MODEL STUDY OF LIQUIFIED NATURAL GAS VAPOR CLOUD DISPERSION WITH WATER SPRAY CURTAINS

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Research Summary

Title Model Study of Liquified Natural Gas Vapor Cloud Dispersion With Water Spray Curtains

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Objective To determine, through utilization of wind tunnel experiments, the effects of water spray curtains on the dilution of Liquified Natural Gas plumes.

Technical Perspective A Liquified Natural Gas (LNG) spill would result in a cold LNG vapor plume. This negatively buoyant plume could be diluted utilizing water spray curtains at or near the spill location. There is a need for determining how these spray curtains interact with an LNG plume, the optimal configurations, and the resultant dilution factors achievable under various wind speeds and LNG boiloff rates.

Results A large data base on the interaction of LNG plumes with water spray curtains was obtained. The wind tunnel experiments included variations of wind speeds, boiloff rates, spray configurations, dike heights, and spray nozzle pressures. The effects of the variation of these parameters on LNG plume dispersion were obtained. A comparison between wind tunnel and field tests was also made.

Technical Approach Wind tunnel tests were performed at a scale of 1:100 and 1:5 to determine the accelerated dispersion of any LNG plume as a result of interactions with water spray curtains. An LNG plume is heavier than air at boiloff conditions and is anticipated to remain negatively buoyant for most conditions until it is adequately dispersed. The negatively buoyant plume can be simulated in the wind tunnel by using an isothermal heavy gas of specific gravity equal to that of LNG at boiloff. The measured results should be modified to account for the difference in moles of cold gas vs. the moles of isothermal gas. The water spray curtains were situated around the source spraying either upwards or downwards and heavy gases were introduced into the wind tunnel via a constant area

source mounted flush with the wind tunnel floor. Gas concentration samples were collected downwind of the area source under various conditions. These samples were analyzed using a gas chromatograph and from this data, the plume structure was determined.

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LIST OF SYMBOLS

Dimensions are given in terms of mass (m), length (L), time (t), moles (n), and temperature (T).

Symbol	Definition	
A	Area	[L^2]
α	Velocity power law exponent	
C	Concentration	[-]
C_p	Specific heat capacity at constant pressure	[$L^2t^{-2}T^{-1}$]
C_p^*	Molar specific heat capacity at constant pressure	[$L^2mt^{-2}T^{-1}n^{-1}$]
g	Gravitational acceleration	[Lt^{-2}]
h	Local plume depth	[L]
k	Thermal conductivity	[$mLT^{-1}t^{-3}$]
L	Length	[L]
M	Molecular weight	[mn^{-1}]
Ma	Mach number	
n	Mole	[n]
Q	Volumetric rate of gas flow	[L^3t^{-1}]
r	Correlation coefficient	
T	Temperature	[T]
ΔT	Temperature difference across some reference layer	[T]
t	Time	[t]
u_*	Friction velocity	[Lt^{-1}]
U	Velocity	[Lt^{-1}]
V	Volume	[L^3]
W	Plume vertical velocity	[Lt^{-1}]
x	General downwind coordinate	[L]
y	General lateral coordinate	[L]

LIST OF SYMBOLS (Con't)

Symbol	Definition	
z	General vertical coordinate	[L]
z_o	Surface roughness parameter	[L]
δ	Boundary layer thickness	[L]
Λ	Integral length scale of turbulence	[L]
$\Delta\rho$	Density difference between source gas and air	$[mL^{-3}]$
ρ	Density	$[mL^{-3}]$
χ	Mole fraction of gas component	
Ω	Angular velocity of earth = 0.726×10^{-4} (radians/sec)	$[t^{-1}]$
λ_p	Peak wavelength	[L]
ν	Kinematic viscosity	$[L^2 t^{-1}]$

Superscripts and Abbreviations

a	Air
b.o.	Boiloff
FMRC	Factory Mutual Research Corporation
g	Gas
H_s	Height of spray nozzle
iso	isothermal
i	Cartesian index
LLNL	Lawrence Livermore National Laboratory
LNG	Liquified Natural Gas
L_n	Spacing between nozzles
l.s.	Length Scale
L_s	Normal distance from the spray curtains to the dike wall
m	Model

LIST OF SYMBOLS (Con't)

Superscripts and Abbreviations (Con't)

NG	Natural gas
o	Reference conditions
p	Prototype
s	Source gas
S.G.	Specific gravity

1.0 Introduction

Water spray curtains could provide an effective rapid dilution mechanism for low lying dense gas clouds. Natural gas is commonly liquified and stored at cryogenic temperatures. A dense gas dispersion situation occurs upon rupture of a storage tank or a spill in a process area. Since for most atmosphere conditions the cold liquified natural gas (LNG) cloud will remain negatively buoyant for significant time intervals, a ground level hazard may exist due to the gas flammability. Physical simulation of scaled situations where water spray curtains and dense gas clouds interact provides design information for possible curtain installations and calibration data to be used to validate or develop numerical or analytical models.

The Gas Research Intitute (GRI) has sponsored an effort to determine how well water curtains can mitigate actual spill conditions and has contracted Factory Mutual Research Corporation (FMRC) to oversee implementation of this effort. Colorado State University (CSU) was selected by FMRC to do the spill simulation in the Enviromental Wind Tunnel of the Fluid Dynamic and Diffusion Laboratory. FMRC provided the test programs to be performed at CSU pending discussion between CSU and FMRC regarding implementation feasibility, parameter variations, etc.

The purpose of this report is to present the data taken in CSU's Environmental Wind Tunnel. The data is provided for subsequent analysis to determine how well water spray curtains act as LNG cloud dilution mechanisms. This report is structured as follows: Section 2 is a theoretical discussion of plume dispersion modeling at the wind tunnel scale. Section 3 describes data acquisition and analysis techniques. Section 4 outlines the test program undertaken and Section 5 is a brief discussion of results obtained. The data is presented in Appendices A and B. Appendix A contains the results of two simulations of field size water curtain/cold CO_2 cloud trials conducted by the (British) Health and Safety Executive (HSE). Appendix B contains concentration data for different spray geometries, source and water flow rates and other spill parameters.

2.0 MODELING OF PLUME DISPERSION

To obtain a predictive model for a specific plume dispersion problem one must quantify the pertinent physical variables and parameters into a logical expression that determines their interrelationships. This task is achieved implicitly for processes occurring in the atmospheric boundary layer by the formulation of the equations of conservation of mass, momentum, and energy. These equations with site and source conditions and associated constituitive relations are highly descriptive of the actual physical interrelationship of the various independent variables (spill size or spill rate, space and time) and dependent variables (velocity, temperature, pressure, density, etc.).

These generalized conservation statements subjected to the typical boundary conditions of atmospheric flow are too complex to be solved by present analytical or numerical techniques. It is also unlikely that one could create a physical model for which exact similarity exists for all the dependent variables over all the scales of motion present in the atmosphere. Thus, one must resort to various degrees of approximation to obtain a predictive model. At present, purely analytical or numerical solutions of plume dispersion are unavailable because of the classical problem of turbulent closure (Hinze, J. O. (1975)). Such techniques which rely heavily upon empirical-analytical-numerical solutions have been combined into several different predictive approaches by Pasquill (1974) and others. The estimates of dispersion by these approaches are often crude; hence, they should only be used when the approach and site terrain are uniform and without obstacles such as fences, buildings or vortex generators. Boundary layer wind tunnels are capable of physically modeling plume processes in the atmosphere under certain restrictions. These restrictions are discussed in the next few sections.

2.1 PHYSICAL MODELING OF THE ATMOSPHERIC BOUNDARY LAYER

The atmospheric boundary layer is that portion of the atmosphere extending from ground level to a height of approximately 100 meters within which the major exchanges of mass, momentum, and heat occur. This region of the atmosphere is described mathematically by statements of conservation of mass, momentum, and energy (Cermak, J. E. (1981)). The general requirements for laboratory-atmospheric-flow similarity may be obtained by fractional analysis of these governing equations (Kline, S. J. (1965)). This methodology is accomplished by scaling the pertinent dependent and independent variables and then casting the equations into dimensionless form by dividing by one of the coefficients (the inertial terms in this case). Performing these operations on such dimensional equations yields dimensionless parameters commonly known as:

Reynolds number	$Re = U_o L_o / \nu_o$	$= \frac{\text{Inertial Force}}{\text{Viscous Force}}$
Bulk Richardson number	$Ri = [(\Delta T)_o / T_o]\ (L_o / U_o^2) g_o$	$= \frac{\text{Gravitational Force}}{\text{Inertial Force}}$
Rossby number	$Ro = U_o / L_o \Omega_o$	$= \frac{\text{Inertial Force}}{\text{Coriolis Force}}$
Prandtl number	$Pr = \nu_o / (k_o / \rho_o C_{p_o})$	$= \frac{\text{Viscous Diffusivity}}{\text{Thermal Diffusivity}}$
Eckert number	$Ec = U_o^2 / C_{p_o} (\Delta \bar{T})_o$	

For exact similarity between different flows which are described by the same set of equations, each of these dimensionless parameters must be equal for both flow systems. In addition to this requirement, there must be similarity between the surface-boundary conditions.

Surface-boundary condition similarity requires equivalence of the following features:

a. Surface-roughness distributions,

b. topographic relief, and

c. surface-temperature distribution.

If all the foregoing requirements are met simultaneously, all atmospheric scales of motion ranging from micro to mesoscale could be simulated within the same flow field for a given set of boundary conditions (Cermak, J. E. (1975)). However, all of the requirements cannot be satisfied simultaneously by existing laboratory facilities; thus, a partial or approximate simulation must be used. This limitation requires that atmospheric simulation for a particular application must be designed to simulate most accurately those scales of motion which are of greatest significance for the given application.

2.1.1 Partial Simulation of the Atmospheric Boundary Layer

A partial simulation is practically realizable only because the kinematics and dynamics of flow systems above a certain minimum Reynolds number are independent of its magnitude (Schlichting, H. (1968); Zoric, D. and Sandborn V. A. (1972)). The magnitude of the minimum Reynolds number will depend upon the geometry of the flow system being studied. Halitsky (1969) reported that for concentration measurements on a cube placed in a near uniform flow field the Reynolds number required for invariance of the concentration distribution over the cube surface and downwind must exceed 11,000. Because of this invariance, exact similarity of Reynolds parameter is neglected when physically modeling the atmosphere.

When the flow scale being modeled is small enough such that the turning of the mean wind directions with height is unimportant, similarity of the Rossby number may be relaxed. For the case of dispersion of LNG plume near the ground level the Coriolis effect on the plume motion would be extremely small.

The Eckert number for air is equivalent to 0.4 $Ma^2 (\frac{T_o}{\Delta T_o})$ where Ma is the Mach number (Hinze, J.O (1975)). For the wind velocities and temperature differences which occur in either the atmosphere or the laboratory flow the Eckert number is very small; thus, the effects of energy dissipation with respect to the convection of energy is negligible for both model and prototype. Eckert number equality is relaxed.

Prandtl number equality is easily obtained since it is dependent on the molecular properties of the working fluid which is air for both model and prototype.

Bulk Richardson number equality may be obtained in special laboratory facilities such as the Meteorological Wind Tunnel at Colorado State University (Plate, E. J. and Cermak, J. E. (1963)).

Quite often during the modeling of a specific flow phenomenon it is sufficient to model only a portion of a boundary layer or a portion of the spectral energy distribution. This relaxation allows more flexibility in the choice of the length scale that is to be used in a model study. When this technique is employed it is common to scale the flow by any combination of the following length scales, δ, the portion of the boundary layer to be simulated; z_o, the aerodynamic roughness; Λ_i, the integral length scale of the velocity fluctuations, or λ_p, the wavelength at which the peak spectral energy is observed.

Unfortunately many of the scaling parameters and characteristic profiles are difficult to obtain in the atmosphere. They are infrequently known for many of the sites to which a model study is to be performed. To help alleviate this problem Counihan (1975) has summarized measured values of some of these different parametric descriptions for the atmospheric flow at many different sites and flow conditions.

2.2 PHYSICAL MODELING OF LNG PLUME MOTION

In addition to modeling the turbulent structure of the atmosphere in the vicinity of a test site it is necessary to scale the LNG plume source conditions properly. One approach would be to follow the methodolgy used in Section 2.1, i.e., writing the conservation statements for the combined flow system followed by fractional analysis to find the governing parameters. An alternative approach, the one which will be used here, is that of similitude (Kline, S. J. (1965)). The method of similitude obtains scaling parameters by reasoning that the mass ratios, force ratios, energy ratios, and property ratios should be equal for both model and prototype. When one considers the dynamics of gaseous LNG plume behavior the following nondimensional parameters of importance are identified (Halitsky, J. (1969); Plate, E. J. and Cermak, J. E. (1963); Hoot, T. G. et al. (1974); Skinner, G. T. and Ludwig, G. R. (1978); Snyder, W. H. (1972)).[*,**]

$$\text{Mass Ratio} = \frac{\text{mass flow of LNG plume}}{\text{effective mass flow of air}}$$

$$= \frac{\rho_s W_s A_s}{\rho_a U_a A_a} = \frac{\rho_s Q}{\rho_a U_a L^2}$$

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[*] It has been assumed that the dominant transfer mechanism is that of turbulent entrainment. Thus the transfer processes of heat conduction, convection, and radiation are negligible.

[**] The scaling of plume Reynolds number is also a significant parameter. Its effects are fortunately invariant over a large range. This makes it possible to scale the distribution of mean and turbulent velocities and relax exact parameter equality.

Momentum Ratio $= \dfrac{\text{inertia of LNG plume}}{\text{effective inertia of air}}$

$$= \frac{\rho_s W_s^2 A_s}{\rho_a U_a^2 A_a} = \frac{\rho_s Q^2}{\rho_a U_a^2 L^4}$$

Densimetric Froude No. (Fr) $= \dfrac{\text{effective inertia of air}}{\text{buoyancy of LNG plume}}$

$$= \frac{\rho_a U_a^2 A_a}{g(\rho_g - \rho_a)V_s} = \frac{U_a^2}{g\left(\dfrac{\rho_s - \rho_a}{\rho_a}\right) L}$$

Volume Flux Ratio $= \dfrac{\text{volume flow of LNG plume}}{\text{effective volume flow of air}}$

$$= \frac{Q}{UL^2}$$

To obtain simultaneous simulation of these four parameters at a reduced geometric scale it is necessary to maintain equality of the LNG plume specific gravity ρ_s/ρ_a.

2.2.1 Partial Simulation of LNG Plume Motion

The restriction to an exact variation of the density ratio for the entire life of a plume is difficult to meet for LNG plumes which simultaneously vary in molecular weight and temperature. To emphasize this point more clearly, consider the mixing of two volumes of gas, one being the source gas, V_s, and other being ambient air, V_a. Consideration of the conservation of mass and energy for this system yields:*

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* The pertinent assumption in this derivation is that the gases are ideal and properties are constant.

$$\frac{\rho_g}{\rho_a} = \frac{\frac{\rho_s}{\rho_a} V_s + V_s}{\left(\frac{T_a}{T_s} V_s + V_a\right)\left(\frac{C_{p_s} M_s}{C_{p_a} M_a} V_s + V_a\right)\left(\frac{C_{p_s} M_s}{C_{p_a} M_a} \frac{T_a}{T_s} V_s + V_a\right)^{-1}}$$

If the temperature of the air, T_a, equals the temperature of the source gases, T_s, or if the product, $C_p M$, is equal for both source gas and air then the equation reduces to:

$$\frac{\rho_g}{\rho_a} = \frac{\frac{\rho_s}{\rho_a} V_s + V_a}{V_s + V_a}$$

Thus for two prototype cases: 1) an isothermal plume and 2) a thermal plume which is mostly composed of air, it does not matter how one models the density ratio as long as the initial density ratio value is equal for both model and prototype.

For a plume whose temperature, molecular weight, and specific heat are all different from that of the ambient air, i.e., a cold natural gas plume, equality in the variation of the density ratio upon mixing must be relaxed slightly if one is to model utilizing a gas different from that of the prototype.* In most situations this deviation from exact similarity is small (see discussion Section 2.3.2).

Scaling of the effects of heat transfer by conduction, convection, or radiation cannot be reproduced when the model source gas and environment are isothermal. Fortunately in a large majority of industrial plumes the effects of heat transfer by conduction, convection, and radiation from the environment are small enough that the plume buoyancy remains essentially unchanged. In the specific case of a cryogenic

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* If one were to use a gas whose temperature is different from that of the ambient air then consideration of similarity in the scaling of the energy ratios must be considered.

liquid spill the influence of heat transfer on cold dense gas dispersion can be divided into two phases. First, the temperature (and hence specific gravity) of the plume at exit from a containment tank and surrounding dike area is dependent on the thermal diffusivity of the tank-dike-spill surface materials, the volume of the tank-dike structure, the actual boiloff rate, and details of the spill surface geometry. A second plume phase involves the heat transfer from the ground surface beyond the spill area into the plume which lowers plume density.

It would be desirable to simulate the entire transient spill phenomenon in the laboratory including spill of cryogenic fluid into the dike, heat transfer from the tank and dike materials to the cryogenic fluid, phase change of the liquid and subsequent downwind dispersal of cold gas. Unfortunately, the different scaling laws for the conduction and convection require markedly different time scales for the various processes as the length scale changes. Since the volume of dike material storing sensible heat scales as the cube of length whereas the pertinent surface area scales as the square of length, heat is transferred to a model cold plume much too rapidly within the model containment structures. This effect is apparently unavoidable since a material having a thermal diffusivity low enough to compensate for this effect does not appear to exist. Calculations for the full-scale situation suggest minimal heating of a cold gas plume by the tank-dike structure; thus it may suffice to cool the model tank-dike walls to reduce the heat transfer to a cold model vapor and study the resultant cold plume.

Boyle and Kneebone (1973) released room temperature propane and LNG onto a water surface under equivalent conditions. The density of propane at ambient temperatures and methane at −161°C are the same. Using the modified Froude number as a model law they concluded dispersion characteristics were equivalent within experimental error.

A mixture of 50% helium and 50% nitrogen pre-cooled to 115° K was released from model tank-dike systems by Meroney et al. (1977) to simulate equivalent LNG spill behavior. It was expected the gross influences of different heat transfer conditions could be determined; however, there was no guarantee that these experiments reproduced quantitatively similar situations in the field. Since the turbulence characteristics of the flow are dominated by roughness, upstream wind profile shape, and stratification one expects the Stanton number in the field will equal that in the model, and heat transfer rates in the two cases should be in proper relation to plume entrainment rates. On the other hand, if temperature differences are such that free convection heat transfer conditions dominate, scaling inequalities may exist; nonetheless, model dispersion rates would be conservative.

Visualization experiments performed with equivalent dense isothermal and dense cold plumes revealed no apparent change in plume geometry. Concentration data followed similar trends in both situations. No significant differentiation appeared between insulated versus heat conducting ground surfaces or neutral versus stratified approach flows (Meroney et al. (1977)).

The influence of latent heat release by moisture upon the buoyancy of a plume is a function of the quantity of water vapor present in the plume and the humidity of the ambient atmosphere. Such phase change effects on plume buoyancy can be very pronounced in some prototype situations. Figure 1 displays the variation of specific gravity from a spill of liquefied natural gas in atmospheres of different humidities. For a LNG vapor plume, humidity effects are shown to reduce the extent

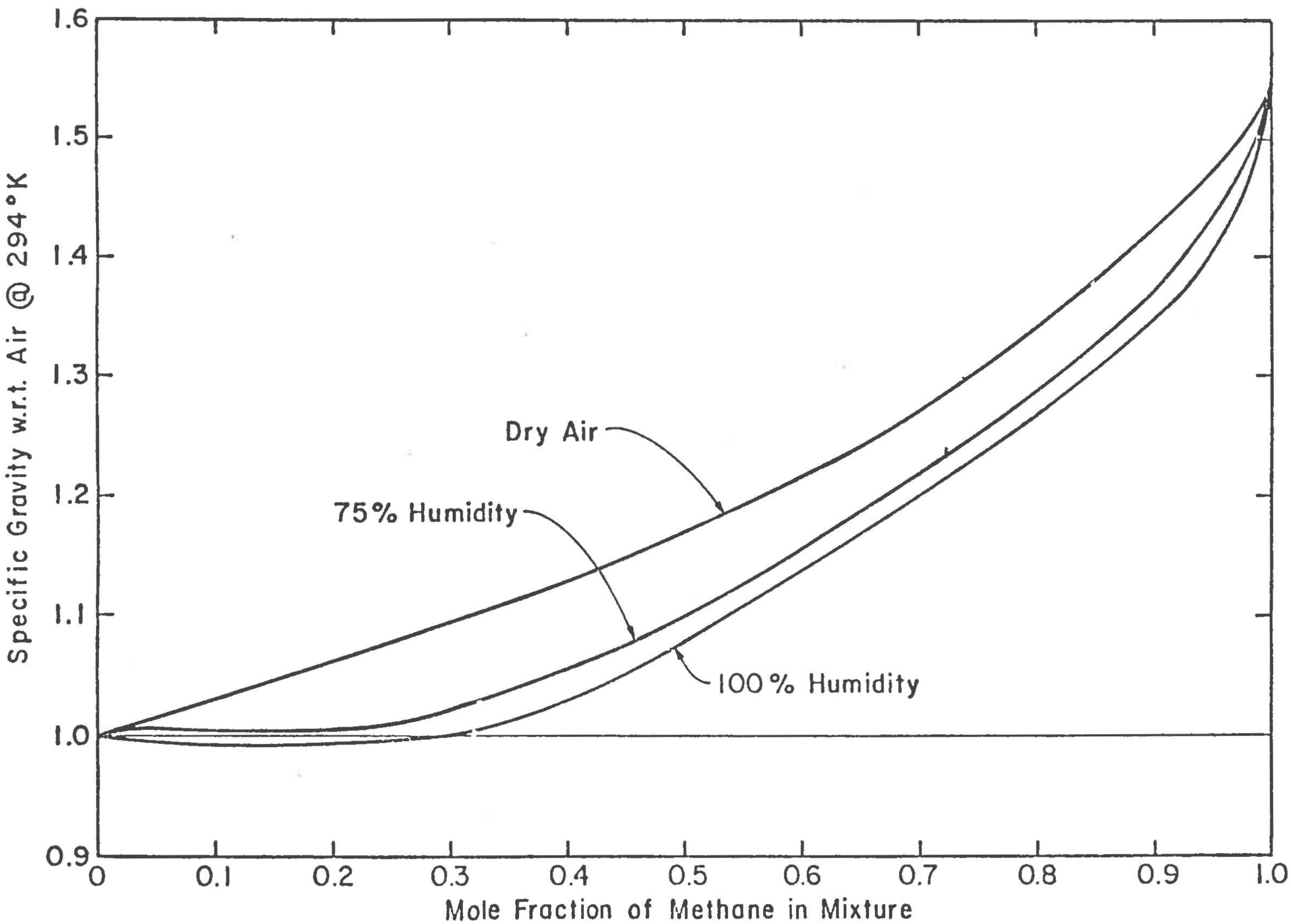

Figure 1. Specific Gravity of LNG Vapor - Humid Atmosphere Mixtures

in space and time of plume buoyancy dominance on plume motion. Hence a dry adiabatic model condition is conservative.

A reasonably complete simulation may be obtained in some situations even when a modified density ratio ρ_s/ρ_a is stipulated. The advantage of such a procedure is demonstrated most clearly by the statement of equality of Froude Numbers.

$$\left(\frac{U_a^2}{(\frac{\rho_s}{\rho_a} - 1)Lg}\right)_m = \left(\frac{U_a^2}{(\frac{\rho_s}{\rho_a} - 1)Lg}\right)_p$$

Solving this equation to find the relationship between model velocity and prototype velocity yields:

$$(U_a)_m = \left(\frac{S.G._m - 1}{S.G._p - 1}\right)^{1/2} \left(\frac{1}{L.S.}\right)^{1/2} (U_a)_p$$

where S. G. is the specific gravity, (ρ_s/ρ_a), and L.S. is the length scale, (L_p/L_m). By increasing the specific gravity of the model gas compared to that of the prototype gas, for a given length scale, one increases the reference velocity used in the model. It is difficult to generate a flow which is similar to that of the atmospheric boundary layer in a wind tunnel run at very low wind speeds. Thus the effect of modifying the model specific gravity extends the range of flow situations which can be modeled accurately. But unfortunately, during such adjustment of the model gases specific gravity, at least two of the four similarity parameters must be neglected. The options as to which two of these parameters to retain, if any, depends upon the physical situation being modeled. Two of the three possible options are listed below.

(1) Froude No. Equality
Momentum Ratio Equality
Mass Ratio Inequality
Velocity Ratio Inequality*

(2) Froude No. Equality
Momentum Ratio Inequality
Mass Ratio Inequality
Velocity Ratio Equality

Both of these schemes have been used to model plume dispersion downwind of an electric power plant complex by Skinner (1978), Kothari et al. (1979) and Meroney (1974) respectively.

The modeling of the plume Reynolds number is relaxed in all physical model studies. This parameter is thought to be of small importance since the plume character will be dominated by background atmospheric turbulence soon after its emission. But, if one was interested in plume behavior near the source, then steps should be taken to assure that the model plume is fully turbulent.

2.3 MODELING OF PLUME DISPERSION FOR PRESENT STUDY

In the sections above a review of the extent to which wind tunnels can model LNG plume dispersion in the atmospheric boundary layer has been presented. In this section these arguments will be applied to the case of an LNG spill for the present study.

2.3.1 Physical Modeling of the Atmospheric Surface Layer

A neutral boundary layer was generated in the Environmental Wind Tunnel using spires and a trip at the entrance of the tunnel. The wind speeds were referenced to a 5 m (prototype) height. The aerodynamic roughness, z_o, and power law exponent, α, were specified such that the

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* When this techniques is employed, distortion in velocity scales or similarly volume flow rates requires that a correction be applied to the measured concentration field.

boundary layer profile was similar to that expected for a flat suburban terrain area.

2.3.2 Physical Modeling of the LNG Spill Plume

The buoyancy of a plume resulting from an LNG spill is a function of both the mole fraction of methane and temperature. If the plume entrains air adiabatically, then the plume would remain negatively buoyant for its entire lifetime. If the humidity of the atmosphere were high then the buoyancy of the plume will vary from negative to weakly positive. These conclusions are born out in Figure 1, which illustrates the specific gravity of a mixture of methane at boiloff temperature with ambient air and water vapor.

Since the adiabatic plume assumption will yield the most conservative downwind dispersion estimates this situation was simulated. Several investigators have confirmed that the Froude number is the parameter which governs plume spread rate, trajectory, plume size, and entrainment during initial dense plume dilution (Kothari, K. M., Meroney, R. N. and Neff, D. E. (1981); Hoot, T. G. et al. (1974); Boyle, G. J. and Kneebone, A. (1973); Bodurtha, F. T., Jr. (1961); van Ulden, A. P. (1974)). The modeling of momentum is not of critical importance for a ground source released over a fairly large area.

The use of an isothermal dense model gas such as a mixture of ethane and carbon dioxide in place of a cold methane vapor also results in a slight distortion of the local dynamic forces acting on equivalent plume volumes as the gas mixes. Unfortunately this distortion is not conservative, i.e., the thermal capacitance properties of methane result in plumes which behave more dense than the model equivalent plume. Analytical approximations based on the integral entrainment box model of Fay (1980) suggest that buoyancy forces are greater at equivalent time and space positions during adiabatic mixing of methane. Let $Fr = \frac{U(h)^2}{g \frac{\Delta\rho}{\rho_a} h}$ be a local Froude number, where h is local plume depth, U(h) is wind speed at plume depth, h, and $\Delta\rho/\rho_a$ is a local density difference ratio. Then given a power law wind profile $U(h) \sim h^{\alpha}$ one finds

$$\frac{Fr_{LNG\ vapor}}{Fr_{isothermal\ gas}} = \frac{(1+XS)(\beta+(1-\beta)\theta)}{(\beta(1+XS)+(1+S)(1-\beta)\theta)} \left[\frac{1+XS-X(1+S)\theta}{(1-X\theta)(1+XS)}\right]^{2\alpha} \left[\frac{R_{LNG}}{R_{iso}}\right]^{2-4\alpha}$$

where X = mole fraction methane vapor

R = local plume spread

$\beta = 1 - M_a/M_s \simeq -0.81$

$\theta = 1 - T_s/T_a \simeq 0.6$

$S = (Cp_s^*/Cp_a^* - 1) \simeq 0.22$

α = velocity power law exponent $\simeq 0.2$.

The variation of this Froude number ratio with equivalent mole fraction methane is plotted in Figure 2. Nonetheless, over most of the concentration range where buoyancy forces are dominant the variation of Froude number is adequately simulated by the isothermal model gas. Indeed, volume integrated or box model calculations when corrected for equal molar source strengths predict equal or slightly higher concentration values at equivalent times.

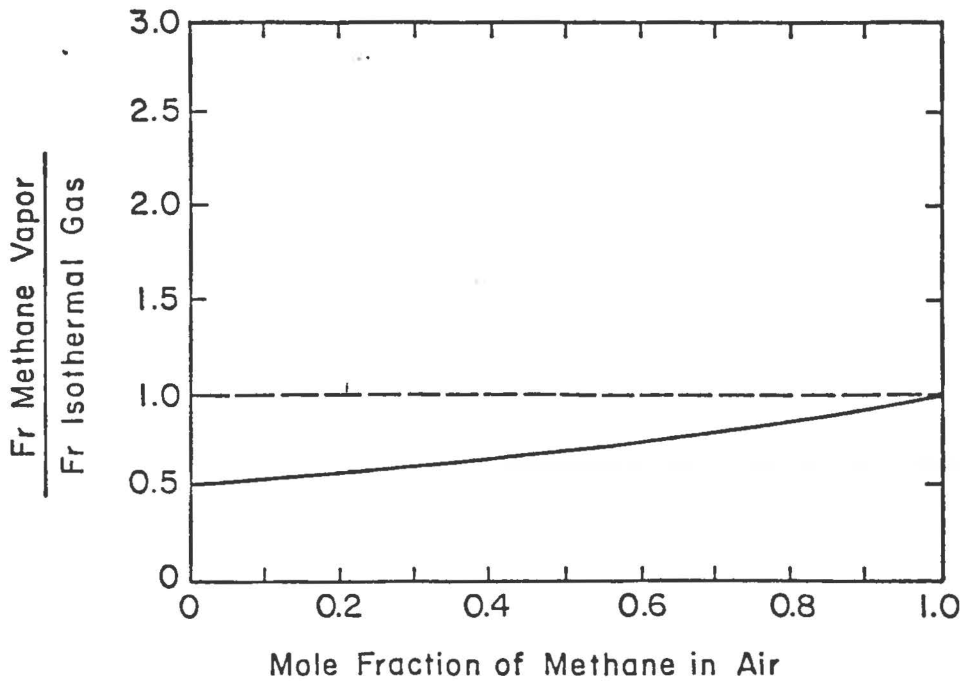


Figure 2. Variation of Isothermal Plume Behavior From Equivalent Cold Methane Plume Behavior

2.3.3 Model Scale Factors

As discussed previously the dominant scaling criteria for the simulation of LNG vapor cloud physics are the Froude number and the volume flux ratio. By setting these parameters equal for model and prototype one obtains the following relationships.

$$(U_a)_m = \left(\frac{S.G._m - 1}{S.G._p - 1}\right)^{1/2} \left(\frac{1}{L.S.}\right)^{1/2} (U_a)_p$$

$$Q_m = \left(\frac{S.G._m - 1}{S.G._p - 1}\right)^{1/2} \left(\frac{1}{L.S.}\right)^{5/2} Q_p$$

$$L_m = \frac{1}{L.S.} L_p$$

In addition to these scaling parameters which govern the flow physics, one must also scale the mole fractions (concentrations) measured in the model to those that would occur in the prototype. This scaling is required, since the number of moles being released in a thermal plume are different from the number of moles being released in an isothermal plume. To be more precise the relationship between the molar flow rate of source gas in the model and the prototype is

$$n_p = (T_m/T_p)_{@b.o.} n_m = (2.70) n_m$$

By definition the concentration of LNG vapor is expressed as:

$$\chi_p = n_s/(n_s + n_a)$$

Substituting model equivalents in the above expression yields

$$\chi_p = \frac{(T_m/T_p)_{b.o.}\, n_s}{(T_m/T_p)_{@b.o.}\, n_s + n_a} = \frac{n_s}{n_s + n_a (T_p/T_m)_{@b.o.}}$$

or

$$\chi_p = \frac{\chi_m}{\chi_m + (1 - \chi_m)(0.37)}$$

This equation was used to correct the modeled measurements to those that would be observed in the field.

3.0 DATA ACQUISITION AND ANALYSIS

Laboratory measurement techniques are discussed in this section, along with conversion methods which provide a basis for interpretation of model data in terms of field equivalent quantities. Some of the methods used are conventional and need little elaboration.

3.1 WIND-TUNNEL FACILITIES

The Environmental Wind Tunnel (EWT) shown in Figure 3 was used for all tests performed. This wind tunnel, specially designed to study atmospheric flow phenomena, incorporates special features such as adjustable ceiling, rotating turntables, transparent boundary walls, and a long test section to permit reproduction of micrometeorological behavior at larger scales. Mean wind speeds of 0.10 to 12 m/s can be obtained in the EWT. A boundary layer depth of 1 m thickness at 6 m downstream of the test entrance can be obtained with the use of the vortex generators and trip at the test section entrance and surface roughness on the floor. The flexible test section roof on the EWT is adjustable in height to permit the longitudinal pressure gradient to be set to zero. The vortex generators and trip at the tunnel entrance were followed by 9.2 m of smooth floor for the 1:100 scaled area-source model.

3.2 MODEL

It was decided that the best reproduction of the surface wind characteristics would be at a model scale of 1:100. The area model was built into a special insert made to fit in the floor of the wind tunnel. The insert incorporated an aluminum turntable on which was mounted a 0.60 m square model dike enclosing a plenum discharging LNG-vapor simulant. The dike heights used were 4, 8, and 16 cm. The insert also incorporated a drain for collecting water discharged by the model nozzles. The turntable was designed to accept the two nozzle manifolds

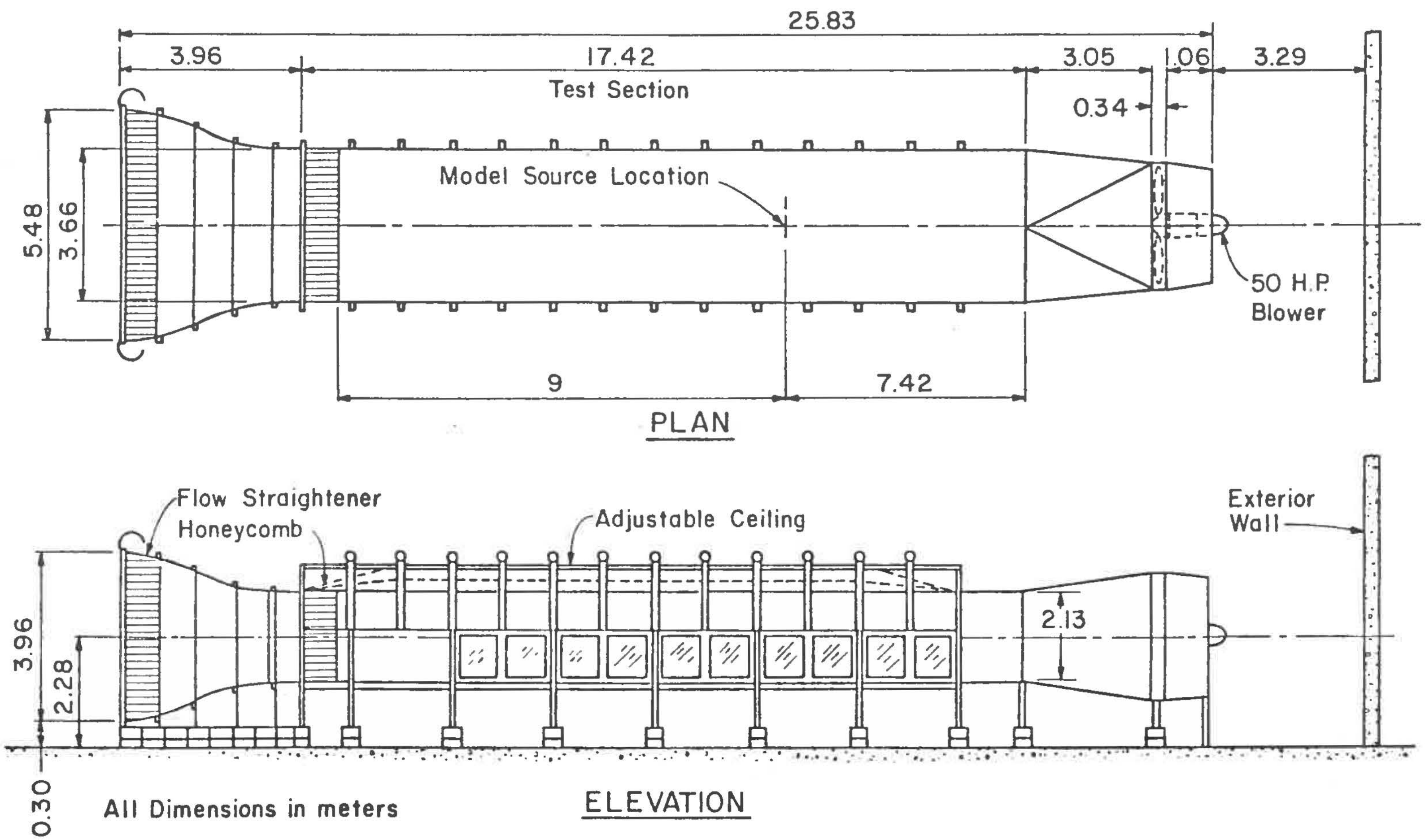


Figure 3. Environmental Wind Tunnel

fabricated at FMRC. One manifold was mounted underneath the turntable with upward-pointing nozzles inserted through clearance holes in the turntable (discharge face flush with top of turntable), and the other manifold with downward-pointing nozzles was mounted above the turntable on stands attached to the turntable.

Six different nozzles were used throughout the test program and are designated as A, D, E, G, H, and I. Nozzles A, H, and I manufactured by Spraco, Inc. were model numbers 19577604, 19437604, and 18171804 respectively. Nozzles D, E, and G made by Spraying Systems Company were model numbers 1/4TTD1-31, 1/4TTD1-33, and 1/4TT1101.

The plenum from which the source gas was discharged was divided into nine separate but contiguous chambers (Figure 4), and the gas was fed into all nine chambers at equal rates. Each of the chambers contained a thin layer of glass beads so that the discharge would be uniform over the entire surface.

Carbon dioxide, with a small amount of ethane (~ 1%) for detection, was used as LNG-vapor simulant. Concentrations were measured at 42 sample points around and downstream of the gas discharge (Figure 5): samples drawn into syringes were analyzed with a gas chromatograph.

3.3 FLOW VISUALIZATION TECHNIQUES

Smoke was used to define plume behavior. The smoke was produced by passing the LNG-vapor simulant through an oil smoke generator (Fog/Smoke Machine manufactured by Roscolab Ltd.). A visible record was obtained from pictures taken with a Speed Graphic camera using Polaroid film for immediate examination. In addition, color slides were taken with a 35 mm camera and several runs were recorded on video cassettes.

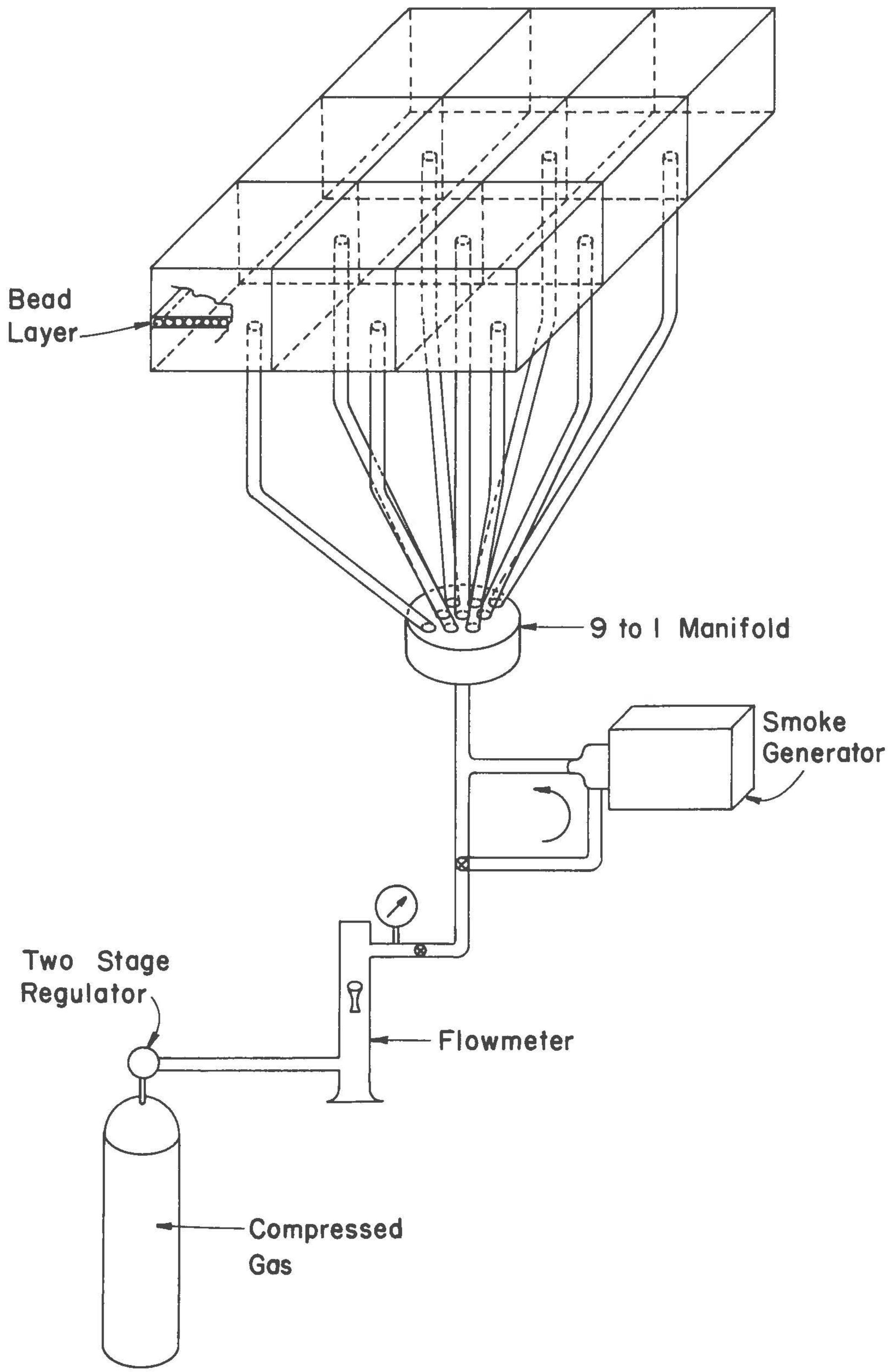


Figure 4. Source Plenum and Gas Supply Detail

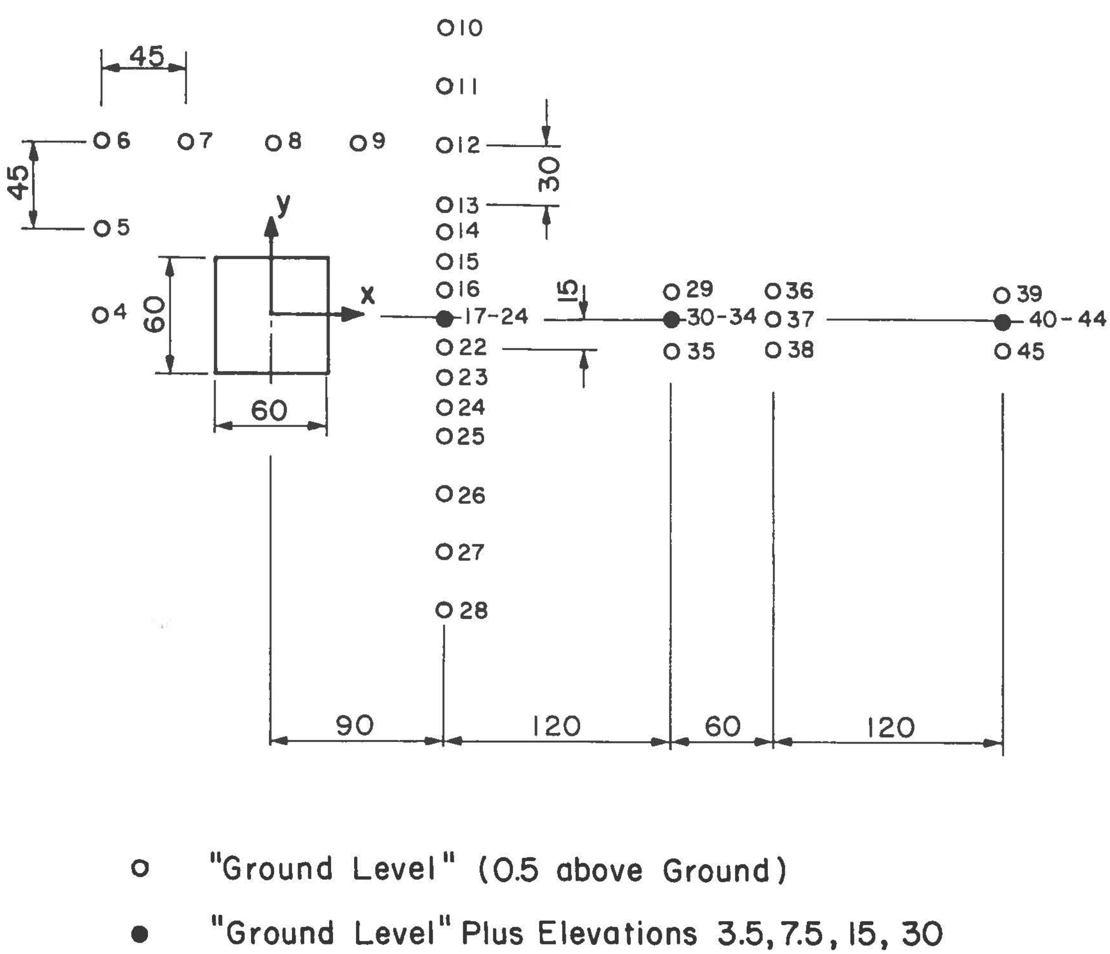
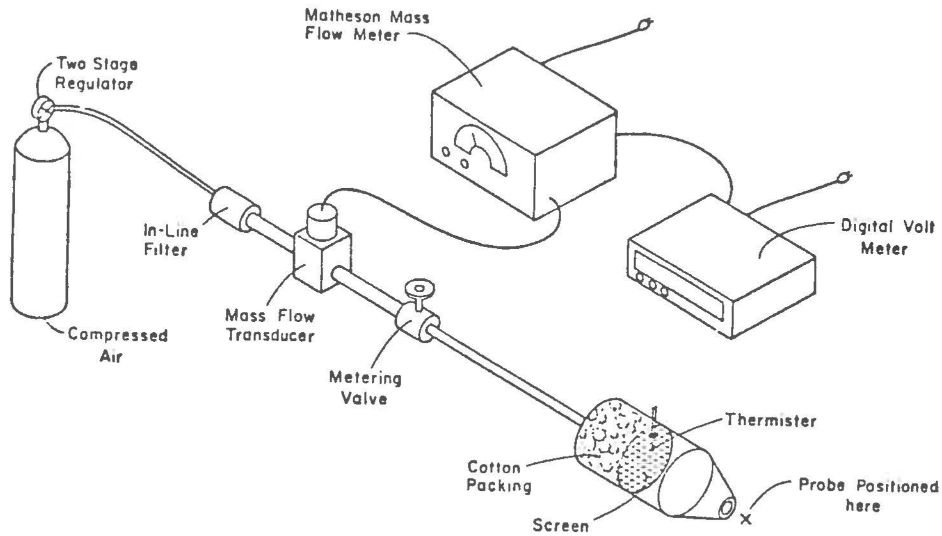


Figure 5. Sampling Grid for Concentration Measurements. All Dimensions in cm (Model) or m (Full Scale for L.S. = 100).

3.4 <u>WIND PROFILE AND TURBULENCE MEASUREMENTS</u>

The velocity profile, reference wind speed conditions, and turbulence were measured with a Thermo-Systems Inc. (TSI) 1050 anemometer and a TSI model 1210 hot-film probe. Since the voltage response of these anemometers is nonlinear with respect to velocity, a multipoint calibration of system response versus velocity was utilized for data reduction.

The velocity standard was that depicted in Figure 6. This consisted of a Matheson Model 8116-0154 mass flowmeter, a Yellow Springs



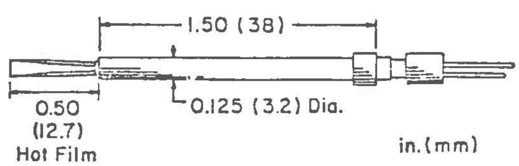


Figure 6. Velocity Probes and Velocity Standard

thermistor, and a profile conditioning section constructed by the CSU Engineering Research Center shop. The mass flowmeter measures mass flow rate independent of temperature and pressure, the thermistor measures the temperature at the exit conditions. The profile conditioning section forms a flat velocity profile of very low turbulence at the position where the probe is to be located. Incorporating a measurement of the ambient atmospheric pressure and a profile correction factor permits the calibration of velocity at the measurement station from 0.1-2.0 m/s.

During calibration of the single film anemometer, the anemometer voltage response values over the velocity range of interest were fit to an expression similar to that of King's law (Sandborn, V. A. (1972)) but with a variable exponent. The accuracy of this technique is approximately ± 2 percent of the actual longitudinal velocity.

The velocity sensors were mounted on a vertical traverse and positioned over the measurement location on the model. The anemometer responses were fed to a Preston analog-to-digital converter and then directly to a HP-1000 minicomputer for immediate interpretation. The HP-1000 computer also controls probe position. A flow chart depicting the control sequence for this process is presented in Figure 7.

3.5 CONCENTRATION MEASUREMENTS

The experimental measurements of concentration were performed using gas-chromatograph and sampling systems (Figure 8) designed by Fluid Dynamics and Diffusion Laboratory staff.

3.5.1 Gas Chromatograph

The (Hewlett-Packard Model 5710A) gas chromatograph with Flame Ionization Detector (FID) operates on the principle that the electrical conductivity of a gas is directly proportional to the concentration of

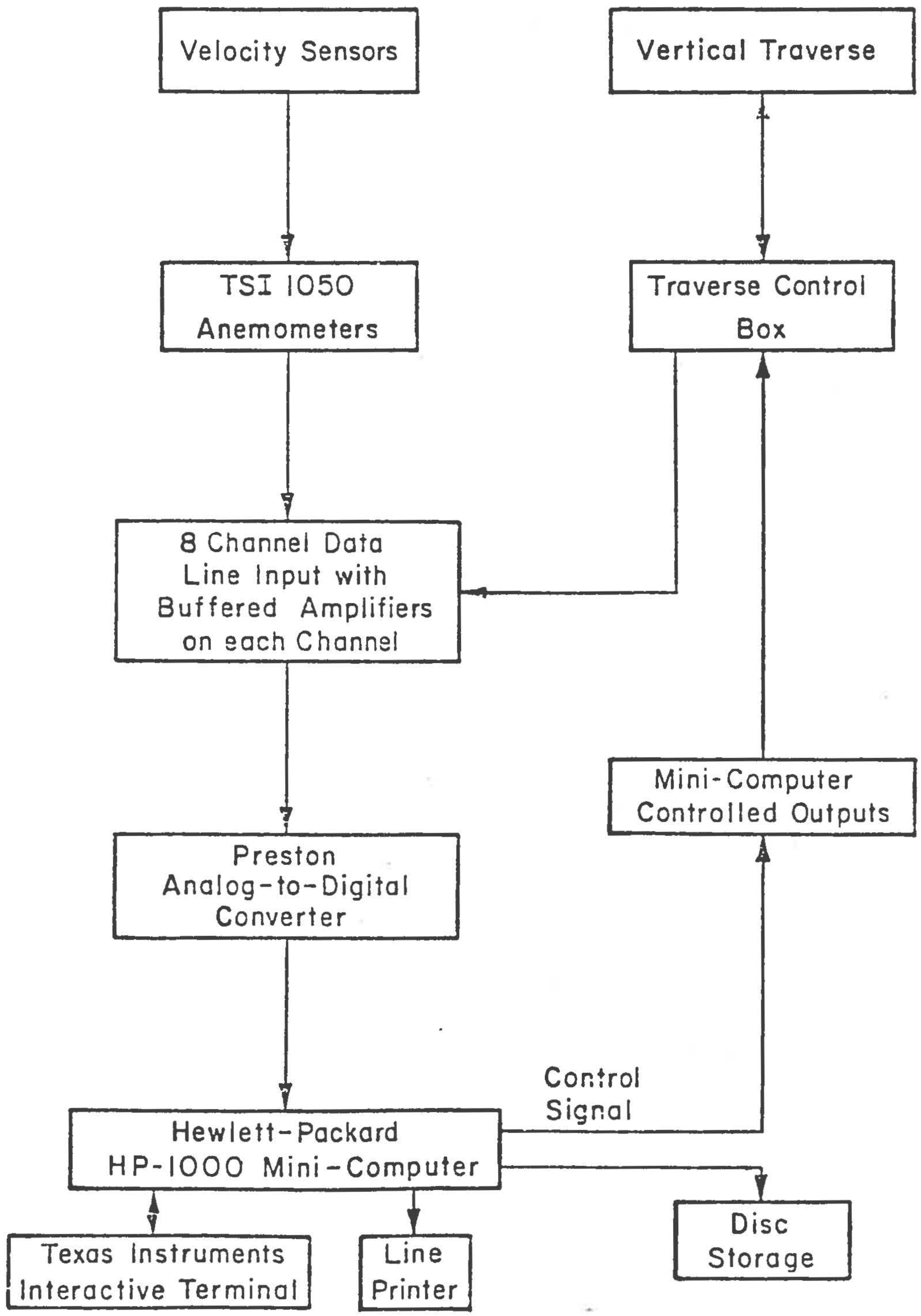
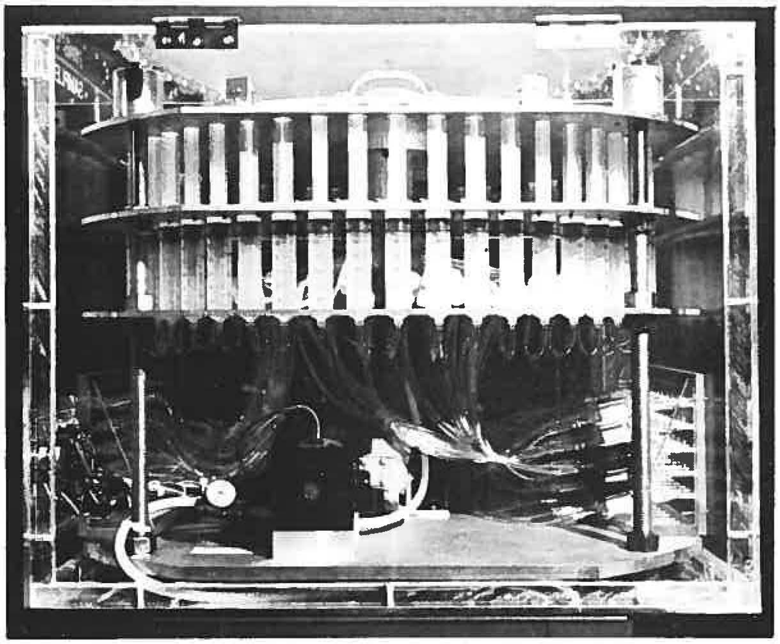
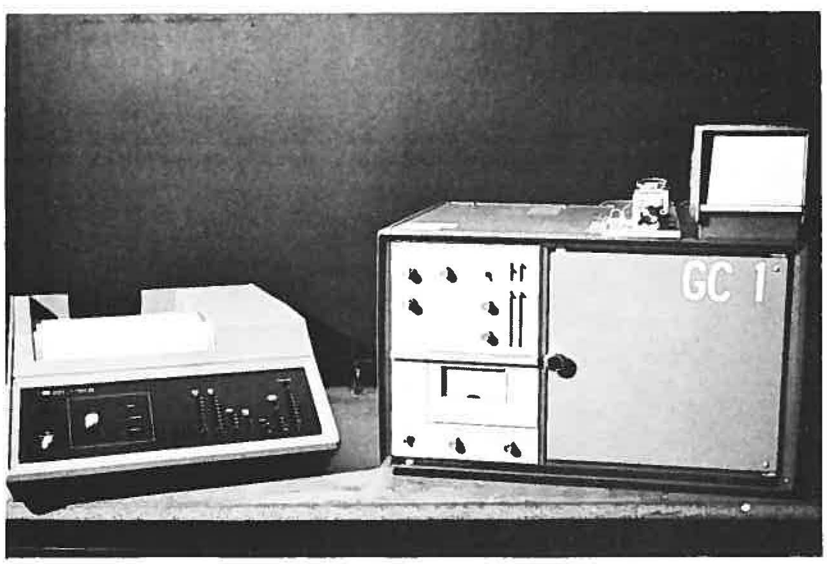


Figure 7. Velocity Data Reduction Flowchart



(a)



(b)

Figure 8. Photographs of (a) the Gas Sampling System, and (b) the HP Integrator and Chromatograph

charge particles within the gas. The ions in this case are formed by the effluent gas being mixed in the FID with hydrogen and then burned in air. The ions and electrons formed enter an electrode gap and decrease the gap resistance. The resulting voltage drop is amplified by an electrometer and fed to the HP 3380 or HP 3390A integrator. When no effluent gas is flowing, a carrier gas (nitrogen) flows through the FID. Due to certain impurities in the carrier, some ions and electrons are formed creating a background voltage or zero shift. When the effluent gas enters the FID, the voltage increase above this zero shift is proportional to the degree of ionization or correspondingly the amount of tracer gas present. Since the chromatograph used in this study features a temperature control on the flame and electrometer, there is very low drift of the zero shift. In case of any zero drift, the HP 3380 or 3390A, which integrates the effluent peak, also subtracts out the zero drift.

The lower limit of measurement is imposed by the instrument sensitivity and the background concentration of tracer within the air in the wind tunnel. Background concentrations were measured and subtracted from all data quoted herein.

3.5.2 Sampling System

The tracer gas sampling system consists of a series of fifty 30 cc syringes mounted between two circular aluminum plates. A variable-speed motor raises a third plate, which in turn raises all 50 syringes simultaneously. A set of check valves and tubing are connected such that airflow from each tunnel sampling point passes over the top of each designated syringe. When the syringe plunger is raised, a sample from the tunnel is drawn into the syringe container. The sampling procedure consists of flushing (taking and expending a sample) the syringe three times after which the test sample is taken. The draw rate is variable and generally set to be approximately 6 cc/min.

The sampler was periodically calibrated to insure proper function of each of the check valve and tubing assemblies. The sampler intake was connected to short sections of Tygon tubing which led to a sampling manifold. The manifold, in turn, was connected to a gas cylinder having a known concentration of tracer gas. The gas was turned on and a valve on the manifold opened to release the pressure produced in the manifold. The manifold was allowed to flush for about 1 min. Normal sampling procedures were carried out to insure exactly the same procedure as when taking a sample from the tunnel. Each sample was then analyzed for tracer gas concentration. Any sample having an error of greater than ±2 percent indicated a failure in the check valve assembly and the check valve was replaced or the bad syringe was not used for sampling from the tunnel.

3.5.3 Test Procedure

The test procedure consisted of: 1) setting the proper tunnel wind speed, 2) releasing a metered mixture of source gas (specific gravity of 1.5) from the release area source, 3) activating the spray curtains at the proper pressure, 4) withdrawing samples of air from the tunnel at the locations designated, and 5) analyzing the samples with a Flame Ionization Gas Chromatograph (FIGC). Photographs of the sampling system and gas chromatograph are shown in Figure 8. The samples were drawn into each syringe over a 300 s (approximate) time period and consecutively injected into the FIGC.

The procedure for analyzing air samples from the tunnel is as follows: 1) a 2 cc sample volume which was drawn from the wind tunnel and collected in a syringe is introduced into the Flame Ionization Detector

(FID), 2) the output from the electrometer (in microvolts) is sent to the Hewlett-Packard 3390 or 3390A Integrator, 3) the output signal is analyzed by the integrator to obtain the proportional amount of hydrocarbons present in the sample, 4) the record is integrated, and the ethane concentration is determined by multiplying the integrated signal (μv-s) by calibration factor (ppm/μv-s), 5) a summary of the integrator analysis (gas retention time and integrated area (μv-s)) is printed out on the integrator at the wind tunnel, 6) the integrated values and associated run information were tabulated on a specially designed form, 7) the integrated values for each tracer are entered into a computer along with pertinent run parameters, and 8) the computer program converts the raw data into mean concentration. The calibration factor was obtained by introducing a known quantity, χ_s, of tracer into the FIGC and recording the integrated value, I, in μv-s.

The calibration factor is $\frac{\chi_s\,(\text{ppm})}{I\ (\mu\text{v-s})}$

Calibrations were obtained at the beginning and end of each measurement period.

4.0 TEST PROGRAM

The goal of the test was to determine the effects of water spray curtains near the source on the dispersion of a modeled Liquified Natural Gas (LNG) plume.

4.1 PRE AND POST "SMALL-SCALE" FIELD EXPERIMENTS

The first series of tests (Runs 1-58) were performed to model a hypothetical spill at a scale of 1:100 from a 60 m x 60 m area surrounded by a 4 m dike. These tests also served as a qualitative pre-test series for subsequent small-scale experiments performed by Factory Mutual Research Corporation (FMRC) and Lawrence Livermore National Laboratory (LLNL) at the Gas Training Facility of the Massachusetts Fire Fighting Academy, (Table 1). (In this table, a "scale ratio" of 20 means that the associated test was designed as a reduced scale model of spill into a 60 m x 60 m dike - the actual spill area was 3 m x 3 m. The parameter, n , refers to the number of sprays per side of the diked area. The quantity U_w is the mean wind speed.) Tests 1-58, then, were designed to cover a wide range of wind speed and spill configurations (see Table B-1).

Once the FMRC/LLNL field experiments were completed, a short post-field series of tests (Runs 59-61) were performed to reproduce the exact conditions which existed during Test 13 of the Field Test Sequence. These tests were run at a linear scale ratio of 1:5.

The wind tunnel simulation of field Test 13 indicated no-spray ground level concentrations near 70% and concentrations with spray of 20%. These values are considerably higher than the values of approximately 8% and 4% respectively, that were measured in the field. These low field test values may have been caused by highly unstable atmos-

Table 1
Selected Small-Scale Spill Tests Performed by
LLNL and FMRC on the Basis of Runs 1-58

Test Number	Spray (Up,Down)	Scale Ratio	Nozzle Config.	n	Approx.* U_w (m/s)
9	Up	20		7	4.5
10	Up	1		7	-
12	Down	1		7	2.5
13	Down	1		4	0.5
18	Up	20		7	4.5
19	Up	20		7	3.0
23	Up	1		7	1.8
24	Up	1		7	2.7
33	Up	1		7	1.8
37	Up	1		4	1.4
41	Up	1		4+3	1.6

* Referred to full scale in case of Scale Ratio = 20

pheric conditions existing during the field tests that were not reproduced in the tunnel. Alternatively, the differences may have been caused by unsimulated vertical velocities reached at the field area source due to accelerated boiloff over the evaporation pad.

4.2 HEALTH AND SAFETY EXECUTIVE FIELD TEST SIMULATION

Additional full scale dispersion experiments with water curtains made elsewhere were sought which could be simulated in the wind tunnel to check the modeling method. A field series test was performed by the (British) Health and Safety Executive (HSE) in 1981 using cold CO_2 vapor (-78°) at an estimated spill rate of 1.1 kg/s from a point source. Two of these tests were selected for simulation in the wind tunnel (at a scale ratio of 1:28.9) to verify the wind tunnel method for studying spray dispersion. The two tests, HSE 41 and HSE 46, were selected because of availibility of model nozzles, practicality of scaling ratios, and apparent quality of the data. Test results and plan views of the test arrangement showing relative wind direction, gas source, spray nozzles and sampling points are given in Appendix A.

4.3 WATER SPRAY CURTAIN DESIGN TEST SERIES

Since HSE Run 46 was satisfactorily replicated in the wind tunnel (see Section 5.2), a test series (Runs 62-107) was designed by FMRC to examine downwind concentration profiles resulting from variations in source strength, mean flow velocities spray configurations and separation geometries. These tests were performed to determine the maximum mitigation expectations assuming a large quantity of water at high pressures was available.

Since previous tests were performed using unobstructed area sources and with a constant dike height of 4 cm (4 m full scale), a test series (Runs 108-153) was investigated to examine the performance of the more favorable spray configurations in the presence of different sized tanks with correspondingly scaled dikes. Wind tunnel results are summarized in Appendix B.

5.0 DISCUSSION OF RESULTS

The primary purpose of this report is to summarize data and test methodologies resulting from wind tunnel simulations of full scale LNG spills. Although an extensive discussion of the data will be prepared by the FMRC staff, an overview of the more significant results follows.

5.1 PRE SMALL-SCALE FIELD EXPERIMENT WIND TUNNEL RUNS

A test series (Runs 1-58) was specified by FMRC and CSU personnel to establish downwind concentration profiles due to changes in spray configurations, spray directions and flowrates, and wind velocities. These tests served as a precursor to small-scale tests conducted by the Massachusetts Firefighting Academy and LLNL.

The data resulting from the no-spray condition gave expected plume behavior. The plume was broad, flat and symmetric about the center line which ran downwind from the source. Figure 9a shows the comparison between lateral concentration measurements at a scaled distance of 90 meters downwind from the source both with and without sprays. The plume maintained a symmetric character about the centerline although concentrations reduction factors (FD)* of 1.35 in the case of upward sprays, 2.80 for downward sprays and 4.67 in the case of mixed downward and upward sprays were measured, indicating that spray curtains can significantly reduce downwind LNG concentrations.

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* Reduction Factor (FD) defined by Moore and Rees (1981) as ratio of concentrations without the spray to with the spray active.

Small scale field results conducted by FMRC and LLNL (Figure 9b) indicated equivalent concentration reduction factors of typically 2.0 when the spray curtain was activated. Surprisingly concentrations did not exceed 20% even when the spray was inactive. Further wind-tunnel tests (Runs 59-61) were conducted which replicated field Run 13 at a scale of 1:5. The laboratory results for equivalent wind speed, source strength and water spray conditions still produced concentration magnitudes and reductions commensurate with previous wind tunnel data.

Re-examination of prior field and model studies rescaled to field Run 13 conditions suggest that the concentrations measured in the laboratory are consistent with prior field and model results. Reduction of weather data by LLNL indicates a highly unstable stratification existed during Run 13 which could not be replicated in the wind tunnel and perhaps accounted for the disparity in the data sets. Alternatively, accelerated boiloff over the evaporation pad may have generated unsimulated vertical velocities which may have lofted the plume (see FMRC 1st Quarterly Report, July 1982, Contract No. 5080-352-0386).

Analytical calculation as specified by Moore and Rees (1981) for the effect of downward directed sprays on the gases emitted by a line source equivalent to the wind tunnel source flowing over a 4 cm dike predicted dilution factors of about 2.05 which are consistent with those measured in the laboratory.

5.2 HSE FIELD TRIALS

HSE Runs 46 and 41 were simulated in the wind tunnel at a scale ratio of 1:28.9. In the field, the wind speeds at 1.25 m (Figure 10) for HSE 46 were reported to average 2.9 m/s during an initial no-spray interval (0-3 min), and 1.7 m/sec during the subsequent (3-5 min) spray interval. Using an equivalent scaled velocity corresponding to 2.9 m/s

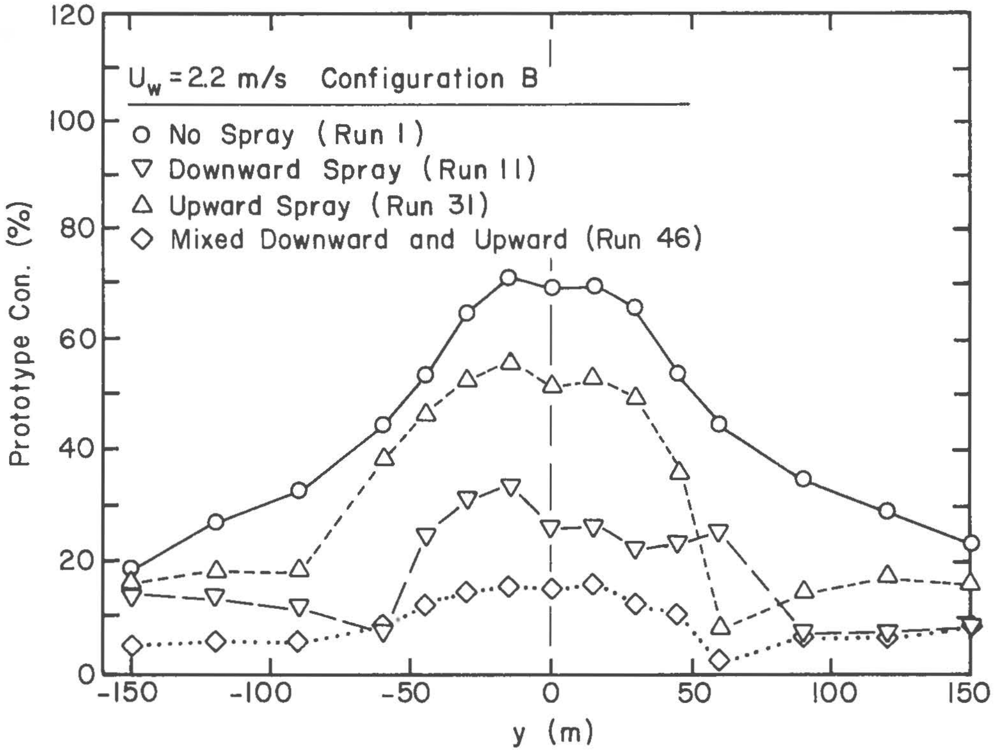

Figure 9a. Concentrations at x = 90 m with Various Spray Configurations

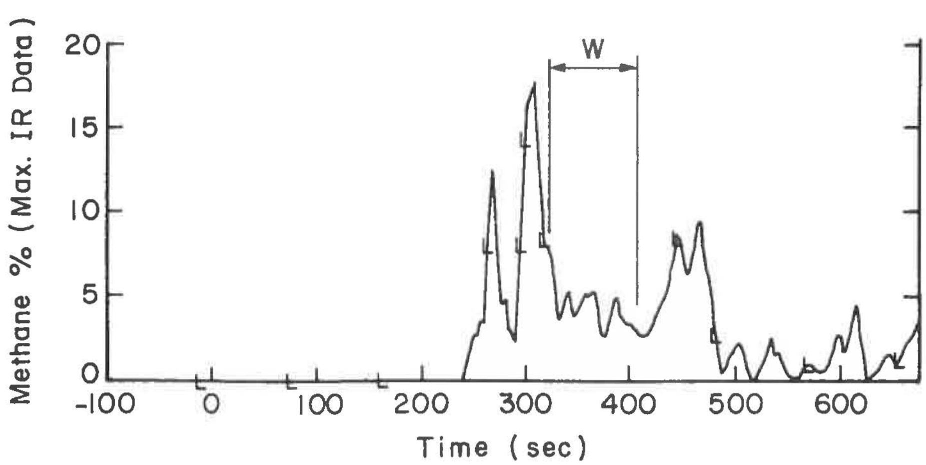

Figure 9b. Field Centerline Concentrations at x = 4.5 m

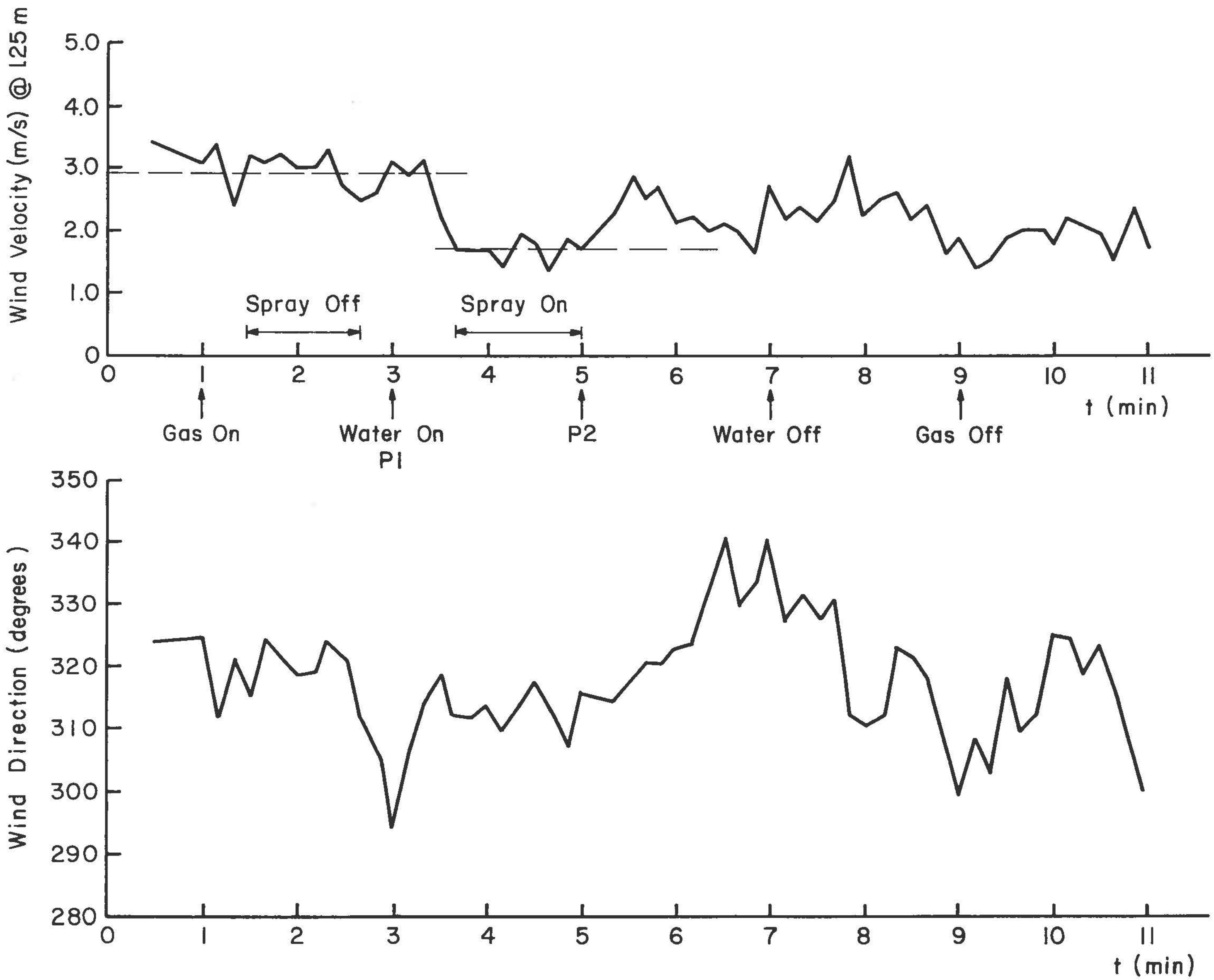

Figure 10. Wind Direction and Wind Velocity Field Data for HSE Run Number 46

(Run 6, Table A-1), the wind tunnel results did not reproduce the field conditions, the lateral spread of the field vapor plume being greater. When the wind speed was reduced to the equivalent of 1.7 m/s (Run 10) the model reproduced the no spray conditions quite well. Linear and logarithmic scatter diagrams of concentrations measured at equivalent scaled points produce correlations, r, of 0.87 and 0.97 respectively (Figure 11). Figure 12 shows the comparisons between vertical concentration profiles recorded in the field and at equivalent locations in the laboratory. Reduction of the effective field wind speed was justified by subsequent HSE tests which employed simultaneous wind measurements at two locations. These measurements showed significant unexplained differences in velocity readings between otherwise similar locations of the order used here.

Laboratory vapor concentrations measured during spray operation (Run 11) agreed quite well with field data as shown in Figure 13.

The average wind speed recorded for HSE 41 was about 3.2 m/s for the no-spray and spray intervals (Figure 14). The wind field appeared very turbulent, and the wind speed varied by ±0.5 m/s during test intervals. In addition wind direction shifted up to 20° during the no spray measurement period and 40° during the active spray period. The no-spray case was not reproduced well in the laboratory (Run 1), the resulting model plume being too narrow. Hence, the model data for HSE 41 (Runs 1-5) is inconclusive. It should be noted, however, that a simple mass balance performed over field measurement stations for HSE 41 fails to agree with the estimated source strength provided for the run. Earlier model experiments performed by Neff and Meroney (1982) suggest that HSE 41 source and wind field conditions should indeed result in a narrow plume geometry.

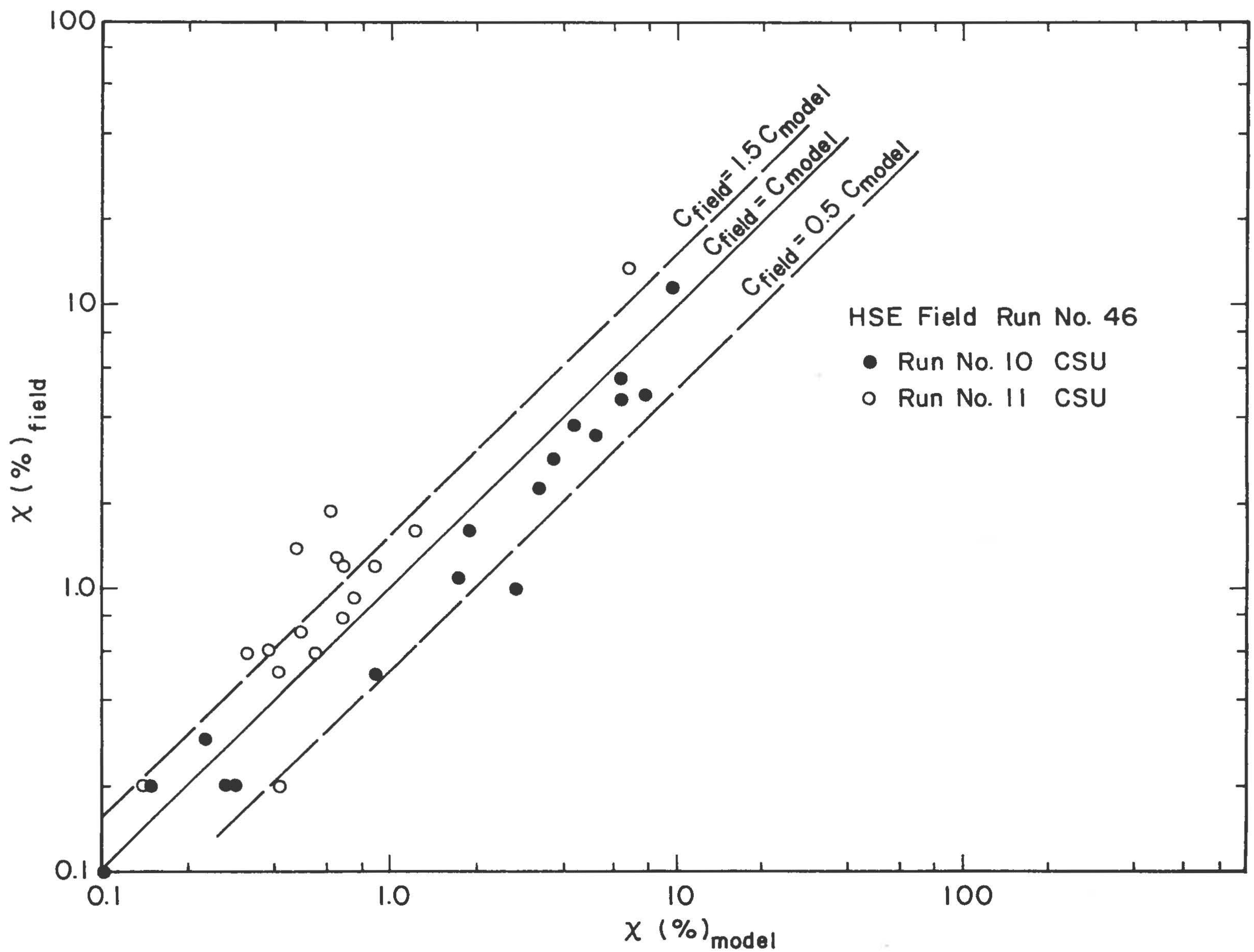

Figure 11. Logarithmic Scatter Diagram Comparing HSE Field and Model Concentrations

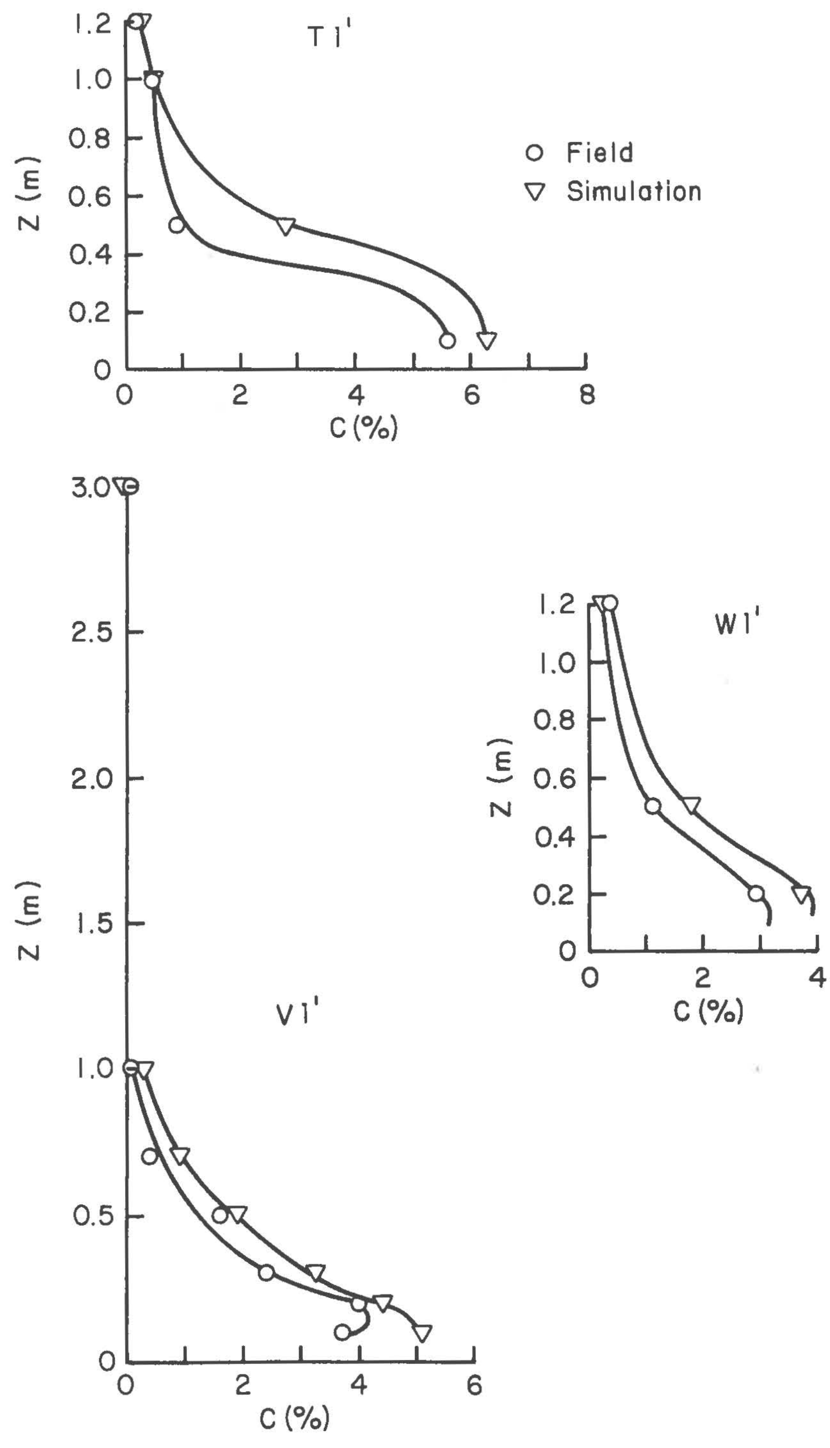

Figure 12. HSE Number 46: No Spray Vertical Concentration Profiles

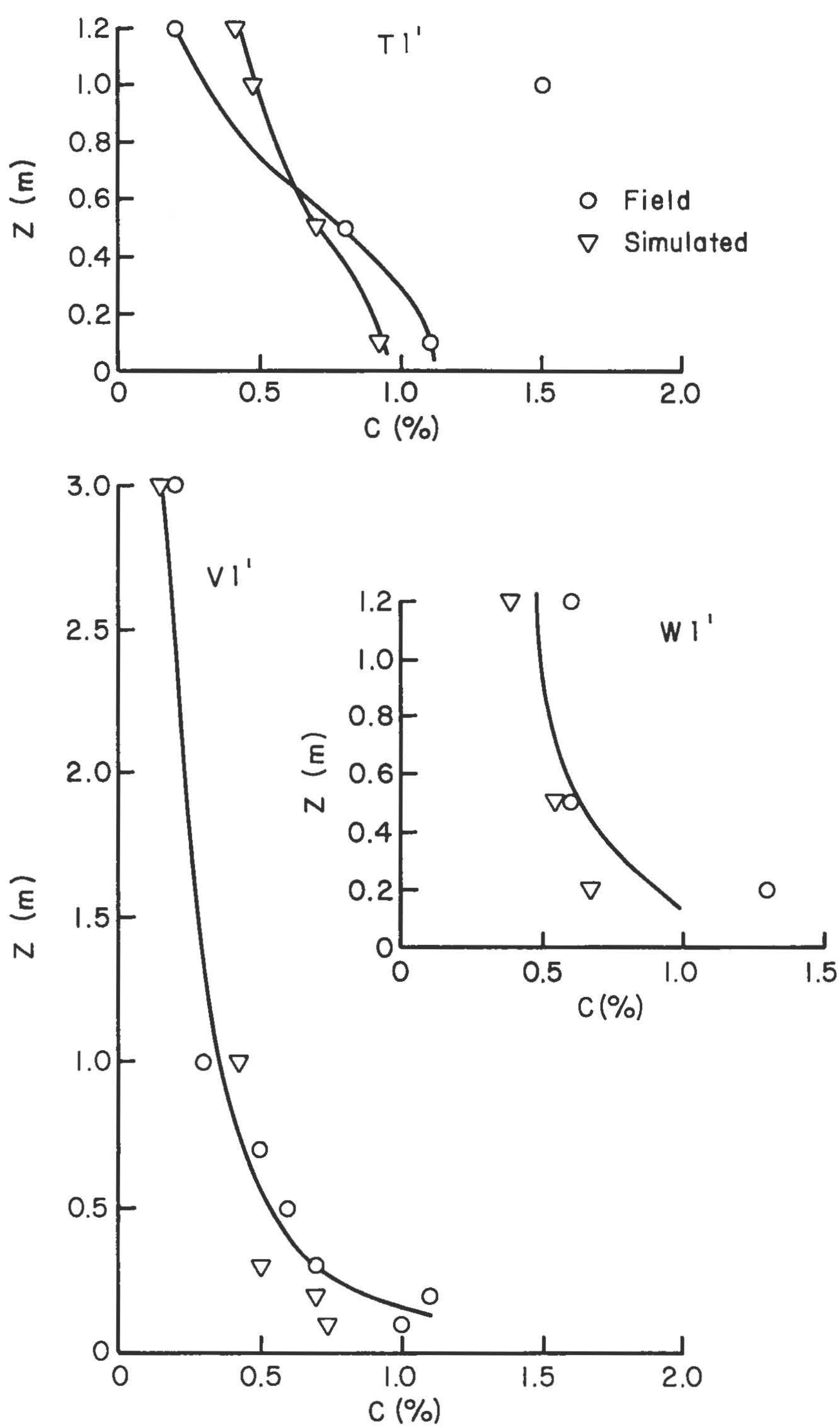

Figure 13. HSE Number 46: With Spray Vertical Concentration Profiles

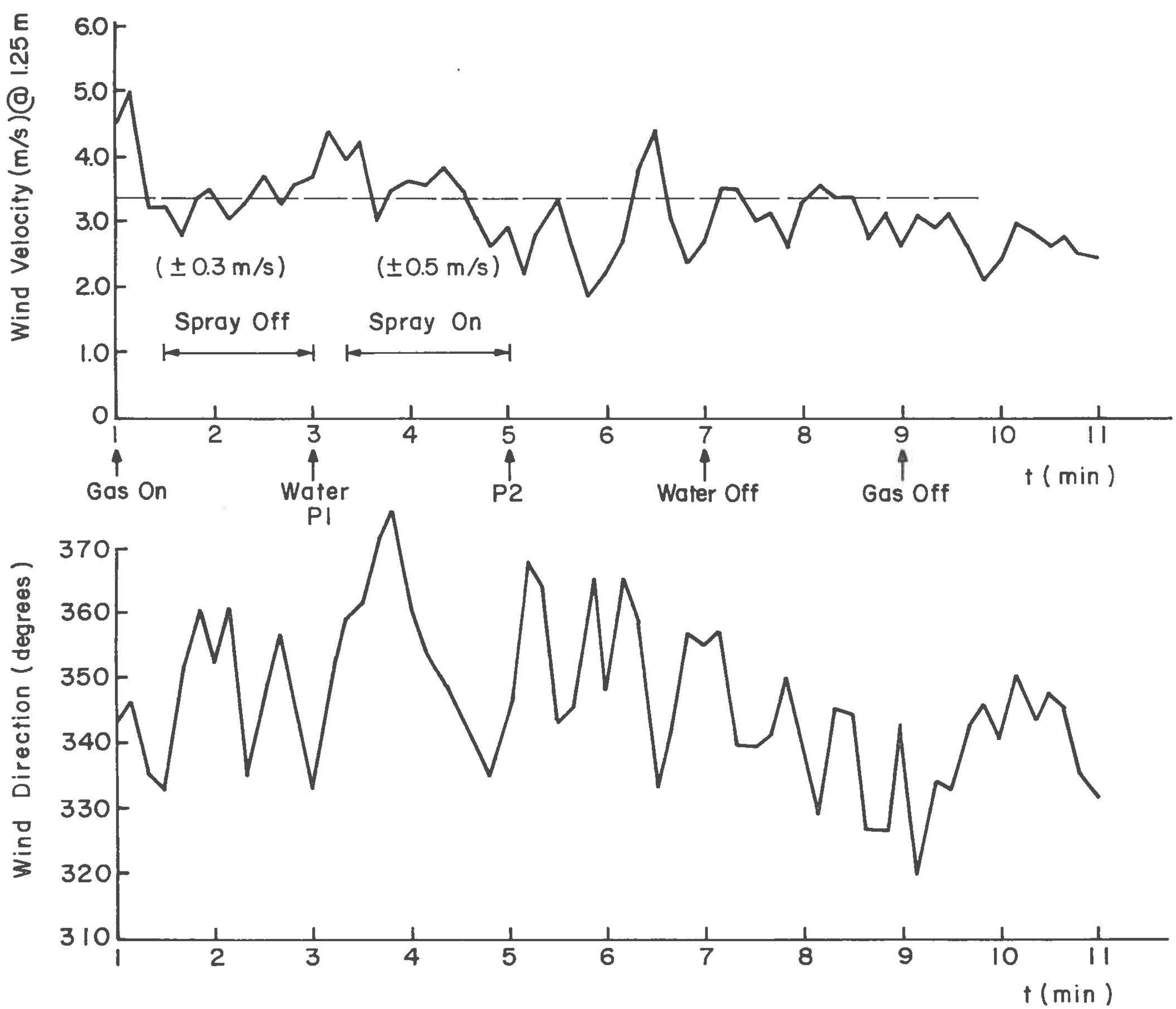

Figure 14. Wind Direction and Wind Velocity Field Data for HSE Run Number 41

5.3 SPRAY OPTIMIZATION AND BUILDING INTERACTION SERIES

A final test series (Runs 108-153) was specified after examining all previous runs in order to ascertain the optimal spray configurations, directions and pressures.

Included in this test series were model LNG storage vessels of varying sizes placed at the center of the area source. Dike heights were adjusted to maintain an entrapped vapor volume between the vessels and vapor barriers equal to 1 1/2 times the stored volumes. Plume bifurcation was noted with these conditions in agreement with similar tests performed by Kothari, Meroney, and Neff (1981). Interaction of the spray curtains with the bifurcated plumes essentially mixed the plume cross-section to the same low levels.

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APPENDIX A
WIND TUNNEL DATA OF HSE RUNS 41 AND 46 SIMULATIONS

APPENDIX A - Wind Tunnel Results of HSE Runs 41 and 46

The field trials performed by the (British) Health and Safety Executive and designated by HSE 41 and HSE 46 were modeled at the scale ratio of 1:28.9 at the Enviromental Wind Tunnel facility of Colorado State University. Source gas flow rates, downwind water curtain placement, wind speeds and water pressure were varied as shown in Table A-1. Runs 1-5 simulated HSE 41 conditions while 6-13 simulated HSE 46. The source gas used in all runs to simulate the cold CO_2 plume was comprised of 68% CO_2, 31% Freon-11, and 1% Ethane (used as a tracer), thus having the proper specific gravity value (i.e. 2.35) of cold CO_2 field plume.

A.1.0 HSE 41

A plan view of HSE 41 is shown in Figure A-1. Wind directions relative to the source, spray curtain orientation, and sampling locations are shown. Locations of the sampling points and corresponding field transducer designations are detailed in Table A-2. Run 1 had the wind approaching at 45° to the normal of the model spray curtain line which contained four nozzles 10.4 cm above the floor spaced 11.75 cm apart and pointed 45° forward of vertical downward. Upon noting the narrow nature of the plume, the wind direction was moved 7° counter clockwise as shown in Figure A-1. Locations A to O indicate points where concentrations were measured only in the wind tunnel, primarily to determine the lateral extent of the plume.

The source used during all thirteen simulations is shown in Figure A-2.

Table A-3 summarizes the data obtained from Runs 1-5 along with a comparison with the values obtained in the field.

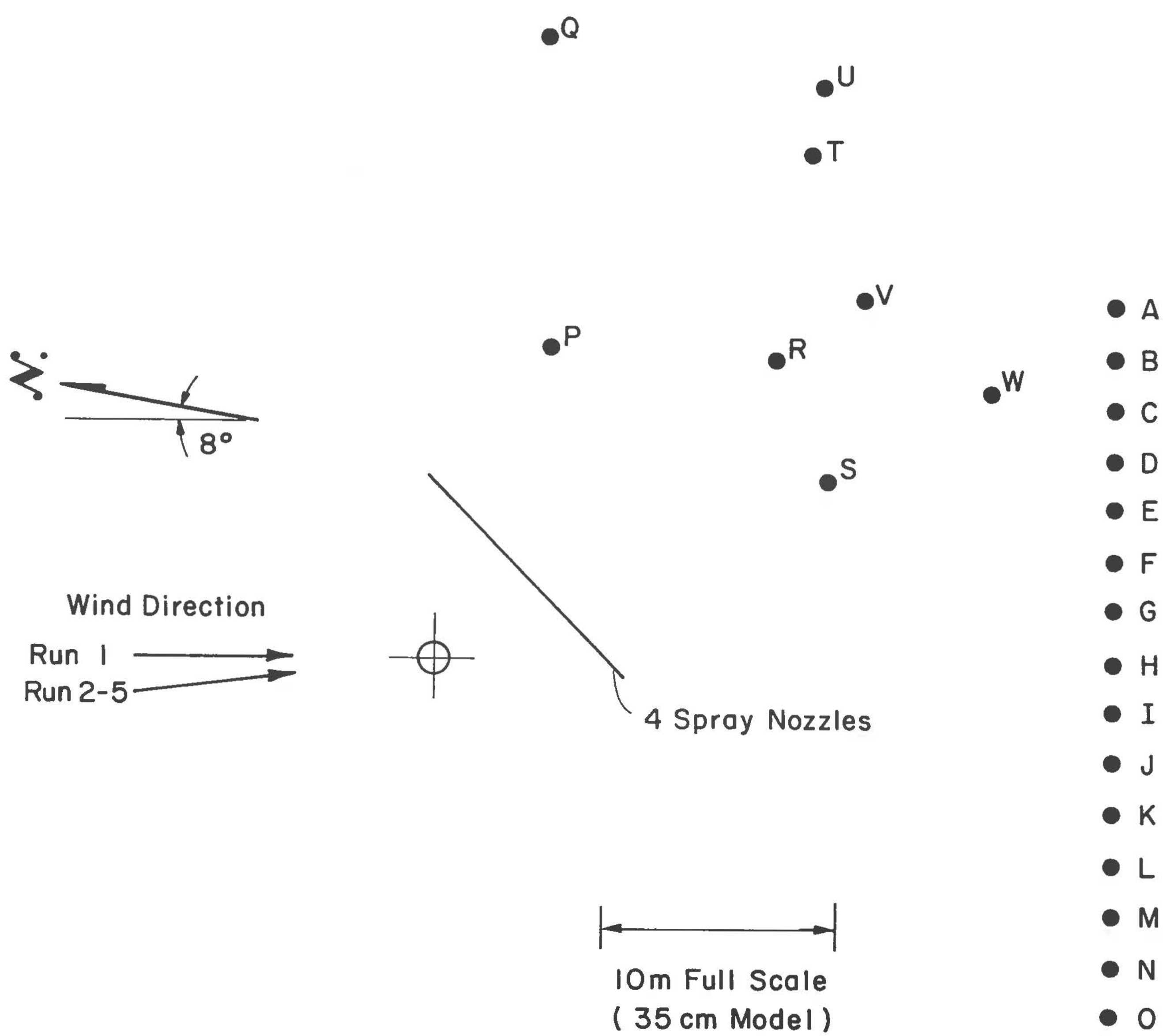

Figure A-1. Plan View of HSE Run Number 41

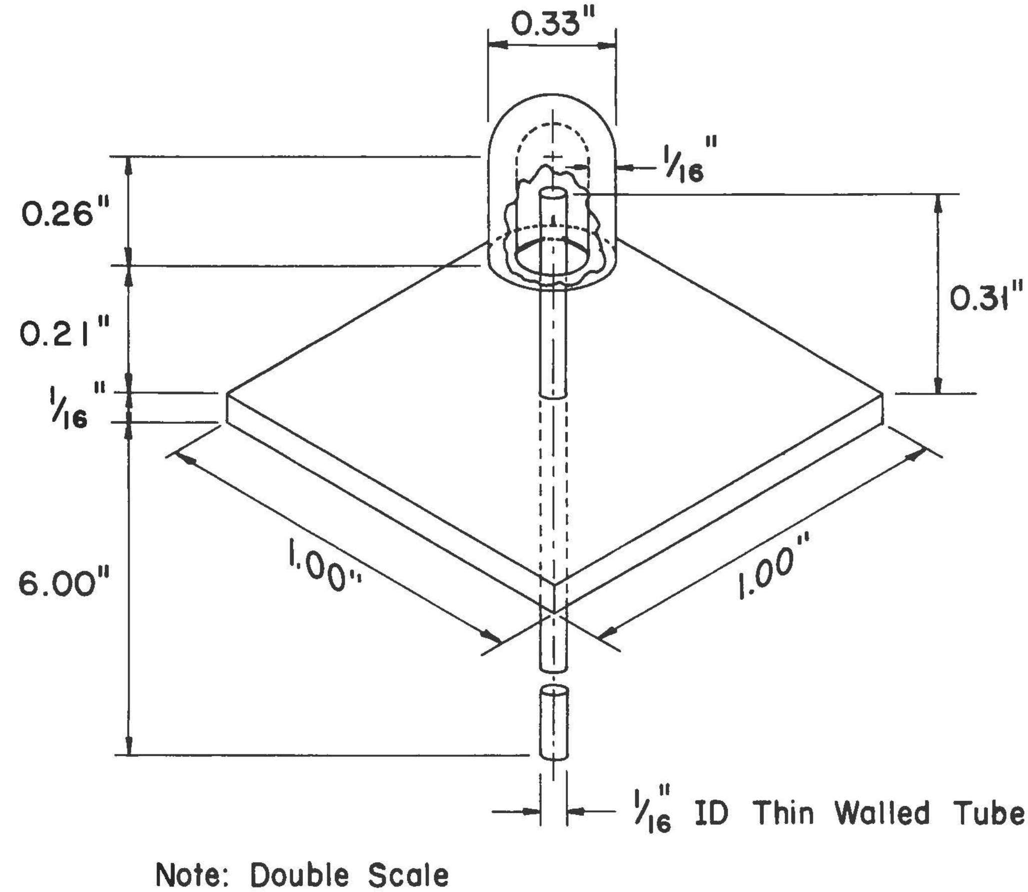

Figure A-2. HSE Source for Wind Tunnel Studies

A.2.0 HSE 46

A plan view of Runs 6-13 is shown in Figure A-3. For Run 6, the wind approached 21° to the normal of the model spray line curtain. The model spray curtain was comprised of 20 nozzles pointed vertically down and spaced 5.66 cm apart. As in HSE 41, the nozzle height (discharge face) was adjusted to 10.4 cm above the tunnel floor. Runs 7-13 were performed with the wind direction changed by 7° as shown in Figure A-3. Details of the sampling point locations and corresponding field transducer designations are given in Table A-4.

Concentration results obtained in the wind tunnel for Runs 6-13 along with the corresponding field values are summarized in Table A-5.

Figure A-4 shows the wind field correlations between averaged field data and wind tunnel data.

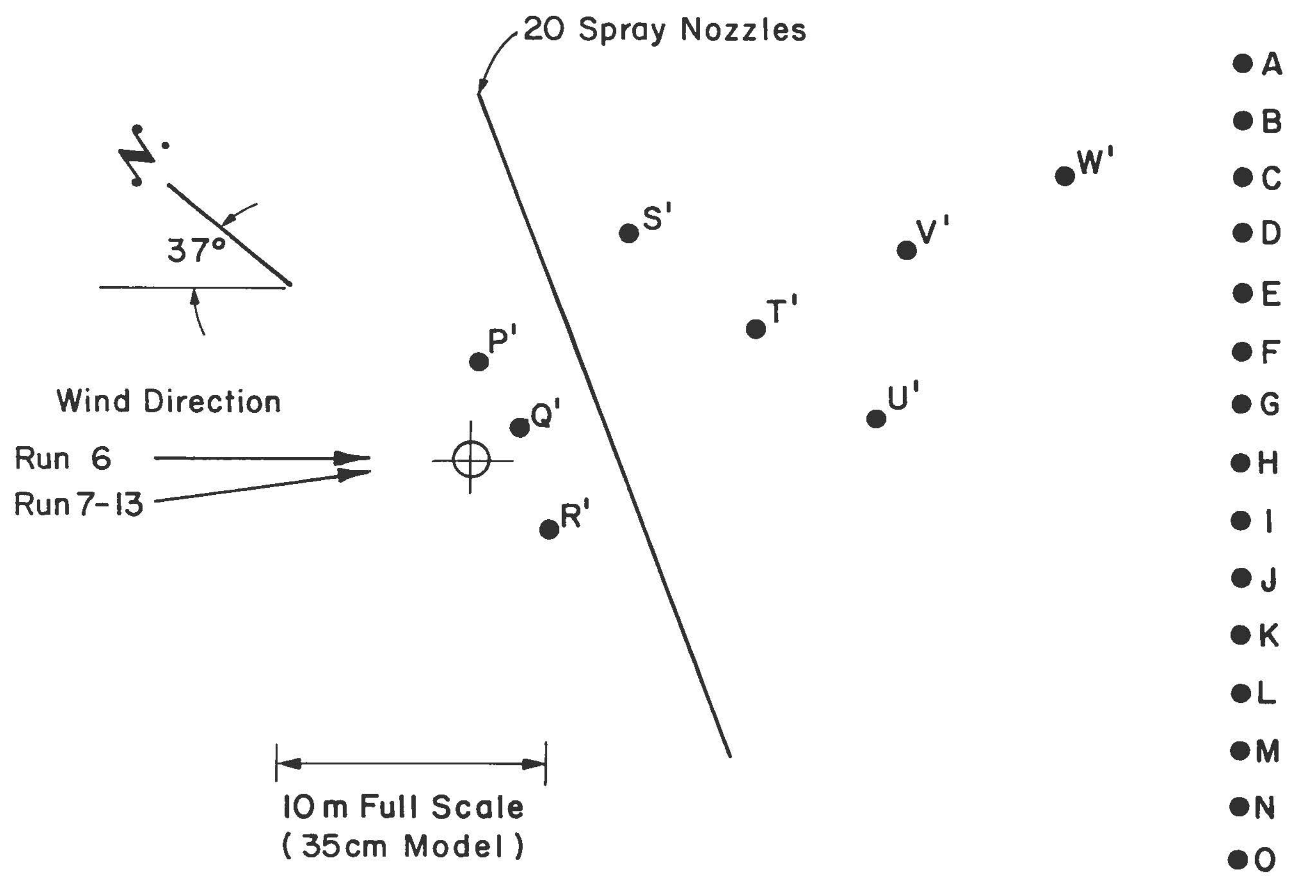

Figure A-3. Plan View of HSE Run Number 46

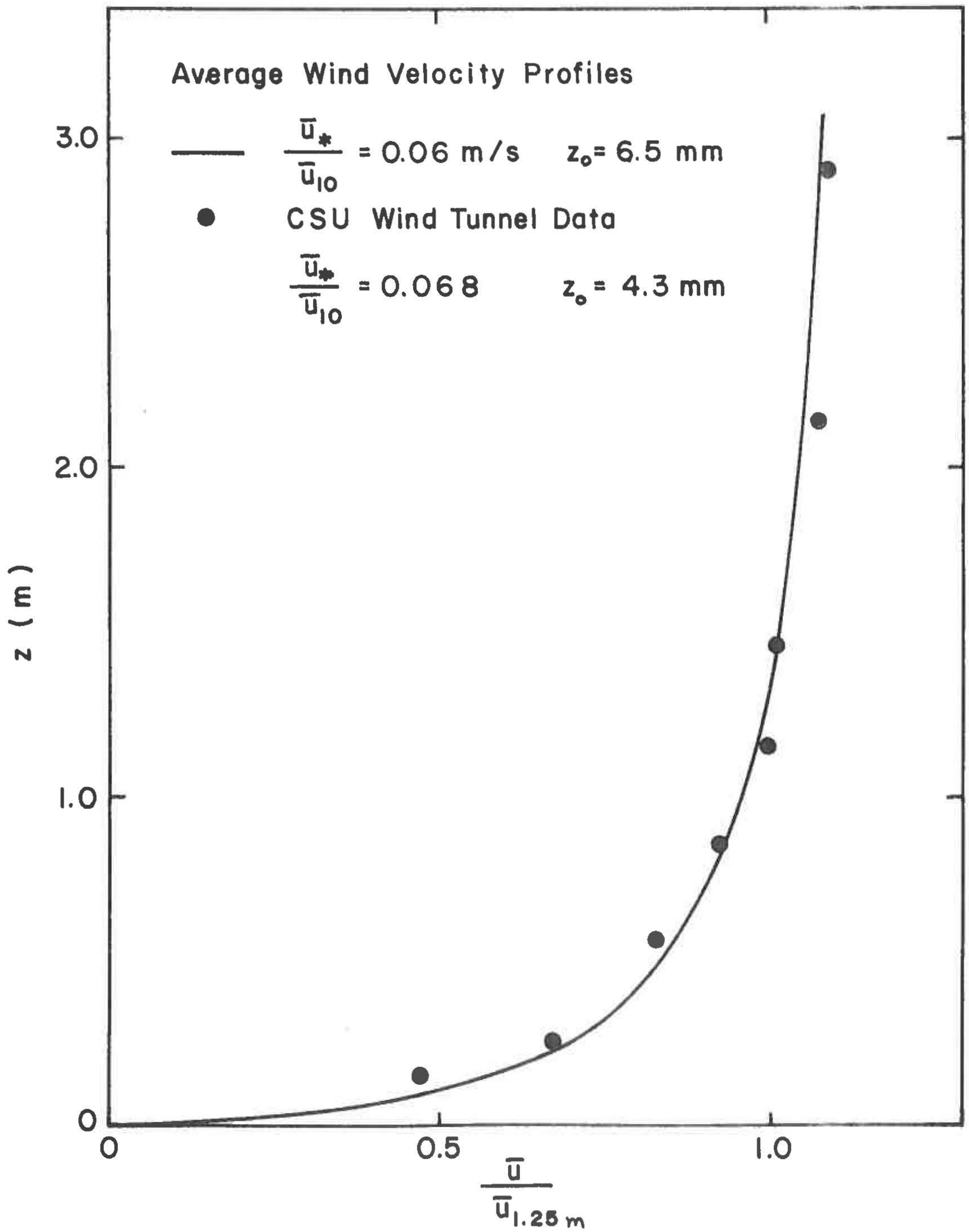

Figure A-4. Average Wind Velocity Profile Comparison Between HSE Field and CSU Wind Tunnel Data

Table A-1
Specifications for HSE Runs Numbers 41 and 46

Run Number	Source Gas Flow Rate (cc/s)	Set-up Configuration	Wind* Speed (cm/s)	Wind Direction (°)	Water Pressure (psig)
1	87	Figure A-1	63	352	0.00
2	87	Figure A-1	63	345	0.00
3	142	Figure A-1	63	345	0.00
4	142	Figure A-1	63	345	4.50
5	87	Figure A-1	63	345	4.50
6	87	Figure A-2	55	323	0.00
7	130	Figure A-2	55	316	0.00
8	108	Figure A-2	55	316	0.00
9	108	Figure A-2	32	316	6.64
10	87	Figure A-2	32	316	0.00
11	87	Figure A-2	32	316	6.64
12	261	Figure A-2	55	316	0.00
13	261	Figure A-2	32	316	6.64

*At 4.33 cm height

Table A-2
Sampling Locations for HSE Run Number 41

Map Location	Transducer (Field Designation)	Model R(cm)	Model Z(cm)	Field R(m)	Field Z(m)	θ (°)
A		114.7	0.00	32.8	0.0	144.3
B		111.4	0.00	31.8	0.0	147.8
C		108.5	0.00	31.0	0.0	151.4
D		106.1	0.00	30.3	0.0	155.3
E		104.1	0.00	29.8	0.0	159.3
F		102.7	0.00	29.4	0.0	163.5
G		101.9	0.00	29.1	0.0	167.7
H		101.6	0.00	29.0	0.0	172.0
I		101.9	0.00	29.1	0.0	176.3
J		102.7	0.00	29.4	0.0	180.5
K		104.1	0.00	29.8	0.0	184.7
L		106.1	0.00	30.3	0.0	188.7
M		108.5	0.00	31.0	0.0	192.6
N		111.4	0.00	31.8	0.0	196.2
O		114.7	0.00	32.8	0.0	199.7
P1	T15	49.6	0.35	14.2	0.1	101.6
P2	T31	49.6	1.73	14.2	0.5	
Q1	T32	94.7	0.35	27.1	0.1	91.5
Q2	T37	94.7	1.73	27.1	0.5	
R1	T34	67.7	0.35	19.3	0.1	
R2	T28	67.7	0.69	19.3	0.2	
R3	T25	67.7	1.04	19.3	0.3	
R4	T17	67.7	1.73	19.3	0.5	130.7
R5	T23	67.7	3.46	19.3	1.0	
R6	T19	67.7	5.19	19.3	1.5	
R7	T05	67.7	8.65	19.3	2.5	
R8	T21	67.7	10.38	19.3	3.0	
S1	T06	62.1	0.69	17.7	0.2	151.4
S2	T08	62.1	1.38	17.7	0.4	
T1	T29	93.8	0.35	26.8	0.1	
T2	T10	93.8	1.73	26.8	0.5	118.1
T3	T04	93.8	3.46	26.8	1.0	
U1	T18	103.5	0.35	29.6	0.1	115.1
U2	T11	103.5	1.73	29.6	0.5	
V1	T33	83.1	0.35	23.7	0.1	131.5
V2	T35	83.1	1.73	23.7	0.5	
W	T01	92.1	1.04	26.3	0.3	146.3

NOTE: R is radial distance of sampler from source location.
Z is vertical distance of sampler from ground.
θ is angle from source to sampler location measured from north.

Table A-3
Concentration Data for HSE Run Number 41

Map Location	Run Number 1	2	3	4	5	Field Transducer Data W/O Spray	W/Spray
A	0.00	0.00	0.02	0.00	0.00		
B	0.00	0.06	0.15	0.00	0.00		
C	0.05	0.39	0.92	0.02	0.00		
D	0.00	0.98	1.34	0.06	0.00		
E	0.35	2.70	2.85	0.12	0.00		
F	3.61	2.52	3.62	0.51	0.51		
G	2.55	3.90	4.99	0.24	0.33		
H	1.49	3.68	4.23	0.23	0.00		
I	3.37	0.86	1.82	0.54	0.59		
J	1.69	0.11	0.24	0.59	0.68		
K	0.86	0.00	0.03	0.70	0.77		
L	0.33	0.00	0.00	0.77	0.74		
M	0.11	0.00	0.00	0.67	0.51		
N	0.08	0.00	0.00	0.36	0.00		
O	0.00	0.00	0.00	0.05	0.00		
P1	0.00	0.00	0.00	0.00	0.00	2.7	0.22
P2							
Q1	0.00	0.00	0.00	0.00	0.00	0.0	0.30
Q2							
R1	0.00	0.00	0.00	0.00	0.00	3.3	
R2	0.00	0.00	0.00	0.00	0.00	3.7	0.60
R3	0.00	0.00	0.00	0.00	0.00	2.1	0.80
R4	0.00	0.00	0.00	0.00	0.00	0.8	0.00
R5	0.00	0.00	0.00	0.00	0.00	0.5	0.60
R6	0.00	0.00	0.00	0.00	0.00	0.0	0.00
R7	0.00	0.00	0.00	0.00	0.00	0.0	0.00
R8	0.00	0.00	0.00	0.00	0.00	0.0	0.30
S1	0.06	1.73	2.11	0.05	0.00	1.6	0.50
S2	0.11	1.16	1.64	0.09	0.00	1.0	0.50
T1	0.00	0.00	0.00	0.00	0.00	1.7	
T2	0.00	0.00	0.00	0.00	0.00	0.9	0.20
U1	0.00	0.00	0.00	0.00	0.00	1.3	0.60
U2							
V1	0.00	0.00	0.00	0.00	0.00	3.0	0.90
V2							
W	0.00	0.00	0.00	0.00	0.00	1.2	1.70

NOTE: Concentration data recorded as mole percent.

Table A-4
Sampling Locations for HSE Run Number 46

Map Location	Transducer (Field Designation)	Model R(cm)	Model Z(cm)	Field R(m)	Field Z(m)	θ (°)
A		114.7	0.0	32.8	0.0	115.3
B		111.4	0.0	31.8	0.0	118.8
C		108.5	0.0	31.0	0.0	122.4
D		106.1	0.0	30.3	0.0	126.3
E		104.1	0.0	29.8	0.0	130.3
F		102.7	0.0	29.4	0.0	134.5
G		101.9	0.0	29.1	0.0	138.7
H		101.6	0.0	29.0	0.0	143.0
I		101.9	0.0	29.1	0.0	147.3
J		102.7	0.0	29.4	0.0	151.5
K		104.1	0.0	29.8	0.0	155.7
L		106.1	0.0	30.3	0.0	159.7
M		108.5	0.0	31.0	0.0	163.6
N		111.4	0.0	31.8	0.0	167.2
O		114.7	0.0	32.8	0.0	170.7
P'	T29	13.3	3.5	3.8	1.0	59.6
Q'	T10	7.6	1.7	2.2	0.5	106.2
R'	T19	13.7	0.3	3.9	0.1	185.0
S1'	T05	36.3	0.3	10.4	0.1	86.7
S2'	T35	36.3	1.7	10.4	0.5	
T1'	T08	40.7	0.3	11.6	0.1	117.4
T2'	T11	40.7	1.7	11.6	0.5	
T3'	T33	40.7	3.5	11.6	1.0	
T4'	T44	40.7	4.2	11.6	1.2	
U'	T17	53.6	0.3	15.3	0.1	137.1
V1'	T04	64.0	0.3	18.3	0.1	
V2'	T06	64.0	0.7	18.3	0.2	
V3'	T03	64.0	1.0	18.3	0.3	
V4'	T21	64.0	1.7	18.3	0.5	116.8
V5'	T18	64.0	2.4	18.3	0.7	
V6'	T27	64.0	3.5	18.3	1.0	
V7'	T23	64.0	10.4	18.3	3.0	
W1'	T37	86.7	0.7	24.8	0.2	
W2'	T28	86.7	1.7	24.8	0.5	116.7
W3'	T32	86.7	4.2	24.8	1.2	
W4'	T31	86.7	6.9	24.8	2.0	

NOTE: R is radial distance of sampler from source location.
Z is vertical distance of sampler from ground.
θ is angle from source to sampler location measured from north.

Table A-5
Concentration Data for HSE Run Number 46

Map Location	Run Number 6	7	8	9	10	11	12	13	Field Transducer Data W/O Spray	W/Spray
A	0.00	0.74	0.21	0.77	2.73	0.44				
B	0.00	2.09	1.28	0.77	2.55	0.57				
C	0.00	2.85	2.12	0.78	2.17	0.56				
D	0.00	3.12	3.06	1.12	2.61	0.85				
E	0.17	3.00	2.66	1.09	2.90	0.92				
F	1.33	3.59	3.18	1.09	3.58	1.01				
G	2.51	3.00	2.66	0.97	3.86	0.97				
H	3.38	2.88	2.66	0.67	4.33	0.76				
I	3.92	2.49	2.09	0.67	4.29	0.57				
J	3.56	1.42	0.48	0.62	4.03	0.54				
K	2.91	0.09	0.00	0.59	3.68	0.47				
L	2.46	0.06	0.00	0.48	-	0.53				
M	1.87	0.00	0.00	0.29	3.00	0.41				
N	0.26	0.00	0.00	0.14	1.97	0.29				
O	0.00	0.00	0.00	0.14	1.15	0.30				
P'										
Q'										
R'	0.36	0.03	0.00	-	9.60	6.81	1.76	5.46	11.7	13.8
S1'	0.00	0.00	0.00	1.00	7.80	0.63	0.08	2.24	4.8	1.9
S2'										
T1'	0.05	5.91	6.52	1.70	6.27	0.92	4.40	3.04	5.5	1.2
T2'	0.00	4.05	4.54	1.07	2.78	0.70	3.13	2.58	1.0	0.8
T3'	0.00	4.36	4.21	0.77	0.53	0.48	1.85	2.15	0.6	1.4
T4'	0.00	4.02	3.41	0.79	0.27	0.41	1.57	1.75	0.2	0.5
U'	4.71	5.56	5.56	1.36	6.32	1.22	4.24	2.48	4.7	1.6
V1'	0.00	4.99	5.33	0.70	5.08	0.74	3.40	2.36	3.5	0.9
V2'	0.00	4.70	4.83	1.24	4.37	0.70	3.04	2.27	3.8	1.2
V3'	0.00	4.26	4.06	1.10	3.28	0.50	2.76	2.11	2.3	0.7
V4'	0.00	3.71	3.06	0.89	1.91	0.56	2.49	1.91	1.6	0.6
V5'	0.00	3.20	2.21	0.79	0.91	-	2.42	1.75	0.5	0.5
V6'	0.00	2.45	1.30	0.59	0.29	0.42	2.34	1.46	0.2	0.2
V7'	0.00	0.05	0.00	0.08	0.00	0.14	0.17	0.36	0.0	0.2
W1'	0.00	3.70	3.01	1.00	3.71	0.67	2.61	1.90	2.9	1.3
W2'	0.00	2.46	1.75	0.77	1.76	0.54	2.43	1.72	1.1	0.6
W3'	0.00	0.59	0.14	0.47	0.23	0.39	2.20	1.36	0.3	0.6
W4'	0.00	0.14	0.00	0.30	0.15	0.32	1.45	0.94	0.2	0.6

NOTE: Concentration data recorded as mole percent.

APPENDIX B
WIND TUNNEL DATA OF SPRAY CURTAIN RUNS

Appendix B - Wind Tunnel Results of Water Spray Curtain Simulations

The following is a compilation of the plume concentration at the locations shown on the grid map (Figure 5) specific to runs 1-153. The concentrations measured in the wind tunnel are also converted to field equivalent concentrations. Table B-1 is a summary of the parameters corresponding to each run. The information provided in the table includes the run number, the dike height, presence of a tank on the area source (none, small, medium or large), the spray configuration as referenced to Figure B-1, the direction of the sprays, the spacing between nozzles (L_n), the normal distance from the spray curtains to the dike wall (L_s), the height of the spray nozzle (H_s), the spray nozzle type, wind velocity used in the tunnel as well as the field equivalent velocity, the model and field source gas flow rates, and the water pressure used during the simulations.

The tanks that were used during the latter runs are described by Figure B-2. Typical average wind velocity and local turbulence intensities are summarized in Figures B-3 thru B-6.

As previously noted, the runs summarized in this section involved plume releases with variations in spray geometries, spray pressures, source flow rate, wind velocities, and with or without a tank present on the area source.

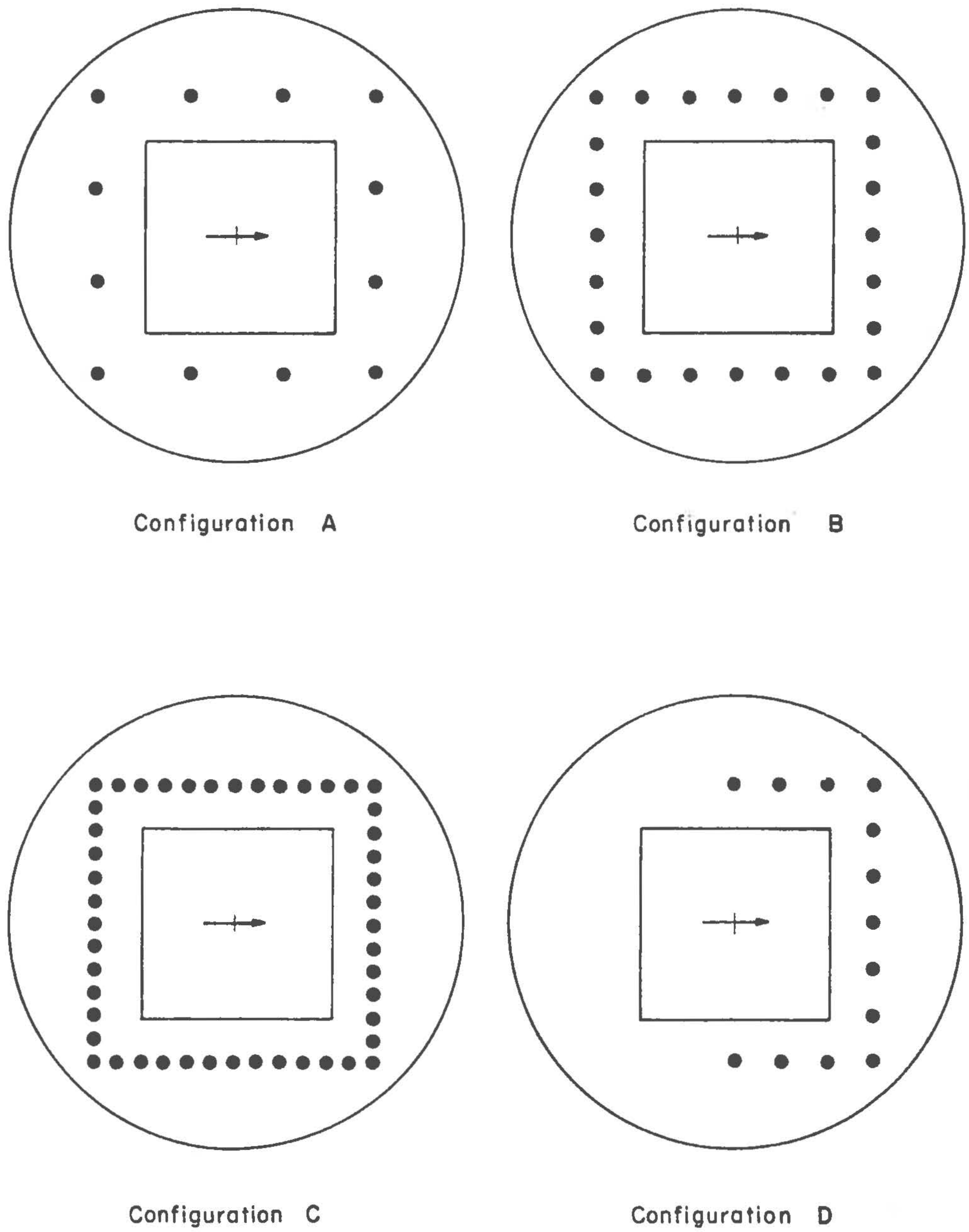

Figure B-1. Spray Configuration Designations

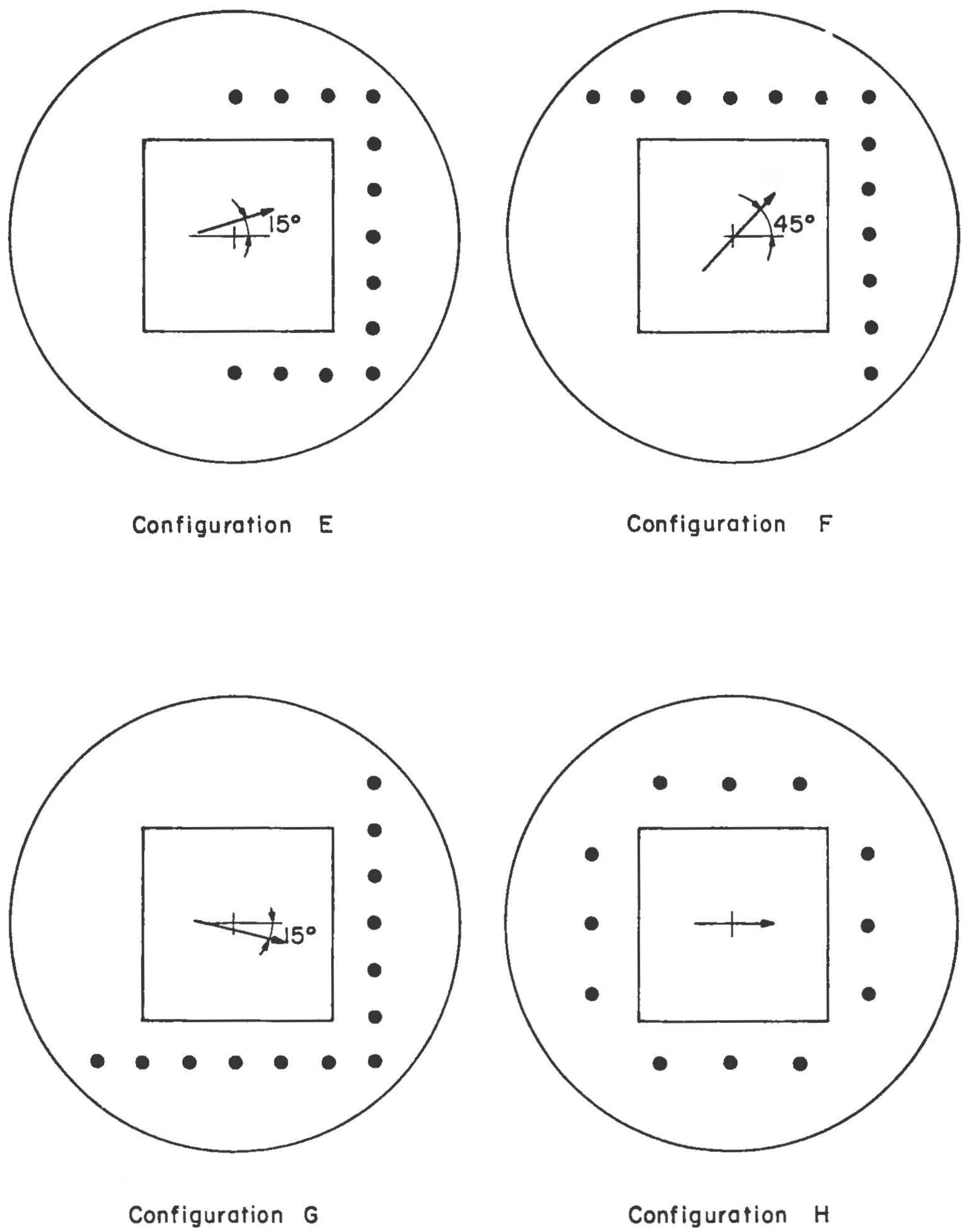

Figure B-1 (Con't). Spray Configuration Designations

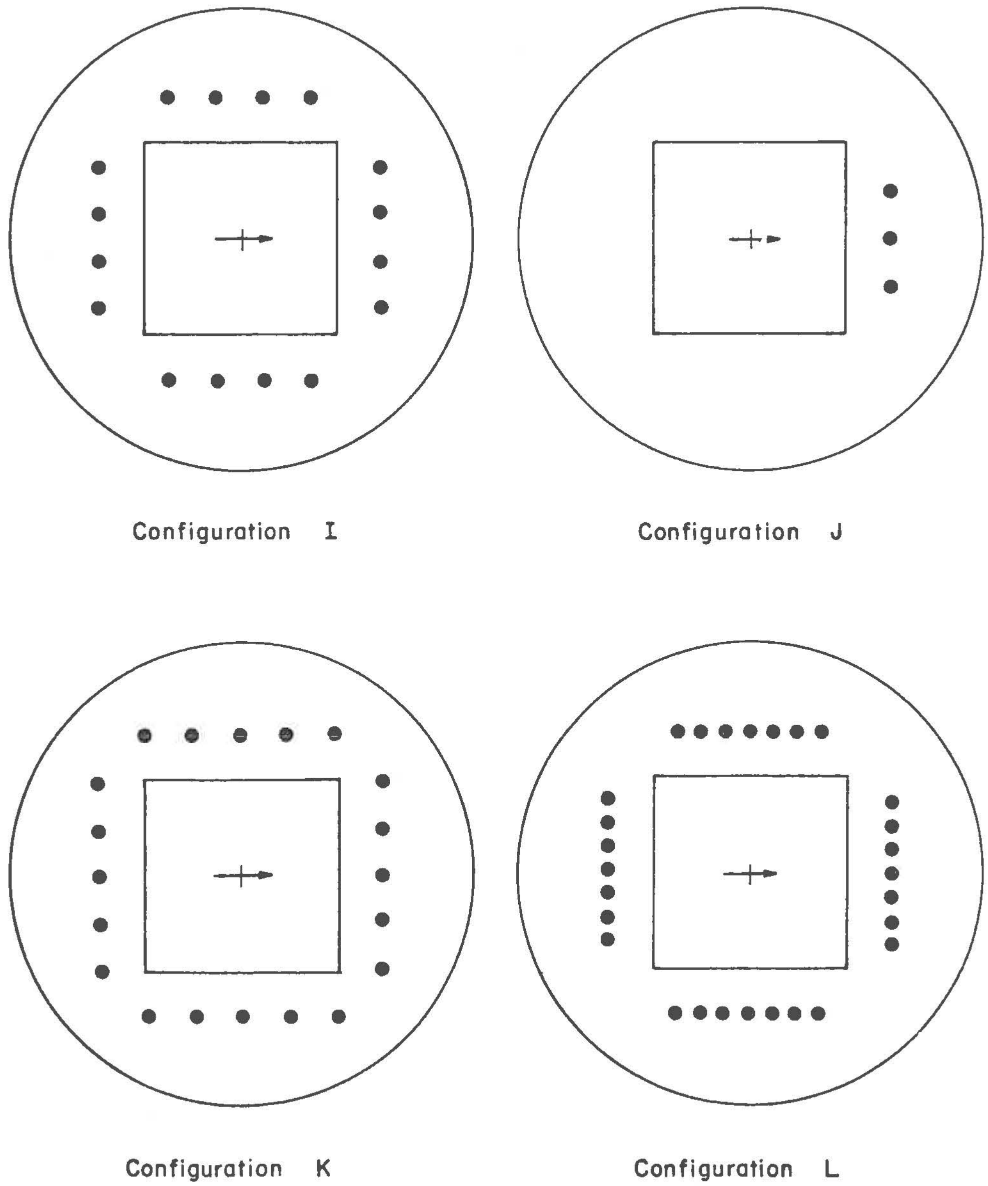

Figure B-1 (Con't). Spray Configuration Designations

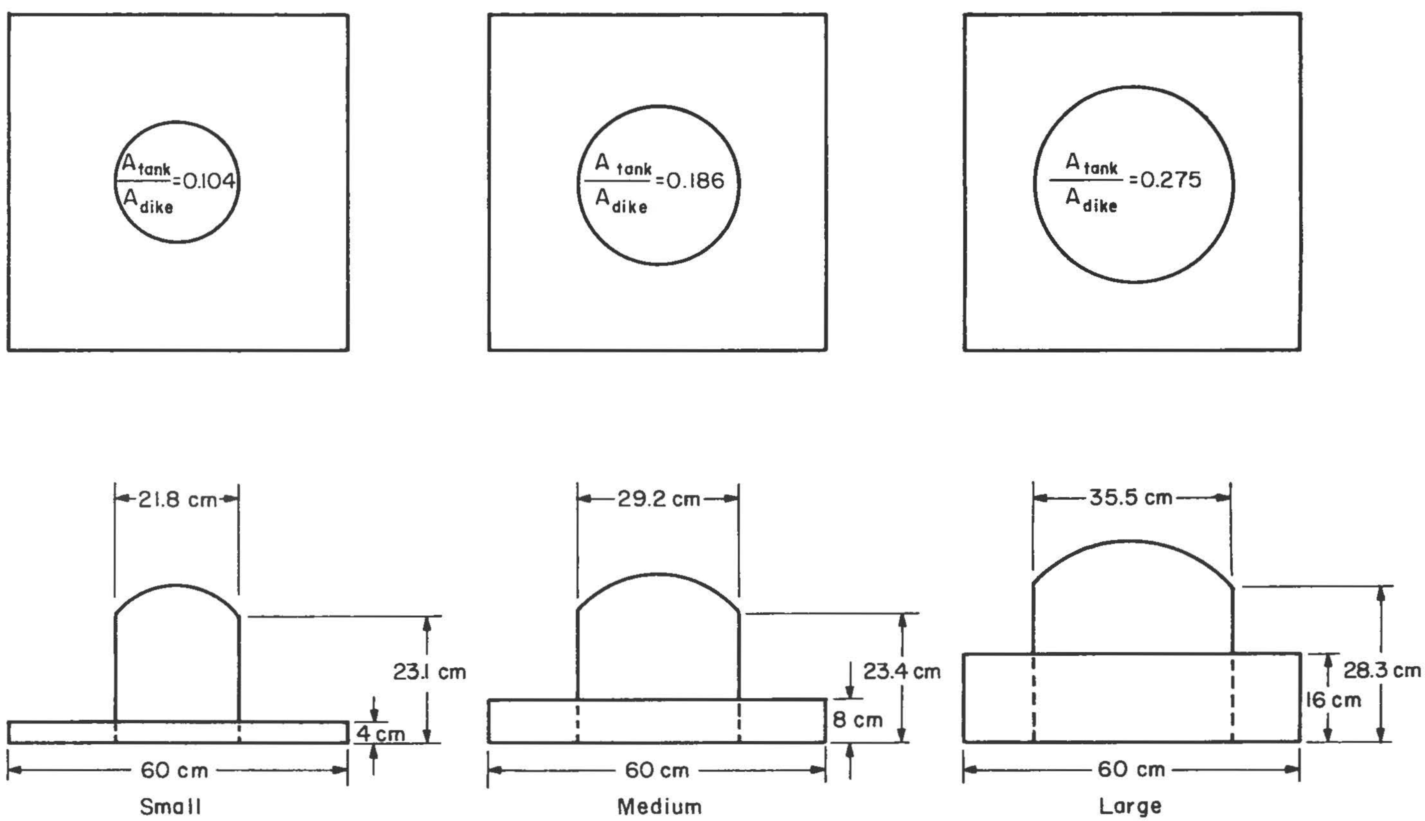

Figure B-2. Specifications of Tanks Used During Spray Simulations

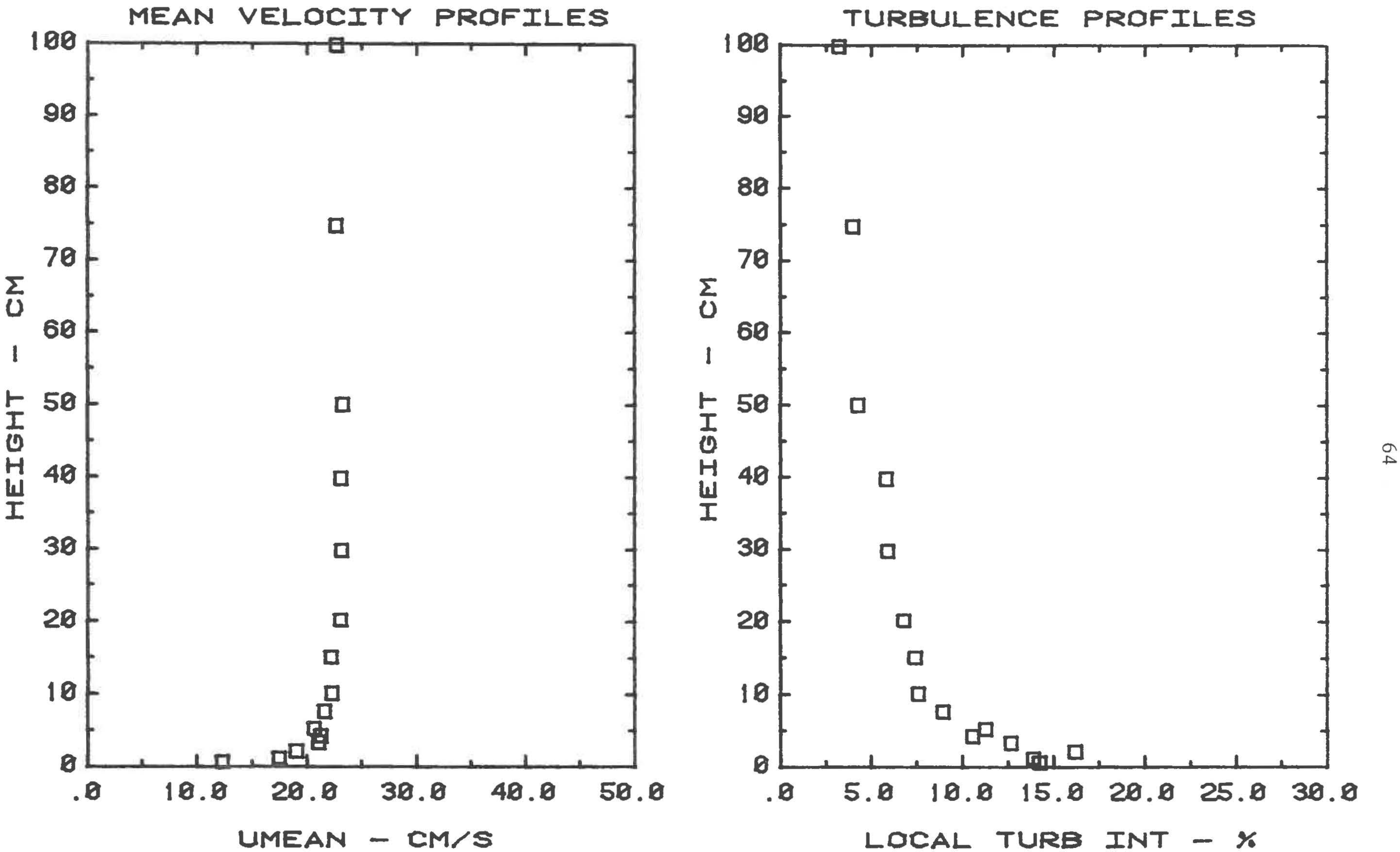

Figure B-3. Wind Velocity and Local Turbulence Intensities for $\overline{u}$ at 5 cm = 22 cm/s

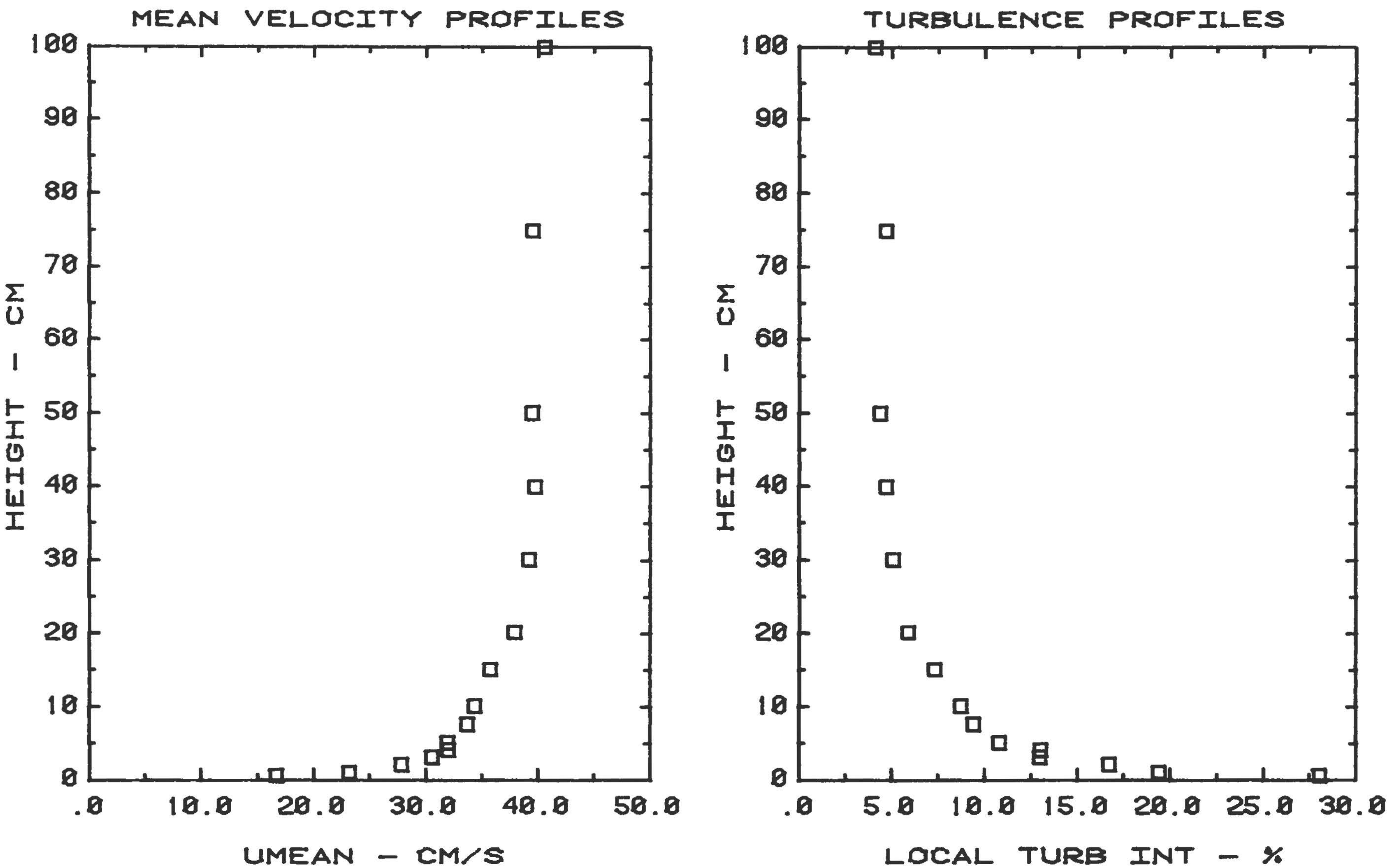

Figure B-4. Wind Velocity and Local Turbulence Intensities for $\bar{u}$ at 5 cm = 30 cm/s

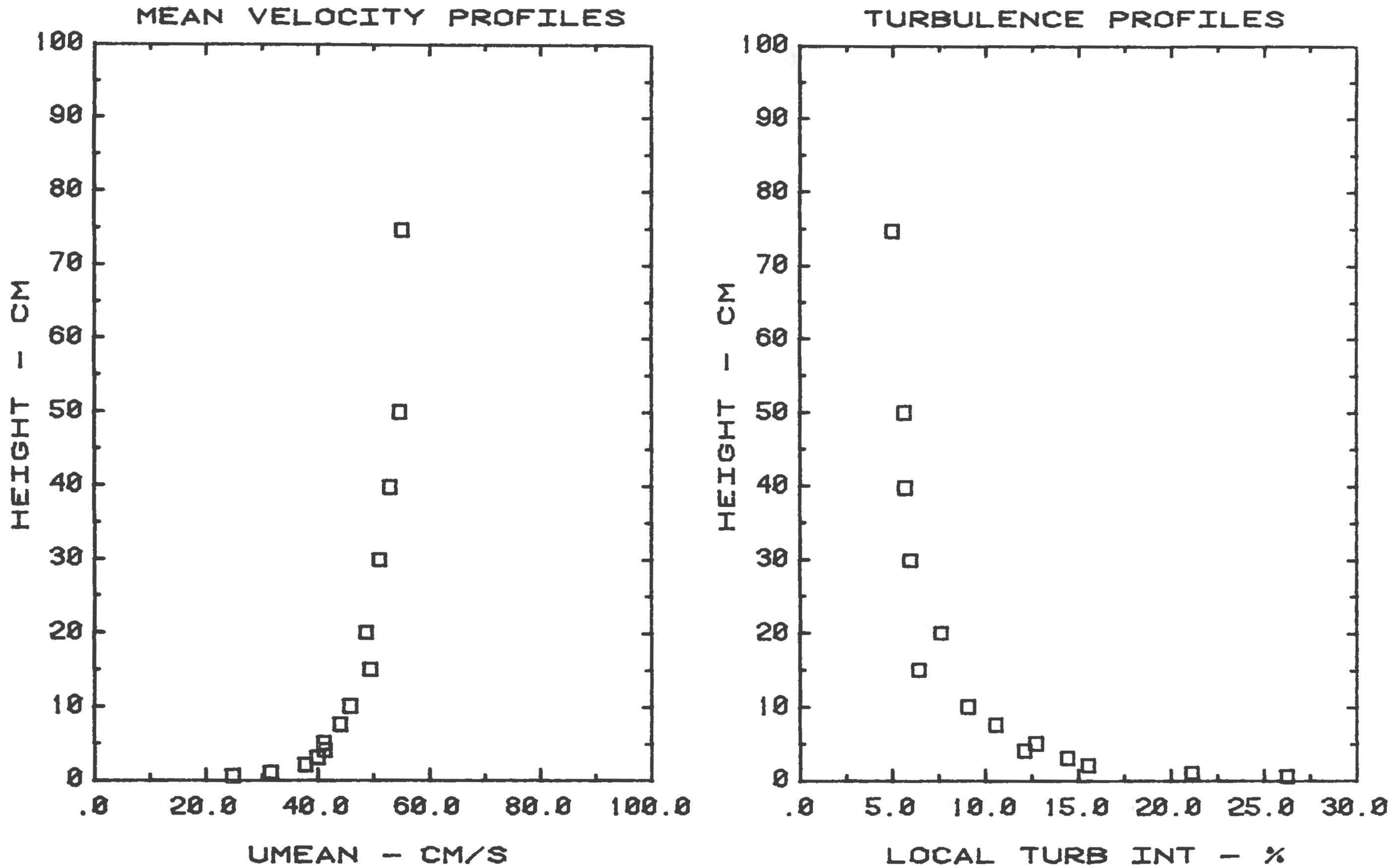

Figure B-5. Wind Velocity and Local Turbulence Intensities for $\overline{u}$ at 5 cm = 45 cm/s

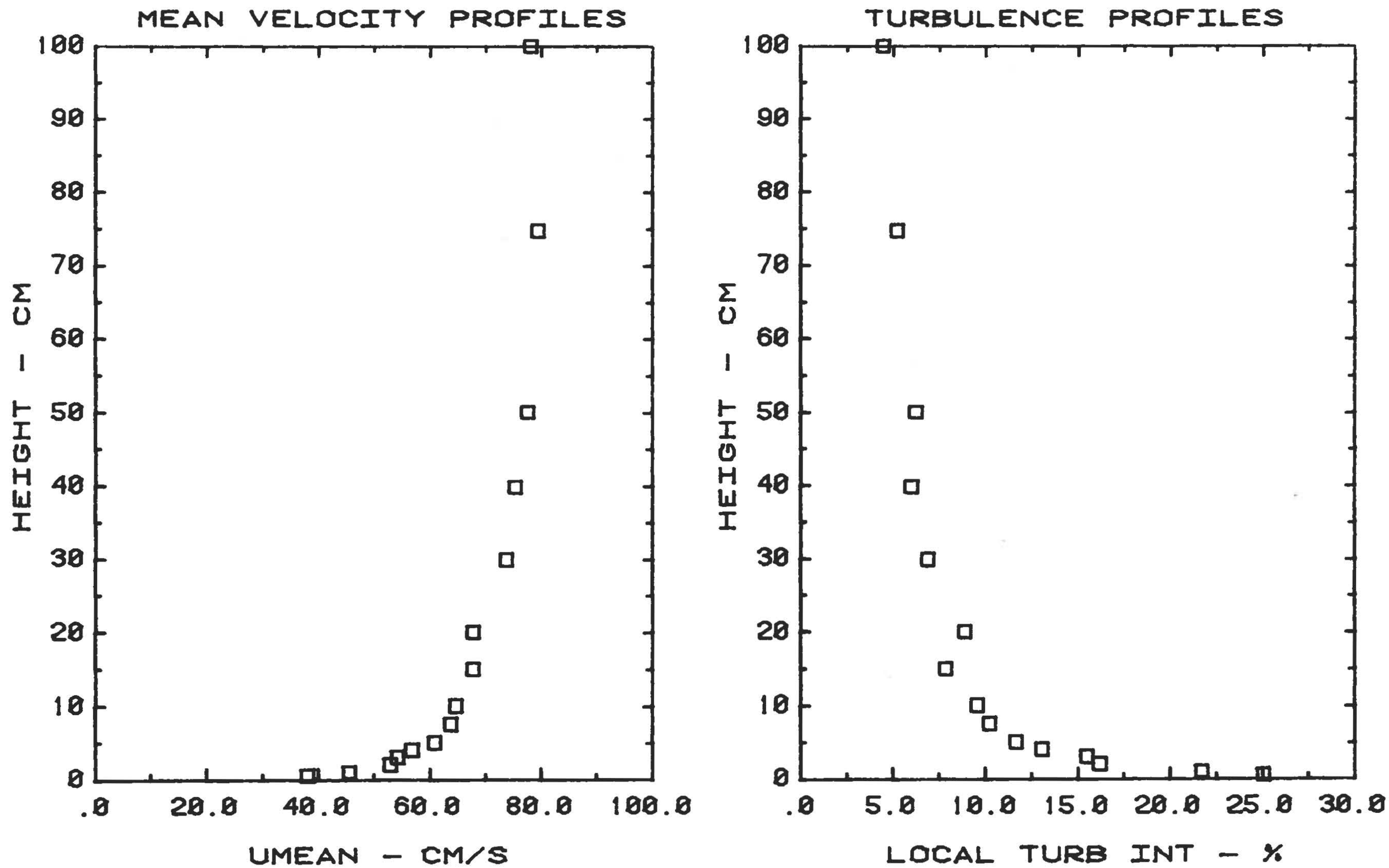

Figure B-6. Wind Velocity and Local Turbulence Intensities for $\overline{u}$ at 5 cm = 60 cm/s

Table B-1
Run Specifications

Run Number	Dike Height (cm)	Tank	Spray Configuration	Spray Direction	L_n (cm)	L_s (cm)	H_s (cm)	Nozzle Type	Field: Wind Velocity (m/s)	Field: Q_p (m^3/s)	Model: Wind Velocity (cm/s)	Model: Q_m (cc/s)	Model: ΔP (psig)
1	4	No	–	–	–	–	–	–	2.2	181.5	22	1815	–
2	4	No	–	–	–	–	–	–	5.0	181.5	50	1815	–
3	4	No	–	–	–	–	–	–	8.0	181.5	80	1815	–
4	4	No	A	Down	29.8	14.7	14.2	A	2.2	181.5	22	1815	5.20
5	4	No	A	Down	29.8	14.7	14.2	A	5.0	181.5	50	1815	5.20
6	4	No	A	Down	29.8	14.7	14.2	A	8.0	181.5	80	1815	5.20
7	4	No	–	–	–	–	–	–	2.2	89.8	22	898	–
8	4	No	A	Down	29.8	14.7	14.2	A	2.2	89.8	22	898	5.20
9	4	No	–	–	–	–	–	–	2.2	357.4	22	3574	–
10	4	No	A	Down	29.8	14.7	14.2	A	2.2	357.4	22	3574	5.20
11	4	No	B	Down	14.9	14.7	14.2	A	2.2	181.5	22	1815	5.20
12	4	No	C	Down	7.5	14.7	14.2	A	2.2	181.5	22	1815	5.20
13	4	No	C	Down	7.5	14.7	14.2	A	2.2	357.4	22	3574	5.20
14	4	No	D	Down	14.9	14.7	14.2	A	2.2	181.5	22	1815	5.20
15	4	No	D	Down	14.9	14.7	14.2	A	5.0	181.5	50	1815	5.20
16	4	No	D	Down	14.9	14.7	14.2	A	8.0	181.5	80	1815	5.20
17	4	No	E	Down	14.9	14.7	14.2	A	2.2	181.5	22	1815	5.20
18	4	No	E	Down	14.9	14.7	14.2	A	5.0	181.5	50	1815	5.20
19	4	No	E	Down	14.9	14.7	14.2	A	8.0	181.5	80	1815	5.20
20	4	No	F	Down	14.9	14.7	14.2	A	2.2	181.5	22	1815	5.20
21	4	No	F	Down	14.9	14.7	14.2	A	5.0	181.5	50	1815	5.20
22	4	No	F	Down	14.9	14.7	14.2	A	8.0	181.5	80	1815	5.20
23	4	No	G	Down	14.9	14.7	14.2	A	2.2	181.5	22	1815	5.20
24	4	No	G	Down	14.9	14.7	14.2	A	5.0	181.5	50	1815	5.20
25	4	No	G	Down	14.9	14.7	14.2	A	8.0	181.5	80	1815	5.20
26	4	No	A	Up	29.8	14.7	0.0	A	2.2	181.5	22	1815	5.00
27	4	No	A	Up	29.8	14.7	0.0	A	5.0	181.5	50	1815	5.00
28	4	No	A	Up	29.8	14.7	0.0	A	8.0	181.5	80	1815	5.00
29	4	No	A	Up	29.8	14.7	0.0	A	2.2	89.8	22	898	5.00
30	4	No	A	Up	29.8	14.7	0.0	A	2.2	357.4	22	3574	5.00
31	4	No	B	Up	14.9	14.7	0.0	A	2.2	181.5	22	1815	5.00
32	4	No	C	Up	7.5	14.7	0.0	A	2.2	181.5	22	1815	5.00
33	4	No	C	Up	7.5	14.7	0.0	A	2.2	357.4	22	3574	5.00
34	4	No	D	Up	14.9	14.7	0.0	A	2.2	181.5	22	1815	5.00
35	4	No	D	Up	14.9	14.7	0.0	A	5.0	181.5	50	1815	5.00
36	4	No	D	Up	14.9	14.7	0.0	A	8.0	181.5	80	1815	5.00
37	4	No	E	Up	14.9	14.7	0.0	A	2.2	181.5	22	1815	5.00
38	4	No	E	Up	14.9	14.7	0.0	A	5.0	181.5	50	1815	5.00
39	4	No	E	Up	14.9	14.7	0.0	A	8.0	181.5	80	1815	5.00
40	4	No	F	Up	14.9	14.7	0.0	A	2.2	181.5	22	1815	5.00

Table B-1
Run Specifications (Con't)

Run Number	Dike Height (cm)	Tank	Spray Configuration	Spray Direction	L_n (cm)	L_s (cm)	H_s (cm)	Nozzle Type	Field: Wind Velocity (m/s)	Field: Q_p (m^3/s)	Model: Wind Velocity (cm/s)	Model: Q_m (cc/s)	Model: ΔP (psig)
41	4	No	F	Up	14.9	14.7	0.0	A	5.0	181.5	50	1815	5.00
42	4	No	F	Up	14.9	14.7	0.0	A	8.0	181.5	80	1815	5.00
43	4	No	G	Up	14.9	14.7	0.0	A	2.2	181.5	22	1815	5.00
44	4	No	G	Up	14.9	14.7	0.0	A	5.0	181.5	50	1815	5.00
45	4	No	G	Up	14.9	14.7	0.0	A	8.0	181.5	80	1815	5.00
46	4	No	B	Up/Down	14.9	14.7	14.2	A	2.2	181.5	22	1815	5.00
47	4	No	-	-	-	-	-	-	2.2	181.5	22	1815	-
48	4	No	B	Down	14.9	14.7	14.2	A	2.2	181.5	22	1815	5.00
49	0	No	-	-	-	-	-	-	2.2	181.5	22	1815	-
50	0	No	-	-	-	-	-	-	2.2	181.5	22	1815	-
51	4	No	B	Down	14.9	14.7	14.2	A	2.2	181.5	22	1815	9.90
52	4	No	B	Down	14.9	14.7	14.2	A	2.2	181.5	22	1815	19.30
54	4	No	B	Up	14.9	14.7	0.0	A	2.2	181.5	22	1815	19.10
59	4	No	A	Down	29.8	14.7	12.1	D	.5 @ .25m	138.1	22	6217	21.50
60	4	No	A	Down	29.8	14.7	24.4	E	.5 @ .25m	138.1	22	6217	21.50
61	4	No	-	-	-	-	-	-	.5 @ .25m	138.1	22	6217	-
62	4	No	-	-	-	-	-	-	3.0	100.0	30	1000	-
63	4	No	J	Down	14.9	14.7	14.2	A	3.0	100.0	30	1000	4.72
64	4	No	J	Down	14.9	14.7	14.2	A	3.0	100.0	30	1000	18.90
65	4	No	J	Down	14.9	4.9	14.2	A	3.0	100.0	30	1000	4.72
66	4	No	J	Down	14.9	4.9	14.2	A	3.0	100.0	30	1000	18.90
67	4	No	J	Down	14.9	21.0	14.2	A	3.0	100.0	30	1000	4.72
68	4	No	J	Down	14.9	21.0	14.2	A	3.0	100.0	30	1000	18.90
69	4	No	J	Down	22.4	14.7	22.0	G	3.0	100.0	30	1000	5.00
70	4	No	J	Down	22.4	4.9	22.0	G	3.0	100.0	30	1000	5.00
71	4	No	J	Down (45°)	22.4	21.0	22.0	G	3.0	100.0	30	1000	5.00
72	4	No	J	Up	14.9	14.7	0.0	A	3.0	100.0	30	1000	4.72
73	4	No	J	Up	14.9	14.7	0.0	A	3.0	100.0	30	1000	18.90
74	4	No	J	Up	14.9	4.9	0.0	A	3.0	100.0	30	1000	4.72
75	4	No	J	Up	14.9	4.9	0.0	A	3.0	100.0	30	1000	18.90
76	4	No	J	Up	22.4	14.7	0.0	G	3.0	100.0	30	1000	5.00
77	4	No	J	Up	22.4	4.9	0.0	G	3.0	100.0	30	1000	5.00
78	4	No	J	Down (45°)	14.9	21.0	14.2	A	3.0	100.0	30	1000	10.00
80	4	No	-	-	-	-	-	-	3.0	100.0	30	1000	-
81	4	No	-	-	-	-	-	-	2.2	100.0	22	1000	-
82	4	No	B	Down	14.9	14.7	14.2	A	2.2	100.0	22	1000	4.70
83	4	No	B	Down	14.9	14.7	14.2	A	3.0	100.0	30	1000	4.70
84	4	No	K	Down (45°)	14.9	21.0	14.2	A	3.0	100.0	30	1000	9.80
85	4	No	K	Down (45°)	14.9	21.0	14.2	A	3.0	100.0	30	1000	18.90
86	4	No	H	Down (45°)	14.9	21.0	14.2	A	3.0	100.0	30	1000	18.90
87	4	No	K	Down (45°)	14.9	21.0	14.2	A	2.2	100.0	22	1000	9.80

Table B-1
Run Specifications (Con't)

Run Number	Dike Height (cm)	Tank	Spray Configuration	Spray Direction	L_n (cm)	L_s (cm)	H_s (cm)	Nozzle Type	Field: Wind Velocity (m/s)	Field: Q_p (m^3/s)	Model: Wind Velocity (cm/s)	Model: Q_m (cc/s)	Model: ΔP (psig)
88	4	No	K	Down (45°)	14.9	21.0	14.2	A	2.2	100.0	22	1000	18.90
89	4	No	B	Up	14.9	14.7	0.0	A	2.2	100.0	22	1000	18.90
90	4	No	B	Up	14.9	14.7	0.0	A	3.0	100.0	30	1000	18.90
91	4	No	-	-	-	-	-	-	2.2	216.6	22	2166	-
92	4	No	K	Down (45°)	14.9	21.0	14.2	A	4.5	100.0	45	1000	-
93	4	No	K	Down (45°)	14.9	21.0	14.2	A	4.5	100.0	45	1000	9.80
94	4	No	K	Down (45°)	14.9	21.0	14.2	A	4.5	100.0	45	1000	18.90
95	4	No	-	-	-	-	-	-	6.0	100.0	60	1000	-
96	4	No	K	Down (45°)	14.9	21.0	14.2	A	6.0	100.0	60	1000	9.80
97	4	No	K	Down (45°)	14.9	21.0	14.2	A	6.0	100.0	60	1000	18.90
98	4	No	-	-	-	-	-	-	8.0	100.0	80	1000	-
99	4	No	K	Down (45°)	14.9	21.0	14.2	A	8.0	100.0	80	1000	2.80
100	4	No	K	Down (45°)	14.9	21.0	14.2	A	8.0	100.0	80	1000	18.90
101	4	No	B	Up	14.9	14.7	0.0	A	4.5	100.0	45	1000	18.90
102	4	No	B	Up	14.9	14.7	0.0	A	6.0	100.0	60	1000	18.90
103	4	No	B	Up	14.9	14.7	0.0	A	8.0	100.0	80	1000	18.90
104	4	No	-	-	-	-	-	-	2.2	181.5	22	1815	-
106	4	No	H	Down	14.9	21.0	14.2	A	3.0	100.0	30	1000	9.80
107	4	No	L	Down	7.5	13.2	14.2	A	3.0	100.0	30	1000	4.70
108	4	No	B	Up	14.9	14.7	0.0	A	3.0	100.0	30	1000	6.70
109	4	No	B	Up	14.9	14.7	0.0	A	3.0	100.0	30	1000	9.70
110	4	No	B	Up	14.9	14.7	0.0	A	3.0	100.0	30	1000	13.60
111	4	No	B	Up	14.9	14.7	0.0	A	3.0	100.0	30	1000	19.10
112	4	No	B	Up	14.9	14.7	0.0	A	3.0	100.0	30	1000	26.90
113	4	S	-	-	-	-	-	-	3.0	100.0	30	1000	-
114	4	S	B	Up	14.9	14.7	0.0	A	3.0	100.0	30	1000	19.10
115	4	No	-	-	-	-	-	-	3.0	50.0	30	500	-
116	4	No	B	Up	14.9	14.7	0.0	A	3.0	50.0	30	500	19.10
117	4	No	-	-	-	-	-	-	3.0	70.7	30	707	-
118	4	No	B	Up	14.9	14.7	0.0	A	3.0	70.7	30	707	19.10
119	4	No	-	-	-	-	-	-	3.0	141.4	30	1414	-
120	4	No	B	Up	14.9	14.7	0.0	A	3.0	141.4	30	1414	19.10
121	4	No	-	-	-	-	-	-	3.0	200.0	30	2000	-
122	4	No	B	Up	14.9	14.7	0.0	A	3.0	200.0	30	2000	19.10
123	8	M	-	-	-	-	-	-	3.0	100.0	30	1000	-
124	8	M	B	Up	14.9	14.7	0.0	A	3.0	100.0	30	1000	19.10
125	16	L	-	-	-	-	-	-	3.0	100.0	30	1000	-
126	16	L	B	Up	14.9	14.7	0.0	A	3.0	100.0	30	1000	19.10
127	4	No	B	Up	14.9	14.7	0.0	I	3.0	100.0	30	1000	7.40
128	4	No	B	Up	14.9	14.7	0.0	I	3.0	100.0	30	1000	10.30
129	4	No	B	Up	14.9	14.7	0.0	I	3.0	100.0	30	1000	14.50

Table B-1
Run Specifications (Con't)

Run Number	Dike Height (cm)	Tank	Spray Configuration	Spray Direction	L_n (cm)	L_s (cm)	H_s (cm)	Nozzle Type	Field: Wind Velocity (m/s)	Field: Q_p (m^3/s)	Model: Wind Velocity (cm/s)	Model: Q_m (cc/s)	Model: ΔP (psig)
130	4	No	B	Up	14.9	14.7	0.0	I	3.0	100.0	30	1000	20.50
131	4	No	A	Up	29.8	14.7	0.0	I	3.0	100.0	30	1000	28.90
132	4	No	A	Up	29.8	14.7	0.0	I	3.0	100.0	30	1000	40.80
133	4	No	A	Up	29.8	14.7	0.0	I	3.0	100.0	30	1000	57.50
134	4	No	K	Down (45°)	14.9	21.0	14.2	A	3.0	100.0	30	1000	6.90
135	4	No	K	Down (45°)	14.9	21.0	14.2	A	3.0	100.0	30	1000	9.70
136	4	No	K	Down (45°)	14.9	21.0	14.2	A	3.0	100.0	30	1000	13.40
137	4	No	K	Down (45°)	14.9	21.0	14.2	A	3.0	100.0	30	1000	18.90
138	4	No	K	Down (45°)	14.9	21.0	14.2	A	3.0	100.0	30	1000	26.70
139	4	S	K	Down (45°)	14.9	21.0	14.2	A	3.0	100.0	30	1000	18.90
140	4	No	K	Down (45°)	14.9	21.0	14.2	A	3.0	50.0	30	500	18.90
141	4	No	K	Down (45°)	14.9	21.0	14.2	A	3.0	70.7	30	707	18.90
142	4	No	K	Down (45°)	14.9	21.0	14.2	A	3.0	141.4	30	1414	18.90
143	4	No	K	Down (45°)	14.9	21.0	14.2	A	3.0	200.0	30	2000	18.90
144	8	M	K	Down (45°)	14.9	21.0	14.2	A	3.0	100.0	30	1000	18.90
145	16	L	K	Down (45°)	14.9	21.0	14.2	A	3.0	100.0	30	1000	18.90
146	4	No	K	Down (45°)	14.9	18.2	10.2	I	3.0	100.0	30	1000	7.20
147	4	No	K	Down (45°)	14.9	18.2	10.2	I	3.0	100.0	30	1000	10.10
148	4	No	K	Down (45°)	14.9	18.2	10.2	I	3.0	100.0	30	1000	14.30
149	4	No	K	Down (45°)	14.9	18.2	10.2	I	3.0	100.0	30	1000	20.30
150	4	No	I	Down (45°)	14.9	21.0	14.2	A	3.0	100.0	30	1000	18.90
151	4	No	I	Down (45°)	14.9	18.2	10.2	I	3.0	100.0	30	1000	10.10
152	4	No	H	Down (45°)	14.9	21.0	14.2	A	3.0	100.0	30	1000	18.90
153	4	No	H	Down (45°)	22.4	34.0	24.0	H	3.0	100.0	30	1000	29.60

RUN NUMBER = 1 CONFIGURATION = —

NO WATER SPRAY
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.0	.0
5	.0	.0
6	.0	.0
7	1.4	3.7
8	18.9	38.7
9	21.7	42.9
10	10.2	23.4
11	13.1	29.0
12	16.5	34.8
13	22.9	44.5
14	30.1	53.7
15	41.6	65.8
16	45.8	69.5
17	45.3	69.1
18	.9	2.5
19	.1	.2
20	.0	.0
21	0.0	0.0
22	47.2	70.7
23	40.5	64.8
24	29.6	53.2
25	22.8	44.4
26	15.3	32.7
27	12.1	27.0
28	7.7	18.4
29	22.1	43.3
30	20.7	41.3
31	3.4	8.6
32	.0	.1
33	0.0	0.0
34	0.0	0.0
35	20.9	41.7
36	16.9	35.4
37	15.4	32.9
38	16.6	35.1
39	12.2	27.3
40	11.4	25.9
41	7.0	17.0
42	.3	.8
43	.0	.1
44	0.0	0.0
45	11.4	25.8

RUN NUMBER = 2 CONFIGURATION = —

NO WATER SPRAY
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =50.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 5.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	0.0	0.0
5	0.0	0.0
6	0.0	0.0
7	0.0	0.0
8	0.0	0.0
9	.7	1.8
10	.0	.0
11	0.0	0.0
12	10.0	23.2
13	15.8	33.7
14	12.8	28.4
15	15.2	32.7
16	16.3	34.5
17	16.3	34.5
18	3.0	7.8
19	.4	1.1
20	.0	.0
21	.0	.0
22	17.4	36.3
23	0.0	0.0
24	13.5	29.6
25	16.3	34.5
26	9.3	21.7
27	.0	.1
28	.0	.0
29	9.4	21.8
30	8.2	19.5
31	1.8	4.7
32	.3	.8
33	.0	.1
34	9.2	21.5
35	.0	.0
36	7.6	18.1
37	6.4	15.5
38	7.7	18.4
39	5.6	13.9
40	5.2	12.8
41	2.1	5.5
42	.3	.8
43	.1	.2
44	0.0	0.0
45	5.4	13.3

RUN NUMBER = 3 CONFIGURATION = —

NO WATER SPRAY
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =80.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 8.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.0	.0
5	.0	.0
6	.0	.0
7	.0	.0
8	.4	1.1
9	.5	1.3
10	.2	.6
11	.3	.9
12	.4	1.1
13	.8	2.2
14	4.4	11.0
15	6.2	15.1
16	6.8	16.5
17	6.9	16.7
18	4.7	11.7
19	3.1	7.9
20	.6	1.5
21	.0	.0
22	6.1	15.0
23	5.8	14.3
24	1.7	4.6
25	.5	1.3
26	.3	.9
27	.2	.7
28	0.0	0.0
29	4.6	11.5
30	4.5	11.4
31	3.4	8.6
32	2.0	5.3
33	0.0	0.0
34	0.0	0.0
35	0.0	0.0
36	4.1	10.4
37	3.9	9.8
38	3.7	9.4
39	3.2	8.1
40	3.0	7.8
41	2.4	6.2
42	1.2	3.2
43	0.0	0.0
44	0.0	0.0
45	2.9	7.5

RUN NUMBER = 4   CONFIGURATION = A-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	3.1	8.0
5	1.2	3.1
6	3.1	8.0
7	9.7	22.6
8	15.1	32.4
9	11.8	26.5
10	9.0	21.0
11	1.9	5.0
12	2.6	6.7
13	18.1	37.4
14	3.2	8.1
15	23.4	45.2
16	26.9	49.9
17	27.7	50.9
18	1.7	4.4
19	.2	.4
20	.0	.1
21	.0	.0
22	24.1	46.1
23	22.6	44.1
24	13.4	29.4
25	9.8	22.7
26	8.0	19.0
27	9.2	21.5
28	8.1	19.2
29	13.9	30.4
30	12.3	27.6
31	5.4	13.4
32	.3	.8
33	.0	.1
34	.0	.0
35	14.2	30.9
36	12.9	28.6
37	12.2	27.3
38	12.5	27.9
39	10.6	24.4
40	10.6	24.3
41	7.8	18.6
42	1.6	4.2
43	0.0	0.0
44	.0	.0
45	10.6	24.3

RUN NUMBER = 5 CONFIGURATION = A-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =50.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 5.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.1	.1
5	.0	.1
6	.0	.1
7	.1	.3
8	.2	.5
9	.2	.4
10	.1	.3
11	.1	.3
12	.2	.6
13	2.3	5.9
14	10.7	24.4
15	10.9	24.9
16	3.6	9.2
17	12.0	27.0
18	7.1	17.1
19	3.8	9.6
20	.1	.3
21	.0	.0
22	3.8	9.6
23	11.1	25.3
24	6.9	16.7
25	2.0	5.4
26	.2	.4
27	.1	.3
28	.1	.3
29	6.9	16.6
30	7.0	16.9
31	3.3	8.5
32	1.0	2.6
33	.1	.3
34	.0	.0
35	7.1	17.1
36	6.0	14.7
37	6.2	15.3
38	6.5	15.8
39	5.1	12.7
40	5.3	13.3
41	3.2	8.3
42	.8	2.2
43	.1	.4
44	.0	.0
45	5.4	13.4

RUN NUMBER = 6 CONFIGURATION = A-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =80.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 8.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.0	.1
5	.0	.0
6	.0	.0
7	.1	.2
8	.1	.3
9	.1	.3
10	.1	.2
11	.1	.2
12	.1	.2
13	.2	.6
14	.5	1.3
15	5.0	12.5
16	3.5	9.0
17	6.4	15.6
18	4.8	12.1
19	3.4	8.8
20	.7	1.9
21	.0	.0
22	3.7	9.4
23	4.8	12.1
24	.4	1.0
25	.1	.4
26	.1	.2
27	.1	.2
28	.1	.2
29	3.6	9.2
30	4.5	11.2
31	3.5	9.0
32	2.3	5.9
33	.6	1.5
34	.0	.1
35	3.9	9.8
36	3.4	8.8
37	3.8	9.7
38	3.8	9.7
39	3.0	7.6
40	3.0	7.6
41	2.3	5.9
42	1.2	3.1
43	.4	1.0
44	.0	.1
45	2.9	7.5

RUN NUMBER = 7   CONFIGURATION = —

NO WATER SPRAY
MODEL FLOW RATE = 898.0 CC/SEC
PROTOTYPE FLOW RATE = 44.9 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.0	.0
5	.0	.0
6	0.0	0.0
7	.0	.0
8	8.2	19.4
9	11.4	25.7
10	3.6	9.1
11	6.0	14.8
12	8.8	20.7
13	13.7	30.0
14	16.9	35.4
15	20.9	41.6
16	22.2	43.5
17	22.1	43.4
18	.8	2.2
19	.0	.0
20	.0	.0
21	0.0	0.0
22	22.4	43.8
23	20.7	41.3
24	16.6	34.9
25	13.4	29.4
26	8.3	19.6
27	5.6	13.7
28	2.7	7.0
29	12.1	27.1
30	11.3	25.7
31	2.1	5.4
32	0.0	0.0
33	0.0	0.0
34	0.0	0.0
35	5.8	14.2
36	9.1	21.2
37	8.3	19.6
38	9.0	21.1
39	5.9	14.5
40	5.7	14.1
41	3.0	7.6
42	0.0	0.0
43	0.0	0.0
44	0.0	0.0
45	5.8	14.4

RUN NUMBER = 8 CONFIGURATION = A-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4
MODEL FLOW RATE = 898.0 CC/SEC
PROTOTYPE FLOW RATE = 44.9 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.2	.5
5	.1	.3
6	.1	.4
7	.3	.8
8	—	—
9	3.4	8.8
10	2.9	7.5
11	3.3	8.4
12	3.8	9.7
13	7.8	18.5
14	7.8	18.5
15	7.5	17.9
16	10.0	23.2
17	10.7	24.5
18	1.6	4.1
19	.3	.7
20	.1	.2
21	.0	.0
22	9.3	21.6
23	6.7	16.3
24	6.7	16.4
25	1.6	4.2
26	2.0	5.3
27	3.5	8.9
28	3.4	8.6
29	6.0	14.7
30	6.0	14.6
31	1.9	5.0
32	.2	.6
33	.0	.1
34	.0	.0
35	5.9	14.6
36	5.1	12.7
37	4.6	11.6
38	5.0	12.5
39	4.4	11.2
40	4.5	11.4
41	3.7	9.3
42	.6	1.7
43	.1	.1
44	.0	.0
45	4.5	11.2

RUN NUMBER = 9 CONFIGURATION = —

NO WATER SPRAY
MODEL FLOW RATE = 3574.0 CC/SEC
PROTOTYPE FLOW RATE = 178.7 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	37.1	61.4
5	31.9	55.9
6	18.7	38.4
7	30.9	54.8
8	46.0	69.7
9	44.5	68.5
10	25.0	47.4
11	29.5	53.0
12	31.4	55.3
13	36.5	60.9
14	46.8	70.4
15	58.6	79.3
16	59.5	79.9
17	61.2	81.0
18	2.4	6.2
19	.1	.2
20	.0	.0
21	0.0	0.0
22	59.3	79.8
23	55.0	76.8
24	43.6	67.6
25	35.0	59.2
26	31.0	54.9
27	28.3	51.6
28	22.9	44.5
29	37.3	61.7
30	35.7	60.0
31	13.6	29.9
32	.4	1.2
33	.0	.1
34	0.0	0.0
35	35.6	59.9
36	30.6	54.4
37	28.6	52.0
38	30.0	53.6
39	21.9	43.1
40	21.2	42.1
41	12.9	28.6
42	1.9	5.1
43	.0	.1
44	.0	.1
45	21.1	41.9

RUN NUMBER = 10   CONFIGURATION = A-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4
MODEL FLOW RATE = 3574.0 CC/SEC
PROTOTYPE FLOW RATE = 178.7 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	19.6	39.7
5	14.9	32.2
6	11.9	26.7
7	16.7	35.1
8	31.2	55.0
9	23.3	45.1
10	16.6	34.9
11	17.0	35.6
12	18.1	37.4
13	29.2	52.7
14	29.2	52.7
15	27.5	50.6
16	28.5	51.8
17	31.9	55.8
18	4.2	10.6
19	.2	.4
20	.0	.0
21	0.0	0.0
22	32.0	56.0
23	28.6	52.0
24	27.6	50.7
25	23.2	44.9
26	21.1	41.9
27	18.3	37.8
28	16.6	34.9
29	20.7	41.4
30	20.5	41.1
31	12.0	26.9
32	1.0	2.6
33	.0	.1
34	.0	.1
35	19.8	40.1
36	17.6	36.6
37	17.6	36.6
38	17.8	37.0
39	13.8	30.1
40	13.6	29.8
41	9.8	22.7
42	2.9	7.5
43	.1	.2
44	.0	.0
45	13.4	29.5

RUN NUMBER = 11 CONFIGURATION = B-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 7
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	3.1	8.0
5	2.4	6.2
6	2.3	6.1
7	3.1	7.9
8	4.2	10.6
9	3.5	9.0
10	3.4	8.6
11	3.0	7.8
12	2.8	7.3
13	11.2	25.4
14	10.3	23.8
15	9.6	22.3
16	11.7	26.4
17	11.7	26.4
18	6.1	15.0
19	1.4	3.8
20	.1	.2
21	.0	.0
22	15.7	33.5
23	14.4	31.3
24	10.9	24.9
25	3.0	7.6
26	4.7	11.7
27	5.4	13.4
28	5.7	14.0
29	10.1	23.2
30	9.7	22.5
31	4.1	10.4
32	.4	1.0
33	.1	.1
34	.0	.1
35	9.4	21.8
36	8.8	20.7
37	8.5	20.1
38	9.0	21.2
39	7.1	17.1
40	6.5	15.9
41	4.6	11.6
42	1.9	4.9
43	.3	.7
44	.0	.0
45	6.3	15.3

RUN NUMBER = 12   CONFIGURATION = C-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 13
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	5.0	12.5
5	2.2	5.8
6	.2	.4
7	2.3	6.1
8	4.4	11.1
9	3.3	8.5
10	3.4	8.6
11	3.2	8.2
12	2.9	7.3
13	5.0	12.5
14	8.6	20.2
15	10.8	24.6
16	12.6	28.0
17	13.2	29.2
18	1.9	5.0
19	4.4	11.1
20	.2	.5
21	0.0	0.0
22	10.6	24.3
23	10.3	23.7
24	8.3	19.7
25	2.3	5.9
26	1.6	4.1
27	1.9	4.9
28	2.3	6.0
29	8.8	20.7
30	8.9	20.9
31	3.6	9.2
32	.4	1.1
33	.1	.2
34	0.0	0.0
35	8.9	20.9
36	7.9	18.8
37	7.6	18.3
38	8.2	19.4
39	6.7	16.3
40	6.6	16.1
41	5.1	12.8
42	.8	2.2
43	.1	.2
44	0.0	0.0
45	7.1	17.1

RUN NUMBER = 13   CONFIGURATION = C-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 13
MODEL FLOW RATE = 3574.0 CC/SEC
PROTOTYPE FLOW RATE = 178.7 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	9.9	22.8
5	9.3	21.7
6	6.3	15.5
7	9.2	21.5
8	12.1	27.1
9	8.9	21.0
10	8.2	19.5
11	8.3	19.6
12	7.4	17.9
13	15.2	32.6
14	15.6	33.3
15	18.2	37.5
16	20.2	40.7
17	—	—
18	9.0	21.1
19	2.2	5.7
20	.0	.1
21	0.0	0.0
22	19.8	40.0
23	14.8	32.0
24	12.4	27.7
25	4.3	10.9
26	5.6	13.8
27	6.8	16.5
28	7.4	17.7
29	15.0	32.3
30	14.5	31.5
31	5.6	13.8
32	.3	.9
33	.1	.1
34	.0	.1
35	14.7	31.7
36	13.3	29.2
37	13.1	28.9
38	13.8	30.2
39	11.2	25.5
40	10.9	24.9
41	8.0	19.1
42	2.5	6.6
43	.7	1.8
44	.0	.0
45	11.2	25.3

RUN NUMBER = 14 CONFIGURATION = D-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4+3
HORSESHOE SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	20.6	41.2
5	16.4	34.6
6	7.0	17.0
7	16.5	34.8
8	17.9	37.0
9	8.9	20.8
10	6.1	14.9
11	4.9	12.2
12	4.8	12.0
13	2.5	6.5
14	4.6	11.6
15	6.5	15.8
16	0.0	0.0
17	7.9	18.9
18	4.7	11.8
19	2.6	6.7
20	.0	.0
21	0.0	0.0
22	8.9	20.9
23	6.6	16.0
24	5.0	12.5
25	3.2	8.1
26	6.9	16.7
27	7.9	18.9
28	8.1	19.2
29	6.8	16.5
30	6.7	16.3
31	3.1	8.0
32	0.0	0.0
33	.0	.1
34	.0	.0
35	6.3	15.4
36	6.0	14.6
37	5.7	14.1
38	6.0	14.7
39	4.8	12.0
40	4.5	11.4
41	3.3	8.4
42	.8	2.2
43	.0	.1
44	0.0	0.0
45	4.2	10.6

RUN NUMBER = 15   CONFIGURATION = D-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4+3
HORSESHOE SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =50.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 5.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.5	1.5
5	.7	1.8
6	.4	1.1
7	.8	2.0
8	.7	1.8
9	7.7	18.3
10	.3	.7
11	.6	1.7
12	3.7	9.4
13	1.6	4.1
14	5.0	12.4
15	4.6	11.4
16	4.1	10.4
17	3.7	9.4
18	.6	1.7
19	1.0	2.7
20	0.0	0.0
21	0.0	0.0
22	6.7	16.2
23	7.4	17.9
24	6.5	15.9
25	1.4	3.8
26	2.5	6.4
27	.2	.5
28	.2	.5
29	6.0	14.7
30	6.2	15.2
31	5.0	12.5
32	2.5	6.5
33	.1	.4
34	0.0	0.0
35	6.3	15.5
36	5.6	13.9
37	5.8	14.3
38	6.1	14.9
39	4.9	12.1
40	4.8	11.9
41	2.8	7.3
42	.7	1.9
43	.1	.3
44	0.0	0.0
45	4.6	11.6

RUN NUMBER = 16 CONFIGURATION = D-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4+3
HORSESHOE SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =80.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 8.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.1	.3
5	.1	.3
6	.1	.2
7	.1	.3
8	.1	.3
9	.1	.3
10	.1	.1
11	.1	.1
12	.1	.2
13	.1	.4
14	.4	1.2
15	3.1	7.9
16	4.5	11.3
17	4.9	12.3
18	4.1	10.4
19	2.9	7.5
20	.4	1.0
21	.0	.0
22	4.4	11.0
23	2.3	5.9
24	.3	.8
25	.1	.2
26	.1	.2
27	.1	.2
28	.1	.2
29	4.3	10.8
30	4.4	10.9
31	3.6	9.1
32	2.3	6.1
33	.5	1.4
34	.0	.0
35	4.0	10.0
36	4.0	10.1
37	3.9	10.0
38	3.9	9.9
39	3.4	8.7
40	3.3	8.4
41	2.6	6.7
42	1.3	3.5
43	.4	1.0
44	4.0	10.1
45	3.9	10.0

RUN NUMBER = 17 CONFIGURATION = E-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 15, SPRAY NOZZLES PER SIDE = 4+3
HORSESHOE SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	24.5	46.7
5	23.2	45.0
6	13.7	30.1
7	23.6	45.4
8	25.9	48.6
9	16.7	35.1
10	10.2	23.4
11	10.7	24.4
12	10.4	23.9
13	5.2	12.9
14	4.7	11.7
15	6.8	16.5
16	8.6	20.2
17	7.9	18.8
18	1.8	4.7
19	2.1	5.4
20	.0	.0
21	0.0	0.0
22	7.5	17.9
23	7.5	17.9
24	7.6	18.3
25	5.2	13.0
26	7.1	17.1
27	7.7	18.5
28	7.5	18.0
29	7.8	18.5
30	7.4	17.7
31	4.6	11.5
32	.5	1.4
33	.0	.1
34	.0	.0
35	7.2	17.2
36	7.3	17.5
37	7.0	17.0
38	6.8	16.5
39	9.0	21.0
40	6.2	15.1
41	5.0	12.6
42	1.7	4.5
43	.1	.2
44	.0	.0
45	5.9	14.6

RUN NUMBER = 18   CONFIGURATION = E-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 15, SPRAY NOZZLES PER SIDE = 4+3
HORSESHOE SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =50.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 5.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.1	.3
5	.1	.3
6	.1	.2
7	.1	.3
8	.3	.8
9	11.9	26.8
10	.1	.2
11	5.1	12.8
12	6.0	14.7
13	2.0	5.3
14	2.8	7.3
15	4.9	12.3
16	4.7	11.9
17	4.9	12.1
18	2.4	6.2
19	1.5	3.8
20	.0	.1
21	0.0	0.0
22	5.0	12.5
23	4.4	11.0
24	5.0	12.5
25	.2	.4
26	.1	.3
27	.0	.1
28	.0	.1
29	4.5	11.3
30	4.8	12.1
31	4.2	10.6
32	2.5	6.6
33	.2	.5
34	.0	.0
35	5.0	12.4
36	4.5	11.2
37	4.6	11.6
38	4.8	11.9
39	4.0	10.1
40	4.0	10.2
41	2.9	7.6
42	1.0	2.6
43	.2	.5
44	.0	.0
45	4.1	10.3

RUN NUMBER = 19   CONFIGURATION = E-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 15, SPRAY NOZZLES PER SIDE = 4+3
HORSESHOE SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =80.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 8.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.2	.6
5	.2	.6
6	.1	.3
7	.2	.5
8	.2	.5
9	.2	.4
10	.1	.3
11	.1	.3
12	.1	.4
13	1.5	4.0
14	2.4	6.3
15	3.8	9.8
16	4.5	11.3
17	4.0	10.2
18	3.6	9.1
19	2.4	6.3
20	.2	.4
21	.0	.0
22	3.6	9.2
23	2.6	6.7
24	.4	1.0
25	.1	.2
26	.1	.3
27	.1	.2
28	.1	.2
29	3.9	9.9
30	3.6	9.2
31	3.0	7.7
32	2.0	5.3
33	.5	1.4
34	.0	.0
35	3.1	8.0
36	3.6	9.1
37	3.4	8.7
38	3.1	7.9
39	3.1	7.9
40	3.0	7.6
41	2.4	6.2
42	1.4	3.6
43	.4	1.2
44	.0	.1
45	2.7	6.9

RUN NUMBER = 20 CONFIGURATION = F-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 45, SPRAY NOZZLES PER SIDE = 4+3
L - SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	12.7	28.2
5	16.2	34.3
6	9.4	21.8
7	24.4	46.5
8	25.6	48.2
9	9.8	22.8
10	7.1	17.1
11	7.0	16.9
12	7.6	18.3
13	8.8	20.6
14	7.3	17.5
15	5.8	14.4
16	5.8	14.2
17	5.6	13.9
18	1.0	2.7
19	.2	.6
20	0.0	0.0
21	0.0	0.0
22	7.6	18.3
23	8.6	20.3
24	6.9	16.6
25	7.3	17.5
26	8.1	19.2
27	8.2	19.4
28	7.9	18.9
29	5.5	13.7
30	5.7	14.0
31	4.0	10.1
32	.7	2.0
33	.0	.1
34	0.0	0.0
35	5.8	14.4
36	5.1	12.6
37	5.2	12.9
38	5.5	13.6
39	4.8	12.0
40	4.5	11.2
41	3.4	8.8
42	1.2	3.2
43	.1	.1
44	0.0	0.0
45	4.1	10.3

RUN NUMBER = 21 CONFIGURATION = F-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 45, SPRAY NOZZLES PER SIDE = 4+3
L - SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE =1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =50.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 5.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.2	.5
5	.2	.6
6	.1	.3
7	.2	.5
8	.2	.4
9	.2	.6
10	.1	.2
11	.1	.3
12	3.2	8.3
13	3.8	9.7
14	4.0	10.1
15	2.1	5.6
16	10.3	23.6
17	3.6	9.1
18	2.9	7.5
19	1.1	3.0
20	.0	.0
21	0.0	0.0
22	3.5	8.9
23	3.3	8.5
24	4.5	11.4
25	4.8	12.0
26	.1	.4
27	.0	.1
28	.0	.1
29	4.5	11.2
30	5.3	13.1
31	2.5	6.5
32	.8	2.1
33	.1	.2
34	0.0	0.0
35	5.7	14.0
36	3.8	9.7
37	4.7	11.8
38	5.0	12.5
39	3.3	8.6
40	3.9	9.9
41	2.3	6.0
42	.8	2.2
43	.2	.4
44	0.0	0.0
45	3.9	9.8

RUN NUMBER = 22 CONFIGURATION = F-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 45, SPRAY NOZZLES PER SIDE = 4+3
L - SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =80.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 8.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.1	.2
5	.1	.2
6	.0	.1
7	.1	.2
8	.1	.2
9	.0	.1
10	.0	.1
11	0.0	0.0
12	.0	.1
13	2.1	5.4
14	2.9	7.4
15	2.2	5.6
16	3.6	9.3
17	5.6	13.8
18	.4	1.0
19	3.7	9.5
20	.1	.4
21	0.0	0.0
22	3.9	9.8
23	2.9	7.5
24	3.2	8.3
25	1.8	4.8
26	.0	.1
27	.0	.1
28	.0	.1
29	3.4	8.7
30	3.7	9.4
31	2.8	7.3
32	1.7	4.4
33	.4	1.1
34	.0	.0
35	3.4	8.6
36	3.1	7.9
37	3.2	8.2
38	3.2	8.2
39	2.5	6.5
40	2.5	6.5
41	1.9	5.0
42	1.0	2.7
43	.4	1.0
44	.0	.1
45	2.4	6.3

RUN NUMBER = 23 CONFIGURATION = G-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 15, SPRAY NOZZLES PER SIDE = 4+3
L - SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	24.8	47.1
5	24.8	47.1
6	11.5	26.1
7	16.8	35.3
8	7.9	18.9
9	4.9	12.3
10	4.7	11.7
11	4.3	10.8
12	3.6	9.2
13	1.7	4.3
14	4.0	10.2
15	5.1	12.7
16	10.3	23.7
17	13.2	29.0
18	7.0	16.8
19	2.1	5.5
20	0.0	0.0
21	0.0	0.0
22	15.6	33.2
23	18.9	38.6
24	16.1	34.1
25	13.0	28.8
26	17.9	37.2
27	18.0	37.3
28	15.9	33.8
29	8.6	20.3
30	9.4	21.9
31	3.4	8.8
32	.6	1.7
33	.0	.0
34	0.0	0.0
35	9.2	21.5
36	7.5	18.0
37	8.1	19.2
38	8.9	21.0
39	7.0	17.0
40	7.3	17.5
41	5.4	13.4
42	.9	2.3
43	.0	.1
44	0.0	0.0
45	7.3	17.5

RUN NUMBER = 24   CONFIGURATION = G-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 15, SPRAY NOZZLES PER SIDE = 4+3
L - SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =50.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 5.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.4	1.0
5	.4	1.0
6	.2	.6
7	.3	.8
8	.2	.6
9	.2	.5
10	.1	.4
11	.1	.3
12	3.0	7.6
13	2.7	7.1
14	3.1	7.9
15	8.5	20.1
16	7.0	16.8
17	9.3	21.6
18	3.1	8.1
19	1.0	2.8
20	.0	.0
21	0.0	0.0
22	9.6	22.3
23	13.3	29.3
24	11.3	25.6
25	5.9	14.5
26	.2	.6
27	.2	.6
28	.2	.5
29	6.2	15.1
30	6.8	16.5
31	3.7	9.4
32	.9	2.3
33	.1	.2
34	.0	.0
35	6.9	16.7
36	5.6	13.8
37	5.9	14.5
38	6.4	15.7
39	4.8	12.1
40	5.0	12.5
41	2.7	7.1
42	.7	1.8
43	.1	.3
44	.0	.0
45	4.9	12.3

RUN NUMBER = 25 CONFIGURATION = G-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 15, SPRAY NOZZLES PER SIDE = 4+3
L - SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =80.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 8.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.2	.5
5	.2	.4
6	.1	.3
7	.1	.4
8	.1	.3
9	.1	.3
10	.1	.2
11	.1	.2
12	.1	.3
13	1.5	3.9
14	2.8	7.3
15	5.0	12.4
16	5.1	12.6
17	4.7	11.7
18	1.3	3.4
19	2.1	5.4
20	.1	.2
21	0.0	0.0
22	3.9	9.9
23	3.2	8.2
24	3.8	9.6
25	.2	.5
26	.1	.2
27	.1	.3
28	.1	.2
29	3.8	9.7
30	3.6	9.2
31	2.9	7.4
32	1.8	4.8
33	.3	.9
34	0.0	0.0
35	2.9	7.4
36	3.4	8.7
37	3.3	8.5
38	2.9	7.4
39	2.9	7.4
40	2.8	7.2
41	2.1	5.5
42	1.1	2.9
43	.3	.8
44	.0	.0
45	2.4	6.3

RUN NUMBER = 26 CONFIGURATION = A-UP

UPWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	5.7	14.1
5	3.0	7.7
6	.2	.5
7	4.7	11.8
8	9.6	22.3
9	9.0	21.0
10	4.5	11.2
11	5.3	13.1
12	6.9	16.8
13	2.5	6.4
14	15.9	33.9
15	19.8	40.1
16	24.0	46.0
17	23.2	45.0
18	.9	2.5
19	.3	.8
20	.2	.5
21	.2	.7
22	30.3	54.1
23	25.6	48.2
24	22.7	44.3
25	20.2	40.7
26	9.1	21.3
27	7.5	18.0
28	6.0	14.8
29	8.5	20.0
30	7.6	18.2
31	1.3	3.4
32	.6	1.5
33	.4	1.1
34	.1	.3
35	7.5	18.1
36	5.1	12.6
37	4.3	10.9
38	5.0	12.4
39	3.1	7.9
40	2.7	7.0
41	1.3	3.3
42	.4	1.0
43	.1	.3
44	.0	.0
45	3.4	8.8

RUN NUMBER = 27 CONFIGURATION = A-UP

UPWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =50.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 5.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.0	.0
5	.0	.0
6	0.0	0.0
7	.0	.0
8	.0	.0
9	.0	.0
10	.0	.0
11	.0	.0
12	8.4	19.9
13	1.6	4.1
14	10.5	24.0
15	13.1	29.0
16	12.2	27.3
17	14.1	30.7
18	1.1	3.0
19	.7	1.9
20	.1	.2
21	0.0	0.0
22	14.2	30.8
23	15.2	32.7
24	11.2	25.4
25	10.9	24.8
26	10.5	24.1
27	.0	.1
28	.0	.0
29	9.2	21.5
30	8.9	20.9
31	1.6	4.2
32	.5	1.2
33	.1	.4
34	.0	.0
35	8.7	20.4
36	7.0	16.8
37	6.2	15.1
38	7.3	17.5
39	4.6	11.6
40	4.3	10.9
41	1.6	4.3
42	.6	1.5
43	.2	.5
44	.0	.0
45	4.5	11.3

RUN NUMBER = 28 CONFIGURATION = A-UP

UPWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =80.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 8.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.0	.0
5	.0	.0
6	0.0	0.0
7	.0	.0
8	.0	.0
9	.0	.0
10	.0	.0
11	.0	.0
12	.0	.0
13	.5	1.3
14	2.3	5.9
15	4.2	10.7
16	5.4	13.4
17	5.1	12.6
18	2.3	6.0
19	2.3	6.0
20	.3	.8
21	0.0	0.0
22	5.3	13.1
23	4.2	10.5
24	1.5	3.9
25	.0	.1
26	.0	.0
27	.0	.0
28	0.0	0.0
29	3.5	9.0
30	3.5	8.8
31	2.8	7.2
32	1.9	4.9
33	.4	1.2
34	.0	.0
35	3.3	8.4
36	3.0	7.6
37	2.9	7.5
38	2.8	7.3
39	2.3	6.0
40	2.3	6.1
41	2.0	5.2
42	1.3	3.5
43	.5	1.2
44	.0	.1
45	2.1	5.5

RUN NUMBER = 29 CONFIGURATION = A-UP

UPWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4
MODEL FLOW RATE = 898.0 CC/SEC
PROTOTYPE FLOW RATE = 44.9 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	1.5	4.0
5	1.1	3.0
6	.6	1.7
7	.9	2.3
8	6.0	14.6
9	6.8	16.4
10	3.0	7.8
11	4.3	10.9
12	5.4	13.5
13	1.8	4.7
14	13.8	30.1
15	15.0	32.4
16	19.1	39.0
17	19.1	38.9
18	1.1	2.9
19	.2	.6
20	.1	.4
21	.1	.4
22	21.2	42.1
23	18.9	38.7
24	15.8	33.7
25	12.9	28.7
26	5.0	12.5
27	5.3	13.2
28	4.1	10.3
29	6.8	16.4
30	6.1	14.9
31	1.3	3.4
32	.3	.9
33	.2	.6
34	.1	.3
35	6.4	15.5
36	4.3	10.8
37	4.0	10.1
38	4.3	10.9
39	2.2	5.8
40	2.2	5.7
41	1.2	3.2
42	.3	.8
43	.1	.2
44	.0	.0
45	2.5	6.5

RUN NUMBER = 30   CONFIGURATION = A-UP

UPWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4
MODEL FLOW RATE = 3574.0 CC/SEC
PROTOTYPE FLOW RATE = 178.7 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	33.8	58.0
5	26.8	49.7
6	12.2	27.2
7	19.8	40.0
8	28.8	52.2
9	26.1	48.8
10	13.8	30.2
11	14.8	31.9
12	14.9	32.1
13	0.0	0.0
14	31.1	54.9
15	40.0	64.3
16	42.3	66.4
17	42.5	66.6
18	2.0	5.3
19	1.1	2.8
20	.5	1.4
21	.1	.3
22	46.8	70.4
23	39.0	63.3
24	31.8	55.8
25	32.1	56.0
26	18.9	38.6
27	19.2	39.1
28	16.2	34.3
29	12.5	27.8
30	11.8	26.5
31	1.8	4.7
32	1.2	3.1
33	.7	1.8
34	.0	.1
35	11.7	26.4
36	9.6	22.3
37	7.0	17.0
38	8.2	19.4
39	9.0	21.2
40	7.9	18.9
41	5.4	13.3
42	1.2	3.1
43	.0	.1
44	0.0	0.0
45	7.2	17.3

RUN NUMBER = 31   CONFIGURATION = B-UP

UPWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 7
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.3	.9
5	.0	.1
6	.2	.5
7	6.1	15.0
8	8.5	20.0
9	12.4	27.7
10	6.6	16.1
11	7.2	17.3
12	5.9	14.4
13	3.1	7.9
14	17.3	36.0
15	26.6	49.5
16	29.2	52.7
17	27.9	51.2
18	1.7	4.3
19	1.6	4.3
20	1.6	4.1
21	0.0	0.0
22	31.8	55.8
23	28.8	52.2
24	24.6	46.9
25	18.7	38.4
26	7.6	18.2
27	7.7	18.4
28	6.5	15.7
29	9.0	21.1
30	8.7	20.6
31	1.8	4.8
32	1.2	3.2
33	.7	1.9
34	0.0	0.0
35	8.8	20.6
36	5.4	13.4
37	4.8	12.0
38	5.4	13.4
39	3.0	7.6
40	3.8	9.7
41	2.1	5.4
42	.3	.9
43	0.0	0.0
44	0.0	0.0
45	4.7	11.8

RUN NUMBER = 32   CONFIGURATION = C-UP

UPWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 13
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY = 22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	2.0	5.3
5	1.0	2.7
6	.8	2.3
7	0.0	0.0
8	9.7	22.4
9	7.7	18.4
10	4.5	11.2
11	5.3	13.2
12	8.0	19.0
13	1.8	4.8
14	13.4	29.4
15	17.3	36.1
16	16.7	35.1
17	16.8	35.3
18	2.4	6.2
19	1.9	5.0
20	.9	2.3
21	0.0	0.0
22	21.7	42.8
23	20.8	41.5
24	18.0	37.2
25	15.2	32.6
26	8.8	20.8
27	4.9	12.3
28	4.4	11.0
29	5.4	13.5
30	5.0	12.5
31	2.1	5.4
32	1.0	2.7
33	.1	.3
34	0.0	0.0
35	5.6	13.8
36	3.9	9.9
37	3.5	9.0
38	3.9	10.0
39	3.5	8.9
40	3.3	8.4
41	2.1	5.6
42	.8	2.0
43	.1	.2
44	0.0	0.0
45	3.2	8.3

RUN NUMBER = 33 CONFIGURATION = C-UP

UPWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 13
MODEL FLOW RATE = 3574.0 CC/SEC
PROTOTYPE FLOW RATE = 178.7 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	28.0	51.2
5	23.3	45.2
6	12.4	27.6
7	21.4	42.4
8	24.8	47.2
9	18.3	37.7
10	13.1	28.9
11	13.9	30.5
12	16.0	34.1
13	4.2	10.7
14	30.8	54.6
15	36.6	60.9
16	33.8	58.0
17	33.7	57.8
18	3.8	9.7
19	2.9	7.5
20	.3	.7
21	.0	.1
22	35.9	60.2
23	34.8	59.1
24	30.1	53.8
25	24.1	46.2
26	12.7	28.2
27	12.4	27.6
28	11.3	25.6
29	10.1	23.3
30	9.6	22.4
31	3.2	8.2
32	.8	2.2
33	.1	.2
34	.0	.1
35	11.0	25.0
36	12.2	27.3
37	12.2	27.3
38	12.5	27.9
39	11.2	25.4
40	10.9	24.9
41	8.7	20.6
42	1.9	4.9
43	.1	.2
44	.0	.1
45	10.7	24.4

RUN NUMBER = 34   CONFIGURATION = D-UP

UPWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4+3
HORSESHOE SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	36.3	60.7
5	32.3	56.3
6	16.0	33.9
7	26.4	49.2
8	28.8	52.2
9	17.1	35.8
10	6.7	16.3
11	7.7	18.3
12	7.8	18.5
13	1.8	4.6
14	2.4	6.3
15	2.8	7.3
16	3.6	9.1
17	4.8	11.9
18	.7	1.9
19	.6	1.5
20	.3	.8
21	.3	.7
22	4.4	11.0
23	5.4	13.3
24	5.5	13.5
25	4.2	10.6
26	11.6	26.2
27	11.0	25.0
28	8.8	20.7
29	1.8	4.7
30	1.8	4.6
31	.9	2.5
32	.5	1.2
33	.1	.3
34	0.0	0.0
35	2.3	5.9
36	2.4	6.3
37	2.6	6.7
38	3.2	8.1
39	2.9	7.6
40	2.8	7.2
41	2.2	5.7
42	1.1	3.0
43	.2	.6
44	0.0	0.0
45	2.6	6.6

RUN NUMBER = 35 CONFIGURATION = D-UP

UPWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4+3
HORSESHOE SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =50.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 5.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	1.4	3.6
5	1.3	3.4
6	.7	2.0
7	1.1	3.0
8	1.1	3.0
9	.8	2.1
10	.6	1.5
11	.6	1.7
12	.7	1.8
13	9.6	22.3
14	12.7	28.3
15	14.5	31.4
16	10.0	23.1
17	15.9	33.9
18	1.3	3.3
19	1.5	3.9
20	1.2	3.1
21	.0	.0
22	20.3	40.7
23	16.9	35.4
24	15.3	32.8
25	13.6	29.8
26	2.4	6.3
27	.4	1.1
28	.3	.9
29	8.8	20.6
30	7.5	18.0
31	1.9	5.1
32	1.1	2.9
33	.5	1.3
34	0.0	0.0
35	8.8	20.8
36	6.9	16.7
37	5.3	13.0
38	7.1	17.1
39	4.6	11.5
40	3.6	9.3
41	1.9	4.9
42	.9	2.4
43	.3	.9
44	.0	.0
45	4.3	10.8

RUN NUMBER = 36   CONFIGURATION = D-UP

UPWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4+3
HORSESHOE SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =80.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 8.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	0.0	0.0
5	0.0	0.0
6	0.0	0.0
7	0.0	0.0
8	.0	.0
9	.0	.0
10	.0	.0
11	0.0	0.0
12	.0	.0
13	.0	.1
14	2.0	5.2
15	4.1	10.4
16	4.6	11.6
17	4.6	11.5
18	2.8	7.3
19	3.1	8.1
20	1.0	2.7
21	0.0	0.0
22	4.4	11.2
23	3.8	9.6
24	.8	2.3
25	.0	.0
26	0.0	0.0
27	0.0	0.0
28	0.0	0.0
29	3.4	8.6
30	3.2	8.1
31	2.6	6.8
32	1.9	4.9
33	.6	1.7
34	0.0	0.0
35	2.8	7.1
36	2.9	7.4
37	2.7	7.0
38	2.5	6.5
39	2.3	6.0
40	2.2	5.8
41	1.9	4.9
42	1.3	3.4
43	.5	1.3
44	.0	.0
45	2.0	5.2

RUN NUMBER = 37 CONFIGURATION = E-UP

UPWARD WATER SPRAY
WIND DIRECTION = 15, SPRAY NOZZLES PER SIDE = 4+3
HORSESHOE SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	27.5	50.7
5	24.4	46.5
6	12.2	27.4
7	18.1	37.4
8	27.5	50.6
9	22.0	43.2
10	9.2	21.5
11	11.3	25.6
12	0.0	0.0
13	5.7	14.1
14	9.7	22.6
15	13.0	28.8
16	16.8	35.3
17	20.1	40.5
18	1.5	4.0
19	0.0	0.0
20	1.0	2.6
21	.8	2.1
22	25.0	47.4
23	23.6	45.5
24	11.2	25.4
25	6.1	14.9
26	9.4	21.8
27	9.6	22.3
28	8.1	19.2
29	4.0	10.1
30	4.2	10.5
31	1.3	3.6
32	.9	2.4
33	.3	.8
34	0.0	0.0
35	3.8	9.7
36	2.4	6.1
37	2.4	6.2
38	2.4	6.3
39	2.0	5.2
40	1.7	4.5
41	1.2	3.3
42	.4	1.1
43	.0	.1
44	.0	.0
45	2.1	5.6

RUN NUMBER = 38   CONFIGURATION = E-UP

UPWARD WATER SPRAY
WIND DIRECTION = 15, SPRAY NOZZLES PER SIDE = 4+3
HORSESHOE SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =50.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 5.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.3	.8
5	.3	.7
6	.2	.4
7	.2	.5
8	.2	.6
9	1.7	4.4
10	.1	.4
11	.2	.4
12	7.3	17.6
13	8.3	19.7
14	8.4	19.8
15	8.8	20.6
16	9.9	23.0
17	10.7	24.5
18	1.4	3.7
19	1.2	3.2
20	.6	1.5
21	0.0	0.0
22	13.3	29.4
23	10.6	24.2
24	6.3	15.5
25	6.6	16.0
26	.1	.2
27	.1	.3
28	.1	.2
29	6.1	14.9
30	6.0	14.7
31	2.3	6.0
32	1.0	2.7
33	.4	1.0
34	.0	.0
35	7.5	18.0
36	4.9	12.3
37	4.8	12.1
38	6.2	15.1
39	3.6	9.2
40	3.5	8.8
41	2.0	5.3
42	.8	2.0
43	.3	.8
44	.0	.0
45	4.2	10.5

RUN NUMBER = 39 CONFIGURATION = E-UP

UPWARD WATER SPRAY
WIND DIRECTION = 15, SPRAY NOZZLES PER SIDE = 4+3
HORSESHOE SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =80.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 8.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	0.0	0.0
5	0.0	0.0
6	.0	.0
7	.0	.0
8	0.0	0.0
9	.0	.0
10	.0	.0
11	0.0	0.0
12	.0	.0
13	.1	.4
14	3.0	7.6
15	3.8	9.7
16	4.6	11.5
17	4.0	10.1
18	3.4	8.6
19	2.6	6.8
20	.1	.3
21	0.0	0.0
22	3.5	9.0
23	2.7	6.9
24	4.0	10.2
25	.0	.1
26	.0	.0
27	.0	.0
28	.0	.0
29	3.1	8.0
30	3.1	8.0
31	2.6	6.6
32	1.9	4.9
33	.6	1.7
34	0.0	0.0
35	2.6	6.7
36	2.6	6.8
37	2.7	6.9
38	2.5	6.4
39	2.1	5.4
40	2.1	5.6
41	1.8	4.7
42	1.3	3.3
43	.5	1.3
44	.0	.0
45	1.9	5.1

RUN NUMBER = 40 CONFIGURATION = F-UP

UPWARD WATER SPRAY
WIND DIRECTION = 45, SPRAY NOZZLES PER SIDE = 4+3
L - SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	5.0	12.4
5	5.1	12.6
6	4.2	10.6
7	10.8	24.6
8	16.2	34.4
9	21.4	42.4
10	9.8	22.7
11	12.9	28.6
12	15.4	33.0
13	18.2	37.5
14	20.6	41.2
15	20.8	41.4
16	17.3	36.2
17	13.3	29.3
18	1.7	4.4
19	.7	2.0
20	.5	1.3
21	.1	.3
22	18.2	37.6
23	19.5	39.5
24	19.9	40.2
25	19.1	39.0
26	16.1	34.2
27	13.8	30.1
28	10.3	23.8
29	5.3	13.2
30	5.1	12.7
31	2.1	5.4
32	.9	2.5
33	.6	1.6
34	.0	.0
35	5.4	13.3
36	4.3	10.9
37	4.1	10.4
38	4.5	11.3
39	4.0	10.2
40	3.4	8.8
41	2.1	5.6
42	.4	.9
43	.0	.1
44	0.0	0.0
45	3.4	8.8

RUN NUMBER = 41 CONFIGURATION = F-UP

UPWARD WATER SPRAY
WIND DIRECTION = 45, SPRAY NOZZLES PER SIDE = 4+3
L - SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =50.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 5.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	8.1	19.2
5	8.4	19.9
6	5.4	13.4
7	8.5	20.0
8	9.0	21.2
9	10.0	23.1
10	5.0	12.4
11	6.8	16.5
12	9.0	21.1
13	8.3	19.7
14	10.2	23.4
15	10.9	24.8
16	8.8	20.7
17	7.9	18.9
18	1.6	4.3
19	1.1	3.0
20	.6	1.6
21	.0	.1
22	10.1	23.2
23	9.4	21.9
24	9.2	21.4
25	8.4	19.8
26	6.8	16.4
27	5.0	12.5
28	3.9	9.8
29	3.4	8.8
30	3.1	8.0
31	1.3	3.4
32	.7	1.9
33	.3	.9
34	0.0	0.0
35	3.3	8.4
36	2.6	6.8
37	2.4	6.2
38	2.7	7.1
39	2.3	5.9
40	1.9	4.9
41	1.0	2.8
42	.3	.9
43	.1	.2
44	.0	.0
45	1.7	4.5

RUN NUMBER = 42   CONFIGURATION = F-UP

UPWARD WATER SPRAY
WIND DIRECTION = 45, SPRAY NOZZLES PER SIDE = 4+3
L - SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =80.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 8.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.0	.1
5	.0	.1
6	0.0	0.0
7	.0	.1
8	.0	.1
9	0.0	0.0
10	.0	.1
11	.0	.1
12	.1	.2
13	1.8	4.7
14	2.7	7.1
15	2.3	6.0
16	3.1	7.9
17	4.4	11.1
18	3.0	7.7
19	3.4	8.7
20	1.0	2.8
21	0.0	0.0
22	2.7	6.9
23	2.6	6.7
24	2.5	6.4
25	.6	1.5
26	.0	.1
27	.0	.1
28	.0	.0
29	2.8	7.3
30	2.9	7.4
31	2.4	6.2
32	1.9	4.9
33	.8	2.1
34	0.0	0.0
35	2.1	5.4
36	2.5	6.5
37	2.3	6.1
38	2.0	5.2
39	2.1	5.4
40	1.9	4.9
41	1.5	4.0
42	1.1	2.8
43	.4	1.2
44	0.0	0.0
45	1.6	4.2

RUN NUMBER = 43 CONFIGURATION = G-UP

UPWARD WATER SPRAY
WIND DIRECTION = 15, SPRAY NOZZLES PER SIDE = 4+3
L - SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	9.7	22.6
5	6.3	15.3
6	2.1	5.6
7	8.8	20.6
8	8.7	20.6
9	10.7	24.4
10	5.2	12.9
11	5.7	14.0
12	4.9	12.2
13	2.8	7.2
14	6.8	16.5
15	15.7	33.5
16	21.7	42.8
17	21.9	43.2
18	.9	2.3
19	1.0	2.5
20	1.0	2.6
21	1.1	3.0
22	0.0	0.0
23	27.4	50.5
24	29.6	53.2
25	28.4	51.8
26	19.0	38.9
27	15.1	32.5
28	12.2	27.3
29	5.2	13.0
30	5.1	12.8
31	1.5	3.8
32	1.1	3.0
33	.9	2.3
34	.0	.1
35	4.6	11.4
36	2.9	7.6
37	2.8	7.2
38	3.6	9.1
39	3.3	8.4
40	4.2	10.5
41	1.4	3.8
42	.4	1.0
43	.0	.1
44	0.0	0.0
45	4.8	12.1

RUN NUMBER = 44 CONFIGURATION = G-UP

UPWARD WATER SPRAY
WIND DIRECTION = 15, SPRAY NOZZLES PER SIDE = 4+3
L - SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =50.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 5.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.1	.2
5	.1	.2
6	.0	.1
7	.0	.1
8	.1	.1
9	.5	1.4
10	.0	.1
11	.0	.1
12	5.5	13.6
13	6.3	15.3
14	7.6	18.2
15	8.7	20.5
16	10.7	24.4
17	10.6	24.3
18	1.0	2.7
19	1.0	2.7
20	.6	1.6
21	0.0	0.0
22	0.0	0.0
23	11.7	26.3
24	10.0	23.1
25	8.1	19.2
26	.0	.1
27	.0	.1
28	.0	.1
29	6.8	16.6
30	6.2	15.1
31	1.9	5.1
32	.9	2.5
33	.4	1.0
34	.0	.0
35	7.4	17.8
36	5.6	13.9
37	5.0	12.6
38	6.0	14.6
39	4.2	10.5
40	4.1	10.3
41	2.0	5.3
42	.8	2.2
43	.3	.8
44	.0	.0
45	3.5	8.9

RUN NUMBER = 45   CONFIGURATION = G-UP

UPWARD WATER SPRAY
WIND DIRECTION = 15, SPRAY NOZZLES PER SIDE = 4+3
L - SHAPE NOZZLE CONFIGURATION
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =80.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 8.0 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	0.0	0.0
5	.3	.7
6	.1	.4
7	.2	.6
8	.2	.6
9	.3	.7
10	.1	.3
11	.2	.4
12	.2	.5
13	1.0	2.6
14	3.9	9.9
15	4.4	11.2
16	4.9	12.3
17	—	—
18	1.3	3.5
19	2.1	5.5
20	.5	1.4
21	.0	.1
22	2.8	7.1
23	2.9	7.4
24	3.8	9.7
25	.5	1.4
26	.3	.9
27	0.0	0.0
28	.2	.6
29	3.2	8.1
30	2.8	7.3
31	2.3	5.9
32	1.6	4.3
33	.6	1.7
34	.0	.0
35	1.9	5.0
36	2.7	7.0
37	2.6	6.6
38	1.9	5.0
39	2.2	5.8
40	2.1	5.4
41	1.6	4.3
42	1.1	2.9
43	.5	1.2
44	.0	.1
45	1.6	4.3

RUN NUMBER = 46 CONFIGURATION = B-UP/DOWN

STAGGERED WATER SPRAY FROM BOTH UP AND DOWN NOZZLES
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 7
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	8.5	20.1
5	6.6	16.1
6	1.7	4.5
7	4.4	11.2
8	11.6	26.1
9	3.0	7.6
10	3.4	8.8
11	2.6	6.7
12	2.6	6.8
13	.8	2.0
14	4.1	10.4
15	5.1	12.7
16	6.6	16.1
17	6.1	15.0
18	3.2	8.2
19	3.5	9.0
20	2.9	7.5
21	.0	.0
22	6.4	15.6
23	6.0	14.8
24	4.8	12.1
25	3.3	8.3
26	2.1	5.4
27	2.1	5.6
28	2.3	5.9
29	4.0	10.1
30	3.9	9.8
31	2.7	6.9
32	1.0	2.6
33	.0	.0
34	.0	.0
35	3.6	9.1
36	3.6	9.1
37	3.5	8.8
38	3.4	8.8
39	3.1	7.9
40	2.8	7.3
41	2.5	6.6
42	1.4	3.8
43	.3	.8
44	0.0	0.0
45	2.7	7.0

RUN NUMBER = 47   CONFIGURATION = –

NO WATER SPRAY
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	0.0	0.0
5	0.0	0.0
6	0.0	0.0
7	0.0	0.0
8	0.0	0.0
9	0.0	0.0
10	0.0	0.0
11	0.0	0.0
12	.0	.0
13	1.1	2.9
14	3.4	8.6
15	9.0	21.0
16	10.1	23.3
17	11.7	26.4
18	4.6	11.6
19	9.0	21.0
20	4.9	12.2
21	.2	.7
22	12.2	27.3
23	8.7	20.4
24	1.2	3.2
25	.0	.1
26	.0	.0
27	0.0	0.0
28	0.0	0.0
29	8.1	19.2
30	8.9	20.9
31	8.2	19.4
32	7.5	17.9
33	4.4	11.0
34	.8	2.1
35	8.1	19.3
36	6.6	16.0
37	7.5	17.9
38	6.9	16.7
39	4.4	11.2
40	4.7	11.8
41	4.0	10.2
42	3.7	9.3
43	2.9	7.4
44	.9	2.4
45	3.9	9.8

RUN NUMBER = 48 CONFIGURATION = B-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 7
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.0	.0
5	.0	.0
6	.0	.0
7	.0	.0
8	.0	.0
9	.0	.0
10	.0	.0
11	.0	.0
12	.3	.7
13	.6	1.6
14	1.9	4.9
15	2.8	7.2
16	0.0	0.0
17	7.4	17.7
18	3.6	9.1
19	7.3	17.6
20	6.5	15.7
21	1.9	4.9
22	5.6	13.8
23	1.5	3.8
24	.7	1.9
25	.4	1.1
26	.0	.0
27	.0	.0
28	.0	.0
29	5.3	13.2
30	5.0	12.5
31	4.9	12.3
32	4.6	11.6
33	4.0	10.2
34	0.0	0.0
35	3.4	8.6
36	4.4	11.1
37	4.1	10.4
38	3.2	8.2
39	3.3	8.4
40	—	—
41	2.7	7.1
42	2.5	6.6
43	2.3	6.1
44	1.1	2.9
45	2.3	5.9

RUN NUMBER = 49 CONFIGURATION = —

NO WATER SPRAY, NO DIKE
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	0.0	0.0
5	0.0	0.0
6	0.0	0.0
7	0.0	0.0
8	0.0	0.0
9	0.0	0.0
10	0.0	0.0
11	0.0	0.0
12	.0	.0
13	.9	2.5
14	1.6	4.2
15	8.7	20.5
16	12.4	27.7
17	14.1	30.7
18	4.1	10.3
19	7.3	17.5
20	2.7	7.0
21	.1	.2
22	16.6	34.9
23	8.8	20.7
24	1.2	3.1
25	.0	.0
26	.0	.0
27	.0	.0
28	0.0	0.0
29	6.3	15.4
30	7.2	17.4
31	6.5	15.7
32	5.8	14.3
33	4.1	10.3
34	0.0	0.0
35	6.8	16.4
36	4.4	11.1
37	5.4	13.4
38	4.8	11.9
39	2.5	6.5
40	3.0	7.7
41	2.8	7.3
42	2.8	7.1
43	2.7	6.9
44	2.0	5.3
45	2.2	5.6

RUN NUMBER = 50   CONFIGURATION = —

NO WATER SPRAY, NO DIKE
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE =   90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	18.3	37.8
5	8.6	20.4
6	0.0	0.0
7	0.0	0.0
8	25.2	47.7
9	25.1	47.5
10	11.1	25.1
11	14.9	32.2
12	17.7	36.8
13	4.7	11.9
14	32.8	56.9
15	38.6	63.0
16	40.1	64.4
17	39.7	64.0
18	4.1	10.3
19	3.0	7.7
20	1.3	3.6
21	0.0	0.0
22	40.9	65.2
23	37.9	62.3
24	32.3	56.3
25	28.7	52.1
26	18.7	38.4
27	16.9	35.5
28	12.4	27.8
29	17.8	36.9
30	17.5	36.4
31	6.7	16.3
32	1.5	4.0
33	1.0	2.7
34	.2	.6
35	17.7	36.7
36	14.6	31.6
37	14.4	31.3
38	14.6	31.6
39	10.8	24.7
40	10.6	24.3
41	7.8	18.5
42	1.6	4.3
43	.9	2.4
44	.6	1.5
45	10.2	23.6

RUN NUMBER = 51 CONFIGURATION = B-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 7
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	5.3	13.1
5	3.3	8.5
6	3.0	7.7
7	4.6	11.5
8	9.9	22.8
9	8.4	19.9
10	7.5	17.9
11	7.6	18.2
12	5.6	13.8
13	6.5	15.9
14	8.8	20.8
15	9.3	21.8
16	8.8	20.7
17	10.9	24.9
18	5.2	12.9
19	3.2	8.2
20	.2	.6
21	0.0	0.0
22	.8	2.2
23	6.5	15.9
24	5.6	13.8
25	3.5	8.9
26	3.7	9.3
27	3.6	9.3
28	3.7	9.4
29	6.4	15.7
30	6.5	15.7
31	3.3	8.4
32	.8	2.1
33	.1	.3
34	0.0	0.0
35	6.7	16.3
36	6.4	15.6
37	5.8	14.3
38	6.5	15.9
39	5.9	14.5
40	5.8	14.3
41	4.6	11.5
42	1.9	5.0
43	.2	.6
44	0.0	0.0
45	6.1	14.9

RUN NUMBER = 52   CONFIGURATION = B-DOWN

DOWNWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 7
MODEL FLOW RATE = 1815.0 CC/SEC
PROTOTYPE FLOW RATE = 90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	2.3	5.9
5	2.4	6.3
6	2.6	6.8
7	3.0	7.8
8	2.8	7.1
9	3.3	8.5
10	3.0	7.8
11	3.4	8.8
12	3.2	8.2
13	3.5	9.0
14	3.8	9.7
15	4.1	10.3
16	5.0	12.6
17	5.4	13.4
18	4.6	11.6
19	4.2	10.7
20	1.3	3.3
21	0.0	0.0
22	4.7	11.7
23	4.7	11.7
24	3.9	9.9
25	1.5	3.9
26	1.4	3.6
27	1.5	3.8
28	1.8	4.8
29	4.5	11.2
30	4.5	11.4
31	3.8	9.5
32	1.1	2.8
33	.0	.1
34	0.0	0.0
35	4.3	10.7
36	4.3	10.9
37	4.1	10.5
38	4.4	11.0
39	3.8	9.6
40	3.7	9.5
41	3.4	8.6
42	2.1	5.5
43	.9	2.5
44	0.0	0.0
45	3.9	9.9

RUN NUMBER = 54   CONFIGURATION = B-UP

UPWARD WATER SPRAY
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 7
MODEL FLOW RATE = 1815.0   CC/SEC
PROTOTYPE FLOW RATE =   90.8 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = 2.2 M/SEC AT 5 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	6.8	16.6
5	6.6	16.1
6	4.5	11.3
7	8.9	20.8
8	12.3	27.5
9	12.6	28.0
10	6.3	15.4
11	8.5	20.0
12	10.1	23.2
13	11.5	26.1
14	17.9	37.1
15	21.8	42.9
16	23.0	44.6
17	22.0	43.3
18	.8	2.2
19	.3	.7
20	.2	.7
21	.5	1.3
22	17.1	35.8
23	16.6	35.0
24	12.9	28.6
25	9.0	21.0
26	6.4	15.5
27	5.3	13.1
28	4.2	10.6
29	8.9	20.9
30	8.4	19.9
31	2.5	6.5
32	.1	.3
33	0.0	0.0
34	0.0	0.0
35	9.2	21.5
36	7.4	17.8
37	7.0	16.8
38	7.4	17.7
39	5.6	13.8
40	5.7	13.9
41	3.5	9.0
42	.3	.9
43	0.0	0.0
44	0.0	0.0
45	5.9	14.4

RUN NUMBER = 59 CONFIGURATION = A-DOWN

DOWNWARD WATER SPRAY , D - NOZZLES
WIND DIRECTION = 0, SPRAY NOZZLES PER SIDE = 4
MODEL FLOW RATE = 6217.0 CC/SEC
PROTOTYPE FLOW RATE = 69.1 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = .5 M/SEC AT 0.25 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	4.5	11.3
5	4.4	11.0
6	3.4	8.6
7	3.9	10.0
8	7.8	18.7
9	6.8	16.4
10	4.2	10.6
11	4.2	10.7
12	2.7	7.0
13	3.2	8.1
14	3.9	9.8
15	6.2	15.1
16	6.9	16.6
17	7.3	17.5
18	1.1	2.9
19	.7	1.8
20	.2	.5
21	0.0	0.0
22	9.3	21.6
23	8.4	20.0
24	6.2	15.2
25	4.8	11.9
26	4.4	11.0
27	5.6	13.9
28	6.1	14.9
29	5.9	14.5
30	5.9	14.5
31	3.1	8.0
32	1.8	4.8
33	.1	.4
34	.0	.0
35	5.2	12.9
36	4.8	12.0
37	4.8	12.0
38	4.7	11.8
39	5.2	13.0
40	5.0	12.5
41	1.9	4.9
42	.7	1.9
43	.1	.3
44	.0	.0
45	3.3	8.4

RUN NUMBER = 60   CONFIGURATION = A-DOWN

DOWNWARD WATER SPRAY , E - NOZZLES
WIND DIRECTION = C, SPRAY NOZZLES PER SIDE = 4
MODEL FLOW RATE = 6217.0 CC/SEC
PROTOTYPE FLOW RATE = 69.1 GM/(SEC(M)(M))
MODEL VELOCITY = 22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = .5 M/SEC AT 0.25 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	4.9	12.2
5	2.9	7.5
6	2.5	6.4
7	2.7	6.9
8	4.1	10.3
9	6.2	15.1
10	4.9	12.1
11	4.2	10.7
12	3.8	9.6
13	4.0	10.2
14	8.5	20.2
15	9.4	21.8
16	7.0	17.0
17	9.8	22.7
18	6.9	16.7
19	7.2	17.3
20	.2	.6
21	0.0	0.0
22	8.2	19.5
23	5.4	13.3
24	.8	2.2
25	3.7	9.5
26	3.4	8.7
27	4.5	11.3
28	5.2	12.8
29	8.7	20.4
30	8.9	20.8
31	6.0	14.7
32	1.4	3.8
33	0.0	0.0
34	0.0	0.0
35	8.2	19.5
36	8.1	19.3
37	7.6	18.2
38	8.0	19.0
39	7.4	17.7
40	7.0	16.9
41	5.4	13.5
42	2.6	6.8
43	1.6	4.2
44	.1	.3
45	6.2	15.2

RUN NUMBER = 61 CONFIGURATION = —

NO WATER SPRAY
MODEL FLOW RATE = 6217.0 CC/SEC
PROTOTYPE FLOW RATE = 69.1 GM/(SEC(M)(M))
MODEL VELOCITY =22.0 CM/SEC AT 5 CM
PROTOTYPE VELOCITY = .5 M/SEC AT 0.25 M

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	28.4	51.8
5	28.3	51.6
6	14.8	32.0
7	30.0	53.7
8	40.8	65.1
9	4.4	11.0
10	19.5	39.6
11	19.9	40.2
12	19.2	39.1
13	21.7	42.8
14	32.9	57.0
15	38.6	63.0
16	42.1	66.3
17	40.7	65.0
18	2.8	7.3
19	.3	.7
20	.0	.0
21	0.0	0.0
22	54.7	76.6
23	42.4	66.5
24	4.0	10.1
25	37.8	62.1
26	28.0	51.2
27	28.8	52.2
28	23.5	45.4
29	28.1	51.3
30	27.1	50.2
31	9.2	21.5
32	.7	1.9
33	0.0	0.0
34	.0	.0
35	24.0	46.0
36	20.3	40.7
37	19.0	38.8
38	19.4	39.4
39	13.6	29.8
40	12.6	28.0
41	6.3	15.5
42	.8	2.0
43	.1	.2
44	.0	.1
45	11.0	25.0

RUN NUMBER 62 CONFIGURATION: -

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
6	.00	.00
7	.00	.00
8	.00	.00
9	12.30	25.65
10	.00	.00
11	.07	.16
12	10.52	22.44
13	13.26	27.33
14	16.91	33.35
15	20.61	38.97
16	22.08	41.07
17	21.80	40.67
18	1.21	2.93
19	.16	.40
20	.00	.00
21	.00	.00
23	20.17	38.33
24	14.90	30.11
25	11.86	24.87
26	6.37	14.34
27	.00	.00
28	.00	.00
29	9.34	20.22
30	9.63	20.77
31	1.49	3.60
32	.11	.28
33	.06	.14
34	.00	.00
35	10.43	22.26
36	7.80	17.23
37	7.75	17.12
38	8.28	18.17
39	5.80	13.15
40	5.76	13.06
41	2.92	6.90
42	.29	.70
43	.07	.17
44	.00	.00
45	5.61	12.75

RUN NUMBER 63 CONFIGURATION: J-DOWN

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6		
7	.00	.00
8	2.10	5.02
9	14.90	30.09
10	4.41	10.18
11	9.70	20.90
12	13.00	26.87
13	15.45	31.01
14	12.16	25.39
15		
16	6.20	13.99
17	3.32	7.79
18	2.58	6.11
19	1.01	2.45
20	.18	.44
21	.00	.00
22	3.17	7.45
23	8.47	18.54
24	15.39	30.90
25	15.67	31.36
26	9.80	21.10
27	6.14	13.86
28	.02	.05
29	3.31	7.77
30	3.33	7.81
31	1.49	3.59
32	.20	.49
33	.03	.06
34	.00	.00
35	3.16	7.44
36	2.69	6.37
37	2.85	6.74
38	2.86	6.76
39	2.37	5.64
40	1.96	4.69
41	1.26	3.05
42	.27	.65
43	.12	.30
44	.00	.00
45	2.17	5.17

RUN NUMBER 64 CONFIGURATION: J-DOWN

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6		
7	.00	.00
8	15.74	31.47
9	16.78	33.15
10	6.41	14.42
11	11.10	23.49
12	9.89	21.26
13	3.16	7.43
14	1.95	4.66
15	1.84	4.41
16	1.54	3.71
17	1.55	3.73
18	1.51	3.64
19	1.34	3.23
20	.35	.86
21	.00	.00
22	1.34	3.22
23	3.11	7.33
24	6.19	13.96
25	11.69	24.56
26	13.21	27.25
27	9.41	20.35
28	4.82	11.07
30	1.21	2.92
31	.95	2.31
32	.73	1.78
33	.20	.50
34	.04	.10

RUN NUMBER 65 CONFIGURATION: J-DOWN

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
10	5.63	12.81
11	11.13	23.54
12	13.26	27.32
14	6.97	15.55
15	4.97	11.40
16	4.21	9.76
17	3.87	9.01
18	2.78	6.56
19	1.14	2.75
20	.02	.05
21		
22	4.48	10.34
23	12.96	26.81
24	16.89	33.33
25	16.52	32.74
26	10.93	23.18
27	6.58	14.76
28	.21	.52
30	3.05	7.19
31	1.53	3.68
32	.26	.64
33	.10	.25
34	.00	.01

RUN NUMBER 66 CONFIGURATION: J-DOWN

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
10	8.76	19.10
11	12.67	26.29
12	12.33	25.69
13	5.97	13.51
14	2.86	6.75
15	1.50	3.62
16	1.71	4.10
17	1.77	4.23
18	1.74	4.17
19	1.33	3.20
20	.43	1.05
21	.00	.00
22	.49	1.21
23	2.98	7.03
24	4.14	9.60
25	6.26	14.11
26	8.81	19.21
27	7.18	15.98
28	1.48	3.57
30	1.23	2.98
31	.99	2.40
32	.35	.86
33	.00	.00
34	.06	.16

RUN NUMBER 67 CONFIGURATION: J-DOWN

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
10	7.30	16.22
11	11.47	24.16
12	10.67	22.70
13	5.71	12.96
14	4.03	9.35
15	3.45	8.07
16	3.03	7.14
17	5.29	12.09
18	2.19	5.22
19	1.13	2.73
20	.00	.00
21	.00	.00
22	5.36	12.23
23	8.74	19.06
24	14.86	30.03
25	15.51	31.11
26	12.20	25.48
27	8.34	18.28
28	3.21	7.54
30	2.22	5.30
31	1.13	2.74
32	.18	.43
33	.06	.15
34	.00	.00

RUN NUMBER 68 CONFIGURATION: J-DOWN

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
10	8.03	17.69
12	7.08	15.78
13	2.34	5.57
14	1.49	3.60
15	1.03	2.50
16	.61	1.48
17	.41	1.01
18	.47	1.16
19	.24	.59
20	.20	.49
21	.18	.45
22	.42	1.03
23	.77	1.87
24	1.97	4.71
25	4.69	10.79
26	8.82	19.21
27	9.50	20.52
28	6.54	14.68
30	.13	.31
31	.20	.50
32	.16	.39
33	.09	.22
34	.03	.07

RUN NUMBER 69 CONFIGURATION: J-DOWN

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
10	8.10	17.82
11	13.81	28.27
12	14.38	29.24
13	5.71	12.96
14	1.23	2.96
15	.	
16	.64	1.57
17	.48	1.18
18	.48	1.17
19	.73	1.78
20	.34	.84
21	.04	.11
22	.79	1.93
23	.78	1.89
24	1.55	3.73
25	6.24	14.07
26	11.30	23.86
27	9.67	20.83
28	5.60	12.73
29	.61	1.50
30	.96	2.33
31	.65	1.59
32	.71	1.72
33	.51	1.25
34	.12	.30

RUN NUMBER 70 CONFIGURATION: J-DOWN

MODEL FLOW RATE= 1000.00CC/S
MODEL VELOCITY= 30.00CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
10	6.33	14.25
11	12.56	26.11
12	12.37	25.77
13	3.16	7.43
14	1.16	2.80
15		
16	.51	1.23
17	.60	1.46
18	.44	1.07
19	.20	.48
20	.18	.45
21	.00	.00
22		
23	.48	1.17
24	.86	2.10
25	3.19	7.50
26	11.05	23.40
27	11.58	24.37
28	7.28	16.19
30	1.06	2.56
31	.64	1.55
32	.62	1.52
33	.32	.77
34	.03	.08

RUN NUMBER 71 CONFIGURATION: J-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
9	9.74	20.98
10	9.88	21.24
11	8.71	19.01
12	3.90	9.09
13	.87	2.11
14	.72	1.76
15	.88	2.13
16	.96	2.33
17	.84	2.04
18	.82	1.99
19	.55	1.35
20	.35	.87
21	.00	.00
22	.65	1.59
23	.53	1.29
24	.73	1.78
25	2.01	4.79
26	7.86	17.33
27	10.89	23.12
28	9.63	20.76
30	.61	1.48
31	.28	.69
32	.24	.59
33		
34	.00	.00

RUN NUMBER 72 CONFIGURATION: J-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
10	4.28	9.90
11	8.87	19.31
12	12.45	25.92
13	16.81	33.20
14	18.70	36.13
15	15.02	30.30
16	13.36	27.49
17	16.86	33.28
18	.52	1.28
19	.48	1.17
20	.21	.52
21	.00	.00
22	20.07	38.19
23	21.45	40.17
24	19.21	36.91
25	14.59	29.58
26	8.01	17.64
27	4.91	11.26
28	.29	.70
30	4.41	10.19
31	.69	1.67
32	.48	1.18
33	.31	.75
34	.00	.00

RUN NUMBER 73 CONFIGURATION: J-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
10	6.75	15.12
11	8.85	19.28
12	8.59	18.77
13	4.36	10.08
14	2.56	6.08
15	.95	2.31
16	.72	1.75
17	.92	2.24
18	.39	.95
19	.47	1.15
20	.31	.76
21		
22	.97	2.35
23	3.38	7.91
24	5.96	13.49
25	7.87	17.35
26	8.98	19.53
27	7.63	16.89
28	1.66	3.99
30	.86	2.08
31	.91	2.20
32	.94	2.28
33	.88	2.14
34	.30	.74

RUN NUMBER 74 CONFIGURATION: J-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.03	.07
10	.65	1.58
11	6.45	14.50
12	10.64	22.65
13	15.75	31.49
14	18.24	35.42
15	18.45	35.75
16	17.30	33.96
17	14.75	29.85
18	1.79	4.29
19	1.56	3.75
20	1.15	2.79
21	.08	.20
22	15.03	30.31
23	16.82	33.21
24	15.85	31.66
25	12.59	26.15
26	7.71	17.05
27	5.02	11.50
28	.33	.80
30	2.68	6.34
31	1.34	3.23
32	.87	2.12
33	.38	.93
34	.30	.74

RUN NUMBER 75 CONFIGURATION: J-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
10	.93	2.27
11	2.67	6.31
12	1.75	4.19
13	1.40	3.37
14	1.14	2.76
15	1.14	2.76
16	1.21	2.93
17	1.19	2.87
18	.95	2.31
19	.82	1.99
20	.89	2.16
21	.98	2.38
22	1.24	2.99
23	1.21	2.92
24	1.22	2.94
25	1.41	3.40
26	2.12	5.05
27	.65	1.58
28	.25	.60
30	1.31	3.17
31	1.19	2.88
32	1.00	2.43
33	.65	1.57
34	.36	.87

RUN NUMBER 76 CONFIGURATION: J-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
10	3.82	8.90
11	7.71	17.05
12	9.66	20.82
13	15.38	30.90
14	15.02	30.29
15	10.11	21.66
16	5.88	13.31
17	4.23	9.80
18	1.48	3.56
19	1.20	2.90
20	1.35	3.25
21	1.28	3.09
22	7.47	16.57
23	13.82	28.28
24	16.01	31.92
25	13.56	27.85
26	7.04	15.69
27	4.69	10.79
28	.14	.33
30	.90	2.18
31	.78	1.89
32	.57	1.38
33		
34	.35	.86

RUN NUMBER 77 CONFIGURATION: J-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
10	3.60	8.42
11	6.71	15.02
12	7.95	17.52
13	8.49	18.57
14	8.63	18.85
15	10.94	23.21
16	10.53	22.44
17	8.53	18.65
18	1.31	3.17
19	.69	1.69
20	.78	1.89
21	.52	1.27
22	16.56	32.80
23	11.18	23.63
24	6.43	14.46
25	5.15	11.79
26	3.80	8.85
27	3.09	7.27
28	.00	.00
30	1.25	3.03
31	.93	2.26
32	.61	1.48
33	.55	1.35
34	.29	.71

RUN NUMBER 78 CONFIGURATION: J-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
10	10.52	22.42
11	12.31	25.66
12	11.50	24.22
13	4.77	10.96
14	1.68	4.04
15	.99	2.40
16	.65	1.57
17	.63	1.54
18	.46	1.11
19	.54	1.31
20	.20	.48
21	.15	.36
22	.99	2.41
23	2.08	4.98
24	5.84	13.23
25	9.44	20.41
26	12.19	25.46
27	11.31	23.87
28	6.99	15.60
30	.43	1.06
31	.25	.61
32	.20	.50
33	.08	.20
34	.02	.04

RUN NUMBER 80 CONFIGURATION: —

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.02	.06
5	.00	.00
6	.00	.01
7	.00	.00
8	.04	.09
9	13.03	26.93
10	.12	.29
11	6.80	15.22
12	10.56	22.49
13	14.16	28.86
14	17.09	33.65
15	22.33	41.42
16	24.50	44.39
17	23.56	43.12
18	.97	2.36
19	.08	.19
20	.00	.00
21	.02	.05
22	23.60	43.17
23	20.27	38.47
24	14.81	29.95
25	12.25	25.56
26	8.33	18.26
27	5.23	11.94
28	.04	.11
29	10.79	22.92
30	10.09	21.62
31	1.30	3.14
32	.21	.51
33	.10	.24
34	.02	.06
35	10.66	22.69
36	8.32	18.24
37	7.48	16.59
38	8.30	18.21
39	5.45	12.41
40	5.48	12.47
41	2.36	5.61
42	.15	.37
43	.05	.13
44	.03	.06
45	5.62	12.78

RUN NUMBER 81 CONFIGURATION: —

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 22.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.00	.00
8	9.63	20.77
9	12.09	25.28
10	4.34	10.03
11	7.70	17.02
12	11.21	23.70
13	17.59	34.42
14	23.08	42.46
15	27.35	48.07
16	30.61	52.04
17	29.11	50.25
18	1.01	2.45
19	.02	.06
20	.05	.12
21	.00	.00
22	30.09	51.42
23	26.37	46.83
24	20.59	38.93
25	14.29	29.08
26	8.01	17.64
27	5.43	12.37
28	2.81	6.63
29	12.09	25.28
30	11.36	23.96
31	1.44	3.46
32	.07	.16
33	.03	.07
34	.00	.00
35	11.93	24.99
36	8.83	19.25
37	8.11	17.84
38	8.75	19.09
39	5.25	11.99
40	5.52	12.57
41	2.35	5.59
42	.07	.18
43	.02	.04
44	.02	.05
45	5.52	12.55

RUN NUMBER 82 CONFIGURATION: B--DOWN

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 22.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.06	.16
5	.00	.00
6	.00	.00
7	.00	.00
8	3.22	7.56
9	2.15	5.12
10	1.87	4.49
11	1.95	4.67
12	1.67	4.01
13	5.24	11.96
14	8.45	18.50
15	8.98	19.52
16	5.99	13.54
17	6.58	14.77
18	5.05	11.57
19	1.95	4.67
20	.05	.13
21	.00	.00
22	5.73	13.00
23	5.30	12.10
24	4.49	10.36
25	2.89	6.81
26	1.45	3.48
27	1.70	4.07
28	1.93	4.63
29	5.29	12.07
30	5.34	12.19
31	3.09	7.27
32	.29	.72
33	.14	.34
34	.00	.00
35	5.13	11.74
36	4.68	10.77
37	4.45	10.27
38	4.48	10.33
39	3.12	7.35
40	3.06	7.21
41	2.69	6.37
42	1.71	4.09
43	.33	.80
44	.01	.02
45	2.97	7.00

RUN NUMBER 83 CONFIGURATION: B-DOWN

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.00	.00
8	.03	.08
10	.01	.01
11	.08	.19
12	.85	2.08
13	3.64	8.50
14	7.35	16.33
15	7.96	17.53
16	6.55	14.71
17	5.24	11.98
18	4.37	10.11
19	3.32	7.79
20	.50	1.22
21	.04	.11
22	6.68	14.98
23	5.67	12.88
24	2.98	7.02
25	1.32	3.18
26	.20	.48
27	.01	.01
28	.00	.00
30	5.27	12.04
31	2.81	6.64
32	.61	1.49
33	.18	.45
34	.20	.48

RUN NUMBER 84 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.15	.38
5	.11	.26
6	.24	.58
7	.10	.25
8	.24	.60
9	.26	.64
10	.24	.60
11	.25	.61
12	.98	2.39
13	1.37	3.30
14	1.48	3.57
15	1.70	4.08
16	2.04	4.88
17	1.91	4.57
18	1.92	4.60
19	1.97	4.70
20	1.98	4.72
21	1.42	3.41
22	1.63	3.93
23	1.16	2.80
24	.96	2.33
25	.64	1.55
26	.25	.62
27	.24	.58
28	.23	.56
29	1.59	3.82
30	1.67	4.02
31	1.60	3.84
32	1.50	3.62
33	1.03	2.49
34	.26	.64
35	1.66	3.99
36	1.46	3.52
37	1.53	3.67
38	1.60	3.85
39	1.36	3.29
40	1.43	3.43
41	1.26	3.04
42	.88	2.13
43	.31	.77
44	.22	.54
45	1.42	3.42

RUN NUMBER 85 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.00	.00
8	.00	.00
9	.00	.00
10	.00	.00
11	.00	.00
12	.17	.42
13	.18	.45
14	.50	1.21
15	.39	.96
16	.64	1.57
17	.59	1.45
18	.59	1.44
19	.57	1.39
20	.52	1.27
21	.66	1.61
22	.69	1.68
23	.70	1.71
24	.66	1.61
25	.40	.98
26	.00	.00
27	.00	.00
28	.00	.00
29	.67	1.63
30	.79	1.91
31	.67	1.62
32	.70	1.70
33	.59	1.44
34	.21	.51
35	.77	1.87
36	.68	1.67
37	.57	1.40
38	.61	1.49
39	.49	1.19
40	.42	1.02
41	.30	.73
42	.17	.41
43	.00	.00
44	.00	.00
45	.58	1.43

RUN NUMBER 86 CONFIGURATION: H-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.00	.00
8	.00	.00
9	.13	.31
10	.00	.00
11	.00	.00
12	.57	1.39
13	.76	1.84
14	.26	.65
15	1.00	2.42
16	1.24	3.00
17	1.36	3.29
18	1.19	2.87
19	1.17	2.83
20	1.04	2.51
21	.76	1.84
22	.84	2.03
23	.39	.95
24	.36	.87
25	.60	1.47
26	1.11	2.68
27	.00	.00
28	.00	.00
29	1.04	2.53
30	1.15	2.78
31	1.07	2.59
32	.96	2.32
33	.81	1.97
34	.41	1.00
35	1.10	2.67
36	1.04	2.52
37	1.05	2.53
38	.97	2.35
39	.90	2.19
40	.81	1.96
41	.70	1.70
42	.53	1.30
43	.13	.33
44	.03	.07
45	.88	2.14

RUN NUMBER 87 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 22.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.00	.00
8	.00	.19
9	.08	.20
10	.05	.13
11	.18	.44
12	1.27	3.06
13	1.64	3.94
14	1.89	4.53
15	2.07	4.94
16	2.27	5.40
17	2.20	5.24
18	2.15	5.13
19	2.10	5.02
20	2.03	4.84
22	2.30	5.46
23	2.08	4.97
24	1.90	4.55
25	1.69	4.06
26	1.20	2.91
27	.32	.79
28	.01	.04
29	1.44	3.46
30	1.40	3.36
31	1.07	2.60
32	.49	1.20
33	.15	.37
34	.02	.04
35	1.47	3.55
36	1.38	3.32
37	1.25	3.02
38	1.52	3.66
39	1.10	2.66
40	1.08	2.62
41	.64	1.57
42	.15	.37
43	.00	.00
44	.02	.05
45	1.10	2.67

RUN NUMBER 88 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 22.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.00	.00
8	.07	.18
9	.28	.68
10	.20	.49
11	.59	1.44
12	.90	2.17
13	1.06	2.57
14	1.18	2.85
15	1.40	3.39
16	1.33	3.21
17	1.29	3.12
18	1.36	3.29
19	1.23	2.98
20	1.15	2.78
21	1.18	2.84
22	1.19	2.89
23	1.15	2.78
24	1.07	2.60
25	.93	2.25
26	.79	1.92
27	.48	1.16
28	.17	.43
29	1.23	2.97
30	1.08	2.61
31	.85	2.06
32	.71	1.72
33	.18	.45
34	.02	.05
35	.99	2.40
36	1.03	2.49
37	.87	2.12
38	.96	2.33
39	.83	2.02
40	.89	2.16
41	.66	1.60
42	.37	.90
43	.13	.33
44	.00	.00

RUN NUMBER 89 CONFIGURATION: B-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 22.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
10	.75	1.82
11	.86	2.09
12	.95	2.32
13	1.23	2.98
14	1.35	3.26
15	1.49	3.59
16	1.49	3.59
17	1.31	3.15
18	.66	1.61
19	.69	1.68
20	.69	1.69
21	.69	1.69
22	1.19	2.87
23	1.18	2.86
24	1.02	2.47
25	.91	2.20
26	.66	1.61
27	.71	1.73
28	.61	1.48
30	.86	2.08
31	.58	1.41
32	.47	1.15
33	.23	.56
34	.09	.21

RUN NUMBER 90 CONFIGURATION: B-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
10	.77	1.88
12	.51	1.24
13	.55	1.35
14	.67	1.64
15	.84	2.03
16	.81	1.97
17	.71	1.74
18	.33	.82
19	.38	.94
20	.30	.74
21	.32	.79
22	.65	1.58
23	.61	1.50
24	.63	1.53
25	.47	1.15
26	.36	.89
27	.75	1.82
28	.41	.99
29	.55	1.34
30	.54	1.32
31	.40	.99
32	.35	.86
33	.36	.89
34	.34	.83

RUN NUMBER 91 CONFIGURATION: —

MODEL FLOW RATE= 2166.0 CC/S
MODEL VELOCITY= 22.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	15.77	31.53
5	11.08	23.45
6		
7		
8	29.30	50.48
9	31.14	52.66
10	14.36	29.20
11	19.55	37.41
12	25.29	45.43
13	35.58	57.60
14		
15	46.76	68.36
16	51.62	72.41
17	50.45	71.46
18	2.14	5.11
19	.00	.00
20	.06	.14
21		
22	52.91	73.43
23		
24	38.70	60.83
25	29.29	50.46
26	22.84	42.13
27	19.27	36.98
28	14.51	29.45
29	24.51	44.40
30	25.56	45.78
31	6.24	14.06
32	.04	.10
33	.10	.25
34	.23	.56
35	25.21	45.33
36	19.71	37.65
37	19.24	36.95
38	21.28	39.94
39	14.04	28.65
40	14.32	29.13
41	6.83	15.28
42	.35	.85
43	.15	.38
44	.00	.00
45	14.14	28.82

RUN NUMBER 92 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 45.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.00	.00
8	.00	.00
9	.00	.00
10	.00	.00
11	.01	.01
12	.01	.03
13	11.04	23.38
14		
15	10.96	23.23
16	12.83	26.57
17	12.41	25.85
18	2.20	5.24
19	.35	.85
20	.00	.00
21	.00	.00
22	12.07	25.25
23	9.49	20.50
24	9.14	19.83
25	10.71	22.77
26	.20	.49
27	.00	.00
28	.00	.00
29	6.46	14.52
30	5.50	12.53
31	1.35	3.26
32	.31	.75
33	.04	.10
34	.00	.00
35	6.70	15.01
36		
37	4.79	11.02
38		
39	3.97	9.22
40	3.48	8.15
41	1.58	3.80
42	.31	.77
43	.05	.11
44	.03	.07
45	2.75	6.51

RUN NUMBER 93 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 45.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.02	.05
6	.02	.04
7	.01	.01
8	.00	.00
9	.00	.00
10	.00	.00
11	.04	.09
12	.14	.35
13	.49	1.21
14	.51	1.26
15	1.12	2.72
16	1.83	4.39
17	2.61	6.18
18	2.34	5.57
19	2.01	4.80
20	1.72	4.13
21	.36	.89
22	2.12	5.06
23	.51	1.25
24	.41	1.01
25	.24	.60
26	.09	.23
27	.02	.05
28	.03	.09
29	1.63	3.92
30	1.64	3.93
31	1.48	3.57
32	1.40	3.37
33	1.12	2.70
34	.57	1.38
35	1.72	4.13
36	1.41	3.40
37	1.42	3.41
38	1.39	3.35
39	1.11	2.69
40	1.19	2.87
41	1.07	2.58
42	.91	2.20
43	.56	1.37
44	.06	.15
45	1.21	2.93

RUN NUMBER 94 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 45.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.12	.31
6	.01	.02
7	.09	.23
8	.15	.37
9	.11	.28
10	.12	.30
11	.12	.30
12	.03	.08
13	.27	.66
14	.31	.76
15	.57	1.40
16	.55	1.34
17	.70	1.72
18	.81	1.96
19	.85	2.06
20	.88	2.14
21	.86	2.09
22	.59	1.43
23	.28	.68
24	.29	.71
25	.20	.50
26	.14	.34
27	.14	.34
28	.15	.37
29	.83	2.02
30	.81	1.97
31	.81	1.96
32	.78	1.89
33	.74	1.80
34	.53	1.30
35	.81	1.97
36	.78	1.90
37	.78	1.90
38	.79	1.92
39	.65	1.59
40	.69	1.68
41	.64	1.57
42	.57	1.38
43	.46	1.12
44	.21	.51
45	.70	1.70

RUN NUMBER 95 CONFIGURATION: —

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 60.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.01	.02
7	.00	.00
8	.00	.00
9	.00	.00
10		
11	.01	.02
12	.03	.08
13	.51	1.24
14	.95	2.30
15	4.71	10.85
16	5.31	12.12
17	5.14	11.76
18	3.91	9.10
19	2.01	4.79
20	.21	.52
21	.06	.16
22	5.00	11.47
23	4.43	10.23
24	3.49	8.17
25	.10	.25
26	.00	.00
27	.00	.00
28	.00	.00
29	3.57	8.35
30	3.70	8.64
31	2.76	6.53
32	1.33	3.21
33	.24	.60
34	.02	.06
35	3.28	7.70
36	3.11	7.32
37	2.97	7.01
38	2.79	6.59
39	2.47	5.87
40	2.30	5.48
41	1.38	3.34
42	.59	1.45
43	.20	.49
44	.18	.45
45	2.13	5.09

RUN NUMBER 96 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 60.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.00	.00
8	.00	.00
9	.00	.00
10	.00	.00
11	.00	.00
12	.00	.00
13	.03	.08
14	.58	1.40
15	.66	1.60
16	2.83	6.68
17	3.14	7.38
18	3.09	7.28
19	2.94	6.92
20	2.26	5.39
21	.20	.48
22	2.06	4.91
23	.19	.46
24	.15	.36
25	.05	.13
26	.00	.00
27	.02	.06
28	.00	.00
29	2.33	5.54
30	2.07	4.95
31	1.69	4.05
32	1.51	3.64
33	1.17	2.83
34	.60	1.47
35	1.61	3.87
36	1.69	4.05
37	1.84	4.40
38	1.78	4.26
39	1.49	3.58
40	1.52	3.65
41	1.25	3.03
42	1.08	2.61
43	.72	1.75
44	.36	.88
45	1.40	3.36

RUN NUMBER 97 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 60.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.01	.03
7		
8	.00	.00
9	.00	.00
10	.00	.00
11	.00	.00
12	.11	.26
13	.07	.18
14	.34	.84
15	.57	1.40
16	.76	1.85
17	.87	2.11
18	.73	1.78
19	.80	1.95
20	1.02	2.47
21	.95	2.31
22	.49	1.20
24	.18	.45
25	.00	.00
26	.00	.00
27	.00	.00
28	.00	.00
29	.87	2.11
30	.82	1.99
31	.88	2.15
32	.83	2.03
33	.73	1.77
34	.68	1.67
35	.77	1.88
36	.91	2.21
37	.86	2.08
38	.66	1.60
39	.75	1.82
40	.63	1.53
41	.76	1.86
42	.54	1.31
43	.51	1.24
44	.25	.60
45	.67	1.64

RUN NUMBER 98 CONFIGURATION: —

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 80.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.00	.00
8	.00	.00
9	.00	.00
10	.02	.06
11	.00	.00
12	.12	.30
13	.13	.33
14	.79	1.92
15	2.30	5.46
16	2.69	6.36
17	3.44	8.07
18	2.77	6.54
19	2.15	5.13
20	.67	1.63
21	.15	.38
22	3.11	7.32
23	2.54	6.03
24	.90	2.17
25	.04	.09
26	.00	.00
27	.00	.00
28	.00	.00
29	2.02	4.82
30	2.33	5.54
31	2.03	4.84
32	1.45	3.49
33	.74	1.81
34	.39	.96
35	2.17	5.17
36	1.80	4.32
37	2.14	5.10
38	1.84	4.40
39	1.83	4.38
40	1.53	3.67
41	1.19	2.87
42	.89	2.17
43	.46	1.12
44	.09	.23
45	1.59	3.82

RUN NUMBER 99 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 80.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.13	.32
8	.00	.00
9	.00	.00
10	.00	.00
11	.00	.00
12	.00	.00
13	.00	.00
14	.57	1.39
15		
16	1.28	3.10
17	2.27	5.40
18	2.20	5.25
19	2.09	4.98
20	1.61	3.88
21	.15	.36
22	1.29	3.10
23	.48	1.16
24	.10	.25
25	.00	.00
26	.00	.00
27	.00	.00
28	.00	.00
29	1.08	2.61
30	1.45	3.49
31	1.28	3.09
32	1.24	2.99
33	1.19	2.88
35	1.11	2.69
36	1.08	2.61
37	1.35	3.27
38	1.28	3.09
39	.89	2.15
40	1.18	2.84
41	1.11	2.70
42	1.03	2.50
43	.87	2.11
44	.61	1.49
45	1.19	2.87

RUN NUMBER 100 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 80.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.06	.16
6	.00	.00
7	.00	.00
8	.00	.00
9	.13	.32
13	.00	.00
14	.50	1.22
15		
16	.75	1.82
17	1.38	3.33
18	1.60	3.84
19	1.57	3.78
20	1.35	3.25
21	.45	1.11
22	.46	1.12
23	.36	.87
24	.08	.20
25	.00	.00
29	.83	2.01
30	.86	2.10
31	.93	2.26
32	.90	2.18
33	.83	2.02
34	.70	1.70
35	.88	2.15
36	1.01	2.45
37	1.06	2.58
38	.64	1.57
40	.77	1.87
41	.76	1.85
42	.87	2.11
43	.71	1.73
44	.30	.73
45	.82	1.99

RUN NUMBER 101 CONFIGURATION: B-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 45.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.01	.04
5	.00	.00
6	.00	.00
7	.00	.01
8	.00	.00
9	.00	.00
10	.00	.00
11	.00	.00
12	.25	.62
13	.65	1.57
14	.44	1.08
15	1.08	2.61
16	.	
17	.80	1.95
18	1.13	2.73
19	.91	2.20
20	.79	1.91
21	.55	1.35
22	1.51	3.64
23	.57	1.40
24	.79	1.92
25	.77	1.86
26	.84	2.05
27	.00	.00
28	.00	.00
29	1.08	2.61
30	1.13	2.73
31	.98	2.38
32	.90	2.18
33	.78	1.90
34	.46	1.11
35	1.02	2.47
36	.99	2.41
37	1.07	2.60
38	.94	2.29
39	.91	2.21
40	.89	2.17
41	.86	2.10
42	.68	1.66
43	.36	.88
44	.12	.30
45	.85	2.06

RUN NUMBER 102 CONFIGURATION: B-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 60.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
6	.00	.00
7	.00	.00
8	.00	.00
9	.00	.00
10	.00	.00
11	.00	.00
12	.00	.00
13	.16	.38
14	.40	.98
15	.88	2.14
16		
17	1.24	3.00
18	.59	1.43
19	.98	2.39
20	.66	1.61
21	.42	1.01
22	1.02	2.47
23	.43	1.05
24	.68	1.64
25	.00	.00
26	.00	.00
27	.03	.07
28	.00	.00
29	1.25	3.01
30	.99	2.39
31	.99	2.41
32	.94	2.29
33	.83	2.01
34	.45	1.10
35	.89	2.17
36	1.05	2.55
37	1.05	2.54
38	.96	2.33
39	.97	2.36
40	.97	2.36
41	.93	2.27
42	.82	2.00
43	.62	1.52
44	.39	.95
45	.95	2.31

RUN NUMBER 103 CONFIGURATION: B-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 80.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.01	.02
5	.00	.00
6	.00	.00
7	.02	.04
8	.00	.00
9	.00	.00
10	.02	.05
11	.02	.06
12	.03	.08
13	.00	.00
14	.36	.89
15	.94	2.27
16		
17	.53	1.29
18	.41	1.00
19	1.06	2.57
20	.41	1.00
21	.49	1.20
22	1.06	2.56
23	.41	1.01
24	.42	1.03
25	.24	.58
26	.02	.06
27	.00	.00
28	.00	.00
29	1.00	2.41
30	.99	2.40
31	1.08	2.61
32	.92	2.24
33	.81	1.96
34	.17	.43
35	.82	2.00
36	.97	2.35
37	.93	2.26
38	.88	2.14
39	.84	2.04
40	.89	2.15
41	.83	2.03
42	.79	1.91
43	.61	1.48
44	.39	.97
45	.93	2.25

RUN NUMBER 104 CONFIGURATION: —

MODEL FLOW RATE= 1815.0 CC/S
MODEL VELOCITY= 22.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	6.76	15.14
5		
6		
7		
8		
9	18.95	36.51
10	7.71	17.04
11	12.50	26.01
12	16.01	31.92
13	23.99	43.70
14		
15	36.89	58.98
16	43.70	65.62
17	40.05	62.17
18	1.64	3.93
19	.00	.00
20	.11	.26
21		
22	45.61	67.35
23		
24	33.15	54.95
25	20.10	38.23
26	13.13	27.10
27	11.85	24.85
28	8.72	19.03
29	17.85	34.83
30	14.44	29.34
31	2.70	6.38
32	.30	.75
33	.15	.36
34	.22	.54
35	19.00	36.59
36	14.65	29.69
37	13.33	27.45
38	13.92	28.45
39	9.56	20.62
40	9.35	20.24
41	3.30	7.74
42	.33	.80
43	.26	.63
44	.00	.00
45	9.73	20.96

RUN NUMBER 106 CONFIGURATION: H-DOWN

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.04	.11
5	.00	.00
6	.00	.00
7		
8		
9	3.92	9.13
10	4.95	11.35
11	3.64	8.49
12	2.03	4.84
13	3.38	7.92
14		
15	2.91	6.87
16	2.67	6.31
17	3.05	7.17
18	2.20	5.25
19	2.06	4.92
20	.77	1.88
21		
22	5.03	11.52
23		
24	9.08	19.72
26	9.18	19.91
27	4.92	11.30
28	3.00	7.06
29	2.91	6.86
30	3.01	7.09
31	1.52	3.65
32	.74	1.79
33	.16	.39
34	.02	.04
35	3.23	7.59
36	2.11	5.04
37	2.42	5.75
38	1.98	4.74
39	1.54	3.72
40	1.59	3.83
41	.05	.13
42	.13	.33
43	.00	.00
44	.00	.00
45	1.61	3.88

RUN NUMBER 107 CONFIGURATION: L-DOWN

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.03	.07
5	.00	.00
6	.00	.00
7	.14	.33
8		
9	3.66	8.55
10	4.31	9.96
11	4.85	11.14
12	5.65	12.83
13	5.40	12.31
14		
15	5.43	12.38
16	4.12	9.55
17	3.58	8.37
18	2.97	6.99
19	2.66	6.29
20	1.66	3.99
21		
22	3.78	8.81
23		
24	3.53	8.27
25	2.29	5.45
26	3.51	8.21
27	3.79	8.83
28	1.34	3.24
29	2.84	6.72
30	2.77	6.55
31	2.07	4.95
32	1.06	2.58
33	.19	.46
34	.03	.08
35	2.97	6.99
36	2.24	5.33
37	2.05	4.88
38	2.25	5.36
39	2.05	4.89
40	1.97	4.71
41	1.10	2.65
42	.23	.56
43	.04	.10
44	.01	.02
45	2.01	4.81

RUN NUMBER 108 CONFIGURATION: B-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.03	.07
8	.06	.16
9	.02	.06
10	.01	.02
11	.04	.11
12	.31	.76
13	1.01	2.45
14	1.55	3.74
15	2.04	4.88
16	2.02	4.82
17	1.94	4.65
18	1.74	4.17
19	1.54	3.71
20	1.20	2.89
21	.39	.95
22	1.75	4.19
23	1.50	3.61
24		
25	.41	1.00
26	.05	.13
27	.01	.02
28	.00	.00
29	1.69	4.05
30	1.71	4.09
31	1.58	3.79
32	1.44	3.46
33	1.14	2.75
34	.26	.65
35	1.65	3.97
36	1.56	3.76
37	1.58	3.81
38	1.60	3.84
41	1.33	3.20
42	1.40	3.38
43	1.14	2.76
44	.70	1.70
45	.24	.60
46	.01	.03
47	1.37	3.29

RUN NUMBER 109 CONFIGURATION: B-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.00	.00
8	.02	.04
9	.54	1.32
10	.08	.19
11	.51	1.24
12	1.48	3.56
13	1.17	2.82
14	1.51	3.63
15	3.80	8.85
16	3.93	9.14
17	3.69	8.60
18	2.01	4.80
19	1.25	3.02
20	.76	1.86
21	.27	.66
22	3.15	7.41
23	2.08	4.96
24		
25	.85	2.06
26	.89	2.17
27	.80	1.94
28	.16	.39
29	1.24	2.99
30	1.38	3.32
31	.99	2.39
32	.73	1.78
33	.54	1.33
34	.32	.78
35	1.60	3.84
36	.96	2.32
37	1.10	2.66
38	1.19	2.88
41	.81	1.97
42	.82	1.99
43	.60	1.47
44	.31	.75
45	.09	.21
46	.00	.00
47	.84	2.04

RUN NUMBER 110 CONFIGURATION: B-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.00	.00
8	.01	.03
9	.27	.67
10	.11	.26
11	.22	.53
12	1.11	2.68
13	.88	2.13
14	.91	2.21
15	1.78	4.26
16	1.52	3.67
17	1.43	3.45
18	1.22	2.96
19	.98	2.37
20	.73	1.79
21	.38	.92
22	1.57	3.78
23	1.89	4.52
24		
25	.50	1.21
26	.39	.96
27	.37	.90
28	.06	.15
29	.72	1.75
30	.80	1.94
31	.71	1.72
32	.62	1.52
33	.49	1.19
34	.32	.79
35	.82	2.00
36	.60	1.47
37	.62	1.51
38	.60	1.47
41	.48	1.17
42	.47	1.15
43	.43	1.05
44	.31	.77
45	.13	.32
46	.00	.01
47	.47	1.14

RUN NUMBER 111 CONFIGURATION: B-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.04	.10
5	.00	.00
6	.00	.00
7	.04	.09
8	.18	.45
9	.75	1.82
10	.35	.85
11	.57	1.38
12	.49	1.19
13	.46	1.12
14	.46	1.12
15		
16	.88	2.15
17	.82	1.99
18	5.31	12.12
19	.47	1.14
20	.35	.85
21	.47	1.14
22	.70	1.71
23	.78	1.90
24		
25	.55	1.35
26	.50	1.21
27	.43	1.04
28	.22	.53
29	.61	1.48
30	.57	1.38
31	.44	1.06
32	.40	.98
33	.37	.91
34	.17	.42
35	.69	1.69
36	.59	1.44
37	.54	1.32
38	.59	1.43
41	.54	1.33
42	.51	1.25
43	.41	1.01
44	.24	.58
45	.03	.08
46	.01	.02
47	.53	1.29

RUN NUMBER 112 CONFIGURATION: B-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.11	.27
5	.03	.07
6	.17	.42
7	.35	.86
8	.51	1.24
9	.45	1.09
10	.31	.75
11	.32	.79
12	.33	.81
13	.37	.90
14	.38	.93
15	.23	.57
16	.41	1.01
17	.40	.99
18	.40	.97
19	.39	.95
20	.37	.91
21	.40	.97
22	.37	.90
23	.32	.79
24		
25	.23	.57
26	.24	.59
27	.24	.58
28	.22	.54
29	.39	.96
30	.38	.92
31	.37	.91
32	.37	.90
33	.35	.85
34	.30	.75
35	.37	.90
36	.37	.91
37	.36	.88
38	.35	.86
41	.34	.82
42	.32	.78
43	.29	.72
44	.22	.54
45	.10	.25
46	.04	.10
47	.31	.76

RUN NUMBER 113 CONFIGURATION: –

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	0.00	0.00
5	0.00	0.00
6	0.00	0.00
7	0.00	0.00
8	.15	.38
9	12.53	26.05
10	2.41	5.73
11	8.05	17.72
12	10.33	22.08
13	11.89	24.91
14	12.29	25.63
15	9.98	21.42
16	5.87	13.29
17	1.39	3.36
18	.43	1.04
19	.23	.55
20	.05	.12
21	0.00	0.00
22	5.29	12.07
23	.85	2.06
24		
25	11.39	24.01
26	10.72	22.80
27	8.06	17.74
28	2.77	6.55
29	1.29	3.12
30	.72	1.76
31	.35	.87
32	.17	.41
33	.05	.13
34	0.00	0.00
35	.91	2.20
36	1.04	2.53
37	.62	1.52
38	.69	1.68
41	1.29	3.12
42	.63	1.53
43	.41	1.00
44	.22	.54
45	.09	.21
46	0.00	0.00
47	.50	1.22

RUN NUMBER 114 CONFIGURATION: B-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.03	.07
6	.24	.59
7	.37	.90
8	.45	1.10
9	.55	1.34
10	.39	.96
11	.38	.93
12	.38	.93
13	.40	.97
14	.41	1.01
15		
16	.41	1.01
17	.41	1.01
18	.41	1.00
19	.40	.98
20	.40	.97
21	.38	.94
22	.45	1.10
23	.46	1.12
24		
25	.42	1.03
26	.40	.99
27	.38	.94
28	.38	.93
29	.38	.92
30	.39	.94
31	.37	.91
32	.36	.88
33	.32	.77
34	.11	.26
35	.40	.97
36	.35	.85
37	.36	.89
38	.37	.90
41	.32	.79
42	.33	.80
43	.30	.73
44	.19	.47
45	.05	.11
46	.02	.06
47	.32	.78

RUN NUMBER 115 CONFIGURATION: —

MODEL FLOW RATE= 500.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.00	.00
8	.00	.00
9	.15	.38
10	.05	.11
11	.10	.25
12	.82	1.99
13		
14	6.55	14.71
15	7.48	16.59
16	7.92	17.46
17	7.49	16.61
18	1.99	4.76
19	.25	.61
20	.00	.00
21	.00	.00
22	7.87	17.35
23	7.23	16.09
24	5.49	12.50
25	5.48	12.47
26	.91	2.22
27	.13	.31
28	.05	.12
29	3.84	8.94
30	3.39	7.94
31	.83	2.01
32	.15	.36
33	.04	.10
34	.00	.00
35	3.80	8.85
36	2.87	6.78
37	2.53	6.01
38	3.03	7.13
41	2.08	4.96
42	1.88	4.51
43	.90	2.19
44	.18	.44
45	.06	.14
46	.00	.00
47	2.02	4.84

RUN NUMBER 116 CONFIGURATION: B-UP

MODEL FLOW RATE= 500.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.01	.03
7	.12	.30
8	.19	.48
9	.26	.64
10	.15	.36
11	.14	.35
12	.14	.35
13	.15	.36
14	.16	.39
15	.16	.38
16	.15	.38
17	.15	.36
18	.14	.34
19	.13	.33
20	.13	.33
21	.15	.36
22	.14	.34
23	.14	.34
24	.29	.70
25	.11	.28
26	.10	.24
27	.08	.20
28	.03	.08
29	.18	.43
30	.17	.42
31	.16	.40
32	.16	.39
33	.15	.36
34	.07	.18
35	.17	.42
36	.16	.40
37	.16	.39
38	.16	.40
41	.15	.37
42	.16	.38
43	.14	.35
44	.11	.26
45	.02	.05
46	.01	.02
47	.15	.37

RUN NUMBER 117 CONFIGURATION: —

MODEL FLOW RATE= 707.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.00	.00
8	.00	.00
9	4.27	9.88
10	.00	.00
11	2.00	4.77
12	6.08	13.74
13	7.97	17.55
14	10.10	21.65
15	12.63	26.23
16	13.42	27.60
17	12.47	25.95
18	1.72	4.12
19	.12	.29
20	.00	.00
21	.00	.00
22	14.20	28.94
23	12.36	25.76
24	7.17	15.96
25	7.88	17.38
26	5.74	13.03
27	.88	2.14
28	.00	.00
29	6.17	13.93
30	5.51	12.55
31	.98	2.38
32	.10	.26
33	.04	.10
34	.00	.00
35	6.05	13.68
36	4.43	10.24
37	4.02	9.35
38	4.56	10.52
41	3.14	7.39
42	2.86	6.74
43	1.36	3.29
44	.17	.42
45	.05	.12
46	.00	.00
47	2.98	7.01

RUN NUMBER 118 CONFIGURATION: B-UP

MODEL FLOW RATE= 707.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.01	.04
7	.16	.38
8	.28	.69
9	.40	.99
10	.25	.61
11	.25	.60
12	.21	.52
13	.20	.48
14	.21	.51
15	.21	.52
16	.23	.56
17	.23	.57
18	.23	.56
19	.23	.55
20	.22	.54
21	.23	.55
22	.23	.57
23	.23	.57
24		
25	.19	.48
26	.18	.43
27	.14	.34
28	.08	.20
29	.27	.66
30	.27	.65
31	.26	.63
32	.25	.62
33	.24	.58
34	.12	.30
35	.27	.67
36	.25	.62
37	.25	.62
38	.27	.65
41	.23	.58
42	.24	.59
43	.23	.55
44	.16	.39
45	.02	.05
46	.01	.03
47	.24	.58

RUN NUMBER 119 CONFIGURATION: —

MODEL FLOW RATE= 1414.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
8	.01	.03
9	11.69	24.56
10	.02	.05
11	5.43	12.38
12	9.53	20.57
13	16.25	32.30
14	21.02	39.56
15	26.66	47.21
16	29.36	50.55
17	25.62	45.86
18	1.86	4.45
19	.13	.32
20	.03	.08
23	25.58	45.81
24	14.80	29.93
25	14.67	29.71
26	10.56	22.50
27	7.71	17.04
28	4.02	9.34
29	12.31	25.66
30	11.14	23.56
31	1.37	3.29
32	.13	.31
34	.02	.05
35	11.90	24.94
36	8.89	19.35
37	8.54	18.68
38	8.51	18.62
41	6.50	14.60
42	5.93	13.43
43	2.34	5.57
44	.16	.38
45	.05	.11
46	.03	.07
47	5.77	13.09

RUN NUMBER 120 CONFIGURATION: B-UP

MODEL FLOW RATE= 1414.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
7	.01	.02
8	.58	1.42
9	1.19	2.87
10	.74	1.81
11	.73	1.77
12	.52	1.27
13	.61	1.48
14	.63	1.53
15	.81	1.98
16	.79	1.93
17	.77	1.88
18	.48	1.17
19	.46	1.11
20	.44	1.07
21	.48	1.17
22	.72	1.75
23	.72	1.75
24		
25	.51	1.25
26	.45	1.09
27	.33	.81
28	.19	.48
29	.70	1.69
30	.62	1.52
31	.49	1.21
32	.49	1.19
33	.49	1.20
34	.28	.69
35	.69	1.68
36	.65	1.58
37	.62	1.51
38	.58	1.42
41	.55	1.34
42	.52	1.26
43	.44	1.07
44	.23	.57
45	.01	.03
46	.02	.04
47	.56	1.38

RUN NUMBER 121 CONFIGURATION: —

MODEL FLOW RATE= 2000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.00	.00
8	13.53	27.79
9	18.16	35.30
10	5.61	12.75
11	10.54	22.46
12		
13	22.39	41.51
14	29.11	50.24
15	37.54	59.65
16		
17	35.31	57.31
18	2.48	5.88
19	.04	.09
20	.00	.00
21	.00	.00
22	39.46	61.59
23	34.60	56.54
24		
25	19.75	37.70
26	13.14	27.11
27	9.30	20.14
28	5.00	11.46
29	16.64	32.92
30	15.50	31.09
31	1.32	3.19
32	.04	.10
33	.00	.00
34	.00	.00
35	16.73	33.07
36	12.17	25.41
37	11.19	23.65
38	11.94	25.00
41	9.31	20.16
42	8.48	18.56
43	4.27	9.89
44	.14	.35
45	.00	.01
46	.00	.00
47	7.78	17.18

RUN NUMBER 122 CONFIGURATION: B-UP

MODEL FLOW RATE= 2000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.01	.04
5	.00	.00
6	.01	.01
7	.02	.06
8	.38	.93
9	1.53	3.67
10	1.09	2.63
11	1.29	3.12
12	.95	2.32
13	.93	2.25
14	.95	2.30
15	1.07	2.58
16	.89	2.15
17	1.09	2.64
18	.80	1.94
19	.81	1.97
23	1.15	2.77
24	2.61	6.18
25	.89	2.15
26	.82	2.00
27	.84	2.05
28	1.45	3.48
29	.99	2.40
30	.95	2.31
31	.86	2.10
32	.80	1.94
33	.79	1.91
34	.57	1.38
35	1.04	2.51
36	.95	2.31
37	.95	2.29
38	.91	2.20
41	.86	2.09
42	.83	2.03
43	.77	1.88
44	.43	1.05
45	.05	.13
46	.03	.08
47	.86	2.08

RUN NUMBER 123 CONFIGURATION: —

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.02	.06
8	8.66	18.91
9	11.36	23.98
10	7.19	16.01
11	9.34	20.21
12	10.21	21.86
13	8.87	19.32
14	7.09	15.80
15		
16	1.79	4.28
17	.99	2.39
18	.37	.92
19	.20	.50
20	.08	.19
21	.00	.01
22	3.55	8.30
23	5.58	12.68
24		
25	8.63	18.85
26	9.13	19.82
27	7.56	16.75
28	6.32	14.23
29	.41	.99
30	.48	1.17
31	.24	.60
32	.12	.28
33	.04	.10
34	.00	.00
35	1.04	2.53
36	.35	.85
37	.43	1.06
38	.81	1.97
41	3.53	8.26
42	3.16	7.42
43	2.17	5.17
44	.50	1.23
45	.06	.16
46	.00	.01
47	2.54	6.03

RUN NUMBER 124 CONFIGURATION: B-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.04	.09
8	.59	1.45
9	.66	1.60
10	.36	.89
11	.38	.93
12	.37	.89
13	.40	.98
14	.41	1.00
15		
16	.41	1.00
17	.41	1.00
18	.41	1.00
19	.41	1.00
20	.39	.96
21	.38	.93
22	.42	1.03
23	.44	1.07
24		
25	.42	1.03
26	.41	1.00
27	.39	.96
28	.37	.91
29	.38	.93
30	.37	.90
31	.35	.87
32	.34	.82
33	.27	.66
34	.07	.16
35	.35	.87
36	.33	.81
37	.33	.80
38	.32	.79
41	.30	.74
42	.29	.70
43	.26	.64
44	.17	.41
45	.06	.14
46	.03	.07
47	.28	.67

RUN NUMBER 125 CONFIGURATION: —

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.01	.01
8	.02	.05
9	4.49	10.36
10	.01	.02
11	4.29	9.93
12	5.79	13.13
13		
14	4.18	9.70
15		
16	2.31	5.50
17	1.46	3.52
18	.76	1.84
19	.41	1.00
20	.22	.53
21	.03	.08
22	1.94	4.63
23	2.40	5.71
24		
25	3.96	9.20
26	4.47	10.32
27	4.24	9.82
28	1.71	4.10
29	.76	1.85
30	.56	1.36
31	.33	.80
32	.20	.49
33	.11	.26
34	.01	.03
35	.44	1.08
36	.64	1.56
37	.45	1.10
38	.33	.81
41	.47	1.14
42	.36	.87
43	.30	.73
44	.22	.54
45	.10	.25
46	.02	.04
47	.25	.61

RUN NUMBER 126 CONFIGURATION: B-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.08	.19
7	.28	.69
8	.37	.90
9	.70	1.70
10	.43	1.05
11	.47	1.16
12	.49	1.19
13	.48	1.17
14	.47	1.15
15		
16	.50	1.21
17	.52	1.26
18		
19	.51	1.25
20	.48	1.18
21	.43	1.06
22	.53	1.30
23	.52	1.26
24		
25	.50	1.21
26	.46	1.13
27	.36	.89
28	.06	.15
29	.40	.98
30	.42	1.03
31	.40	.98
32	.37	.90
33	.28	.69
34	.05	.12
35	.45	1.09
36	.37	.89
37	.39	.95
38	.40	.97
41	.34	.83
42	.34	.83
43	.30	.74
44	.18	.44
45	.03	.08
46	.04	.09
47	.34	.84

RUN NUMBER 127 CONFIGURATION: B-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.04	.09
8	.41	1.00
9	1.74	4.18
10	.90	2.18
11	.71	1.72
12	.88	2.13
13	1.48	3.55
14	1.70	4.07
15	2.11	5.03
16	2.43	5.76
17	2.23	5.30
18	1.41	3.40
19	1.01	2.44
20	.70	1.71
21	.09	.23
22	1.77	4.24
23	.80	1.93
24		
25	.89	2.15
26	.91	2.21
27	.99	2.40
28	1.16	2.80
29	.79	1.92
30	.82	1.99
31	.72	1.75
32	.63	1.55
33	.44	1.08
34	.04	.10
35	.74	1.79
37	.68	1.66
38	.65	1.58
41	.54	1.31
42	.51	1.26
43	.36	.89
44	.07	.17
45	.01	.02
46	.00	.00
47	.51	1.25

RUN NUMBER 128 CONFIGURATION: B-UP

MODEL FLOW RATE= 1000 0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.02	.06
7	.00	.00
8	.50	1.22
9	.22	.53
10	.33	.80
11	.34	.84
12	.37	.91
13	.42	1.02
14	.48	1.17
15	.50	1.21
16	.52	1.27
17	.57	1.38
18	.55	1.35
19	.52	1.27
20	.45	1.10
21	.28	.68
22	.57	1.40
23	.58	1.42
24		
25	.61	1.48
26	.53	1.30
27	.55	1.34
28	.58	1.41
29	.45	1.10
30	.46	1.13
31	.44	1.08
32	.41	1.01
33	.34	.84
34	.10	.25
35	.48	1.16
36	.41	.99
37	.41	1.01
38	.41	1.01
41	.37	.89
42	.36	.87
43	.28	.68
44	.18	.45
45	.00	.01
46	.00	.00
47	.35	.85

RUN NUMBER 129 CONFIGURATION: B--UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.24	.58
5	.28	.70
6	.34	.83
7	.71	1.72
8	.63	1.53
9	.23	.58
10	.32	.79
11	.34	.83
12	.38	.94
13	.39	.96
14	.41	1.01
15	.43	1.06
16	.46	1.13
17	.51	1.25
18		
19	.50	1.23
20	.49	1.19
21	.48	1.17
22	.57	1.40
23	.50	1.22
24	.49	1.20
25	.50	1.23
26	.43	1.06
27	.42	1.03
28	.41	1.00
29	.37	.90
30	.38	.92
31	.36	.88
32	.34	.84
33	.31	.76
34	.16	.40
35	.38	.93
36	.34	.83
37	.34	.83
38	.34	.82
41	.32	.79
42	.30	.73
43	.07	.16
44	.19	.46
45	.09	.22
46	.03	.09
47	.29	.72

RUN NUMBER 130 CONFIGURATION: B UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.05	.11
5	.19	.45
6	.22	.54
7	.18	.44
8	.25	.61
9	.22	.55
10	.41	1.00
11	.42	1.03
12	.46	1.11
13	.47	1.15
14	.48	1.17
15	.48	1.18
16	.48	1.18
17	.49	1.19
18	.47	1.15
19	.46	1.14
20	.45	1.09
21	.46	1.13
22	.47	1.14
23		
24		
25	.37	.91
26	.32	.78
27	.30	.74
28	.30	.73
29	.37	.91
30	.34	.83
31	.33	.80
32	.31	.77
33	.29	.71
34	.14	.34
35	.33	.80
36	.32	.78
37	.30	.74
38	.28	.69
41	.29	.71
42	.25	.62
43	.22	.55
44	.17	.43
45	.12	.30
46		
47	27.14	47.81

RUN NUMBER 131 CONFIGURATION: A-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.13	.33
5	.18	.44
6	.21	.52
7	.18	.44
8	.20	.50
9	.29	.71
10	.36	.89
11	.38	.93
12	.42	1.02
13	.44	1.09
14	.46	1.11
15	.45	1.10
16	.43	1.05
17	.43	1.04
18	.43	1.05
19	.44	1.08
20	.46	1.13
21	.51	1.26
22	.45	1.09
23		
24		
25	.41	1.01
26	.39	.94
27	.38	.92
28	.37	.90
29	.35	.85
30	.34	.84
31	.31	.77
32	.27	.67
33	.19	.46
34	.07	.18
35	.33	.81
36	.30	.75
37	.30	.74
38	.30	.72
41	.26	.64
42	.25	.62
43	.22	.55
44	.16	.39
45	.11	.27
46	.07	.16
47	.24	.59

RUN NUMBER 132 CONFIGURATION: A-UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.18	.44
5	.17	.42
6	.21	.51
7	.14	.34
8	.23	.56
9	.42	1.02
10	.44	1.08
11	.47	1.14
12	.50	1.21
13	.50	1.22
14	.50	1.22
15	.51	1.23
16	.51	1.23
17	.48	1.18
18	.47	1.16
19	.48	1.18
20	.49	1.21
21	.53	1.29
22	.49	1.19
23		
24		
25	.43	1.06
26	.41	1.01
27	.40	.97
28	.38	.93
29	.35	.86
30	.34	.83
31	.25	.62
32	.19	.47
33	.13	.31
34	.05	.13
35	.33	.81
36	.29	.70
37	.27	.65
38	.26	.65
41	.25	.60
42	.22	.54
43	.21	.53
44	.17	.41
45	.14	.34
46	.08	.20
47	.24	.58

RUN NUMBER 133 CONFIGURATION: A--UP

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.13	.32
5	.12	.30
6	.18	.45
7	.16	.39
8	.25	.61
9	.35	.86
10	.37	.90
11	.37	.91
12	.40	.97
13	.42	1.02
14	.42	1.04
15	.43	1.05
16	.42	1.04
17	.42	1.02
18		
19	.42	1.03
20	.42	1.03
21	.45	1.10
22	.42	1.02
23		
24		
25	.39	.96
26	.40	.97
27	.37	.92
28	.36	.88
29	.32	.77
30	.31	.75
31	.25	.60
32	.21	.53
33	.15	.36
34	.08	.21
35	.29	.72
36	.26	.64
37	.25	.62
38	.25	.61
41	.22	.55
42	.23	.56
43	.20	.48
44	.16	.40
45	.13	.31
46	.07	.18
47	.21	.52

RUN NUMBER 134 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.01
7	.04	.10
8	.05	.12
9	.02	.04
10	.00	.01
11	.00	.01
12	.04	.10
13	.72	1.75
14	1.19	2.88
15	2.25	5.35
16	2.81	6.64
17	2.82	6.67
18	2.75	6.49
19	2.64	6.24
20	2.37	5.64
21	.11	.26
22	2.69	6.38
23		
24		
25	1.44	3.47
26	.20	.49
27	.00	.00
28	.00	.00
29	1.95	4.66
30	2.11	5.03
31	1.81	4.34
32	1.37	3.31
33	.61	1.49
34	.01	.03
35	2.09	4.99
36	1.75	4.20
37	1.81	4.34
38	1.90	4.55
41	1.45	3.49
42	1.53	3.68
43	1.07	2.59
44	.35	.85
45	.06	.14
46	.00	.00
47	1.52	3.65

RUN NUMBER 135 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.01
7	.07	.17
8	.03	.08
9	.01	.02
10	.01	.03
11	.02	.04
12	.10	.24
13	.55	1.34
14	.75	1.84
15	1.15	2.77
16	1.57	3.78
17	1.55	3.73
18		
19	1.51	3.63
20	1.61	3.86
21	.73	1.77
22	1.17	2.83
23		
24		
25	.67	1.63
26	.03	.07
27	.00	.01
28	.00	.00
29	1.14	2.75
30	1.21	2.93
31	1.16	2.80
32	1.09	2.63
33	.90	2.18
34	.08	.19
35	1.28	3.10
36	.98	2.37
37	1.06	2.58
38	1.16	2.79
41	.85	2.07
42	.93	2.26
43	.17	.43
44	.52	1.26
45	.11	.28
46	.00	.01
47	.97	2.36

RUN NUMBER 136 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.06	.15
8	.04	.11
9	.04	.11
10	.00	.01
11	.04	.09
12	.05	.11
13	.19	.48
14	.30	.74
15	.48	1.17
16	.70	1.71
17	.99	2.40
18		
19	.89	2.16
20	.92	2.24
21	1.08	2.60
22	1.06	2.56
23		
24		
25	.86	2.08
26	.19	.45
27	.03	.06
28	.00	.00
29	.86	2.09
30	.90	2.18
31	.84	2.04
32	.77	1.87
33	.62	1.52
34	.16	.39
35	.94	2.27
36	.76	1.85
37	.77	1.88
38	.79	1.92
41	.62	1.51
42	.66	1.61
43	.17	.42
44	.45	1.09
45	.16	.39
46	.00	.01
47	.68	1.66

RUN NUMBER 137 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.07	.17
8	.05	.11
9	.01	.03
10	.00	.00
11	.01	.02
12	.02	.04
13	.26	.64
14	.31	.75
15	.36	.87
16	.43	1.05
17	.57	1.38
18		
19	.52	1.27
20	.52	1.26
21	.69	1.68
22	.68	1.65
23		
24		
25	.63	1.53
26	.37	.89
27	.03	.06
28	.00	.00
29	.63	1.53
30	.64	1.55
31	.58	1.41
32	.52	1.26
33	.38	.92
34	.08	.20
35	.64	1.57
36	.55	1.35
37	.56	1.37
38	.56	1.37
41	.48	1.18
42	.49	1.19
43	.10	.24
44	.29	.71
45	.07	.18
46	.00	.00
47	.49	1.19

RUN NUMBER 138 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.09	.22
8	.04	.09
9	.01	.01
10	.01	.02
11	.03	.08
12	.15	.37
13	.28	.69
14	.35	.86
15	.41	1.00
16	.45	1.11
17	.45	1.11
18		
19	.44	1.09
20		
21	.49	1.21
22	.45	1.09
23		
24		
25	.40	.97
26	.15	.37
27	.00	.00
28	.00	.00
29	.50	1.22
30	.49	1.21
31	.45	1.11
32	.40	.97
33	.27	.67
34	.06	.15
35	.49	1.20
36	.45	1.11
37	.45	1.10
38	.44	1.07
41	.40	.99
42	.39	.96
43	.34	.82
44	.21	.51
45	.06	.15
46	.00	.00
47	.38	.92

RUN NUMBER 139 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.11	.27
8	.04	.10
9	.00	.01
10	.00	.01
11	.02	.05
12	.08	.20
13	.31	.75
14	.34	.83
15	.41	1.01
16	.62	1.50
17	.76	1.86
18		
19		
20	.71	1.74
21	.86	2.08
22	.80	1.93
23		
24		
25	.51	1.25
26	.21	.52
27	.00	.00
28	.00	.01
29	.68	1.66
30	.69	1.68
31	.63	1.55
32	.56	1.37
33	.37	.92
34	.02	.04
35	.69	1.67
36	.60	1.47
37	.62	1.51
38	.61	1.50
41	.53	1.30
42	.54	1.33
43	.50	1.21
44	.37	.90
45	.11	.27
46	.00	.01
47	.55	1.35

RUN NUMBER 140 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 500.0 CC/S
MODEL VELOCITY= 30 0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.01	.02
5	.01	.02
6	.01	.03
7	.08	.20
8	.06	.16
9	.04	.11
10	.01	.01
11	.01	.02
12	.04	.09
13	.04	.10
14	.05	.12
15	.06	.16
16	.13	.33
17	.22	.53
18	.22	.53
19	.20	.50
20	.22	.55
21	.32	.79
22	.28	.68
23		
24		
25	.21	.52
26	.05	.12
27	.01	.02
28	.01	.02
29	.25	.61
30	.27	.65
31	.26	.63
32	.25	.61
33	.23	.57
34	.18	.45
35	.27	.66
36	.25	.60
37	.25	.60
38	.24	.59
41	.21	.52
42	.21	.51
43	.19	.47
44	.17	.41
45	.10	.24
46	.01	.03
47	.20	.50

RUN NUMBER 141 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 707.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.10	.24
8	.06	.15
9	.02	.06
10	.00	.01
11	.01	.02
12	.01	.04
13	.14	.35
14	.18	.45
15	.20	.49
16	.26	.65
17	.39	.96
18	.38	.93
19	.37	.90
20	.41	1.00
21	.57	1.38
22	.45	1.10
23	.41	1.01
24		
25	.32	.79
26	.08	.19
27	.00	.00
28	.00	.00
29	.47	1.14
30	.47	1.14
31	.45	1.09
32	.43	1.04
33	.38	.93
34	.16	.38
35	.45	1.11
36	.41	1.01
37	.41	1.01
38	.40	.97
41	.35	.87
42	.35	.85
43	.31	.76
44	.24	.58
45	.08	.21
46	.00	.01
47	.34	.83

RUN NUMBER 142 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1414.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.10	.26
8	.06	.14
9	.02	.06
10	.00	.01
11	.02	.04
12	.03	.08
13	.45	1.09
14	.58	1.42
15	.68	1.65
16	.81	1.96
17	1.02	2.48
18	1.00	2.42
19	.97	2.35
20	1.01	2.44
21	1.22	2.95
22	1.07	2.59
23	.96	2.32
24		
25	.62	1.52
26	.32	.78
27	.00	.01
28	.00	.00
29	.97	2.34
30	.95	2.29
31	.86	2.09
32	.78	1.90
33	.56	1.37
34	.09	.22
35	.88	2.13
36	.84	2.05
37	.81	1.97
38	.75	1.82
41	.72	1.76
42	.70	1.71
43	.59	1.45
44	.33	.82
45	.08	.19
46	.00	.01
47	.66	1.61

RUN NUMBER 143 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 2000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.01	.02
7	.16	.39
8	.07	.16
9	.30	.72
10	.14	.34
11	.31	.77
12	.32	.78
13	.80	1.93
14	.88	2.13
15	1.34	3.23
16	1.91	4.56
17	2.05	4.90
18		
19	1.81	4.35
20	1.74	4.17
21	1.95	4.67
22	1.92	4.59
23	1.89	4.52
24		
25	1.58	3.81
26	.97	2.36
27	.27	.66
28	.03	.08
29	1.67	4.00
30	1.63	3.91
31	1.36	3.28
32	1.14	2.77
33	.67	1.64
34	.05	.11
35	1.66	4.00
36	1.50	3.62
37	1.43	3.45
38	1.43	3.45
41	1.29	3.12
42	1.27	3.07
43	1.00	2.42
44	.45	1.09
45	.07	.17
46	.00	.01
47	1.26	3.05

RUN NUMBER 144 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.08	.21
8	.04	.09
9	.04	.10
10	.00	.00
11	.01	.03
12	.07	.17
13	.18	.45
14	.23	.57
15	.35	.86
16	.53	1.30
17	.60	1.46
18		
19	.58	1.40
20	.60	1.47
21	.76	1.85
22	.53	1.30
23	.39	.95
24		
25	.29	.72
26	.03	.08
27	.00	.00
28	.00	.00
29	.61	1.48
30	.62	1.52
31	.60	1.46
32	.57	1.38
33	.49	1.20
34	.15	.38
35	.62	1.52
36	.55	1.33
37	.56	1.36
38	.56	1.38
41	.43	1.05
42	.46	1.13
43	.43	1.06
44	.37	.91
45	.23	.57
46	.02	.04
47	.48	1.17

RUN NUMBER 145 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.01	.01
7	.09	.22
8	.03	.08
9	.88	2.14
10	.50	1.22
11	.64	1.56
12	.74	1.79
13	.74	1.81
14	.65	1.59
15	.61	1.49
16	.58	1.41
17	.55	1.34
18		
19	.55	1.33
20	.57	1.38
21	.55	1.33
22	.49	1.19
23	.44	1.07
24		
25	.36	.87
26	.06	.15
27	.00	.00
28	.00	.00
29	.50	1.22
30	.51	1.23
31	.47	1.14
32	.41	.99
33	.25	.61
34	.02	.04
35	.50	1.23
36	.46	1.12
37	.46	1.13
38	.47	1.15
41	.42	1.02
42	.43	1.05
43	.40	.99
44	.33	.80
45	.13	.33
46	.01	.01
47	.44	1.08

RUN NUMBER 146 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.00CC/S
MODEL VELOCITY= 30.00CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.06	.15
8	.03	.07
9	.01	.02
10	.01	.02
11	.02	.04
12	.14	.35
13	.86	2.09
14	1.11	2.68
15	1.41	3.40
16	1.98	4.73
17	2.10	5.02
18	2.01	4.80
19	1.81	4.33
20	1.26	3.05
21	.06	.16
22	2.36	5.61
23		
24		
25	2.25	5.37
26	1.78	4.26
27	.89	2.16
28	.00	.00
29	1.73	4.16
30	1.66	4.00
31	1.26	3.03
32	.78	1.89
33	.19	.46
34	.00	.00
35	1.59	3.83
36	1.53	3.69
37	1.48	3.55
38	1.45	3.48
41	1.25	3.01
42	1.19	2.88
43	.78	1.89
44	.24	.58
45	.03	.07
46	.00	.00
47	1.21	2.93

RUN NUMBER 147 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.06	.14
8	.02	.05
9	.01	.01
10	.01	.03
11	.02	.04
12	.06	.15
13	.50	1.23
14	.70	1.70
15	.90	2.18
16	1.36	3.28
17	1.64	3.93
18	1.61	3.87
19	1.53	3.69
20	1.39	3.35
21	.66	1.61
22	1.75	4.20
23		
24		
25	1.56	3.76
26	1.02	2.46
27	.35	.85
28	.00	.00
29	1.33	3.20
30	1.30	3.14
31	1.09	2.64
32	.80	1.94
33	.31	.75
34	.01	.01
35	1.29	3.10
36	1.19	2.87
37	1.15	2.77
38	1.15	2.78
41	.96	2.33
42	.96	2.32
43	.72	1.74
44	.24	.59
45	.03	.07
46	.01	.01
47	.97	2.36

RUN NUMBER 148 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.06	.15
8	.04	.10
9	.10	.24
10	.02	.05
11	.35	.86
12	.79	1.92
13	1.25	3.02
14	1.31	3.17
15	1.41	3.39
16	1.48	3.57
17	1.34	3.24
18	.64	1.56
19	.55	1.34
20		
21	.60	1.46
22	1.17	2.83
23		
24	.95	2.30
25	.83	2.02
26	.41	1.00
27	.04	.10
28	.00	.01
29	1.08	2.62
30	1.01	2.45
31	.93	2.27
32	.84	2.04
33	.57	1.40
34	.01	.03
35	1.02	2.47
36	.96	2.33
37	.90	2.19
38	.89	2.16
41	.82	1.98
42	.79	1.93
43	.59	1.43
44	.19	.48
45	.02	.06
46	.00	.00
47	.79	1.92

RUN NUMBER 149 CONFIGURATION: K-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.04	.11
8	.01	.04
9	.00	.01
10	.01	.02
11	.02	.06
12	.22	.54
13	.60	1.47
14	.66	1.62
15	.71	1.74
16	.71	1.74
17	.70	1.69
18		
19	.66	1.61
20	.61	1.48
21	.51	1.23
22	.60	1.47
23		
24		
25	.38	.92
26	.04	.11
27	.01	.03
28	.00	.00
29	.53	1.31
30	.50	1.23
31	.50	1.23
32	.49	1.20
33	.45	1.11
34	.15	.38
35	.48	1.18
36	.48	1.16
37	.45	1.10
38	.44	1.07
41	.41	1.00
42	.39	.94
43	.04	.10
44	.22	.53
45	.06	.15
46	.00	.01
47	.38	.93

RUN NUMBER 150 CONFIGURATION: I-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.03	.07
8	.04	.09
9	.02	.05
10	.00	.00
11	.00	.00
12	.03	.06
13	.21	.52
14	.36	.87
15	.45	1.10
16	.47	1.16
17	.65	1.59
18		
19	.74	1.80
20	.85	2.06
21	.83	2.02
22	.78	1.90
23		
24		
25	.51	1.25
26	.24	.59
27	.00	.00
28	.00	.00
29	.82	1.99
30	.81	1.98
31	.79	1.91
32	.76	1.84
33	.68	1.66
34	.25	.61
35	.77	1.87
36	.76	1.85
37	.75	1.83
38	.70	1.71
41	.67	1.62
42	.66	1.61
43	.60	1.47
44	.47	1.14
45	.17	.42
46	.00	.00
47	.64	1.55

RUN NUMBER 151 CONFIGURATION: I-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.00
7	.06	.14
8	.00	.01
9	.14	.35
10	.00	.00
11	.26	.63
12	.87	2.12
13	1.42	3.42
14	1.61	3.86
15	1.86	4.46
16	1.98	4.72
17	1.94	4.65
18		
19	1.81	4.34
20	1.39	3.36
21	.08	.18
22	1.90	4.55
23		
24		
25	1.36	3.28
26	.84	2.05
27	.26	.62
28	.00	.00
29	1.68	4.04
30	1.66	3.98
31	1.51	3.64
32	1.23	2.96
33	.40	.99
34	.01	.02
35	1.55	3.74
36	1.56	3.76
37	1.51	3.63
38	1.49	3.59
41	1.25	3.02
42	1.25	3.03
43	.87	2.12
44	.21	.51
45	.02	.04
46	.00	.00
47	1.25	3.01

RUN NUMBER 152 CONFIGURATION: H-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.01
7	.08	.20
8	.03	.08
9	.03	.07
10	.01	.02
11	.01	.03
12	.08	.20
13	.27	.67
14	.36	.88
15	.67	1.62
16	1.29	3.10
17	1.41	3.41
18		
19	1.29	3.10
20	1.13	2.73
21	.58	1.41
22	1.35	3.25
23		
24		
25	.46	1.12
26	.25	.62
27	.05	.11
28	.00	.00
29	.98	2.38
30	1.05	2.53
31	.89	2.16
32	.75	1.82
33	.55	1.34
34	.07	.18
35	1.05	2.55
36	.86	2.10
37	.89	2.17
38	.91	2.21
41	.74	1.79
42	.76	1.85
43	.67	1.62
44	.50	1.23
45	.26	.64
46	.02	.04
47	.76	1.84

RUN NUMBER 153 CONFIGURATION: H-DOWN (45°)

MODEL FLOW RATE= 1000.0 CC/S
MODEL VELOCITY= 30.0 CM/S
LENGTH SCALE=100.0

SAMPLE POINT	MEAN CONCENTRATION PERCENT (MODEL)	MEAN CONCENTRATION PERCENT (PROTOTYPE)
4	.00	.00
5	.00	.00
6	.00	.01
7	.07	.18
8	.03	.07
9	.02	.05
10	.00	.01
11	.02	.04
12	.05	.13
13	.30	.74
14	.53	1.30
15	1.14	2.76
16	1.84	4.40
17	1.96	4.70
18		
19	1.52	3.66
20	1.34	3.23
21	.65	1.59
22	1.11	2.69
23		
24		
25	.24	.59
26	.05	.12
27	.01	.03
28	.00	.00
29	1.33	3.21
30	1.31	3.15
31	1.20	2.89
32	1.08	2.61
33	.88	2.14
34	.11	.26
35	1.24	3.01
36	1.20	2.89
37	1.17	2.82
38	1.13	2.73
41	.99	2.41
42	.99	2.40
43	.19	.46
44	.33	.82
45	.05	.12
46	.00	.01
47	.99	2.39