOKE, CEM-based EGU emissions inventories, area and point source inventories utilizing NEI and locally updated emissions data, NONROAD based emissions estimates and projections for off-road mobile sources, BEIS3 biogenics, and wildfires.

SIP Strategy Comprehension Plan (SSCP) Client: Industry Consortium, 2005 – 2007. The objective of the project was examining the components of an integrated 8-hr ozone and annual PM<sub>2.5</sub> modeling study for the five-state Upper Midwest region. The aim of the SSCP is to allow the Project Sponsors insight and assurance that best modeling practices are being utilized to identify effective emission reduction controls to address the residual nonattainment issues in this region and that if alternate and credible information are developed independently outside of the scope, timelines, or budgets of the RPO recommendation process that these data are introduced to the States in a constructive manner for consideration in SIP development timelines.

## **PROFESSIONAL EXPERIENCE**

Air and Waste Management Association (AWMA)

## **Journal Papers And Presentations**

"Processing Mobile Emissions in SMOKE: Is it worth simulating everyday onroad mobile emissions to support 8-hr ozone modeling?," presented at the International Emission Inventory Conference, New Orleans, LA, May 2006. Stella, G.M., C. Loomis, M. Abraczinskas,

"Application Of The Emissions Modeling System EMS-95 To The Southern California SCAQS-97 Domain," Ninth Joint Conference on the Applications of Air Pollution Meteorology, American Meteorological Society and the Air and Waste Management Association, 28 January - 2 February, 1996, Atlanta, (with others).

"Development of a Draft PM-10 Emissions Inventory in the SARMAP region Using EMS-95 Emissions Estimates Modeling System", (with Robert Emigh) 1995 Emissions Inventory: Programs & Progress Specialty Conference, sponsored by AWMA, Research Triangle Park, NC.

"Comparison of the CAL-MoVEM and DTIM2 Emissions Estimate Models", (with James G. Wilkinson) 1995 Emissions Inventory: Programs & Progress Specialty Conference, sponsored by AWMA, Research Triangle Park, NC.

"Evaluation Protocols for Emissions Modeling Systems", (with J.G. Wilkinson) 1993 International Regional Photochemical Measurement and Modeling Studies Specialty Conference, sponsored by AWMA, San Diego, CA.

"An Independent Evaluation of the Geocoded Emissions Modeling and Projections System (GEMAP)", (with J.G. Wilkinson) 1993 International Regional Photochemical Measurement and Modeling Studies Specialty Conference, sponsored by AWMA, San Diego, CA.

"An Electronic Approach to Compliance", (with others) Colorado Hazardous Waste Management Society Fifth Annual Conference, 3-4 October, 1991, Denver, CO.

"Total Data Quality", (with others) Colorado Hazardous Waste Management Society Fifth Annual Conference, 3-4 October, 1991, Denver, CO.

## **Company Reports (selected)**

"Regional Haze Modeling for Southeastern VISTAS II Regional Haze Analysis Project: Final Modeling Protocol", (with others), prepared for SESARM, Inc., Stockbridge, GA, June 2018.

"Regional Haze Modeling for Southeastern VISTAS II Regional Haze Analysis Project: 2011el and 2028el CAMx Benchmarking Report", (with others), prepared for SESARM, Inc., Stockbridge, GA, August 2018.

"Regional Haze Modeling for Southeastern VISTAS II Regional Haze Analysis Project: 2011el CAMx Version 6.32 and 6.40 Comparison Report", (with others), prepared for SESARM, Inc., Stockbridge, GA, December 2018.

"Regional Haze Modeling for Southeastern VISTAS II Regional Haze Analysis Project: 2011el CAMx Version 6.40 12km VISTAS and EPA 12km Continental Grid Comparison Report", (with others), prepared for SESARM, Inc., Stockbridge, GA, December 2018.

“Regional Haze Modeling for Southeastern VISTAS II Regional Haze Analysis Project: 2028 CAMx Version 6.32 and 6.40 12km Comparison Report”, (with others), prepared for SESARM, Inc., Stockbridge, GA, April 2019.

“Regional Haze Modeling for Southeastern VISTAS II Regional Haze Analysis Project: 2028elv2 CAMx Version 6.40 12km VISTAS and EPA 12km Continental Grid Comparison Report”, (with others), prepared for SESARM, Inc., Stockbridge, GA, May 2019.

“Ozone Impact Analysis of the Proposed Resid Oil Upgrader Expansion and Capital Development Project”, (with Dennis McNally), prepared for Sage Environmental Consulting, Metairie, LA, 11 December 2014

“Ozone and PM<sub>2.5</sub> Impact of the Proposed Sasol Lake Charles Gas-to-Liquids and Lake Charles Cracker Projects”, (with Dennis McNally), prepared for Sasol North America Inc., Houston, TX, 15 November 2013.

“Ozone Impact Analysis of the Proposed Cameron LNG Facility”, (with Dennis McNally), prepared for Cindy Thompson, C-K Associates, Baton Rouge, LA, 29 April 2013.

“Application and Evaluation of WRF for August through October 2010” (with Dennis McNally) prepared for Louisiana Foundation for Excellence in Science, Technology and Education, (2012).

“Application and Evaluation of WRF for Calendar Year 2007”, (with Dennis McNally), prepared for Allegheny County Health Department, (2011).

“Ozone Impact Analysis of the Proposed Cheniere Sabine Pass Liquefaction Facility”, (with Dennis McNally), prepared for Trinity Consultants, (2011).

“Evaluation of Air Quality Impacts of Biofuels in Pennsylvania”, (with others), prepared for Commonwealth of Pennsylvania Department of Environmental Protection Bureau of Air Quality, (2009).

“Technical Support Document for VISTAS Emissions and Air Quality Modeling to Support Regional Haze State Implementation Plans”. (with others), prepared for Visibility Improvement State and Tribal Association of the Southeast (VISTAS), (2009).

“Technical Support Document for the Association of Southeastern Integrated Planning (ASIP) Emissions and Air Quality Modeling to Support PM<sub>2.5</sub> and 8-Hour Ozone State Implementation Plans”, (with others), prepared for Southeastern States Air Resource Managers, Inc. Association for Southeastern Integrated Planning, (2009).

“Final 2010 Ozone Attainment Demonstration Modeling for the Denver 8-Hour Ozone State Implementation Plan”,(with others), prepared for the Denver Regional Air Quality Council, (2009).

“Ozone Impact Analysis of the Proposed Nucor Steel Louisiana Facility”, (with Dennis McNally), prepared for Environmental Resource Management, (2008).

“Work Plan 2: Emissions Modeling Software Implementation Work Plan. Upgrade of a Regional Air Quality Modelling System (PATH) – Feasibility Study.” Prepared for Environmental Protection Department Hong Kong. Prepared by ENVIRON Hong Kong Limited and Alpine Geophysics, June 2009. (with others)

“Second Draft Report— VISTAS Emissions and Air Quality Modeling— Phase I Task 6 Report: Modeling Protocol for the VISTAS Phase II Regional Haze Modeling”, prepared for VISTAS, prepared by ENVIRON International Corporation, Novato, CA, Alpine Geophysics, LLC, Ft. Wright, KY, and UC Riverside, Riverside, CA. 2004. (with Stella, G.M., R.W. Morris, B. Koo, T.W. Tesche, C. Loomis, G. Tonnesen, and Z. Wang.)

"Scientific Peer-Review of the Hg-CAMx Atmospheric Mercury Model and Its Application to the 2002 Annual Cycle," prepared for Wisconsin Department of Natural Resources, Mercury Modeling Team, prepared by Alpine Geophysics, LLC, Arvada, CO, April 2004. (with Stella, G.M., T.W. Tesche, D. McNally, J. Wilkinson)

"Technical Support Study 15: Evaluation And Improvement Of Methods For Determining Ammonia Emissions In The San Joaquin Valley." Prepared for the California Air Resources Board, Sacramento, CA. Prepared by Sonoma Technology, Inc., Santa Rosa, CA. STI-95310-1759-DFR. 1997. (with S. Coe, L. Chinkin, J.G. Wilkinson, J. Zwicker, D. Fitz, D. Pankratz, and E. Ringler).

"Comparison of the CAL-MoVEM and DTIM2 Motor Vehicle Emissions Estimate Models", prepared for the California Air Resources Board (Sacramento, CA), February, 1997.

"Photochemical Modeling Analysis of the Pittsburgh-Beaver Valley Ozone Nonattainment Area", (with others) prepared for the Southwestern Pennsylvania Clean Air Stakeholders Group, February 21, 1997.

"Estimates of UAM-IV Model Sensitivities to Emissions Changes in the Pittsburgh-Beaver Valley Ozone Non-Attainment Area", (with others) prepared for the Southwestern Pennsylvania Clean Air Stakeholders Group, September 15, 1996.

"PM10 Air Quality Models for Application in the San Joaquin Valley PM10 SIP", (with others) prepared for the California Air Resources Board (Sacramento, CA), September 1996.

"Pittsburgh Regional Ozone Attainment Study: Emissions Modeling Results", (with James G. Wilkinson) prepared for the Southwestern Pennsylvania Clean Air Stakeholders Group, July 1996.

"Review of Current Methodologies for Estimating Ammonia Emissions", (with others) prepared for the California Air Resources Board (Sacramento, CA), May 1996

"Urban Airshed Modeling for 1996 in the South Central Coast Air Basin of California", (with others), report to Santa Barbara County Air Pollution Control District by Alpine Geophysics, Golden, CO., 1994

"EMS-95: Technical Formulation Document," prepared for the Lake Michigan Air Directors Consortium (Des Plaines, IL) and the Valley Air Pollution Study Agency (Fresno, CA), October 22, 1994 (with James G. Wilkinson).

"Photochemical Modeling in Support of the Ventura County SIP", (with others), Alpine Geophysics, Crested Butte, CO., 1994.

"Software Verification and Validation Plan for the GEMAP System", (with others), Radian Corporation, Sacramento, CA, 1991.

"Software Testing Plan for the GEMAP System", (with others), Radian Corporation, Sacramento, CA, 1991.