

**FLUID MODELING OF EXHAUST GAS DISPERSION
FROM THE BOSTON EDISON 500 ATLANTIC BUILDING SITE,
VENTILATION BUILDING NO. 3,
CENTRAL ARTERY/THIRD HARBOR
TUNNEL PROJECT**

Prepared by

David E. Neff

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Boston Edison Company
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**FLUID MECHANICS AND WIND ENGINEERING PROGRAM
DEPARTMENT OF CIVIL ENGINEERING**

**Colorado
State**
University

EXECUTIVE SUMMARY

Title: Fluid Modeling of Exhaust Gas Dispersion
from the Boston Edison 500 Atlantic Avenue Building Site,
Ventilation Building No. 3,
Central Artery/Third Harbor Tunnel Project

Contractors: Civil Engineering Department
Colorado State University
Fort Collins, Colorado 80523

**Principal
Investigators:** D.E. Neff and R.N. Meroney

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Objective: The Commonwealth of Massachusetts, in cooperation with the Department of Transportation, Federal Highway Administration, proposes to depress and widen the Central Artery through central Boston. The underground sections of the Central Artery and the Third Harbor Tunnel will be ventilated. Several ventilation buildings are planned for the project. The Boston Edison 500 Atlantic Avenue Building site is the location for Ventilation Building No. 3 and is located in a congested, heavily populated area within the confines of downtown Boston (see Figure 6 and Figure 7). The complicated flow patterns associated with this site clearly indicate the need for physical modeling of vent building air quality impacts. The Fluid Dynamics and Diffusion Laboratory at Colorado State University has conducted the wind tunnel physical modeling study requested by Rizzo Associates, Inc. and Tech Environmental, Inc., consultants to Boston Edison Company. The objectives of this model study were a) to provide concentration data and visual information on the environmental impact of the proposed vent building - stack height specifications, and b) summarize this information and data into a convenient format.

Results: The environmental effects of exhaust from the ventilator stacks will depend upon tunnel traffic volume, ventilator flow rates, state and federal ambient air-quality regulations, building and plume aerodynamics, and local meteorology. This study evaluates through fluid modeling the influence of building and plume aerodynamics on plume dilution. Data is reported in terms of normalized concentrations (K coefficients) to permit concentration estimates for alternative traffic, exhaust and wind speed conditions. Concentrations can be estimated for alternative configurations, but acceptability must depend upon current air-quality standards.

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INTRODUCTION

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The objectives of this model study are:

- 1) To provide concentration data and visual information on the environmental impact of the proposed 17-story office building and ventilation stack height specification for 24 wind directions and 4 wind speeds, and
- 2) Summarize this information and data into a convenient format for further environmental assessment.

Presented in this report are the technical aspects, experimental methods and results for the wind tunnel study designed to meet the above requirements.

1 INTRODUCTION

The Commonwealth of Massachusetts, in cooperation with the Department of Transportation, Federal Highway Administration, proposes to depress and widen the Central Artery through central Boston. The underground sections of the Central Artery and the Third Harbor Tunnel will be ventilated. Seven ventilation buildings are planned for the project. Two of the building sites, Parcel 7 site (Ventilation Building No. 4) and the Boston Edison site (Ventilation Building No. 3), are located in congested, heavily populated areas within the confines of downtown Boston. The complicated flow patterns associated with these sites clearly indicate the need for physical modeling of vent building air quality impacts.

In 1988 Colorado State University (CSU), under the direction of Bechtel/ Parsons Brinkerhoff (B/PB), performed a plume dispersion physical modeling study of both of the Parcel 7 and the Boston Edison site vent buildings. Since the time of this study the design of the Boston Edison site vent building has changed substantially. The new Boston Edison vent building design calls for a 17-story office complex (228 feet) to wrap around the original ventilation building and stacks, with the vent stacks extending above the building (287 feet above grade). Rizzo Associates, Inc. contracted with the Fluid Dynamics and Diffusion Laboratory at CSU to perform a plume dispersion physical modeling study at the Boston Edison site using the current 17-story building design specifications.

The objectives of this model study are:

- 1) *To provide concentration data and visual information on the environmental impact of the proposed 17-story office building and ventilation stack height specification for 36 wind directions and 4 wind speeds, and*
- 2) *Summarize this information and data into a convenient format for further environmental assessment.*

Presented in this report are the technical aspects, experimental methods and results for the wind tunnel study designed to meet the above requirements.

2 TECHNICAL CONSIDERATIONS

An accurate simulation of the boundary-layer winds and stack gas flow is an essential prerequisite to any wind-tunnel study of diffusion from an industrial facility. The similarity requirements can be obtained from dimensional arguments derived from the equations governing fluid motion. A detailed discussion on these requirements is given in the EPA fluid modeling guideline (Snyder, 1981).

Airflow and Dispersion Simulation Criteria

- All significant structures and terrain within a 700 m (2300 ft) radius of the vent stacks (see Figure 1) were modeled at a 1:384 scale reduction. This ensures that all major structures of interest whose critical dimension (lesser of height or width) exceeds 1/20th of the distance from the source are included in the model.
- The mean velocity profile through the entire depth of the boundary layer was represented by a power law $U/U_\infty = (z/z_\infty)^n$ where the power law exponent, n , is dependent on the value of surface roughness, z_o , through the following equation:

$$n = 0.24 + 0.096 \log_{10} z_o + 0.016 (\log_{10} z_o)^2 \quad (1)$$

- Reynolds number independence was ensured: the building Reynolds number ($Re_b = U_b H_b / \nu_a$; the product of the wind speed, U_b , at the building height, H_b , times the building height divided by the viscosity of air, ν_a) was greater than 11,000 and Reynolds number independence tests were conducted in previous study (Neff et.al., 1988a).
- A neutral atmospheric boundary layer was established (Pasquill-Gifford D stability) by setting bulk Richardson number (Ri_b) equal to zero in model and full scale. Verification of the testing facilities reproduction of neutral atmospheric boundary layer dispersion characteristics is documented in Appendix A (Neff, 1995).

Plume Trajectory Simulation Criteria

- Match velocity ratio,

$$R = \frac{W_e}{U_h} \quad (2)$$

- Match density ratio,

$$\lambda = \frac{\rho_s}{\rho_a} \quad (3)$$

- Ensure that the stack Reynolds number exceeds 670 for buoyant plumes and 2000 for neutrally buoyant plumes (Arya and Lape, 1990). If these criteria cannot be met, a trip (i.e.,

turbulence enhancing device) is installed in the stack to ensure an accurate plume rise simulation.

- The exhaust air released from the tunnel ventilators will exit at ambient temperatures and densities, i.e., specific gravity = 1.0; thus the plume momentum flux and volume flux are essentially equivalent ratios, and the plume Froude number is not a relevant parameter.

Using the above criteria and site source conditions, the model test conditions were computed for the Boston Edison vent building stack. Table 1 shows both model and full-scale testing parameters for wind speeds of 2, 5, 8, and 12 m/s (at a 10 m height at the Logan Airport). These wind speeds were determined to represent a good cross-section of wind speeds that occur frequently in the Boston area (see Figure 2 and Table 2). To make these computations, the following additional assumptions were made: 1) the surface roughness length for the airport anemometer is 0.05 m; 2) the boundary layer thickness is 600 m; 3) the anemometer height at the airport is 10 m; 4) the approach surface roughness length at the site was 1.0 m.

Wind speeds in the tunnel were set at an equivalent reference height of 600 m above stack grade. The speed at this reference height is determined by scaling the 10 m airport wind speed up to the freestream height, 600 m (Snyder, 1981) above ground level. At this height it is assumed that wind speeds at the site and at the anemometer location are the same (i.e., local topographic effects are not important).

The Boston Edison site is located between downtown Boston and Boston Harbor. The wind approaches this site over surfaces varying from smooth harbor/sea conditions to rough city/suburb conditions. Replicas (at reduced scale of 1:384) of all buildings within 700 meters (2,300 feet) of the Boston Edison vent building were constructed and placed on the downwind turntable in the wind tunnel. The modeled wind characteristics approaching this replicated Boston Edison site were as follows:

- for wind directions from the 20 to 100 degree sector, a harbor wind approach profile represented by a roughness length of 0.08 m and a power law index of 0.14 was used;
- for wind directions from the 110 to 210 degree sector, a city/suburb wind approach profile represented by a roughness length of 0.8 m and a power law index of 0.26 was used; and
- for wind directions from the 220 to 10 degree sector, a city wind approach profile represented by a roughness length of 1.8 m and a power law index of 0.32 was used.

The modeling parameter decision process yielded the following conclusions:

- 1) *Maximum field dispersion distance of interest (700 m) and size of the FDDL Environmental Wind Tunnel facility resulted in the selection of a 1:384 model length scale ratio.*
- 2) *Neutral stratification in the laboratory was used to reproduce the dispersion dynamics of the windy Boston area.*
- 3) *Wind-tunnel floor roughness was adjusted to properly reproduce scaled wind shear and turbulent structure for three upwind fetch conditions.*
- 4) *Model wind speed and stack exit velocity were set at large enough magnitudes to assure Reynolds number independence of approach flow and stack flow.*
- 5) *Model wind to plume velocity ratios were set equal to the field values; thus assuring similarity of plume trajectories.*

3 EXPERIMENTAL METHODS

A physical modeling study of the Boston Edison site vent building was performed to assist in predicting environmental impacts for the proposed stack-building configuration. This involved:

- 1) *The 1:384 reduced scale construction of the Boston Edison stack-building configuration along with all buildings within 700 meters (2300 feet) of the Boston Edison site;*
- 2) *The placement of this model into a wind tunnel facility with the appropriate wind direction dependent upwind roughness for this site;*
- 3) *Acquisition of velocity and turbulence profiles approaching the modeled Boston Edison site for each wind direction of interest;*
- 4) *Video taping of the model plume for 144 different combinations of wind direction and wind speed;*
- 5) *Concentration measurements at 47 different sampling locations for 144 different combinations of wind direction and wind speed; and*
- 6) *The presentation of a final report that lists all data and discusses all experimental techniques used to acquire this data.*

The following sub-sections discuss experimental methods to perform these topics in greater detail.

3.1 Boundary Layer Wind Tunnel

All model tests were performed in the Environmental Wind Tunnel (EWT) test facility at Colorado State University (CSU). This wind tunnel, specifically designed to study atmospheric flow phenomena, incorporates special features such as an adjustable ceiling, a rotating turntable and a long test section to permit adequate reproduction of micro meteorological behavior. Boundary-layer thickness up to 1.2 m can be developed "naturally" over the downstream 6 m of the EWT test section by using vortex generators at the test section entrance and surface roughness on the floor. The flexible test section on the EWT roof is adjustable in height to permit the longitudinal pressure gradient to be set at zero. The tunnel has a 3.66 m by 2.13 m cross section, a 17.4 m length, a wind speed range of 0.1 to 15 m/s. A descriptive drawing of this facility is provided in Appendix A (Neff, 1995).

Appropriate boundary layer development techniques were utilized to accurately represent wind conditions approaching the vent building from all wind directions. The project model was placed on a 3.66 meter diameter turntable located ~13.6 meters into the test section. This placement provides sufficient upwind fetch, and a sufficient downwind measurement zone. The zones upwind

and downwind of the turntable area were modeled with a generic roughness design to create the desired model boundary layer.

3.2 Model Construction

Based on atmospheric data over the Boston area, the size of the concentration grid, and modeling constraints discussed in Section 2, a model scale of 1:384 was selected. Since the Environmental Wind Tunnel has a 3.66 meter (12 foot) turntable this allowed for the reduced scale construction of all significant buildings within a 700 meter (2300 foot) radius of the Boston Edison vent building site. The location of the Boston Edison site along with a circle demarking the portion of downtown Boston which was replicated is shown in Figure 1. Figure 3 shows the street layout of the model turntable area as well as the locations of several prominent buildings near the vent site.

The buildings surrounding the vent structures were fabricated from Styrofoam and were placed in their appropriate locations on a 12 foot diameter 1/4 inch masonite sheet. All roads and waterways were painted on this masonite sheet. The topography changes were modeled by layering the appropriate number of 1/4 inch sheets to match the land contours within the modeled area. Figure 4 is a picture of the turntable model as seen from outside the wind tunnel along with test equipment used in the project. Figure 5 and Figure 6 show closeup views of buildings on the model turntable area.

The Boston Edison unit was located near the center of the 3.66 meter (12 foot) turntable model. The stack on ventilator building was 287 feet above ground level. The vent buildings and stacks were constructed of plastic. The building contained a manifold through which metered simulate gases were directed into the stacks. The ventilator building used 14 vent fans to blow exhaust gases through 10 by 12 foot (inside measure) openings. Figure 7 shows the model vent building and stacks.

The terrain upwind of the turntable area was modeled with; 1) smooth astroturf roughness for harbor wind approaches (20° through 100°); 2) a generic one inch roughness for city/suburb approaches (110° through 210°), and; 3) a generic two inch roughness for city approaches (220° through 10°).

3.3 Velocity Measurements

The techniques employed in the acquisition of velocity profiles are discussed in detail in Appendix A (Neff, 1995), including basic equations and errors associated with each technique. Single-hot-film (TSI 1220 Sensor), cross-film (TSI 1241) probes and pitot-static probes are used to measure velocity statistics. TSI 1125 Velocity Calibrator System and Pitot-static Probes are used for velocity calibration.

The approach mean velocity and turbulent statistics profiles are obtained from velocity measurement techniques. The approach mean velocity profiles for each approach condition are regressed to find the best power law and log-linear fit. The power law regression will find an exponent, p , such that

$$U/U_r = (z/z_r)^p.$$

The log-linear regression

$$U/u_* = 2.5 \ln\{(z-d)/z_0\}$$

will find a best fit roughness length z_0 , friction velocity u_* , and displacement height, d .

Velocity measurements obtained in this study are summarized and presented through plots of vertical profiles of mean velocity and longitudinal turbulence. The velocity coordinate is normalized by the model velocity at a reference height. Since a neutral boundary layer's velocity is invariant with respect to wind speed, the normalized profiles can be converted to any field velocity at a specific height by the appropriate multiplicative constant. The vertical profiles of mean velocity are plotted on linear-linear and log-linear paper to display the best fit regressions. The vertical profiles of turbulent velocity are plotted along with atmospheric correlations of expected profile behavior.

3.4 Plume Visualization Techniques

Techniques employed to obtain a visible plume are discussed in Appendix A (Neff, 1995). A Smoke Generator System and a Video Camera System are used for plume visualization. Given a field to model wind speed ratio of 4.0 ($= [5.0 \text{ m/s}]/[1.25 \text{ m/s}]$) and a model to field length scale ratio of 1:384, the time scale ratio between the model and the field is 1:96. Thus, phenomena observed over the model in the wind tunnel will occur 96 times faster than observed at full scale. If the TV tapes were replayed in slow motion (96 times slower than the recorded speed) the observed plume trajectories and motions would appear realistic.

3.5 Concentration Measurements

Techniques employed to obtain the concentration data are discussed in Appendix A (Neff, 1995). A gas chromatograph with flame ionization detector is used to measure gas concentrations. A schematic of stack gas release, sampling, and analyzing methodology is included in Appendix A.

Concentration data are reported in terms of field scale normalized concentration, K_p , where $K_p = (\chi U_H/Q)_p$ [m^{-2}]. This normalized format is convenient because the concentration results, χ_p [gm/m^3], from a test at one particular combination of wind speed, $(U_H)_p$ [m/s], and

source mass flow rate, Q_p [gm/sec], can be extrapolated to other $(U_H)_p$ and Q_p values provided that flow physics, such as plume rise, remains the same. $(U_H)_p$ is the field wind speed at the airport reference height of 10 meters. The conversion from model units to field units is as follows:

$$K_p = K_m \cdot (H_m/H_p)^2 \text{ [m}^{-2}\text{]}; \text{ with } K_m = (\chi U_H/Q)_m \text{ [cm}^{-2}\text{]}.$$

χ_m is the source normalized model concentration (ppm),

$(U_H)_m$ [cm/s] is model wind speed referred to airport conditions at field height of 10m,

Q_m [ccs] is the model stack flow rate,

H_m [cm] is the model reference height (10m/384), and

H_p [m] is the field reference height (10m).

Hourly full scale concentrations for comparison with ambient standards are computed as follows:

$$\chi_p = K_p Q_p / (U_H)_p .$$

The hourly maximum concentrations can be converted to 3-hr, 24-hr and annual average concentrations using scaling factors provided in EPA-454/R-92-019, 1992. That EPA reference states “ to obtain the estimated maximum concentrations for 3-, 8-, 24-hour or annual averaging times, multiply the 1-hour (wind tunnel) value by the indicated factor:

<u>Averaging Time</u>	<u>Scaling or Multiplying Factors</u>
3 hours	0.9 ($\pm$ 0.1)
8 hours	0.7 ($\pm$ 0.2)
24 hours	0.4 ($\pm$ 0.2)
Annual	0.08 ($\pm$ 0.02)

Table 3 details an example of the conversion of model concentrations to field values.

3.6 Stack Flow Rate and Composition Techniques

An Omega mass flow controlling system was used to monitor and control all stack gas flow settings. This system has six mass flow channels with full scale responses of 0.1, 1, 5, 10, 50 and 100 SLPM for gases with unity gas factors. Different gases will have different gas factors and this must be taken into account when calculating the proper meter setting. The local atmospheric pressure (~631 mmHg at CSU) must also be accounted for in these calculations.

During a visual plume test the proper plume flow rate and specific gravity is attained by mixing metered quantities of Air (SG = 1) and Helium (SG = 0.14). This gas mixture is then pass through the smoke generator and then out the model stack. During a plume concentration test a

hydrocarbon gas must be in the source mixture so that measurements of sample concentration can be made with a flame ionization type gas chromatograph. Depending upon many experimental considerations, a hydrocarbon, either methane ($SG = 0.55$), ethane ($SG = 1.04$), or propane ($SG = 1.52$) will be mixed with Helium ($SG = 0.14$), Nitrogen ($SG = 0.967$), or Argon ($SG = 1.38$). This mixture is passed directly into the model stack. Table 4, Stack Gas Flow Settings and Composition, lists the settings and type of gas used to achieve the proper model stack effluent discharge velocities and specific gravities.

3.7 Atmospheric Dispersion Comparability (ADC) of the Test Facility

The EPA stack height guideline (EPA, 1981) requires that the wind tunnel testing facility demonstrate atmospheric dispersion comparability by acquiring and documenting a set of velocity and concentration profiles on a standardized stack plume released into a standardized model boundary layer. This guideline outlines in detail the testing requirements for this comparability demonstration. Appendix A (Neff, 1995) is the documentation of this ADC testing program. From this ADC testing program it is concluded that the wind tunnel is capable of reproducing a boundary layer flow that is representative of a 1:400 scaled Pasquill-Gifford open C to D dispersion category.

4 RESULTS OF FLUID MODELING TESTS

4.1 Wind Profiles Measurements

The techniques employed in the acquisition of velocity profiles are discussed in Section 3.3 and Appendix A. The site model was located on a turntable, thus it could be rotated to simulate the different wind directions. An approach flow upwind of the turntable model, typical of a city environment, was created through the placement of CSU vortex generators with trim pieces and a 8.9 cm high floor trip at the tunnel entrance, followed by 20' of 1" generic roughness into 10' of 2" generic roughness on the tunnel floor. An approach flow upwind of the turntable model, typical of a city/suburb environment, was created through the placement of CSU vortex generators with trim pieces and a 8.9 cm high floor trip at the tunnel entrance, followed by 30' of 1" generic roughness on the tunnel floor. An approach flow upwind of the turntable model, typical of a harbor environment, was created through the placement of CSU vortex generators without trim pieces and a 2.5 cm high floor trip at the tunnel entrance, followed by 30' of carpet on the tunnel floor.

To document the wind tunnel flow conditions, wind tunnel centerline wind profiles were measured just upwind of the model turntable for all three approach flow conditions. Table 5, Table 6, and Table 7 presents model and field equivalent values for the city, city/suburb, and harbor approach flow conditions respectively. These approach mean velocity profiles were regressed to find the best log-log and log-linear fit. The log-log regression ($U/U_r = (z/z_r)^p$) produced a power law exponent, p , equal to 0.32, 0.26, and 0.14 for the city, city/suburb, and harbor approach flow conditions respectively. The log-linear regression ($U/u_* = 2.5 \ln\{(z/z_0)\}$) found a best fit roughness length, z_0 , of 1.8, 0.8, and 0.08 meters field scale for the city, city/suburb, and harbor approach flow conditions respectively. These values of the power law exponent and the roughness length are appropriate for their respective roughness conditions.

The above mean velocity profiles are displayed graphically in the left window of both Figure 8 and Figure 9. The mean velocity coordinate in these figures has been normalized by the gradient wind speed (model height of 1.56 meter, field height of 600 m). Since a neutral boundary layer's velocity is invariant with respect to wind speed, the normalized profiles presented can be converted to any field velocity at a specific height by the appropriate multiplicative constant. The left graph in Figure 8 displays the test data as symbols and the design power law curves as a lines. The left graph in Figure 9 displays the mean velocity profile test data and the design log-lin law on log-lin coordinates. These graphs show that the model profiles are representative of the field design values.

The right graph in Figure 8 displays the longitudinal turbulent intensity profile test data, as symbols, and the Snyder (1981) suggested design curves for each of the three approach flow conditions.

The right graph in Figure 9 displays the longitudinal turbulent intensity profile test data, as symbols, and the Simiu and Scanlan (1985) suggested design curves for each of the three approach flow conditions.

Lateral wind speed profiles ($Y_m = \pm 90, \pm 60, \pm 30, 0$ cm) at five heights ($Z_m = 10, 15, 20, 30, 40$ cm) were taken upwind of the turntable for the city/suburb approach flow condition. These mean velocity and turbulent intensity data are presented in Table 8. Graphs of the lateral mean velocity and lateral turbulent intensity profiles for the heights of 10, 20, and 40 cm model are presented in Figure 10. These data demonstrate the uniformity of the wind tunnel approach flow conditions.

To test the Reynolds number invariance of the approach flow conditions, mean velocity profiles at several model reference velocities for each upwind fetch condition were obtained. These profiles are presented in Figure 11. Figure 11 shows that the wind tunnel approach flows were invariant with respect to wind speed, and thus Reynolds number.

4.2 Stack Plume Visualization

Table 9 through Table 12 document for 2, 5, 8, and 12 m/s wind speeds, respectively, the run conditions, camera positions, VHS tape number and index for 144 (4 wind speeds, 36 wind directions) stack plume visualizations. Each test observes the plume trajectories from the vent stack down to the end of the model turntable, approximately 700 meters field equivalent distance. Figure 12 and Figure 13 display photographs of the vent plume tagged with visible smoke.

Table 13 through Table 16 summarizes for 2, 5, 8, and 12 m/s wind speeds, respectively, the observations of plume behavior for each visualization run. The observations notes the severity of,

- | | | | |
|------|-------------------|---|---|
| i) | Stack downwash | - | plume flagging or suction of smoke into stack wake |
| ii) | Building downwash | - | suction of plume downward into building cavity |
| iii) | Cavity mixing | - | mixing of plume throughout downwind building cavities |
| iv) | Building Impact | - | elevated plume impacts faces of downwind tall buildings |
| v) | Plume Fumigation | - | downward mixing of plume into stagnation regions |
| vi) | Plume lofting | - | plume little influenced by building, plume remains aloft. |

Examination of the visual records of these experiments reveals the follow with respect to:

a) Wind Speed:

The vent gases are expected to exhaust at near ambient temperatures; hence, the vent plume will have little or no thermal buoyancy. Thus, plume rise will occur only as a result of vertical momentum. Lower wind speeds will add effective height to the vent stack plume. In addition high wind speeds ($W/U < 1.5$) may permit local downwash behind the vent stack, reducing the effective stack height significantly. Tests show that the 12 m/s wind speed permits significant downwash of the plume down the side of the stack directly into the building cavity. A 2 m/s wind speed minimizes local building downwash effects.

b) Wind Direction:

The model was rotated to allow approach winds from the 36 compass points. As the flow interacted with upwind buildings and the shape of the vent building the plume trajectory was modified by the variation in streamline patterns. Winds over the Boston downtown from the W through N directions were blocked by the tall buildings, which produced a sheltered low-wind region at the Boston Edison site. Plumes exhausting into this wind environment were lofted quite high by their initial momentum; hence, they rarely penetrated the local wake region, and the plume touched down farther downwind.

Winds from the SE direction passed over only low rise residential areas before reaching the Boston Edison site. High wind speeds at stack height deflected the plume immediately; hence, downwash was often significant. Furthermore, even plumes which did not reach ground level quickly often impacted the tall skyscrapers which stand to the NW. Such conditions will result in high concentrations at elevated samplers located on roof tops.

4.3 Concentration Measurements

Table 1 lists all pertinent field and model parameter values for the stack plume tests. Techniques employed to obtain the concentration data are discussed in Section 3.5 and Appendix A. Appendix A (Neff, 1995) shows a schematic of the manner simulant stack gases were introduced into the wind tunnel and subsequently sampled for concentration analysis. Figure 3 shows all the concentration sampling locations marked on a street map of the modeled area. Table 17 describes the 47 sampling locations and provides the associated building code number, building description and coordinates from a reference points near the vent building stacks (not turntable center). Comparison of sample point location measurements made on the model "as built" and measurements on Sandborn maps of the field site demonstrate that the coordinates reported in Table 17 are accurate to ± 9.4 meters in distance, ± 2.8 degrees in angle, and ± 1.7 meters in height (95% confidence level). Table 18 through Table 21 summarize, for 2, 5, 8, and 12 m/s wind speeds, respectively, both the model and field concentration test conditions for all 144 runs performed (4 wind speeds, 36 wind directions).

Table 22 through Table 29 list the run conditions, the model and field position of the concentration measurements, and the model normalized concentrations (source and background adjusted ppm, i.e., dilution ratios in ppm). Table 30 through Table 37 list the run conditions, the model and field position of the concentration measurements, and the field normalized concentrations, $(\chi U_H/Q) \cdot 10^6$, in $[m^{-2}]$. Note that U_H is the wind speed at 10 meters height at Logan Airport.

Figure 14 displays a bar chart of the maximum (over both wind speed and direction) dilution ratios, in percent, observed at each of the 47 sample locations. Location 19, on top of the Federal Reserve Building, registered the highest concentration, 7.4%. Figure 15 through Figure 20 display line graphs of the maximum (over wind speed only) dilution ratios, in percent, versus wind direction observed at the sample locations located in the NNE, ENE&ESE, SSE&SSW, WSW, WNW, and

NNW sectors, respectively. These figures demonstrate that the 10 degree wind direction increment was sufficient to estimate the maximums at each of the sample points.

Turner, D. E., "Workbook of Atmospheric Dispersion Estimates, 2nd Edition," CRC Press, Inc., 2000
 Corporate Blvd., Boca Raton, Florida 33430-0123, X, 1974

Fitz, W. H., "Guidelines for Fluid Modeling of Atmospheric Diffusion," USEPA Environmental
 Sciences Research Laboratory, Office of Research and Development, Research Triangle
 Park, NC 27711, Report No. EPA-600/3-81-002, 1981.

Sawyer, P., and Schuman, R. H., "Wind Effects on Structures: An Introduction to Wind Engineering,"
 John Wiley & Sons, New York, 428 pp., 1982.

Neft, D. E., "Wind Tunnel Good Engineering Practice Height Study of the FCC Tower Stack at the
 Billings Refinery - Atmospheric Dispersion Engineering Test Report,"
 Technical Report for Exxon Research and Engineering Company, Fluid Dynamics and
 Diffusion Laboratory, Colorado State University, Fort Collins, Colorado, July 1982.

Neft, D. E., "Wind Tunnel Good Engineering Practice Height Study of the FCC Tower Stack at the
 Billings Refinery - Atmospheric Dispersion Engineering Test Report,"
 December 1982, 74 pp. CERES-80DEN-T27-KM-1

Neft, D. E., Metteney, R. N., and Tan, Z. T., "Fluid Modeling of Exhaust Gas Dispersion from the
 Boston Edison Ventilation Stack, Central Avenue and Harbor Tunnel Project," for Boston Edison
 Corporation, Boston, Massachusetts, CSU Contract No. 23-7360, December 1984, 82 pp.
 CERES-80DEN-T27-KM-2

Neft, D. E., Metteney, R. N., and Tan, Z. T., "Fluid Modeling of Exhaust Gas Dispersion from the
 Boston Edison Ventilation Stack, Central Avenue and Harbor Tunnel Project," for Boston Edison
 Corporation, Boston, Massachusetts, CSU Contract No. 23-7360, December 1984, 82 pp.
 CERES-80DEN-T27-KM-3

Arya, S. P. S., and J. F. Lape, Jr., "A Comparative Study of the Diffusion Coefficients for the Physical
 Modeling of Buoyant Plumes Released in a Neutral Atmosphere," Atmospheric Environment, Vol.
 24A, No. 2, pp. 289-295, 1990

EPA, "Guidelines for Use of Fluid Modeling to Determine Good Engineering Practice Stack Height,"
 USEPA Office of Air Quality, Planning and Standards, Research Triangle Park, NC,
 EPA-450/4-81-003, July 1981

REFERENCES

- Arya, S.P.S., and J.F. Lape, Jr., "A Comparative Study of the Different Criteria for the Physical Modeling of Buoyant Plume Rise in a Neutral Atmosphere," *Atmospheric Environment*, Vol. 24A, No. 2, pp. 289-295, 1990.
- EPA, "Guideline for Use of Fluid Modeling to Determine Good Engineering Practice Stack Height," USEPA Office of Air Quality, Planning and Standards, Research Triangle Park, NC, EPA-450/4-81-003, July 1981.
- Neff, D.E., Meroney, R.N., and Tan, Z.T., "Fluid Modeling of Exhaust Gas Dispersion from the Parcel 7 Ventilation Site, Central Artery/third Harbor Tunnel Project," for Bechtel/Parsons Brinkerhoff, Boston, Massachusetts, CSU Contract No. 29-7360, December 1988a, 82 pp. CER88-89DEN-TZT-RNM-6.
- Neff, D.E., Meroney, R.N., and Tan, Z.T., "Fluid Modeling of Exhaust Gas Dispersion from the Boston-edison Ventilation Site, Central Artery/third Harbor Tunnel Project," for Bechtel/Parsons Brinkerhoff, Boston, Massachusetts, CSU Contract No. 29-7360, December 1988b, 74 pp. CER88-89DEN-TZT-RNM-7.
- Neff, D.E., "Wind Tunnel Good Engineering Stack Height Study of the FCC COB Stack at the Billings Refinery - Atmospheric Dispersion Comparability Testing Documentation," Technical Report for Exxon Research and Engineering Company, Fluid Dynamics and Diffusion Laboratory, Colorado State University, Fort Collins, Colorado, July 1995a.
- Simiu, F., and Scanlan, R.H., "Wind Effects on Structures: An Introduction to Wind Engineering," John Wiley & Sons, New York, 458 pp., 1985.
- Snyder, W.H., "Guideline for Fluid Modeling of Atmospheric Diffusion," USEPA, Environmental Sciences Research Laboratory, Office of Research and Development, Research Triangle Park, NC 27711, Report No. EPA600/8-81-009, 1981.
- Turner, D. B., "Workbook of Atmospheric Dispersion Estimates, 2nd Edition" CRC Press, Inc., 2000 Corporate Blvd., Boca Raton, Florida, ISBN 1-56670-023-X, 1994.

TABLES

Table 2 - Wind Speed Distribution at Logan Intl. Airport

Field and Model Parameters - Boston-Edison Vent Building Study - PHASE II (1996)

Model Scale = 384

Parameter Description	Field Wind Speed (m/s @ 10 m)					Model Wind Speed (cm/s @ 2.6 cm)				
	2.0	5.0	8.0	12.0	Unit	125.0	125.0	200.0	300.0	Unit
SELECTED HEIGHTS										
Ref Height (Airport @10 m) =	10.0	10.0	10.0	10.0	m	2.6	2.6	2.6	2.6	cm
Vent Building Height =	69.5	69.5	69.5	69.5	m	18.1	18.1	18.1	18.1	cm
Stack Height =	87.5	87.5	87.5	87.5	m	22.8	22.8	22.8	22.8	cm
Boundary Layer Gradient Height =	600.0	600.0	600.0	600.0	m	156.3	156.3	156.3	156.3	cm
SELECTED DISTANCES										
Distance to Mid-Turntable =	350	350	350	350	m	91.1	91.1	91.1	91.1	cm
Distance to Turntable Edge =	700	700	700	700	m	182.3	182.3	182.3	182.3	cm
APPROACH FLOW CHARACTER										
<i>At the Airport Reference Conditions</i>										
Roughness Length =	0.05	0.05	0.05	0.05	m	0.013	0.013	0.013	0.013	cm
Power Law Index =	0.14	0.14	0.14	0.14		0.14	0.14	0.14	0.14	
Friction Velocity =	0.15	0.38	0.60	0.91	m/s	9.4	9.4	15.1	22.6	cm/s
Wind Speed @ Airport Ref =	2.0	5.0	8.0	12.0	m/s	125.0	125.0	200.0	300.0	cm/s
Wind Speed @ Gradient Height =	3.6	8.9	14.3	21.5	m/s	223.7	223.7	358.0	537.0	cm/s
<i>At the Site Conditions</i>										
Roughness Length =	1.00	1.00	1.00	1.00	m	0.260	0.260	0.260	0.260	cm
Power Law Index =	0.24	0.24	0.24	0.24		0.24	0.24	0.24	0.24	
Friction Velocity =	0.20	0.50	0.80	1.21	m/s	12.6	12.6	20.1	30.2	cm/s
Wind Speed @ Vent Building Height =	2.1	5.3	8.5	12.8	m/s	133.4	133.4	213.4	320.1	cm/s
Wind Speed @ Stack Top =	2.3	5.6	9.0	13.5	m/s	140.9	140.9	225.5	338.2	cm/s
Wind Speed @ Gradient Height =	3.6	8.9	14.3	21.5	m/s	223.7	223.7	358.0	537.0	cm/s
STACK FLOW CHARACTER										
Stack Exit Area =	11.15	11.15	11.15	11.15	m ²	0.76	0.76	0.76	0.76	cm ²
Number of Stacks =	14	14	14	14		14	14	14	14	
Stack Exit Velocity =	7.3	7.3	7.3	7.3	m/s	457.9	183.2	183.2	183.2	cm/s
Stack Flow Rate =	81.7	81.7	81.7	81.7	m ³ /s	346.2	138.5	138.5	138.5	ccs
Total Flow Rate (all stacks) =	1143.4	1143.4	1143.4	1143.4	m ³ /s	4846.5	1938.6	1938.6	1938.6	ccs
Stack gas Temp. =	20.0	20.0	20.0	20.0	C	20.0	20.0	20.0	20.0	C
Ambient Temp. =	20.0	20.0	20.0	20.0	C	20.0	20.0	20.0	20.0	C
Stack Gas Equivalent MW =	29	29	29	29		29.0	29.0	29.0	29.0	
DIMENSIONLESS PARAMETERS										
Roughness RE # at Site =	134	335	537	805		21.8	21.8	34.9	52.4	
Vent Bldg RE # =	98855	247137	395420	593130		16090	16090	25743	38615	
Stack RE # =	18402	18402	18402	18402		2995	1198	1198	1198	
Stack Exit Velocity Ratio (W/U) =	3.25	1.30	0.81	0.54		3.25	1.30	0.81	0.54	
Stack Gas Specific Gravity =	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	

<indicates input values

Table 1 Field and Model Testing Parameters

Logan Intl. Airport, Boston MA, Annual Wind Frequency Table
 Wind Speed values are converted to m/s at a 10 meter height

Wind Dir.	Median Wind Speed (m/s at 10m)									Total	Avg. Speed
	0.8	2.7	4.6	7.1	10.3	13.3	16.6	20.1	Over		
N	0.3	1.4	3.0	2.2	0.4	0.1				7.4	5.6
NNE	0.2	0.8	0.9	0.7	0.2	0.1				2.9	5.8
NE	0.2	0.5	1.1	1.0	0.3	0.2				3.3	6.5
ENE	0.1	0.7	1.2	1.1	0.3	0.1				3.5	5.9
E	0.3	1.0	2.4	2.3	0.3	0.1				6.4	5.9
ESE	0.3	0.9	1.9	1.9	0.3					5.3	5.8
SE	0.2	1.0	1.6	0.6						3.4	4.8
SSE	0.2	0.8	1.1	0.4						2.5	4.8
S	0.3	1.6	3.0	1.8	0.2	0.1				7.0	5.3
SSW	0.1	0.7	2.0	2.4	0.6	0.1				5.9	6.2
SW	0.1	0.8	1.9	2.7	0.6	0.1				6.2	6.2
WSW	0.1	1.1	3.3	3.9	0.7	0.1				9.2	6.0
W	0.2	0.9	2.7	5.0	1.5	0.5	0.1			10.9	7.0
WNW	0.1	0.7	2.7	4.7	1.6	0.5	0.1			10.4	7.1
NW	0.1	0.8	3.1	4.1	1.1	0.3				9.5	6.5
NNW	0.1	0.7	2.2	2.2	0.4					5.6	5.9
Calm	0.3									0.3	
Total	3.2	14.4	34.1	37.0	8.5	2.3	0.2			99.7	6.1

Notes 1) 1965-1974; 29206 observations NOAA

Wind Instrument Height, Zinstr (m) = 6.7
 Field Reference Height, Zref (m) = 10
 Power Law Index 1/n = 0.142

Table 2 Wind Speed Distribution at Logan Intl. Airport

Wind Tunnel Concentration Conversions

The procedure for concentration measurement and field conversions is as follows:

- 1) The HP 3390A integrator is calibrated with a certified gas mixture of 76.4 ppm Ethane in Nitrogen, i.e., cal. factor = (76.4 ppm)/(area under peak of standard gas, volt-sec). The integrator uses this cal. factor to compute unknown concentrations via the relationship; concentration in ppm = (cal. factor) times (area under peak of sample, volt-sec). The sample concentration is reported from the integrator to the computer as an ASCII value on a serial communications line. The integrator calibration procedure was performed before and after every concentration sampling run.
- 2) The source gas is mixed to approximately 1% ethane in air via a multi-channel mass flow controller system. This source gas was measured via direct injection into the GC FID - integrator system. The background concentrations at three different locations upwind of the model plume were obtained over the same time period as the sample location data collection. These three background concentrations were averaged together.

- 3) The model normalized concentration, χ_m , was determined as

$$\chi_{\text{model}} = 10^6 * (\chi_{\text{measured}} - \chi_{\text{background}}) / (\chi_{\text{source}} - \chi_{\text{background}})$$
 where all concentrations, χ , are in units of ppm. The similarity parameters used in this project dictate that this model normalized concentration, χ_{model} , is equal to the field concentration, χ_{field} (in units of ppm), i.e., $\chi_{\text{field}} = \chi_{\text{model}}$. In this report this field concentration is also referred to as Dilution Ratio, expressed in units of ppm as is, or expressed in units of percent when divided by 10^4 . To calculate field concentrations in mass units from this dilution ratio the following equation may be used;

$$C_{\text{field}} [\mu\text{gm}/\text{m}^3] = \chi_{\text{field}} [\text{ppm}] * Q_s [\text{gm}/\text{s}] / V_s [\text{m}^3/\text{s}],$$

where, Q_s , is the field mass release rate of the pollutant of interest out of the stack and, V_s , is the field total volumetric flow rate of the stack plume. The bracketed quantities are the units of the adjacent parameter.

- 4) This report also expresses field concentrations in the popular K format in $[\text{m}^{-2}]$. To calculate this value from model measurements the following equations were used;

$$K_{\text{model}} [\text{m}^{-2}] = 10^{-6} [\text{ppm}^{-1}] * \chi_{\text{model}} [\text{ppm}] * (U_{\infty})_m [\text{m}/\text{s}] / (V_s)_m [\text{m}^3/\text{s}];$$

$$\begin{aligned} K_{\text{field}} [\text{m}^{-2}] &= C_{\text{field}} [\text{gm}/\text{m}^3] * U_{10} [\text{m}/\text{s}] / Q_s [\text{gm}/\text{s}]; \\ &= K_m [\text{m}^{-2}] * (Z_{10} / Z_{\infty})^n * (H_m / H_f)^2; \end{aligned}$$

where, $(U_{\infty})_m$, is the model wind speed at gradient height of 1.56m (=600/384),

$(V_s)_m$, is the model total volumetric flow rate of the stack plume,

U_{10} , is the field airport wind speed at 10 meters height,

Z_{10} , is field reference wind speed height of 10 meters,

Z_{∞} , is field gradient wind speed height of 600 meters,

n , is the power law index at the airport, $n = 0.142$, and,

(H_m / H_f) , is equivalent to one over the model length scale ratio, i.e., $(1/384)$.

Table 3 Model to Field Concentration Calculation Example

Mass Flow System Settings

11-Mar-96

Field Wind Speed (mps)	Test Type	Gas Mixture Comp.#	Total Flow Rate (ccs)	Mix Specific Gravity	Gas Type	Percent of Total Mixture (%)	Comp. Flow Rate (ccs)	Meter Fullscale Range (SLPM)	Meter Setting (%FS)
2	Visual	1 of 1	1938.6	1.000	Air	100.0	1938.6	100.0	96.4
"	"	2 of 2	"	"					
5	Visual	1 of 1	1938.6	1.000	Air	100.0	1938.6	100.0	96.4
"	"	2 of 2	"	"					
8	Visual	1 of 1	1938.6	1.000	Air	100.0	1938.6	100.0	96.4
"	"	2 of 2	"	"					
12	Visual	1 of 1	1938.6	1.000	Air	100.0	1938.6	100.0	96.4
"	"	2 of 2	"	"					
2	Conc. A	1 of 1	1938.6	1.000	Air	99.0	1919.2	100.0	95.5
"	"	2 of 2	"	"	Ethane	1.0	19.4	5.0	39.4
2	Conc.	1 of 1	4846.5	1.000	Air	99.0	4798.0	FP-Large@10#	24.9
"	"	2 of 2	"	"	Ethane	1.0	48.5	5.0	97.2
5	Conc.	1 of 1	1938.6	1.000	Air	99.0	1919.2	100.0	95.5
"	"	2 of 2	"	"	Ethane	1.0	19.4	5.0	39.4
8	Conc.	1 of 1	1938.6	1.000	Air	99.0	1919.2	100.0	95.5
"	"	2 of 2	"	"	Ethane	1.0	19.4	5.0	39.4
12	Conc.	1 of 1	1938.6	1.000	Air	99.0	1919.2	100.0	95.5
"	"	2 of 2	"	"	Ethane	1.0	19.4	5.0	39.4

Velocity System Settings

Field Wind Speed (mps)	Model Wind Speed (cm/s)	Tunnel Dial Setting	Tunnel Readout Setting (rpm*10)	MKS Pres. Range	GCSAMPLE Pitot Value (volt/mmHg)
2a	90	1.2	310	X.01	1000
2	224	2.0	750	X.1	100
5	224	2.0	750	X.1	100
8	358	2.7	1160	X.1	100
12	537	3.8	1720	X 1	10

Ref. Pitot at 156 cm (600 m field), 220 cm in front of turntable center
 8 CSU spires w/ trim pieces, 3.5" trip, 1" wooden roughness

Table 4 Stack Gas Flow Settings and Composition

City Approach Conditions (wind dir. 220, 230, ... 10)

FIELD VALUES							MODEL VALUES				
Height (m)	Average Normalize Velocity	2m/s Wind* (m/s)	5m/s Wind* (m/s)	8m/s Wind* (m/s)	12m/s Wind* (m/s)	Avg. T.I. (%)	Height (cm)	Velocity (cm/s)	Long. T.I. (%)	Velocity (cm/s)	Long. T.I. (%)
13.4	0.28	1.0	2.5	4.0	6.0	31.6	3.5	59.7	31.5	94.9	31.7
15.4	0.30	1.1	2.7	4.2	6.4	32.2	4.0	65.4	32.5	98.6	31.9
19.2	0.31	1.1	2.7	4.4	6.6	33.9	5.0	66.4	34.5	103.8	33.2
23.0	0.34	1.2	3.0	4.8	7.2	31.0	6.0	72.7	30.6	114.9	31.3
26.9	0.35	1.2	3.1	5.0	7.5	29.2	7.0	77.1	29.5	115.6	28.9
36.5	0.41	1.5	3.7	5.9	8.8	27.5	9.5	89.3	28.4	138.1	26.7
46.1	0.45	1.6	4.0	6.4	9.6	26.8	12.0	99.6	28.3	148.6	25.4
65.3	0.50	1.8	4.4	7.1	10.7	23.5	17.0	105.5	24.2	171.9	22.7
84.5	0.55	2.0	5.0	7.9	11.9	21.4	22.0	121.3	21.6	185.6	21.2
122.9	0.58	2.1	5.2	8.3	12.5	20.1	32.0	125.7	19.2	198.4	20.9
161.3	0.64	2.3	5.7	9.2	13.7	17.3	42.0	140.9	16.7	213.5	18.0
199.7	0.68	2.4	6.1	9.8	14.7	17.6	52.0	145.1	18.4	236.6	16.9
238.1	0.73	2.6	6.5	10.5	15.7	16.0	62.0	156.5	16.9	251.1	15.1
314.9	0.82	2.9	7.4	11.8	17.7	13.2	82.0	177.4	13.3	281.1	13.0
391.7	0.89	3.2	7.9	12.7	19.1	10.4	102.0	194.4	9.8	298.2	10.9
468.5	0.97	3.5	8.6	13.8	20.7	8.6	122.0	209.7	8.9	326.4	8.3
Ref.							Ref.				
600.0	1.0	3.6	8.9	14.3	21.5		156.0	216.0		340.0	

Wind* > Airport Wind Speed at 10m height

Power Law Index = 0.32

Field Roughness Length (m) = 1.80

Length Scale = 384

Table 5 Model and Field Wind Profile Data - City Approach Flow

City/Suburb Approach Conditions (wind dir. 110, 120, ... 210)

FIELD VALUES							MODEL VALUES				
Height (m)	Normalize Velocity	2m/s Wind* (m/s)	5m/s Wind* (m/s)	8m/s Wind* (m/s)	12m/s Wind* (m/s)	Avg. T.I. (%)	Height (cm)	Velocity (cm/s)	Long. T.I. (%)	Velocity (cm/s)	Long. T.I. (%)
							1.5			96.6	29.9
7.7	0.29	1.0	2.6	4.2	6.2	30.2	2.0	64.3	32.6	107.5	27.9
11.5	0.35	1.3	3.2	5.1	7.6	29.4	3.0	78.4	29.5	115.3	29.3
15.4	0.37	1.3	3.3	5.3	8.0	28.0	4.0	82.2	27.8	124.6	28.3
19.2	0.42	1.5	3.7	6.0	9.0	26.5	5.0	92.2	25.9	130.3	27.1
28.8	0.43	1.6	3.9	6.2	9.3	23.3	7.5	96.0	23.5	148.4	23.1
38.4	0.51	1.8	4.5	7.3	10.9	22.2	10.0	112.4	21.7	169.9	22.7
57.6	0.56	2.0	5.0	8.0	12.0	20.0	15.0	123.1	19.4	178.6	20.6
76.8	0.60	2.2	5.4	8.6	12.9	18.3	20.0	132.9	17.3	187.6	19.3
115.2	0.63	2.3	5.7	9.1	13.6	17.0	30.0	140.0	16.0	200.8	18.1
153.6	0.68	2.4	6.0	9.7	14.5	16.8	40.0	149.4	17.0	218.3	16.7
192.0	0.73	2.6	6.5	10.4	15.6	15.2	50.0	160.5	13.9	233.2	16.5
230.4	0.78	2.8	6.9	11.1	16.6	14.1	60.0	171.4	13.6	249.9	14.5
307.2	0.82	2.9	7.4	11.8	17.7	11.0	80.0	181.8	10.6	278.7	11.4
384.0	0.91	3.2	8.1	13.0	19.4	8.0	100.0	200.1	7.5	310.2	8.5
460.8	0.94	3.4	8.4	13.5	20.2	6.5	120.0	208.2	5.8	323.1	7.3
Ref.							Ref.				
600.0	1.0	3.6	8.9	14.3	21.5		156.0	221.0		335.0	

Wind* > Airport Wind Speed at 10m height

Power Law Index = 0.26

Field Roughness Length (m) = 0.80

Length Scale = 384

Table 6 Model and Field Wind Profile Data - City/Suburb Approach Flow

Harbor Approach Conditions (wind dir. 20, 30, ... 100)

FIELD VALUES							MODEL VALUES				
Height (m)	Average Normalize Velocity	2m/s Wind* (m/s)	5m/s Wind* (m/s)	8m/s Wind* (m/s)	12m/s Wind* (m/s)	Avg. T.I. (%)	Height (cm)	Velocity (cm/s)	Long. T.I. (%)	Velocity (cm/s)	Long. T.I. (%)
5.8	0.44	1.6	4.0	6.3	9.5	22.6	1.5	92.1	21.7	143.6	23.5
7.7	0.49	1.7	4.4	7.0	10.5	19.1	2.0	100.4	18.1	161.2	20.1
11.5	0.54	1.9	4.9	7.8	11.7	17.0	3.0	108.5	16.5	184.3	17.6
15.4	0.58	2.1	5.2	8.3	12.4	16.2	4.0	116.9	15.8	193.9	16.5
19.2	0.61	2.2	5.4	8.7	13.0	15.1	5.0	122.4	14.8	204.5	15.5
28.8	0.65	2.3	5.8	9.3	14.0	12.9	7.5	127.6	12.9	225.0	12.9
38.4	0.68	2.4	6.1	9.8	14.7	11.2	10.0	136.2	11.0	232.8	11.3
57.6	0.73	2.6	6.5	10.4	15.7	9.8	15.0	143.8	10.1	251.4	9.5
76.8	0.76	2.7	6.8	10.8	16.3	8.8	20.0	151.2	8.6	257.4	8.9
115.2	0.78	2.8	7.0	11.2	16.8	7.8	30.0	155.8	7.6	268.2	8.1
153.6	0.80	2.9	7.2	11.5	17.3	7.2	40.0	158.3	7.2	277.3	7.3
192.0	0.84	3.0	7.5	12.0	17.9	7.3	50.0	163.3	7.4	290.3	7.1
230.4	0.85	3.1	7.6	12.2	18.3	6.8	60.0	167.4	7.1	294.6	6.6
307.2	0.90	3.2	8.1	12.9	19.3	6.0	80.0	177.9	6.2	309.3	5.8
384.0	0.93	3.3	8.3	13.2	19.9	5.5	100.0	183.6	5.6	316.1	5.5
460.8	0.95	3.4	8.5	13.6	20.5	5.2	120.0	189.0	5.3	326.0	5.2
Ref.							Ref.				
600.0	1.0	3.6	8.9	14.3	21.5		156.0	196.0		346.0	

Wind* > Airport Wind Speed at 10m height

Power Law Index = 0.14

Field Roughness Length (m) = 0.08

Length Scale = 384

Table 7 Model and Field Wind Profile Data - Harbor Approach Flow

Lateral Velocity and Turbulence Profiles

(City/Suburban Roughness Condition, ~5 m/s Equil. Field Wind Speed)

Model Mean Wind Speed (cm/s)

Z (cm)	Y (cm)						
	-90	-60	-30	0	30	60	90
10.0	99	99	93	91	100	96	104
15.0	113	104	102	97	112	105	113
20.0	114	110	110	115	108	117	122
30.0	131	125	122	121	127	134	140
40.0	144	129	133	129	143	137	151

Avg.
Values

97.4
106.5
113.9
128.5
138.0

Normalized Mean Wind

Z (cm)	Y (cm)						
	-90	-60	-30	0	30	60	90
10.0	0.93	0.93	0.87	0.85	0.94	0.90	0.97
15.0	1.06	0.98	0.95	0.91	1.05	0.99	1.06
20.0	1.07	1.03	1.03	1.08	1.01	1.10	1.15
30.0	1.23	1.17	1.15	1.14	1.19	1.25	1.31
40.0	1.35	1.21	1.25	1.21	1.34	1.28	1.42

Local Longitudinal Turbulent Intensity (%)

Z (cm)	Y (cm)						
	-90	-60	-30	0	30	60	90
10.0	26	24	25	22	26	23	25
15.0	21	23	24	21	19	21	21
20.0	21	22	20	19	21	18	19
30.0	20	19	17	20	18	17	15
40.0	17	18	20	18	15	16	16

Avg.
Values

24.4
21.5
20.1
17.9
17.1

Normalized Local Long. Turb. Int.

Z (cm)	Y (cm)						
	-90	-60	-30	0	30	60	90
10.0	1.23	1.10	1.16	1.02	1.20	1.06	1.15
15.0	0.98	1.07	1.13	0.97	0.89	1.00	0.96
20.0	0.99	1.01	0.94	0.89	0.99	0.83	0.89
30.0	0.91	0.90	0.78	0.91	0.84	0.78	0.70
40.0	0.81	0.83	0.91	0.82	0.70	0.75	0.73

Table 8 Model Lateral Wind Profile Data - City/Suburb Approach Flow

Model Visual Testing - Wind Speed = 2 m/s

Run No.	Wind Dir. (deg)	MODEL CONDITIONS								Date/By
		Upwind Fetch Type	Seq. No.	Camera - SVHS			Camera - Hi8			
				Tunnel Pos.	Tape No.	Time Index	Tunnel Pos.	Tape No.	Time Index	
100	0	8' - 2"	80	B	#1		C	#2		10/11/96 DEN
101	10	8' - 2"	81	B	#1		C	#2		10/11/96 DEN
102	20	8' out	109	B	#1		C	#2	1:02:50	10/11/96 DEN
103	30	8' out	110	B	#1		C	#2		10/11/96 DEN
104	40	8' out	111	B	#1		C	#2		10/11/96 DEN
105	50	8' out	112	B	#1		C	#2		10/11/96 DEN
106	60	8' out	113	B	#1	1:11:00	C	#2		10/11/96 DEN
107	70	8' out	114	B	#1		C	#2		10/11/96 DEN
108	80	8' out	115	B	#1		C	#2		10/11/96 DEN
109	90	8' out	116	B	#1		C	#2		10/11/96 DEN
110	100	8' out	117	B	#1		C	#2		10/11/96 DEN
111	110	Full 1"	1	A	#1	6:54	C	#2	0:00	10/10/96 DEN
112	120	Full 1"	2	A	#1	7:48	C	#2		10/10/96 DEN
113	130	Full 1"	3	A	#1		C	#2		10/10/96 DEN
114	140	Full 1"	4	A	#1		C	#2		10/10/96 DEN
115	150	Full 1"	5	A	#1		C	#2		10/10/96 DEN
116	160	Full 1"	6	A	#1	10:30	C	#2		10/10/96 DEN
117	170	Full 1"	7	A	#1		C	#2		10/10/96 DEN
118	180	Full 1"	8	A	#1		C	#2		10/10/96 DEN
119	190	Full 1"	9	A	#1		C	#2		10/10/96 DEN
120	200	Full 1"	10	A	#1		C	#2		10/10/96 DEN
121	210	Full 1"	11	A	#1	13:58	C	#2		10/10/96 DEN
122	220	8' - 2"	45	A	#1		C	#2	25:54	10/11/96 DEN
123	230	8' - 2"	46	A	#1		C	#2		10/11/96 DEN
124	240	8' - 2"	47	A	#1		C	#2		10/11/96 DEN
125	250	8' - 2"	48	A	#1		C	#2		10/11/96 DEN
126	260	8' - 2"	49	A	#1		C	#2		10/11/96 DEN
127	270	8' - 2"	50	A	#1		C	#2		10/11/96 DEN
128	280	8' - 2"	51	A	#1	35:44	C	#2		10/11/96 DEN
129	290	8' - 2"	73	B	#1		C	#2	41:55	10/11/96 DEN
130	300	8' - 2"	74	B	#1	48:40	C	#2		10/11/96 DEN
131	310	8' - 2"	75	B	#1		C	#2		10/11/96 DEN
132	320	8' - 2"	76	B	#1		C	#2		10/11/96 DEN
133	330	8' - 2"	77	B	#1		C	#2		10/11/96 DEN
134	340	8' - 2"	78	B	#1		C	#2		10/11/96 DEN
135	350	8' - 2"	79	B	#1		C	#2		10/11/96 DEN

Model Wind Speed

Speed = 90 cm/s

Height = 156 cm

Setting = 1.2 ~ 31.0rpm

Model Flow Rate

Flow = 1939 ccs

Setting 100SLPM Unit at 96.4%

Camera & Positions

A = Lateral South Side - SVHS

B = Downwind North Side - SVHS

C = Upwind Center - Hi8

Table 9 Visual Test Conditions - 2 m/s Wind

Model Visual Testing - Wind Speed = 5 m/s

Run No.	Wind Dir. (deg)	MODEL CONDITIONS								Date/By
		Upwind Fetch Type	Seq. No.	Camera - SVHS			Camera - Hi8			
				Tunnel Pos.	Tape No.	Time Index	Tunnel Pos.	Tape No.	Time Index	
200	0	8' - 2"	89	B	#1		C	#2		10/11/96 DEN
201	10	8' - 2"	90	B	#1		C	#2		10/11/96 DEN
202	20	8' out	118	B	#1		C	#2	1:08:17	10/11/96 DEN
203	30	8' out	119	B	#1	1:14:26	C	#2		10/11/96 DEN
204	40	8' out	120	B	#1		C	#2		10/11/96 DEN
205	50	8' out	121	B	#1		C	#2		10/11/96 DEN
206	60	8' out	122	B	#1		C	#2		10/11/96 DEN
207	70	8' out	123	B	#1		C	#2		10/11/96 DEN
208	80	8' out	124	B	#1	1:17:12	C	#2		10/11/96 DEN
209	90	8' out	125	B	#1		C	#2		10/11/96 DEN
210	100	8' out	126	B	#1		C	#2		10/11/96 DEN
211	110	Full 1"	12	A	#1	14:42	C	#2	7:49	10/10/96 DEN
212	120	Full 1"	13	A	#1		C	#2		10/10/96 DEN
213	130	Full 1"	14	A	#1		C	#2		10/10/96 DEN
214	140	Full 1"	15	A	#1		C	#2		10/10/96 DEN
215	150	Full 1"	16	A	#1		C	#2		10/10/96 DEN
216	160	Full 1"	17	A	#1		C	#2		10/10/96 DEN
217	170	Full 1"	18	A	#1	18:08	C	#2		10/10/96 DEN
218	180	Full 1"	19	A	#1		C	#2		10/10/96 DEN
219	190	Full 1"	20	A	#1		C	#2		10/10/96 DEN
220	200	Full 1"	21	A	#1		C	#2		10/10/96 DEN
221	210	Full 1"	22	A	#1		C	#2		10/10/96 DEN
222	220	8' - 2"	52	A	#1		C	#2	30:20	10/11/96 DEN
223	230	8' - 2"	53	A	#1		C	#2		10/11/96 DEN
224	240	8' - 2"	54	A	#1		C	#2		10/11/96 DEN
225	250	8' - 2"	55	A	#1	38:08	C	#2		10/11/96 DEN
226	260	8' - 2"	56	A	#1		C	#2		10/11/96 DEN
227	270	8' - 2"	57	A	#1		C	#2		10/11/96 DEN
228	280	8' - 2"	58	A	#1		C	#2		10/11/96 DEN
229	290	8' - 2"	82	B	#1	53:36	C	#2	47:37	10/11/96 DEN
230	300	8' - 2"	83	B	#1		C	#2		10/11/96 DEN
231	310	8' - 2"	84	B	#1		C	#2		10/11/96 DEN
232	320	8' - 2"	85	B	#1		C	#2		10/11/96 DEN
233	330	8' - 2"	86	B	#1		C	#2		10/11/96 DEN
234	340	8' - 2"	87	B	#1	56:27	C	#2		10/11/96 DEN
235	350	8' - 2"	88	B	#1		C	#2		10/11/96 DEN

Model Wind Speed

Speed = 224 cm/s

Height = 156 cm

Setting = 2.125 ~ 80.5rpm

Model Flow Rate

Flow = 1939 ccs

Setting = 100SLPM Unit at 96.4%

Camera & Positions

A = Lateral South Side - SVHS

B = Downwind North Side - SVHS

C = Upwind Center - Hi8

Table 10 Visual Test Conditions - 5 m/s Wind

Model Visual Testing - Wind Speed = 8 m/s

Run No.	Wind Dir. (deg)	MODEL CONDITIONS								Date/By
		Upwind Fetch Type	Seq. No.	Camera - SVHS			Camera - Hi8			
				Tunnel Pos.	Tape No.	Time Index	Tunnel Pos.	Tape No.	Time Index	
300	0	8' - 2"	98	B	#1		C	#2		10/11/96 DEN
301	10	8' - 2"	99	B	#1	1:03:25	C	#2		10/11/96 DEN
302	20	8' out	127	B	#1		C	#2	1:13:27	10/11/96 DEN
303	30	8' out	128	B	#1		C	#2		10/11/96 DEN
304	40	8' out	129	B	#1		C	#2		10/11/96 DEN
305	50	8' out	130	B	#1		C	#2		10/11/96 DEN
306	60	8' out	131	B	#1	1:21:11	C	#2		10/11/96 DEN
307	70	8' out	132	B	#1		C	#2		10/11/96 DEN
308	80	8' out	133	B	#1		C	#2		10/11/96 DEN
309	90	8' out	134	B	#1		C	#2		10/11/96 DEN
310	100	8' out	135	B	#1		C	#2		10/11/96 DEN
311	110	Full 1"	23	A	#1	20:37	C	#2	13:55	10/10/96 DEN
312	120	Full 1"	24	A	#1		C	#2		10/10/96 DEN
313	130	Full 1"	25	A	#1		C	#2		10/10/96 DEN
314	140	Full 1"	26	A	#1		C	#2		10/10/96 DEN
315	150	Full 1"	27	A	#1		C	#2		10/10/96 DEN
316	160	Full 1"	28	A	#1		C	#2		10/10/96 DEN
317	170	Full 1"	29	A	#1		C	#2		10/10/96 DEN
318	180	Full 1"	30	A	#1	24:29	C	#2		10/10/96 DEN
319	190	Full 1"	31	A	#1		C	#2		10/10/96 DEN
320	200	Full 1"	32	A	#1		C	#2		10/10/96 DEN
321	210	Full 1"	33	A	#1		C	#2		10/10/96 DEN
322	220	8' - 2"	59	A	#1		C	#2	34:14	10/11/96 DEN
323	230	8' - 2"	60	A	#1		C	#2		10/11/96 DEN
324	240	8' - 2"	61	A	#1	41:30	C	#2		10/11/96 DEN
325	250	8' - 2"	62	A	#1		C	#2		10/11/96 DEN
326	260	8' - 2"	63	A	#1		C	#2		10/11/96 DEN
327	270	8' - 2"	64	A	#1		C	#2		10/11/96 DEN
328	280	8' - 2"	65	A	#1		C	#2		10/11/96 DEN
329	290	8' - 2"	91	B	#1		C	#2	52:47	10/11/96 DEN
330	300	8' - 2"	92	B	#1		C	#2		10/11/96 DEN
331	310	8' - 2"	93	B	#1		C	#2		10/11/96 DEN
332	320	8' - 2"	94	B	#1	1:00:28	C	#2		10/11/96 DEN
333	330	8' - 2"	95	B	#1		C	#2		10/11/96 DEN
334	340	8' - 2"	96	B	#1		C	#2		10/11/96 DEN
335	350	8' - 2"	97	B	#1		C	#2		10/11/96 DEN

Model Wind Speed

Speed = 358 cm/s

Height = 156 cm

Setting = 2.75 ~ 115.8rpm

Model Flow Rate

Flow = 1939 ccs

Setting 100SLPM Unit at 96.4%

Camera & Positions

A = Lateral South Side - SVHS

B = Downwind North Side - SVHS

C = Upwind Center - Hi8

Table 11 Visual Test Conditions - 8 m/s Wind

Model Visual Testing - Wind Speed =12 m/s

Run No.	Wind Dir. (deg)	MODEL CONDITIONS								Date/By
		Upwind Fetch Type	Seq. No.	Camera - SVHS			Camera - Hi8			
				Tunnel Pos.	Tape No.	Time Index	Tunnel Pos.	Tape No.	Time Index	
400	0	8' - 2"	107	B	#1	1:07:29	C	#2		10/11/96 DEN
401	10	8' - 2"	108	B	#1		C	#2		10/11/96 DEN
402	20	8' out	136	B	#1		C	#2	1:18:48	10/11/96 DEN
403	30	8' out	137	B	#1		C	#2		10/11/96 DEN
404	40	8' out	138	B	#1	1:25:23	C	#2		10/11/96 DEN
405	50	8' out	139	B	#1		C	#2		10/11/96 DEN
406	60	8' out	140	B	#1		C	#2		10/11/96 DEN
407	70	8' out	141	B	#1		C	#2		10/11/96 DEN
408	80	8' out	142	B	#1		C	#2		10/11/96 DEN
409	90	8' out	143	B	#1		C	#2		10/11/96 DEN
410	100	8' out	144	B	#1		C	#2		10/11/96 DEN
411	110	Full 1"	34	A	#1		C	#2	20:00	10/10/96 DEN
412	120	Full 1"	35	A	#1		C	#2		10/10/96 DEN
413	130	Full 1"	36	A	#1	27:40	C	#2		10/10/96 DEN
414	140	Full 1"	37	A	#1		C	#2		10/10/96 DEN
415	150	Full 1"	38	A	#1		C	#2		10/10/96 DEN
416	160	Full 1"	39	A	#1		C	#2		10/10/96 DEN
417	170	Full 1"	40	A	#1		C	#2		10/10/96 DEN
418	180	Full 1"	41	A	#1		C	#2		10/10/96 DEN
419	190	Full 1"	42	A	#1		C	#2		10/10/96 DEN
420	200	Full 1"	43	A	#1	31:20	C	#2		10/10/96 DEN
421	210	Full 1"	44	A	#1		C	#2		10/10/96 DEN
422	220	8' - 2"	66	A	#1		C	#2	38:01	10/11/96 DEN
423	230	8' - 2"	67	A	#1		C	#2		10/11/96 DEN
424	240	8' - 2"	68	A	#1	45:23	C	#2		10/11/96 DEN
425	250	8' - 2"	69	A	#1		C	#2		10/11/96 DEN
426	260	8' - 2"	70	A	#1		C	#2		10/11/96 DEN
427	270	8' - 2"	71	A	#1		C	#2		10/11/96 DEN
428	280	8' - 2"	72	A	#1		C	#2		10/11/96 DEN
429	290	8' - 2"	100	B	#1	1:03:52	C	#2	58:08	10/11/96 DEN
430	300	8' - 2"	101	B	#1		C	#2		10/11/96 DEN
431	310	8' - 2"	102	B	#1		C	#2		10/11/96 DEN
432	320	8' - 2"	103	B	#1		C	#2		10/11/96 DEN
433	330	8' - 2"	104	B	#1		C	#2		10/11/96 DEN
434	340	8' - 2"	105	B	#1		C	#2		10/11/96 DEN
435	350	8' - 2"	106	B	#1		C	#2		10/11/96 DEN

Model Wind Speed

Speed =537 cm/s

Height =156 cm

Setting = 3.75 ~ 171.7rpm

Model Flow Rate

Flow = 1939 ccs

Setting : 100SLPM Unit at 96.4%

Camera & Positions

A = Lateral South Side - SVHS

B = Downwind North Side - SVHS

C = Upwind Center - Hi8

Table 12 Visual Test Conditions - 12 m/s Wind

Model Visual Results - Wind Speed = 2 m/s

Run No.	Wind Dir. (deg)	Upwind Fetch Type	Observed Plume Behavior					
			Stack Down-wash	Building Down-wash	Cavity Mixing	Building Impact	Plume Fumigation	Plume Lofting
100	0	City	-	-	-	-	-	x
101	10	City	-	-	-	-	-	x
102	20	Harbor	-	-	-	-	-	x
103	30	Harbor	-	-	-	o	-	o
104	40	Harbor	-	-	-	x	-	o
105	50	Harbor	-	-	-	x	-	-
106	60	Harbor	-	-	-	x	-	o
107	70	Harbor	-	-	-	o	-	o
108	80	Harbor	-	-	-	o	-	o
109	90	Harbor	-	-	-	o	-	o
110	100	Harbor	-	-	-	x	-	x
111	110	City/Sub	-	-	-	o	-	o
112	120	City/Sub	-	-	-	x	-	o
113	130	City/Sub	-	-	-	o	-	o
114	140	City/Sub	-	-	-	-	-	o
115	150	City/Sub	-	-	-	-	-	o
116	160	City/Sub	-	-	-	o	-	o
117	170	City/Sub	-	-	-	x	-	o
118	180	City/Sub	-	-	-	x	-	o
119	190	City/Sub	-	-	-	o	-	o
120	200	City/Sub	-	-	-	o	-	o
121	210	City/Sub	-	-	-	o	-	-
122	220	City	-	-	o	-	-	-
123	230	City	-	-	-	-	-	-
124	240	City	-	-	-	-	-	-
125	250	City	-	-	-	-	-	-
126	260	City	-	-	-	-	o	-
127	270	City	-	-	o	-	o	o
128	280	City	-	o	o	-	o	o
129	290	City	-	-	-	-	-	x
130	300	City	-	-	-	-	-	x
131	310	City	-	-	-	-	-	x
132	320	City	-	-	-	-	-	x
133	330	City	-	-	-	-	-	x
134	340	City	-	-	-	-	-	x
135	350	City	-	-	-	-	-	x

Behavior Scale

x = very noticable

o = noticable

- = not noticable

Table 13 Visual Test Results - 2 m/s Wind

Model Visual Results - Wind Speed = 5 m/s

Run No.	Wind Dir. (deg)	Upwind Fetch Type	Observed Plume Behavior					
			Stack Down-wash	Building Down-wash	Cavity Mixing	Building Impact	Plume Fumigation	Plume Lofting
200	0	City	-	-	-	-	-	0
201	10	City	-	-	-	-	-	-
202	20	Harbor	-	-	X	-	0	-
203	30	Harbor	-	-	0	0	-	-
204	40	Harbor	-	-	-	X	0	-
205	50	Harbor	-	-	-	X	0	-
206	60	Harbor	-	-	-	X	-	-
207	70	Harbor	-	-	0	X	-	-
208	80	Harbor	-	-	0	0	-	-
209	90	Harbor	-	-	0	X	-	-
210	100	Harbor	-	0	0	X	-	-
211	110	City/Sub	-	-	-	X	0	-
212	120	City/Sub	-	-	-	X	0	-
213	130	City/Sub	-	-	-	X	0	-
214	140	City/Sub	-	-	-	X	-	-
215	150	City/Sub	-	-	-	0	-	-
216	160	City/Sub	-	-	-	X	-	-
217	170	City/Sub	-	-	-	X	-	-
218	180	City/Sub	0	-	-	X	0	-
219	190	City/Sub	0	0	0	X	-	-
220	200	City/Sub	0	0	-	X	-	-
221	210	City/Sub	0	-	-	0	-	-
222	220	City	0	-	-	-	-	-
223	230	City	0	-	-	-	-	-
224	240	City	0	-	-	-	-	-
225	250	City	0	-	0	-	-	-
226	260	City	-	-	0	-	-	-
227	270	City	0	-	0	-	0	0
228	280	City	-	0	0	-	0	0
229	290	City	-	-	-	-	-	X
230	300	City	-	-	0	-	-	0
231	310	City	-	-	-	-	0	0
232	320	City	-	-	-	-	-	-
233	330	City	-	-	-	-	-	-
234	340	City	-	-	0	-	-	-
235	350	City	-	-	-	-	-	0

Behavior Scale

X = very noticeable

0 = noticeable

Table 14 Visual Test Results - 5 m/s Wind

Model Visual Results - Wind Speed = 8 m/s

Run No.	Wind Dir. (deg)	Upwind Fetch Type	Observed Plume Behavior					
			Stack Down-wash	Building Down-wash	Cavity Mixing	Building Impact	Plume Fumigation	Plume Lofting
300	0	City	-	o	-	-	-	-
301	10	City	o	o	-	-	-	-
302	20	Harbor	o	x	x	x	x	-
303	30	Harbor	o	o	x	x	x	-
304	40	Harbor	o	o	x	x	x	-
305	50	Harbor	o	-	-	x	o	-
306	60	Harbor	o	-	o	x	-	-
307	70	Harbor	o	-	o	x	o	-
308	80	Harbor	o	o	x	x	x	-
309	90	Harbor	o	x	x	x	x	-
310	100	Harbor	o	x	x	x	x	-
311	110	City/Sub	o	o	-	x	x	-
312	120	City/Sub	x	o	o	x	x	-
313	130	City/Sub	x	-	-	x	x	-
314	140	City/Sub	x	-	-	x	o	-
315	150	City/Sub	x	-	-	o	-	-
316	160	City/Sub	o	-	-	o	-	-
317	170	City/Sub	o	-	-	x	x	-
318	180	City/Sub	x	o	-	x	x	-
319	190	City/Sub	x	x	-	x	-	-
320	200	City/Sub	o	o	-	x	-	-
321	210	City/Sub	o	o	-	o	-	-
322	220	City	x	o	o	-	-	-
323	230	City	x	o	o	-	-	-
324	240	City	x	-	-	-	-	-
325	250	City	x	o	o	-	-	-
326	260	City	x	o	x	-	x	-
327	270	City	o	o	x	-	x	-
328	280	City	-	-	o	-	o	o
329	290	City	-	-	o	-	-	o
330	300	City	-	-	-	-	-	o
331	310	City	-	-	o	-	-	-
332	320	City	-	-	o	-	o	-
333	330	City	-	-	-	-	-	-
334	340	City	-	-	-	-	-	-
335	350	City	-	-	o	-	-	-

Behavior Scale

X = very noticable

O = noticable

Table 15 Visual Test Results - 8 m/s Wind

Model Visual Results - Wind Speed = 12 m/s

Run No.	Wind Dir. (deg)	Upwind Fetch Type	Observed Plume Behavior					
			Stack Down-wash	Building Down-wash	Cavity Mixing	Building Impact	Plume Fumigation	Plume Lofting
400	0	City	o	o	o	-	-	-
401	10	City	o	o	o	-	o	-
402	20	Harbor	x	x	x	x	x	-
403	30	Harbor	x	x	x	x	x	-
404	40	Harbor	x	o	x	x	x	-
405	50	Harbor	x	o	o	x	x	-
406	60	Harbor	x	o	o	x	x	-
407	70	Harbor	x	x	x	o	x	-
408	80	Harbor	x	x	x	x	x	-
409	90	Harbor	x	x	x	x	x	-
410	100	Harbor	x	x	x	x	x	-
411	110	City/Sub	x	x	x	x	x	-
412	120	City/Sub	x	x	x	x	x	-
413	130	City/Sub	x	x	x	x	x	-
414	140	City/Sub	x	x	o	x	o	-
415	150	City/Sub	x	x	o	x	-	-
416	160	City/Sub	x	x	o	x	-	-
417	170	City/Sub	x	x	o	x	x	-
418	180	City/Sub	x	x	o	x	x	-
419	190	City/Sub	x	x	o	o	o	-
420	200	City/Sub	x	x	o	x	-	-
421	210	City/Sub	x	x	o	x	-	-
422	220	City	-	-	-	-	-	o
423	230	City	-	-	-	-	-	o
424	240	City	-	-	-	-	-	o
425	250	City	-	-	-	-	o	o
426	260	City	-	-	-	-	o	x
427	270	City	-	-	-	-	o	x
428	280	City	-	-	-	-	o	x
429	290	City	-	-	o	-	-	o
430	300	City	o	o	o	-	-	-
431	310	City	o	-	o	-	-	-
432	320	City	x	x	x	-	o	-
433	330	City	o	o	o	-	o	-
434	340	City	-	-	o	-	-	-
435	350	City	-	-	-	-	-	-

Behavior Scale

X = very noticeable

O = noticeable

Table 16 Visual Test Results - 12 m/s Wind

Sampling Grid for Boston-Edison Project

Point No.	Code No.	Description of Receptor Site	Field			Model (calc from Field)			Wind Dir. (deg)
			Dist. (m)	Dir. (deg)	Height (m)	Dist. (cm)	Dir. (deg)	Height (cm)	
43	D14	International Place (intake)	197	0	13	51.3	0	3.3	180
2	A1	Harbor Tower I (plume ht.)	397	16	note A	103.3	16	note A	196
3	A2	Harbor Towers (pool)	386	18	0	100.5	18	0.0	198
45	A8	Harbor Tower II (plume ht.)	468	21	note A	121.8	21	note A	201
4	A3	Boston Harbor Hotel	277	25	37	72.3	25	9.5	205
6	A5	Rowe's Wharf	345	32	33	89.9	32	8.5	212
5	A4	Coast Guard Bldg. (street)	147	36	0	38.2	36	0.0	216
7	A6	Coast Guard Bldg. (roof)	160	37	32	41.6	37	8.3	217
10	A9	Coast Guard Building (windows)	154	41	23	40.1	41	6.0	221
1	A7	Harbor Plaza	39	76	53	10.1	76	13.9	256
8	B1	Federal Courthouse (roof)	305	87	40	79.3	87	10.3	267
9	B2	Victoria Station Rest.	253	118	4	65.9	118	1.0	298
12	B5	Children's Museum	284	134	0	74.0	134	0.0	314
13	B6	Congress Street	439	147	0	114.2	147	0.0	327
14	B7	Boston Tea Party Museum	204	163	0	53.2	163	0.0	343
16	C1	Congress St. & Dorchester Ave	195	188	0	50.7	188	0.0	8
17	C2	Dorchester Ave. & Summer St.	305	196	0	79.4	196	0.0	16
11	C14	Russia Wharf (balcony)	81	203	23	21.1	203	6.0	23
47	A11	Atlantic Center (intake)	61	210	8	16.0	210	2.0	30
18	C3	Stone & Webster Building	339	211	69	88.3	211	17.9	31
20	C6	Russia Wharf East Bldg. (roof)	97	227	30	25.4	227	7.9	47
19	C5	Fed Reserve Intake #3	248	230	159	64.7	230	41.4	50
22	C8	Fed Reserve Intake #2	251	232	30	65.4	232	7.7	52
21	C7	South Station	353	233	27	92.0	233	7.1	53
46	A10	Atlantic Center (roof)	48	235	69	12.5	235	18.1	55
23	C9	South Station (Street)	338	237	0	88.0	237	0.0	57
24	C4	One Financial Center (roof)	419	240	185	109.1	240	48.3	60
25	C10	One Financial Center (street)	336	241	0	87.4	241	0.0	61
26	C11	Fed Reserve (street)	153	250	0	39.9	250	0.0	70
15	D19	Summer St/ Purchase St.	391	251	0	101.9	251	0.0	71
27	C12	Keystone Building (intake)	220	268	58	57.4	268	15.2	88
28	C13	Keystone Building (street)	188	271	0	48.9	271	0.0	91
29	D1	Bldg betw High St. & Matthews	275	276	122	71.6	276	31.7	96
35	D18	100 Federal St. (intake)	335	281	176	87.3	281	45.7	101
30	D2	Western Union Building	183	285	53	47.7	285	13.9	105
31	D3	Road House	153	288	18	39.7	288	4.8	108
37	D20	Congress Street	306	293	0	79.8	293	0.0	113
32	D4	125 High Street Building	174	300	69	45.3	300	17.9	120
33	D5	NYNEX	300	302	101	78.1	302	26.2	122
36	D7	State Street Bank Building	256	319	143	66.7	319	37.3	139
34	D6	New Fire House	118	319	7	30.7	319	1.9	139
39	D11	Oliver St. & High St.	244	331	0	63.6	331	0.0	151
38	D10	21 Story Tower	205	331	70	53.3	331	18.3	151
40	D12	Shops on Purchase & Olive	136	333	22	35.5	333	5.8	153
41	D17	Bldg. on India & Milk (roof)	501	341	40	130.5	341	10.4	161
42	D13	International Place (street)	143	353	0	37.3	353	0.0	173
44	D16	Bldg. on Broad & High (roof)	308	359	21	80.3	359	5.6	179

note A) at plume height, i.e., for 2,5,8,12 m/s wind Z=121.9,109.7,97.5,85.3 m field and Z=31.7,28.57,25.4,22.2 cm model

Table 17 Concentration Sampling Locations

Model Concentration Settings - Wind Speed = 2 m/s

Run No.	Wind Dir. (deg)	FIELD CONDITIONS			MODEL CONDITIONS			File Name *.GC	GC Seq. No.
		Upwind Fetch Type	Wind Speed (m/s)*	Exit Speed (m/s)	Upwind Fetch Type	Wind Speed (cm/s)*	Flow Rate (ccs)		
100	0	City	2.0	7.3	8' - 2"	224	4798	E00	199
101	10	City	2.0	7.3	8' - 2"	224	4798	E01	200
102	20	Harbor	2.0	7.3	carpet	224	4798	E02	202
103	30	Harbor	2.0	7.3	carpet	224	4798	E03	203
104	40	Harbor	2.0	7.3	carpet	224	4798	E04	204
105	50	Harbor	2.0	7.3	carpet	224	4798	E05	205
106	60	Harbor	2.0	7.3	carpet	224	4798	E06	206
107	70	Harbor	2.0	7.3	carpet	224	4798	E07	207
108	80	Harbor	2.0	7.3	carpet	224	4798	E08	208
109	90	Harbor	2.0	7.3	carpet	224	4798	E09	209
110	100	Harbor	2.0	7.3	carpet	224	4798	E10	210
111	110	City/Sub	2.0	7.3	Full 1"	224	4798	E11	172
112	120	City/Sub	2.0	7.3	Full 1"	224	4798	E12	173
113	130	City/Sub	2.0	7.3	Full 1"	224	4798	E13	174
114	140	City/Sub	2.0	7.3	Full 1"	224	4798	E14	175
115	150	City/Sub	2.0	7.3	Full 1"	224	4798	E15	177
116	160	City/Sub	2.0	7.3	Full 1"	224	4798	E16	178
117	170	City/Sub	2.0	7.3	Full 1"	224	4798	E17	179
118	180	City/Sub	2.0	7.3	Full 1"	224	4798	E18	180
119	190	City/Sub	2.0	7.3	Full 1"	224	4798	E19	181
120	200	City/Sub	2.0	7.3	Full 1"	224	4798	E20	182
121	210	City/Sub	2.0	7.3	Full 1"	224	4798	E21	201
122	220	City	2.0	7.3	8' - 2"	224	4798	E22	184
123	230	City	2.0	7.3	8' - 2"	224	4798	E23	185
124	240	City	2.0	7.3	8' - 2"	224	4798	E24	186
125	250	City	2.0	7.3	8' - 2"	224	4798	E25	187
126	260	City	2.0	7.3	8' - 2"	224	4798	E26	188
127	270	City	2.0	7.3	8' - 2"	224	4798	E27	189
128	280	City	2.0	7.3	8' - 2"	224	4798	E28	190
129	290	City	2.0	7.3	8' - 2"	224	4798	E29	191
130	300	City	2.0	7.3	8' - 2"	224	4798	E30	192
131	310	City	2.0	7.3	8' - 2"	224	4798	E31	193
132	320	City	2.0	7.3	8' - 2"	224	4798	E32	194
133	330	City	2.0	7.3	8' - 2"	224	4798	E33	195
134	340	City	2.0	7.3	8' - 2"	224	4798	E34	196
135	350	City	2.0	7.3	8' - 2"	224	4798	E35	198

* Wind Ref. Heights

Field = 10 meters

Model = 1.56m (600m/384)

Model Flow Rate

Air Set = 100SLPM Unit at 95.5%

C2H6 Set 5SLPM Unit at 39.4%

Table 18 Concentration Test Conditions - 2 m/s Wind

Model Concentration Settings - Wind Speed = 5 m/s

Run No.	Wind Dir. (deg)	FIELD CONDITIONS			MODEL CONDITIONS			File Name *.GC	GC Seq. No.
		Upwind Fetch Type	Wind Speed (m/s)*	Exit Speed (m/s)	Upwind Fetch Type	Wind Speed (cm/s)*	Flow Rate (ccs)		
200	0	City	5.0	7.3	8' - 2"	224	1939	B00	116
201	10	City	5.0	7.3	8' - 2"	224	1939	B01	120
202	20	Harbor	5.0	7.3	carpet	224	1939	F02	211
203	30	Harbor	5.0	7.3	carpet	224	1939	F03	212
204	40	Harbor	5.0	7.3	carpet	224	1939	F04	213
205	50	Harbor	5.0	7.3	carpet	224	1939	F05	214
206	60	Harbor	5.0	7.3	carpet	224	1939	F06	215
207	70	Harbor	5.0	7.3	carpet	224	1939	F07	216
208	80	Harbor	5.0	7.3	carpet	224	1939	F08	217
209	90	Harbor	5.0	7.3	carpet	224	1939	F09	218
210	100	Harbor	5.0	7.3	carpet	224	1939	F10	219
211	110	City/Sub	5.0	7.3	Full 1"	224	1939	B11	10,14
212	120	City/Sub	5.0	7.3	Full 1"	224	1939	B12	20
213	130	City/Sub	5.0	7.3	Full 1"	224	1939	B13	24
214	140	City/Sub	5.0	7.3	Full 1"	224	1939	B14	28
215	150	City/Sub	5.0	7.3	Full 1"	224	1939	B15	32
216	160	City/Sub	5.0	7.3	Full 1"	224	1939	B16	36
217	170	City/Sub	5.0	7.3	Full 1"	224	1939	B17	40
218	180	City/Sub	5.0	7.3	Full 1"	224	1939	B18	44
219	190	City/Sub	5.0	7.3	Full 1"	224	1939	B19	48,165
220	200	City/Sub	5.0	7.3	Full 1"	224	1939	B20	52,161
221	210	City/Sub	5.0	7.3	Full 1"	224	1939	B21	56
222	220	City	5.0	7.3	8' - 2"	224	1939	B22	60
223	230	City	5.0	7.3	8' - 2"	224	1939	B23	64
224	240	City	5.0	7.3	8' - 2"	224	1939	B24	68
225	250	City	5.0	7.3	8' - 2"	224	1939	B25	72
226	260	City	5.0	7.3	8' - 2"	224	1939	B26	76
227	270	City	5.0	7.3	8' - 2"	224	1939	B27	80
228	280	City	5.0	7.3	8' - 2"	224	1939	B28	84
229	290	City	5.0	7.3	8' - 2"	224	1939	B29	88
230	300	City	5.0	7.3	8' - 2"	224	1939	B30	92
231	310	City	5.0	7.3	8' - 2"	224	1939	B31	96
232	320	City	5.0	7.3	8' - 2"	224	1939	B32	100
233	330	City	5.0	7.3	8' - 2"	224	1939	B33	104
234	340	City	5.0	7.3	8' - 2"	224	1939	B34	108
235	350	City	5.0	7.3	8' - 2"	224	1939	B35	112

* Wind Ref. Heights

Field = 10 meters

Model = 1.56m (600m/384)

Model Flow Rate

Air Set = 100SLPM Unit at 95.5%

C2H6 Set 5SLPM Unit at 39.4%

Table 19 Concentration Test Conditions - 5 m/s Wind

Model Concentration Settings - Wind Speed = 8 m/s

Run No.	Wind Dir. (deg)	FIELD CONDITIONS			MODEL CONDITIONS			File Name *.GC	GC Seq. No.
		Upwind Fetch Type	Wind Speed (m/s)*	Exit Speed (m/s)	Upwind Fetch Type	Wind Speed (cm/s)*	Flow Rate (ccs)		
300	0	City	8.0	7.3	8' - 2"	358	1939	C00	117
301	10	City	8.0	7.3	8' - 2"	358	1939	C01	121
302	20	Harbor	8.0	7.3	carpet	358	1939	G02	220
303	30	Harbor	8.0	7.3	carpet	358	1939	G03	221
304	40	Harbor	8.0	7.3	carpet	358	1939	G04	222
305	50	Harbor	8.0	7.3	carpet	358	1939	G05	223
306	60	Harbor	8.0	7.3	carpet	358	1939	G06	224
307	70	Harbor	8.0	7.3	carpet	358	1939	G07	225
308	80	Harbor	8.0	7.3	carpet	358	1939	G08	226
309	90	Harbor	8.0	7.3	carpet	358	1939	G09	227
310	100	Harbor	8.0	7.3	carpet	358	1939	G10	228
311	110	City/Sub	8.0	7.3	Full 1"	358	1939	C11	11,15
312	120	City/Sub	8.0	7.3	Full 1"	358	1939	C12	21
313	130	City/Sub	8.0	7.3	Full 1"	358	1939	C13	25
314	140	City/Sub	8.0	7.3	Full 1"	358	1939	C14	29
315	150	City/Sub	8.0	7.3	Full 1"	358	1939	C15	33
316	160	City/Sub	8.0	7.3	Full 1"	358	1939	C16	37
317	170	City/Sub	8.0	7.3	Full 1"	358	1939	C17	41
318	180	City/Sub	8.0	7.3	Full 1"	358	1939	C18	45
319	190	City/Sub	8.0	7.3	Full 1"	358	1939	C19	49,166
320	200	City/Sub	8.0	7.3	Full 1"	358	1939	C20	53,160
321	210	City/Sub	8.0	7.3	Full 1"	358	1939	C21	57
322	220	City	8.0	7.3	8' - 2"	358	1939	C22	61
323	230	City	8.0	7.3	8' - 2"	358	1939	C23	65
324	240	City	8.0	7.3	8' - 2"	358	1939	C24	69
325	250	City	8.0	7.3	8' - 2"	358	1939	C25	73
326	260	City	8.0	7.3	8' - 2"	358	1939	C26	77
327	270	City	8.0	7.3	8' - 2"	358	1939	C27	81
328	280	City	8.0	7.3	8' - 2"	358	1939	C28	85
329	290	City	8.0	7.3	8' - 2"	358	1939	C29	89
330	300	City	8.0	7.3	8' - 2"	358	1939	C30	93
331	310	City	8.0	7.3	8' - 2"	358	1939	C31	97
332	320	City	8.0	7.3	8' - 2"	358	1939	C32	101
333	330	City	8.0	7.3	8' - 2"	358	1939	C33	105
334	340	City	8.0	7.3	8' - 2"	358	1939	C34	109
335	350	City	8.0	7.3	8' - 2"	358	1939	C35	113

* Wind Ref. Heights

Field = 10 meters

Model = 1.56m (600m/384)

Model Flow Rate

Air Set = 100SLPM Unit at 95.5%

C2H6 Set 5SLPM Unit at 39.4%

Table 20 Concentration Test Conditions - 8 m/s Wind

Model Concentration Settings - Wind Speed = 12 m/s

Run No.	Wind Dir. (deg)	FIELD CONDITIONS			MODEL CONDITIONS			File Name *.GC	GC Seq. No.
		Upwind Fetch Type	Wind Speed (m/s)*	Exit Speed (m/s)	Upwind Fetch Type	Wind Speed (cm/s)*	Flow Rate (ccs)		
400	0	City	12.0	7.3	8' - 2"	537	1939	D00	118
401	10	City	12.0	7.3	8' - 2"	537	1939	D01	122
402	20	Harbor	12.0	7.3	carpet	537	1939	H02	229
403	30	Harbor	12.0	7.3	carpet	537	1939	H03	230
404	40	Harbor	12.0	7.3	carpet	537	1939	H04	231
405	50	Harbor	12.0	7.3	carpet	537	1939	H05	232
406	60	Harbor	12.0	7.3	carpet	537	1939	H06	233
407	70	Harbor	12.0	7.3	carpet	537	1939	H07	234
408	80	Harbor	12.0	7.3	carpet	537	1939	H08	235
409	90	Harbor	12.0	7.3	carpet	537	1939	H09	236
410	100	Harbor	12.0	7.3	carpet	537	1939	H10	237
411	110	City/Sub	12.0	7.3	Full 1"	537	1939	D11	12,16
412	120	City/Sub	12.0	7.3	Full 1"	537	1939	D12	22
413	130	City/Sub	12.0	7.3	Full 1"	537	1939	D13	26
414	140	City/Sub	12.0	7.3	Full 1"	537	1939	D14	30
415	150	City/Sub	12.0	7.3	Full 1"	537	1939	D15	34
416	160	City/Sub	12.0	7.3	Full 1"	537	1939	D16	38
417	170	City/Sub	12.0	7.3	Full 1"	537	1939	D17	42
418	180	City/Sub	12.0	7.3	Full 1"	537	1939	D18	46
419	190	City/Sub	12.0	7.3	Full 1"	537	1939	D19	50,167
420	200	City/Sub	12.0	7.3	Full 1"	537	1939	D20	54,159
421	210	City/Sub	12.0	7.3	Full 1"	537	1939	D21	58
422	220	City	12.0	7.3	8' - 2"	537	1939	D22	62
423	230	City	12.0	7.3	8' - 2"	537	1939	D23	66
424	240	City	12.0	7.3	8' - 2"	537	1939	D24	70
425	250	City	12.0	7.3	8' - 2"	537	1939	D25	74
426	260	City	12.0	7.3	8' - 2"	537	1939	D26	78
427	270	City	12.0	7.3	8' - 2"	537	1939	D27	82
428	280	City	12.0	7.3	8' - 2"	537	1939	D28	86
429	290	City	12.0	7.3	8' - 2"	537	1939	D29	90
430	300	City	12.0	7.3	8' - 2"	537	1939	D30	94
431	310	City	12.0	7.3	8' - 2"	537	1939	D31	98
432	320	City	12.0	7.3	8' - 2"	537	1939	D32	102
433	330	City	12.0	7.3	8' - 2"	537	1939	D33	106
434	340	City	12.0	7.3	8' - 2"	537	1939	D34	110
435	350	City	12.0	7.3	8' - 2"	537	1939	D35	114

* Wind Ref. Heights

Field = 10 meters

Model = 1.56m (600m/384)

Model Flow Rate

Air Set = 100SLPM Unit at 95.5%

C2H6 Set 5SLPM Unit at 39.4%

Table 21 Concentration Test Conditions - 12 m/s Wind

Model Conc. Results - Wind Speed ~ 2 m/s

			Run No. =			100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	118	117
			Wind Direction (deg) =			0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
Point No.	Recept. ID	Receptor Description	X (m)	Y (Deg)	Z (m)	Model Concentrations normalized by source conc. and corrected for background conc. (i.e., Dilution Ratios in ppm)																	
						(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
43	D14	International Place (intake)	197	0	13														0	0	0	90	94
2	A1	Harbor Tower I (plume ht.)	397	16	var																0	0	0
3	A2	Harbor Towers (pool)	386	18	0																0	0	20
45	A8	Harbor Tower II (plume ht.)	468	21	var																	0	0
4	A3	Boston Harbor Hotel	277	25	37																	0	0
6	A5	Rowe's Wharf	345	32	33																		
5	A4	Coast Guard Bldg. (street)	147	36	0																		
7	A6	Coast Guard Bldg. (roof)	160	37	32																		
10	A9	Coast Guard Building (windows)	154	41	23																		
1	A7	Harbor Plaza	39	76	53																		
8	B1	Federal Courthouse (roof)	305	87	40																		
9	B2	Victoria Station Rest.	253	118	4																		
12	B5	Children's Museum	284	134	0	21																	
13	B6	Congress Street	439	147	0	0	0																
14	B7	Boston Tea Party Museum	204	163	0	16	0	0	0	0													
16	C1	Congress St. & Dorchester Ave	195	188	0	196	553	376	80	0	0												
17	C2	Dorchester Ave. & Summer St.	305	196	0	211	1058	1848	1041	42	0	0											
11	C14	Russia Wharf (balcony)	81	203	23	17	231	640	261	42	0	0	0										
47	A11	Atlantic Center (intake)	61	210	8	0	0	106	36	10	0	0	2	0	0								
18	C3	Stone & Webster Building	339	211	69	30	951	7785	6899	1815	45	0	11	2	0								
20	C6	Russia Wharf East Bldg. (roof)	97	227	30	0	93	900	644	190	127	43	15	6	0								
19	C5	Fed Reserve Intake #3	248	230	159	0	60	566	2111	16017	73595	53794	12037	186	2	9							
22	C8	Fed Reserve Intake #2	251	232	30	0	8	199	221	591	1304	722	24	1	0	1							
21	C7	South Station	353	233	27	0	26	330	1242	495	957	1359	182	4	0	0							
46	A10	Atlantic Center (roof)	48	235	69	0	38	42	53	141	335	56	62	391	62	8	2						
23	C9	South Station (Street)	338	237	0		21	240	883	376	520	549	31	1	0	11	0						
24	C4	One Financial Center (roof)	419	240	185		0	23	2	15	315	33613	33109	463	12	14	0						
25	C10	One Financial Center (street)	336	241	0		78	148	190	449	435	59	15	11	25	0							
26	C11	Fed Reserve (street)	153	250	0		0	0	0	11	11	5	3	39	0	0							
15	D19	Summer St./ Purchase St.	391	251	0				34	59	81	28	33	71	205	318	1	0					
27	C12	Keystone Building (intake)	220	268	58					7	0	0	7	1	814	1965	113	0	0				
28	C13	Keystone Building (street)	188	271	0						0	0	6	0	2	14	3	2	0	0			
29	D1	Bldg betw High St. & Matthews	275	276	125						0	4	6	6	2309	10299	1638	175	0	0			
35	D18	100 Federal St. (intake)	335	281	176							0	6	19	129	10014	27367	11616	106	0	0		
30	D2	Western Union Building	183	285	53							0	6	0	0	39	136	118	15	0	0		
31	D3	Road House	153	288	18							0	5	0	0	10	0	8	11	0	0		
37	D20	Congress Street	306	293	0								0	0	15	193	155	140	2	0	0	0	0
32	D4	125 High Street Building	174	300	69								10	0	0	47	214	764	269	12	0	0	0
33	D5	NYNEX	300	302	122									0	12	439	2833	3222	313	2	0	0	0
36	D7	State Street Bank Building	256	319	143										0	24	37	160	1289	3447	3218	397	0
34	D6	New Fire House	118	319	7										0	14	0	0	0	0	0	0	0
39	D11	Oliver St. & High St.	244	331	0												0	0	4	0	0	0	4
38	D10	21 Story Tower	205	331	70												0	0	0	0	38	156	98
40	D12	Shops on Purchase & Olive	136	333	22												0	0	0	0	0	0	0
41	D17	Bldg. on India & Milk (roof)	501	341	40													0	0	4	1297	2507	2577
42	D13	International Place (street)	143	353	0													0	0	0	0	10	0
44	D16	Bldg. on Broad & High (roof)	308	359	21													0	0	0	0	57	492
Model Wind Speed (cm/s at 156cm) =						230	224	221	224	222	230	222	222	225	223	222	225	231	226	229	226	226	228
Model Flow rate (ccs) =						4847	4847	4847	4847	4847	4847	4847	4847	4847	4847	4847	4847	4847	4847	4847	4847	4847	4847

Table 22 Conc. Dilution Ratio Results - 2 m/s Wind - 0 to 170 degrees

Model Conc. Results - Wind Speed ~2 m/s

			Run No. =		118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
			Wind Direction (deg) =		180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350
Point No.	Recept. ID	Receptor Description	X (m)	Y (Deg)	Z (m)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
43	D14	International Place (intake)	197	0	13	35	0	0	0	0	0											
2	A1	Harbor Tower I (plume ht.)	397	16	var	1403	9788	14410	4038	266	34	44										
3	A2	Harbor Towers (pool)	386	18	0	175	192	182	210	57	39	48										
45	A8	Harbor Tower II (plume ht.)	468	21	var	30	4743	16871	12047	1269	102	26	0									
4	A3	Boston Harbor Hotel	277	25	37	45	77	196	529	102	28	47	19									
6	A5	Rowe's Wharf	345	32	33	0	0	445	2261	1000	202	169	90	139								
5	A4	Coast Guard Bldg. (street)	147	36	0	0	0	0	0	3	14	11	0									
7	A6	Coast Guard Bldg. (roof)	160	37	32	0	0	4	122	18	3	16	20	0								
10	A9	Coast Guard Building (windows)	154	41	23	0	0	0	35	0	46	63	13	0	35							
1	A7	Harbor Plaza	39	76	53			0	0	0	45	81	30	9	119	118	18	20				
8	B1	Federal Courthouse (roof)	305	87	40					0	39	70	102	429	2568	2247	1078	70	0			
9	B2	Victoria Station Rest.	253	118	4								23	0	32	65	232	1010	312	75	0	0
12	B5	Children's Museum	284	134	0										0	26	79	250	420	405	178	44
13	B6	Congress Street	439	147	0											0	0	84	1300	1891	1103	481
14	B7	Boston Tea Party Museum	204	163	0													11	76	413	157	38
16	C1	Congress St. & Dorchester Ave	195	188	0															68	71	51
17	C2	Dorchester Ave. & Summer St.	305	196	0																0	8
11	C14	Russia Wharf (balcony)	81	203	23																	4
47	A11	Atlantic Center (intake)	61	210	8																	0
18	C3	Stone & Webster Building	339	211	69																	0
20	C6	Russia Wharf East Bldg. (roof)	97	227	30																	0
19	C5	Fed Reserve Intake #3	248	230	159																	
22	C8	Fed Reserve Intake #2	251	232	30																	
21	C7	South Station	353	233	27																	
46	A10	Atlantic Center (roof)	48	235	69																	
23	C9	South Station (Street)	338	237	0																	
24	C4	One Financial Center (roof)	419	240	185																	
25	C10	One Financial Center (street)	336	241	0																	
26	C11	Fed Reserve (street)	153	250	0																	
15	D19	Summer St./ Purchase St.	391	251	0																	
27	C12	Keystone Building (intake)	220	268	58																	
28	C13	Keystone Building (street)	188	271	0																	
29	D1	Bldg betw High St. & Matthews	275	276	125																	
35	D18	100 Federal St. (intake)	335	281	176																	
30	D2	Western Union Building	183	285	53																	
31	D3	Road House	153	288	18																	
37	D20	Congress Street	306	293	0																	
32	D4	125 High Street Building	174	300	69																	
33	D5	NYNEX	300	302	122																	
36	D7	State Street Bank Building	256	319	143	0																
34	D6	New Fire House	118	319	7	0																
39	D11	Oliver St. & High St.	244	331	0	0	0	0														
38	D10	21 Story Tower	205	331	70	0	0	0														
40	D12	Shops on Purchase & Olive	136	333	22	0	0	0														
41	D17	Bldg. on India & Milk (roof)	501	341	40	1379	305	0	0													
42	D13	International Place (street)	143	353	0	0	0	0	0													
44	D16	Bldg. on Broad & High (roof)	308	359	21	713	58	0	0	0												
Model Wind Speed (cm/s at 156cm) =						228	226	223	228	227	229	222	226	226	226	225	227	228	228	227	226	221
Model Flow rate (ccs) =						4847	4847	4847	4847	4847	4847	4847	4847	4847	4847	4847	4847	4847	4847	4847	4847	4847

Table 23 Conc. Dilution Ratio Results - 2 m/s Wind - 180 to 350 degrees

Model Conc. Results - Wind Speed ~5 m/s

			Run No. =			200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217
			Wind Direction (deg) =			0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
Point No.	Recept. ID	Receptor Description	X	Y	Z	Model Concentrations normalized by source conc. and corrected for background conc. (i.e., Dilution Ratios in ppm)																	
			(m)	(Deg)	(m)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
43	D14	International Place (intake)	197	0	13														16	1	119	2747	2275
2	A1	Harbor Tower I (plume ht.)	397	16	var																0	9	341
3	A2	Harbor Towers (pool)	386	18	0																0	92	1962
45	A8	Harbor Tower II (plume ht.)	468	21	var																7	23	
4	A3	Boston Harbor Hotel	277	25	37																	69	1139
6	A5	Rowe's Wharf	345	32	33																		
5	A4	Coast Guard Bldg. (street)	147	36	0																		
7	A6	Coast Guard Bldg. (roof)	160	37	32																		
10	A9	Coast Guard Building (windows)	154	41	23																		
1	A7	Harbor Plaza	39	76	53																		
8	B1	Federal Courthouse (roof)	305	87	40																		
9	B2	Victoria Station Rest.	253	118	4																		
12	B5	Children's Museum	284	134	0	19																	
13	B6	Congress Street	439	147	0	21	0																
14	B7	Boston Tea Party Museum	204	163	0	68	20	0	0														
16	C1	Congress St. & Dorchester Ave	195	188	0	1451	3627	2975	1332	100	0												
17	C2	Dorchester Ave. & Summer St.	305	196	0	1413	5831	8565	7502	2273	10	0											
11	C14	Russia Wharf (balcony)	81	203	23	323	1820	4568	2804	501	280	0	0										
47	A11	Atlantic Center (intake)	61	210	8	31	80	741	501	140	110	20	10	10	10								
18	C3	Stone & Webster Building	339	211	69	223	1993	10619	18990	15152	701	10	0	10	10								
20	C6	Russia Wharf East Bldg. (roof)	97	227	30	67	1211	6391	6891	2263	1262	260	150	60	60								
19	C5	Fed Reserve Intake #3	248	230	159	36	7	30	50	180	2403	9473	900	30	30	60							
22	C8	Fed Reserve Intake #2	251	232	30	40	212	821	1783	4416	10405	4041	40	10	0	0							
21	C7	South Station	353	233	27	38	476	1693	6981	5378	6349	5042	120	10	0	10							
46	A10	Atlantic Center (roof)	48	235	69	176	553	771	1302	2123	5938	9873	8744	4242	1651	691	48						
23	C9	South Station (Street)	338	237	0		494	1102	4457	3926	4476	4171	250	50	30	40	6						
24	C4	One Financial Center (roof)	419	240	185		6	20	30	20	20	1440	1781	40	30	30	0						
25	C10	One Financial Center (street)	336	241	0			341	982	1592	4006	5702	1191	350	540	540	17						
26	C11	Fed Reserve (street)	153	250	0			0	0	0	160	520	530	250	781	1561	114	127					
15	D19	Summer St./ Purchase St.	391	251	0				280	501	1082	1160	1381	2411	6725	8338	342	291					
27	C12	Keystone Building (intake)	220	268	58					0	0	10	10	840	13949	31264	2778	359	5				
28	C13	Keystone Building (street)	188	271	0						0	10	10	130	410	310	585	1218	156	27			
29	D1	Bldg betw High St. & Matthews	275	276	125						0	10	0	20	2632	28822	8716	768	3	0			
35	D18	100 Federal St. (intake)	335	281	176							10	20	170	140	761	16991	3271	41	0	0		
30	D2	Western Union Building	183	285	53							10	0	10	110	1061	5295	5681	752	131	0		
31	D3	Road House	153	288	18							10	10	10	10	20	212	1695	1009	240	0		
37	D20	Congress Street	306	293	0							0	40	1461	5074	3651	3664	566	106	27	0		
32	D4	125 High Street Building	174	300	69							0	10	20	200	1905	12529	5950	931	117	1	8	
33	D5	NYNEX	300	302	122								20	50	1561	11805	19875	1859	210	0	0	5	
36	D7	State Street Bank Building	256	319	143										10	10	47	858	16364	20277	12447	927	30
34	D6	New Fire House	118	319	7										10	10	24	79	33	9	41	0	2
39	D11	Oliver St. & High St.	244	331	0												2	628	652	360	301	666	372
38	D10	21 Story Tower	205	331	70												8	8	93	325	2064	5444	1078
40	D12	Shops on Purchase & Olive	136	333	22												2	1	34	15	176	410	106
41	D17	Bldg. on India & Milk (roof)	501	341	40													0	35	106	2268	10143	5990
42	D13	International Place (street)	143	353	0														10	0	48	596	443
44	D16	Bldg. on Broad & High (roof)	308	359	21														19	4	105	2561	7059
Model Wind Speed (cm/s at 156cm) =						227	223	228	223	219	221	220	222	220	219	223	225	227	224	229	225	229	228
Model Flow rate (ccs) =						1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939

Table 24 Conc. Dilution Ratio Results - 5 m/s Wind - 0 to 170 degrees

Model Conc. Results - Wind Speed ≈ 5 m/s

Run No. =					218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	
Wind Direction (deg) =					180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	
Point No.	Recept. ID	Receptor Description	X	Y	Z																		
			(m)	(Deg)	(m)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	
43	D14	International Place (intake)	197	0	13	664	61	3	6	0	0												
2	A1	Harbor Tower I (plume ht.)	397	16	var	4349	14731	11106	1956	162	0	1											
3	A2	Harbor Towers (pool)	386	18	0	2180	1829	1385	970	156	0	1											
45	A8	Harbor Tower II (plume ht.)	468	21	var	340	6080	16051	6321	446	0	1	0										
4	A3	Boston Harbor Hotel	277	25	37	1170	1222	2277	2339	379	11	40	43										
6	A5	Rowe's Wharf	345	32	33	10	148	3075	8025	2692	568	441	414	900									
5	A4	Coast Guard Bldg. (street)	147	36	0	123	122	141	190	88	48	22	0	60									
7	A6	Coast Guard Bldg. (roof)	160	37	32	84	143	417	956	229	177	159	43	151									
10	A9	Coast Guard Building (windows)	154	41	23	83	109	311	570	236	147	50	414	109	78								
1	A7	Harbor Plaza	39	76	53			27	47	29	155	809	0	2178	1785	343	199	99					
8	B1	Federal Courthouse (roof)	305	87	40				0	0	23	43	3079	6388	3025	1587	258	13					
9	B2	Victoria Station Rest.	253	118	4							414	24	244	357	1116	2739	1699	359	0	0		
12	B5	Children's Museum	284	134	0									28	115	410	962	2199	3011	92	15	10	
13	B6	Congress Street	439	147	0										2	39	357	3110	7736	1820	641	110	
14	B7	Boston Tea Party Museum	204	163	0												168	1049	4367	1616	760	391	
16	C1	Congress St. & Dorchester Ave	195	188	0														1655	1071	1410	1274	
17	C2	Dorchester Ave. & Summer St.	305	196	0															176	152	198	
11	C14	Russia Wharf (balcony)	81	203	23																659	425	
47	A11	Atlantic Center (intake)	61	210	8																203	33	
18	C3	Stone & Webster Building	339	211	69																	55	
20	C6	Russia Wharf East Bldg. (roof)	97	227	30																		
19	C5	Fed Reserve Intake #3	248	230	159																		
22	C8	Fed Reserve Intake #2	251	232	30																		
21	C7	South Station	353	233	27																		
46	A10	Atlantic Center (roof)	48	235	69																		
23	C9	South Station (Street)	338	237	0																		
24	C4	One Financial Center (roof)	419	240	185																		
25	C10	One Financial Center (street)	336	241	0																		
26	C11	Fed Reserve (street)	153	250	0																		
15	D19	Summer St./ Purchase St.	391	251	0																		
27	C12	Keystone Building (intake)	220	268	58																		
28	C13	Keystone Building (street)	188	271	0																		
29	D1	Bldg betw High St. & Matthews	275	276	125																		
35	D18	100 Federal St. (intake)	335	281	176																		
30	D2	Western Union Building	183	285	53																		
31	D3	Road House	153	288	18																		
37	D20	Congress Street	306	293	0																		
32	D4	125 High Street Building	174	300	69																		
33	D5	NYNEX	300	302	122																		
36	D7	State Street Bank Building	256	319	143	0																	
34	D6	New Fire House	118	319	7	0																	
39	D11	Oliver St. & High St.	244	331	0	47	4	0															
38	D10	21 Story Tower	205	331	70	241	16	2															
40	D12	Shops on Purchase & Olive	136	333	22	0	4	0															
41	D17	Bldg. on India & Milk (roof)	501	341	40	1518	613	73	14														
42	D13	International Place (street)	143	353	0	128	10	0	0	0													
44	D16	Bldg. on Broad & High (roof)	308	359	21	2611	394	41	1	0													
Model Wind Speed (cm/s at 156cm) =						222	225	224	223	232	227	229	231	225	224	223	225	227	230	230	236	227	227
Model Flow rate (ccs) =						1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939

Table 25 Conc. Dilution Ratio Results - 5 m/s Wind - 180 to 350 degrees

Model Conc. Results - Wind Speed ~ 8 m/s

Run No. =				300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317
Wind Direction (deg) =				0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
Point No.	Recept. ID	Receptor Description	X (m)	Y (Deg)	Z (m)	Model Concentrations normalized by source conc. and corrected for background conc. (i.e., Dilution Ratios in ppm)															
43	D14	International Place (intake)	197	0	13												8	32	476	3548	4158
2	A1	Harbor Tower I (plume ht.)	397	16	var														0	21	328
3	A2	Harbor Towers (pool)	386	18	0														0	139	2117
45	A8	Harbor Tower II (plume ht.)	468	21	var															20	25
4	A3	Boston Harbor Hotel	277	25	37															98	1277
6	A5	Rowe's Wharf	345	32	33																
5	A4	Coast Guard Bldg. (street)	147	36	0																
7	A6	Coast Guard Bldg. (roof)	160	37	32																
10	A9	Coast Guard Building (windows)	154	41	23																
1	A7	Harbor Plaza	39	76	53																
8	B1	Federal Courthouse (roof)	305	87	40																
9	B2	Victoria Station Rest.	253	118	4																
12	B5	Children's Museum	284	134	0	9															
13	B6	Congress Street	439	147	0	7	0														
14	B7	Boston Tea Party Museum	204	163	0	118	54	20	0												
16	C1	Congress St. & Dorchester Ave	195	188	0	2217	4824	4604	1852	160	0										
17	C2	Dorchester Ave. & Summer St.	305	196	0	2291	7553	11940	8738	2152	10	10									
11	C14	Russia Wharf (balcony)	81	203	23	595	3359	7727	3824	911	410	10	0								
47	A11	Atlantic Center (intake)	61	210	8	24	184	1281	731	270	220	60	20	20	40						
18	C3	Stone & Webster Building	339	211	69	307	2581	9919	17096	10591	340	10	0	10	20						
20	C6	Russia Wharf East Bldg. (roof)	97	227	30	94	2148	11140	9779	3924	2343	670	450	150	150						
19	C5	Fed Reserve Intake #3	248	230	159	18	2	30	20	100	1702	5411	420	30	60	60					
22	C8	Fed Reserve Intake #2	251	232	30	28	266	1261	3013	6747	13585	4541	50	10	10	10					
21	C7	South Station	353	233	27	23	850	3583	8728	6597	8049	4721	80	10	10	10					
46	A10	Atlantic Center (roof)	48	235	69	392	1726	2722	2843	3834	10461	23033	20757	7736	4914	2833	555				
23	C9	South Station (Street)	338	237	0		881	2652	6436	4935	6397	4661	310	60	30	20	0				
24	C4	One Financial Center (roof)	419	240	185		0	30	90	30	20	690	620	40	50	40	0				
25	C10	One Financial Center (street)	336	241	0			741	1591	2422	6087	6981	1771	570	1071	631	116				
26	C11	Fed Reserve (street)	153	250	0			10	10	10	390	1010	1250	550	2182	3403	697	632			
15	D19	Summer St./ Purchase St.	391	251	0				520	941	2353	1950	2441	3893	11610	9159	1287	721			
27	C12	Keystone Building (intake)	220	268	58				20	10	10	0	1361	13292	23102	5340	1140	58			
28	C13	Keystone Building (street)	188	271	0					0	10	0	320	1461	430	2190	3090	1223	19		
29	D1	Bldg betw High St. & Matthews	275	276	125					10	10	0	20	2742	14024	5832	1507	47	0		
35	D18	100 Federal St. (intake)	335	281	176						20	10	250	130	450	6247	1489	45	0	0	
30	D2	Western Union Building	183	285	53						10	0	10	90	1471	12355	12888	3481	238	0	
31	D3	Road House	153	288	18						10	0	10	10	854	2846	3892	598	3		
37	D20	Congress Street	306	293	0							0	70	2512	5315	7553	7798	2064	102	0	6
32	D4	125 High Street Building	174	300	69							0	0	10	200	3057	11436	13348	2838	116	10
33	D5	NYNEX	300	302	122								0	60	1231	10768	15839	4207	471	0	5
36	D7	State Street Bank Building	256	319	143								0	10	32	673	12309	19042	8969	915	20
34	D6	New Fire House	118	319	7								0	0	7	60	117	125	309	12	7
39	D11	Oliver St. & High St.	244	331	0										0	299	1225	936	994	907	837
38	D10	21 Story Tower	205	331	70										0	21	92	1844	4699	6477	2081
40	D12	Shops on Purchase & Olive	136	333	22										0	2	101	215	934	724	285
41	D17	Bldg. on India & Milk (roof)	501	341	40											0	24	270	2838	7075	4692
42	D13	International Place (street)	143	353	0												3	20	380	1023	783
44	D16	Bldg. on Broad & High (roof)	308	359	21												6	23	340	2528	6749
Model Wind Speed (cm/s at 156cm) =				356	362	356	358	358	359	363	360	359	358	359	353	367	353	361	351	352	354
Model Flow rate (ccs) =				1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939

Table 26 Conc. Dilution Ratio Results - 8 m/s Wind - 0 to 170 degrees

Model Conc. Results - Wind Speed ~8 m/s

Point No.	Receptor ID	Receptor Description	Run No. =			318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335
			Wind Direction (deg) =			180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350
			X	Y	Z	(m)	(Deg)	(m)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
43	D14	International Place (intake)	197	0	13	935	75	0	0	0	14												
2	A1	Harbor Tower I (plume ht.)	397	16	var	3318	10558	7454	1244	67	15	7											
3	A2	Harbor Towers (pool)	386	18	0	3359	2497	1834	1234	183	29	14											
45	A8	Harbor Tower II (plume ht.)	468	21	var	290	4771	10236	3754	333	26	2	0										
4	A3	Boston Harbor Hotel	277	25	37	1896	2007	3420	2686	382	65	31	63										
6	A5	Rowe's Wharf	345	32	33	27	226	3601	7775	2515	720	334	453	782									
5	A4	Coast Guard Bldg. (street)	147	36	0	157	149	323	463	245	104	69	0	91									
7	A6	Coast Guard Bldg. (roof)	160	37	32	139	295	1019	2051	735	242	146	63	233									
10	A9	Coast Guard Building (windows)	154	41	23	126	154	657	1166	677	242	120	453	137	118								
1	A7	Harbor Plaza	39	76	53			84	135	140	256	1090	0	5491	5246	738	659	247					
8	B1	Federal Courthouse (roof)	305	87	40					0	20	22	63	2466	6664	2304	1289	302	14				
9	B2	Victoria Station Rest.	253	118	4								453	12	231	568	1167	2811	3018	321	0	11	
12	B5	Children's Museum	284	134	0										0	127	349	904	2717	3588	54	18	7
13	B6	Congress Street	439	147	0											3	99	377	3191	7406	2636	503	70
14	B7	Boston Tea Party Museum	204	163	0													222	1171	5212	4316	1430	530
16	C1	Congress St. & Dorchester Ave	195	188	0															1915	3127	2946	2329
17	C2	Dorchester Ave. & Summer St.	305	196	0																214	230	405
11	C14	Russia Wharf (balcony)	81	203	23																	1971	973
47	A11	Atlantic Center (intake)	61	210	8																	844	53
18	C3	Stone & Webster Building	339	211	69																		97
20	C6	Russia Wharf East Bldg. (roof)	97	227	30																		
19	C5	Fed Reserve Intake #3	248	230	159																		
22	C8	Fed Reserve Intake #2	251	232	30																		
21	C7	South Station	353	233	27																		
46	A10	Atlantic Center (roof)	48	235	69																		
23	C9	South Station (Street)	338	237	0																		
24	C4	One Financial Center (roof)	419	240	185																		
25	C10	One Financial Center (street)	336	241	0																		
26	C11	Fed Reserve (street)	153	250	0																		
15	D19	Summer St. / Purchase St.	391	251	0																		
27	C12	Keystone Building (intake)	220	268	58																		
28	C13	Keystone Building (street)	188	271	0																		
29	D1	Bldg betw High St. & Matthews	275	276	125																		
35	D18	100 Federal St. (intake)	335	281	176																		
30	D2	Western Union Building	183	285	53																		
31	D3	Road House	153	288	18																		
37	D20	Congress Street	306	293	0																		
32	D4	125 High Street Building	174	300	69																		
33	D5	NYNEX	300	302	122																		
36	D7	State Street Bank Building	256	319	143																		
34	D6	New Fire House	118	319	7																		
39	D11	Oliver St. & High St.	244	331	0																		
38	D10	21 Story Tower	205	331	70																		
40	D12	Shops on Purchase & Olive	136	333	22																		
41	D17	Bldg. on India & Milk (roof)	501	341	40																		
42	D13	International Place (street)	143	353	0																		
44	D16	Bldg. on Broad & High (roof)	308	359	21																		
Model Wind Speed (cm/s at 156cm) =						355	354	359	363	362	355	350	361	357	358	352	364	355	355	352	356	357	356
Model Flow rate (ccs) =						1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939

Table 27 Conc. Dilution Ratio Results - 8 m/s Wind - 180 to 350 degrees

Model Conc. Results - Wind Speed ~ 12 m/s

			Run No. =			400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417
			Wind Direction (deg) =			0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
Point No	Recpt. ID	Receptor Description	X	Y	Z	Model Concentrations normalized by source conc. and corrected for background conc. (i.e., Dilution Ratios in ppm)																	
			(m)	(Deg)	(m)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
43	D14	International Place (intake)	197	0	13														6	133	667	4084	4195
2	A1	Harbor Tower I (plume ht.)	397	16	var																0	21	509
3	A2	Harbor Towers (pool)	386	18	0																0	164	2150
45	A8	Harbor Tower II (plume ht.)	468	21	var																	3	43
4	A3	Boston Harbor Hotel	277	25	37																	113	1281
6	A5	Rowe's Wharf	345	32	33																		
5	A4	Coast Guard Bldg. (street)	147	36	0																		
7	A6	Coast Guard Bldg. (roof)	160	37	32																		
10	A9	Coast Guard Building (windows)	154	41	23																		
1	A7	Harbor Plaza	39	76	53																		
8	B1	Federal Courthouse (roof)	305	87	40																		
9	B2	Victoria Station Rest.	253	118	4																		
12	B5	Children's Museum	284	134	0	5																	
13	B6	Congress Street	439	147	0	9	5																
14	B7	Boston Tea Party Museum	204	163	0	189	110	30	0														
16	C1	Congress St. & Dorchester Ave	195	188	0	3709	6979	4995	2423	270	20												
17	C2	Dorchester Ave. & Summer St.	305	196	0	3429	9235	11472	8431	2303	30	10											
11	C14	Russia Wharf (balcony)	81	203	23	1051	5394	7918	3875	1142	551	20	10										
47	A11	Atlantic Center (intake)	61	210	8	26	319	1431	811	350	290	80	20	10	40								
18	C3	Stone & Webster Building	339	211	69	466	3098	8429	12165	7540	260	20	20	10	20								
20	C6	Russia Wharf East Bldg. (roof)	97	227	30	198	3311	11922	10063	4726	2734	1202	771	200	220								
19	C5	Fed Reserve Intake #3	248	230	159	11	11	20	10	60	1202	3565	300	20	60	100							
22	C8	Fed Reserve Intake #2	251	232	30	25	308	1261	2914	6719	12867	5077	70	10	10	0							
21	C7	South Station	353	233	27	23	1007	4044	7930	6288	7710	4727	130	10	10	0							
46	A10	Atlantic Center (roof)	48	235	69	1566	4298	5816	4666	4676	11536	27829	27359	8321	10174	8542	1681						
23	C9	South Station (Street)	338	237	0		1132	3153	6058	4947	6489	4927	431	70	50	40	7						
24	C4	One Financial Center (roof)	419	240	185		6	30	70	20	20	240	190	30	60	40	0						
25	C10	One Financial Center (street)	336	241	0			761	1292	2423	6018	7280	2333	721	1212	1011	118						
26	C11	Fed Reserve (street)	153	250	0			20	10	10	511	1212	1923	641	2293	4877	1062	628					
15	D19	Summer St./ Purchase St.	391	251	0				491	1041	2473	2524	3405	3585	9614	8522	1535	488					
27	C12	Keystone Building (intake)	220	268	58					0	10	10	20	1041	6589	12558	5548	977	66				
28	C13	Keystone Building (street)	188	271	0						0	0	10	230	1252	371	3123	3019	1056	54			
29	D1	Bldg betw High St. & Matthews	275	276	125						0	0	10	10	1682	5708	4205	986	44	0			
35	D18	100 Federal St. (intake)	335	281	176							10	20	250	60	80	2205	416	11	0	0		
30	D2	Western Union Building	183	285	53							0	10	0	60	501	14933	14626	3968	247	0		
31	D3	Road House	153	288	18							0	10	0	20	10	1124	3781	4451	671	12		
37	D20	Congress Street	306	293	0							0	60	1742	3184	8725	7733	2209	143	6	0		
32	D4	125 High Street Building	174	300	69							10	0	10	70	2954	13892	13103	2502	202	0	23	
33	D5	NYNEX	300	302	122								0	40	451	7668	10846	4067	444	4	0	15	
36	D7	State Street Bank Building	256	319	143								0	0	35	1240	10296	13527	5779	542	25		
34	D6	New Fire House	118	319	7								0	0	17	18	173	327	389	19	17		
39	D11	Oliver St. & High St.	244	331	0											5	548	1305	1208	1083	1029	891	
38	D10	21 Story Tower	205	331	70											13	9	325	2691	5166	5939	1996	
40	D12	Shops on Purchase & Olive	136	333	22											3	0	218	578	1300	968	302	
41	D17	Bldg. on India & Milk (roof)	501	341	40												0	30	433	2545	5496	3062	
42	D13	International Place (street)	143	353	0													2	102	569	1213	881	
44	D16	Bldg. on Broad & High (roof)	308	359	21													7	61	503	3092	5491	
Model Wind Speed (cm/s at 156cm) =						541	538	538	540	539	535	536	535	538	535	535	532	531	539	537	532	538	537
Model Flow rate (ccs) =						1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939

Table 28 Conc. Dilution Ratio Results - 12 m/s Wind - 0 to 170 degrees

Model Conc. Results - Wind Speed ~12 m/s

Model Conc. Results - Wind Speed = 12 m/s					Run No. =		418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435
Wind Direction (deg) =							180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350
Point No.	Recpt. ID	Receptor Description	X (m)	Y (Deg)	Z (m)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
43	D14	International Place (intake)	197	0	13	737	81	0	0	0	23													
2	A1	Harbor Tower I (plume ht.)	397	16	var	3000	7297	4676	620	14	18	8												
3	A2	Harbor Towers (pool)	386	18	0	3216	2454	2011	1064	148	46	18												
45	A8	Harbor Tower II (plume ht.)	468	21	var	386	4003	6264	2119	116	21	9	7											
4	A3	Boston Harbor Hotel	277	25	37	1923	2372	3615	2325	255	50	24	74											
6	A5	Rowe's Wharf	345	32	33	48	385	4075	7238	2205	650	362	405	894										
5	A4	Coast Guard Bldg. (street)	147	36	0	234	250	446	631	375	177	94	7	124										
7	A6	Coast Guard Bldg. (roof)	160	37	32	157	493	1433	2401	811	320	189	74	250										
10	A9	Coast Guard Building (windows)	154	41	23	149	290	950	1621	864	343	183	405	204	213									
1	A7	Harbor Plaza	39	76	53			195	275	243	344	1947	7	10560	7279	1477	627	976						
8	B1	Federal Courthouse (roof)	305	87	40					0	16	11	74	2309	4935	1944	1279	259	23					
9	B2	Victoria Station Rest.	253	118	4								405	13	254	702	1058	3195	3061	288	42	0		
12	B5	Children's Museum	284	134	0											7	181	404	1077	3499	3597	78	1	3
13	B6	Congress Street	439	147	0												0	75	339	2637	6680	2537	609	63
14	B7	Boston Tea Party Museum	204	163	0														234	1616	5863	3741	1925	693
16	C1	Congress St. & Dorchester Ave	195	188	0																2112	2785	3340	3364
17	C2	Dorchester Ave. & Summer St.	305	196	0																259	233	486	
11	C14	Russia Wharf (balcony)	81	203	23																		2527	1228
47	A11	Atlantic Center (intake)	61	210	8																		898	45
18	C3	Stone & Webster Building	339	211	69																			98
20	C6	Russia Wharf East Bldg. (roof)	97	227	30																			
19	C5	Fed Reserve Intake #3	248	230	159																			
22	C8	Fed Reserve Intake #2	251	232	30																			
21	C7	South Station	353	233	27																			
46	A10	Atlantic Center (roof)	48	235	69																			
23	C9	South Station (Street)	338	237	0																			
24	C4	One Financial Center (roof)	419	240	185																			
25	C10	One Financial Center (street)	336	241	0																			
26	C11	Fed Reserve (street)	153	250	0																			
15	D19	Summer St./ Purchase St.	391	251	0																			
27	C12	Keystone Building (intake)	220	268	58																			
28	C13	Keystone Building (street)	188	271	0																			
29	D1	Bldg betw High St. & Matthews	275	276	125																			
35	D18	100 Federal St. (intake)	335	281	176																			
30	D2	Western Union Building	183	285	53																			
31	D3	Road House	153	288	18																			
37	D20	Congress Street	306	293	0																			
32	D4	125 High Street Building	174	300	69																			
33	D5	NYNEX	300	302	122																			
36	D7	State Street Bank Building	256	319	143	3																		
34	D6	New Fire House	118	319	7	11																		
39	D11	Oliver St. & High St.	244	331	0	131	11	0																
38	D10	21 Story Tower	205	331	70	130	12	0																
40	D12	Shops on Purchase & Olive	136	333	22	24	6	0																
41	D17	Bldg. on India & Milk (roof)	501	341	40	862	442	56	13															
42	D13	International Place (street)	143	353	0	227	14	0	0	0														
44	D16	Bldg. on Broad & High (roof)	308	359	21	1834	201	20	0	0														
Model Wind Speed (cm/s at 156cm) =						540	534	533	546	543	535	538	539	540	538	547	540	546	538	533	545	544	545	
Model Flow rate (ccs) =						1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	

Table 29 Conc. Dilution Ratio Results - 12 m/s Wind - 180 to 350 degrees

Field Conc. Results - Wind Speed ~ 2 m/s

					Run No. =	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	
					Wind Direction (deg) =	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	
Point No.	Recpt. ID	Receptor Description	X (m)	Y (Deg)	Z (m)	Field Normalized Concentrations $K = 10^{-6} \cdot X/UQ$																		
			(m)	(Deg)	(m)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	
43	D14	International Place (intake)	197	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	A1	Harbor Tower I (plume ht.)	397	16	var	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	A2	Harbor Towers (pool)	386	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	A8	Harbor Tower II (plume ht.)	468	21	var	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	A3	Boston Harbor Hotel	277	25	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	A5	Rowe's Wharf	345	32	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	A4	Coast Guard Bldg. (street)	147	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	A6	Coast Guard Bldg. (roof)	160	37	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	A9	Coast Guard Building (windows)	154	41	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	A7	Harbor Plaza	39	76	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	B1	Federal Courthouse (roof)	305	87	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	B2	Victoria Station Rest.	253	118	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	B5	Children's Museum	284	134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	B6	Congress Street	439	147	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	B7	Boston Tea Party Museum	204	163	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	C1	Congress St. & Dorchester Ave	195	188	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	C2	Dorchester Ave. & Summer St.	305	196	0	0	2	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	C14	Russia Wharf (balcony)	81	203	23	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	A11	Atlantic Center (intake)	61	210	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	C3	Stone & Webster Building	339	211	69	0	2	13	12	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	C6	Russia Wharf East Bldg. (roof)	97	227	30	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	C5	Fed Reserve Intake #3	248	230	159	0	0	1	4	28	133	93	21	0	0	0	0	0	0	0	0	0	0	0
22	C8	Fed Reserve Intake #2	251	232	30	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0
21	C7	South Station	353	233	27	0	0	1	2	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0
46	A10	Atlantic Center (roof)	48	235	69	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
23	C9	South Station (Street)	338	237	0	0	0	0	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
24	C4	One Financial Center (roof)	419	240	185	0	0	0	0	0	1	58	57	1	0	0	0	0	0	0	0	0	0	0
25	C10	One Financial Center (street)	336	241	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
26	C11	Fed Reserve (street)	153	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	D19	Summer St./ Purchase St.	391	251	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
27	C12	Keystone Building (intake)	220	268	58	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0
28	C13	Keystone Building (street)	188	271	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	D1	Bldg betw High St. & Matthews	275	276	125	0	0	0	0	0	0	0	0	0	4	18	3	0	0	0	0	0	0	0
35	D18	100 Federal St. (intake)	335	281	176	0	0	0	0	0	0	0	0	0	0	17	48	21	0	0	0	0	0	0
30	D2	Western Union Building	183	285	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	D3	Road House	153	288	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	D20	Congress Street	306	293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	D4	125 High Street Building	174	300	69	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
33	D5	NYNEX	300	302	122	0	0	0	0	0	0	0	0	0	0	1	5	6	1	0	0	0	0	0
36	D7	State Street Bank Building	256	319	143	0	0	0	0	0	0	0	0	0	0	0	0	0	2	6	6	1	0	0
34	D6	New Fire House	118	319	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	D11	Oliver St. & High St.	244	331	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	D10	21 Story Tower	205	331	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	D12	Shops on Purchase & Olive	136	333	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	D17	Bldg. on India & Milk (roof)	501	341	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	5	0	0
42	D13	International Place (street)	143	353	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	D16	Bldg. on Broad & High (roof)	308	359	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Field Wind Speed (m/s at 10m airport) =						2.1	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	
Field Flow rate (m³3/s) =						1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143

Table 30 Conc. K Value Results - 2 m/s Wind - 0 to 170 degrees

Field Conc. Results - Wind Speed ~ 2 m/s

			Run No. =		118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
			Wind Direction (deg) =		180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350
Point No.	Recept. ID	Receptor Description	X (m)	Y (Deg)	Z (m)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)
43	D14	International Place (intake)	197	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	A1	Harbor Tower I (plume ht.)	397	16	var	2	17	25	7	0	0	0	0	0	0	0	0	0	0	0	0	0
3	A2	Harbor Towers (pool)	386	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	A8	Harbor Tower II (plume ht.)	468	21	var	0	8	29	21	2	0	0	0	0	0	0	0	0	0	0	0	0
4	A3	Boston Harbor Hotel	277	25	37	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6	A5	Rowe's Wharf	345	32	33	0	0	1	4	2	0	0	0	0	0	0	0	0	0	0	0	0
5	A4	Coast Guard Bldg. (street)	147	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	A6	Coast Guard Bldg. (roof)	160	37	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	A9	Coast Guard Building (windows)	154	41	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	A7	Harbor Plaza	39	76	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	B1	Federal Courthouse (roof)	305	87	40	0	0	0	0	0	0	0	1	5	4	2	0	0	0	0	0	0
9	B2	Victoria Station Rest.	253	118	4	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0
12	B5	Children's Museum	284	134	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
13	B6	Congress Street	439	147	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	2	1	0
14	B7	Boston Tea Party Museum	204	163	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
16	C1	Congress St. & Dorchester Ave	195	188	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	C2	Dorchester Ave. & Summer St.	305	196	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	C14	Russia Wharf (balcony)	81	203	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	A11	Atlantic Center (intake)	61	210	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	C3	Stone & Webster Building	339	211	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	C6	Russia Wharf East Bldg. (roof)	97	227	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	C5	Fed Reserve Intake #3	248	230	159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	C8	Fed Reserve Intake #2	251	232	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	C7	South Station	353	233	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	A10	Atlantic Center (roof)	48	235	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	C9	South Station (Street)	338	237	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	C4	One Financial Center (roof)	419	240	185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	C10	One Financial Center (street)	336	241	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	C11	Fed Reserve (street)	153	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	D19	Summer St./ Purchase St.	391	251	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	C12	Keystone Building (intake)	220	268	-58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	C13	Keystone Building (street)	188	271	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	D1	Bldg betw High St. & Matthews	275	276	125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	D18	100 Federal St. (intake)	335	281	176	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	D2	Western Union Building	183	285	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	D3	Road House	153	288	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	D20	Congress Street	306	293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	D4	125 High Street Building	174	300	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	D5	NYNEX	300	302	122	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	D7	State Street Bank Building	256	319	143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	D6	New Fire House	118	319	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	D11	Oliver St. & High St.	244	331	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	D10	21 Story Tower	205	331	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	D12	Shops on Purchase & Olive	136	333	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	D17	Bldg. on India & Milk (roof)	501	341	40	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	D13	International Place (street)	143	353	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	D16	Bldg. on Broad & High (roof)	308	359	21	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Field Wind Speed (m/s at 10m airport) =						2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
Field Flow rate (m ³ /s) =						1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143

Table 31 Conc. K Value Results - 2 m/s Wind - 180 to 350 degrees

Field Conc. Results - Wind Speed ≈ 5 m/s

			Run No. =			200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217
			Wind Direction (deg) =			0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
Point No.	Recept. ID	Receptor Description	X (m)	Y (Deg)	Z (m)	Field Normalized Concentrations $K = 10^{-6} \cdot X \cdot U / Q$																	
			(m)	(Deg)	(m)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)	(m ⁻²)
43	D14	International Place (intake)	197	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	12	10
2	A1	Harbor Tower I (plume ht.)	397	16	var	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
3	A2	Harbor Towers (pool)	386	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
45	A8	Harbor Tower II (plume ht.)	468	21	var	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	A3	Boston Harbor Hotel	277	25	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
6	A5	Rowe's Wharf	345	32	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	A4	Coast Guard Bldg. (street)	147	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	A6	Coast Guard Bldg. (roof)	160	37	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	A9	Coast Guard Building (windows)	154	41	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	A7	Harbor Plaza	39	76	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	B1	Federal Courthouse (roof)	305	87	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	B2	Victoria Station Rest.	253	118	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	B5	Children's Museum	284	134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	B6	Congress Street	439	147	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	B7	Boston Tea Party Museum	204	163	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	C1	Congress St. & Dorchester Ave	195	188	0	6	16	13	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	C2	Dorchester Ave. & Summer St.	305	196	0	6	25	38	33	10	0	0	0	0	0	0	0	0	0	0	0	0	0
11	C14	Russia Wharf (balcony)	81	203	23	1	8	20	12	2	1	0	0	0	0	0	0	0	0	0	0	0	0
47	A11	Atlantic Center (intake)	61	210	8	0	0	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
18	C3	Stone & Webster Building	339	211	69	1	9	47	83	65	3	0	0	0	0	0	0	0	0	0	0	0	0
20	C6	Russia Wharf East Bldg. (roof)	97	227	30	0	5	28	30	10	5	1	1	0	0	0	0	0	0	0	0	0	0
19	C5	Fed Reserve Intake #3	248	230	159	0	0	0	0	1	10	41	4	0	0	0	0	0	0	0	0	0	0
22	C8	Fed Reserve Intake #2	251	232	30	0	1	4	8	19	45	17	0	0	0	0	0	0	0	0	0	0	0
21	C7	South Station	353	233	27	0	2	8	30	23	27	22	1	0	0	0	0	0	0	0	0	0	0
46	A10	Atlantic Center (roof)	48	235	69	1	2	3	6	9	26	43	38	18	7	3	0	0	0	0	0	0	0
23	C9	South Station (Street)	338	237	0	0	2	5	19	17	19	18	1	0	0	0	0	0	0	0	0	0	0
24	C4	One Financial Center (roof)	419	240	185	0	0	0	0	0	6	8	0	0	0	0	0	0	0	0	0	0	0
25	C10	One Financial Center (street)	336	241	0	0	0	2	4	7	17	25	5	2	2	2	0	0	0	0	0	0	0
26	C11	Fed Reserve (street)	153	250	0	0	0	0	0	0	1	2	2	1	3	7	1	1	0	0	0	0	0
15	D19	Summer St./ Purchase St.	391	251	0	0	0	0	1	2	5	5	6	10	29	36	2	1	0	0	0	0	0
27	C12	Keystone Building (intake)	220	268	58	0	0	0	0	0	0	0	0	-4	60	136	12	2	0	0	0	0	0
28	C13	Keystone Building (street)	188	271	0	0	0	0	0	0	0	0	0	1	2	1	3	5	1	0	0	0	0
29	D1	Bldg betw High St. & Matthews	275	276	125	0	0	0	0	0	0	0	0	0	11	126	38	3	0	0	0	0	0
35	D18	100 Federal St. (intake)	335	281	176	0	0	0	0	0	0	0	0	1	1	3	75	15	0	0	0	0	0
30	D2	Western Union Building	183	285	53	0	0	0	0	0	0	0	0	0	0	5	23	25	3	1	0	0	0
31	D3	Road House	153	288	18	0	0	0	0	0	0	0	0	0	0	0	1	8	4	1	0	0	0
37	D20	Congress Street	306	293	0	0	0	0	0	0	0	0	0	0	6	22	16	16	2	0	0	0	0
32	D4	125 High Street Building	174	300	69	0	0	0	0	0	0	0	0	0	0	1	8	56	26	4	1	0	0
33	D5	NYNEX	300	302	122	0	0	0	0	0	0	0	0	0	0	7	52	88	8	1	0	0	0
36	D7	State Street Bank Building	256	319	143	0	0	0	0	0	0	0	0	0	0	0	4	72	91	55	4	0	0
34	D6	New Fire House	118	319	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	D11	Oliver St. & High St.	244	331	0	0	0	0	0	0	0	0	0	0	0	0	3	3	2	1	3	2	2
38	D10	21 Story Tower	205	331	70	0	0	0	0	0	0	0	0	0	0	0	0	0	1	9	24	5	5
40	D12	Shops on Purchase & Olive	136	333	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0
41	D17	Bldg. on India & Milk (roof)	501	341	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	45	27	27
42	D13	International Place (street)	143	353	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	2
44	D16	Bldg. on Broad & High (roof)	308	359	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	32	32
Field Wind Speed (m/s at 10m airport) =						5.1	5.0	5.1	5.0	4.9	4.9	4.9	5.0	4.9	4.9	5.0	5.0	5.1	5.0	5.1	5.0	5.1	5.1
Field Flow rate (m ³ /s) =						1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143

Table 32 Conc. K Value Results - 5 m/s Wind - 0 to 170 degrees

Field Conc. Results - Wind Speed ~ 5 m/s

			Run No. =		218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235
			Wind Direction (deg) =		180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350
Point No.	Recept. ID	Receptor Description	X (m)	Y (Deg)	Z (m)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)
43	D14	International Place (intake)	197	0	13	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	A1	Harbor Tower I (plume ht.)	397	16	var	19	65	49	9	1	0	0	0	0	0	0	0	0	0	0	0	0
3	A2	Harbor Towers (pool)	386	18	0	9	8	6	4	1	0	0	0	0	0	0	0	0	0	0	0	0
45	A8	Harbor Tower II (plume ht.)	468	21	var	1	27	70	27	2	0	0	0	0	0	0	0	0	0	0	0	0
4	A3	Boston Harbor Hotel	277	25	37	5	5	10	10	2	0	0	0	0	0	0	0	0	0	0	0	0
6	A5	Rowe's Wharf	345	32	33	0	1	13	35	12	3	2	2	4	0	0	0	0	0	0	0	0
5	A4	Coast Guard Bldg. (street)	147	36	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7	A6	Coast Guard Bldg. (roof)	160	37	32	0	1	2	4	1	1	1	0	1	0	0	0	0	0	0	0	0
10	A9	Coast Guard Building (windows)	154	41	23	0	0	1	2	1	1	0	2	0	0	0	0	0	0	0	0	0
1	A7	Harbor Plaza	39	76	53	0	0	0	0	0	1	4	0	10	8	1	1	0	0	0	0	0
8	B1	Federal Courthouse (roof)	305	87	40	0	0	0	0	0	0	0	0	14	28	13	7	1	0	0	0	0
9	B2	Victoria Station Rest.	253	118	4	0	0	0	0	0	0	0	2	0	1	2	5	12	8	2	0	0
12	B5	Children's Museum	284	134	0	0	0	0	0	0	0	0	0	0	0	1	2	4	10	14	0	0
13	B6	Congress Street	439	147	0	0	0	0	0	0	0	0	0	0	0	0	2	14	35	8	3	0
14	B7	Boston Tea Party Museum	204	163	0	0	0	0	0	0	0	0	0	0	0	0	1	5	20	7	3	2
16	C1	Congress St. & Dorchester Ave	195	188	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	5	6	6
17	C2	Dorchester Ave. & Summer St.	305	196	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
11	C14	Russia Wharf (balcony)	81	203	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2
47	A11	Atlantic Center (intake)	61	210	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
18	C3	Stone & Webster Building	339	211	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	C6	Russia Wharf East Bldg. (roof)	97	227	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	C5	Fed Reserve Intake #3	248	230	159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	C8	Fed Reserve Intake #2	251	232	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	C7	South Station	353	233	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	A10	Atlantic Center (roof)	48	235	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	C9	South Station (Street)	338	237	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	C4	One Financial Center (roof)	419	240	185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	C10	One Financial Center (street)	336	241	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	C11	Fed Reserve (street)	153	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	D19	Summer St./ Purchase St.	391	251	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	C12	Keystone Building (intake)	220	268	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	C13	Keystone Building (street)	188	271	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	D1	Bldg betw High St. & Matthews	275	276	125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	D18	100 Federal St. (intake)	335	281	176	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	D2	Western Union Building	183	285	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	D3	Road House	153	288	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	D20	Congress Street	306	293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	D4	125 High Street Building	174	300	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	D5	NYNEX	300	302	122	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	D7	State Street Bank Building	256	319	143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	D6	New Fire House	118	319	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	D11	Oliver St. & High St.	244	331	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	D10	21 Story Tower	205	331	70	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	D12	Shops on Purchase & Olive	136	333	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	D17	Bldg. on India & Milk (roof)	501	341	40	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	D13	International Place (street)	143	353	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	D16	Bldg. on Broad & High (roof)	308	359	21	11	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Field Wind Speed (m/s at 10m airport) =						5.0	5.0	5.0	5.0	5.2	5.1	5.1	5.2	5.0	5.0	5.0	5.0	5.1	5.1	5.1	5.3	5.1
Field Flow rate (m ³ /s) =						1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143

Table 33 Conc. K Value Results - 5 m/s Wind - 180 to 350 degrees

Field Conc. Results - Wind Speed ~ 8 m/s

Run No. =				300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317
Wind Direction (deg) =				0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
Point No.	Recept. ID	Receptor Description	X (m)	Y (Deg)	Z (m)	Field Normalized Concentrations $K = 10^{-6} \cdot X \cdot U / Q$															
			(m)	(Deg)	(m)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)
43	D14	International Place (intake)	197	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	3	24	29
2	A1	Harbor Tower I (plume ht.)	397	16	var	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
3	A2	Harbor Towers (pool)	386	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	15
45	A8	Harbor Tower II (plume ht.)	468	21	var	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	A3	Boston Harbor Hotel	277	25	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	9
6	A5	Rowe's Wharf	345	32	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	A4	Coast Guard Bldg. (street)	147	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	A6	Coast Guard Bldg. (roof)	160	37	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	A9	Coast Guard Building (windows)	154	41	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	A7	Harbor Plaza	39	76	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	B1	Federal Courthouse (roof)	305	87	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	B2	Victoria Station Rest.	253	118	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	B5	Children's Museum	284	134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	B6	Congress Street	439	147	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	B7	Boston Tea Party Museum	204	163	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	C1	Congress St. & Dorchester Ave	195	188	0	15	34	32	13	1	0	0	0	0	0	0	0	0	0	0	0
17	C2	Dorchester Ave. & Summer St.	305	196	0	16	53	83	61	15	0	0	0	0	0	0	0	0	0	0	0
11	C14	Russia Wharf (balcony)	81	203	23	4	24	54	27	6	3	0	0	0	0	0	0	0	0	0	0
47	A11	Atlantic Center (intake)	61	210	8	0	1	9	5	2	2	0	0	0	0	0	0	0	0	0	0
18	C3	Stone & Webster Building	339	211	69	2	18	69	120	74	2	0	0	0	0	0	0	0	0	0	0
20	C6	Russia Wharf East Bldg. (roof)	97	227	30	1	15	78	68	27	16	5	3	1	1	0	0	0	0	0	0
19	C5	Fed Reserve Intake #3	248	230	159	0	0	0	0	1	12	38	3	0	0	0	0	0	0	0	0
22	C8	Fed Reserve Intake #2	251	232	30	0	2	9	21	47	95	32	0	0	0	0	0	0	0	0	0
21	C7	South Station	353	233	27	0	6	25	61	46	56	33	1	0	0	0	0	0	0	0	0
46	A10	Atlantic Center (roof)	48	235	69	3	12	19	20	27	73	163	146	54	34	20	4	0	0	0	0
23	C9	South Station (Street)	338	237	0	0	6	18	45	35	45	33	2	0	0	0	0	0	0	0	0
24	C4	One Financial Center (roof)	419	240	185	0	0	0	1	0	0	5	4	0	0	0	0	0	0	0	0
25	C10	One Financial Center (street)	336	241	0	0	0	5	11	17	43	50	12	4	8	4	1	0	0	0	0
26	C11	Fed Reserve (street)	153	250	0	0	0	0	0	0	3	7	9	4	15	24	5	5	0	0	0
15	D19	Summer St / Purchase St.	391	251	0	0	0	0	4	7	16	14	17	27	81	64	9	5	0	0	0
27	C12	Keystone Building (intake)	220	268	58	0	0	0	0	0	0	0	10	93	162	37	8	0	0	0	0
28	C13	Keystone Building (street)	188	271	0	0	0	0	0	0	0	0	2	10	3	15	22	8	0	0	0
29	D1	Bldg betw High St. & Matthews	275	276	125	0	0	0	0	0	0	0	0	19	98	40	11	0	0	0	0
35	D18	100 Federal St. (intake)	335	281	176	0	0	0	0	0	0	0	2	1	3	43	11	0	0	0	0
30	D2	Western Union Building	183	285	53	0	0	0	0	0	0	0	0	1	10	85	92	24	2	0	0
31	D3	Road House	153	288	18	0	0	0	0	0	0	0	0	0	0	6	20	27	4	0	0
37	D20	Congress Street	306	293	0	0	0	0	0	0	0	0	0	18	37	52	56	14	1	0	0
32	D4	125 High Street Building	174	300	69	0	0	0	0	0	0	0	0	0	1	21	82	92	20	1	0
33	D5	NYNEX	300	302	122	0	0	0	0	0	0	0	0	0	9	74	114	29	3	0	0
36	D7	State Street Bank Building	256	319	143	0	0	0	0	0	0	0	0	0	0	5	85	134	61	6	0
34	D6	New Fire House	118	319	7	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0
39	D11	Oliver St. & High St.	244	331	0	0	0	0	0	0	0	0	0	0	0	2	8	7	7	6	6
38	D10	21 Story Tower	205	331	70	0	0	0	0	0	0	0	0	0	0	0	1	13	32	45	14
40	D12	Shops on Purchase & Olive	136	333	22	0	0	0	0	0	0	0	0	0	0	0	1	2	6	5	2
41	D17	Bldg. on India & Milk (roof)	501	341	40	0	0	0	0	0	0	0	0	0	0	0	0	2	19	49	32
42	D13	International Place (street)	143	353	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	7	5
44	D16	Bldg. on Broad & High (roof)	308	359	21	0	0	0	0	0	0	0	0	0	0	0	0	0	2	17	47
Field Wind Speed (m/s at 10m airport) =						8.0	8.1	8.0	8.0	8.0	8.1	8.1	8.0	8.0	8.0	7.9	8.2	7.9	8.1	7.8	7.9
Field Flow rate (m ³ /s) =						1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143

Table 34 Conc. K Value Results - 8 m/s Wind - 0 to 170 degrees

Field Conc. Results - Wind Speed $\approx$ 8 m/s

			Run No. =		318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335
			Wind Direction (deg) =		180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350
Point No.	Recept. ID	Receptor Description	X (m)	Y (Deg)	Z (m)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)	(m ² -2)
43	D14	International Place (intake)	197	0	13	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	A1	Harbor Tower I (plume ht.)	397	16	var	23	73	52	9	0	0	0	0	0	0	0	0	0	0	0	0	0
3	A2	Harbor Towers (pool)	386	18	0	23	17	13	9	1	0	0	0	0	0	0	0	0	0	0	0	0
45	A8	Harbor Tower II (plume ht.)	468	21	var	2	33	72	27	2	0	0	0	0	0	0	0	0	0	0	0	0
4	A3	Boston Harbor Hotel	277	25	37	13	14	24	19	3	0	0	0	0	0	0	0	0	0	0	0	0
6	A5	Rowe's Wharf	345	32	33	0	2	25	55	18	5	2	3	5	0	0	0	0	0	0	0	0
5	A4	Coast Guard Bldg. (street)	147	36	0	1	1	2	3	2	1	0	0	1	0	0	0	0	0	0	0	0
7	A6	Coast Guard Bldg. (roof)	160	37	32	1	2	7	15	5	2	1	0	2	0	0	0	0	0	0	0	0
10	A9	Coast Guard Building (windows)	154	41	23	1	1	5	8	5	2	1	3	1	1	0	0	0	0	0	0	0
1	A7	Harbor Plaza	39	76	53	0	0	1	1	1	2	7	0	38	37	5	5	2	0	0	0	0
8	B1	Federal Courthouse (roof)	305	87	40	0	0	0	0	0	0	0	0	17	47	16	9	2	0	0	0	0
9	B2	Victoria Station Rest.	253	118	4	0	0	0	0	0	0	0	3	0	2	4	8	19	21	2	0	0
12	B5	Children's Museum	284	134	0	0	0	0	0	0	0	0	0	0	0	1	2	6	19	25	0	0
13	B6	Congress Street	439	147	0	0	0	0	0	0	0	0	0	0	0	1	3	22	51	18	4	0
14	B7	Boston Tea Party Museum	204	163	0	0	0	0	0	0	0	0	0	0	0	0	2	8	36	30	10	4
16	C1	Congress St. & Dorchester Ave	195	188	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	22	21	16
17	C2	Dorchester Ave. & Summer St.	305	196	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3
11	C14	Russia Wharf (balcony)	81	203	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	7
47	A11	Atlantic Center (intake)	61	210	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0
18	C3	Stone & Webster Building	339	211	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
20	C6	Russia Wharf East Bldg. (roof)	97	227	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	C5	Fed Reserve Intake #3	248	230	159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	C8	Fed Reserve Intake #2	251	232	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	C7	South Station	353	233	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	A10	Atlantic Center (roof)	48	235	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	C9	South Station (Street)	338	237	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	C4	One Financial Center (roof)	419	240	185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	C10	One Financial Center (street)	336	241	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	C11	Fed Reserve (street)	153	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	D19	Summer St./ Purchase St.	391	251	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	C12	Keystone Building (intake)	220	268	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	C13	Keystone Building (street)	188	271	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	D1	Bldg betw High St. & Matthews	275	276	125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	D18	100 Federal St. (intake)	335	281	176	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	D2	Western Union Building	183	285	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	D3	Road House	153	288	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	D20	Congress Street	306	293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	D4	125 High Street Building	174	300	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	D5	NYNEX	300	302	122	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	D7	State Street Bank Building	256	319	143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	D6	New Fire House	118	319	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	D11	Oliver St. & High St.	244	331	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	D10	21 Story Tower	205	331	70	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	D12	Shops on Purchase & Olive	136	333	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	D17	Bldg. on India & Milk (roof)	501	341	40	9	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	D13	International Place (street)	143	353	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	D16	Bldg. on Broad & High (roof)	308	359	21	17	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Field Wind Speed (m/s at 10m airport) =						7.9	7.9	8.0	8.1	8.1	7.9	7.8	8.1	8.0	8.0	7.9	8.1	7.9	7.9	8.0	8.0	8.0
Field Flow rate (m ³ /s) =						1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143

Table 35 Conc. K Value Results - 8 m/s Wind - 180 to 350 degrees

Field Conc. Results - Wind Speed ≈ 12 m/s

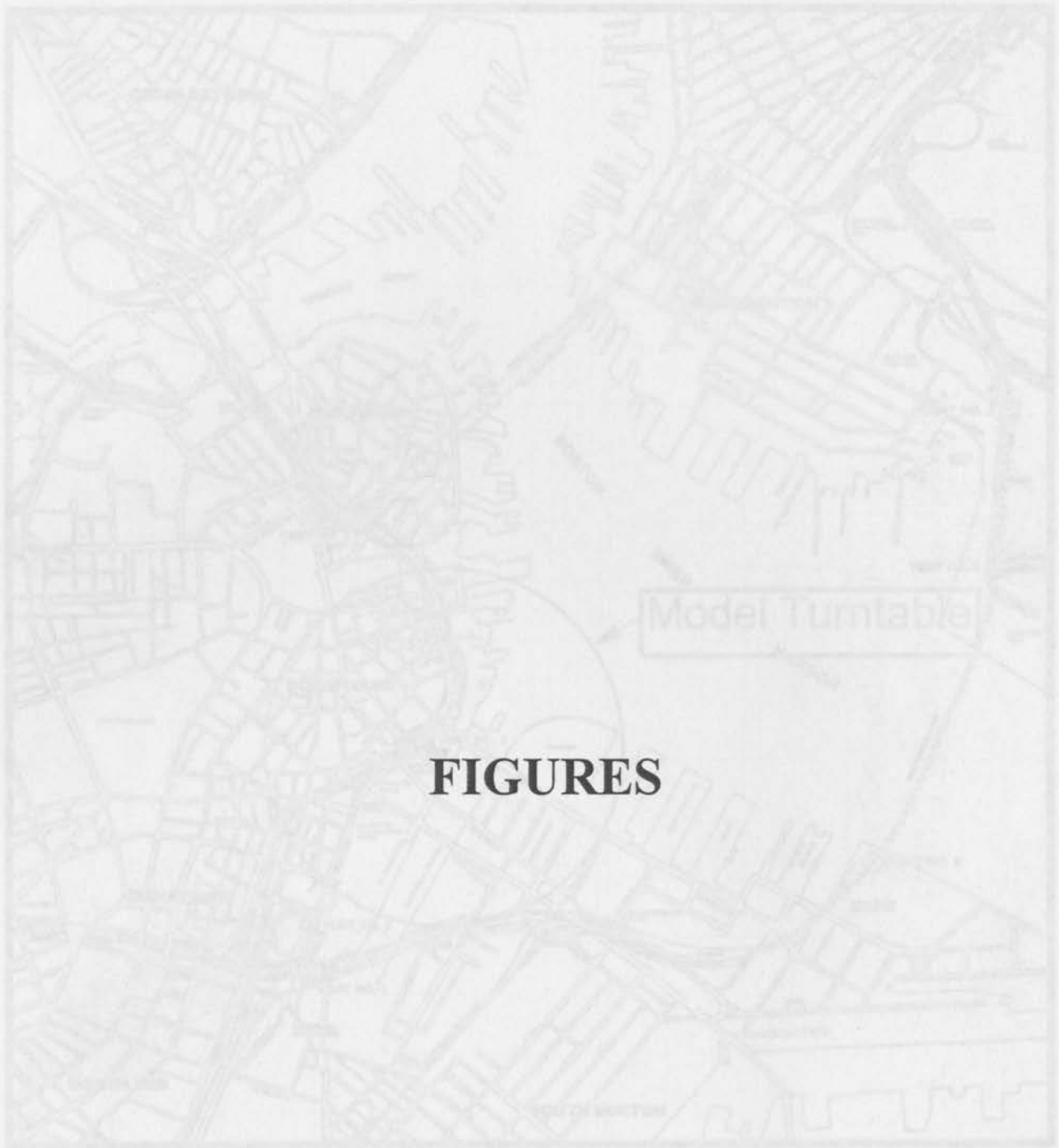
			Run No. =			400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417
			Wind Direction (deg) =			0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
Point No.	Recept. ID	Receptor Description	X (m)	Y (Deg)	Z (m)	Field Normalized Concentrations $K = 10^{-6} \cdot X U / Q$																	
			(m)	(Deg)	(m)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)	(m ² /s ²)
43	D14	International Place (intake)	197	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7	43	44
2	A1	Harbor Tower I (plume ht.)	397	16	var	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
3	A2	Harbor Towers (pool)	386	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	23
45	A8	Harbor Tower II (plume ht.)	468	21	var	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	A3	Boston Harbor Hotel	277	25	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	13
6	A5	Rowe's Wharf	345	32	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	A4	Coast Guard Bldg. (street)	147	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	A6	Coast Guard Bldg. (roof)	160	37	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	A9	Coast Guard Building (windows)	154	41	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	A7	Harbor Plaza	39	76	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	B1	Federal Courthouse (roof)	305	87	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	B2	Victoria Station Rest.	253	118	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	B5	Children's Museum	284	134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	B6	Congress Street	439	147	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	B7	Boston Tea Party Museum	204	163	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	C1	Congress St. & Dorchester Ave	195	188	0	39	73	53	26	3	0	0	0	0	0	0	0	0	0	0	0	0	0
17	C2	Dorchester Ave. & Summer St.	305	196	0	36	97	121	89	24	0	0	0	0	0	0	0	0	0	0	0	0	0
11	C14	Russia Wharf (balcony)	81	203	23	11	57	83	41	12	6	0	0	0	0	0	0	0	0	0	0	0	0
47	A11	Atlantic Center (intake)	61	210	8	0	3	15	9	4	3	1	0	0	0	0	0	0	0	0	0	0	0
18	C3	Stone & Webster Building	339	211	69	5	33	89	128	79	3	0	0	0	0	0	0	0	0	0	0	0	0
20	C6	Russia Wharf East Bldg. (roof)	97	227	30	2	35	125	106	50	29	13	8	2	2	0	0	0	0	0	0	0	0
19	C5	Fed Reserve Intake #3	248	230	159	0	0	0	0	1	13	37	3	0	1	1	0	0	0	0	0	0	0
22	C8	Fed Reserve Intake #2	251	232	30	0	3	13	31	71	135	53	1	0	0	0	0	0	0	0	0	0	0
21	C7	South Station	353	233	27	0	11	43	84	66	81	49	1	0	0	0	0	0	0	0	0	0	0
46	A10	Atlantic Center (roof)	48	235	69	17	45	61	49	49	121	291	286	87	106	89	17	0	0	0	0	0	0
23	C9	South Station (Street)	338	237	0	0	12	33	64	52	68	52	5	1	1	0	0	0	0	0	0	0	0
24	C4	One Financial Center (roof)	419	240	185	0	0	0	1	0	0	3	2	0	1	0	0	0	0	0	0	0	0
25	C10	One Financial Center (street)	336	241	0	0	0	8	14	26	63	76	24	8	13	11	1	0	0	0	0	0	0
26	C11	Fed Reserve (street)	153	250	0	0	0	0	0	0	5	13	20	7	24	51	11	7	0	0	0	0	0
15	D19	Summer St./ Purchase St.	391	251	0	0	0	0	5	11	26	26	36	38	100	89	16	5	0	0	0	0	0
27	C12	Keystone Building (intake)	220	268	58	0	0	0	0	0	0	0	0	11	69	131	58	10	1	0	0	0	0
28	C13	Keystone Building (street)	188	271	0	0	0	0	0	0	0	0	0	2	13	4	32	31	11	1	0	0	0
29	D1	Bldg betw High St. & Matthews	275	276	125	0	0	0	0	0	0	0	0	0	18	60	44	10	0	0	0	0	0
35	D18	100 Federal St. (intake)	335	281	176	0	0	0	0	0	0	0	0	3	1	1	23	4	0	0	0	0	0
30	D2	Western Union Building	183	285	53	0	0	0	0	0	0	0	0	0	1	5	155	152	42	3	0	0	0
31	D3	Road House	153	288	18	0	0	0	0	0	0	0	0	0	0	0	12	39	47	7	0	0	0
37	D20	Congress Street	306	293	0	0	0	0	0	0	0	0	0	1	18	33	91	80	23	2	0	0	0
32	D4	125 High Street Building	174	300	69	0	0	0	0	0	0	0	0	0	0	1	31	144	138	26	2	0	0
33	D5	NYNEX	300	302	122	0	0	0	0	0	0	0	0	0	0	5	80	113	43	5	0	0	0
36	D7	State Street Bank Building	256	319	143	0	0	0	0	0	0	0	0	0	0	0	0	13	108	142	60	6	0
34	D6	New Fire House	118	319	7	0	0	0	0	0	0	0	0	0	0	0	0	2	3	4	0	0	0
39	D11	Oliver St. & High St.	244	331	0	0	0	0	0	0	0	0	0	0	0	0	6	14	13	11	11	9	9
38	D10	21 Story Tower	205	331	70	0	0	0	0	0	0	0	0	0	0	0	0	3	28	54	62	21	21
40	D12	Shops on Purchase & Olive	136	333	22	0	0	0	0	0	0	0	0	0	0	0	0	2	6	14	10	3	3
41	D17	Bldg. on India & Milk (roof)	501	341	40	0	0	0	0	0	0	0	0	0	0	0	0	0	5	26	58	32	32
42	D13	International Place (street)	143	353	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	13	9	9
44	D16	Bldg. on Broad & High (roof)	308	359	21	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	32	58	58
Field Wind Speed (m/s at 10m airport) =						12.1	12.0	12.0	12.1	12.0	12.0	12.0	12.0	12.0	12.0	12.0	11.9	11.9	12.0	12.0	11.9	12.0	12.0
Field Flow rate (m ³ /s) =						1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143

Table 36 Conc. K Value Results - 12 m/s Wind - 0 to 170 degrees

Field Conc. Results - Wind Speed ≈ 12 m/s

			Run No. =			418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	
			Wind Direction (deg) =			180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	
Point No.	Recpt. ID	Receptor Description	X	Y	Z	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	(m ²)	
			(m)	(Deg)	(m)																			
43	D14	International Place (intake)	197	0	13	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	A1	Harbor Tower I (plume ht.)	397	16	var	32	76	49	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	A2	Harbor Towers (pool)	386	18	0	34	26	21	11	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	A8	Harbor Tower II (plume ht.)	468	21	var	4	42	65	23	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	A3	Boston Harbor Hotel	277	25	37	20	25	38	25	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0
6	A5	Rowe's Wharf	345	32	33	1	4	42	77	23	7	4	4	9	0	0	0	0	0	0	0	0	0	0
5	A4	Coast Guard Bldg. (street)	147	36	0	2	3	5	7	4	2	1	0	1	0	0	0	0	0	0	0	0	0	0
7	A6	Coast Guard Bldg. (roof)	160	37	32	2	5	15	26	9	3	2	1	3	0	0	0	0	0	0	0	0	0	0
10	A9	Coast Guard Building (windows)	154	41	23	2	3	10	17	9	4	2	4	2	2	0	0	0	0	0	0	0	0	0
1	A7	Harbor Plaza	39	76	53	0	0	2	3	3	4	20	0	111	76	16	7	10	0	0	0	0	0	0
8	B1	Federal Courthouse (roof)	305	87	40	0	0	0	0	0	0	0	1	24	52	21	13	3	0	0	0	0	0	0
9	B2	Victoria Station Rest.	253	118	4	0	0	0	0	0	0	0	4	0	3	8	11	34	32	3	0	0	0	0
12	B5	Children's Museum	284	134	0	0	0	0	0	0	0	0	0	0	0	2	4	11	37	37	1	0	0	0
13	B6	Congress Street	439	147	0	0	0	0	0	0	0	0	0	0	0	0	1	4	28	70	27	6	1	0
14	B7	Boston Tea Party Museum	204	163	0	0	0	0	0	0	0	0	0	0	0	0	0	2	17	61	40	20	7	0
16	C1	Congress St. & Dorchester Ave	195	188	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	30	35	36	0
17	C2	Dorchester Ave. & Summer St.	305	196	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	5	0
11	C14	Russia Wharf (balcony)	81	203	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	13	0
47	A11	Atlantic Center (intake)	61	210	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
18	C3	Stone & Webster Building	339	211	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
20	C6	Russia Wharf East Bldg. (roof)	97	227	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	C5	Fed Reserve Intake #3	248	230	159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	C8	Fed Reserve Intake #2	251	232	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	C7	South Station	353	233	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	A10	Atlantic Center (roof)	48	235	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	C9	South Station (Street)	338	237	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	C4	One Financial Center (roof)	419	240	185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	C10	One Financial Center (street)	336	241	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	C11	Fed Reserve (street)	153	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	D19	Summer St./ Purchase St.	391	251	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	C12	Keystone Building (intake)	220	268	58	0	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	C13	Keystone Building (street)	188	271	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	D1	Bldg betw High St. & Matthews	275	276	125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	D18	100 Federal St. (intake)	335	281	176	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	D2	Western Union Building	183	285	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	D3	Road House	153	288	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	D20	Congress Street	306	293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	D4	125 High Street Building	174	300	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	D5	NYNEX	300	302	122	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	D7	State Street Bank Building	256	319	143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	D6	New Fire House	118	319	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	D11	Oliver St. & High St.	244	331	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	D10	21 Story Tower	205	331	70	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	D12	Shops on Purchase & Olive	136	333	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	D17	Bldg. on India & Milk (roof)	501	341	40	9	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	D13	International Place (street)	143	353	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	D16	Bldg. on Broad & High (roof)	308	359	21	19	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Field Wind Speed (m/s at 10m airport) =						12.1	11.9	11.9	12.2	12.1	12.0	12.0	12.0	12.1	12.0	12.2	12.1	12.2	12.0	11.9	12.2	12.2	12.2	12.2
Field Flow rate (m³/s) =						1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143	1143

Table 37 Conc. K Value Results - 12 m/s Wind - 180 to 350 degrees



FIGURES

Figure 1 Site Topography and Model Study Area Extent

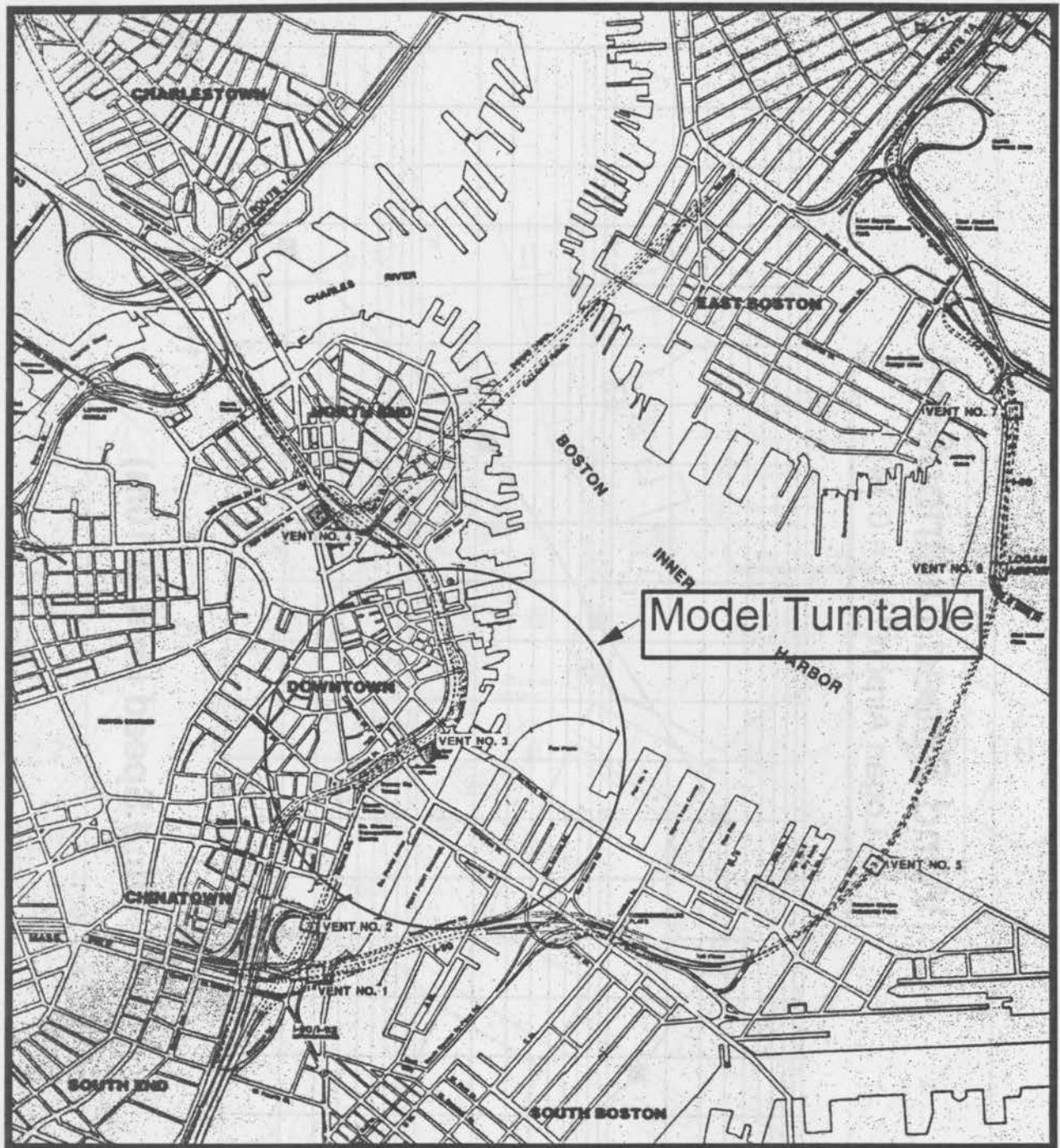


Figure 1 Site Topography and Model Study Area Extent

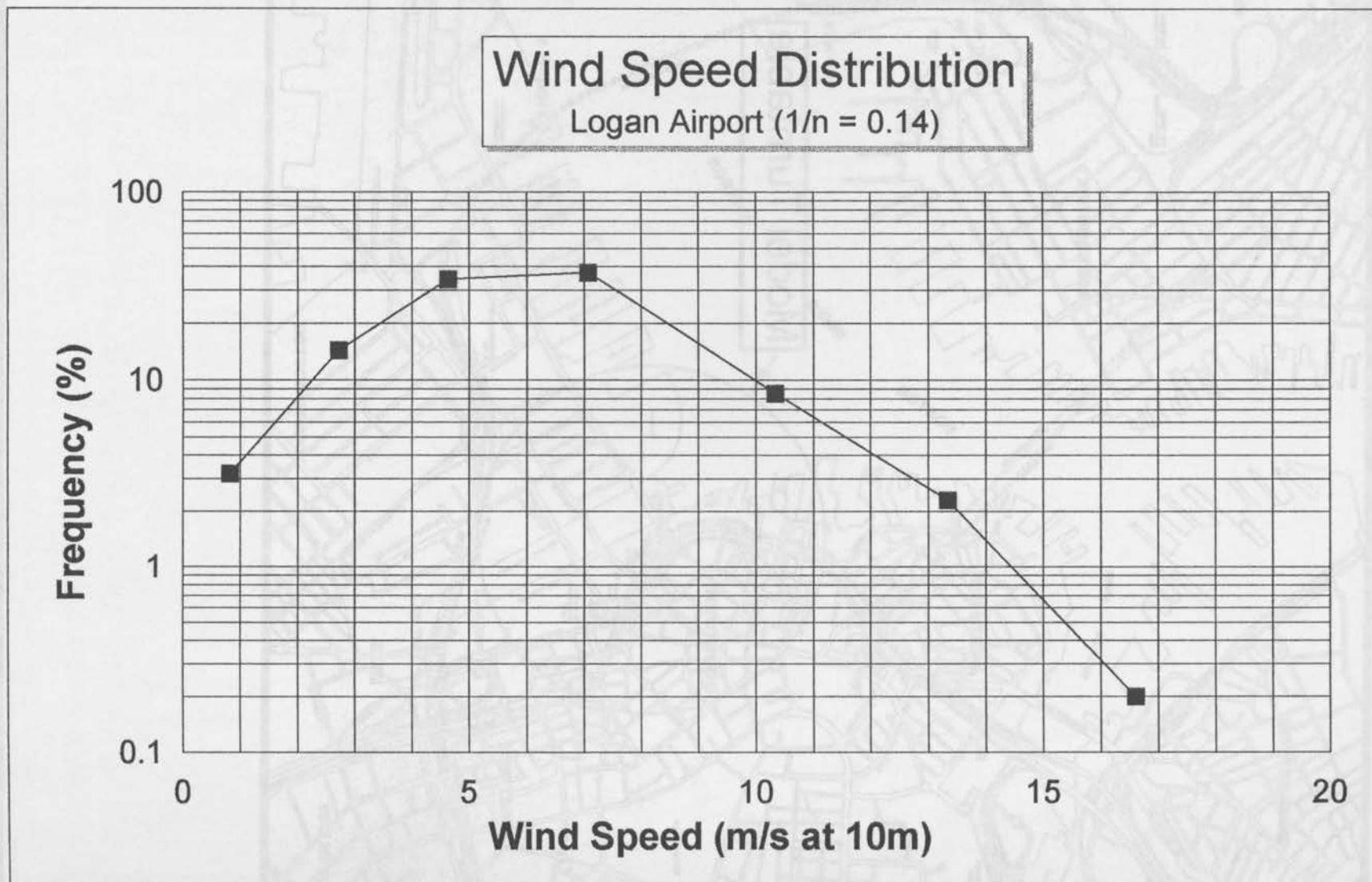


Figure 2 Wind Speed Distribution at Logan Intl. Airport



Figure 3 Model Turntable Street Layout with Sample Locations



Figure 4 Model Turntable, Wind Tunnel and Equipment Photograph

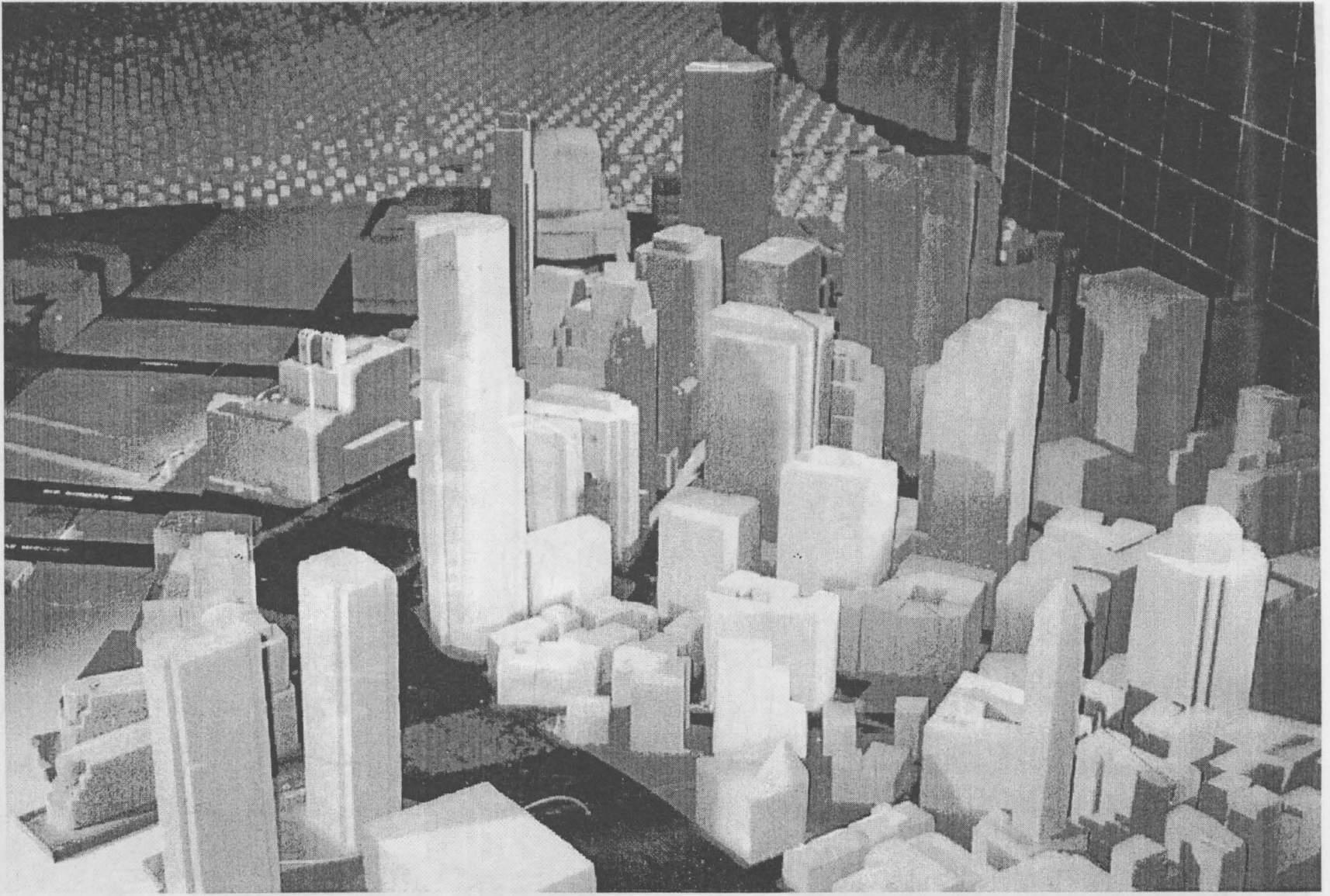


Figure 5 Model Site Photograph

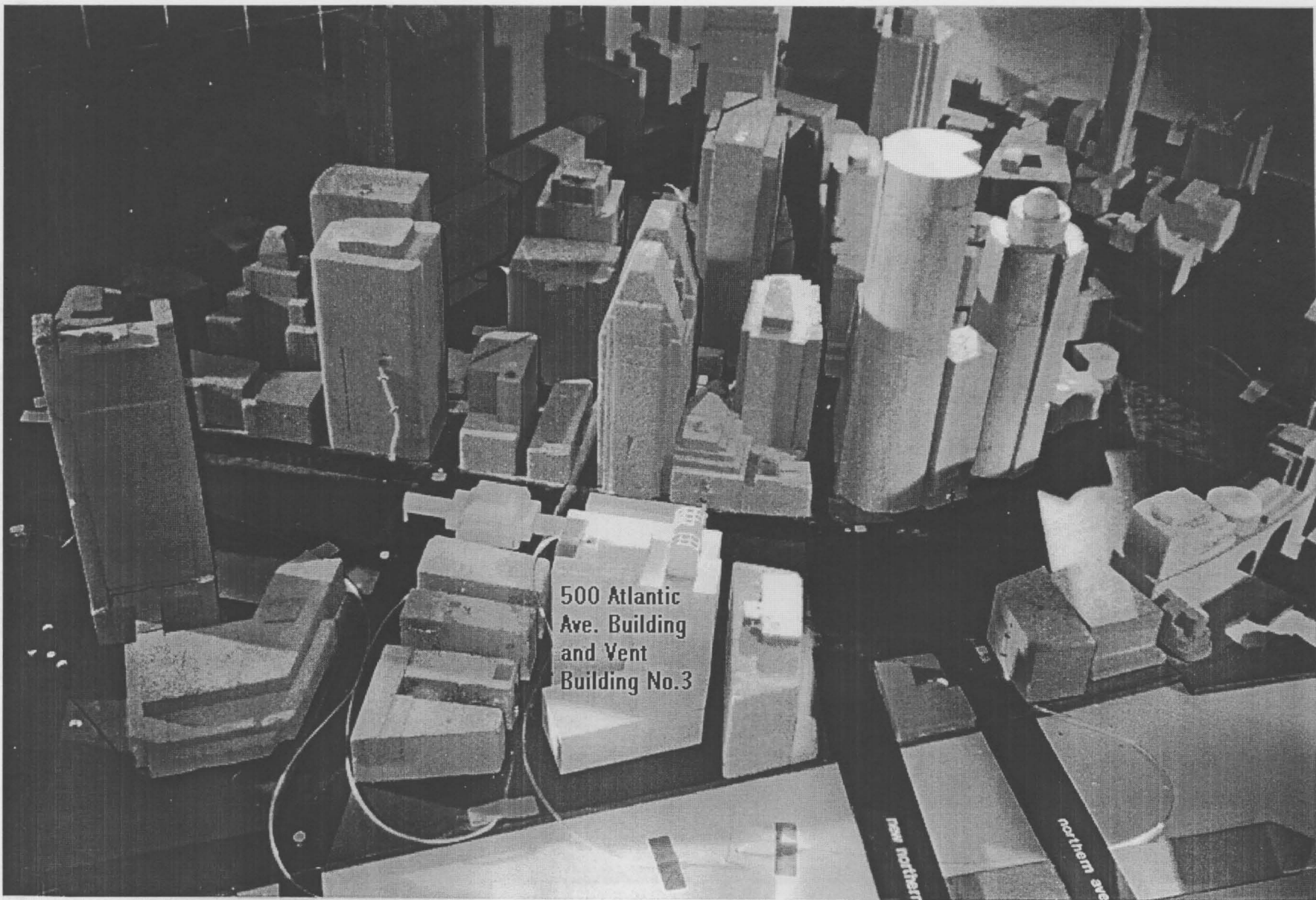


Figure 6 Model Site Photograph

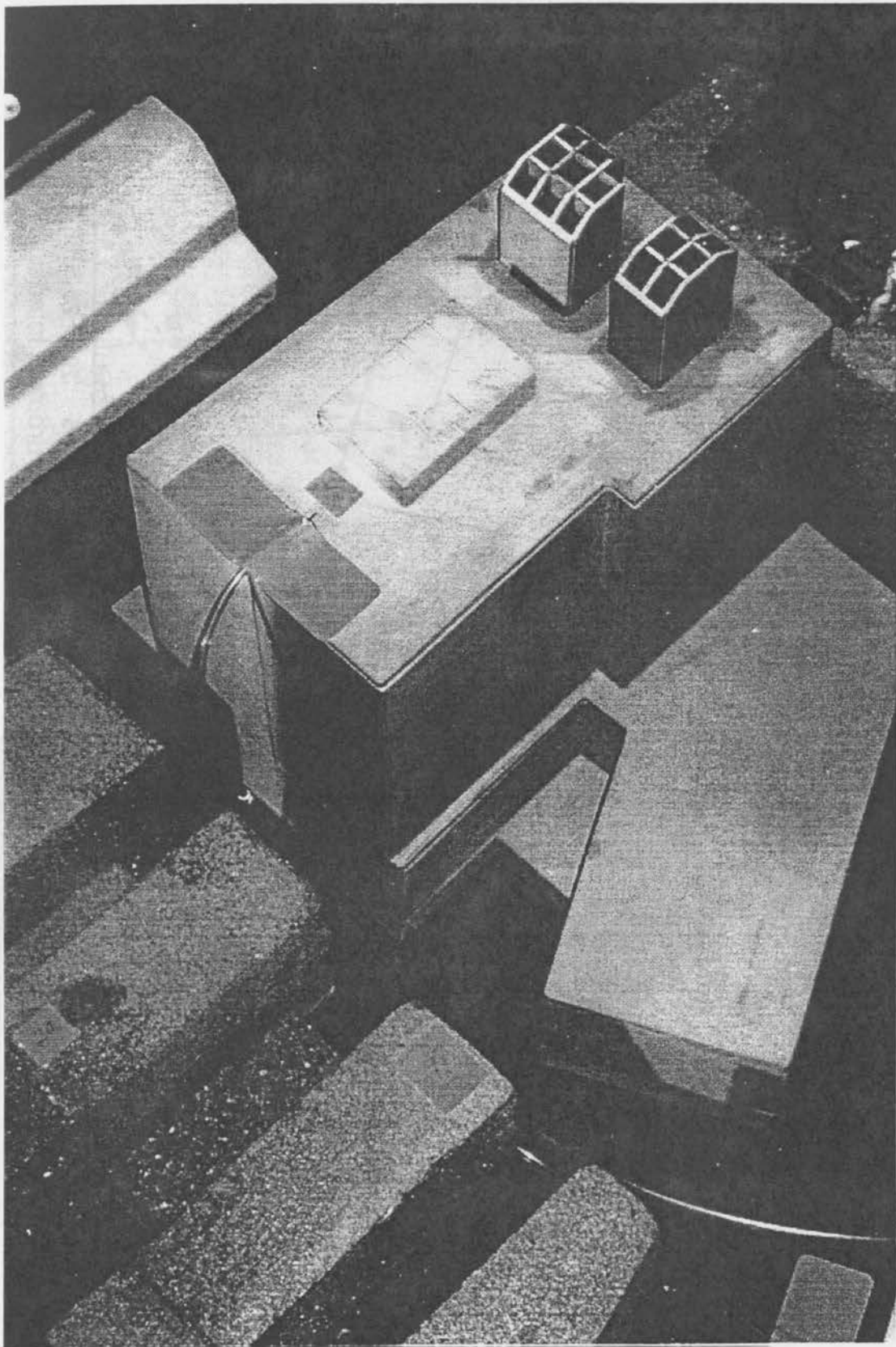


Figure 7 Model Vent Building Photograph

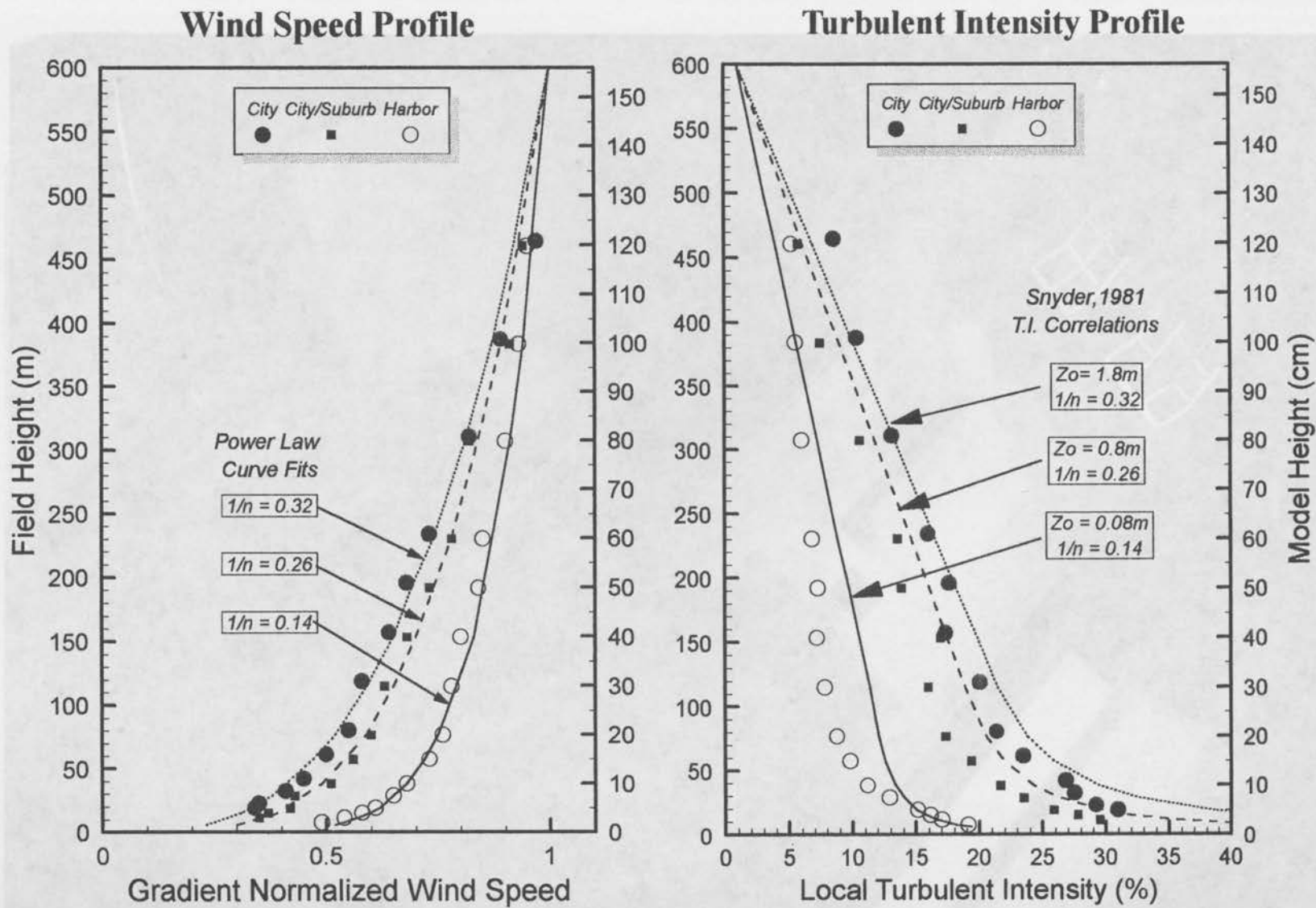


Figure 8 Mean and Turb. Wind Profile with Snyder Correlations

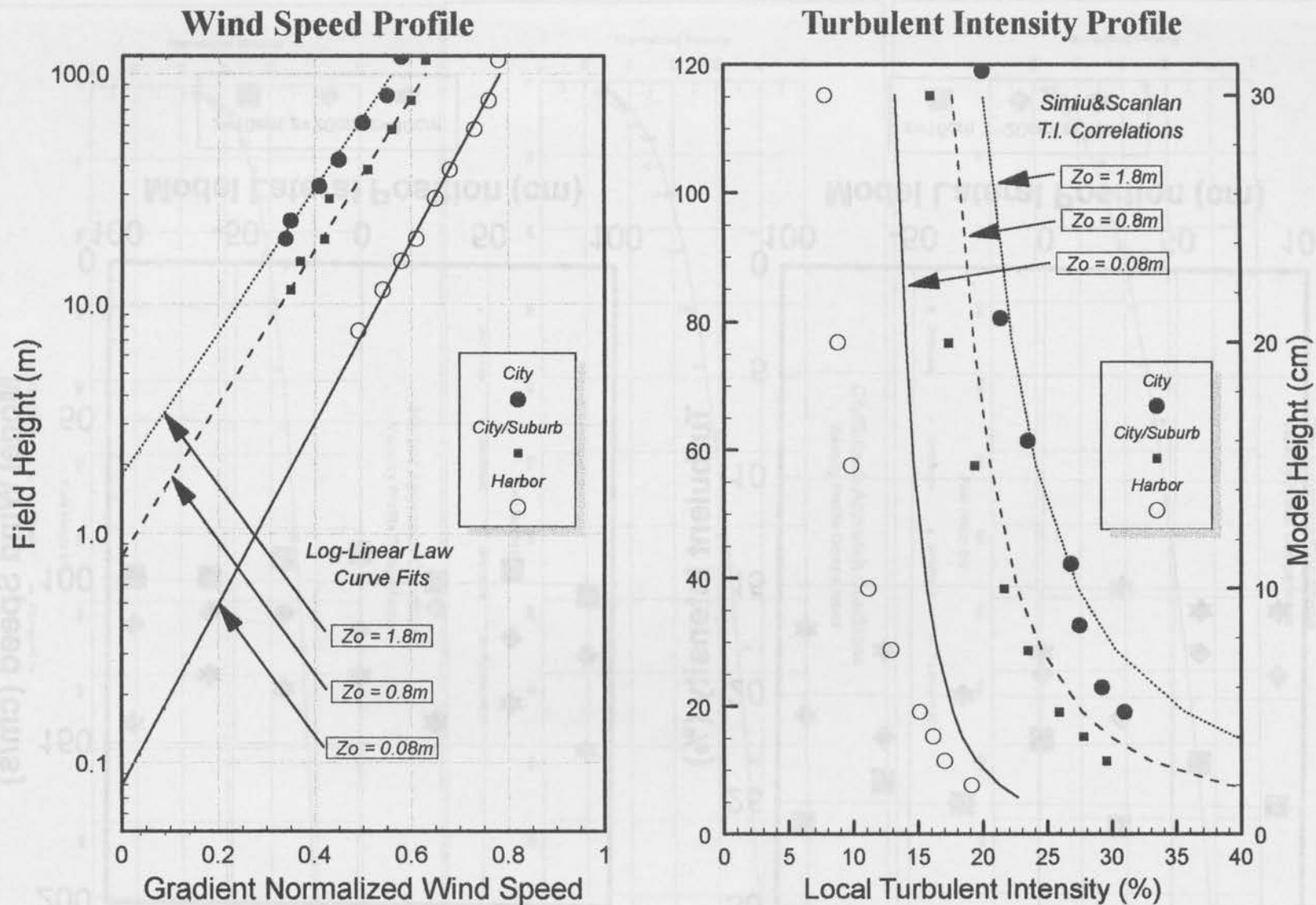


Figure 9 Mean and Turb. Wind Profiles with Simiu Correlations

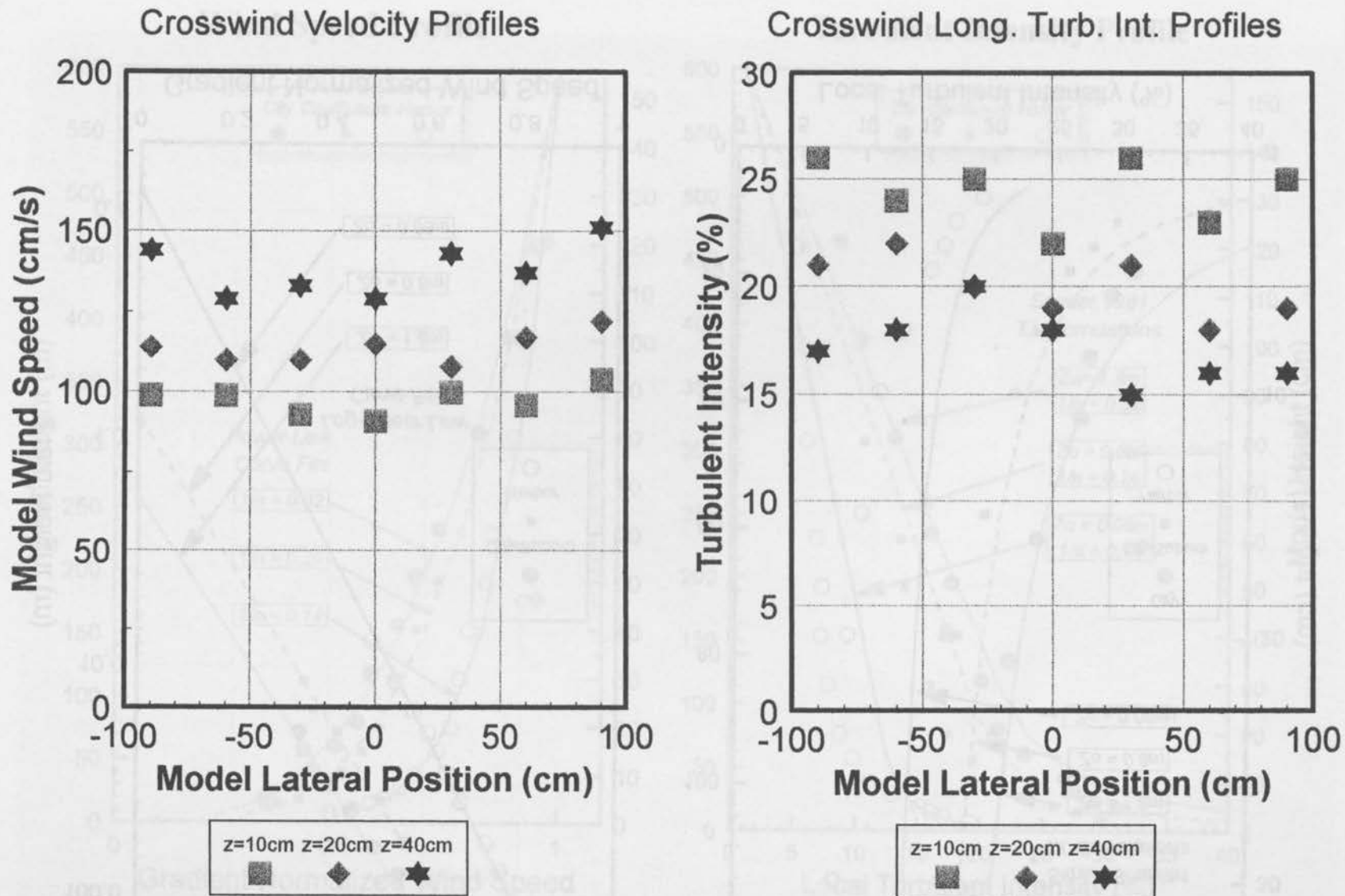


Figure 10 Lateral Wind Profiles

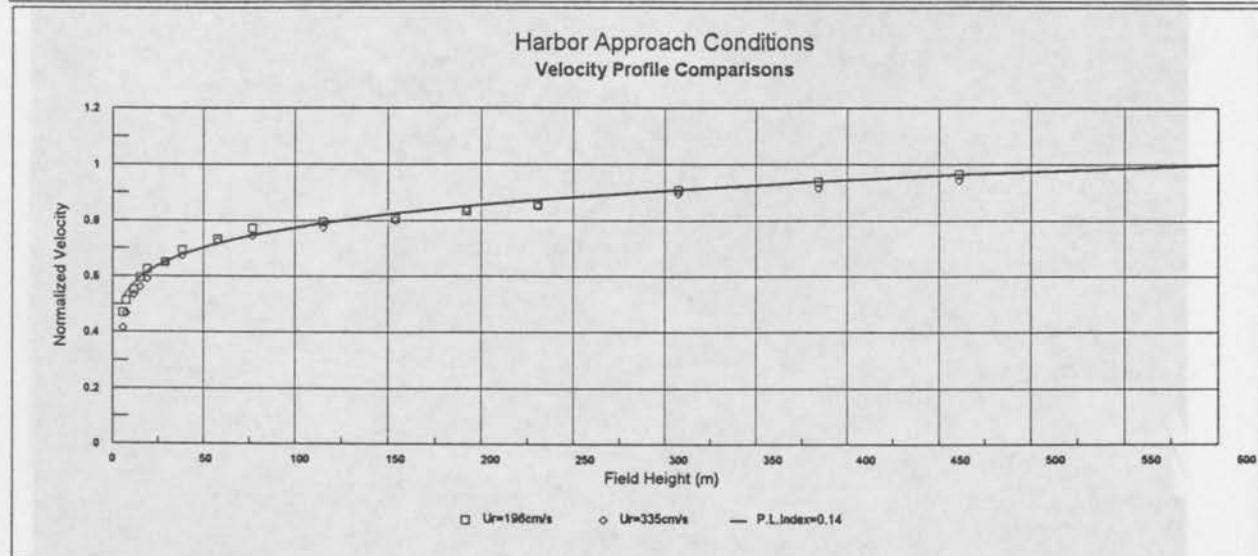
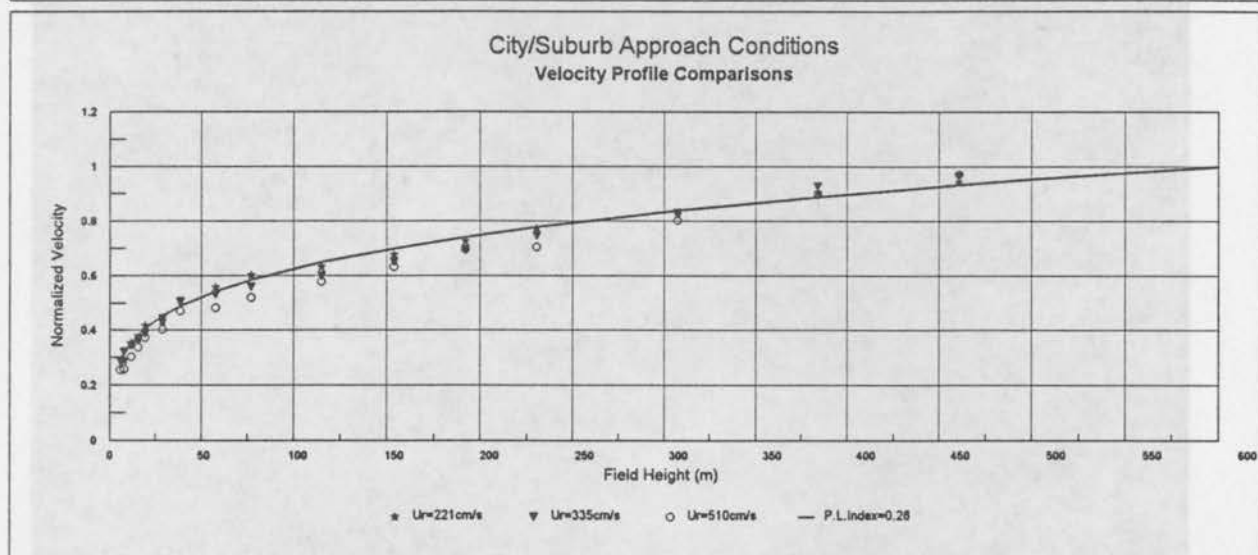
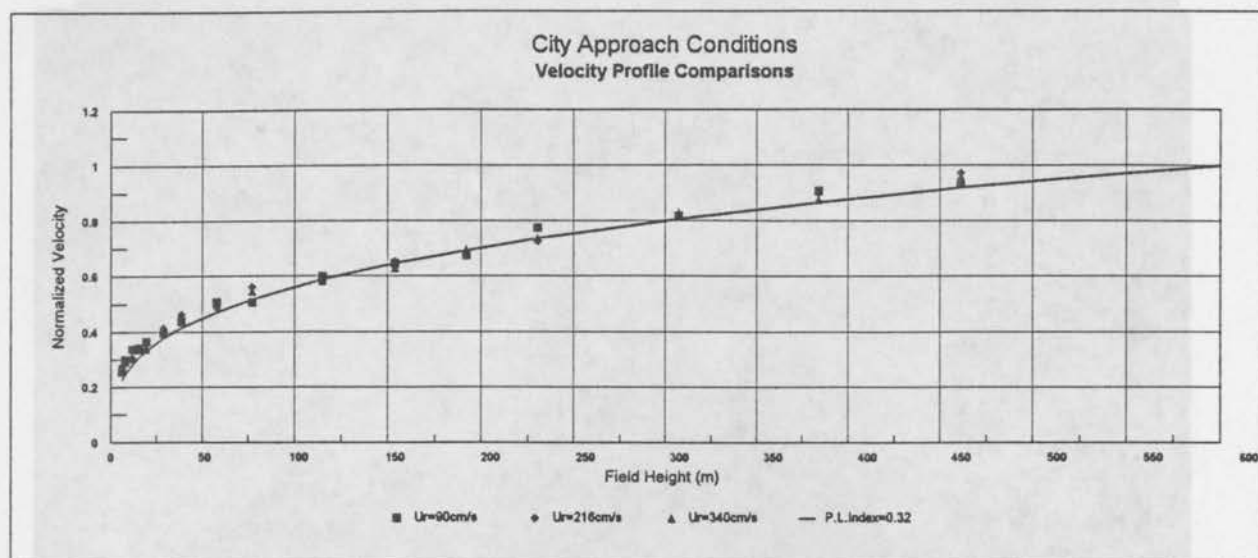


Figure 11 Re# Independence of Mean Wind Profiles

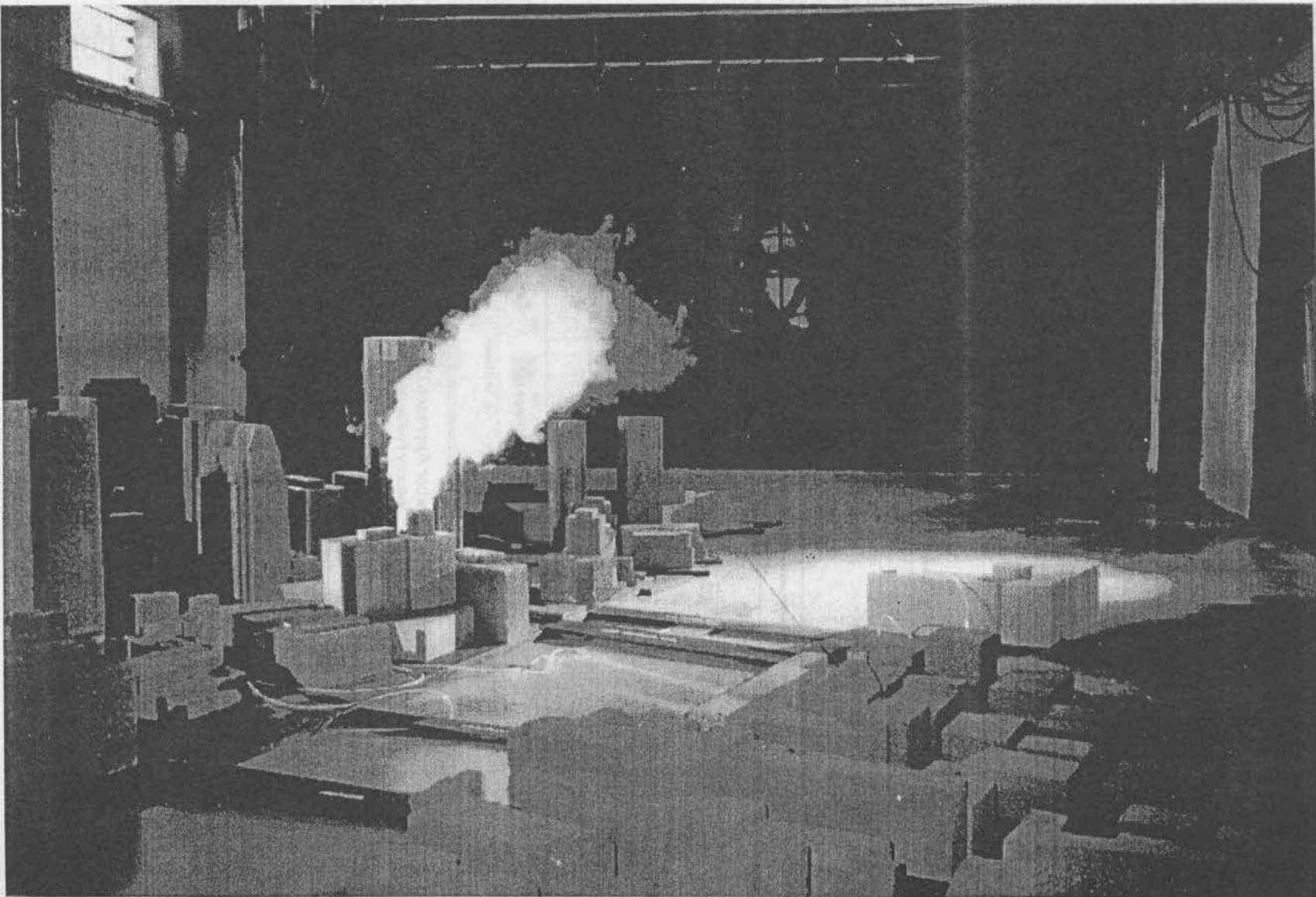


Figure 12 Model Plume Visualization Picture

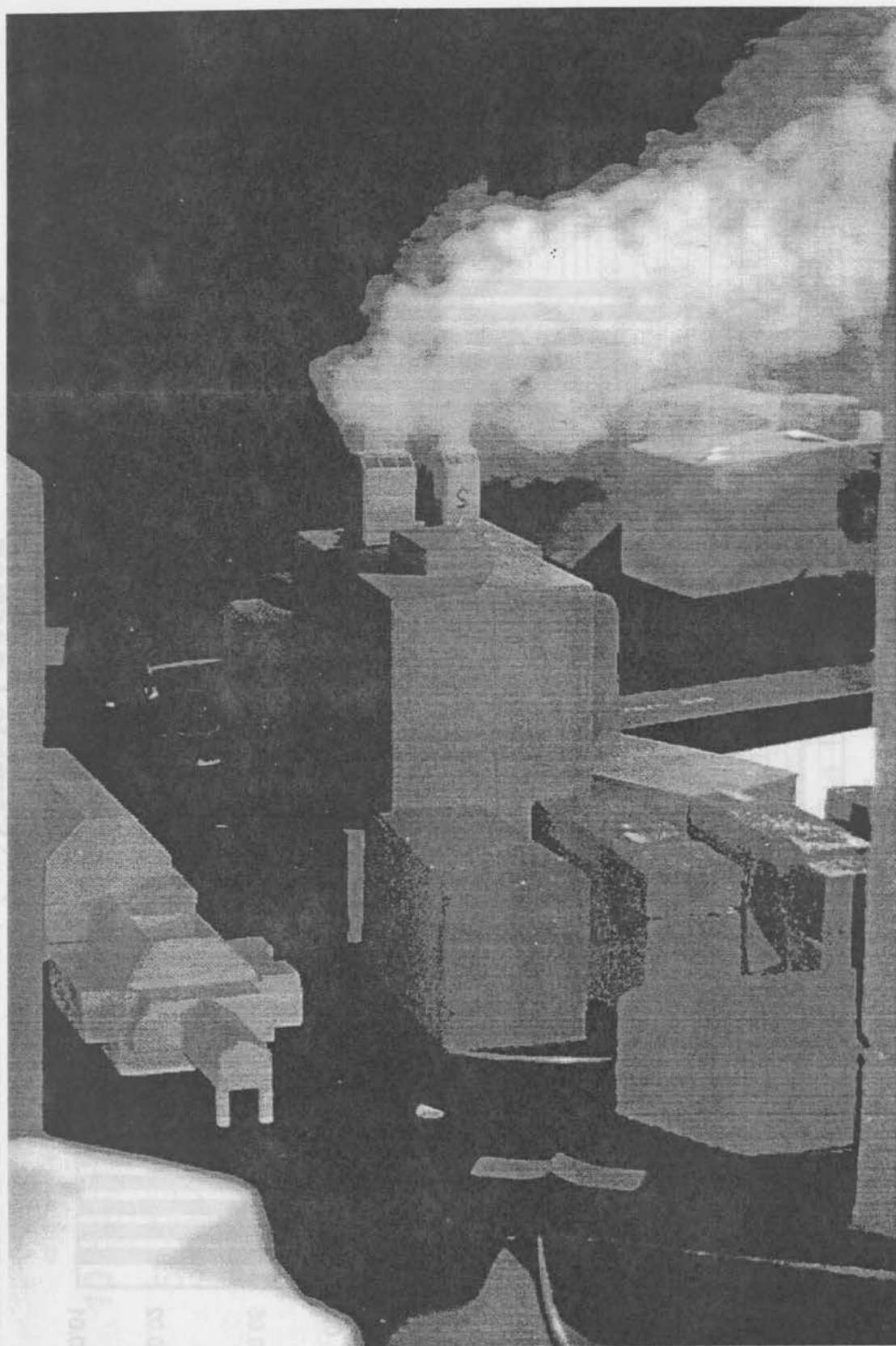


Figure 13 Model Plume Visualization Picture

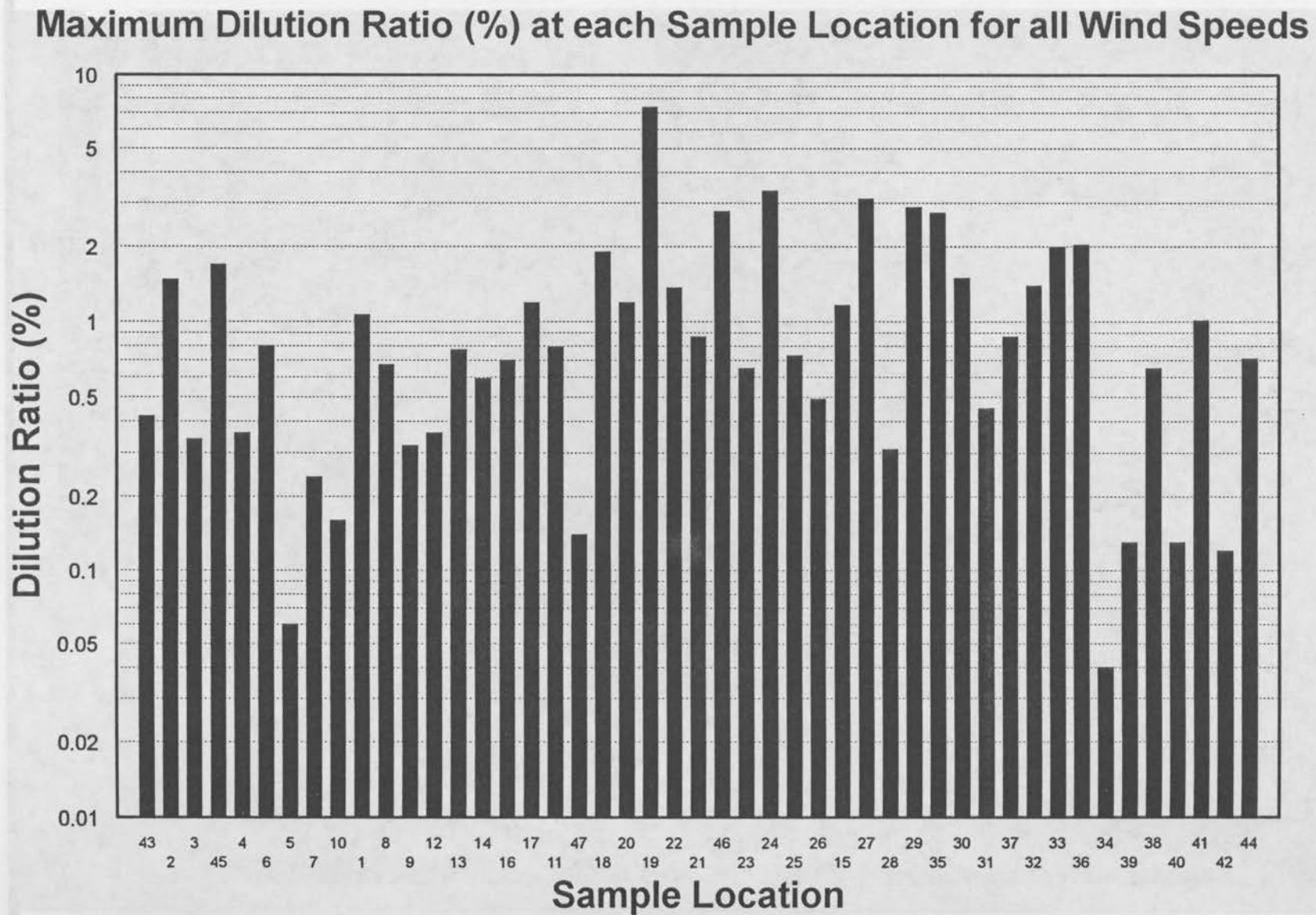


Figure 14 Maximum Dilution Ratios at all Sample Locations

Maximum Dilution Ratio (%) vs. Wind Direction at Sample Locations (Locations in the NNE Sector)

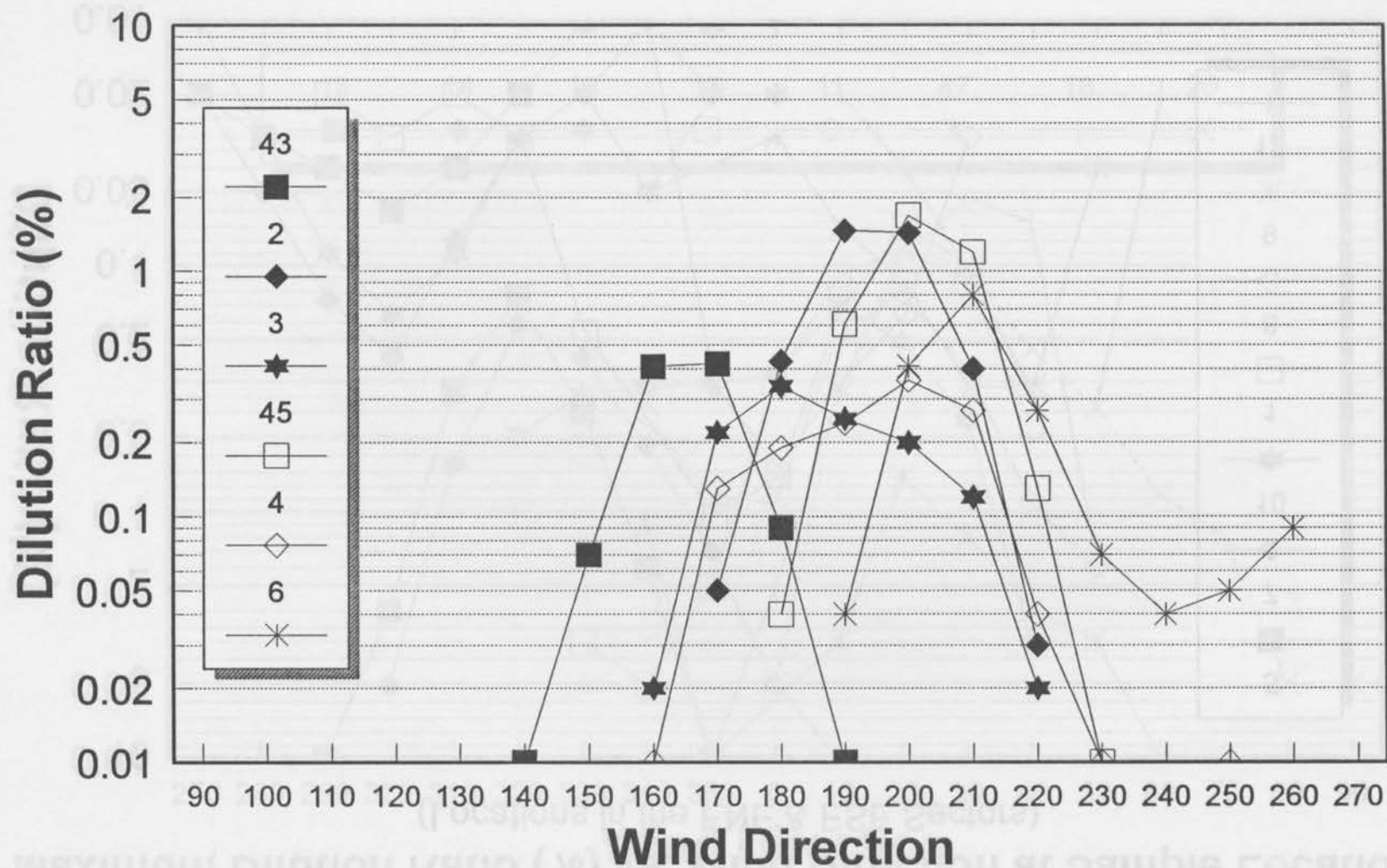


Figure 15 Max. Dilution Ratios vs. Wind Dir. at Samples in NNE Sector

Maximum Dilution Ratio (%) vs. Wind Direction at Sample Locations (Locations in the ENE & ESE Sectors)

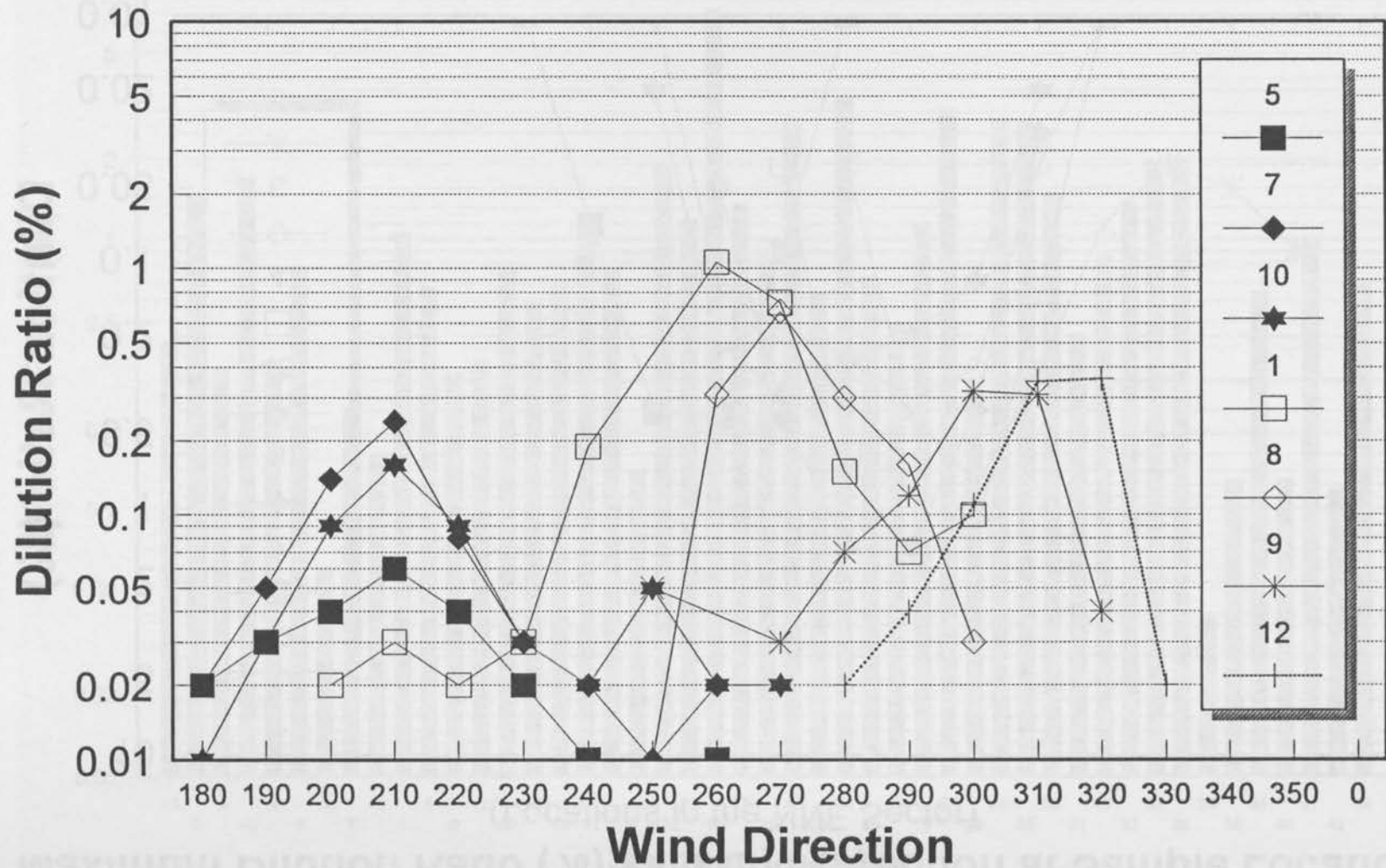


Figure 16 Max. Dilution Ratios vs. Wind Dir. at Samples in ENE&ESE Sector

Maximum Dilution Ratio (%) vs. Wind Direction at Sample Locations (Locations in the SSE & SSW Sectors)

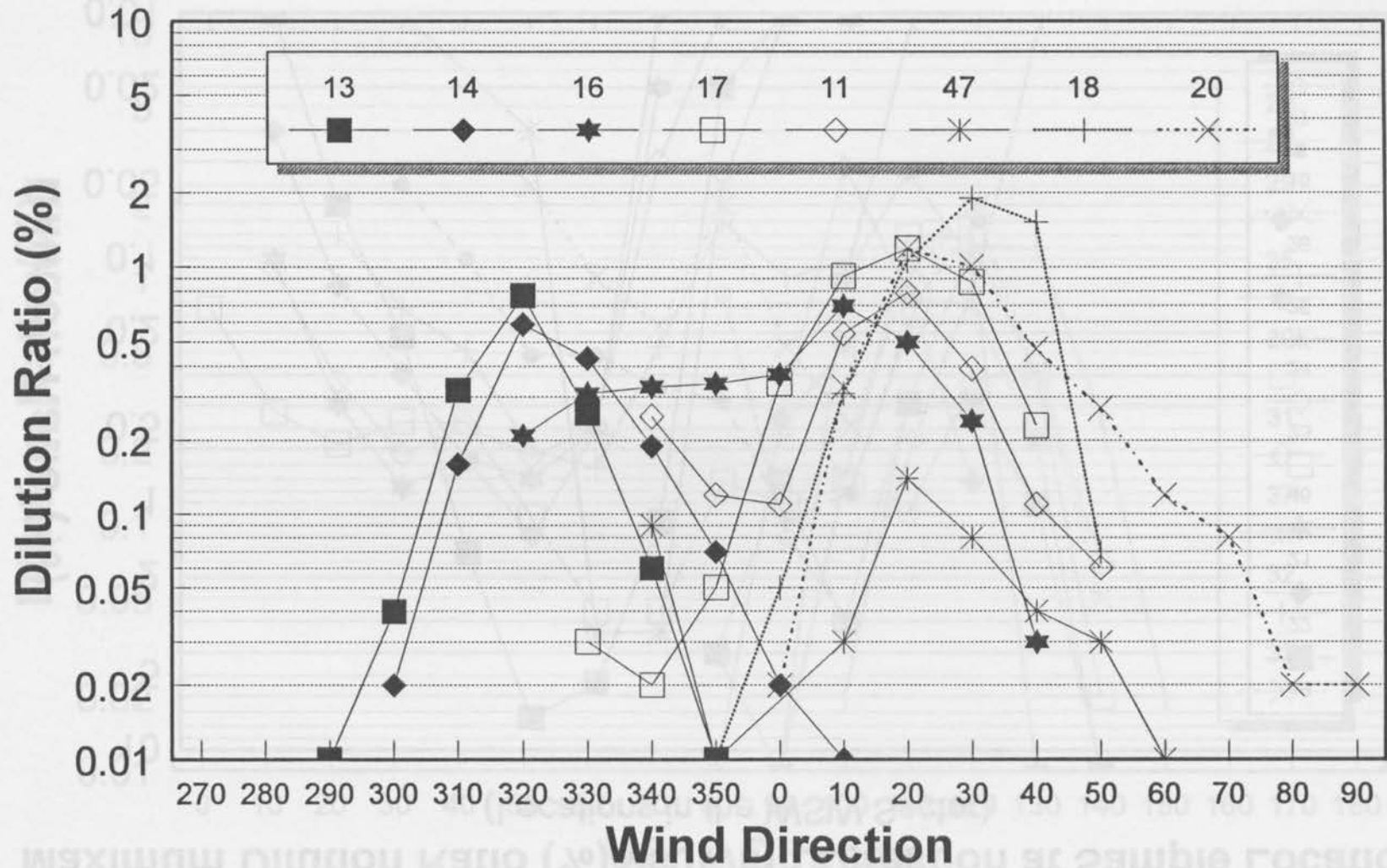


Figure 17 Max. Dilution Ratios vs. Wind Dir. at Samples in SSE&SSW Sector

Maximum Dilution Ratio (%) vs. Wind Direction at Sample Locations (Locations in the WSW Sector)

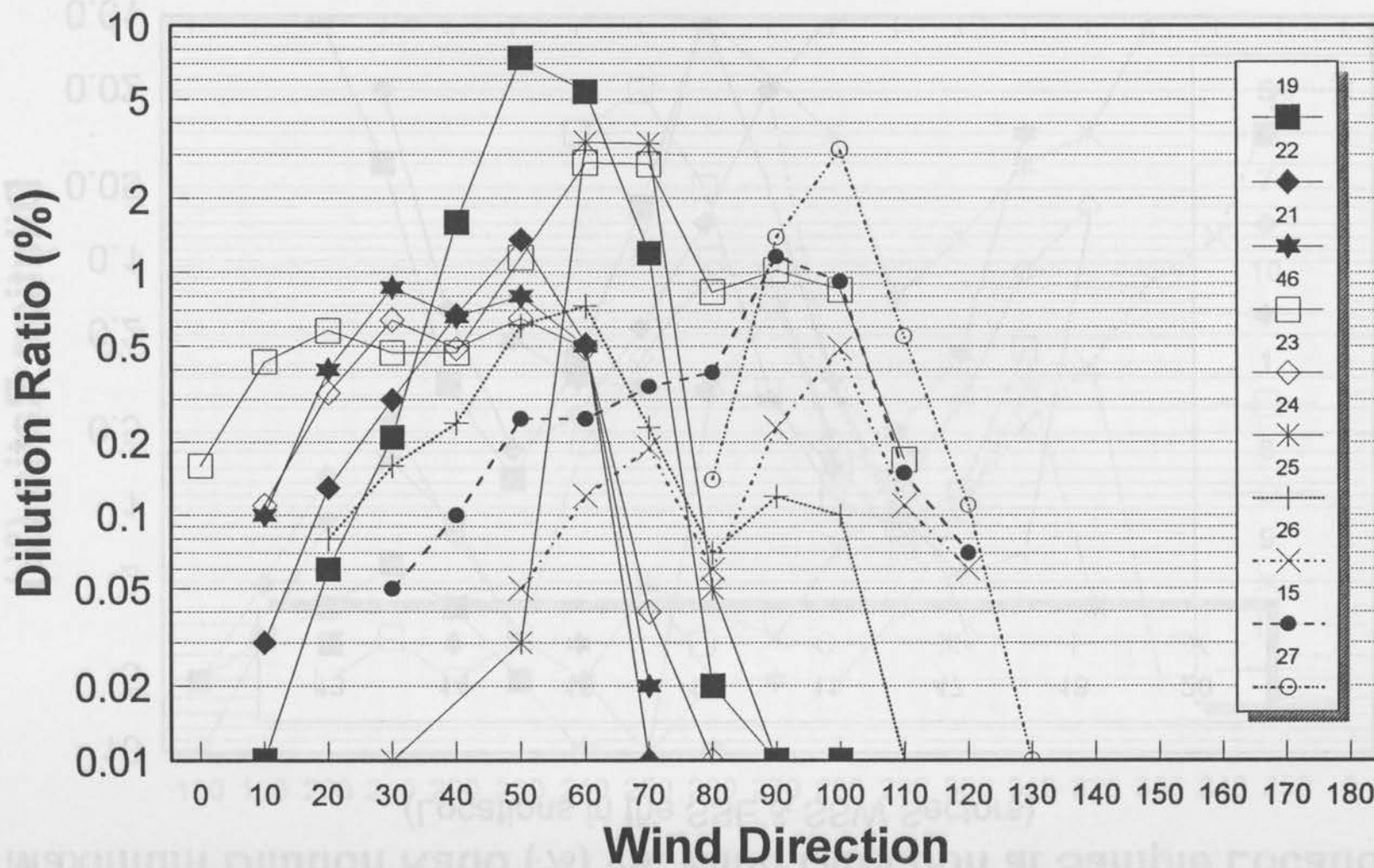


Figure 18. Max. Dilution Ratios vs. Wind Dir. at Samples in WSW Sector

Maximum Dilution Ratio (%) vs. Wind Direction at Sample Locations (Locations in the WNW Sector)

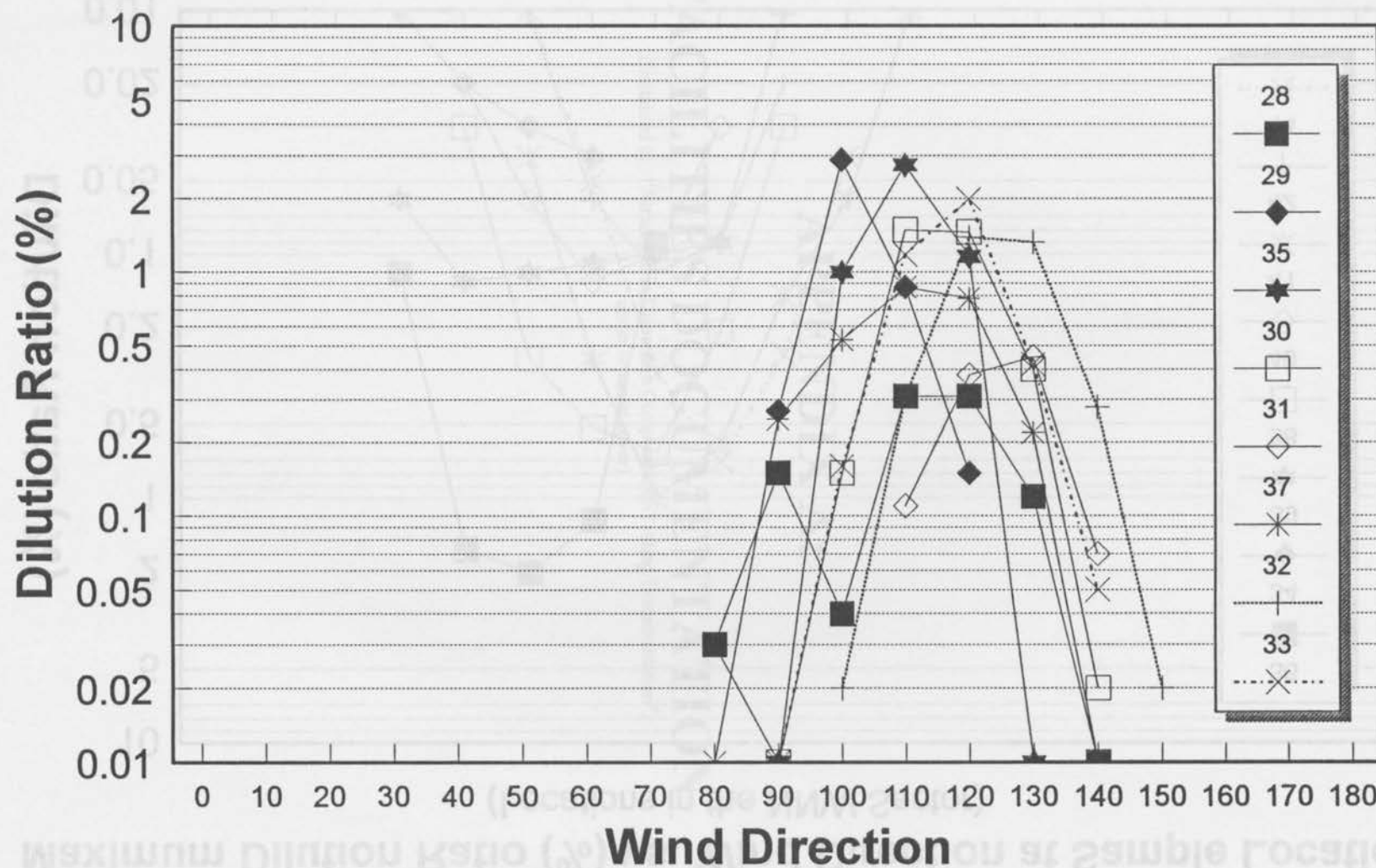


Figure 19 Max. Dilution Ratios vs. Wind Dir. at Samples in WNW Sector

Maximum Dilution Ratio (%) vs. Wind Direction at Sample Locations (Locations in the NNW Sector)

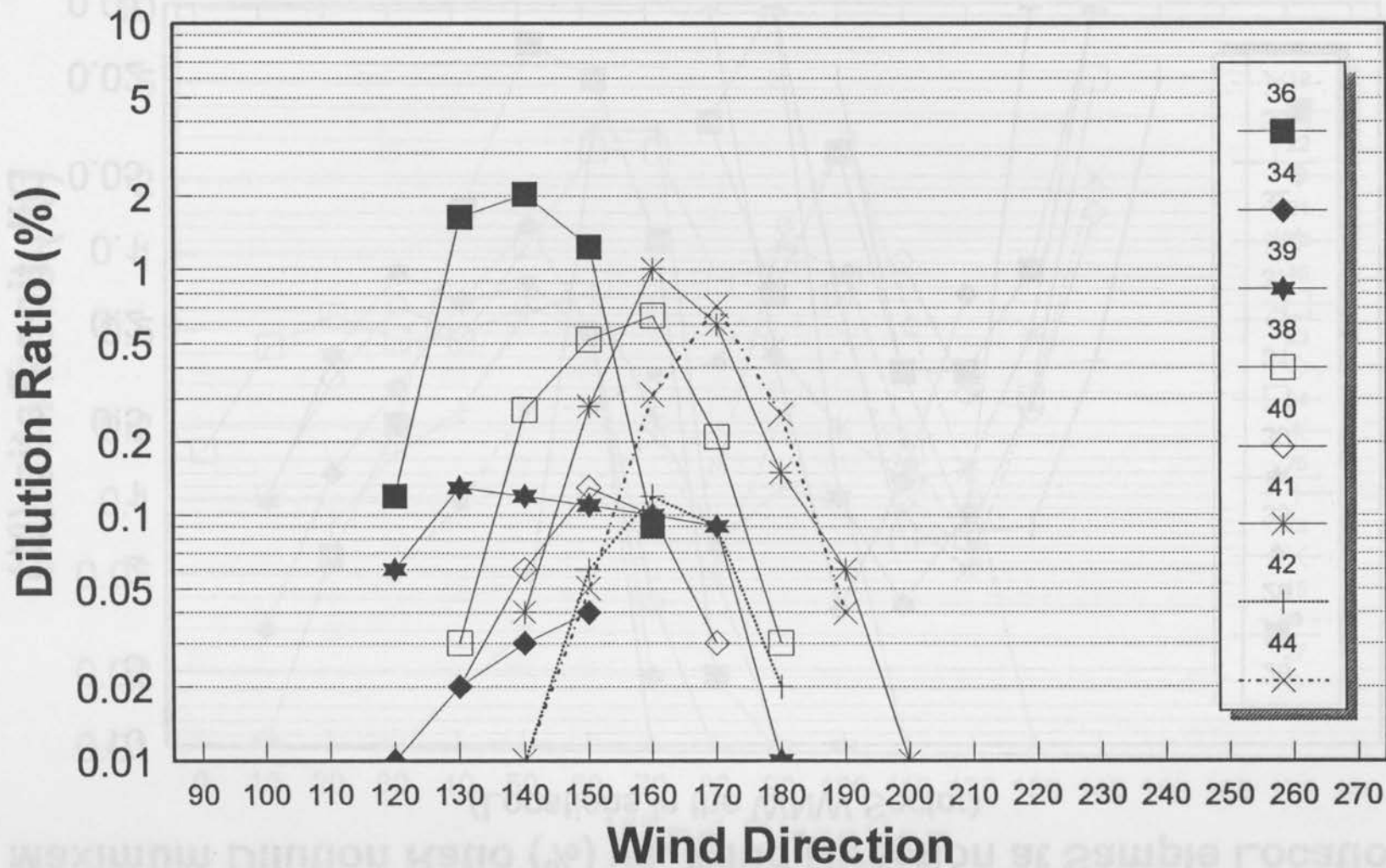


Figure 20 Max. Dilution Ratios vs. Wind Dir. at Samples in NNW Sector

APPENDIX A:

FACILITIES DOCUMENTATION

(Contained in : "Atmospheric Dispersion Comparability Testing Documentation",
under separate cover)

FLUID MODELING OF EXHAUST GAS DISPERSION
FROM THE BOSTON EDISON 500 ATLANTIC BUILDING SITE,
VENTILATION BUILDING NO. 3,
CENTRAL ARTERY/THIRD HARBOR
TUNNEL PROJECT

Prepared by
David E. Neft

ATMOSPHERIC DISPERSION
COMPARABILITY TESTING DOCUMENTATION
(July 1998)

**APPENDIX B:
VIDEO TAPE ENCLOSURE**

Boston Edison Company
800 Boylston Street
Boston, MA 02116