14 AVAILABLE COMPUTER PACKAGES

Many computer programs have been developed for meteorological and air quality simulations. Some of them, generally the simplest, are well documented and relatively easy to use. Most of them, however, require users with good technical skills and, often, the supervision of the developers of the codes.

Readers that desire to be informed about air pollution and meteorological software are encouraged to use, among others, the following sources of information.

- New software, for air pollution and hazardous waste problems, is reviewed each month in the *Journal of the Air Pollution Control Association*, (now the *Journal of the Air and Waste Management Association*, P.O. Box 2861, Pittsburgh, Pennsylvania 15230, USA).
- The European Association for the Science of Air Pollution (EURASAP) prints a monthly newsletter dealing with conferences, air pollution modeling and other topics. The newsletter is edited by Prof. P.J.H. Builtjes, MT-TNO, P.O. Box 342, 7300 AH Apeldoorn, The Netherlands.
- A monthly *Environmental Software* report is published by Donley Technology, P.O. Box 335, Garrisonville, Virginia 22463, USA. It presents a summary of software tools in environmental studies, especially for U.S. regulatory applications. The same group has published the *1989 Environmental Software Directory.*
- The California Air Resources Board publishes the *Modeling Center News*, dealing mostly with air pollution issues in California (contact Terry McGuire, Chief, Technical Support Division, Air Resources Board, P.O. Box 2815, Sacramento, California 95812, USA.
- New software is presented in the quarterly journal *Environmental Software* (published by Computational Mechanics Publications, Ashurst Lodge, Ashurst, Southampton SO4 2AA, UK.
- An annual environmental software review is presented in the January issue of the *Pollution Engineering* journal (1935 Shermer Road, Northbrook, Illinois 60062, USA).

Selected meteorological and air quality packages are discussed in the sections below. The reader is also referred to Appendix B, Part 2, and Appendix C of Roth et al. (1988) for a comprehensive compendium of air quality models.

14.1 U.S. EPA MODELS AND UNAMAP(*)

In the last fifteen years in the United States, air quality models have been systematically used as official decision-making tools for State Implementation Plan (SIP) revisions for existing sources and new source reviews, including those activities related to Prevention of Significant Deterioration (PSD). The U.S. Environmental Protection Agency (U.S. EPA) has periodically provided guidelines and recommendations to identify for all interested parties, those techniques and data bases it considers acceptable (U.S. EPA, 1978, 1984, 1986, and 1987).

Many of the models the U.S. EPA recommends are available as part of UNAMAP (Version 6) (see Turner et al., 1989), and can be obtained from the U.S. EPA's Support Center for Regulatory Air Models Bulletin Board System (SCRAM-BBS) by dialing in on the Bulletin Board number (919) 541-5742. Alternatively, the models can be obtained on a 9-track magnetic tape from

Computer Products
National Technical Information Service
U.S. Department of Commerce
Springfield, VA 22161
Phone: (703) 487-4650

The U.S. EPA divides the air quality models into four generic classes:

1. Gaussian
2. numerical
3. statistical or empirical
4. physical

Gaussian models, which are the most widely used, are recommended for estimating the impact of nonreactive pollutants. Numerical models (i.e., grid models or box models) are suggested for urban applications involving reactive pollutants (e.g., photochemical smog). Other models can be used for particular applications. Moreover, the models are categorized by two levels of sophistication:

(*) The text in this section is taken from the U.S. EPA (1986 and 1987).

- Screening techniques (or screening models). These are relatively simple estimation techniques that provide *conservative* estimates of air quality impacts. They can, in several cases, eliminate from further consideration those sources that clearly do not contribute to ambient concentrations.
- Refined models. These provide a more detailed treatment of physical and chemical processes, require more detailed and precise input data, have higher computational costs, and provide (at least theoretically) a more accurate estimate of the source impact and the effectiveness of different control strategies.

The U.S. EPA also divides the air quality models recommended in its guideline into "preferred" and "alternative" models. Preferred models are those that EPA either found to perform better than others in a given category, or chose on the basis of other factors such as fast use, public familiarity, cost or resource requirements, and availability. These preferred models can be used for regulation applications without a formal demonstration of applicability, as long as they are used as indicated by the U.S. EPA (1986 and 1987). Alternative models can be used when (1) a demonstration can be made that the model produces concentration estimates equivalent to the estimates obtained using a preferred model; (2) a statistical performance evaluation has been conducted using measured air quality data and the results of that evaluation indicate the alternative model performs better for the application than a comparable preferred model; (3) there is no preferred model for the specific application but a refined model is needed to satisfy regulatory requirements.

The U.S. EPA constantly solicits new refined models that are based on sounder scientific principles and that are more reliable in estimating pollutant concentrations. Models that are submitted in accordance with the EPA's requirements will be evaluated as submitted. These requirements are

- The model must be computerized and functioning in a common FORTRAN language suitable for use on a variety of computer systems.
- The model must be documented in a user's guide that identifies the mathematics of the model, data requirements and program operating characteristics at a level of detail comparable to that available for currently recommended models, e.g., the Single Source (CRSTER) Model.

- The model must be accompanied by a complete test data set, including input parameters and output results. The test data must be included in the user's guide as well as provided in computer-readable form.
- The model must be useful to typical users, e.g., state air pollution control agencies, for specific air quality control problems. Such users should be able to operate the computer program(s) from available documentation.
- The model documentation must include a comparison with air quality data or with other well-established analytical techniques.
- The developer must be willing to make the model available to users at reasonable cost or make it available for public access through the SCRAM-BBS or the National Technical Information Service; the model cannot be proprietary.

14.1.1 The EPA's Preferred Models

The U.S. EPA preferred air quality models are (U.S. EPA, 1986 and 1987)

- Buoyant Line and Point Source Dispersion Model (BLP)
- CALINE 3
- Climatological Dispersion Model (CDM 2.0)
- Gaussian-Plume Multiple Source Air Quality Algorithm (RAM)
- Industrial Source Complex Model (ISC)
- Multiple Point Gaussian Dispersion Algorithm with Terrain Adjustment (MPTER)
- Single Source Model (CRSTER)
- Urban Airshed Model (UAM)
- Offshore and Coastal Dispersion Model (OCD)

A brief description of each of the above models is presented below.

- **Buoyant Line and Point Source Dispersion Model (BLP)**

Reference: Schulman, L.L., and J.S. Scire (1980): *Buoyant Line and Point Source (BLP) Dispersion Model User's Guide*. Document P-7304B. Environmental Research and Technology, Inc., Concord, Massachusetts. (NTIS PB81-164642)

Availability: This model is available as part of UNAMAP (Version 6).

Abstract: BLP is a Gaussian plume dispersion model designed to handle unique modeling problems associated with aluminum reduction plants and other industrial sources where plume rise and downwash effects from stationary line sources are important.

Recommendations for Regulatory Use: The BLP model is appropriate for the following applications:

- aluminum reduction plants that contain buoyant, elevated line sources
- rural area
- transport distances less than 50 kilometers
- simple terrain
- one-hour to one-year averaging times.

- **CALINE 3**

Reference: Benson, P.E. (1979): *CALINE 3 – A Versatile Dispersion Model for Predicting Air Pollutant Levels Near Highways and Arterial Streets.* Interim report FHWA/CA/TL-79/23. Federal Highway Administration, Washington, D.C. (NTIS PB80-220841)

Availability: The CALINE 3 model computer tape is available from NTIS as PB80-220833. The model is also available from the California Department of Transportation (manual free of charge and approximately $50 for the computer tape). Requests should be directed to

Mr. Marlin Beckwith
Chief, Office of Computer Systems
California Department of Transportation
1120 N. Street
Sacramento, CA 95814

Abstract: CALINE 3 can be used to estimate the concentrations of nonreactive pollutants from highway traffic. This steady-state Gaussian model can be applied to determine air pollution concentrations at receptor locations downwind of "at-grade," "fill," "bridge," and "cut section" highways located in relatively uncomplicated

terrain. The model is applicable for any wind direction, highway orientation, and receptor location. The model has adjustments for averaging time and surface roughness and can handle up to 20 links and 20 receptors. It also contains an algorithm for deposition and settling velocity so that particulate concentrations can be predicted.

Recommendations for Regulatory Use: CALINE 3 is appropriate for the following applications:

- highway (line) sources
- urban or rural areas
- simple terrain
- transport distances less than 50 kilometers
- one hour to 24 hours averaging times

- **Climatological Dispersion Model (CDM 2.0)**

References: Irwin, J.S., T. Chico, and J. Catalano (1985): *CDM 2.0 – Climatological Dispersion Model – User's Guide*. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. (NTIS PB86-136546)

Availability: This model is available as part of UNAMAP (Version 6).

Abstract: CDM is a climatological steady-state Gaussian plume model for determining long-term (seasonal or annual) arithmetic average pollutant concentrations at any ground-level receptor in an urban area.

Recommendations for Regulatory Use: CDM is appropriate for the following applications:

- point and area sources
- urban areas
- flat terrain
- transport distances less than 50 kilometers
- long-term averages over one month to one year or longer

- **Gaussian-Plume Multiple Source Air Quality Algorithm (RAM)**

References: Turner, D.B., and J.H. Novak (1978): *User's guide for RAM*. Publication EPA-600/8-78-016 Vols. A and B. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. (NTIS PB294791 and PB294792).

Catalano, J.A., D. B. Turner, and H. Novak (1987): *User's Guide for RAM, Second Edition*. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. (Distributed as part of UNAMAP, Version 6, documentation.)

Availability: This model is available as part of UNAMAP (Version 6).

Abstract: RAM is a steady-state Gaussian plume model for estimating concentrations of relatively stable pollutants, for averaging times from an hour to a day, from point and area sources in a rural or urban setting. Level terrain is assumed. Calculations are performed for each hour.

Recommendations for Regulatory Use: RAM is appropriate for the following applications:

- point and area sources
- urban areas
- flat terrain
- transport distances less than 50 kilometers
- one-hour to one-year averaging times

- **Industrial Source Complex Model (ISC)**

Reference: Environmental Protection Agency (1986): *Industrial Source Complex (Isc) Dispersion Model User's Guide*, Second Edition, Volumes 1 and 2. Publications EPA-450/4-86-005a, and -005b. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. (NTIS PB86-234259 and PB86-234267)

Environmental Protection Agency (1987): *Industrial Source Complex (ISC) Dispersion Model. Addendum to the User's Guide*. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina.

Availability: This model is available as part of UNAMAP (Version 6).

Abstract: This ISC model is a steady-state Gaussian plume model that can be used to assess pollutant concentrations from a wide variety of sources associated with an industrial source complex. This model can account for the following: settling and dry deposition of particulates; downwash; area, line and volume sources; plume rise as a function of downwind distance; separation of point sources; and limited terrain adjustment. It operates in both long-term and short-term modes.

Recommendations for Regulatory Use: ISC is appropriate for the following applications:

- industrial source complexes
- rural or urban areas
- flat or rolling terrain
- transport distances less than 50 kilometers
- one-hour to annual averaging times

- **Multiple point Gaussian Dispersion Algorithm with Terrain Adjustment (MPTER)**

Reference: Pierce, T.D., and D.B. Turner (1980): *User's Guide for MPTER*. Publication EPA-600/8-80-016. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. (NTIS PB80-197361)

Chico, T., and J.A. Catalano (1986): *Addendum to the User's Guide for MPTER*. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711. (Distributed as part of UNAMAP, Version 6, documentation.)

Availability: This model is available as part of UNAMAP (Version 6).

Abstract: MPTER is a multiple point source algorithm. This algorithm is useful for estimating air quality concentrations of relatively non-reactive pollutants. Hourly estimates are made using the Gaussian steady-state model.

Recommendations for Regulatory Use: MPTER is appropriate for the following applications:

- point sources
- rural or urban areas
- flat or rolling terrain (no terrain above stack height)
- transport distances less than 50 kilometers
- one-hour to one-year averaging times

- **Single Source (CRSTER) Model**

Reference: Environmental Protection Agency (1977): *User's Manual for Single Source (CRSTER) Model.* Publication EPA-450/2-77-013. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. (NTIS PB271360)

Catalano, J.A. (1986): *Single Source (CRSTER) Model. Addendum to the User's Manual.* U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711. (Distributed as part of UNAMAP, Version 6, documentation.)

Availability: This model is available as part of UNAMAP (Version 6).

Abstract: CRSTER is a steady-state, Gaussian dispersion model designed to calculate concentrations from point sources at a single location in either a rural or urban setting. Highest and highest second-highest concentrations are calculated at each receptor for 1-hour, 3-hour, 24-hour, and annual averaging times.

Recommendations for Regulatory Use: CRSTER is appropriate for the following applications:

- single point sources
- rural or urban areas
- flat or rolling terrain (no terrain above stack height)

- **Urban Airshed Model (UAM)**

References: Ames, J., T.C. Myers, L.E. Reid, D.C. Whitney, S.H. Golding, S.R. Hayes, and S.D. Reynolds (1985): *SAI Airshed Model Operations Manuals. Volume I, User's Manual.* Publication EPA-600/8-85-007a. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. (NTIS PB85-191567)

Ames, J.S., R. Hayes, T.C. Myers, and D.C. Whitney (1985): *SAI Airshed Model Operations Manuals. Volume II, Systems Manual.* Publication EPA-600/8-85-007b. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. (NTIS PB85-191575)

Environmental Protection Agency, 1980. *Guideline for Applying the Airshed Model to Urban Areas.* Publication EPA 450/4-80-020. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. (NTIS PB81-200529)

Availability: The computer code is available on magnetic tape from

Computer Products
National Technical Information Service
U.S. Department of Commerce
Springfield, VA 22161
Telephone: (703) 487-4650

Abstract: UAM is an urban-scale, three-dimensional, grid-type, numerical simulation model. The model incorporates a condensed photochemical kinetics mechanism for urban atmospheres. The UAM is designed for computing ozone (O_3) concentrations under short-term, episodic conditions lasting one or two days resulting from emissions of oxides of nitrogen (NO_x) and volatile organic compounds (VOC). The model treats urban VOC emissions as their carbon-bond surrogates.

Recommendations for Regulatory Use: UAM is appropriate for the following applications

- single urban areas having significant ozone attainment problems in the absence of interurban emission transport
- one-hour averaging times

- **Offshore and Coastal Dispersion Model (OCD)**

Reference: Hanna, S.R., L.L. Schulman, R.J. Paine and J.E. Pleim (1984): *The Offshore and Coastal Dispersion (OCD) Model User's Guide, Revised*. OCS Study MMS 84-0069. Environmental Research and Technology, Inc., Concord, Massachusetts (NTIS PB86-159803)

Availability: The above user's guide is available for $40.95 from NTIS. The computer tape is available from NTIS as PB85-246106 at a cost of $800. Technical contact is

Minerals Management Service
ATTN: Mitchell Baer
12203 Sunrise Valley Drive, Mail Stop 644
Reston, VA 22091

Abstract: OCD is a straight-line Gaussian model developed to determine the impact of offshore emissions from point sources on the air quality of coastal regions. OCD incorporates overwater plume transport and dispersion as well as changes that occur as the plume crosses the shoreline. Hourly meteorological data are needed from both offshore and onshore locations. These include water surface temperature, overwater air temperature, and relative humidity.

Some of the key features include platform building downwash, partial plume penetration into elevated inversions, direct use of turbulence intensities for plume dispersion, interaction with the overland internal boundary layer, and continuous shoreline fumigation.

Recommendations for Regulatory Use: The Minerals Management Service has recommended OCD for emissions located on the outer continental shelf (Federal Register 50, 12248, 28 March 1985). OCD is applicable for overwater sources where onshore receptors are below the lowest source height. Where onshore receptors are above the lowest source height, offshore plume transport and dispersion may be modeled on a case-by-case basis in consultation with the U.S. EPA regional office.

14.1.2 The EPA's Alternative Models

The U.S. EPA's list of alternative air quality models is presented below:

- Air Quality Display Model (AQDM)
- Air Resources Regional Pollution Assessment (ARRPA) Model
- APRAC-3
- AVACTA II
- COMPTER
- ERT Air Quality Model (ERTAQ)
- ERT Visibility Model
- HIWAY-2
- Integrated Model for Plumes and Atmospheric Chemistry in Complex Terrain (IMPACT)
- LONGZ
- Maryland Power Plant Siting Program Model (PPSP)
- Mesoscale Puff Model (MESOPUFF II)
- Mesoscale Transport Diffusion and Deposition Model for Industrial Sources (MTDDIS)
- Models 3141 and 4141
- MULTIMAX
- Multiple Point Source Diffusion Model (MPSDM)
- Multi-Source Model (SCSTER)
- Pacific Gas and Electric Plume 5 Model
- PLMSTAR Air Quality Simulation Model
- Plume Visibility Model (PLUVUE II)
- Point, Area, Line Source Algorithm (PAL)
- Random Walk Advection and Dispersion Model (RADM)
- Reactive Plume Model (RPM-II)
- Regional Transport Model (RTM-II)
- SHORTZ
- Simple Line-Source Model (GMLINE)

- Texas Climatological Model (TCM)
- Texas Episodic Model (TEM)

A brief description of each of these models is presented below.

- **Air Quality Display Model (AQDM)**

Reference: TRW Systems Group (1969): *Air Quality Display Model*. Prepared for National Air Pollution Control Administration, DHEW, U.S. Public Health Service, Washington, D.C. (NTIS PB189194)

Availability: The above user's guide is available from NTIS at a cost of $16.95. This model is available at no cost in the form of a punched card deck from

Library Services
MD-35
U.S. Environmental Protection Agency
Research Triangle Park, North Carolina 27711
ATTN: Ann Ingram

Abstract: AQDM is a climatological steady-state Gaussian plume model that estimates annual arithmetic average sulfur dioxide and particulate concentrations at ground level in urban areas. A statistical model based on Larsen (1971) is used to transform the average concentration data from a limited number of receptors into expected geometric mean and maximum concentration values for several different averaging times.

- **Air Resources Regional Pollution Assessment (ARRPA) Model**

Reference: Mueller, S.F., R.J. Valente, T.L. Crawford, A.L. Sparks, and L.L. Gautney, Jr. (1983): *Description of the Air Resources Regional Pollution Assessment (ARRPA) Model*. Document TVA/ONR/AQB-83/14. Tennessee Valley Authority, Muscle Shoals, Alabama.

Availability: The computer code and sample input for this model on magnetic tape and a copy of the user's guide are available from

Computer Services Development Branch
Office of Natural Resources and Economic Development
Tennessee Valley Authority
OSWHA
Muscle Shoals, AL 35660
Telephone: (205) 386-2985

A hard copy of the model output corresponding to the sample input is also available. The cost of copying model information to a buyer-supplied 2400-ft, high density tape is estimated to be about $100. The user's guide is free of charge.

Abstract: The ARRPA model is a medium/long-range segmented-plume model. It is designed to compute air concentrations and surface dry mass deposition of sulfur dioxide and sulfate. A unique feature of the model is its use of prognostic meteorological output from the National Weather Service's Boundary Layer Model (BLM). Boundary-layer conditions are computed by the BLM on a grid with a spatial resolution of 80 km, and are archived in intervals of three hours. BLM output used by this model includes three-dimensional wind field components and potential temperature at ten height levels from the surface through 2000 m above the surface.

- **APRAC-3**

Reference: Simmon, P.B., R.M. Patterson, F.L. Ludwig, and L.B. Jones (1981): *The APRAC-3/Mobile 1 Emissions and Diffusion Modeling Package*. Publication EPA 909-9-81-002. U.S. Environmental Protection Agency, Region IX, San Francisco, California. (NTIS PB82-103763)

Availability: This model is available as part of UNAMAP (Version 6).

Abstract: APRAC-3 computes hourly average carbon monoxide concentrations for any urban location. The model calculates contributions from dispersion on various scales: extraurban, from freeway, arterial, and feeder street sources; and local, from dispersion within a street canyon. It requires an extensive traffic inventory for the city of interest. APRAC-3, as it exists on UNAMAP (Version 6), has been updated with Mobile 2 emission factors.

- **AVACTA II**

Reference: Zannetti, P., G. Carboni, and R. Lewis (1985): *AVACTA II User's Guide (Release 3)*. Technical Report AV-OM-85/520, AeroVironment Inc., Monrovia, California.

Availability: A magnetic tape copy of the FORTRAN coding and the user's guide are available at a cost of $2,500 (nonprofit organization) or $3,500 (other organizations) from

AeroVironment Inc.
825 Myrtle Avenue
Monrovia, CA 91016
Telephone: (818) 357-9983

Abstract: The AVACTA II model is a Gaussian model in which atmospheric dispersion phenomena are described by the evolution of plume elements, either segments or puffs. The model can be applied for short-time (e.g., one-day) simulations in both transport and calm conditions.

The user is given flexibility in defining the computational domain, the three-dimensional meteorological and emission input, the receptor locations, the plume-rise formulas, the sigma formulas, etc. Without explicit user's specifications, standard default values are assumed.

AVACTA II provides both concentration fields on the user-specified receptor points, and dry/wet deposition patterns throughout the domain. The model is particularly oriented to the simulation of the dynamics and transformation of sulfur species (SO_2 and SO_4), but can handle virtually any pair of primary-secondary pollutants.

- **COMPTER**

Reference: State of Alabama (1980): *COMPTER Model User's Guide*. Alabama Department of Environmental Management, Air Division, Montgomery, Alabama.

Availability: This model is available to users for tape and reproduction charges. If a tape is sent, the reproduction is free. Send tape and desired format and specifications to

Mr. Richard E. Grusnick
Chief, Air Division
Alabama Department of Environmental Management
1751 Federal Drive
Montgomery, AL 36109

Abstract: COMPTER is based on the Gaussian steady-state technique applicable to both urban and rural areas. The model does the following: (a) determines maximum 24-hour, 3-hour, 1-hour and variable-hour concentrations for both block and running averages; (b) considers elevated terrain with the standard plume-chopping technique or stability dependent plume path trajectory; (c) uses annual hourly meteorological data in the CRSTER preprocessor format; (d) uses Pasquill-Gifford stability curves; (e) allows for stability class substitution in the stable categories. Typical model use is for rural areas with moderate to low terrain features.

- **ERT Air Quality Model (ERTAQ)**

Reference: Environmental Research & Technology, Inc. (1980): *ERTAQ User's Guide*. Document M-0186-001E. Environmental Research & Technology, Inc., Concord, Massachusetts.

Availability: The above report and a computer tape are available from

Computer Products
National Technical Information Service
U.S. Department of Commerce
5825 Port Royal Road
Springfield, Virginia 22161
Telephone: (703) 487-4650

Abstract: ERTAQ is a multiple point, line and area source dispersion model that uses the univariate Gaussian formula with multiple reflections.

With the fugitive dust option, entrainment of particulates from ground-level sources and subsequent deposition are accountable. The model offers an urban/rural option and calculates long-term or worst-case concentrations due to arbitrarily located sources for arbitrarily located receptors above or at ground level. Background

concentrations and calibration factors at each receptor can be user specified. Unique flexibility is afforded by postprocessing storage and manipulation capability.

- **ERT Visibility Model**

Reference: Drivas, P.J., M. Savithri, and D.W. Heinold (1980): *ERT Visibility Model, Version 3, Technical Description and User's Guide*. Document M2020-001. Environmental Research & Technology, Inc., Concord, Massachusetts.

Availability: The above report and a computer tape are available from:

Computer Products
National Technical Information Service
U.S. Department of Commerce
5825 Port Royal Road
Springfield, VA 22161
Telephone: (703) 487-4650

Abstract: The ERT visibility model is a Gaussian dispersion model designed to estimate visibility impairment for arbitrary lines of sight due to isolated point source emissions by simulating gas-to-particle conversion, dry deposition, NO-to-NO_2 conversion, and linear radiative transfer.

- **HIWAY-2**

Reference: Petersen, W.B. (1980): *User's Guide for HIWAY-2*. Publication EPA-600/8-80-018. U.S. Environmental Protection Agency, ESRL, Research Triangle Park, North Carolina. (NTIS PB80-227-556)

Availability: This model is available as part of UNAMAP (Version 6).

Abstract: HIWAY-2 can be used to estimate the concentrations of nonreactive pollutants from highway traffic. This steady-state Gaussian model can be applied to determine air pollution concentrations at receptor locations downwind of "at-grade" and "cut-section" highways located in relatively uncomplicated terrain. The model is applicable for any wind direction, highway orientation, and receptor location. The model was developed for situations where hori-

zontal wind flow dominates. The model cannot consider complex terrain or large obstructions to the flow such as buildings or large trees.

- **Integrated Model for Plumes and Atmospheric Chemistry in Complex Terrain (IMPACT)**

Reference: Fabrick, A.J., and P.J. Haas (1980): *User Guide to IMPACT: An Integrated Model for Plumes and Atmospheric Chemistry in Complex Terrain*. Document DCN 80-241-403-01. Radian Corporation, 8501 Mo-Pac Blvd., Austin, Texas.

Availability: A magnetic tape containing the IMPACT model, a set of test data, and a copy of the IMPACT user's guide are available for a cost of $500 from

Howard Balentine
Senior Meteorologist
Radian Corporation
Post Office Box 9948
Austin, TX 78766

Abstract: IMPACT is an Eulerian, three-dimensional, finite-difference grid model designed to calculate the impact of pollutants, either inert or reactive, in simple or complex terrain, emitted from either point or area sources. It automatically treats single or multiple point or area sources, the effects of vertical temperature stratifications on the wind and diffusion fields, shear flows caused by the atmospheric boundary layer or by terrain effects, and chemical transformations.

- **LONGZ**

Reference: Bjorklund, J.R., and J.F. Bowers (1982): *User's Instructions for the SHORTZ and LONGZ Computer Programs,* Volumes I and II. Publication EPA 903/9-82-004. U.S. Environmental Protection Agency, Region III, Philadelphia, Pennsylvania.

Availability: The model is available as part of UNAMAP (Version 6).

Abstract: LONGZ uses the steady-state univariate Gaussian plume formulation for both urban and rural areas in flat or complex terrain to

calculate long-term (seasonal and/or annual) ground-level ambient air concentrations attributable to emissions from up to 14,000 arbitrarily placed sources (stacks, buildings and area sources). The output consists of the total concentration at each receptor due to emissions from each user-specified source or group of sources, including all sources. An option that considers losses due to deposition (see the description of SHORTZ) is deemed inappropriate by the authors for complex terrain, and is not discussed here.

- **Maryland Power Plant Siting Program (PPSP) Model**

References: Brower R. (1982): *The Maryland Power Plant Siting Program (PPSP) Air Quality Model User's Guide*. Ref. No. PPSP-MP-38. Prepared for Maryland Department of Natural Resources, by Environmental Center, Martine Marietta Corporation, Baltimore, Maryland. (NTIS PB82-238387)

Weil, J.C., and R.P. Brower (1982): *The Maryland PPSP Dispersion Model for Tall Stacks*. Ref. No. PPSP-MP-36. Prepared for Maryland Department of Natural Resources, by Environmental Center, Martine Marietta Corporation, Baltimore, Maryland. (NTIS PB82-219155)

Availability: Two reports referenced above are available from NTIS. The model code and test data are available on magnetic tape for a cost of $210 from

Power Plant Siting Program
Department of Natural Resources
Tawes State Office Building
Annapolis, MD 21401
ATTN: Dr. Michael Hirshfield

Abstract: PPSP is a Gaussian dispersion model applicable to tall stacks in either rural or urban areas, but in terrain that is essentially flat (on a scale large compared to the ground roughness elements). The PPSP model follows the same general formulation and computer coding as CRSTER, also a Gaussian model, but differs in four major ways. The differences are in the scientific formulation of specific ingredients or "sub-models" to the Gaussian model and are based on recent theoretical improvements as well as sup-

porting experimental data. The differences are the following: (1) stability during daytime is based on convective scaling instead of the Turner criteria; (2) Briggs's dispersion curves for elevated sources are used; (3) Briggs's plume-rise formulas for convective conditions are included; and (4) plume penetration of elevated stable layers is given by Briggs' (1984) model.

- **Mesoscale Puff Model (MESOPUFF II)**

Reference: Scire, J.S., F.W. Lurmann, A. Bass, and S.R. Hanna (1984): *User's Guide to the Mesopuff II Model and Related Processor Programs*. Publication EPA 600/8-84-013. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. (NTIS PB84-181775)

Availability: This model is available as part of UNAMAP (Version 6).

Abstract: MESOPUFF II is a short-term, regional-scale puff model designed to calculate concentrations of up to five pollutant species (SO_2, SO_4, NO_x, HNO_3, NO_3). Transport, puff growth, chemical transformation, and wet and dry deposition are accounted for in the model.

- **Mesoscale Transport Diffusion and Deposition Model for Industrial Sources (MTDDIS)**

Reference: Wang, I.T., and T.L. Waldron (1980): *User's Guide for MTDDIS Mesoscale Transport, Diffusion, and Deposition Model for Industrial Sources*. EMSC6062.1UR(R2). Combustion Engineering, Newbury Park, California.

Availability: a magnetic tape copy of the FORTRAN coding and the user's guide are available for a cost of $100 from

Dr. I.T. Wang
Combustion Engineering
Environmental Monitoring and Services, Inc.
2421 West Hillcrest Drive
Newbury Park, CA 19320

Abstract: MTDDIS is a variable-trajectory Gaussian puff model applicable to long-range transport of point source emissions over level or

rolling terrain. It can be used to determine 3-hour maximum and 24-hour average concentrations of relatively nonreactive pollutants from up to ten separate stacks.

- **Models 3141 and 4141**

Reference: Enviroplan, Inc. (1981): *User's Manual for Enviroplan's Model 3141 and Model 4141*. Enviroplan, Inc., West Orange, New Jersey.

Availability: A magnetic tape copy of the FORTRAN coding and the user's guide are available for a cost of $1,900 from

Environplan, Inc.
59 Main Street
West Orange, NJ 07052

Abstract: Models 3141 and 4141 are modifications of CRSTER (UNAMAP VERSION 3) and are applicable to complex terrain, particularly where receptor elevation equals or exceeds the stack-top elevation. The model uses intermediate ground displacement procedures and dispersion enhancements developed from an aerial tracer study and ground-level concentrations measured for a power plant located in complex terrain.

- **MULTIMAX**

Reference: Moser, J.H. (1979): *Multimax: An Air Dispersion Modeling Program for Multiple Sources, Receptors, and Concentration Averages*. Shell Development Company, Westhollow Research Center, P.O. Box 1380, Houston, Texas. (NTIS PB80-170178)

Availability: The above report is available from NTIS ($16.95 for paper copy; $5.95 on microfiche). The access number for the computer tape for MULTIMAX is PB80-170160, and the cost is $370.00. Requests should be sent to

Computer Products
National Technical Information Service
U.S. Department of Commerce
5825 Port Royal Road
Springfield, VA 22161
Telephone: (703) 487-4650

Abstract: MULTIMAX is a Gaussian plume model applicable to both urban and rural areas. It can be used to calculate highest and second-highest concentrations for each of several averaging times due to up to 100 sources arbitrarily located.

- **Multiple Point Source Diffusion Model (MPSDM)**

Reference: Environmental Research & Technology, Inc. (1984): *User's guide to MPSDM.* Document PB881585. Environmental Research & Technology, Inc., Concord, Massachusetts.

Availability: The above report and a computer tape are available from

Computer Products
National Technical Information Service
U.S. Department of Commerce
5825 Port Royal Road
Springfield, VA 22161
Telephone: (703) 487-5650

Abstract: MPSDM is a steady-state Gaussian dispersion model designed to calculate, in sequential mode or in "case-by-case" mode, concentrations of nonreactive pollutants resulting from single or multiple source emissions. The MPSDM model may be used for sources located in flat or complex terrain, in a univariate (σ_z) or bivariate (σ_y, σ_z) mode. Sufficient flexibility is allowed in the specification of model parameters to enable the MPSDM user to duplicate results that would be obtained from many other Gaussian point-source models. A number of features are incorporated to facilitate site-specific model validation studies.

- **Multi-Source (SCSTER) Model**

Reference: Malik, M.H., and B. Baldwin (1980): *Program Documentation for Multi-Source (SCSTER) Model.* Program documentation EN7408SS. Southern Company Services, Inc., Technical Engineering Systems, 64 Perimeter Center East, Atlanta, Georgia.

Availability: The SCSTER model and user's manual are available at no charge to a limited number of persons through Southern Company Services. A magnetic tape must be provided by those desiring the model. Requests should be directed to

Mr. Bryan Baldwin
Research Program Supervisor
Air Quality Program
Southern Company Services
P.O. Box 2625
Birmingham, AL 35202

Abstract: SCSTER is a modified version of the EPA CRSTER model. The primary distinctions of SCSTER are its ability to consider multiple sources that are not necessarily collocated, its enhanced receptor specifications, its variable plume height terrain adjustment procedures and plume distortion from directional wind shear.

- **Pacific Gas and Electric PLUME5 Model**

Reference: Pacific Gas and Electric (1981): *User's Manual for Pacific Gas and Electric PLUME5 Model.* San Francisco, California.

Availability: The user's manual will be supplied for cost of reproduction. An IBM version of the model can be obtained on a user-supplied tape free of charge from

Mr. Robert N. Swanson
Pacific Gas and Electric Company
245 Market Street, RM 451
San Francisco, CA 94106

Abstract: PLUME5 is a steady-state Gaussian plume model applicable to both rural and urban areas in uneven terrain. Pollutant concentrations at 500 receptors from up to 10 sources with up to 15 stacks each can be calculated using up to 5 meteorological inputs. The model in its "basic" mode is similar to CRSTER and MPTER. Several options are available that allow better simulation of atmospheric conditions and improved model outputs. These options allow plume rise into or through a stable layer and crosswind spread of the plume by wind directional shear with height, initial

plume expansion, mean (advective) wind speed, terrain considerations, and chemical transformation of pollutants.

Differences between PLUME5 and CRSTER are in the following areas: stability class determination, hourly mixing height schemes, hourly stable layer data, randomization of wind direction, extent of data set required for preprocessing meteorological data inputs.

- **PLMSTAR Air Quality Simulation Model**

Reference: Lurmann, F.W., D.A. Godden, and H. Collins (1985): *User's Guide to the PLMSTAR Air Quality Simulation Model.* ERT Document M-2206-100, Environmental Research & Technology, Inc., Newbury Park, California.

Availability: The above report and a computer tape are available from

Computer Products
National Technical Information Service
U.S. Department of Commerce
5825 Port Royal Road
Springfield, VA 22161
Telephone: (703) 487-4650

Abstract: PLMSTAR is a mesoscale Lagrangian photochemical model designed to predict atmospheric concentrations of O_3, NO_x, HNO_3 PAN, SO_2, SO_4 from reactive hydrocarbons, NO_x and SO_x emissions. It is intended to simulate the behavior of pollutants in chemically reactive plumes resulting from major point source emissions. The model's Lagrangian air parcel is subdivided into a five-layer/nine-column domain of computational cells. The approach allows for realistic simulation of the combined effects of atmospheric chemical reactions and pollutant dispersion in the horizontal and vertical directions. Other key features of the model include the ability to generate trajectories at any level of a three-dimensional, divergence-free wind field; the ability to calculate and use the time- and space-varying surface deposition of pollutants; an up-to-date $O_3/RHC/NO_x/SO_x$ chemical mechanism that uses eight classes of reactive hydrocarbons; the ability to handle both point and area source emissions simultaneously; and the

ability to simulate overwater conditions and land/water transitions.

- **Plume Visibility Model (PLUVUE II)**

Reference: Seigneur, C., C.D. Johnson, D.A. Latimer, R.W. Bergstrom, and H. Hogo (1984): *User's Manual for the Plume Visibility Model (PLUVUE II)*. Publication EPA-600/8-84-005. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. (NTIS PB84-158302)

Availability: This model is available as part of UNAMAP (Version 6).

Abstract: The Plume Visibility Model (PLUVUE II) is a computerized model used for estimating visual range reduction and atmospheric discoloration caused by plumes resulting from the emissions of particles, nitrogen oxides and sulfur oxides from a single emission source. PLUVUE II predicts the transport, dispersion, chemical reactions, optical effects and surface deposition of point or area source emissions. Addenda to the user's manual were prepared in February 1985 to allow the execution of PLUVUE II and test cases on the UNIVAC computer. The addenda are included in the UNAMAP (Version 6) documentation.

- **Point, Area, Line Source Algorithm (PAL-DS)**

Reference: Petersen, W.B. (1978): *User's Guide for PAL – A Gaussian-Plume Algorithm for Point, Area, and Line Sources*. Publication EPA-600/4-78-013. Office of Research and Development, Research Triangle Park, North Carolina. (NTIS PB281306)

Rao, K.S., and H.F. Snodgrass (1982): *PAL-DS Model: The PAL Model Including Deposition and Sedimentation*. Publication EPA-600/8-82-023. Office of Research and Development, Research Triangle Park, North Carolina. (NTIS PB83-117739)

Availability: This model is available as part of UNAMAP (Version 6).

Abstract: PAL-DS is an acronym for this point, area, and line source algorithm and is a method of estimating short-term dispersion using Gaussian plume steady-state assumptions. The algorithm can be used to estimate concentrations of nonreactive pollutants at

99 receptors for averaging times of 1 to 24 hours, for a limited number of point, area, and line sources (99 of each type). This algorithm is not intended for application to entire urban areas but to assess the impact on air quality, on scales of tens to hundreds of meters, of portions of urban areas such as shopping centers, large parking areas, and airports. Level terrain is assumed. The Gaussian point source equation estimates concentrations from point sources after determining the effective height of emission and the upwind and crosswind distance of the source from the receptor. Numerical integration of the Gaussian point source equation is used to determine concentrations from the four types of line sources. Subroutines are included that estimate concentrations for multiple lane line and curved path sources, special line sources (line sources with endpoints at different heights above ground), and special curved path sources. Integration over the area source, which includes edge effects from the source region, is done by considering finite line sources perpendicular to the wind at intervals upwind from the receptor. The crosswind integration is done analytically; integration upwind is done numerically by successive approximations. The PAL–DS model uses Gaussian plume-type diffusion-deposition algorithms based on analytical solutions of a gradient-transfer model. The PAL–DS model can treat deposition of both gaseous and suspended particulate pollutants in the plume since gravitational settling and dry deposition of the particles are explicitly accounted for. The analytical diffusion-deposition expressions in the PAL–DS model, in the limit when pollutant settling and deposition velocities are zero, reduce to the usual Gaussian plume diffusion algorithms.

- **Random–walk Advection and Dispersion Model (RADM)**

References: Austin, D.I., A.W. Bealer, and W.R. Goodin (1981): *Random–Walk Advection and Dispersion Model (RADM), User's Manual.* Dames & Moore, Los Angeles, California.

Runchal, A.K., W.R. Goodin, A.W. Bealer, D.I. Austin (1981): *Technical Description of the Random–Walk Advection and Dispersion Model (RADM).* Dames & Moore, Los Angeles, California.

Availability: A magnetic tape of the computer code and the user's manual are available for a cost of $440.00 from

Mr. C. James Olsten
Dames & Moore
445 South Figueroa Street
Suite 3500
Los Angeles, CA 90071–1665

Abstract: RADM is a Lagrangian dispersion model that uses the random-walk method to simulate atmospheric dispersion. The technical procedure involves tracking tracer particles having a given mass through advection by the mean wind and diffusion by the random motions of atmospheric turbulence. Turbulent movement is calculated by determining the probability distribution of particle movement for a user-defined time step. A random number between 0 and 1 is then computed to determine the distance of particle movement according to the probability distribution. A large number of particles is used to statistically represent the distribution of pollutant mass. Concentrations are calculated by summing the mass in a volume around the receptor of interest and dividing the total mass by the volume. Concentrations can be calculated for any averaging time. RADM is applicable to point and area sources.

- **Reactive Plume Model (RPM–II)**

Reference: D. Stewart, M. Yocke, and M.–K. Liu (1981): *Reactive plume model – RPM–II, User's guide*. Publication EPA–600/8–81–021. U.S. Environmental Protection Agency, ESRL, Research Triangle Park, North Carolina. (NTIS PB82–230723)

Availability: The above report is available from NTIS ($16.95 for paper copy; $5.95 on microfiche). The access number for the computer tape is PB83–154898, and the cost is $460.00. Requests should be sent to

Computer Products
National Technical Information Service
U.S. Department of Commerce
Springfield, VA 22161
Telephone: (703) 487–4650

Abstract: The Reactive Plume Model, RPM–II, is a computer model for estimating short–term concentrations of primary and secondary pollutants resulting from point or area source emissions. The model is capable of simulating the complex interaction of plume dispersion and nonlinear photochemistry. Two main features of the model are (1) the horizontal resolution within the plume, which offers a more realistic treatment of the entrainment process, and (2) its flexibility with regard to choices of chemical kinetic mechanisms.

- **Regional Transport Model (RTM–II)**

Reference: Morris, R.E., D.A. Stewart, and M.–K. Liu (1982): *Revised User's Guide to the Regional Transport Model – Version II.* Publication SYSAPP–83/022. Systems Applications Inc., San Rafael, California.

Availability: The computer code is available on magnetic tape for a cost of $100 (which includes the user's manual) from

Systems Applications, Inc.
101 Lucas Valley Road
San Rafael, CA 94903

Abstract: The Regional Transport Model (RTM–II) is a computer–based air quality grid model whose primary use is estimating the distribution of air pollution from multiple point sources and area sources at large distances (on the scale of several hundred to a thousand kilometers). RTM–II offers significant advantages over other long–range transport models because it is a quasi–three–dimensional hybrid (grid plus Lagrangian puff) approach to the solution of the advection–diffusion equation. Furthermore, its formulation allows the treatment of spatially and temporarily varying wind, mixing depths, diffusivity, and transformation rate fields. It is also capable of treating spatially varying surface depletion processes. While the modeling concept is capable of predicting concentration distributions of many pollutant species (e.g., NO_x, CO, TSP, etc.), the most notable applications of the model to date focus on the long–range transport and transformation of SO_2 and sulfates.

- **SHORTZ**

Reference: Bjorklund, J.R., and J.F. Bowers (1982): *User's Instructions for the SHORTZ and LONGZ Computer Programs,* Volumes I and II. Publication EPA-903/9-82-0004a and b, U.S. Environmental Protection Agency, Region III, Philadelphia, PA.

Availability: This model is available as part of UNAMAP (Version 6).

Abstract: SHORTZ uses the steady-state bivariate Gaussian plume formulation for both urban and rural areas in flat or complex terrain to calculate ground-level ambient air concentrations. It can calculate 1-hour, 2-hour, 3-hour, etc., average concentrations due to emissions from stacks, buildings and area sources for up to 300 arbitrarily placed sources. The output consists of the total concentration at each receptor due to emissions from each user-specified source or group of sources, including all sources. If the option for gravitational settling is invoked, analysis cannot be accomplished in complex terrain without violating mass continuity.

- **Simple Line-Source Model (GMLINE)**

Reference: Chock, D.P. (1980): *User's Guide for the Simple Line-Source Model for Vehicle Exhaust Dispersion Near a Road.* Environmental Science Department, General Motors Research Laboratories, Warren, Michigan.

Availability: Copies of the above reference are available without charge from

Dr. D.P. Chock
Environmental Science Department
General Motors Research Laboratories
General Motors Technical Center
Warren, MI 48090

The user's guide contains the short algorithm of the model.

Abstract: GMLINE is a simple steady-state Gaussian plume model that can be used to determine hourly (or half-hourly) averages of exhaust concentrations within 100m from a roadway on relatively flat terrain. The model allows for plume rise due to the heated exhaust, which can be important when the crossroad wind is low. It also

uses a new set of vertical dispersion parameters that reflects the influence of traffic-induced turbulence.

- **Texas Climatological Model (TCM-2)**

Reference: Staff of the Texas Air Control Board (1980): *User's Guide to the Texas Climatological Model (TCM)*. Texas Air Control Board, Permits Section, 6330 Highway 290 East, Austin, Texas.

Availability: The TCM-2 model is available from the Texas Air Control Board at the following cost:

User's manual only	$20.00
User's manual and model (magnetic tape)	$80.00

Requests should be directed to

Data Processing Division
Texas Air Control Board
6330 Highway 290 East
Austin, TX 78723

Abstract: TCM is a climatological steady-state Gaussian plume model for determining long-term (seasonal or annual arithmetic) average pollutant concentrations of nonreactive pollutants.

- **Texas Episodic Model (TEM-8)**

Reference: Staff of the Texas Air Control Board (1979): *User's Guide to the Texas Episodic Model*. Texas Air Control Board, Permits Section, 6330 Highway 290 East, Austin, TX.

Availability: The TEM-8 model is available from the Texas Air Control Board at the following costs:

User's manual only	$20.00
User's manual and model (magnetic tape)	$80.00

Requests should be directed to

Data Processing Division
Texas Air Control Board
6330 Highway 290 East
Austin, TX 78723

Abstract: TEM is a short-term, steady-state Gaussian plume model for determining short-term concentrations of nonreactive pollutants.

14.2 OTHER MODELS

Many other models are available for air quality applications. Some are listed below in alphabetical order.

- ACID, a receptor-oriented backward trajectory model for long-range transport and deposition (Samson et al., 1982)
- ADEPT, a decision framework software to aid in the analysis of policy alternatives for acidic deposition (EPRI, 1989)
- ADPIC, a particle-in-cell model (Lange, 1978)
- Air Quality Model Performance Assessment Package (Bencala and Seinfeld, 1979)
- ARAMS, the Advanced Regional Atmospheric Modeling System, a generalized, comprehensive and flexible numerical weather prediction system (Colorado State University)
- ATMOS1, a diagnostic wind model for wind simulations in complex terrain (Davis et al., 1984; King and Bunker, 1984)
- CALGRID, a new three-dimensional Eulerian photochemical model with advanced mechanisms for dry and wet deposition (Yamartino et al., 1989)
- COMPLEX I and II, Gaussian dispersion models for complex terrain applications (Gulfreund et al., 1983)
- CTDM, a complex terrain dispersion model (Strimaitis, 1986)
- DIFKIN, a Lagrangian multi-box photochemical model (Martinez et al., 1973)
- DWM, a diagnostic wind model capable of generating three-dimensional wind fields in complex terrain from limited observations (Douglas and Kessler, 1988)

- EKMA, Empirical Kinetic Modeling Approach, for simple simulations of the effects of O_3 control strategies (Dodge, 1977)
- ENAMAP-2, a source-oriented Lagrangian model for long-range transport and deposition (Nitz et al., 1983)
- FEM3, a full three-dimensional model for heavy gas dispersion (Ermak et al., 1981)
- GD, a simple Gaussian model for heavy gas dispersion (Ermak et al., 1981)
- HOTMAC, a three-dimensional hydrodynamic model for simulating higher order turbulence for atmospheric circulation (Yamada, 1985)
- IBMAQ-2, a model for meteorological and dispersion simulations (Shir and Shieh, 1976)
- KAPPA-G, a non-Gaussian steady-state dispersion model (Tirabassi et al., 1986)
- Los Alamos Visibility Model, for visibility impairment computations (Williams et al., 1980 and 1981)
- MASCON, a mass-consistent atmospheric flux model for meteorological simulations in complex terrain (Dickerson, 1978)
- MATHEW, an objective meteorological model (Sherman, 1978)
- MC-LAGPAR II, a Monte-Carlo Lagrangian particle model (Zannetti et al., 1988)(*)
- MINERVE, a mass-consistent wind field model for diagnostic simulations (Geai, 1987)
- MPRM, a general purpose computer processor for organizing available meteorological data into a format suitable for use by air quality dispersion models (available from SCRAM BBS)
- NCAR/PSU/SUNY, a mesoscale meteorological model for regional simulations (Chang et al., 1987)
- NMM, a primitive equation-mode numerical mesoscale model (Pielke et al., 1983)
- NOABL, an objective meteorological model (Phillips and Traci, 1978)

(*) An improved version of this code, MC-LAGPAR III, is available. This code also comes as a Macintosh II version, with fully interactive graphics and user-friendly interface.

- OZIPM-2, a program that generates city-specific isopleths to be used in the EKMA methodology (Gipson, 1984)
- PARIS, Plume-Airshed Reactive-Interactive System, an urban air quality model that is capable of providing a detailed treatment of large point source emissions by embedding one or more reactive plume models into the UAM model (the UAM model is described in Section 14.1.1) (Seigneur et al., 1983)
- PHOENIX, a model for visibility impairment computations (Eltgroth and Hobbs, 1979)
- PRISE, a comprehensive model for plume rise and pollution dispersion (Henderson-Sellers, 1987)
- PTPLU, a model for estimating the location of the maximum short-term concentration (Pierce et al., 1982)
- RAPTAP, a Lagrangian particle model for Monte Carlo dispersion simulation (Yamada and Bunker, 1988)
- RDV 2.0, a relief valve discharge screening model (available from SCRAM BBS)
- REM II, a Lagrangian single-box photochemical model (Drivas et al., 1977)
- RIVAD, a plume-segment Lagrangian model for regional transport and deposition simulation (SAI, 1984)
- RTDM, a sequential Gaussian plume model designed to estimate ground-level concentrations in rough terrain (Paine and Egan, 1987)
- SCIMP, Second-Order Closure Integrated Plume Model, a plume methodology using second-order closure techniques (Sykes et al., 1989b)
- SCIPUFF, Second-Order Integrated Puff Model, a puff methodology using second-order closure techniques (Sykes et al., 1989c)
- SCREEN, a PC-compatible companion to the revised screening procedures developed by the U.S. EPA to estimate air quality impact of stationary sources (U.S. EPA, 1988a)
- SEM, Stack Exhaust Model, for advanced simulations of the initial phase of the plume, including its buoyant rise and bending-over phase (Sykes et al., 1989a)
- SLAB, a layer-averaged conservation equation model for heavy gas dispersion (Ermak et al., 1981)

- SMOG, a photochemical model for ozone simulations (Allen and Munger, 1981)
- TRACE, a Lagrangian box photochemical model (Tran, 1981)
- URBMET (3D version), a prognostic meteorological model (Bornstein et al., 1985)
- VALLEY, a steady-state Gaussian model (Burt, 1980) in which plume height is adjusted according to terrain elevation for stable cases (available from SCRAM BBS)
- VISCREEN, to predict the visual impact of a plume (U.S. EPA, 1988b)
- 3AM, the Annual Average Urban Airshed Model structure, which uses routine emissions, meteorological and air quality data to provide hourly ozone concentrations over long periods of time (e.g., one year) (Tesche and McNally, 1989). The methodology includes a plan for incorporating secondary PM_{10} aerosols and air toxics.
- 3D, a second-order closure mesoscale model (Yamada, 1978)

14.3 VAPOR CLOUD DISPERSION MODELS

Hanna and Drivas (1987) provide guidelines for use of vapor cloud dispersion models and review the available software for simulating source emissions (e.g., tank rupture, pipe break, venting of runaway reaction), and transport/diffusion phenomena of buoyant, nonbuoyant and dense gases. This review was based on literature investigation and the analysis of questionnaires sent to modelers.

Table 14–1 presents the models for which a questionnaire was completed, while Table 14–2 summarizes the results from model questionnaires.

Table 14–1. Models for which questionnaire was completed. Addresses and references are listed (from Hanna and Drivas, 1987; see this publication for the references mentioned in this table). [Reprinted with permission from the American Institute of Chemical Engineers.]

Model	Address	Scientific Validity	Evaluation
AVACTA II	P. Zannetti, Aerovironment, 825 Myrtle Ave., Monrovia, CA 91016	Zannetti et al. 1986	
CARE	G. Verholek, ESC, 200 Tech. Center Dr., Knoxville, TN 37912	Verholek 1986	
CHARM	H. Balentine, Radian, P.O. Box 9948, Austin, TX 78766	Eltgorth and Smith 1983	Balentine and Eltgorth 1985, McNaughton et al. 1986
COBRA III	E. Alp, CSC, 2 Tippett Rd., Downsview, Ont., Canada M3H2V2	Alp 1985, Oliverio et al. 1986	
CRUNCH	A. Byrne, SRD, Wigshaw L., Culceth, England WA34NE	Jagger 1983	
DEGADIS	J. Havens, Un. Arkansas, Dept. Ch. Eng., Fayetteville, AR 72701	Havens and Spicer 1985	Spicer and Havens 1986
DENZ	Same as CRUNCH	Fryer and Kaiser 1979	
D2DC	Commander, USA, CRDC, Aberdeen Proving Ground, MD 21010-5423	Whitacre et al. 1986	
EAHAP	J. Cornwell, EAI, P.O. Box 1508, Norman, OK 73069		
Eidsvik	Y. Gotoas, NIAR, P.B. 64, N-2001 Lillestrom, Norway	Eidsvik 1981	Gotaas 1985
Emissions	J. Schroy, Monsanto, 800 N. Lindbergh Blvd., St. Louis, MO 63167	Wu and Schroy 1979	
EPIDIS	J. Woodward, FSE, 200 Woodport Road, Sparta, NJ 07971		
FEM3	S. Chan, LLNL, P.O. Box 808, Livermore, CA 94550	Chan 1983	Ermak et al. 1982, 1985
GASP	Same as CRUNCH	Webber 1986, Brighton 1985	
HASTE	A. Puri, ERT, 696 Virginia Road, Concord, MA 01742	Paine et al. 1986	Heinold et al 1986, McNaughton et al 1986
HEAVYPUFF	N. Jensen, Riso N.L., DK-4000 Roskilde, Denmark		
HEGADAS	M. Pikaar, Shell, Postbus 162, 2501 AN the Hague, Holland	Colenbrander 1980; Colenbrander and Puttock 1983	Puttock et al 1982
INPUFF2.0	W. Petersen, EPA, RTP, NC	Petersen and Lavdas 1986	
MIDAS	K. Woodard, Pickard Lowe & Garrick, 1615 M Street, Wash., DC 20036		
ModSys	Same as COBRA III		
PLUMEPATH	Same as HEGADAS	Ooms 1972, Ooms et al. 1974	
RIMPUFF	T. Mikkelsen, Riso, N.L., DK-4000 Roskilde, Denmark		
SAFE	P. Ross, AOSTRA, 10010-106 St., Edmonton, Alberta T5J 3L8		
SAFEMODS	P. Raj, TMS, 99 S. Bedford Street, Burlington, MA 01803-5128	Raj 1981, 1985, 1986	
SAFER	G. Gelinas, Safer, 5700 Corsa Avenue, Westlake Village, CA 91362		
SAFETI	R. Cox, Technica, 7/12 Tavistock Sq., London WC1H9LT	Ale and Whitehouse 1986	
SLAB	D. Ermak, LLNL, P.O. Box 808, Livermore, CA 94550	Ermak et al. 1982	Ermak and Chan 1985
SPILLS	J. Moser, Shell, P.O. Box 1380, Houston, TX 77001	Fleischer 1980	Kunkel 1983
SRI PUFF	F. Ludwig, SRI International, Menlo Park, CA 94025		
TELJET	Same as SAFETI		
TRAUMA	Same as CRUNCH	Wheatley 1986	
VAPID	Same as HEAVYPUFF	Jensen 1983	
WHAZAN	Same as SAFETI	Kayes 1985	

Table 14–2. Results from model questionnaires (most answers are given as Y = Yes or N = No) as of December 1986 (from Hanna and Drivas, 1987). [Reprinted with permission from the American Institute of Chemical Engineers.]

Question	AVACTA II	CARE	CHARM	COBRA III	CRUNCH	DEGADIS	DENZ	D2DC	EAHAP	Eidsvik	Emissions	EPIDIS	FEM3	GASP	HASTE
Operating Information															
Form of model: H=Hardware; S=Software	S	H;S	H;S	S	S	S	S	S	S	H;S	S	S	S	S	H;S
Main use: R=Research; A=Applied	R;A	A	A	A	R;A	R;A	R;A	A	R	R;A	A	A	R	R;A	A
Operate in interactive mode?	N	Y	Y	N	Y	Y	N	Y	Y	Y	N	Y	N	N	Y
Support system?		Y	Y		N	Y	N	Y	Y	N	N			N	Y
Number sold or given away?	2	15	80		>10	>10	>10	40	5		0				6
Link to emergency system?		Y	Y		N	N	N	N	N	N	N			N	Y
Input Data															
Accept real time weather data?	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	Y
Method of data entry: H=Hand; F=data file memory; D=disk or tape	F	H;F;D	H;F;D	H;F	F	H;F	F	H	H	H	H;F	H;F;D	F	H;F	H;F
Source Emissions Model?	N	Y	Y	Y	N	N	N	Y	Y	N	Y	Y	Y	Y	Y
Evaporation of Spilled Liquids?		Y	Y	Y				Y	Y		Y	Y	Y	Y	Y
Flashing		Y	Y	Y				N	Y		Y	Y	N	N	Y
Multicomponents		N	N	N				N	Y		Y	N	N	N	N
Entrainment as aerosols?		Y	Y	Y				N	N		N	Y	N	N	Y
Heat transfer, substrate to cloud?		Y	N	Y				N	Y		Y	Y	Y	Y	Y
Number of substrates (W=Water; S=Soil)		W;S		W;S					W;S		W;S	W;S	W;S	W;S	W;S
Mass transfer in liquid phase?		Y	N	N				N	Y		Y	Y	N	Y	Y
Evaporation of aerosols		N	Y	Y				N	N		N	Y	N	N	Y
Gas flux from container rupture?		N	Y	Y				N	Y		N	Y	N	N	Y
Condens. of moisture in vapor cloud?		N	Y	Y				N	Y		N	Y	Y	N	N
Wind influence on evaporation?		Y	Y	N				Y	Y		Y	Y	N	N	Y
Number of chemicals hardwired (I=input by user)		50,I	83	5,I				17	21		I	10,I	I	I	I
Transport and Dispersion Model?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y
Releases treated: I=Instantaneous; C=Continuous; V=Variable	I;C;V	C;V	I;C;V	V	C	I;C;V	I	I;C;V	I;C;V	I;C		V	I;C		I;C;V
Dense cloud?	N	Y	Y	Y	Y	Y	Y	N	Y	Y		Y	Y		Y
Jet?	Y	N	Y	N	N	N	N	Y	Y	N		N	N		N
Neutral cloud?	Y	Y	Y	N	Y	Y	Y	Y	Y	N		Y	Y		Y
Buoyant cloud?	Y	N	Y	N	N	N	N	Y	Y	N		N	N		Y
Surface roughness?	Y	Y	N	Y	Y	Y	Y	Y	Y	Y		Y	Y		Y
Complex terrain handled?	Y	Y	N	N	N	N	N	N	N	N		N	Y		N
U variations in time and space?	Y	Y	N	N	N	N	N	N	N	N		N	Y		N
Indoor concentrations?	N	N	N	N	N	N	N	N	N	N		N	N		N
Building wake effects?	N	Y	Y	N	N	N	N	N	N	N		N	Y		Y
Advection/Dispersion Model: B=Box or Slab; G=Gaussian; K=K/numerical	G	G	G	B	B;G	K	B;G	G	B;G	B;G		K	K		B;G
Along-wind dispersion?	Y	Y	Y	Y	N	Y	Y	N	Y	Y		Y	Y		Y
Vertical wind shear?	N	Y	N	Y	Y	Y	Y	N	Y			Y	Y		Y
Chemical reactions in plume?	Y	Y	Y	N	N	Y	N	N	N	N		N	N		N
Dry or wet deposition?	Y	Y	N	N	N	N	N	D	N	N		N	N		N
Concentration fluctuations?	N	N	N	N	N	N	N	N	N	N		Y	N		N
Number of chemicals (I=input)	I	50,I	83	5,I		5		17	21			10,I	I		I
Output															
Averaging time (minutes) (I=input)		15	1-10	3		10						0			
Distance limits (km)								20	100			70	10		
Evaluation?	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N
How are data presented T=Table; G=Graph		T;G	T;G		T	T	T;G	T;G	T;G	T	T;G	T;G	T;G	T;G	T;G

Table 14–2 (continued)

	HEAVYPUFF	HEGADAS	INPUFF2.0	MIDAS	ModSys	PLUME PATH	RIMPUFF	SAFEMODS	SAFER/TRACE	SLAB	SPILLS	SRI PUFF	TRAUMA	VAPID
Operating Information														
Form of model: H=Hardware; S=Software	S	S	S	S;H	S	S	S	S;H	S;H	S	S	S	S	S
Main use: R=Research; A=Applied	R	R;A	A	R;A	A	R;A	A	R;A	A	R;A	A	R	A	R
Operate in interactive mode?	N	N	N	Y	N	N	Y	Y	Y	N	Y	Y	N	N
Support system?	N	N	Y	Y	N	N	Y		Y			N	N	
Number sold or given away?		1	120	20		>10	3		75		>100			
Link to emergency system?		N	N	Y	N	N			Y				N	
Input Data														
Accept real time weather data?	N	N	N	Y	N	N	Y	Y	Y	N	N	N	N	N
Method of data entry: H=Hand; F=data file memory; D=disk or tape	H;F;D	F	D	H;F;D	H;F	F	F	H;F;D	H;F;D	F	H	H;F;D	F	H;F;D
Source Emissions Model?	N	Y	N	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y
Evaporation of Spilled Liquids?		Y		Y	N			Y	Y	Y	Y		N	Y
Flashing		N		Y	N			Y	Y	N	Y		Y	Y
Multicomponents		N		Y	Y		Y	Y	Y	N	N		N	
Entrainment as aerosols?		N		N	N			Y	Y	N	N		N	
Heat transfer, substrate to cloud?		Y		Y	N			Y	Y	Y	Y		N	
Number of substrates (W=Water; S=Soil)		W;S		W;S				W;S	W;S		S			
Mass transfer in liquid phase		N		Y	N			Y	Y	N	Y		Y	
Evaporation of aerosols		N		N	N			Y	Y	N	N		Y	
Gas flux from container rupture?		N		Y	Y		Y	Y	Y	N	Y		T	
Condens. of moisture in vapor cloud?		Y		N	N			Y	Y	N	N		Y	
Wind influence on evaporation?		N		Y	N			Y	Y	N	Y		N	Y
Number of chemicals hardwired (I=input by user)		I		I	2		25	I	I	1	34+		I	
Transport and Dispersion Model?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Releases treated: I=Instantaneous; C=Continuous; V=Variable	I	C;V	C;V	V	V	C	I;C;V	I;C;V	I;C;V	C	C,V	V	C	V
Dense cloud?	Y	Y	N	Y	Y	Y		Y	Y	Y	N	N	N	Y
Jet?	Y	N	N	Y	Y	Y	N	Y	Y	N	N	N	N	N
Neutral cloud?	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Buoyant cloud?	Y	N	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N
Surface roughness?	Y	Y	N	Y	Y	N	Y	Y	Y	Y	N	N	N	Y
Complex terrain handled?	N	N	N	Y	N	N	Y	Y	Y	N	N	N	N	N
U variations in time and space?	N	N	Y	Y	N	N	Y	Y	Y	N	N	Y	N	N
Indoor Concentrations?	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N
Building wake effects?	N	N	N	Y	N	N	N	N	N	N	N	N	N	N
Advection/Dispersion Model: B=Box or Slab; G=Gaussian; K=K/numerical	B	B;G	G	B;G;K	G;K	G	G	B;G	B;G	B	G	G	B	B
Along-wind dispersion?	Y	Y	N	Y	Y	N	Y	Y	Y	N	N	Y	N	N
Vertical wind shear?	Y	Y	N	Y	Y	N	Y	Y	N	N	Y	N	N	Y
Chemical reactions in plume?	N	N	N	N	Y	N	N	Y	Y	N	N	N	Y	N
Dry or wet deposition?	N	N	Y	Y	N	N	Y	Y	N	N	N	N	Y	D
Concentration fluctuations?	N	N	N	N	Y	N	Y	Y	N	N	N	N	N	N
Number of chemicals (1=Input)	4	I		I	2	I	25	900	I	1	34+		1	1
Output														
Averaging time (minutes)(1=input)		I	3,60			0		0.5,1		I	10	60		10
Distance limits (km)			100	10		1	20	5			10			10
Evaluation?	N	Y	Y	Y	Y		Y	Y	Y	Y	Y		N	N
How are data presented T=Table; G=Graph	T;G	T	T	T;G	T;G	T	T;G	T;G	T;G	T;G	T,G		T	T;G

Table 14–2 (continued)

	SAFE	SAFETI	TECJET	WHAZAN
Operating Information				
Form of model: H=Hardware; S=Software	S	S	S	S
Main use: R=Research; A=Applied	A	A	A	A
Operate in interactive mode?	Y	Y	Y	Y
Support system?	Y	Y	Y	Y
Number sold or given away?	1	7	6	60
Link to emergency system?	N	N	N	N
Input Data				
Accept real time weather data?	Y	N	N	N
Method of data entry: H=Hand; F=data file memory; D=disk or tape	H;F;D	H;F;D	H;F	H
Source Emissions Model?	N	Y	Y	Y
Evaporation of Spilled Liquids?		Y	N	Y
Flashing		Y	Y	Y
Multicomponents		N	N	N
Entrainment as aerosols?		Y	Y	Y
Heat transfer, substrate to cloud?		Y	N	Y
Number of substrates (W=Water; S=Soil)		S		S
Mass transfer in liquid phase		Y	N	Y
Evaporation of aerosols		Y	Y	Y
Gas flux from container rupture?		Y	Y	Y
Condens. of moisture in vapor cloud?		Y	Y	Y
Wind influence on evaporation?		N	N	Y
Number of chemicals hardwired (I=input by user)		60,I	62,I	20,I
Transport and Dispersion Model?	Y	Y	Y	Y
Releases treated: I=Instantaneous; C=Continuous; V=Variable	C;V	I;C;V	C	I;C;V
Dense cloud?	N	Y	Y	Y
Jet?	Y	Y	Y	Y
Neutral cloud?	Y	Y	Y	Y
Buoyant cloud?	Y	Y	Y	Y
Surface roughness?	Y	Y	Y	Y
Complex terrain handled?	N	N	N	N
U variations in time and space?	Y	N	N	N
Indoor Concentrations?	N	N	N	N
Building wake effects?	N	N	N	N
Advection/Dispersion Model: B=Box or Slab; G=Gaussian; K=K/numerical	G;K	B;G		B;G
Along-wind dispersion?	Y	N	N	N
Vertical wind shear?	Y	N	N	N
Chemical reactions in plume?	Y	N	N	N
Dry or wet deposition?	Y	Y	N	N
Concentration fluctuations?	Y	N	N	N
Number of chemicals (I=Input)	I	60,I	62,I	20,I
Output				
Averaging time (minutes)(I=input)	60	10	10	10
Distance limits (km)	50	20		
Evaluation?	N	N	Y	N
How are data presented T=Table; G=Graph	T;G	T,G	T,G	T,G

14.4 COMPUTER SYSTEMS FOR CHEMICAL EMERGENCY PLANNING

The U.S. EPA (1989) has identified the computer systems applicable to Title III of the Superfund Amendments and Reauthorization Act of 1986, i.e., those packages that are suitable for local planning and for assistance in emergency response planning (e.g., hazard identification, vulnerability analysis through modeling of the releases, risk analysis, regulatory requirements, etc.).

This preliminary list of computer applications and systems is presented to Table 14–3.

Table 14–3. Preliminary list of computer applications and and systems of potential use under SARA Title III (from U.S. EPA, 1989). Two asterisks indicate an apparent high degree of usefulness. All systems require an IBM–compatible microcomputer, unless otherwise specified.

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	CONTACT ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
ACAPP	Aqueous Chemical and Physical Properties	P.S. Lowell & Co., Inc.	8868 Research Blvd Suite 309 Austin, TX 78758 (512) 454-4797	Predicts properties and computes chemical and solid-liquid phase equilibrium for aqueous mixtures. Up to 20 composition data sets may be handled in memory at once. Requires 512K memory.
ACT		Techdata	6615 la Mora Houston, TX 77083 (713) 498-0797	Designs activated sludge systems. Also provides data data for flow modeling and permits.
ADPM	Automated Defense Priority Model Development	Roy F. Weston, Inc.	Judith Hushon 955 L'Enfant Plaza, SW 6th Floor Washington, DC 20024 (202) 646-6800	System considers surface water and groundwater pathways of exposure in evaluating the potential for adverse effects. Air and soil pathways will be added as will numerous built-in error checking routines.
AIRDAS	Air Quality and Meteorological Monitoring Data Acquisition System	Enviroplan, Inc.	Michael Abrams 59 Main St. West Orange, NJ 07052 (201) 325-1544	Collects, processes, displays, and reports air quality and meteorological data. Requires Data General Corp. MicroECLIPSE processor.
AMINE-1		TECS Software, Inc.	P.O. Box 720730 Houston, TX 77272 (713) 561-6143	Performs preliminary design of MEA, DEA, and MDEA plants through mass and energy balance calculations for all major equipment involved.
ANASOFT		Anafaze, Inc.	Mike Jacobs 1041 17th Ave. Santa Cruz, CA 95062 (408) 479-0415	Records results of environmental monitoring data: flows, pH, pollution levels, waste disposal areas and control of pollution.
APE	Air Pollution Emissions	Jerome R. Barta	Jerome R. Barta 1513 White Post Cedar Park, TX 78613 (512) 258-1812 (Call after 4 PM)	Tracks air pollution emissions. Screen formats for data input and output in Basic. User can customize using Basic.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
ARCHIE	Automated Resource for Chemical Hazard Incident Evaluation	Department of Transportation	Stacy Gerard ARCHIE Support (DHM-15/Room 8104) U.S. Department of Transportation 400 7th Street, S.W. Washington, D.C. 20590 (202) 366-4900	Program created for DOT, EPA, and FEMA to aid emergency preparedness personnel in assessing the sequence and nature of events that may follow an accident. ARCHIE incorporates several estimation methods that may be used to assess the vapor discharge, fire, and explosion impacts associated with episodic discharges of hazardous materials.
ASPER	Activated Sludge Performance Evaluation Routines	Cochrane Associates, Inc.	Jay J. Pink 236 Huntington Ave. Boston, MA 02115 (617) 247-0444	Evaluates the performance of each unit of a wastewater treatment plant based on hydraulic loadings, solid flux loadings, food/microorganism ratios, sludge age, settleability, and related parameters.
BASIS	Text Information Management System (TIMS)	Information Dimensions	655 Metro Place South Suite 500 Dublin, OH 43017 (614) 761-7300	Provides access to textual and numeric data in its databases for information retrieval and reporting needs. Features word proximity and phrase searching; thesaurus and index.
Batchmaster Plus		Pacific Micro Software Engineering	35 59th Place Long Beach, CA 90803 (213) 434-0011	MSDS, HMIS labeling modules.
BEE - SARA		Bowman Environmental Engineering	P.O. Box 29072 Dallas, TX 75229 (214) 241-1895	Dispersion modeling software including EPA dispersion models, data entry programs, vulnerability zones, meteorological data processing programs, and puff-type programs for modeling gas releases. Uses more than 20 models.
BEESTAR, CRSMET, STAR WROSE		Bowman Environmental Engineering	P.O. Box 29072 Dallas, TX 75229 (214) 241-1895	Meteorological data processing. Prepares data in a suitable format for input in models.
BeSafe	BeSafe Hazardous Substance Information and Tracking Module	Azimuth Technologies, Inc.	P.O. Box 5787 Pasadena, CA 91117 (818) 405-0300	Information management system designed to aid in the creation of MSDSs. Includes packages containing hazardous materials data for compliance with "Right to Know" legislation.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
BLUE SKY		Kelon Corporation	P.O. Box 64577 Tucson, AZ 85716 (602) 299-5636	An integrated package that creates air pollution permits, calculates and reports on emission inventory information and individual air pollution incidents.
BREEZE AIR		Trinity Consultants, Inc.	12801 N Central Expwy Suite 1200 Dallas, TX 75243 (214) 661-8100	Air pollution dispersion models derived from the UNAMAP6 stationary source models and other specialized dispersion models. Uses more than 20 models. Requires 512K memory and 132 column printer.
BREEZE HAZ		Trinity Consultants, Inc.	12801 N Central Expwy Suite 1200 Dallas, TX 75243 (214) 661-8100	Models toxic gas releases. Two models available: SHELL SPILLS and TRPUF (based on EPA PUFF). Graphical output. Requires 512K memory and 132 column printer.
CALS/EWDS	Computer Automated Laboratory System/ Environmental Waste Database System	Beckman Instruments Inc.	Lab. Automation Operations 160 Hopper Ave. Waldwick, NJ 07463 (201) 444-8900	CALS combines sample tracking facilities with a database for management and documentation of information in the environmental waste monitoring laboratory. EWDBS provides a reporting format that prints data on the NPDES form.
**CAMEO II	Computer-Aided Management of Emergency Operations, Version 1.02	U.S. Department of Commerce - NOAA/U.S. Environmental Protection Agency - Office of Solid Waste and Emergency	Mark Miller NOAA HazMat Resp. Branch 7600 Sand Point Wy NE Seattle, WA 98115 (206) 526-6317 John Laumer National Safety Council 444 N. Michigan Ave. Chicago, IL 60611 (312) 527 4800 x5606	Emergency planning and response information including the following: chemical information, response information, air modeling, mapping, response resources inventory, facility information, route information, population information, emergency recordkeeping, MSDS information, Section 304 release reports, information request records, facility reports, and planning introduction and assistance. Requires Apple computer equipment.
CAMEO	Computer-Aided Management of Emergency Operations, IBM Version	U.S. Department of Commerce - NOAA/U.S. Environmental Protection Agency - Office of Solid Waste and Emergency	Mark Miller NOAA HazMat Resp. Branch 7600 Sand Point Wy NE Seattle, WA 98115 (206) 526-6317	Database of chemical data and response information.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
CARE	Computerized Airborne Release Evaluation	Environmental Systems Corporation	Ron Webb 200 Tech Center Dr. Knoxville, TN 37912 (615) 688-7900	Uses mathematical models to assess gas cloud movements. Uses gas detectors and weather sensors to alert user of release, and provides plume dispersion, effects, and response information.
CASH/TRACK		Livingston Enterprises	2855 Kifer Road Santa Clara, CA 95051 (408) 986-8866	Full inventory chemical tracking system designed to extract Tier I and Tier II information for assistance in reporting.
CEMDAS	Continuous Emission Monitoring Data Acquisition System	Enviroplan, Inc.	Ron Zowan 59 Main Street West Orange, NJ 07052 (201) 325-1544	Data acquisition system for continuous emission monitoring of ambient air or stack emissions. Also provides reports.
CENS	Computerized Emergency Notification System	Advanced Systems Laboratories, Inc.	7137 West Main St. Lima, NY 14485 (716) 624-3276	Can be used with CERS or CMSDS. Determines if incident requires emergency notification based on quantity of release. Telephone roster included. Requires 640K memory and hard disk.
**CERS	Computerized Emergency Response Series	Advanced Systems Laboratories, Inc.	7137 West Main St. Lima, NY 14485 (716) 624-3276	Determines response procedures for incidents based on data from CMSDS and CHIMS. Includes firefighting information, personal protective equipment, emergency first aid procedures, spill and containment procedures, waste disposal procedures, and physical and health hazards. Requires 640K memory and hard disk.
CHARM	Complex Hazardous Air Release Model	Radian Corp.	Lou Fowler 8501 Mo-Pac Blvd. Attn: CHARM P.O. Box 9948 Austin, TX 78766 (512) 454-4797	Primarily models chemical releases to the air. Includes a chemical database and map editor and is capable of mapping concentration isopleths. Allows real-time meteorological data input.
CHART/PC		Engineering Applications Specialists, Inc.	5610 Medical Circle Suite 31 Madison, WI 5371 (608) 273-0065	Computerized psychometric chart. User provides two independent properties of moist air and program calculates the remaining properties.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
CHCS	Computerized Hazard Compliance Series	Advanced Systems Laboratories, Inc.	7137 West Main St. Lima, NY 14485 (716) 624-3276	Provides compliance information including lists of hazardous substances under SARA, OSHA, and CERCLA, Tier I reports, Tier II reports, emergency and release reporting. Requires 640K memory and hard disk.
CHCS Compliance Engine		Advanced Systems Laboratories, Inc.	7137 West Main St. Lima, NY 14485 (716) 624-3276	Assists with SARA Title III compliance. User inputs information and system provides compliance status and tasks required for compliance.
CHEM MASTER Version 2.1		ITS Technologies	Angela Loundes 9 East Stow Road Marlton, NJ 08053 (609) 983-7300 (800) 727-2487	Aids in SARA Title III compliance and chemical inventory tracking. Database of over 3,800 regulated chemicals. Has capability of tracking and reporting for multiple facilities. Prints in-house warning labels, prepares Section 311 reports and facsimiles of Tier I and Tier II reports.
CHEM MULTI BASE		CHEM Multi BASE, Inc.	P.O. Box 350 Mahomet, IL 61853 (217) 586-4131	Database of 16,000 chemicals with synonyms and trade names. Government numbers and information are cross referenced with MSDSs for all DOT regulated chemicals. Includes tracking and inventory system.
CHEMASYST		ICF Incorporated	June Bolstridge 9300 Lee Highway Fairfax, VA 22031-1207 (703) 934-3208 (800) 283-2243	Manages data needed to comply with SARA Title III and OSHA HSC Regulations. Provides text, guidance materials, instructions, and interpretations of the requirements; forms for reporting; databases of physical and chemical properties of some regulated chemicals; lists of chemicals that require reporting; Section 313 chemical references/sources/ citations; and an approved list of synonyms. Stores calculations of estimated releases and prints information onto submittable EPA forms.
CHEMCALC 1, Separations Calculations		Gulf Publishing Company, Book Division	P.O. Box 2608 Houston, TX 77252 (713) 520-4444	Programs for use with multi-component mixtures to determine the conditions and compositions at the dew point and at the bubble point.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
CHEMCALC 7	Chemical Compound Databank	Gulf Publishing Company, Book Division	P.O. Box 2608 Houston, TX 77252 (713) 520-4444	Contains the physical properties of 500 compounds. Estimates properties at temperature or pressure within a specified range. Includes OSHA toxicity data, DOT notations, and directory of manufacturers for each compound. Requires 2 disk drives.
CHEMCALC 11, AMSIM	Amine Gas Treating Plant Simulator	Gulf Publishing Company, Book Division	P.O. Box 2608 Houston, TX 77252 (713) 520-4444	Models processes for absorption and stripping of H_2S and CO_2 in a gas stream. For hydrocarbon gases, also calculates hydrocarbons absorbed and stripped.
CHEMMASTER		Envirogenics, Inc.	136 W. Franklin Ave. Pennington, NJ 08534 (609) 737-3233	Chemical inventory system for Tier I/II information. Includes capacity to inventory quantity and location information. Contains database of 3100 hazardous chemicals.
CHEMEST	Chemical Property Estimation System	Camp, Dresser, & McKee, Inc.	Dr. Warren Lyman 1 Center Plaza Boston, MA 02108 (617) 742-5151 x5711	Designed to predict environmentally important properties of organic chemicals. Requires DEC VAX and IBM PC.
CHEMLINE	Chemical Dictionary Online	National Library of Medicine	8600 Rockville Pike Bethesda, MD 20894 (301) 496-1131	Online chemical dictionary with over 500,000 records on chemical substances found in the TOXLINE, TOXBACK65, TOXBACK74, RTECS, MEDLINE, and TDB databases, as well as the EPA TSCA Inventory. Search capability by synonyms, CAS Registry Numbers, and by classes of compounds. Prime time connect cost is $54 per hour.
CHEM-PLY		Environmental Communications Consultants, Inc.	1759 Sharwood Place Crofton, MD 21114 (301) 858-0332 (301) 793-0622	Provides brief regulatory information for RCRA, OSHA, and SARA compliance; also full text. Access to a 2,700 chemical data base with hazard information, precautions, and health effects. Menu-driven software.
CHEMTOX DATABASE		Resource Consultants	P.O. Box 1848 Brentwood, TN 37024 (615) 373-5040	Information on 3,500 chemical substances that are hazardous and of economic importance. Data include chemical names, CAS and DOT numbers, properties, exposure limits, EPA waste information, and spill response information. Quarterly updates. Requires 320K memory and 10Meg hard disk.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
CHEMTREC	Chemicals in Transportation Emergency Center	Chemical Manufacturers Association (CMA)	2501 M Street, NW Washington, DC 20037 (202) 887-1255 (800) 424-9300	Available during a transportation-related emergency to provide hazard warning and assistance to response personnel. Modem allows direct access to HIT, the CMA's response information database.
CHIMS	Computerized Hazardous Inventory Management System	Advanced Systems Laboratories, Inc.	7137 West Main St. Lima, NY 14485 (716) 624-3276	Calculates and prints Tier I and Tier II inventory reports. Also assists with inventory and chemical storage information required for Toxic Chemical Release Reports. Requires 640K memory and hard disk.
**CHIP	Community Hazmat Information Platform	Material Safety Data Systems, Inc.	2674 E. Main St. Suite C-107 Ventura, CA 93003-2899 (805) 648-6800	Contains four modules that store and retrieve information: Administrative Information module for administrative information for local government; Emergency Response module for emergency response information for local government; Hazmat Handler Information module for handler information; and Hazmat Information module which contains hazardous material data for local government and handlers.
CHIT	Chemical Hazard Identification and Training	Marcom Marketing Group, Ltd.	P.O. Box 9557 4 Denny Road Wilmington, DE 19809 (800) 654-CHIT	Hazardous chemical information storage and retrieval for facilities. Modules for: MSDS, right-to-know requests, spill procedures, training, and labeling.
CHRIS	Chemical Hazard Response Information System	Chemical Information Systems, Inc.	Fein-Marquart 7215 York Rd Baltimore, MD 21212 (800) CIS-USER	Provides chemical information to assist response to emergencies involving spills of hazardous materials. Contains chemical, physical, and biological data, and specific response-oriented information (e.g., countermeasures). Developed by the U.S. Coast Guard.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
CHRIS and CHRIS PLUS	Chemical Hazard Records and Inventory Software	Random House	Linda Goldfarb Jane Rathbun 201 East 50th Street New York, NY 10022 (800) 733-3000	Primarily recordkeeping system for individual facilities. Includes information on chemicals and manufacturers and records of accidents and training. Chris Plus adds capability of storing and printing MSDS information and assists with the preparation of Tier I and Tier II reports and right-to-know requests. Both systems contain database of 600 toxic substances and synonyms.
CIS	Chemical Information Service	Fein-Marquart Associates, Inc.	7215 York Road Baltimore, MD 21212 (800) CIS-USER	Collection of databases providing information that includes chemical properties, basic effects, and response techniques. $300 annual subscription fee; $20 - $95 per computer connect hour.
CMSDS	Computerized MSDS System	Advanced Systems Laboratory, Inc.	7137 West Main St. Lima, NY 14485 (716) 624-3276	Software manages and tracks MSDS database information by chemical ID, supplier, synonyms, components, registry numbers, completion status, uses, and hazard classes. Subscription updating. Requires 640K memory and hard disk.
COMPLIANCE MANAGER		OSHA-SOFT Corporation	Peter Bragdon P.O. Box 894 Concord, NH 03301 (603) 672-7230	Facility-specific information system that manages information on the following modules: MSDS MANAGER, TRAINING MANAGER and INVENTORY MANAGER.
COPE		Metcalf & Eddy, Inc.	10 Harvard Mill Sq. Wakefield, MA 01880 (617) 246-5200	COPE has 9 modules: PM scheduler, corrective maintenance, equipment history, equipment reference listing, spare parts entry, database integrity verification, and training.
CORKES		Roy F. Weston, Inc.	Judith Hushon 955 L'Enfant Plaza, SW Washington, DC 20024 (202) 646-6800	Provides facility-specific information for emergency situations.
CoVOCalc		Dawn Graphics Company	19 Edgehill Road Winchester, MA 01890 (617) 721-0456	Spreadsheet template that calculates expected VOC emissions from use of paints, inks, and coatings. Prints out EPA data forms.

Table 14-3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
CSIN	Chemical Substance Information Network	U.S. EPA/Office of Pesticides and Toxic Substances	Mr. Dalton Tidwell/ Dr. Sidney Siegal OPTS Chemical Coordination Staff (TS-777) 401 M Street, SW Washington, DC 20460	Complex switching network that provides user access to over 400 individual databases. Necessary to obtain user codes for various vender databases.
CTCRRS	Computerized Toxic Chemical Release Reporting System	Advanced Systems Laboratories, Inc.	7137 West Main St. Lima, NY 14485 (716) 624-3276	Assists with completion of EPA Form R using CMSDS and CHIMS information. Also tracks reporting requirements and emission and waste treatment. Requires 640K memory and hard disk.
CYCLONE		TECS Software, Inc.	P.O. Box 720730 Houston, TX 77272 (713) 561-6143	Does the following calculations for a gas or air cyclone: sizing, pressure drop, and fractional and overall efficiency.
DATASTREAM		Datastream Systems, Inc.	1200 Woodruff Road Suite C-40 Greenville, SC 29607 (803) 297-6775	System designed for industrial and municipal wastewater treatment facility data management, including key process parameters and plant evaluation.
DIALOG		DIALOG Information Services	3460 Hillview Ave. Palo Alto, CA 94304 (415) 858-3785	Reference system containing information from all areas of science, technology, and medicine. $10 - $285 per computer connect hour.
DIPPR	Design Institute for Physical Property Data	National Bureau of Standards		Data compilation of pure compound properties.
ECMS	Environmental Compliance Monitoring System	Versar Environmental Systems	9200 Rumsey Road Columbia, MD 21045-1934 (301) 964-9200	Facility-specific system including modules for air emissions, calendar, facility and agency processes, groundwater, hazardous waste, incident response, permit tracking, solid (non-hazardous) waste, work orders, and wastewater.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
ECOTRAC	Environmental Data Management System	HAZOX Corporation	Daniel Fullerton 12600 W. Colfax Ave. Suite C420 Lakewood, CO 80215 (303) 237-1065	Provides manifest tracking, permit tracking, source inventory, environmental events, TSCA required data management, waste disposal costs, and groundwater monitoring.
**EIS/C	Emergency Information System/Chemical	Research Alternatives, Inc.	Maxine Orens Suite 3 966 Hungerford Dr. Rockville, MD 20850 (301) 424-2803	Primarily an emergency planning and response system. Records chemical, facility, transportation, vulnerable population, and other planning and response information. Presents information on maps. Prepares Tier I and II reports. Stores MSDS information.
EMERGENCY CALL SYSTEM		Weith Computer Products and Services	802 Brittany Suite 101 Bowling Green, OH 43402 (419) 352-8659	Automatically calls emergency response personnel based on incident specific information.
EMERGENCY RESPONSE COMPUTER PROGRAM		Ontario Ministry of Environment	Air Resources Branch 880 Bay Street 4th floor Toronto, Ontario M5S 1Z8	Release modeling system. Contains database of chemicals and characteristics which may be modified by user. User selects chemical, weather conditions and type of release for simple or heavy gas modeling. Output is numeric for times and distances with graphic capabilities.
ENFLEX DATA 313		ERM Computer Services, Inc.	Terry Percel 855 Springdale Dr. Exton, PA 19341 (800) 365-2146 (800) 544-3118	Calculates releases by four principle methods to the following media: water, POTW, Underground Injection, Stack or Point Air, Fugitive, Land, Waste Offsite, and other processes in the facility. Also performs a mass balance function around each process; prints Form R and submits to EPA; provides for unlimited comments; and stores unused calculations.
ENFLEX INFO		ERM Computer Services, Inc.	Terry Percell 855 Springdale Dr. Exton, PA 19341 (800) 365-2146 (800) 544-3118	Provides access to the full text of current federal and state environmental regulations. Includes NJ and PA regulations. Provided on a subscription basis, and furnished on CD-ROM compact laser disc.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
EnviroBase III	Environmental Data Management System	Enviro Base Systems	Michael H. Freeland 2 Inverness Drive East Suite 101 Englewood, CO 80112 (303) 790-8396	Organizes, analyzes, and generates reports of laboratory analytic data associated with groundwater, soils and surface sampling and testing programs. Written and compiled in Clipper, an extension of dBase III. Requires DOS 3.0 or greater with at least 410K of free RAM, and a hard disk with at least 1.5 megabytes of free storage space.
EnviroLab III	Laboratory Data Management System (LDMS)	Enviro Base Systems	Richard L. Sayrs, Jr. 2 Inverness Drive East Suite 101 Englewood, CA 80112 (303) 790-8396	Organizes analytical laboratory paperwork: sample log-in and tracking to final analysis reporting and invoicing, operates on single-CPU or local area network of IBM PC/XT/AT/80386 or compatible.
ENVIRONMENTAL AIDE		Odessa Engineering	P.O. Box 26537 Austin, TX 78755 (512) 251-5543	Screen oriented, menu driven program that facilitates data editing, data analysis and preparation of reports for stack emissions.
ETIS	Environmental Technical Information System	U.S. Army	Ron Webster Construction Engineering Research Laboratory P.O. Box 4005 Champaign, IL 61820	Computerized information retrieval system that aids the Army and other government agencies in preparing environmental impact statements.
FIESTA	Field Slug Test Analyzer	Roy F. Weston, Inc.	Judith Hushon 955 L'Enfant Plaza, SW 6th Floor Washington, DC 20024 (202) 646-8600	Uses raw data from field tests to compute hydraulic conductivity; computed value is evaluated by the expert system for its correctness with regard to these considerations: site-specific geological characteristics, validity of test procedures, accuracy of the raw data, and the computational method. System is written in Arity-Prolog on a PC.
FINANCIAL ANALYSIS OF WASTE MANAGEMENT ALTERNATIVES		General Electric Company Corporate Environmental Programs	Mr. Richard MacLean 3135 Easton Turnpike Fairfield, CT 06431 (203) 373-3077	System calculates the long-term costs, including liability, associated with environmental control technologies. Requires printer with capability of printing 240 columns of width

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
FINDEX		HAZOX Corporation	Daniel Fullerton P.O. Box 637 Chadds Ford, PA 19317 (215) 388-2030 (800) 558-6942	Indexing and retrieval software for searching MSDS files.
FLAREHDR and FLARESTK		TECS Software, Inc.	P.O. Box 720730 Houston, TX 77272 (713) 561-6143	Two programs, one of which determines header size based on maximum allowable relief velocity along the header and the other program calculates flare tip diameter and stack height.
FLOW GEMINI	Environmental Information Management System and Occupational Health Information System	Flow General, Inc.	Dr. Wanda Rappaport 7655 Old Springhouse Rd McLean, VA 22102 (703) 893-5900	Generates reports, schedules, and reminders; summary, detail, and status; and inventory, inspection and monitoring for permits, air and water monitoring, waste, PCBs and problems and events. Generates MSDSs, and aids in waste tracking and environmental audits. Requires DEC VAX or IBM mini or mainframe.
FRES	First Responders Expert System	Roy F. Weston, Inc.	Judith Hushon 955 L'Enfant Plaza, SW Washington, DC 20024 (202) 646-6800	Provides pollutant toxicity information and optimal response strategy.
GASPROPS		Software Systems Corporation	P.O. Box 202017 Austin, TX 78720 (512) 451-8634	Computes thermodynamic properties of air, argon, carbon monoxide, carbon dioxide, hydrogen, nitrogen, oxygen, water vapor, and products of combustion for hydrocarbons. Computes all properties from any two independent properties.
GEMS	Graphical Exposure Modeling System	U.S. EPA	Cathy Turner Pat Harrigan Office of Toxic Subst. TS-798 Washington, DC 20460 (202) 382-3929 (202) 382-3397	On-line system. Provides support for exposure assessments of toxic substances. Includes chemical property estimation techniques, statistical analysis, multi-media modeling, and graphics display (including models).

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
GLIDE	Geographically Locate Inventoried Dangers Easily		Jerome Barta 1513 White Post Cedar Park, TX 78613 (512) 258-1812 (call after 4 PM)	Provides capability to inventory and retrieve information on stored hazardous chemicals and their proximity to central areas.
GROUNDWATER/DMS	Groundwater Data Management System	CSW Data Systems	One Overlocker Road Poughkeepsie, NY 12603 (914) 454-0090	A data management package which tracks the data associated with a groundwater monitoring network. The system quantifies and identifies all forms of data, reports, analyses, corporate and government standards. Requires 4.6 megs of hard disk space; 640K RAM, 80286 (80386) processor and a DOS version of 3.30 or higher.
HAZARD		North American Software, Inc.	George Stephens P.O. Box 3309 Tustin, CA 92680 (714) 830-6248	Database system that is designed to aid in producing both the EPA Manifest and Drum Labels. Includes DOT information for verification.
HAZARDLINE		Occupational Health Services, Inc.	John Fee Suite 2407 450 7th Avenue New York, NY 10123 (800) 445-6737 (212) 967-1100	Online information on hazardous substances. Includes: response information and medical effects data with unique search capabilities. Cost is $120 per hour (1983).
Hazardous Incident Data Base		U.S. EPA	Pacita Tibay Woodbridge Ave. Edison, NJ 08837 (201) 321-6632	Search and retrieval system designed to direct the user to documented first-spill incidents. No charge.
Hazardous Material Document and Package Verification System		Bureau of Dangerous Goods, Ltd.	Russell Bowen Front & Erickson Sts Essington, PA 19029 (215) 521-0900	Prepares shipper's declaration and identifies marking, labeling, and other packaging requirements.
**HazKNOW Know-IT-ALL		HazMat Control Systems, Inc.	Carolyn Husemoller 3409 Lakewood Blvd Suite 2C Long Beach, CA 90808 (213) 429-9055	Stores hazmat information; generates documents and reports; MSDS document management.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
HAZM	Hazardous Waste Manager	Z Micro Systems	P.O. Box 6634 San Pedro, CA 90734 (213) 831-4888	Records and prints waste disposal manifests on official forms and outputs reports by waste category, transporter, and disposal site. Also records MSDSs. Requires 256K memory.
**HAZMIN	The Hazardous Material Information Network	Logical Technology, Inc.	Vicky Demoss P.O. Box 3655 Peoria, IL 61614 (309) 677-3303	System manages hazardous materials: includes storage, inventory, compliance, and training. MSDS based emergency response data storage and retrieval. Assists with Tier I/II reports. Extensive search capabilities. Requires VAX. PC version scheduled for release in early 1988.
HAZOX LABEL PROGRAM		HAZOX Corporation	Kathleen Goddard P.O. Box 637 Chadds Ford, PA 19317 (215) 388-2030 (800) 558-6942	Prepares labels for containers. User may copy information from MSDSs or other text files. May be used in conjunction with TOXIC ALERT.
HAZOX EMPLOYEE TRAINING LEDGER		HAZOX Corporation	Kathleen Goddard P.O. Box 637 Chadds Ford, PA 19317 (215) 388-2030 (800) 558-6942	Employee recordkeeping system. Tracks worker training, job location, and job assignments, as well as employee courses and qualifications. May be used in conjunction with TOXIC ALERT.
HAZ/TRAK		HAWKWA Group, Inc.	Russ Hannula P.O. Box 321 Mundelein, IL 60060 (312) 949-8488	Computerizes MSDSs in OSHA-174 format. Also tracks material use and storage. Requires 448K memory and 2 disk drives.
HAZWASTE		HazMat Control Systems, Inc.	Carolyn Husemoller 3409 Lakewood Blvd Suite 2C Long Beach, CA 90808 (213) 429-9055	Hazardous waste data management and reporting system. Prepares hazardous waste manifests. Requires 10 Meg hard disk and 132 column printer.
HMIS	Hazardous Materials Information System	Defense Logistics Agency	Rhonda Herns Rockville, MD (301) 468-8858	DoD system that stores MSDS information, quantity and manufacturer, and National Stock numbers. On-line Database and microfiche. Cost: $30 - $40 per hour. For DoD facilities only.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
HMMS	Hazardous Materials Management System	Caelus	Larry Williams Caelus Inc. 1100 Paulsen Center W. 421 Riverside Spokane, WA 99201 (509) 624-8794 or Craig Van Velzer Wang Laboratories, Inc. N1000 Argonne Rd Suite 100 Spokane, WA 99212 (509) 922-2136	Integrates both Wang supplied and Caelus supplied software into a system for managing data and reporting requirements. Includes: aliases, trade and industry standard names and IDs; components of mixtures and compounds; plant sites, annual usage, and storage locations; hazardous properties and medical precautions; approved treatment or remedies; MSDSs; references; protective equipment and requirements; approved suppliers and/or manufacturers; agencies; reporting forms. Can run stand-alone on any Wang VS computer.
HWCS	Hazardous Waste Computer System	National Safety Council	P.O. Box 11933 Chicago, IL 60611 (800) 621-7619 (312) 527-4800	Tracks waste from collection to treatment. Database of 2,600 common chemicals which provides the EPA number for each chemical, DOT classification for hazardous waste transport, and permit information. Templates for all required forms, labels, and notices.
HYCARB		Software Systems Corporation	Donna Schmidt P.O. Box 26065 Austin, TX 78755-0065 (512) 451-8634	Computes the thermodynamic and transport properties of 78 common petroleum and chemical industry hydrocarbons.
IEMIS	Integrated Emergency Management Information	Federal Emergency Management Agency	Dr. Bob Jaske 500 C Street SW Room 627 Washington, DC 20472 (202) 646-2865	FEMA's database system for emergency response information for governments. For use in planning, training, and eventually real-time operational decision-making for all types of emergencies. Includes plume dispersion modeling. A wide variety of access options are available.
INFO (EHIS)	Emergency/Hazmat Information System	Emergency Automation Inc.	Gary Hill 1401 Wilson Blvd. Suite 720 Arlington, VA 22209 (703) 522-4550	An incident information management tool for hazardous materials emergency responders.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
INHEC1		Roy F. Weston, Inc.	Judith Hushon 955 L'Enfant Plaza, SW Washington, DC 20024 (202) 646-6800	INHEC1 is a front-end to the HEC-1 model developed by Hydrologic Engineering Center. Assists in modeling a watershed and creating the inputs to HEC-1 for hydrologic simulations. INHEC1 contains information about the requirements and limitations of HEC-1 and rainfall-runoff processes.
INVENTORY MANAGER		OSHA-SOFT Corporation	Peter Bragdon P.O. Box 668 Amherst, NH 03031 (603) 672-7230	Tracks hazardous materials in workplace and inventory for purchasing. Includes manufacturer listings.
IRIS	Integrated Risk Information System	DIALCOM, Inc.	Mike McLaughlin 600 Maryland Ave, SW Washington, DC 20024 (202) 488-0550	On-line database containing chemical files that present summaries of hazard and dose-response assessments for carcinogenic and/or noncarcinogenic effects and contain information on Office of Drinking Water Health Advisories, EPA regulations and guidelines (e.g., Clean Air Act regulations and Drinking Water Criteria) acute toxicity, and physical/chemical properties.
ISCST	Industrial Source Complex Short Term	Trinity Consultants, Inc.	Shirley Lake 12801 N. Central Expwy Suite 1200 Dallas, TX 75243 (214) 661-8100	Software for dispersion modeling; uses Gaussian plume model. The system calculates concentration or deposition values for inputed time periods. May be used in conjunction with "Breeze Air."
LABSYS	Laboratory Selection Expert System	Roy F. Weston, Inc.	Judith Hushon 955 L'Enfant Plaza SW 6th Floor Washington, DC 20024 (202) 646-6800	Assists in identifying appropriate analytical laboratories to evaluate environmental samples (e.g., soil, water, sludge, waste, air) for characterizing hazards at a site. The system factors type of sample, suspected pollutants, user's needs for on-site evaluation, and laboratories' locations, capabilities, and qualifications.
**MANGUARD		ManGuard Systems, Inc.	Craig Rylee 25972 Novi Road Suite 203 Novi, MI 48050 (313) 349-3830	Twelve Modules addressing environmental activities monitored by EPA, RCRA, OSHA, CERCLA, and DOT regulations. Includes SARA reporting module containing MSDS and production information, SARA reporting assistance, tracking capabilities.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
MEDLARS	Medical Literature Analysis Retrieval System	National Library of Medicine	Carolyn Tilley MEDLARS Management Section 8600 Rockville Pike Bethesda, MD 20894 (301) 496-6193	Collection of databases containing toxicological research information and literature citations.
MESOCHEM	Chemical Atmospheric and Hazard Assessment System	Impell Corporation	Becky Cropper 300 Tristate Internat'l Suite 400 Lincolnshire, IL 60069 (312) 940-2090	Software for atmospheric dispersion and chemical exposure assessment. A plume dispersion model.
MESOREM Jr.		Impell Corporation	Becky Cropper 300 Tristate Internat'l Suite 400 Lincolnshire, IL 60069 (312) 940-2090	Atmospheric release analysis system that includes back calculations of source release rates from field readings, terrain modeling, meteorological conditions modeling of multipoint dose and deposition exposures. Also provides ingestion exposure reports for atmospheric effluent pathways.
METROHEALTH		Lamb & Associates, Inc.	Tommy Roach P.O. Box 638 Lumberton, NC 28359 (919) 739-3181	Multi-user safety and health package. Records data on personnel and MSDS information. Assists with medical reports and OSHA forms.
METROSOFT		Metrosonics	Rob Brauch P.O. Box 23075 Rochester, NY 14692 (716) 334-7300	Industrial hygiene information record system. Utilizes hand held monitoring system to record exposure data on computer.
microCHRIS		The HazMat Software Co./ AIA Corporation	Rod Nenner 134 Middle Neck Rd Suite 210 Great Neck, NY 11021 (516) 829-5858 (800) 284-6737	Coast Guard CHRIS system. Includes chemical designations, observable characteristics, health hazards, responses to discharges, fire hazards, chemical reactivity, water pollution, shipping information, hazard assessment codes, hazard classifications, and physical and chemical properties. Requires 640K memory and 10Meg hard disk.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
microOHM/TADS		The HazMat Software Co./ AIA Corporation	Rod Nenner 134 Middle Neck Rd Suite 210 Great Neck, NY 11021 (516) 829-5858 (800) 284-6737	Microcomputer version of EPA's Oil and Hazardous Materials Technical Assistance Database. Contains emergency response, physical and chemical properties, and hazards of 1400 compounds. Requires 640K memory and 10Meg hard disk.
MIDAS	Meteorological Information and Dispersion Assessment System	Pickard, Lowe and Garrick, Inc.	Mark Abrams 1615 M Street, NW Suite 730 Washington, DC 20036 (202) 659-1122	Calculates impact of gaseous releases under routine or accident conditions.
MSDS ALERT		HAZOX Corporation	Kathleen Goddard P.O. Box 637 Chadds Ford, PA 19317 (800) 558-6942 (215) 388-2030	MSDS database.
MSDS Engine Software		GENIUM Publishing Corporation	1145 Catalyn St. Schenectady, NY 12303-1836 (518) 377-8854	Collection of MSDSs. Has capability to create additional MSDSs and search by name and CAS#.
MSDS-MAN	MSDS-MAN	Spumifer American, Inc.	Pete Dyke P.O. Box 3267 St. Augustine, FL 32085 (904) 824-0603	Data base manager for MSDSs.
MSDS MANAGER		OSHA-Soft Corporation	Peter Bragdon P.O. Box 668 Amherst, NH 03031 (603) 672-7230	Software containing MSDS information in OSHA format. Stores and prints MSDSs; assists with training of employees.
MSDS-PC		J.J. Keller & Associates, Inc.	145 W. Wisconsin Ave. P.O. Box 368 Neenah, WI 54957-0368 (800) 558-5011	User created chemical information database. Includes trade name, manufacturer, ingredients, CAS Number, and plant location. Requires 256K memory.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
MSDSPLUS		Robert E.J. Thomas & Associates, Inc.	Dr. Robert J. Thomas Woodsboro, Md. 21798 (301) 695-5603	MSDS recording and tracking system. Used to maintain employee and inventory records. System also has ability to track location and first and last date that a chemical was used or stored at a facility.
MSDSFILE		HazMat Control Systems, Inc.	Carolyn Husemoller 3409 Lakewood Blvd Suite 2C Long Beach, CA 90808 (213) 429-9055	Prepares, prints, and stores MSDSs. Creates reports. Requires 10Meg hard disk.
OASIS	Operator Assisted Sewer Information System	Public Works Software, Inc.	Jerry Cadwell Harbor Plaza P.O. Box 580 Port Hueneme, CA 93401 (805) 488-7324	Database for management of sanitary and storm wastewater collection systems. Maintains field operations data including safety history, engineering data, inspection records, and work orders. Requires 640K memory and hard disk.
OPERATOR 10		Macola Incorporated	Don Knaur P.O. Box 485 Marion, OH 43301-0485 (614) 382-5999 (800) 468-0834	Assists in the management of wastewater treatment plants using four programs: Process Evaluation for generating process equations; Inventory/Maintenance for work order generation and printouts, preventive maintenance, and inventory tracking; Industrial Pollutant Monitoring for record-keeping and report generation; and Process Monitoring/Reporting for process reports and other reports. Each requires 512K memory and 10Meg hard disk.
ORBIT		Pergamon	Orbit Action Desk Infoline, Inc. 8000 Westpark Dr. McLean, VA 22102 (703) 442-0900	Database of information from all areas of science, technology, and medicine, as well as business, current affairs, and humanities. $30 - $160 per computer connect hour.
OSHA-SOFT CFR		OSHA-SOFT Corporation	Peter Bragdon P.O. Box 668 Amherst, NH 03031 (603) 672-7230	Text of 29 CFR(OSHA) and 40 CFR(EPA) regulations on disk. Requires 512K memory and hard disk.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
PART B OUTLINE		Weith Computer Products & Services	Roger Weiter 802 Brittany Suite 101 Bowling Green, OH 43402-1511 (419) 352-8659	Assists user with writing Part B application. Cites regulations by number.
PART B PERMITTING			Gerald Rich 17719 Brim Road Bowling Green, OH 43402 (419) 352-7085 (after 5:30 p.m.)	Permit application assistance for hazardous waste facilities on diskettes.
PCB HAZARD		U.S. Construction Engineering Research Laboratory	Attn: Bernie Donahue P.O. Box 4005 Champaign, IL 61820-1305 (217) 373-6733	Provides guidance on the repair and disposal of transformers containing 50 ppm or more of PCB's.
POSSEE	Plant Organizational Software System for Emissions from Equipment	Chemical Manufacturers Association (CMA)	Deborah Stine 2501 M Street, NW Washington, DC 20037 (202) 887-1176	Supports the organization, entry, and analysis of plant data and field measurements of fugitive emissions. A menu-driven system.
PRETRE		Cochrane Associates, Inc.	Jay J. Fink 236 Huntington Ave. Boston, MA 02115 (617) 247-0444	Information management system for wastewater treatment facilities. Assists with monitoring compliance, tracking construction projects, producing reports, and generating letters.
PRETREATMENT		Spica Systems	4921 Seminary Road Suite 1502 Alexandria, VA 22311 (703) 671-5874	Series of programs for implementing EPA's categorical pretreatment standards. Contains data forms for identifying and collecting information needed for Applicability, production, special conditions, and flow.
PSYCHRO		Software Systems Corporation	P.O. Box 202017 Austin, TX 78720 (512) 451-8634	Computes properties of air-water vapor mixtures for HVAC, combustion, aerodynamic, and meteorological applications. Any two independent properties may be inputed by user.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
PTPLU-2		Trinity Consultants, Inc.	Shirley Lake 12801 N. Central Expwy Suite 1200 Dallas, TX 75080 (214) 661-8100	Dispersion modeling software based upon EPA's UNAMAP. System is upgraded version of PTMAX; it is a screening model that can be applied to single sources.
Quantum Software		Quantum Software Solutions, Inc.	Laurie Breck P.O. Box 640 Ann Arbor, MI 48107-0640 (313) 761-2175	Series of compliance assistance modules including: Worker Right to Know, Asbestos Compliance Tracking, Community Right to Know, Firefighter Right to Know, assistance with report generation and Underground Tank Inventory.
Rainbo MSDS-PRO, SARA, and SAFETY		Pro Am Safety	Zoltan Toth P.O. Box 750 Gibsonia, PA 15044 (412) 443-0410	Database management system for MSDS information. Modules include SARA, for assistance in creating reports for Title III, and SAFETY for accident and incident record-keeping.
Regulation Scanning System		Data Regs. Inc.	Robert McCardy 243 West Main St. Kutztown, PA 19530 (215) 683-5098	Hazardous materials transportation regulations on disk. System displays text of regulations by chemical name or number. Also searches by keyword. Updates to regulations are provided on a monthly basis.
RESREC	Disposal Alternatives Planning and Resource Recovery Systems	Roy F. Weston, Inc.	Judith Hushon 955 L'Enfant Plaza, SW Washington, DC 20024 (202) 646-6800	Assists in planning disposal systems for community waste. The model accepts appropriate inputs describing the community's situation and constraints, performs cost analyses for various scenarios to account for uncertainties in the input, and provides the system with heuristic indicators which describe the results. Interprets the results and provides advice on planning scenarios to be used as guidelines for making a study of appropriate alternative scenarios.
RODA	Records and Operations Management	Metcalf & Eddy, Inc.	Eric Burman 529 Main Street Charlestown, MA 02129 (617) 241-8850	Data management system for wastewater treatment operators.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
RTECS	Registry of Toxic Effects of Chemicals	National Library of Medicine, Specialized Information Services	Genne Gosloth 8600 Rockville Pike Building 38A Bethesda, MD 20894 (301) 496-1131	On-line database containing records for more than 50,000 potentially toxic chemicals. Source for basic acute and chronic toxicity information. Prime-time cost is about $5 per hour.
SAFECHEM II	Management System	SAFEWARE, INC.	4677 Old Ironsides Dr. Santa Clara, CA 95054 (408) 727-2436	Hazardous chemical management system implemented on a proprietary database package.
SAFER	System Approach for Emergency Response	SAFER Emergency Systems, Inc.	Darlene Davis Dave Dillehay 756 Lakefield Road Westlake Village, CA 91361 (818) 707-2777	Facility spill response, tracking of releases, materials inventory, and training.
SAM	Laboratory Information Management System	Radian Corporation	Mike McAnally P.O. Box 9948 8501 Mo-Pac Blvd Austin, TX 78766 (512) 454-4797	Laboratory tracking, scheduling, reporting, and statistical analysis.
**SARA!		OSHA-SOFT Corporation	Peter Bragdon P.O. Box 668 Amherst, NH 03031-0668 (603) 672-7230 (800) 446-3427	Generates inventory and Tier I and II reports required under SARA Title III. Monitors chemical inventories and locates hazardous chemicals in the workplace. Emergency Response version maintains inventories of all hazards and chemicals in the area for emergency response personnel.
SARA TITLE III 313 ADVISOR		E.I. Du Pont de Nemours & Company Inc. Environmental Management Services	Barley Mill Plaza (P27-2125) Wilmington, DE 19898 (800) 992-0560	Assists with completion of form R. Provides list of synonyms and copy of regulations in software. Maintains audit trail.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
SARATRAX		IIT Research Institute, Maryland Technology Center	Dr. Quon Y. Kwan Sr. Env. Engineer 4600 Forbes Blvd Lanham, MD 20706 (800) 458-1564 (301) 459-3711	Assists with determination of facility reporting responsibilities under Sections 301-303, 304, and 311-312. Assists with notification requirements and definitions of responsibilities. Maintains lists of chemicals, quantities, locations, and properties to assist with the preparation of Tier I and Tier II reports. Generates Form R.
SENTRY		Besserman Corporation	Wes Turner 1702 East Highland Suite 120 Phoenix, AZ 85016 (602) 264-8000	Records industrial hygiene and health information. Creates reports, tracks MSDS information; MSDS information by synonym, name, mixture name, and CAS #.
SEWER MAINTENANCE SYSTEM		O'Brien & Gere Engineers, Inc.	Trish Anrig 1304 Buckley Road Syracuse, NY 13221 (315) 451-4700 (315) 451-2060	Management assistance for sewer line maintenance and recordkeeping. Database system that allows monitoring of specific operations and activities. Requires 640K.
SLUDGE MANAGER		Resource Conservation Services, Inc.	42 Main Street Yarmouth, ME 04096 (207) 846-3737	Recordkeeping and database management for treatment plants and facilities that produce useful sludge. Requires 312K memory, 5Meg hard disk, and dBase II.
SLUDGE REGULATOR		Resource Conservation Services, Inc.	42 Main Street Yarmouth, ME 04096 (207) 846-3737	Designed for state regulatory agencies. Tracks land spreading operations within the state. Produces reports, mailing lists and labels, permit expiration dates, and generator/material descriptions. Requires 312K memory and 5Meg hard disk.
SOPHIE	Selection of Procedures for Hazard Identification and Evaluation	Battelle	Columbus Division 505 King Avenue Columbus, OH 43201-2693 (614) 424-6424	Assists users with selection of methods to employ for identifying and evaluating hazards in chemical and petrochemical facilities.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
SPCC	Spill Prevention Control and Countermeasure Data Base System	U.S. EPA	Ms. Jean H. Wright Office of Emergency and Remedial Response WHS48B 401 M Street, SW Washington, DC 20460 (202) 245-3057	Database containing compliance/ noncompliance records of oil facility discharges. Spill data include amount of material spilled, rate, response, and control measures.
SPILCOM		Globe International, Inc.	P.O. Box 1062 Buffalo, NY 14206 (716) 824-8484	Oil spill contingency planning tool intended to improve notification of federal and state agencies and improve response and reporting capabilities.
SUNHEALTH		Stewart-Todd Associates, Inc.	1016 W. 9th Ave. King of Prussia, PA 19406 (215) 962-0166	Manages occupational health records, MSDSs, chemical information, and employee records. Aids with emergency release reports.
SWIS	Solid Waste Information System	Mathtech The Technical Research and Consulting Division of Mathematica, Inc.	Barrett J. Riordan 5111 Leesburg Pike Suite 702 Falls Church, VA 22041 (703) 284-7900	Inventory and record system designed for the State of California Solid Waste Management Board.
Systems/Services Engineering		Systems/Services Engineering	P.O. Box 32008 Dayton, OH 45432 (513) 429-2709	Wastewater treatment assistance. Software includes: Data Handling System, Lab Bench File, Lab Stock Inventory, Scheduled Work System, Unscheduled Work System, Facility Stock Inventory, Tool Record System, Personnel Record System, Budget Control System, Equipment Record System, and Industrial Pretreatment File.
TECJET	Advanced Jet Dispersion Model	Technica International	David A. Jones 1400 N. Harbor Blvd Suite 800 Fullerton, CA 92635 (714) 447-9400	Jet dispersion model for PC.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
TEM	The Environmental Manager	Environmental Information System	Sherida Mock 1101 Capital of Texas Highway South Building 8, Suite 212 Austin, TX 78746 (512) 328-5211	Tracks regulatory requirements; produces reports. Modules available on Environmental Audits, Permit Tracking, Groundwater Monitoring, Wastewater Monitoring, Air Emissions, Task Management, Waste Manifesting, Chemical Inventory, MSDS Management, Incident Reporting, and Operational Journals.
THERMOSIM Module 1: EQUIL		Gulf Publishing Company, Book Division	Melissa Beck P.O. Box 2608 Houston, TX 77252 (713) 520-4444	Database of thermodynamic properties of 200 hydrocarbons, 9 non-hydrocarbon gases, carbon, and sulfur. Requires 512K memory and 2 disk drives.
TOXIC, PUFF, SPILLS, INPUFF, AND INPUFF 2.0		Bowman Environmental Engineering	P.O. Box 29072 Dallas, TX 75229 (214) 241-1895	In ascending order of data complexity, these systems address toxic gas releases using models designed for each type of release, based on emission rate, facility characteristics and weather data.
**TOXIC ALERT		HAZOX Corporation	Daniel Fullerton P.O. Box 637 Chadds Ford, PA 19317 (215) 358-4990 (800) 558-6942	Incident management tool with some emergency planning capability. Modules for MSDS, incident documentation, inventory, and Tier I/II report generation.
TOXLINE (non-royalty based)	Toxicology Information Online	National Library of Medicine	8600 Rockville Pike Bethesda, MD 20894 (301) 496-1131	On-line bibliographic database covering the pharmacological, physiological, and toxicological effects of drugs and chemicals. Information is taken from eleven secondary sources.
TRACE II	Toxic Release Analysis of Chemical Emissions	Safer Emergency Systems, Inc.	Darlene Davis Dave Dillehay 756 Lakefield Road Westlake Village, CA 91361 (818) 707-2777	Models toxic gas and flammable vapor cloud dispersion. Intended for risk assessment and planning purposes, rather than real-time emergencies.
TRAINING MANAGER		OSHA-SOFT Corporation	P.O. Box 894 Concord, NH 03301 (603) 228-3610	Records employee training information, and allows classification and tracking of products and employees by category.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
TREDAT		Cochrane Associates, Inc.	Jay J. Fink 236 Huntington Ave. Boston, MA 02115 (617) 247-0448	Data handling and process control software program for wastewater treatment plants. Requires Apple II.
TREMAIN		Cochrane Associates, Inc.	Jay J. Fink 236 Huntington Ave. Boston, MA 02115 (617) 247-0448	Equipment and inventory management software system for wastewater treatment plants. Requires Apple II.
TREPORT		Cochrane Associates, Inc.	Jay J. Fink 236 Huntington Ave. Boston, MA 02115 (617) 247-0444	Data handling and reporting system for wastewater treatment facilities. Assists with daily calculation of data and generation of reports.
TRI Database	Toxic Chemical Release Inventory	National Library of Medicine, Specialized Information Services	8600 Rockville Pike Bethesda, MD 20894 (301) 496-6531	Contains information on industrial location, storage, and release to air, water, and land of SARA Section 313 chemicals. Data is divided into the following categories: facility identification, substance identification, environmental release of chemical, waste treatment, and off-site waste transfer.
TSAR	Technology Selector of Alternative Remedies	Roy F. Weston, Inc.	Judith Hushon 955 L'Enfant Plaza, SW 6th Floor Washington, DC 20024 (202) 646-6800	Assists in selecting appropriate remedial technologies at waste sites. Using available quantitative and/or qualitative information the system selects potential general response actions and eliminates some specific technologies from further consideration; identifies additional data required to decide among the remaining engineering alternatives. The system can be delivered on Compaq-386 or requires PC HOST for the PC/AT.
TSDSYS	Treatment, Storage and Disposal Facilities Expert System	Roy F. Weston, Inc.	Judith Hushon 955 L'Enfant Plaza SW 6th Floor Washington, DC 20024 (202) 646-6800	Database containing information on over 400 contractors and the treatment, storage and disposal methods they offer. Treatment is broken into on-site and off-site and then by the following categories: biological, chemical, physical, and thermal treatment. Menu driven. Available through cross talk for EPA Regional offices.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
UMT	The UNIFORM MANIFEST TRACKER	HAZOX Corporation	Daniel Fullerton P.O. Box 637 Chadds Ford, PA 19317 (800) 558-6942	Maintains information about hazardous waste generators, transporters, disposal facilities, materials shipped, and how they have been shipped. Assists with Uniform Hazardous Waste Manifest document required by RCRA. Generates records and letters. Requires 200K memory plus 1K memory for each record and a printer that can penetrate a six-part form.
VAX DEChealth		Digital	146 Main Street Maynard, MA 01754 (617) 897-5111	Employee and environmental health data records system. Maintains medical exposure data of employees.
VENTDATA		Hatch Associates Ltd.	21 St. Clair Ave. East Toronto, Ontario, Canada M4T 1L9 (416) 962-6350	Recordkeeping and analytical program for use in monitoring and maintenance of exhaust ventilation systems. Requires Apple II.
VULZONE.WK1	Vulnerability Zone Worksheet	New York State Emergency Management Office	Ed Lipps Public Security Bldg State Campus Albany, NY 12226-5000 (518) 457-9959	Calculates mileage of vulnerability zone for Extremely Hazardous Substances, giving a radial value to use on a map. Chemicals may be searched by CAS number; with each search, the system verifies the chemical name.
WASTETRAX		Engineering-Science	57 Executive Park S, NE Suite 590 Atlanta, GA 30329 (404) 325-0770	For water and wastewater treatment plants. Information management for groundwater monitoring, hazardous waste management, and air quality monitoring. Statistical capabilities.
WASTEWATER DATA MANAGEMENT SYSTEM		WDMS Computer Services	P.O. Box 27561 Tulsa, OK 74149 (918) 241-5755	Database that allows storage, retrieval, analysis, and reporting for industrial pretreatment programs. Requires 512K memory.
WATER COST		CWC-HDR Inc.	300 Admiral Way Suite 204 Edmonds, WA 98020 (206) 774-1947	Water and wastewater cost estimation software program. Contains extensive cost data.

Table 14–3 (continued)

ACRONYM/ABBREVIATION	SYSTEM NAME	VENDOR	ADDRESS/PHONE	PURPOSE/DESCRIPTION/REQUIREMENTS
WATER MASTER		Waid and Associates	8000 Centre Park Dr. Suite 270 Austin, TX 78754 (512) 835-6112	Animated training aid and simulation program for water and wastewater treatment plant operators.
WDC MANIFESTING SYSTEM		Waste Documentation and Control, Inc.	P.O. Box 7363 Beaumont, TX 77706 (409) 839-4495	Produces internal control documentation and governmentally required reports. Manifest printing from files containing information on approved transporters and disposers, waste materials, and historical data.
WHAZAN	World Bank Hazards Analysis	Technica International	David A. Jones 1440 N. Harbor Blvd. Suite 800 Fullerton, CA 92635 (714) 447-9400	Modeling of chemical dispersion and spill behavior. Database for 30 hazardous substances. 13 mathematical models that predict effects of release of flammable or toxic chemicals. Hard disk required.

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