

## **Curriculum Vitae: Russell F. Lee**

Meteorologist

Mailing address:

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PMB# 385

Asheville, NC 28804

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### **EXPERTISE**

#### **General expertise:**

I am a meteorologist<sup>1</sup> specializing in applications to air quality. I have 52 years experience as a meteorologist, including 46 years specializing in air pollution applications with emphasis in air dispersion of chemicals and air quality modeling.

#### **Specific areas of specialization:**

Atmospheric turbulence and diffusion

Boundary layer meteorology

Air quality modeling of industrial sources, mobile (traffic) sources, and mining operations

Expert reports and consulting (I no longer do expert testimony in court)

PSD (Prevention of Significant deterioration) analyses, including visibility and sulfate and nitrate deposition

Specific expertise using AERMOD and AERMET, CALPUFF and CALMET, ISC and RAMMET, CAL3QHC, CAL3QHCR, CTDM, SLAB and other air models

Training in the use of air quality models, especially ISC and AERMOD

Air quality model evaluation

Technical and peer review of modeling projects, technical reports and papers

### **EDUCATION AND TRAINING**

B.S. Engineering (Meteorology), University of Michigan, 1963.

Graduate courses in meteorology and mathematics, North Carolina State University, 1981-1985, including advanced courses in:

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<sup>1</sup> Meteorology is defined by the American Meteorological Society as “the study of the physics, chemistry, and dynamics of the earth’s atmosphere including the related effects at the air-earth boundary over both land and the oceans.” [*Glossary of Meteorology*, Second Edition, American Meteorological Society, Boston, MA 2000.]

- Atmospheric Turbulence and Diffusion,
- Planetary Boundary Layer,
- Air-Sea Interaction,
- Dynamic Meteorology,
- Linear Algebra, and
- Advanced Mathematics for Scientists and Engineers

CALPUFF Training Course by Earth Tech, Inc., 2003. This course was taught by Joseph Scire and Françoise Robe, two of the developers of the CALPUFF model.

Contract Manager Recertification Course, U.S. EPA, 1995.

AMS Workshop on Meteorology and Environmental Assessment, American Meteorological Society, 1975.

Course on Fortran V, Sperry-Univac Computer Systems, 1973.

Symposium on Statistical Aspects of Air Quality Data, sponsored by the Triangle Universities Consortium on Air Pollution and the division of Meteorology, U.S. EPA, 1972.

Workshop on EPA Dispersion Modeling Techniques and Applications, U.S. EPA, 1973.

A Workshop on Courtroom Procedure, U.S. EPA, 1972.

Course on Diffusion of Air Pollution – Theory and Application, National Air Pollution Control Administration (predecessor to the U.S. EPA), 1970.

## **PROFESSIONAL AFFILIATIONS**

American Meteorological Society (AMS) (Full Member since 1971).

(The AMS is a member organization of the American Institute of Physics, an organization of scientific societies in the physical sciences)

Air and Waste Management Association (A&WMA) (Individual Member continuously since 1998; first joined 1986, when A&WMA was known as Air Pollution Control Association).

American Association for the Advancement of Science (Professional Member since 1998).

American Chemical Society (Member since 2015). Member of Environmental Chemistry Division.

New York Academy of Science (Professional Member since 1999).

## **ACTIVITIES AND AWARDS**

### **AMS/EPA Regulatory Model Improvement Committee (AERMIC) (1991 – 2005).**

I participated as a full member of the AMS/EPA Regulatory Model Improvement Committee from its inception in 1991 through 2005. I participated as a full member of AERMIC from its inception in 1991 until 2005. The primary function of AERMIC was to develop a state-of-the-art air quality model based on modern planetary boundary layer theory. This model was named AERMOD (**AERMIC Model**). I was especially involved in the developmental evaluations of the model (see Lee, et al., 1995 and Lee, et al., 1998 under “Technical Conference Papers” below). A developmental evaluation is a diagnostic evaluation, using a portion of the evaluation databases, consists of a series of diagnostic tests, using a subset of the evaluation databases. This evaluation was performed each time a change was made to the model. This approach allows problems and errors to be detected and corrected early in the development of the model, before the final evaluation was conducted. The final evaluation was conducted using model evaluation databases that were not previously used for the developmental evaluation.

### **US-USSR Workshop**

I participated in two workshops, part of a scientific exchange between the US and USSR. The first was in 1991 in Durham, NC, in which I presented a discussion on the use of air pollution models in a regulatory setting in the U.S. I was invited to attend a second such workshop, held in St. Petersburg, Russia (with the breakup of the USSR, this became a US-Russia workshop) where I provided a detailed discussion of the main US model, ISC, and a comparison of US versus USSR modeling techniques

### **Technology Transfer Workgroup.**

I served as an active member of the ad hoc “Technology Transfer Workgroup” formed within EPA during two periods of time. From 1986 through 1991, this workgroup helped define how the complex terrain dispersion model, CTDM-PLUS, would be implemented in a regulatory setting which involved the development of a screening version of the model, CTSCREEN. More recently, the TTW was reactivated for a period of time to address the implementation of the newly developed AERMOD air quality model in a regulatory setting,

### **Cash Reward for Sustained Superior Performance**

In 1988, EPA received numerous reports of errors in the recently released version of ISCST. To quote the recommendation letter, “This recommendation for award is especially based on Mr. Lee’s highly commendable performance in finding and correcting errors in EPA’s ISCST model and then exhaustively testing the code to ensure the model was working properly. This model is EPA’s mainstay regulatory air dispersion model and the code was improperly revised by a contractor to incorporate a new building downwash algorithm.”

## **Education Chair of the Central North Carolina Chapter of the American Meteorological Society, 1990 - 1995**

### **EMPLOYMENT HISTORY**

1999 – now Self-employed private consultant in meteorology, specializing in air pollution, currently located in Burnsville, NC (near Asheville, NC).

1998 Senior Product Specialist. Trinity Consultants, Inc., Research Triangle Park, NC.

1970 – 1997 Meteorologist, NOAA, U.S. Department of Commerce, assigned to the U.S. Environmental Protection Agency, Research Triangle Park, NC (Retired October 1997).

1964 – 1969 Meteorologist, National Weather Records Center (now National Centers for Environmental Information), U.S. Department of Commerce, Asheville, NC.

### **BRIEF SUMMARY OF EXPERIENCE**

#### **1964 – 1969**

I began my career in 1964 as a meteorologist at what is now the National Centers for Environmental Information (NCEI), U.S. Department of Commerce. While at NCEI, I was invited to join the Science Advisory Staff, where I worked on special meteorological studies for the Department of Commerce, NASA, the U.S. Navy and other government agencies.

#### **1970 – 1997**

During much of my assignment to the U.S. EPA (formally as a NOAA employee), I was responsible for the activities described below. A few of the many specific projects are noted also.

I was responsible for the evaluation, modification, and improvement of atmospheric dispersion and related models. I was tasked with the responsibility of fostering consistency within the agency in the evaluation and use of mathematical models and other techniques for specifying emission limits needed to achieve air quality standards.

Along these lines, I was the lead meteorologist on numerous special model evaluation projects during my tenure at the EPA. These projects included an evaluation of the EPA's ISCST2 air quality model, using standardized procedures to allow comparison with its European counterparts, and a comparison of the relative effects on model predictions of using several alternative dispersion parameters. The results of these studies were presented in conferences in the U.S. and in Europe (see Irwin and Lee, 1996; Lee and Irwin, 1995; and Lee, 1993a under "Technical Conference Papers" below).

I have been active in developing as well as applying model evaluation procedures and sensitivity analyses throughout much of my career. I have been actively involved in efforts to improve techniques used in the evaluation of air quality models that have been reported at conferences, and in professional journals in the U.S. and Internationally. More than a dozen of the publications listed below involved developing or applying model evaluation procedures.

It was sometimes necessary to correct bugs in some of the models in-house. In 1989 I received a commendation and cash reward for a major correction to coding errors in the ISC model, a “mainstay” model of the regulatory community, after “the [model] code was improperly revised by a contractor.” I corrected the code. After the revised model was released, “no users reported technical problems.”

Part of my duties included contract management. I was instrumental in bringing about, by means of a contract, a major revision of the Industrial Source Complex Model (ISC), known as ISC2 (including both ISCST2 and ISCLT2). The design of this completely re-programmed model virtually eliminated programming errors that had plagued the earlier version.

I was also responsible for preparing guidance on model inputs and applying and evaluating models that are used to assess, develop and revise air pollution control strategies.

I was responsible for providing technical support to the modeling community through the Support Center for Regulatory Air Models (SCRAM). SCRAM started as a dial-up electronic bulletin board system—the Internet was not yet in common use—that allowed users to download the EPA suite of air quality models, and allowed users to submit questions or concerns about the models. I was involved with SCRAM from its inception by educating users on the proper use of the models, and responding to reports of possible errors in the model code, either by electronic bulletin board or telephone. I also was the contributing editor of the newsletter, *Scram News*, from 1990 to 1996 which provided users with short articles related to models and modeling techniques.

I was responsible for providing technical assistance and consultation to support personnel at EPA headquarters and the Regional Offices responsibilities’ for development and enforcement of Federal regulations and standards. This included consultation and assistance on the appropriate use of the EPA regulatory air quality models, including the Industrial Source Complex air quality models (ISCST and ISCLT). I also served as a technical consultant to other professionals in EPA’s Air Quality Planning and Standards, Technical Support Division.

I have presented a number of training lectures on the applications of the ISCST and other EPA air quality models in the classroom, by satellite, and by video conferencing. The audience has included EPA Regional Office personnel, air

pollution professionals from throughout the United States, and the U.S.-Russian Working Group on Air Pollution Modeling in St. Petersburg, Russia (noted above).

I also developed a procedure that allows the EPA to verify when a modification of a regulatory model may be considered equivalent to the regulatory model. In 1990 I developed and applied an analysis designed to inform modelers of the impact that using a new or revised model will have on modeled design concentrations for a variety of source types. The EPA now requires this analysis, called a “consequence analysis,” for most new and revised models that are proposed for regulatory use.

### **SELECTED PROJECTS WHILE A PRIVATE CONSULTANT SINCE 1999**

I developed and taught an AERMOD segment to an EPA modeling training course that was transmitted live to the EPA Regional Offices via satellite and videotaped for future use.

I co-taught more than 40 AERMOD and ISCST3 training courses in the U.S. and Canada.

Since 1999, I have conducted more than 200 modeling or model-related projects involving AERMOD, AERMET, AERSCREEN, ISCST3, PCRAMMET, SCREEN, RAM, CALPUFF, CALMET, CALPUFF-SCREEN (also called CALPUFF-Lite), OCD, BLP, CAL3QHC, CALINE3, CTDMPLUS, CTSCREEN, SLAB, ALOHA, VISCREEN, OBODM, and MOBILE6 (an emissions model), most requiring written reports. These projects including the following:

- “Hot Spot” mobile source CAL3QHC modeling for carbon monoxide for six planned highway intersection expansions; 3 in Denver, 2 in Fort Collins and one in Centennial, Colorado (2009 – 2013) for purpose of obtaining air pollution permits required for construction permits;
- Acquisition and preprocessing of meteorological data (using AERMET or PCRAMMET) for engineering consultants for their modeling projects (several projects).
- Technical advice, assistance and other consultation to clients for their CALPUFF, AERMOD and ISCST3 modeling projects (well as the associated meteorological preprocessors, CALMET, AERMET and PCRAMMET), as well as other model-related issues (more than 45 projects);
- Technical consultation on, and co-authoring (with Dr. Jesse Thé) of, a draft air modeling guidance for a the Provinces of Ontario and Saskatchewan, and for the state of Ohio;
- Technical review of modeling projects and documents at the request of other consulting firms (AERMOD, ISCST3, SCREEN3, VISCREEN, CTSCREEN, CTDMPLUS, CALPUFF, and OBODM) (more than 20 projects);

- Model-related software modification and development (more than 10 projects).

I provided expert consultation and reports for legal cases including the following:

- Provided consultation and expert reports for Florine Shanley, et al., (plaintiff) vs. Chalmette Refining, LLC (defendant), U.S. District Court, Eastern District of Louisiana, Civil Action No.: 12-3045. (2014)
- Provided consultation and expert reports for Anthony Arnold, Jr. (plaintiff) vs. Canal Barge Company, Inc. (defendant) U.S. District Court, Eastern District of Louisiana, Civil Action No.: 13-4966. (2014)
- Provided consultation and expert reports for Karen Snyderman vs Millard Refrigerated Services, Inc., et al., Circuit Court of Mobile County, Alabama, Case No: 02-CV-2013-000106.00. (2014)
- Provided text for the rebuttal to a motion in limine to exclude the ALOHA model as evidence in the case of Tom Berggren, Ruby McClure, et al. vs Evans Industries, Inc.(case 615-001) (2013)
- Provided, jointly with Dr. W. Gale Biggs, questions to be used to interrogate witnesses in the same case as above (2013)
- Preparation of rebuttal expert report related to the use of air dispersion models and transport and diffusion of pollutants from the Roadway Express trailer fire, Forrest City, AR (2004)
- Preparation of an expert report on modeling analysis of anhydrous ammonia leak in Finley, ND for the case of Norgaard vs TDS Trucking (2004)

**EXPERT TESTIMONY AND DEPOSITIONS OVER THE PAST FOUR YEARS**

Anthony Arnold, Jr. (plaintiff) vs. Canal Barge Company, Inc. (defendant)

U.S. District Court, Eastern District of Louisiana

Civil Action No.: 13-4966

Deposition: May 14, 2014

Florine Shanley, et al., (plaintiff) vs. Chalmette Refining, LLC (defendant)

U.S. District Court, Eastern District of Louisiana

Civil Action No.: 12-3045

Deposition: July 25, 2014

Testimony at trial: October 20 – 21, 2014



## SELECTED PUBLICATIONS AND PRESENTATIONS

### **Books**

Thé, J.L., and **R.F. Lee**, 2004: "Available Software," Chapter 22 of *Air Quality Modeling: Volume I—Fundamentals*, Paolo Zannetti, ed. Air and Waste Management Association, Pittsburgh, PA.

### **Journal Articles**

A.J. Cimorelli, Perry, S.G., A. Venkatram, J.C. Weil, R.J. Paine, R.B. Wilson, **R.F. Lee** and W.D. Peters, 2005: AERMOD: A dispersion model for industrial source applications Part I: General formulation and boundary layer characterization. *J. Appl. Meteor.* Vol. 44, No. 5, pp. 682–692.

Perry, S.G., A.J. Cimorelli, J.C. Weil, A. Venkatram, R.J. Paine, R.B. Wilson, **R.F. Lee** and W.D. Peters, 2005: AERMOD: A dispersion model for industrial source applications Part II: Model performance against 17 field-study databases. *J. Appl. Meteor.* Vol. 44, No. 5, pp. 694–708.

Venkatram, A., R. Brode, **R. Lee**, R. Paine, S. Perry, W. Peters, J. Weil, R. Wilson, 2001: A complex terrain dispersion model for regulatory applications. *Atmos. Environ.* Vol. 35, No. 24, pp. 4211–4221.

**Lee, R.F.**, and J.S. Irwin, 1997: Improving concentration measures used for evaluating air quality models. *Jour. Appl. Meteorol.*, Vol. 36, No. 8, pp. 1107-1112.

Irwin, J.S., and **R.F. Lee**, 1996: Comparative evaluation of two air quality models: within-regime evaluation statistic. *Proceedings, Fourth Workshop on Harmonisation with Atmospheric Dispersion Modelling for Regulatory Purposes*, May 6-9, 1996, Oostende, Belgium. pp 535-542. *Published in International Journal of Environment and Pollution.*

**Lee, R.F.**, and J.S. Irwin, 1995: Methodology for a comparative evaluation of two air quality models, *Workshop on Operational Short-range Atmospheric Dispersion Models for Environmental Impact Assessment in Europe*, Mol, Nov. 1994, published in *Int. J. Environment and Pollution*, Vol. 5, Nos. 4-6, pp. 723-733. (Note: The proceedings of the Workshop were published "as is" without further review in the *Int. J. Environment and Pollution.*)

### **Technical Conference Papers**

**Lee, R.F.**, 2004: Use of Air Models for Compliance in the U.S. Presented at *Air Quality Modelling: New Methods for a New Reality*, May 17 – 19, 2004, Toronto, Ontario, Canada. (Slides only)

**Lee, R.F.** and J.L. Thé, 2003: The Effect of CALMET Surface Layer Weighting Parameter R1 on the Accuracy of CALMET at Other Nearby Sites: a Case Study. Paper number 03-A-32 presented at *Guideline on Air Quality Models: The Path*

*Forward*, October 22-24, 2003, Mystic, CT. Air and Waste Management Association, Pittsburgh, PA.

Paine, R.J, R.W. Brode, R.B. Wilson, A.J Cimorelli, S.G Perry, J.C Weil, A. Venkatram, W.D. Peters and **R.F Lee**, 2003: AERMOD: Latest Features and Evaluation Results. Paper number 69878 presented at *A&WMA 96<sup>th</sup> Annual Conference and Exhibition*, June 22-26, 2003

Nand, K., **R.F. Lee** and K. Lu, 2003: AERMOD-ACE2588 Model for Performing Air Toxics Health Risk Assessment. Paper number 69951 presented at *A&WMA 96<sup>th</sup> Annual Conference and Exhibition*, June 22-26, 2003. Air and Waste Management Association, Pittsburgh, PA.

J. L. Thé, R.W. Brode and **R.F. Lee**, 2001: Worldwide data quality effects on PBL short-range regulatory air dispersion models. *Proceedings, Seventh International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes*, May 28-31, 2001, Belgirate, Italy. Paper presented by J.L. Thé.

**Lee, R.F.**, R.J. Paine, 2001: Effect of ASOS Cloud Data on AERMOD Results. *Air and Waste Management Association Conference on Guideline on Air Quality Models: A New Beginning*, April 4–6, 2001, Newport, RI. Air and Waste Management Association, Pittsburgh, PA. Paper presented by R. F. Lee.

**Lee, R.F.**, A. Goodman, A. Heinerikson, 1999: Comparison between AERMOD and ISCST3 using data from three industrial plants. Paper No. 99-536. *Air and Waste Management Association 90th Annual Meeting and Exhibition in Saint Louis, Missouri, June, 1999*.

Paine, R., **R. Lee**, R. Brode, R. Wilson, A. Cimorelli, S. Perry, J. Weil, A. Venkatram, W. Peters, 1999: AERMOD: Model formulation and evaluation results. Paper No. 99-476. *Air and Waste Management Association 92<sup>nd</sup> Annual Meeting and Exhibition, St. Louis, Missouri, June 20–24, 1999*. Air and Waste Management Association, Pittsburgh, PA. Paper presented by R. Paine.

Grosch, T. and **R. F. Lee**, 1999: Sensitivity of the AERMOD Air Quality Model to the Selection of Land Use Parameters. Presented at the *Seventh International Conference on Air Pollution: AIR POLLUTION 99*, 27-29 July 1999, Palo Alto, CA. Paper presented by T. Grosch.

**Lee, R.F.**, R.J. Paine, S.G. Perry, A.J. Cimorelli, J.C. Weil, A. Venkatram, R.B. Wilson, 1998: Developmental Evaluation of the AERMOD Dispersion Model. *Preprints, Tenth Joint Conference on Application of Air Pollution Meteorology with the A&WMA, January 11-16, Phoenix, Arizona*. American Meteorological Society, Boston, MA pp. 21-25. Paper presented by R. F. Lee.

Venkatram, A., J. Weil, A. Cimorelli, **R. Lee**, S. Perry, R. Wilson, R. Paine, 1998: AERMOD's simplified algorithm for dispersion in complex terrain. *Preprints, Tenth Joint Conference on Application of Air Pollution Meteorology with the A&WMA, January 11-16, Phoenix, Arizona*. American Meteorological Society, Boston, MA pp. 21-25. Paper presented by A. Venkatram.

Cimorelli, A.J., S.G. Perry, **R.F. Lee**, R.J. Paine, A. Venkatram, J.C. Weil, R.B. Wilson, 1996: Current progress in the AERMIC model development program. *Air and Waste Management Association 89th Annual Meeting and Exhibition in Nashville, Tennessee, June, 1996*.

Irwin, J.S., and **R.F. Lee**, 1996: Comparative evaluation of two air quality models: within-regime evaluation statistic. *Proceedings, Fourth Workshop on Harmonisation with Atmospheric Dispersion Modelling for Regulatory Purposes, May 6-9, 1996, Oostende, Belgium*, pp 535-542. (published in proceedings, also published in *International Journal of Environment and Pollution*). Paper presented by J.S. Irwin.

**Lee, R.F.**, and J.S. Irwin, 1996: Improving concentration measures used for evaluating air quality models. *Preprints, Ninth Joint Conference on Applications of Air Pollution Meteorology with the A&WMA, January 28-February 2, 1996, Atlanta, Georgia*. American Meteorological Society, Boston, MA, pp. 520-523. Paper presented by R.F. Lee.

**Lee, R.F.**, R.J. Paine, S. Perry, A.J. Cimorelli, J.C. Weil, A. Venkatram, R.B. Wilson, 1996. Development and Evaluation of the AERMOD Dispersion Model'. *Proceedings of the 21-st NATO/CCMS Conference Air Pollution Modelling and its Application, Baltimore, MD, USA*, 623-660.

**Lee, R.F.**, S.G. Perry, A.J. Cimorelli, R.J. Paine, A. Venkatram, J.C. Weil, R.B. Wilson, 1995: AERMOD—The developmental evaluation. *Proceedings of the Twenty-First NATO/CCMS International Technical Meeting on Air Pollution Modeling and Its Application*. Paper presented by W. Peterson.

**Lee, R.F.** and J.S. Irwin, 1995: Methodology for a comparative evaluation of two air quality models, Workshop on Operational Short-range Atmospheric Dis[p]ersion Models for Environmental Impact assessment in Europe. Mol, Belgium, Nov. 1994, published in *Int. J. Environment and Pollution*, Vol. 5, Nos. 4-6, pp. 723-733.

Perry, S.G., A.J. Cimorelli, **R.F. Lee**, R.J. Paine, A. Venkatram, J.C. Weil, and R.B. Wilson, 1994: AERMOD: A Dispersion Model for Industrial Source Applications. *Air and Waste Management Association 87th Annual Meeting and Exhibition in Cincinnati, Ohio, June 19-24, 1994*. (NTIS #PB94-176179)

**Lee, R.F.**, 1993: Pilot Study: Evaluation of the ISCST2 Model. *Proceedings of the Workshop: Intercomparison of Advanced Practical Short-Range Atmospheric Dispersion Models*, August 30-September 3, 1993, Manno, Switzerland. Paper presented by R.F. Lee.

**Lee, R.F.**, 1993: Overview of the U.S. Environmental Protection Agency's Model Evaluation Activities. *Proceedings of the Workshop: Intercomparison of Advanced Practical Short-Range Atmospheric Dispersion Models*, August 30-September 3, 1993, Manno, Switzerland. Paper presented by R.F. Lee.

Lee, R.F., J.L. Dicke, and J.B. Mersch, 1986: The Impact of Revisions to Regulatory Air Quality Models. *Preprints, Fifth joint Conference on Applications*

*of Air Pollution Meteorology, November 18-21, 1986, Chapel Hill, North Carolina.* American Meteorological Society, Boston, MA. Paper presented by R.F. Lee

Lee, R.F., J.L. Dicke, D.A. Wilson, J.A. Tikvart, 1984: Evaluating the Effects on Concentration Estimates of Technical Changes to Regulatory Air Quality Models. Extended Abstracts, Fourth Joint Conference on Applications of Air Pollution Meteorology, October 16-19, Portland, OR. American Meteorological Society, Boston, MA. Paper presented by R.F. Lee.

Mills, M.T., and R.F. Lee, 1980: Critical Meteorological Conditions for Elevated 3-hour and 24-hour **SO<sub>2</sub>** Concentrations in the Vicinity of Coal Fired Power Plants. Conference Papers, Second Joint Conference on Applications of Air Pollution Meteorology, March 24-27, 1980, at New Orleans, LA. American Meteorological Society, Boston, MA. Paper presented by M.T. Mills.

Lee, R.F., J.A. Tikvart, J.L. Dicke, and R.W. Fisher, 1979: The Effect of Revised Dispersion Parameters on Concentration Estimates. *Preprints, Fourth Symposium on Turbulence, Diffusion and Air Pollution, January 15-18, 1979, at Reno, NV.* American Meteorological Society, Boston, Massachusetts. Paper presented by R.F. Lee.

Freas, W.P., and R.F. Lee, 1976: Sensitivity Analysis of the Single Source (CRSTER) Model. *Proceedings of the Seventh NATO/CCMS International Technical Meeting on Air Pollution Modeling*, September 1976, Airlie, VA. Paper presented by R.F. Lee.

Lee, R.F., M.T. Mills, and R.W. Stern, 1975: Validation of a Single Source Dispersion Model. *Proceedings of the Sixth NATO/CCMS International Technical Meeting on Air Pollution Modeling*, September 1975, Frankfurt, Germany. Paper presented by R.F. Lee.

Turner, D.B., and **R.F. Lee**, 1973: User's Needs and the Applications of Air Quality Simulation Models. Fourth Meeting of the Panel on Modeling of the NATO Committee on the Challenges of Modern Society. May 1973, Oberursel, Federal Republic of Germany.

### ***Other Technical Reports and Papers***

Cimorelli, A., S. Perry, A. Venkatram, J. Weil, R. Paine, **R. Lee**, W. Peters, R. Brode, J. Paumier, 2004: *AERMOD: Description of Model Formulation*. EPA-454/R-03-004, U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Website ([http://www.epa.gov/scram001/7thconf/aermod/aermod\\_mfd.pdf](http://www.epa.gov/scram001/7thconf/aermod/aermod_mfd.pdf)).

Cimorelli, A.J., S.G. Perry, A. Venkatram, J.C. Weil, R.J. Paine, R.B. Wilson, R.F. Lee, W.D. Peters, R.W. Brode, J.O. Paumier, 2002: *AERMOD: Description of Model Formulation*. U.S. Environmental Protection Agency, EPA-454/R-02-002d (draft dated October 31, 2002). Available from <http://www.epa.gov/scram001>.

Cimorelli, A., R. Wilson, S. Perry, A. Venkatram, J. Weil, R. Paine, **R. Lee**, W. Peters, 1998: Minimum meteorological data requirements for AERMOD—study and recommendations. Draft document. EPA Website (<http://www.epa.gov/scram001/7thconf/aermod/degrade.pdf>).

Paine, R.J., **R.F. Lee**, R. Brode, R.B. Wilson, A.J. Cimorelli, S.G. Perry, J.C. Weil, A. Venkatram, and W.D. Peters, 1998: Model Evaluation Results for AERMOD, Draft document. EPA web site (<http://www.epa.gov/scram001/7thconf/aermod/evalrep.pdf>).

**Lee, R. F.**, July 1, 1993. *Stack-Structure Relationships – Further clarification of our memoranda dated May 11, 1988 and June 28, 1989*, Memorandum to Richard L. Daye, U.S. EPA.

Atkinson, D., and **R.F. Lee**, 1992: “Procedures for Substituting Values for Missing NWS Meteorological Data for Use in Regulatory Air Quality Models.” Available from the website <http://www.epa.gov/scram001>.

**Lee, R.F.**, 1984: Some Considerations in Adapting FORTRAN Programs to CBASIC for use on Microcomputers. ACCESS, The Journal of Microcomputer Applications in Engineering and Science, Vol. 3, No. 2.

**Lee, R.F.**, 1984: Some Notes on Exchanging Data Between a Commercial Word Processor and a CP/M Based Microcomputer. ACCESS, The Journal of Microcomputer Applications in Engineering and Science, Vol. 3, No. 5.

Mears, C.E., **Lee, R.F.**, and D.H. Barrett, 1973: Application of Implementation Planning Program (IPP) Modeling Analysis to the Metropolitan Boston Intrastate AQCR. U.S. EPA Report, September 1973. National Technical Information Center.

**Lee, R.F.**, and C.E. Mears, 1973: Application of Implementation Planning Program (IPP) Modeling Analysis to the Niagara Frontier Intrastate AQCR. U.S. EPA Report, September 1973. National Technical Information Center.

Cox, W.M., **R.F. Lee**, G.L. Gipson, and J.B. Mersch, 1973: Application of Implementation Planning Program (IPP) Modeling Analysis to the New Jersey – New York - Connecticut Intrastate AQCR. U.S. EPA Report, September 1973. National Technical Information Center.

Barrett, D., J. Davis, R.F. Lee, and C. Mears (authors listed in alphabetical order), 1973: Fuel Distribution Study for Five Midwest AQCR's. Internal EPA report.

Barrett, D., J. Davis, R.F. Lee, and C. Mears (authors listed in alphabetical order), 1973: Fuel Distribution Study for the Indianapolis Southern Indiana and Wabash Valley AQCR's. Internal EPA Report.

Barrett, D., J. Davis, R.F. Lee, and C. Mears (authors listed in alphabetical order), 1973: Fuel Distribution Study for the Indianapolis, Southern Indiana and Wabash Valley AQCR's. Internal EPA Report.

**Lee, R.F.**, 1971: Modelling of the Puget Sound Air Quality Control Region. Internal Division of Abatement, U.S. EPA, Report.

**Lee, R.F.**, G.W. Goodge, and H. L. Crutcher, 1970: Surface Climatological Information for Twelve Selected Stations for Re-entry Vehicles. NASA Contractor Report NASA CR-61319.

Crutcher, H.L., **R.F. Lee**, and H.B. Harshbarger, 1970: Improved Estimates of Winds at Standard Heights Generated from Winds Recorded at Standard Pressure Levels. ESSA Technical Memorandum EDSTM 15.

**Lee, R.F.**, J.W. Ownbey, and F.T. Quinlan, 1969: Thunderstorm Persistence at Cape Kennedy, Florida. NASA Contractor Report NASA CR-61259.

Wood, R.A., and **R.F. Lee**, 1966: "Radar Hook" Observed with 21-Decibel Gain Reduction. *Monthly Weather Review*, 94, 45-46.

### **Peer Reviews**

Lee, R.F., 1998. Peer review of Journal Paper for *Journal of Applied Meteorology*.

Lee, R.F., 1996. Peer review of Journal Paper for *Journal of Applied Meteorology*.

### **Book Reviews**

Lee, R.F., 2003. Invited book review of *Air Pollution Modelling and its Application XV*, C. Borrego and G. Schayes, eds. Book Review published in the *Bulletin, American Meteorological Society*.

Lee, R.F., 1995. Invited book review of *Workbook of Atmospheric Dispersion Estimates: An Introduction to Dispersion Modeling, Second Edition* by D. Bruce Turner, 1994. Book review published in the *Bulletin, American Meteorological Society*.

Lee, R.F., 1994. Invited book review of *Air Pollution Modelling and its Application X*, S.E. Gryning and M.M. Millan, eds. Book review published in the *Bulletin, American Meteorological Society*.

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