3. PGPLUME: It assumes a Gaussian concentration profile in which the cross-wind and vertical dispersion coefficients are determined by empirical expressions. All unknown parameters in this profile are determined by imposing appropriate matching criteria at the transition point.

### k. Vertical Dispersion

See description above.

*l. Chemical Transformation* Not treated.

# m. Physical Removal

Not treated.

## n. Evaluation Studies

1. PLUME has been validated against field data for releases of liquified propane, and wind tunnel data for buoyant and vertically-released dense plumes. HFPLUME and PLUME have been validated against field data for releases of HF (Goldfish experiments) and propane releases. In addition, the plume rise algorithms have been tested against Hoot, Meroney, and Peterka, Ooms and Petersen databases. HEGADAS has been validated against steady and transient releases of liquid propane and LNG over water (Maplin Sands field data), steady and finiteduration pressurized releases of HF (Goldfish experiments; linked with HFPLUME). instantaneous release of Freon (Thorney Island field data; linked with the box model HEGABOX) and wind tunnel data for steady, isothermal dispersion.

2. Validation studies are contained in the following references:

McFarlane, K., Prothero, A., Puttock, J.S., Roberts, P.T. and Witlox, H.W.M., 1990. Development and validation of atmospheric dispersion models for ideal gases and hydrogen fluoride, Part I: Technical Reference Manual. Report TNER.90.015. Thornton Research Centre, Shell Research, Chester, England. [EGG 1067–1151] (NTIS No. DE 93–000953)

Witlox, H.W.M., McFarlane, K., Rees, F.J., and Puttock, J.S., 1990.
Development and validation of atmospheric dispersion models for ideal gases and hydrogen fluoride, Part II: HGSYSTEM Program User's Manual. Report TNER.90.016.
Thornton Research Centre, Shell Research, Chester, England. [EGG 1067–1152] (NTIS No. DE 93–000954)

## B.33 SLAB

#### Reference

Ermak, D.L., 1990. User's Manual for SLAB: An Atmospheric Dispersion

Model for Denser-than-Air Releases (UCRL-MA–105607), Lawrence Livermore National Laboratory.

#### Availability

1. The computer code is available on the Support Center for Regulatory Air Models Bulletin Board System (Upload/ Download Area; see page B–1), and can also be obtained from: Energy Science and Technology Center, P.O. Box 1020, Oak Ridge, TN 37830, (615) 576–2606.

2. The User's Manual (NTIS No. DE 91–008443) can be obtained from: Computer Products, National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161, (703) 487–4650.

## Abstract

The SLAB model is a computer model, PC-based, that simulates the atmospheric dispersion of denser-thanair releases. The types of releases treated by the model include a ground-level evaporating pool, an elevated horizontal jet, a stack or elevated vertical jet and an instantaneous volume source. All sources except the evaporating pool may be characterized as aerosols. Only one type of release can be processed in any individual simulation. Also, the model simulates only one set of meteorological conditions; therefore direct application of the model over time periods longer than one or two hours is not recommended.

#### a. Recommendations for Use

The SLAB model should be used as a refined model to estimate spatial and temporal distribution of short-term ambient concentration (e.g., 1-hour or less averaging times) and the expected area of exposure to concentrations above specified threshold values for toxic chemical releases where the release is suspected to be denser than the ambient air.

#### b. Input Requirements

1. The SLAB model is executed in the batch mode. Data are input directly from an external input file. There are 29 input parameters required to run each simulation. These parameters are divided into 5 categories by the user's guide: source type, source properties, spill properties, field properties, and meteorological parameters. The model is not designed to accept real-time meteorological data or convert units of input values. Chemical property data are not available within the model and must be input by the user. Some chemical and physical property data are available in the user's guide.

2. Source type is chosen as one of the following: evaporating pool release,

horizontal jet release, vertical jet or stack release, or instantaneous or short duration evaporating pool release.

3. Source property data requirements are physical and chemical properties (molecular weight, vapor heat capacity at constant pressure; boiling point; latent heat of vaporization; liquid heat capacity; liquid density; saturation pressure constants), and initial liquid mass fraction in the release.

4. Spill properties include: source temperature, emission rate, source dimensions, instantaneous source mass, release duration, and elevation above ground level.

5. Required field properties are: desired concentration averaging time, maximum downwind distance (to stop the calculation), and four separate heights at which the concentration calculations are to be made.

6. Meteorological parameter requirements are: ambient measurement height, ambient wind speed at designated ambient measurement height, ambient temperature, surface roughness, relative humidity, atmospheric stability class, and inverse Monin-Obukhov length (optional, only used as an input parameter when stability class is unknown).

## c. Output

1. No graphical output is generated by the current version of this program. The output print file is automatically saved and must be sent to the appropriate printer by the user after program execution. Printed output includes in tabular form:

2. Listing of model input data; 3. Instantaneous spatially-averaged cloud parameters—time, downwind distance, magnitude of peak concentration, cloud dimensions (including length for puff-type simulations), volume (or mole) and mass fractions, downwind velocity, vapor mass fraction, density, temperature, cloud velocity, vapor fraction, water content, gravity flow velocities, and entrainment velocities;

4. Time-averaged cloud parameters parameters which may be used externally to calculate time-averaged concentrations at any location within the simulation domain (tabulated as functions of downwind distance);

5. Time-averaged concentration values at plume centerline and at five off-centerline distances (off-centerline distances are multiples of the effective cloud half-width, which varies as a function of downwind distance) at four user-specified heights and at the height of the plume centerline.