

Caltrans Air Quality Research – Transportation Laboratory (Before 1997)

Overview

Caltrans carried out early research regarding air quality and modeling, including development of the CALINE series of line-source dispersion models and two versions of comprehensive project-level air quality analysis guidance. Most of these materials are available on the internet at the Caltrans [Division of Research and Innovation \(DRI\)](#) web site as part of their scanned-image collection of documents from the Transportation Laboratory (Translab) library. Unless otherwise noted, links on this page are to the documents at the DRI web site.

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Translab was reorganized as primarily a material testing organization in 1997. Its environmental technical assistance and research functions were transferred to the [Division of Environmental Analysis](#).

Caline4, which was originally a mainframe computer program, became available as a MS-DOS executable file in 1994. It was distributed on floppy disk by mail and bulletin board system (later by web site). The Caline4 model now available at the [Caltrans Air Quality web site](#) has been recompiled to work in 32-bit Windows, but is otherwise unchanged from the PC version distributed in 1994. A "CL4" user interface for Caline4 was developed in 1996-98 to support use of Appendix B (Detailed Analysis) of the [CO Protocol](#), and was updated in 2012 to address compatibility with more recent Windows systems.

The Caltrans [Research and Innovation Division \(DRI\)](#) archive of past research reports is in the "[Research Publications and Databases](#)" section of the site. Some documents listed below were prepared by Caltrans District office staff rather than directly by Translab.

Contents

- Air Quality Analysis for Projects
 - [Workbook of Atmospheric Dispersion Estimates](#) (1970; Report No. 70-07) - reprint of early U.S. EPA documentation of dispersion modeling
 - The following set of reports was issued or reissued as the first Caltrans "Air Quality Manual":
 - [Meteorology And Its Influence On The Dispersion Of Pollutants From Highway Line Sources](#) (1972, Report No. 72-11. Reissued in March 1974 (revised) as [Report No. 72-33](#), used as Air Quality Manual Vol. I)
 - [Motor Vehicle Emission Factors For Estimates Of Highway Impact On Air Quality](#) (1972, Report No. 72-10. Also as [Air Quality Manual: Vol. II](#), Report No. 72-34)

- [Air Quality Manual: Vol. III. Traffic Information Requirements For Estimates Of Highway Impact On Air Quality](#) (1972, Report No. 72-35)
 - [Mathematical Approach To Estimating Highway Impact On Air Quality](#) (1972 - Report No. 72-12. Also as [Air Quality Manual Vol. IV](#), Report No. 72-36) - the original CALINE model was introduced in this report
 - (Vol. V of the "Manual" was an appendix to Vol. IV (Report No. 72-08) is not available in DRI online database.)
 - [Analysis of Ambient Air Quality For Highway Projects](#) (1972 - Report No. 72-13. Also as [Air Quality Manual: Vol. VI](#), Report No. 72-38)
 - [A Method For Analyzing And Reporting Highway Impact On Air Quality](#) (1972, Report No. 72-14. Also as [Air Quality Manual: Vol. VII](#), Report No. 72-39)
 - [Impact Of Transportation System s On The Air Environment](#) (1975, Report No. 75-51; used as Vol. VIII of the Air Quality Manual for training purposes)
- [The Quantitative Air Quality Report](#) (1972, Report No. 72-29)
- [Applications of Statistics in Analyzing Aerometric Data for Transportation Systems](#) (1974, Report No. 74-38)
- [Advanced Air Quality Analysis](#) (1975, Report No. 75-55)
- [Air Pollution And Roadway Location, Design, And Operation- Preliminary Study of Distribution Of Carbon Monoxide On And Adjacent To Freeways](#) (1975, Report No. 75-15)
- [Consistent Scheme for Estimating Diffusivities to Be Used in Air Quality Models.](#) (1976, Report No. 76-32)
- [Transportation Systems & Regional Air Quality an Approach & Computer Program for Wind Flow Field Analysis](#) (1976, Report No. 76-38)
- [Air Pollution and Roadway Location- Design and Operation - Project Overview](#) (1977, Report No. 77-25)
- [Measurement and Analysis of Ambient Carbon Monoxide Concentrations for Project-Level Air Quality Impact Studies](#) (1984, Report No. 84-01)
- [The Mammoth Lake Route 203 Transportation Project: A Case Study in Air Quality Modeling and Mitigation](#) (1985, Report No. 85-11)
- [Air Quality Technical Analysis Notes](#) (1988, no report number) - replaced the 1970s Air Quality Manual
- [Using CALINE4 to Estimate Air Quality Impacts Near Intersections](#) (1995, Technical Advisory T950428.01)
- More recent project-level analysis materials can be viewed at the [Caltrans Air Quality web site](#) and the [Caltrans Standard Environmental Reference \(Chapter 11 - Air Quality, Chapter 13 - Energy, Chapter 38 - NEPA Assignment\)](#), and Annotated Outline language for environmental documents and the conformity process at [Forms and Templates](#))
- The CALINE and early EMFAC models
 - CALINE2:
 - [Caline 2 Improved Microscale Model for the Diffusion of Air Pollutants from a Line Source](#) (1976, Report No. 76-23)

- [Validation of the Caline 2 Model Using Other Databases](#) (1979, Report No. 79-09)
 - CALINE3:
 - *CALINE 3 - A Versatile Dispersion Model for Predicting Air Pollutant Levels Near Highways and Arterial Streets* (1979, Report No. 79-23; not available in DRI online database) - available from U.S. EPA as [User's Guide - Unabridged](#) (PDF, 7.6MB)
 - [Background and Development of the Caline 3 Line Source Dispersion Model](#) (1980, Report No. 80-31)
 - [CALINE3 at U.S. EPA](#)
 - [CAL3QHC and CAL3QHCR at U.S. EPA](#) - incorporates CALINE3
 - CALINE4: [Caline 4 - A Dispersion Model for Predicting Air Pollutant Concentrations](#) (1984, Report No. 84-15; this is the Revised 1989 edition, which was issued without changing the original report number)
 - For a searchable version of the report and an executable version of the Caline4 model, see the [Caltrans Air Quality web site](#).
 - [Development of Worse Case Meteorology Criteria](#) (1985, Report No. 85-14) - companion document to Caline4
 - Origins of the EMFAC (California's EMISSION FACTOR) model
 - [Motor Vehicle Emission Factors for Estimates of Highway Impact on Air Quality](#) (March 1976, Report No. 76-24)
 - [Motor Vehicle Emission Factors for Estimates of Highway Impact on Air Quality](#) (August 1976, Report No. 76-54)
 - EMFAC is now maintained by the California Air Resources Board (ARB), and has been revised many times. The current version and related materials can be found at the ARB [Mobile Source Emission Inventory web site](#). See also the [EMFAC page at the Caltrans Air Quality web site](#).
- Other Air Quality and Related Caltrans Research
 - [Review of Motor Vehicle Air Pollution Research](#) (1968, Report No. 68-08)
 - [Pollution Requirements for Cut-Back Asphalt](#) (1970); Report No. 70-37)
 - [Control of Wind Erosion](#) (1971; Report No. 72-02)
 - [Synthesis of Information on Highway Transportation and Air Quality](#) (FHWA Version, 1972, Report No. 72-45)
 - [Air Quality Measurements From a Highway Perspective](#) (1972 - Report No. 72-64)
 - [Design & Development of a Mobile Air Quality Monitoring Van for Highway Environmental Impact Studies](#) (1974, Report No. 74-35)
 - [Degradation of Oxides of Nitrogen and Total Hydrocarbons in Ambient Air Samples](#) (1977, Report No. 77-27)
 - [Design and Development of an Improved Model Mobile Air Quality Monitoring Van for Highway Environmental Impact Studies](#) (1977, Report No. 77-36)
 - [Design of an Air Quality Monitoring Trailer for Regional Air Quality Assessment](#) (1977, Report No. 77-28)
 - [User Manual Air Quality Data Handling System](#) (1977, Report No. 77-32)
 - [Variables Affecting Air Quality Instrument Operation](#) (1977-Report No. 77-15)
 - [Wind Tunnel Design for Calibrating Wind System](#) (1977, Report No. 77-33)

- [Dustfall Analysis for the Pavement Storm Runoff Study \(I-405- LA\)](#) (1978, Report No. 78-12)
- [Energy and Transportation Systems](#) (1978, Report No. 78-39) - updated [Energy and Transportation Systems](#) (1983, Report No. 83-08)
- [South Lake Tahoe Cold Weather Carbon Monoxide and Hydrocarbon Study](#) (1979, Report No. 79-11)
- [Transportation Systems and Regional Air Quality - Photochemical Modeling of the Fresno California Region](#) (1980, Report No. 80-18)
- [Transportation Systems and Regional Air Quality Photochemical Modeling of Sacramento California Region](#) (1980, Report No. 80-06)
- [Energy and Transportation Systems](#) (1983, Report No. 83-08)
- [Carbon Monoxide Concentrations Adjacent to Sound Barriers](#) (1984, Report No. 84-04)
- [Carbon Monoxide Concentrations Adjacent to Ramp Meters](#) (1984, Caltrans District 4 report)
- [Carbon Monoxide Concentrations Adjacent to Ramp Meters \(Supplemental Report\)](#) (1985, Caltrans District 4 report)