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A FORTRAN 77-Code for the Calculation of the Long-Term Concentration Distribution in the Environment of Nuclear Installations

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ISOLA V - A FORTRAN 77-Code for the Calculation of the Long-Term Concentration Distribution in the Environment of Nuclear Installations

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Abstract

The computer program ISOLA V has been developed to calculate the dispersion of radioactive material released with a constant rate into the atmosphere during a given time period from several days up to several months. It will be used as a subroutine in the program system UFOMOD for assessing the consequences of accidental releases of radionuclides into the environment.

ISOLA V is a statistical Gaussian dispersion model. It calculates the activity concentration in air near the ground and the ground contamination due to dry and wet deposition at specified locations in a polar grid system. The program requires a four-parametric meteorological statistics derived for from one or more years synoptic recordings of 1-hour-averages of wind speed, wind direction, stability class and pricipitation intensity.

ISOLA V - Ein Fortran 77-Programm zur Berechnung der langfristigen Konzentrationsverteilung in der Umgebung kerntechnischer Anlagen

Zusammenfassung

Das Computerprogramm ISOLA V dient der Berechnung der atmosphärischen Ausbreitung von kontinuierlich und mit gleichmäßiger Quellstärke emittiertem radioaktivem Material während eines Zeitraums von einigen Tagen bis einigen Monaten. Das Programm wird als Modul im Programmsystem UFOMOD eingesetzt, welches die radiologischen Folgen nach Unfällen in kerntechnischen Anlagen abschätzt.

ISOLA V ist ein statistisches auf der Gaußverteilung beruhendes Ausbreitungsmodell. Es berechnet die bodennahe Aktivitätskonzentration in der Luft und die Bodenkontamination durch trockene und nasse Ablagerung an Gitterpunkten, die in einem Polarkoordinatensystem durch die Schnittpunkte von Winkel und Radius festgelegt werden. Es benötigt eine 4-parametrige Ausbreitungsstatistik über mehrere Jahre, die aus stündlichen Mittelwerten der Windgeschwindigkeit und -richtung, der Ausbreitungskategorie und Niederschlagsintensität abgeleitet wird.

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1. Introduction

The computer code ISOLA V serves to calculate atmospheric dispersion of radionuclides around nuclear installations for long term release events (several days up to several months) with release rates which were nearly constant during this time. The version described here is used as a subroutine in the program system UFOMOD [1] as an atmospheric dispersion module.

ISOLA V is a so-called 'statistical Gaussian dispersion model'. This means, for all different dispersion situations during the considered weather sequence, a double Gaussian distribution of the released radionuclides is assumed throughout the plume. The activity concentrations calculated for these dispersion situations at the locations of interest are summarized where their frequency of occurrence is taken into account. This leads to a mean load during the considered weather sequence.

ISOLA V is segmented into **two** parts:

1. Statistics submodule

2. Dispersion submodule

In the first part, from hourly meteorological data of a station near the source, a four-parameter statistics will be prepared [5]. It includes meteorological parameters like wind speed, wind direction, stability classes and rain intensities. In the second part, for all realized dispersion conditions, the activity concentrations of the air near the ground and the ground contamination will be calculated. Each of these single events during one weather sequence will be evaluated with respect to its frequency, to create the final result for the required period. The source is assumed to be cold (that means, no thermal plume rise). The plume inventory is depleted during the passage by dry and wet deposition. The plume extends into one, two or more sectors, depending on its width and the position of the axis relative to the wind direction sectors.

2. Statistics Submodule

In the statistics submodule which is called before the dispersion subroutine, the four-parameter statistics will be created. The meteorological data of one station should be available for a period of two years with the observation interval of one hour. These two years had to be no leap-years. The user can chose from these two years an interval whatever he wants to calculate the statistics. If the user selects a starting time of a weather sequence near the end of the second year, it is to be provided not to exceed the meteorological dataset. Therefore, ISOLA will rewind the meteorological dataset and start again at the beginning of the first year of the available data.

The following four meteorological parameters determine the Gaussian like dispersion and its deposition on the ground:

- Wind speed (measured at a known reference height)
- Wind direction (measured at a known reference height)
- Stability class
- Precipitation intensity

These four groups are subdivided into several classes.

Wind direction is classified in 10^0 or 30^0 sectors (36 or 12 sectors).

The category grading of wind speed is

Class	Speed in m/s
1	0.5 - 1.0
2	1.1 - 1.5
3	1.6 - 2.0
4	2.1 - 4.0
5	4.1 - 8.0
6	8.1 - 15.0
7	> 15.1

A wind speed lower than 0.5 m/s will be set to this value, because the Gaussian distribution is valid only for higher velocities.

The stability class is defined according to the turbulence intensity described by standard dispersion information like the Pasquill-Turner system. The 6 stability classes range from A = extremly unstable to F = very stable.

The precipitation intensities are subdivided into 4 classes [6].

Class	Rain intensity in mm/h
1	<0.02 (no rain)
2	> 0.02 - 1.0
3	> 1.0 - 3.0
4	> 3.0

The meteorological dataset should not include any hour without confidential parameter values. The statistical submodule samples from a predefined period greater than one hour of the hourly meteorological data all existing combinations of the four parameters. The maximum value of different dispersion situations is 36 x 7 x 6 x 4. The hourly meteorological data will be sorted into these 6048 possible classes. The probability P_C of occurrence of one class during the considered period is defined as

$$P_C = \frac{hour\ per\ class}{\sum considered\ hours} \tag{1}$$

Additionally a general statistics of all weather sequences will be created for output. So the user may control the choice of weather sequences. These overall statistics include the probability of occurrence of each weather sequence too . Here the value P_{CW} of one class is summarized by the general statistics.

$$P_{CW} = P_C \times P_{WA} \tag{2}$$

with:

P_{WA} Probability of one weather sequence

The sum of P_{WA} should always be equal to unity.

$$P_{WG} = \sum P_{WA} = 1 \tag{3}$$

with:

P_{WG} Probability of all weather sequences

For preparing the outlist, a hierarchy of the meteorological parameters is being established. First, the probabilities of the rain intensity classes will be calculated. Second, the probabilities of wind direction sectors within one precipitation class are considered. For each combination of precipitation class and wind direction sector the occurrence of combinations of wind speed and stability class will be listed. These will be normalized to 100% in the outlist (Fig. 1).

An example of a weather sequence with the probability of $P_{WG} = P_{WA} = 1$ is given below.

During a time period of 4 days, there was during 72 hours or 75% of the time no measurable precipitation. Within this class of precipitation the wind was blowing during 24 hours in the sector of 240° (this means 33.33%). For these selected 24 hours there is listed the combination of wind speed and stability class, normalized to 100%. With the information described before and the data in Fig. 2 one can calculate the number of hours with the combination of stability class D and wind speed ranging from 4.1 m/s to 8.0 m/s characterized in the outlist by the value of 29.16%:

$$P_{WA} \times \frac{33.3}{100.} \times \frac{75}{100.} \times 29.16 \;=\; 7.3 \times N_H \;=\; 7 \text{ hours} \qquad (4)$$

with:

N_H relative number of hours here $\frac{96}{100.}$

3. The Dispersion Submodule ISOLA V

3.1 Features of the Program

The computer code ISOLA serves to calculate the annual dose equivalent distribution around the Karlsruhe Nuclear Research Center (KNRC). About 30 different emitters of radionuclides are located at the center which release individual nuclide mixtures at varying rates. Therefore this program offers a large degree of flexibility [3]. The essential features are described as follows:

1. up to 36 wind direction sectors;
2. assumption of a cold source (no thermal plume rise);
3. eddies behind a building are taken into account in case of low release height;
4. constant release rate during the time period covered by the meteorological data;
5. radioactive decay of the released substances during the atmospheric transport is not considered in ISOLA, because UFOMOD calculates later onthe correction for the radioactive decay during dispersion and the build up of radionuclides from radioactive decay chains;
6. activity is distributed in the plume according to a double Gaussian distribution function, being reflected completely at the ground;
7. wind direction is distributed evenly in each sector, that means, the activity may cross the sector borderline when the wind direction approaches this borderline;
8. depletion of the plume by washout and dry deposition;
9. washout calculation with individual washout coefficients,
10. in the actual version, a polar grid, with the source in the centre of the system;

One should realize that the washout coefficient depends not only on the material to be washed out (gas or aerosol) but also on the precipitation intensity. As the precipitation duration is not allways eaqual to the observation period, a characteristic relative duration of the rainfall is linked to each intensity class. [6], [4].

The structure of the present ISOLA version is based on a polar coordinate grid system with the centre point at the location of the nuclear installation. The radial and azimuthal resolution can be preselected but the standard values of 20 radii and 72 azimuthal sectors are recommended. The polar system is defined in accordance with the wind rose. The polar angle is counted clockwise and is zero if it coincides with the northern direction.

3.2 *Basic Equations*

3.2.1 Activity Concentration of the Atmosphere Near the Ground

If the pollutant concentration distribution in the plume is assumed to be a double Gaussian distribution, with total reflection at the ground plane, the averaged concentration of a nuclide q near the ground $\dot{A}_{A_q}$ is expressed as follows:

$$\dot{A}_{A_q} = \dot{A}_q \, \overline{X}(r, \Phi) \tag{5}$$

in which

$\dot{A}_{A_q}$ = air concentration rate, in $Bq\ m^{-3}s^{-1}$

$\dot{A}_q$ = release rate of nuclide q, in Bq / time period

q = type of nuclide :
1. noble gas
2. aerosols
3. elemental iodine
4. organically bound iodine
5. particulate iodine

$\overline{X}(r, \Phi)$ = average diffusion factor, see Equ. 7

r = distance in m

Φ = angle of the polar grid

3.2.2 Ground Contamination

The ground is contaminated by dry deposition (fallout) and by wet deposition (washout).

- Dry deposition is described by v_g, v_g = deposition velocity in m/s.
- Washout is described by the washout factor $\overline{W}$ in m^{-2}.

The ground contamination rate $\dot{A}_{F_q}$ due to dry and wet deposition is calculated according to Equation 6. $\dot{A}_{F_q}$ will be handled separately for each group of nuclides listed below. $\dot{A}_{F_q}$ is a momentary contamination rate, averaged over the time period under consideration.

$$\dot{A}_{F_q} = \dot{A}_q \left[v_{g_q} \, \overline{X}(r, \Phi) + \overline{W}_q(r, \Phi) \right] \tag{6}$$

in which

$\dot{A}_{F_q}$ = ground contamination rate in in $Bq\ m^{-2}s^{-1}$

$\overline{W}_q(r, \Phi)$ = average washout factor, in m^{-2}, see Equ. 8

v_{g_q} = deposition velocity of nuclide q, in $m\ s^{-1}$

The following definition formulas are used:

$$\overline{X}(r_q, \Phi_q) = \frac{1}{\sqrt{2\pi}\ r_q\ \Delta\Phi} \sum_{j=1}^{6} \frac{\exp\frac{H^2}{2\,\sigma_{zj}^2}}{\sigma_{zj}(r_q)}\ B_{\mathrm{dry,j}}(r_q, \Phi_q) \tag{7}$$

and

$$\overline{W}_q(r, \Phi) = \frac{1}{\sqrt{2\pi}\ r_q\ \delta\Phi} \sum_{j=1}^{6} B_{\mathrm{wet,j}}(r_q, \Phi_q) \tag{8}$$

in which

$\Delta\Phi$ = $\frac{2\pi}{I}$ = sector width

I = number of wind direction sectors (up to 36)

H = emission height of the q^{th} nuclide, in m

$\sigma_{zj}(r)$ = vertical diffusion parameter of the stability category j at the distance r, given in m (will be modified at low emission height, see Equ. 16 and 17 in chapter 3.2.5)

$B_{dry,j}$ = according to Equ. 12, see chapter 3.2.3 in s / m

$B_{wet,j}$ = according to Equ. 14, see chapter 3.2.3 in m^{-1}

3.2.3 Variables $B_{dry,j}$ and $B_{wet,j}$

At first the number of neighbour sectors is evaluated which has to be considered at the distance r_q and for the stability category j.

$$z_\alpha = \frac{I}{\sqrt{2\pi}} \left[\frac{2.15\, \sigma_{yj}(r_q)}{r} - \alpha \right] \tag{9}$$

and

$$z_\beta = \frac{I}{\sqrt{2\pi}} \left[\frac{2.15\, \sigma_{yj}(r_q)}{r} - \beta \right] \tag{10}$$

in which

z_α (z_β) = the number of the sectors on the left (right) hand side if looking into direction of the transport of the plume. Each rounded up to an integer value;
minimum is zero, maximum is 2 for I = 12 and 6 for i = 36 sectors

$\sigma_{yj}(r)$ = transversal diffusion parameter of the stability category j at the distance r_q, given in m (will be modified at low emission height, see Equ. 16 and 17 in chapter 3.2.5)

α = $\Phi\,(i - \frac{1}{2})\Delta\Phi$ in rad (see Fig. 3)

β = $\Delta\Phi - \alpha$ in rad (see Fig. 3)

The following definition is beeing used in the Equ. 12 and Equ. 14.

$$\mathrm{ERF}(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-v^2} dv \tag{11}$$

If $z_\alpha \geq 1$ and $z_\beta \geq 1$ then is

$$
\begin{aligned}
B_{\mathrm{dry,j}} = & \left\{ 1 - ERF\left[\frac{\alpha + (z_\alpha - 1)\Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)} r \right] \right\} \sum_{k=1}^{K} \frac{f_{i-z_\alpha j,k}}{\bar{u}_{jk}} \exp - \left(\frac{\Lambda_q r}{\bar{u}_{jk}} + d \right) \\
& \cdots\cdots \qquad \cdots\cdots \\
& + \left\{ ERF\left[\frac{\alpha + 2\Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)} r \right] - ERF\left[\frac{\alpha + \Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)} r \right] \right\} \sum_{k=1}^{K} \frac{f_{i-2,j,k}}{\bar{u}_{jk}} \exp - \left(\frac{\Lambda_q r}{\bar{u}_{jk}} + d \right) \\
& + \left\{ ERF\left[\frac{\alpha + \Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)} r \right] - ERF\left[\frac{\alpha}{\sqrt{2}\,\sigma_{yj}(r)} r \right] \right\} \sum_{k=1}^{K} \frac{f_{i-1,j,k}}{\bar{u}_{jk}} \exp - \left(\frac{\Lambda_q r}{\bar{u}_{jk}} + d \right) \\
& + \left\{ \underbrace{ERF\left[\frac{\alpha}{\sqrt{2}\,\sigma_{yj}(r)} r \right]}_{C_\alpha} - \underbrace{ERF\left[\frac{\beta}{\sqrt{2}\,\sigma_{yj}(r)} r \right]}_{C_\beta} \right\} \sum_{k=1}^{K} \frac{f_{i,j,k}}{\bar{u}_{jk}} \exp - \left(\frac{\Lambda_q r}{\bar{u}_{jk}} + d \right) \qquad (12) \\
& + \left\{ ERF\left[\frac{\beta + \Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)} r \right] - ERF\left[\frac{\beta}{\sqrt{2}\,\sigma_{yj}(r)} r \right] \right\} \sum_{k=1}^{K} \frac{f_{i+1,j,k}}{\bar{u}_{jk}} \exp - \left(\frac{\Lambda_q r}{\bar{u}_{jk}} + d \right) \\
& + \left\{ ERF\left[\frac{\beta + 2\Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)} r \right] - ERF\left[\frac{\beta + \Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)} r \right] \right\} \sum_{k=1}^{K} \frac{f_{i+2,j,k}}{\bar{u}_{jk}} \exp - \left(\frac{\Lambda_q r}{\bar{u}_{jk}} + d \right) \\
& \cdots\cdots \qquad \cdots\cdots \\
& + \left\{ 1 - ERF\left[\frac{\beta + (z_\beta - 1)\Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)} r \right] \right\} \sum_{k=1}^{K} \frac{f_{i+z_\beta j,k}}{\bar{u}_{jk}} \exp - \left(\frac{\Lambda_q r}{\bar{u}_{jk}} + d \right)
\end{aligned}
$$

If $z_\alpha = 0$ then is $C_\alpha = 1$,
if $z_\beta = 0$ then is $C_\beta = 1$,,

in which

$\bar{u}_{jk}$ = vertical averaged wind velocity in $m\ s^{-1}$ (see chapter 3.2.4)

f_{ijk} = frequency of the simultaneous occurrence of wind velocity range k, stability category j and wind direction sector i,

$$\sum_{ijk} f_{ijk} = 1$$

The f_{ijk} are calculated from the four parametric statistics by the following simulation

$$f_{ijk} = \sum_{l=1}^{L} q_{ijkl}$$

for q_{ijkl} see below.

Λ_q = decay constant of the q^{th} nuclide, in s^{-1}, set to 1 (see chap. 3.1)

d = effects of depletion of the plume due to dry deposition

$$d = \frac{v_{g_q}}{\bar{u}_{jk}} \sqrt{\frac{2}{\pi}} \int_{j=r_0}^{r} \frac{1}{\sigma_{zj}} \exp - \frac{H^2}{2\,\sigma_{zj}^2}\, dr \qquad (13)$$

v_{g_q} = deposition velocity of nuclide q, in $m\ s^{-1}$

r_0 = H, if $H \geq 10\,m$
= 10 m, if $H < 10\,m$

To integrate Equ. 13, the range from r_0 up to r is subdivided into four equal steps. Between these steps the integrand will be interpolated. By this algorithm the depletion is underestimated in unfavourable cases only, compared to other expended source depletion integration solutions.

$$
\begin{aligned}
B_{\text{wet,j}} = & \left\{ 1 \qquad - ERF\left[\frac{\alpha + (z_\alpha - 1)\Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)}\, r \right] \right\} \sum_{k=1}^{K}\sum_{l=1}^{L} \Lambda_l \frac{q_{i-z_\alpha j,k,l}}{\bar{u}_{jk}} \exp - \left(\frac{\Lambda_{ql}^{x}\, r}{\bar{u}_{jk}} + d \right) \\
& \qquad \dots\dots\dots \qquad\qquad \dots\dots\dots \\
& + \left\{ ERF\left[\frac{\alpha + 2\Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)}\, r \right] - ERF\left[\frac{\alpha + \Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)}\, r \right] \right\} \sum_{k=1}^{K}\sum_{l=1}^{L} \Lambda_l \frac{q_{i-2,j,k,}}{\bar{u}_{jk}} \exp - \left(\frac{\Lambda_{ql}^{x}\, r}{\bar{u}_{jk}} + d \right) \\
& + \left\{ ERF\left[\frac{\alpha + \Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)}\, r \right] - ERF\left[\frac{\alpha}{\sqrt{2}\,\sigma_{yj}(r)}\, r \right] \right\} \sum_{k=1}^{K}\sum_{l=1}^{L} \Lambda_l \frac{q_{i-1,j,k,l}}{\bar{u}_{jk}} \exp - \left(\frac{\Lambda_{ql}^{x}\, r}{\bar{u}_{jk}} + d \right) \\
& + \left\{ \underbrace{ERF\left[\frac{\alpha}{\sqrt{2}\,\sigma_{yj}(r)}\, r \right]}_{C_\alpha} - \underbrace{ERF\left[\frac{\beta}{\sqrt{2}\,\sigma_{yj}(r)}\, r \right]}_{C_\beta} \right\} \sum_{k=1}^{K}\sum_{l=1}^{L} \Lambda_l \frac{q_{i,j,k,l}}{\bar{u}_{jk}} \exp - \left(\frac{\Lambda_{ql}^{x}\, r}{\bar{u}_{jk}} + d \right) \qquad (14) \\
& + \left\{ ERF\left[\frac{\beta + \Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)}\, r \right] - ERF\left[\frac{\beta}{\sqrt{2}\,\sigma_{yj}(r)}\, r \right] \right\} \sum_{k=1}^{K}\sum_{l=1}^{L} \Lambda_l \frac{q_{i+1,j,k,l}}{\bar{u}_{jk}} \exp - \left(\frac{\Lambda_{ql}^{x}\, r}{\bar{u}_{jk}} + d \right) \\
& + \left\{ ERF\left[\frac{\beta + 2\Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)}\, r \right] - ERF\left[\frac{\beta + \Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)}\, r \right] \right\} \sum_{k=1}^{K}\sum_{l=1}^{L} \Lambda_l \frac{q_{i+2,j,k,l}}{\bar{u}_{jk}} \exp - \left(\frac{\Lambda_{ql}^{x}\, r}{\bar{u}_{jk}} + d \right) \\
& \qquad \dots\dots\dots \qquad\qquad \dots\dots\dots \\
& + \left\{ 1 \qquad - ERF\left[\frac{\beta + (z_\beta - 1)\Delta\Phi}{\sqrt{2}\,\sigma_{yj}(r)}\, r \right] \right\} \sum_{k=1}^{K}\sum_{l=1}^{L} \Lambda_l \frac{q_{i+z_\beta j,k,l}}{\bar{u}_{jk}} \exp - \left(\frac{\Lambda_{ql}^{x}\, r}{\bar{u}_{jk}} + d \right)
\end{aligned}
$$

If $z_\alpha = 0$ then is $C_\alpha = 1$,
if $z_\beta = 0$ then is $C_\beta = 1$,

in which

$\bar{u}_{jk}$ = vertical averaged wind velocity in m / s (see chapter 3.2.4)

f_{ijkl} = frequency of the simultaneous occurrence of precipitation intensity l with the wind velocity range k, stability category j and wind direction sector i, $\sum_{ijkl} q_{ijkl} = 1$

l = 1 means "no precipitation"

Λ_{lq} = washout coefficient for nuclide q and rain intensity l, in 1 / s

λ^{x}_{ql} = $\lambda_q + \Lambda_{lq}$ total depletion coefficient of the plume, in 1 / s

3.2.4 Wind Velocity $\bar{u}_{jk}$

The wind velocity $\bar{u}_{jk}$ is being averaged in the vertical direction from ground up to twice the emission level, separately for each stability category j and for each wind velocity range k.

$$\bar{u}_{jk} = \frac{1}{H} \int_0^{2H_q} u_{0k} \left(\frac{z}{H_0} \right)_{p_j} dz = \frac{u_o}{1 + p_j} \left(\frac{2H}{H} \right)^{p_j} \qquad (15)$$

in which

H = reference height of measuring the wind velocity, in m

u_{0k} = average of the wind velocity range k at the level H, in $m\ s^{-1}$

p_j = exponent of the vertical wind velocity profile for stability category j

The average u_{0k} is being calculated from all single measured velocities which fall into the range k. It is independent of the stability category. The wind profile exponent p_j is the average of all exponents p, which result from the least-squares-fit of an exponential function - like the integrand in Equ. 15 - to the measured vertical wind velocity profile at the stability category j. If $\bar{u}_{jk} < 1\ m\ s^{-1}$, calculated from Equ. 15, then $\bar{u}_{jk}$ is set equal to $1\ m\ s^{-1}$. Values of p_j, valid for the KNRC are :

stability	A	B	C	D	E	F
p_j	0.07	0.13	0.21	0.34	0.44	0.44

3.2.5 Eddies Caused by a Building

If $H < H_{thresh}$,
then the diffusion parameters $\sigma_{yj}(r)$ and $\sigma_{zj}(r)$
are modified as follows in order to take into account the additional turbulence caused by eddies behind a building :

$$\sigma_{yj} = \sqrt{\sigma_{yj}^2 + \frac{H^2}{2\pi}} \qquad (16)$$

and

$$\sigma_{zj} = \sqrt{\sigma_{zj}^2 + \frac{H^2}{2\pi}} \qquad (17)$$

in which

H_{thresh} = height of a building, in m

4. Structure of the ISOLA V Program

4.1 Loop Structure

The following FORTRAN statements show the general loop structure of the ISOLA V program (see also Fig. 4).

```
C----------------- Main subroutine of ISOLA V -----------------
C       loop over the  W E A T H E R  S E Q U E N C E S  INPL **
         DO 601  INPL= 1,LMAX
C
         REWIND NUNITS(50)
         REWIND NUNITS(51)
C
C-------------- 1. subroutine: the statistics submodule ----------
C       loop over hourly T I M E  I N T E R V A L S  N    *******
          DO 250   N= 1,IZL
C
C
C    ****  END  **** loop over the time intervals
  250  CONTINUE
C-------------- End of the statistics submodule ---------------
C
C----------- 2. subroutine: the dispersion submodule -----------
C       loop over the  N U C L I D E  T Y P E S  NNUC  ********
              DO 711 NNUC= 1,NNUCL
C
C       loop over the  G R I D  P O I N T S  IP  ***************
              DO 480  IP= 1,IPMAX
C
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C               -  calculate normalized air concentration and ground
C                  contamination and the arrival time of the radioactive plume
C               -  reorganize the  ISOLA V  results into NP-NN-J-I-
C                  dependent arrays, according to the UFOMOD loop structure
C
C                  LMAX          :  no. of weather sequences
C                  IZL           :  no. of hours
C                  IPMAX         :  no. of polar grid points in the concen-
C                                   tration grid ( IPMAX  =  NPHI * NRAD )
```

```
C                 NPHI          : no. of radial distances
C                 NRAD          : no. of azimuthal sectors
C                 NNUCL         : no. of nuclide types with different dry
C                                 and wet deposition properties
C                                 NNUC = 1 : noble gases
C                                 NNUC = 2 : aerosols
C                                 NNUC = 3 : elemental iodine
C                                 NNUC = 4 : organically bound iodine
C                                 NNUC = 5 : particulate iodine
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C    **** END **** loop over the grid points
  480 CONTINUE
C    **** END **** loop over the nuclide types
  711  CONTINUE
C
C
C-------------------------------------------------------------
C      store the ISOLA V - results on NUNITS(21)
C-------------------------------------------------------------
C
C------------------ end of the dispersion submodule -----------
C
C    **** END **** loop over the weather sequences
  601 CONTINUE
C------------------- end of the main subroutine ---------------
```

4.2 *Namelist of Input Variables*

The standard input data for an UFOMOD run with the dispersion module ISOLA V is described in [4] and [2] . For controlling the statistics submodule and additional outlist of the dispersion submodule, the namelist **ISODAT** will assign some additional parameters. The user had to define the number of wind direction sectors and the length (in hours) of each weather sequence. Parameters which control the output printed on paper may additionally be defined. All other input variables like source strength, emission height, deposition velocities e.o. will be defined by the user in the other titled namelists described in [4] and [2] .

CHIMAX = minimum value of interest of the time integrated air concentration (cut-off value)
(DEFAULT = 1.0E-12)

IDBER = number of wind direction sectors (12 or 36)
(DEFAULT = 36)

IDAUER(i) = number of hours selected for a weather sequence; I = 1,LMAX
(DEFAULT = 144)

IJAHR(2) = number of the selected year
(DEFAULT = 82 and 83)

IWRITE = 0 no output on paper of the statistics submodule
1 output of the statistics submodule for each weather sequence
(DEFAULT = 1)

IDMP = index of the first position of the concentration matrix for the printed output of the concentration data (radius)
0 < IDMP ≤ NRAD
(DEFAULT = 0)

IDMPMX = index of the last position of the concentration matrix for the printed output of the concentration data (radius)
IDMP < IDMPMX ≤ NRAD
(DEFAULT = 20)

JDMP = index of the first position of the concentration matrix for the printed output of the concentration data (sector)
0 < JDMP ≤ NPHI
(DEFAULT = 0)

JDMPMX = index of the last position of the concentration matrix for the printed output of the concentration data (sector)
JDMP < JDMPMX ≤ NPHI
(DEFAULT = 72)

IOUTR(I) = number of weather sequences to be printed, I = 1,5
(DEFAULT = 5 x 0)

IOUTN(I) = number of nuclide to be printed I = 1,5
(DEFAULT = 5 x 0)

TEXT(I) = text of 72 characters to define the run
(DEFAULT = 72 x ' ')

4.3 Input and Output of the Statistics Submodule

The meteorological input file contains wind directions, wind speeds, stability classes and precipitation intensities. These data should be available from the selected meteorological observation station with observation intervals of one hour. The program reads the data from the logical unit 50. The data had to be formatted. The reading command which is embedded in a do loop over the required number of hours contains the following lines:

```
      Read (50,1100,End=170) JAHR,MON,ITAG,NSTD,D,WG,KS,NI
 1100 FORMAT (4I2,i3,2x,F5.1,2I5)
```

with

JAHR = year (1982 oder 1983)

MON = month (1 - 12)

ITAG = day (1 - 365)

NSTD = hour (1 - 24)

D = wind direction in degree

WG = wind speed in m/s

KS = stability class (1 = unstable; 6 = stable)

NI = rain intensity in 1/100 mm/h

The four-parameter statistics will be stored on the logical unit 51. The output of the statistics submodule is given in the form:

```
      DO 460 IR=1,NRAIN
      WRITE(51,2400) RMWG
        DO 450 N=1,IDBER
          DO 450 J=1,KAT
            WRITE(51,2500) (AUST(J,L,N),L=1,IWG)
 450    CONTINUE
        WRITE(51,2400) DUREG
 460  CONTINUE
 2400 FORMAT(4F10.5)
 2500 FORMAT(8F6.3)
```

with :

AUST(J,L,N) = probability of the selected class-combinations; new calculated for each rain intensity class

DUREG = mean precipitation intensity in each rain intensity class

IDBER = number of wind direction sectors

IWG = number of wind speed classes

KAT = number of stability classes

NRAIN = number of rain intensity classes

RMWG(8) = mean wind speed in each class

4.4 Input and Output of the Dispersion Submodule

The dispersion submodule reads the four-parameter statistics, created by the statistics submodule in the same format, the data was stored on the logical unit 51. When the loops over the nuclides, dispersion situations and grid points are worked off, the near ground air concentrations, ground contaminations and arrival times will be written on the logical unit 21. For each weather sequence these data will be stored in the form required by the UFOMOD program system. The following FORTRAN statements show the procedure. Variables not described here will be found in the chapter of the general loop structure or within the input namelist.

```
C
C---------------------------------------------------------------
C        store the  ISOLA V - results on NUNITS(21)
C---------------------------------------------------------------
C
C       loop over the  D I S T A N C E S  I  *********************
                DO 369 I= 1,NRAD
C
                      WRITE(NUNITS(21)) SWGMIT,((JUSD(I,J),J= 1,NPHI)
C
C        loop over the  A Z I M U T H A L  S E C T O R S  J  ****
                      DO 359 J= 1,NPHI
C
                         IF(JUSD(I,J).EQ.0) GOTO 359
```

```
                WRITE(NUNITS(21))  (EVAL(NNUC,2,I,J),EVAL(NNUC,1,I,J),
     $                              EVAL(NNUC,2,I,J),NNUC=1,NNUCL),
     $                              EVAL(NNUCL,3,I,J)
C
C   **** END **** loop over the azimuthal sectors
  359   CONTINUE
C
C   **** END **** loop over the radial distances
  369   CONTINUE
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C              NPHI          : no. of radial distances
C              NRAD          : no. of azimuthal sectors
C              SWGMIT        : mean wind speed
C              JUSD          : index array to define the used sectors
C              EVAL(.,1..)   : ground contamination
C              EVAL(.,2..)   : cloud concentration
C              EVAL(.,3..)   : arrival time
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
```

Additional to the general control output, regulated by the UFOMOD main program, the user may order for special weather sequences and one nuclide some supplementary outlist (control statements, arrival times, ground contamination and air concentrations near ground level) shown in Fig. 5. The steering parameters are described in the chapter 'Namelist of Input variables'.

Appendix A.

DISPERSION-STATISTICS
28. 7.1982 - 6. 9.1982
PRECIPITATION 0.0 MM/H 90.83 %
CALME (<=0.4M/S) 0.00 %

SECTOR OF WIND DIR. 10 GRAD (1.15 %)

WS (M/S)	STABILITY CLASS A	B	C	D	E	F	SUM
0.5- 1.0	0.00	0.00	0.00	0.00	30.00	40.00	70.00
1.1- 1.5	0.00	0.00	20.00	0.00	0.00	0.00	20.00
1.6- 2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.1- 4.0	10.00	0.00	0.00	0.00	0.00	0.00	10.00
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	10.00	0.00	20.00	0.00	30.00	40.00	100.00

SECTOR OF WIND DIR. 20 GRAD (2.52 %)

WS (M/S)	STABILITY CLASS A	B	C	D	E	F	SUM
0.5- 1.0	4.55	0.00	0.00	4.55	9.09	18.18	36.36
1.1- 1.5	4.55	4.55	4.55	9.09	9.09	9.09	40.91
1.6- 2.0	4.55	0.00	0.00	0.00	0.00	0.00	4.55
2.1- 4.0	0.00	0.00	18.18	0.00	0.00	0.00	18.18
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	13.64	4.55	22.73	13.64	18.18	27.27	100.00

SECTOR OF WIND DIR. 30 GRAD (2.64 %)

WS (M/S)	STABILITY CLASS A	B	C	D	E	F	SUM
0.5- 1.0	4.35	0.00	0.00	0.00	13.04	21.74	39.13
1.1- 1.5	17.39	4.35	0.00	0.00	8.70	4.35	34.78
1.6- 2.0	4.35	0.00	0.00	0.00	4.35	0.00	8.70
2.1- 4.0	4.35	0.00	8.70	0.00	4.35	0.00	17.39
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	30.43	4.35	8.70	0.00	30.43	26.09	100.00

SECTOR OF WIND DIR. 40 GRAD (2.52 %)

WS (M/S)	STABILITY CLASS A	B	C	D	E	F	SUM
0.5- 1.0	0.00	4.55	0.00	0.00	0.00	40.91	45.45
1.1- 1.5	4.55	0.00	0.00	0.00	4.55	4.55	13.64
1.6- 2.0	0.00	4.55	0.00	0.00	0.00	0.00	4.55
2.1- 4.0	9.09	4.55	18.18	0.00	4.55	0.00	36.36
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	13.64	13.64	18.18	0.00	9.09	45.45	100.00

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....

Figure 1. Outlist of the statistics program

DISPERSION STATISTICS SUMMING UP OVER ALL SECTORS OF WIND DIRECTION
28. 7.1982 - 6. 9.1982

IN PERCENT

WS (M/S)	STABILITY CLASS						
	A	B	C	D	E	F	SUM
0.0- 0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.5- 1.0	2.29	0.92	0.11	0.57	6.08	19.95	29.93
1.1- 1.5	1.49	2.06	1.95	1.26	4.47	2.18	13.42
1.6- 2.0	1.26	1.95	1.15	1.03	2.41	1.95	9.75
2.1- 4.0	4.01	3.56	13.19	8.60	4.47	0.00	33.83
4.1- 8.0	1.49	1.83	1.72	8.03	0.00	0.00	13.07
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	10.55	10.32	18.12	19.50	17.43	24.08	100.00

MEAN PRECIPITATION INT. 0.0000 MM/H

Figure 1 continued

DISPERSION-STATISTICS
28. 7.1982 - 6. 9.1982
PRECIPITATION 0.02-0.9MM/H 4.79 %
CALME (<=0.4M/S) 0.00 %
SECTOR OF WIND DIR. 10 GRAD (0.00 %)

WS (M/S)	STABILITY CLASS						
	A	B	C	D	E	F	SUM
0.5- 1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.1- 1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6- 2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.1- 4.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SECTOR OF WIND DIR. 20 GRAD (0.00 %)

WS (M/S)	STABILITY CLASS						
	A	B	C	D	E	F	SUM
0.5- 1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.1- 1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6- 2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.1- 4.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SECTOR OF WIND DIR. 30 GRAD (0.00 %)

WS (M/S)	STABILITY CLASS						
	A	B	C	D	E	F	SUM
0.5- 1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.1- 1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6- 2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.1- 4.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SECTOR OF WIND DIR. 40 GRAD (0.00 %)

WS (M/S)	STABILITY CLASS						
	A	B	C	D	E	F	SUM
0.5- 1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.1- 1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6- 2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.1- 4.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00

....
....

Figure 1 continued

DISPERSION STATISTICS SUMMING UP OVER ALL SECTORS OF WIND DIRECTION
28. 7.1982 - 6. 9.1982

IN PERCENT

WS (M/S)	STABILITY CLASS A	B	C	D	E	F	SUM
0.0- 0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.5- 1.0	0.00	0.00	0.00	2.17	2.17	0.00	4.35
1.1- 1.5	0.00	0.00	2.17	2.17	0.00	0.00	4.35
1.6- 2.0	0.00	2.17	0.00	2.17	4.35	0.00	8.70
2.1- 4.0	0.00	0.00	26.09	39.13	0.00	0.00	65.22
4.1- 8.0	0.00	0.00	0.00	17.39	0.00	0.00	17.39
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	0.00	2.17	28.26	63.04	6.52	0.00	100.00

MEAN PRECIPITATION INT. 0.1500 MM/H

Figure 1 continued

DISPERSION-STATISTICS
28. 7.1982 - 6. 9.1982
PRECIPITATION 1.00-2.9MM/H 3.65 %
CALME (<=0.4M/S) 0.00 %

SECTOR OF WIND DIR. 10 GRAD (0.00 %)

WS (M/S)	STABILITY CLASS						
	A	B	C	D	E	F	SUM
0.5- 1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.1- 1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6- 2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.1- 4.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SECTOR OF WIND DIR. 20 GRAD (0.00 %)

WS (M/S)	STABILITY CLASS						
	A	B	C	D	E	F	SUM
0.5- 1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.1- 1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6- 2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.1- 4.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SECTOR OF WIND DIR. 30 GRAD (0.00 %)

WS (M/S)	STABILITY CLASS						
	A	B	C	D	E	F	SUM
0.5- 1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.1- 1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6- 2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.1- 4.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SECTOR OF WIND DIR. 40 GRAD (0.00 %)

WS (M/S)	STABILITY CLASS						
	A	B	C	D	E	F	SUM
0.5- 1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.1- 1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6- 2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.1- 4.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00

....
....

Figure 1 continued

DISPERSION STATISTICS SUMMING UP OVER ALL SECTORS OF WIND DIRECTION
28. 7.1982 - 6. 9.1982

IN PERCENT

WS (M/S)	STABILITY CLASS						
	A	B	C	D	E	F	SUM
0.0- 0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.5- 1.0	0.00	0.00	0.00	0.00	11.43	2.86	14.29
1.1- 1.5	0.00	0.00	0.00	0.00	2.86	2.86	5.71
1.6- 2.0	0.00	0.00	2.86	2.86	0.00	0.00	5.71
2.1- 4.0	0.00	2.86	31.43	31.43	0.00	0.00	65.71
4.1- 8.0	0.00	0.00	0.00	8.57	0.00	0.00	8.57
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	0.00	2.86	34.29	42.86	14.29	5.71	100.00

Figure 1 continued

MEAN PRECIPITATION INT. 1.1900 MM/H

DISPERSION-STATISTICS

28. 7.1982 - 6. 9.1982

PRECIPITATION >= 3.0 MM/H 0.73 %

CALME (<=0.4M/S) 0.00 %

SECTOR OF WIND DIR. 10 GRAD (0.00 %)

WS (M/S)	STABILITY CLASS A	B	C	D	E	F	SUM
0.5- 1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.1- 1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6- 2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.1- 4.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SECTOR OF WIND DIR. 20 GRAD (0.00 %)

WS (M/S)	STABILITY CLASS A	B	C	D	E	F	SUM
0.5- 1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.1- 1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6- 2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.1- 4.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SECTOR OF WIND DIR. 30 GRAD (0.00 %)

WS (M/S)	STABILITY CLASS A	B	C	D	E	F	SUM
0.5- 1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.1- 1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6- 2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.1- 4.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SECTOR OF WIND DIR. 40 GRAD (0.00 %)

WS (M/S)	STABILITY CLASS A	B	C	D	E	F	SUM
0.5- 1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.1- 1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6- 2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.1- 4.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.1- 8.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00

....

....

Figure 1 continued

DISPERSION STATISTICS SUMMING UP OVER ALL SECTORS OF WIND DIRECTION
28. 7.1982 - 6. 9.1982

IN PERCENT

WS (M/S)	STABILITY CLASS A	B	C	D	E	F	SUM
0.0- 0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.5- 1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.1- 1.5	0.00	0.00	0.00	0.00	14.29	0.00	14.29
1.6- 2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.1- 4.0	0.00	0.00	28.57	28.57	0.00	0.00	57.14
4.1- 8.0	0.00	0.00	0.00	28.57	0.00	0.00	28.57
8.1-15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	0.00	0.00	28.57	57.14	14.29	0.00	100.00

MEAN PRECIPITATION INT. 4.1900 MM/H

Figure 1 continued

DISPERSION-STATISTICS
20. 7.1982 - 23. 7.1982
PRECIPITATION 0.0 MM/H 75.00 %
CALME (<=0.4M/S) 0.00 %
SECTOR OF WIND DIR. 240 GRAD (33.33 %)

WS (M/S)	STABILITY CLASS						
	A	B	C	D	E	F	SUM
0.5- 1.0	0.00	4.17	0.00	0.00	0.00	4.17	8.33
1.1- 1.5	0.00	0.00	4.17	0.00	12.50	0.00	16.67
1.6- 2.0	8.33	4.17	4.17	0.00	0.00	0.00	16.67
2.1- 4.0	0.00	0.00	8.33	4.17	4.17	0.00	16.67
4.1- 8.0	0.00	0.00	8.33	29.16	0.00	0.00	37.50
8.1-15.0	0.00	0.00	0.00	4.17	0.00	0.00	4.17
15.1-90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM	8.33	8.33	25.00	37.50	16.67	4.17	100.00

Figure 2. Example of the statistics program for 4 days

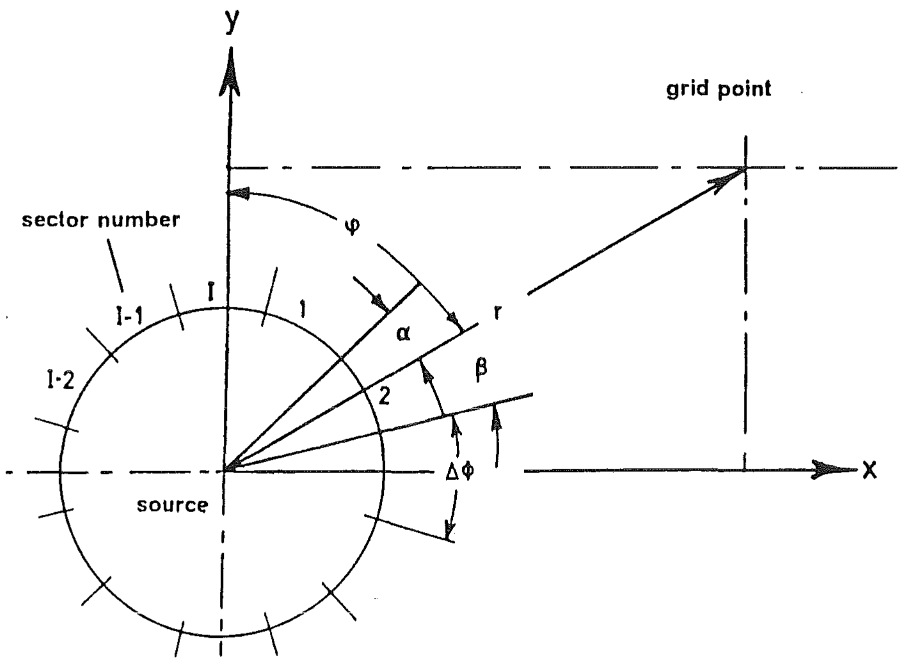

Figure 3. Geometrical relationship of ISOLA V

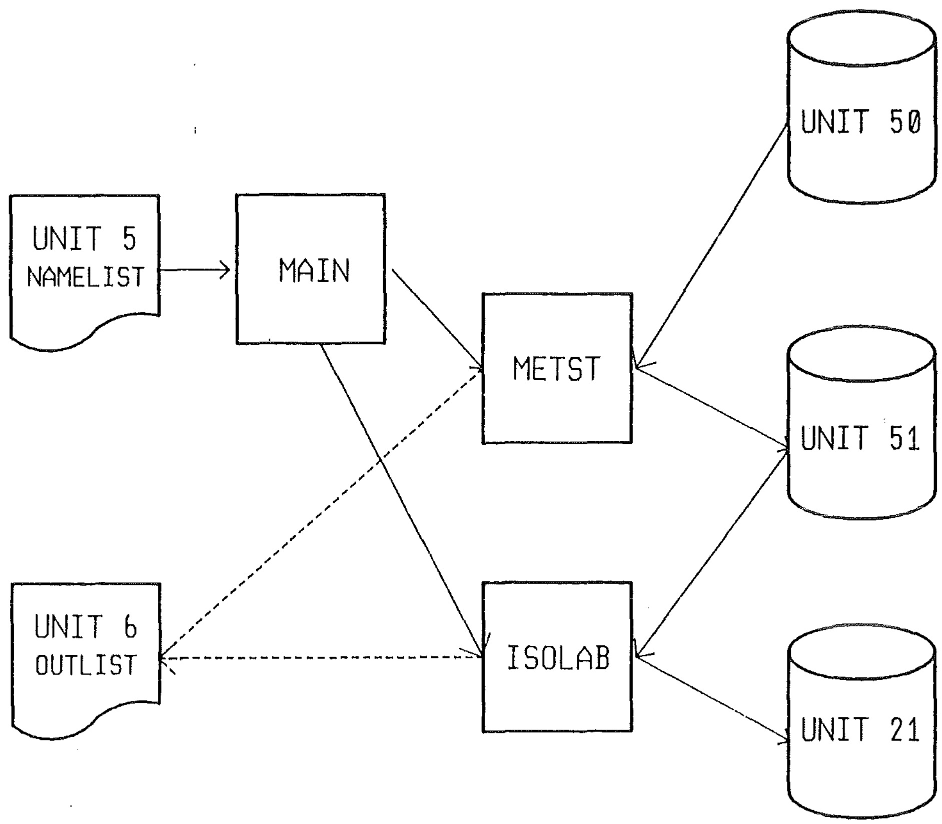

Figure 4. Illustration of I/O structure of the ISOLA V

```
************************************
***         I S O L A          ***
***        IS  RUNNING         ***
************************************
*                                  *
*      PARAMETER-CHECK             *
*                                  *
* LMAX     :          1 DEFAULT    *
* IDAUER   :        960            *
* IDBER    :         36 DEFAULT    *
* IJAHR(1):          82 DEFAULT    *
* IJAHR(2):          83 DEFAULT    *
* IMAX     :         20            *
* JMAX     :         72 DEFAULT    *
* IDMP     :          1            *
* IDMPMX   :         13            *
* JDMP     :          1            *
* JDMPMX   :         72 DEFAULT    *
* IWRITE   :          1 DEFAULT    *
* CHIMAX   : 0.100E-11 DEFAULT     *
* IOUTN    :          2 DEFAULT    *
* IOUTR    :          1            *
* IOUTR    :          2            *
* IOUTR    :          3            *
* IOUTR    :          0 DEFAULT    *
* IOUTR    :          0 DEFAULT    *
* RADIUS   : 0.250E+03             *
* RADIUS   : 0.400E+03             *
* RADIUS   : 0.625E+03             *
* RADIUS   : 0.875E+03             *
* RADIUS   : 0.115E+04             *
* RADIUS   : 0.155E+04             *
* RADIUS   : 0.210E+04             *
* RADIUS   : 0.270E+04             *
* RADIUS   : 0.370E+04             *
* RADIUS   : 0.490E+04             *
* RADIUS   : 0.655E+04             *
* RADIUS   : 0.875E+04             *
* RADIUS   : 0.115E+05             *
* RADIUS   : 0.155E+05             *
* RADIUS   : 0.210E+05             *
* RADIUS   : 0.270E+05             *
* RADIUS   : 0.370E+05             *
* RADIUS   : 0.490E+05             *
* RADIUS   : 0.655E+05             *
* RADIUS   : 0.875E+05             *
*                                  *
************************************


TEXT CARDS
----------

******************************************************************************
TEST
******************************************************************************
```

Figure 5. Outlist of the dispersion program

Figure 5 continued

```
ANEMOMETER HEIGHT FOR THE STATISTICS  10. M
WINDSPEED IN THE INTERVALS      0.000     0.628     1.500     2.000     3.108     4.963     0.000     0.000    M/S
++++++++++  MET. STAT. IS OK.  +++++++++++++
                                                     I S O L A   V
NUCLIDE GROUP :   AEROSOLS
STATISTICS WITH 4 PRECIPITATION CLASSES
INTEGRATION TIL THE TWICE OF EMISSION HEIGHT
LAMDA IN THE PRECIPITATION INTERVALS  :   0.0000E+00   3.4000E-05   1.1700E-04   3.3300E-04 1/S
PRECIPITATION FACTOR IN THE INTERVALS :   0.0000E+00   5.0000E-01   7.3000E-01   5.8000E-01
PRECIPITATION INTENSITIES IN THE INT. :   0.0000E+00   1.5000E-01   1.1900E+00   4.1900E+00 MM/H
THE SUM OF STATISTICS IS     99.94150


        NUMBER OF SOURCES : 1          NUMBER OF POINTS : 1440          NUMBER OF SECTORS : 36

        SUM OF WINDSPEED INTERVALS:   8                         P-VALUE
                 NUMBER  FOR CATEGORY  A :    8                 0.07000
                             CATEGORY  B :    8                 0.13000
                             CATEGORY  C :    8                 0.21000
                             CATEGORY  D :    8                 0.34000
                             CATEGORY  E :    8                 0.44000
                             KATEGORY  F :    8                 0.44000

SOURCE NR.      X        Y       HEIGHT    SOURCE ST.      ZERF         T-WET        T-DRY        VAU
    1          0.0      0.0       100      1.0000E+00   0.0000E+00   1.0000E+00   1.8000E-02   1.8000E-02
MAXIMUM IN POINT   9 (    41.781/    49.793) =  2.751E-08
MINIMUM =  4.939E-13
```

Figure 5 continued

GROUND CONCENTRATION IN BQ/M**2

I \ J	1	2	3	4	5	6	7	8	9	10	11	12	13
1	2.36E-09	1.65E-09	1.17E-09	9.44E-10	7.92E-10	6.43E-10	4.98E-10	3.86E-10	2.70E-10	1.88E-10	1.27E-10	8.42E-11	5.64E-11
2	2.90E-09	2.08E-09	1.48E-09	1.16E-09	9.57E-10	7.61E-10	5.79E-10	4.43E-10	3.03E-10	2.08E-10	1.38E-10	8.88E-11	5.86E-11
3	3.44E-09	2.46E-09	1.75E-09	1.36E-09	1.11E-09	8.67E-10	6.50E-10	4.98E-10	3.37E-10	2.31E-10	1.52E-10	9.65E-11	6.25E-11
4	4.02E-09	2.89E-09	2.00E-09	1.54E-09	1.25E-09	9.77E-10	7.38E-10	5.66E-10	3.91E-10	2.73E-10	1.84E-10	1.22E-10	8.10E-11
5	4.70E-09	3.36E-09	2.29E-09	1.72E-09	1.37E-09	1.07E-09	8.02E-10	6.11E-10	4.28E-10	3.04E-10	2.09E-10	1.41E-10	9.60E-11
6	5.55E-09	3.94E-09	2.63E-09	1.91E-09	1.49E-09	1.12E-09	8.24E-10	6.25E-10	4.28E-10	2.98E-10	2.01E-10	1.34E-10	9.01E-11
7	6.58E-09	4.73E-09	3.13E-09	2.22E-09	1.68E-09	1.23E-09	8.81E-10	6.53E-10	4.35E-10	2.98E-10	1.95E-10	1.27E-10	8.52E-11
8	7.69E-09	5.70E-09	3.83E-09	2.70E-09	2.01E-09	1.46E-09	1.03E-09	7.58E-10	5.04E-10	3.45E-10	2.31E-10	1.55E-10	1.08E-10
9	8.84E-09	6.65E-09	4.50E-09	3.19E-09	2.38E-09	1.72E-09	1.21E-09	9.03E-10	6.08E-10	4.22E-10	2.90E-10	2.00E-10	1.42E-10
10	9.64E-09	7.31E-09	4.94E-09	3.50E-09	2.62E-09	1.89E-09	1.34E-09	9.98E-10	6.81E-10	4.80E-10	3.33E-10	2.32E-10	1.67E-10
11	9.88E-09	7.38E-09	4.93E-09	3.47E-09	2.59E-09	1.87E-09	1.32E-09	9.91E-10	6.78E-10	4.80E-10	3.37E-10	2.36E-10	1.70E-10
12	9.44E-09	6.85E-09	4.53E-09	3.15E-09	2.32E-09	1.65E-09	1.16E-09	8.56E-10	5.81E-10	4.09E-10	2.84E-10	1.98E-10	1.41E-10
13	8.56E-09	6.05E-09	3.84E-09	2.62E-09	1.90E-09	1.34E-09	9.25E-10	6.78E-10	4.52E-10	3.13E-10	2.16E-10	1.47E-10	1.02E-10
14	7.46E-09	5.07E-09	3.15E-09	2.13E-09	1.53E-09	1.08E-09	7.38E-10	5.36E-10	3.53E-10	2.42E-10	1.63E-10	1.09E-10	7.44E-11
15	6.33E-09	4.20E-09	2.59E-09	1.74E-09	1.26E-09	8.83E-10	6.09E-10	4.40E-10	2.92E-10	1.98E-10	1.32E-10	8.75E-11	5.89E-11
16	5.34E-09	3.47E-09	2.09E-09	1.42E-09	1.04E-09	7.41E-10	5.22E-10	3.84E-10	2.57E-10	1.76E-10	1.18E-10	7.73E-11	5.17E-11
17	4.33E-09	2.77E-09	1.69E-09	1.17E-09	8.70E-10	6.32E-10	4.52E-10	3.37E-10	2.28E-10	1.58E-10	1.06E-10	7.02E-11	4.70E-11
18	3.50E-09	2.21E-09	1.34E-09	9.26E-10	6.98E-10	5.11E-10	3.71E-10	2.80E-10	1.92E-10	1.34E-10	9.17E-11	6.14E-11	4.16E-11
19	2.82E-09	1.74E-09	1.03E-09	7.07E-10	5.35E-10	3.98E-10	2.90E-10	2.19E-10	1.51E-10	1.06E-10	7.33E-11	4.97E-11	3.43E-11
20	2.32E-09	1.38E-09	8.02E-10	5.40E-10	4.07E-10	3.03E-10	2.20E-10	1.66E-10	1.13E-10	7.89E-11	5.40E-11	3.66E-11	2.50E-11
21	1.97E-09	1.18E-09	6.78E-10	4.55E-10	3.38E-10	2.46E-10	1.75E-10	1.28E-10	8.65E-11	5.98E-11	4.03E-11	2.69E-11	1.82E-11
22	1.83E-09	1.09E-09	6.43E-10	4.35E-10	3.22E-10	2.30E-10	1.63E-10	1.21E-10	8.12E-11	5.62E-11	3.82E-11	2.57E-11	1.76E-11
23	1.75E-09	1.06E-09	6.55E-10	4.58E-10	3.42E-10	2.48E-10	1.76E-10	1.32E-10	8.95E-11	6.17E-11	4.21E-11	2.83E-11	1.93E-11
24	1.62E-09	1.05E-09	6.76E-10	4.82E-10	3.64E-10	2.66E-10	1.90E-10	1.42E-10	9.74E-11	6.79E-11	4.57E-11	2.99E-11	1.96E-11
25	1.49E-09	9.82E-10	6.45E-10	4.61E-10	3.47E-10	2.52E-10	1.80E-10	1.36E-10	9.20E-11	6.37E-11	4.22E-11	2.71E-11	1.71E-11
26	1.26E-09	8.31E-10	5.41E-10	3.83E-10	2.81E-10	1.96E-10	1.35E-10	9.82E-11	6.45E-11	4.33E-11	2.80E-11	1.74E-11	1.09E-11
27	1.01E-09	6.45E-10	3.98E-10	2.68E-10	1.88E-10	1.25E-10	8.05E-11	5.62E-11	3.37E-11	2.08E-11	1.25E-11	7.35E-12	4.49E-12
28	7.72E-10	4.55E-10	2.69E-10	1.75E-10	1.17E-10	7.23E-11	4.29E-11	2.77E-11	1.56E-11	9.28E-12	5.52E-12	3.31E-12	1.97E-12
29	5.79E-10	3.27E-10	1.78E-10	1.08E-10	7.00E-11	4.21E-11	2.47E-11	1.41E-11	8.37E-12	5.36E-12	3.49E-12	2.27E-12	1.66E-12
30	4.68E-10	2.42E-10	1.23E-10	6.56E-11	4.28E-11	2.59E-11	1.48E-11	9.63E-12	5.65E-12	3.63E-12	2.36E-12	1.55E-12	1.13E-12
31	4.08E-10	1.84E-10	9.41E-11	5.38E-11	3.39E-11	1.99E-11	1.13E-11	6.97E-12	3.83E-12	2.04E-12	1.32E-12	8.97E-13	6.54E-13
32	3.69E-10	1.85E-10	8.79E-11	5.00E-11	3.31E-11	2.11E-11	1.30E-11	8.61E-12	4.89E-12	2.98E-12	1.79E-12	1.09E-12	6.80E-13
33	4.09E-10	2.14E-10	1.06E-10	6.57E-11	4.71E-11	3.37E-11	2.32E-11	1.63E-11	1.04E-11	6.81E-12	4.26E-12	2.62E-12	1.66E-12
34	4.63E-10	2.66E-10	1.52E-10	1.00E-10	7.64E-11	5.72E-11	4.13E-11	3.12E-11	2.08E-11	1.42E-11	9.30E-12	6.03E-12	4.01E-12
35	5.31E-10	3.39E-10	2.12E-10	1.51E-10	1.18E-10	9.05E-11	6.68E-11	5.04E-11	3.39E-11	2.29E-11	1.52E-11	9.96E-12	6.75E-12
36	6.19E-10	4.25E-10	2.81E-10	2.09E-10	1.67E-10	1.29E-10	9.46E-11	7.10E-11	4.73E-11	3.20E-11	2.08E-11	1.35E-11	9.10E-12
37	6.97E-10	5.07E-10	3.53E-10	2.67E-10	2.14E-10	1.66E-10	1.22E-10	9.15E-11	6.05E-11	4.07E-11	2.63E-11	1.68E-11	1.13E-11
38	7.63E-10	5.81E-10	4.16E-10	3.16E-10	2.55E-10	1.99E-10	1.48E-10	1.11E-10	7.36E-11	4.94E-11	3.21E-11	2.06E-11	1.38E-11
39	8.30E-10	6.48E-10	4.66E-10	3.58E-10	2.91E-10	2.29E-10	1.71E-10	1.29E-10	8.64E-11	5.83E-11	3.81E-11	2.46E-11	1.65E-11
40	8.75E-10	6.93E-10	5.08E-10	4.00E-10	3.28E-10	2.58E-10	1.93E-10	1.46E-10	9.82E-11	6.66E-11	4.36E-11	2.81E-11	1.89E-11
41	9.03E-10	7.18E-10	5.31E-10	4.22E-10	3.53E-10	2.83E-10	2.14E-10	1.63E-10	1.09E-10	7.36E-11	4.80E-11	3.10E-11	2.08E-11
42	9.01E-10	7.05E-10	5.25E-10	4.29E-10	3.69E-10	3.02E-10	2.32E-10	1.77E-10	1.19E-10	8.04E-11	5.23E-11	3.35E-11	2.23E-11

Figure 5 continued

43	8.81E-10	6.64E-10	4.98E-10	4.17E-10	3.70E-10	3.13E-10	2.45E-10	1.90E-10	1.29E-10	8.77E-11	5.72E-11	3.65E-11	2.42E-11
44	8.73E-10	6.28E-10	4.53E-10	3.91E-10	3.61E-10	3.18E-10	2.57E-10	2.02E-10	1.40E-10	9.63E-11	6.34E-11	4.07E-11	2.69E-11
45	8.84E-10	6.01E-10	4.18E-10	3.73E-10	3.59E-10	3.29E-10	2.73E-10	2.18E-10	1.53E-10	1.06E-10	7.05E-11	4.57E-11	3.01E-11
46	8.88E-10	5.91E-10	4.11E-10	3.79E-10	3.76E-10	3.51E-10	2.95E-10	2.38E-10	1.68E-10	1.17E-10	7.81E-11	5.07E-11	3.33E-11
47	9.01E-10	6.09E-10	4.25E-10	4.02E-10	4.05E-10	3.82E-10	3.23E-10	2.60E-10	1.84E-10	1.28E-10	8.49E-11	5.50E-11	3.62E-11
48	9.15E-10	6.27E-10	4.50E-10	4.25E-10	4.32E-10	4.09E-10	3.50E-10	2.81E-10	1.98E-10	1.37E-10	9.06E-11	5.85E-11	3.85E-11
49	9.11E-10	6.31E-10	4.64E-10	4.45E-10	4.53E-10	4.31E-10	3.66E-10	2.96E-10	2.09E-10	1.47E-10	9.69E-11	6.24E-11	4.09E-11
50	9.03E-10	6.32E-10	4.64E-10	4.47E-10	4.55E-10	4.36E-10	3.72E-10	3.03E-10	2.16E-10	1.52E-10	1.01E-10	6.60E-11	4.36E-11
51	8.88E-10	6.21E-10	4.56E-10	4.35E-10	4.40E-10	4.19E-10	3.57E-10	2.91E-10	2.09E-10	1.47E-10	9.95E-11	6.54E-11	4.36E-11
52	8.69E-10	6.00E-10	4.35E-10	4.09E-10	4.08E-10	3.82E-10	3.24E-10	2.61E-10	1.85E-10	1.29E-10	8.66E-11	5.66E-11	3.77E-11
53	8.15E-10	5.57E-10	3.97E-10	3.67E-10	3.61E-10	3.34E-10	2.77E-10	2.21E-10	1.54E-10	1.08E-10	7.09E-11	4.58E-11	3.02E-11
54	7.38E-10	4.94E-10	3.48E-10	3.17E-10	3.08E-10	2.82E-10	2.33E-10	1.85E-10	1.29E-10	8.90E-11	5.91E-11	3.84E-11	2.55E-11
55	6.35E-10	4.18E-10	2.91E-10	2.64E-10	2.56E-10	2.34E-10	1.93E-10	1.53E-10	1.08E-10	7.34E-11	4.96E-11	3.26E-11	2.18E-11
56	5.21E-10	3.42E-10	2.35E-10	2.15E-10	2.11E-10	1.94E-10	1.59E-10	1.27E-10	8.84E-11	6.10E-11	4.01E-11	2.58E-11	1.68E-11
57	4.36E-10	2.78E-10	1.97E-10	1.80E-10	1.78E-10	1.65E-10	1.37E-10	1.09E-10	7.53E-11	5.16E-11	3.30E-11	2.07E-11	1.32E-11
58	3.87E-10	2.40E-10	1.66E-10	1.56E-10	1.59E-10	1.49E-10	1.26E-10	1.01E-10	7.06E-11	4.87E-11	3.20E-11	2.05E-11	1.34E-11
59	3.77E-10	2.13E-10	1.44E-10	1.41E-10	1.45E-10	1.39E-10	1.19E-10	9.63E-11	6.88E-11	4.80E-11	3.23E-11	2.12E-11	1.42E-11
60	3.95E-10	2.31E-10	1.52E-10	1.32E-10	1.35E-10	1.29E-10	1.07E-10	8.74E-11	6.25E-11	4.40E-11	2.95E-11	1.92E-11	1.27E-11
61	4.62E-10	2.90E-10	1.82E-10	1.53E-10	1.43E-10	1.28E-10	1.04E-10	7.96E-11	5.51E-11	3.74E-11	2.46E-11	1.57E-11	1.02E-11
62	5.91E-10	3.75E-10	2.48E-10	2.09E-10	1.82E-10	1.53E-10	1.18E-10	8.92E-11	5.86E-11	3.84E-11	2.42E-11	1.49E-11	9.40E-12
63	7.36E-10	5.04E-10	3.56E-10	2.92E-10	2.55E-10	2.11E-10	1.63E-10	1.25E-10	8.30E-11	5.49E-11	3.45E-11	2.10E-11	1.30E-11
64	8.54E-10	6.17E-10	4.60E-10	3.86E-10	3.41E-10	2.88E-10	2.27E-10	1.78E-10	1.25E-10	8.65E-11	5.73E-11	3.66E-11	2.35E-11
65	8.86E-10	6.54E-10	5.01E-10	4.31E-10	3.87E-10	3.33E-10	2.69E-10	2.15E-10	1.53E-10	1.08E-10	7.36E-11	4.82E-11	3.15E-11
66	7.89E-10	5.86E-10	4.54E-10	3.98E-10	3.63E-10	3.16E-10	2.55E-10	2.03E-10	1.43E-10	9.99E-11	6.65E-11	4.27E-11	2.78E-11
67	6.68E-10	4.51E-10	3.47E-10	3.12E-10	2.94E-10	2.61E-10	2.12E-10	1.69E-10	1.16E-10	7.95E-11	5.11E-11	3.19E-11	2.02E-11
68	5.93E-10	3.61E-10	2.58E-10	2.37E-10	2.35E-10	2.17E-10	1.80E-10	1.43E-10	9.90E-11	6.77E-11	4.40E-11	2.79E-11	1.77E-11
69	5.81E-10	3.71E-10	2.44E-10	2.26E-10	2.25E-10	2.10E-10	1.75E-10	1.34E-10	9.53E-11	6.54E-11	4.34E-11	2.80E-11	1.84E-11
70	8.69E-10	4.82E-10	3.22E-10	2.82E-10	2.70E-10	2.44E-10	1.99E-10	1.57E-10	1.08E-10	7.37E-11	4.77E-11	3.01E-11	1.93E-11
71	1.28E-09	7.90E-10	5.34E-10	4.34E-10	3.93E-10	3.39E-10	2.71E-10	2.13E-10	1.45E-10	9.90E-11	6.38E-11	3.99E-11	2.52E-11
72	1.80E-09	1.22E-09	8.43E-10	6.82E-10	5.89E-10	4.88E-10	3.81E-10	3.00E-10	2.10E-10	1.47E-10	9.78E-11	6.37E-11	4.18E-11

Figure 5 continued

AIR CONCENTRATION IN BQ*SEC/M**3

J \ I	1	2	3	4	5	6	7	8	9	10	11	12	13
1	5.01E-07	4.87E-07	4.36E-07	4.15E-07	3.98E-07	3.58E-07	2.93E-07	2.32E-07	1.62E-07	1.12E-07	7.42E-08	4.81E-08	3.20E-08
2	6.53E-07	6.42E-07	5.60E-07	5.10E-07	4.72E-07	4.10E-07	3.29E-07	2.58E-07	1.78E-07	1.22E-07	7.99E-08	5.12E-08	3.40E-08
3	8.79E-07	8.16E-07	6.83E-07	5.97E-07	5.36E-07	4.55E-07	3.57E-07	2.77E-07	1.88E-07	1.28E-07	8.32E-08	5.28E-08	3.48E-08
4	1.19E-06	1.07E-06	8.27E-07	6.87E-07	5.98E-07	4.95E-07	3.85E-07	2.96E-07	2.00E-07	1.36E-07	8.81E-08	5.62E-08	3.73E-08
5	1.62E-06	1.41E-06	1.04E-06	8.16E-07	6.81E-07	5.48E-07	4.17E-07	3.16E-07	2.14E-07	1.45E-07	9.47E-08	6.08E-08	4.06E-08
6	2.18E-06	1.87E-06	1.32E-06	9.94E-07	7.95E-07	6.18E-07	4.60E-07	3.46E-07	2.32E-07	1.56E-07	1.02E-07	6.55E-08	4.38E-08
7	2.85E-06	2.48E-06	1.73E-06	1.25E-06	9.68E-07	7.25E-07	5.24E-07	3.88E-07	2.56E-07	1.72E-07	1.11E-07	7.13E-08	4.79E-08
8	3.52E-06	3.13E-06	2.21E-06	1.58E-06	1.19E-06	8.62E-07	6.07E-07	4.42E-07	2.87E-07	1.91E-07	1.23E-07	7.96E-08	5.45E-08
9	4.12E-06	3.70E-06	2.60E-06	1.84E-06	1.37E-06	9.74E-07	6.73E-07	4.87E-07	3.12E-07	2.06E-07	1.32E-07	8.61E-08	5.98E-08
10	4.52E-06	4.03E-06	2.80E-06	1.96E-06	1.44E-06	1.01E-06	6.87E-07	4.89E-07	3.10E-07	2.03E-07	1.30E-07	8.49E-08	5.96E-08
11	4.62E-06	4.01E-06	2.73E-06	1.88E-06	1.36E-06	9.41E-07	6.31E-07	4.48E-07	2.81E-07	1.83E-07	1.17E-07	7.70E-08	5.41E-08
12	4.42E-06	3.69E-06	2.44E-06	1.65E-06	1.17E-06	7.95E-07	5.26E-07	3.68E-07	2.29E-07	1.48E-07	9.52E-08	6.23E-08	4.36E-08
13	4.02E-06	3.18E-06	2.01E-06	1.32E-06	9.27E-07	6.23E-07	4.09E-07	2.84E-07	1.76E-07	1.12E-07	7.23E-08	4.71E-08	3.26E-08
14	3.49E-06	2.61E-06	1.60E-06	1.03E-06	7.20E-07	4.85E-07	3.16E-07	2.20E-07	1.36E-07	8.76E-08	5.64E-08	3.68E-08	2.53E-08
15	2.93E-06	2.11E-06	1.26E-06	8.13E-07	5.71E-07	3.87E-07	2.57E-07	1.78E-07	1.12E-07	7.18E-08	4.66E-08	3.05E-08	2.10E-08
16	2.45E-06	1.69E-06	9.78E-07	6.36E-07	4.57E-07	3.20E-07	2.19E-07	1.56E-07	9.90E-08	6.47E-08	4.20E-08	2.73E-08	1.87E-08
17	1.98E-06	1.32E-06	7.76E-07	5.15E-07	3.78E-07	2.73E-07	1.93E-07	1.41E-07	9.20E-08	6.16E-08	4.02E-08	2.62E-08	1.77E-08
18	1.59E-06	1.04E-06	6.06E-07	4.08E-07	3.09E-07	2.32E-07	1.70E-07	1.28E-07	8.64E-08	5.89E-08	3.92E-08	2.58E-08	1.75E-08
19	1.29E-06	8.15E-07	4.64E-07	3.19E-07	2.48E-07	1.92E-07	1.45E-07	1.11E-07	7.60E-08	5.26E-08	3.54E-08	2.35E-08	1.60E-08
20	1.04E-06	6.35E-07	3.61E-07	2.46E-07	1.93E-07	1.50E-07	1.14E-07	8.70E-08	5.90E-08	4.02E-08	2.67E-08	1.74E-08	1.16E-08
21	8.39E-07	5.07E-07	2.84E-07	1.92E-07	1.48E-07	1.13E-07	8.31E-08	6.17E-08	4.06E-08	2.71E-08	1.74E-08	1.10E-08	7.14E-09
22	7.31E-07	4.29E-07	2.37E-07	1.56E-07	1.17E-07	8.48E-08	6.08E-08	4.43E-08	2.84E-08	1.85E-08	1.18E-08	7.54E-09	4.96E-09
23	6.22E-07	3.67E-07	2.06E-07	1.37E-07	9.97E-08	7.04E-08	4.83E-08	3.46E-08	2.21E-08	1.39E-08	9.18E-09	6.03E-09	4.14E-09
24	5.17E-07	3.21E-07	1.94E-07	1.29E-07	9.24E-08	6.37E-08	4.14E-08	2.92E-08	1.85E-08	1.21E-08	7.79E-09	5.02E-09	3.46E-09
25	4.68E-07	3.06E-07	1.92E-07	1.28E-07	8.97E-08	5.95E-08	3.83E-08	2.64E-08	1.60E-08	1.01E-08	6.40E-09	4.05E-09	2.83E-09
26	4.20E-07	2.88E-07	1.86E-07	1.25E-07	8.69E-08	5.58E-08	3.48E-08	2.32E-08	1.37E-08	8.49E-09	5.36E-09	3.41E-09	2.46E-09
27	4.01E-07	2.72E-07	1.74E-07	1.16E-07	7.97E-08	5.07E-08	3.10E-08	2.06E-08	1.20E-08	7.26E-09	4.65E-09	3.02E-09	2.20E-09
28	3.95E-07	2.48E-07	1.56E-07	1.03E-07	7.00E-08	4.42E-08	2.66E-08	1.76E-08	1.03E-08	6.51E-09	4.19E-09	2.72E-09	1.97E-09
29	3.79E-07	2.25E-07	1.32E-07	8.42E-08	5.63E-08	3.51E-08	2.13E-08	1.41E-08	8.37E-09	5.36E-09	3.49E-09	2.27E-09	1.66E-09
30	3.73E-07	2.05E-07	1.10E-07	6.56E-08	4.28E-08	2.59E-08	1.48E-08	9.63E-09	5.65E-09	3.63E-09	2.36E-09	1.55E-09	1.13E-09
31	3.72E-07	1.84E-07	9.41E-08	5.38E-08	3.39E-08	1.99E-08	1.13E-08	6.97E-09	3.83E-09	2.04E-09	1.32E-09	8.97E-10	6.54E-10
32	3.70E-07	1.85E-07	8.79E-08	5.00E-08	3.31E-08	2.11E-08	1.30E-08	8.61E-09	4.89E-09	2.98E-09	1.79E-09	1.09E-09	6.80E-10
33	4.09E-07	2.14E-07	1.06E-07	6.57E-08	4.71E-08	3.37E-08	2.32E-08	1.63E-08	1.04E-08	6.81E-09	4.26E-09	2.62E-09	1.66E-09
34	4.63E-07	2.66E-07	1.52E-07	1.00E-07	7.64E-08	5.72E-08	4.13E-08	3.12E-08	2.08E-08	1.42E-08	9.30E-09	6.03E-09	4.01E-09
35	5.31E-07	3.39E-07	2.12E-07	1.51E-07	1.18E-07	9.05E-08	6.68E-08	5.04E-08	3.39E-08	2.29E-08	1.52E-08	9.96E-09	6.75E-09
36	6.19E-07	4.25E-07	2.81E-07	2.09E-07	1.67E-07	1.29E-07	9.46E-08	7.10E-08	4.73E-08	3.20E-08	2.08E-08	1.35E-08	9.10E-09
37	6.97E-07	5.07E-07	3.53E-07	2.67E-07	2.14E-07	1.66E-07	1.22E-07	9.15E-08	6.05E-08	4.07E-08	2.63E-08	1.68E-08	1.13E-08
38	7.63E-07	5.81E-07	4.16E-07	3.16E-07	2.55E-07	1.99E-07	1.48E-07	1.11E-07	7.36E-08	4.94E-08	3.21E-08	2.06E-08	1.38E-08
39	8.30E-07	6.48E-07	4.66E-07	3.58E-07	2.91E-07	2.29E-07	1.71E-07	1.29E-07	8.64E-08	5.83E-08	3.81E-08	2.46E-08	1.65E-08
40	8.75E-07	6.93E-07	5.08E-07	4.00E-07	3.28E-07	2.58E-07	1.93E-07	1.46E-07	9.82E-08	6.66E-08	4.36E-08	2.81E-08	1.89E-08
41	9.03E-07	7.18E-07	5.32E-07	4.22E-07	3.53E-07	2.83E-07	2.14E-07	1.63E-07	1.09E-07	7.36E-08	4.80E-08	3.10E-08	2.08E-08

Figure 5 continued

42	9.01E-07	7.05E-07	5.25E-07	4.29E-07	3.69E-07	3.02E-07	2.32E-07	1.77E-07	1.19E-07	8.04E-08	5.23E-08	3.35E-08	2.23E-08
43	8.81E-07	6.64E-07	4.98E-07	4.17E-07	3.70E-07	3.13E-07	2.45E-07	1.90E-07	1.29E-07	8.77E-08	5.72E-08	3.65E-08	2.42E-08
44	8.73E-07	6.28E-07	4.53E-07	3.91E-07	3.61E-07	3.18E-07	2.57E-07	2.02E-07	1.40E-07	9.63E-08	6.34E-08	4.07E-08	2.69E-08
45	8.84E-07	6.01E-07	4.18E-07	3.73E-07	3.59E-07	3.29E-07	2.73E-07	2.18E-07	1.53E-07	1.06E-07	7.05E-08	4.57E-08	3.01E-08
46	8.88E-07	5.91E-07	4.11E-07	3.79E-07	3.76E-07	3.51E-07	2.95E-07	2.38E-07	1.68E-07	1.17E-07	7.81E-08	5.07E-08	3.33E-08
47	8.91E-07	6.05E-07	4.25E-07	4.02E-07	4.05E-07	3.82E-07	3.23E-07	2.60E-07	1.84E-07	1.28E-07	8.49E-08	5.50E-08	3.62E-08
48	8.94E-07	6.17E-07	4.45E-07	4.23E-07	4.31E-07	4.09E-07	3.50E-07	2.81E-07	1.98E-07	1.37E-07	9.06E-08	5.85E-08	3.85E-08
49	8.78E-07	6.13E-07	4.53E-07	4.38E-07	4.48E-07	4.28E-07	3.64E-07	2.95E-07	2.09E-07	1.47E-07	9.69E-08	6.24E-08	4.09E-08
50	8.48E-07	5.99E-07	4.44E-07	4.33E-07	4.45E-07	4.28E-07	3.67E-07	2.99E-07	2.14E-07	1.50E-07	1.00E-07	6.54E-08	4.33E-08
51	8.10E-07	5.71E-07	4.24E-07	4.11E-07	4.22E-07	4.05E-07	3.47E-07	2.84E-07	2.03E-07	1.43E-07	9.65E-08	6.34E-08	4.22E-08
52	7.73E-07	5.36E-07	3.91E-07	3.76E-07	3.82E-07	3.62E-07	3.08E-07	2.49E-07	1.76E-07	1.22E-07	8.13E-08	5.26E-08	3.46E-08
53	7.11E-07	4.87E-07	3.48E-07	3.31E-07	3.32E-07	3.11E-07	2.59E-07	2.07E-07	1.43E-07	9.90E-08	6.43E-08	4.07E-08	2.63E-08
54	6.42E-07	4.29E-07	3.04E-07	2.84E-07	2.82E-07	2.62E-07	2.17E-07	1.72E-07	1.20E-07	8.19E-08	5.37E-08	3.44E-08	2.25E-08
55	5.57E-07	3.68E-07	2.58E-07	2.41E-07	2.38E-07	2.20E-07	1.83E-07	1.46E-07	1.02E-07	6.95E-08	4.66E-08	3.05E-08	2.03E-08
56	4.66E-07	3.09E-07	2.15E-07	2.01E-07	2.01E-07	1.87E-07	1.54E-07	1.23E-07	8.62E-08	5.95E-08	3.92E-08	2.52E-08	1.65E-08
57	4.03E-07	2.60E-07	1.85E-07	1.73E-07	1.74E-07	1.63E-07	1.36E-07	1.08E-07	7.47E-08	5.12E-08	3.30E-08	2.07E-08	1.32E-08
58	3.65E-07	2.30E-07	1.62E-07	1.54E-07	1.57E-07	1.49E-07	1.26E-07	1.01E-07	7.06E-08	4.87E-08	3.20E-08	2.05E-08	1.34E-08
59	3.34E-07	2.09E-07	1.44E-07	1.41E-07	1.45E-07	1.39E-07	1.19E-07	9.63E-08	6.88E-08	4.80E-08	3.23E-08	2.12E-08	1.42E-08
60	3.05E-07	1.96E-07	1.39E-07	1.32E-07	1.35E-07	1.29E-07	1.07E-07	8.74E-08	6.25E-08	4.40E-08	2.95E-08	1.92E-08	1.27E-08
61	2.93E-07	1.95E-07	1.39E-07	1.31E-07	1.30E-07	1.21E-07	1.00E-07	7.96E-08	5.51E-08	3.74E-08	2.46E-08	1.57E-08	1.02E-08
62	2.85E-07	2.00E-07	1.49E-07	1.42E-07	1.39E-07	1.26E-07	1.03E-07	7.96E-08	5.35E-08	3.58E-08	2.29E-08	1.43E-08	9.15E-09
63	2.69E-07	2.08E-07	1.69E-07	1.62E-07	1.60E-07	1.45E-07	1.18E-07	9.19E-08	6.24E-08	4.19E-08	2.68E-08	1.67E-08	1.07E-08
64	2.53E-07	2.12E-07	1.85E-07	1.83E-07	1.84E-07	1.71E-07	1.41E-07	1.13E-07	7.94E-08	5.50E-08	3.63E-08	2.34E-08	1.55E-08
65	2.31E-07	2.04E-07	1.89E-07	1.96E-07	2.01E-07	1.91E-07	1.62E-07	1.32E-07	9.40E-08	6.60E-08	4.44E-08	2.92E-08	1.96E-08
66	1.88E-07	1.81E-07	1.79E-07	1.96E-07	2.06E-07	1.98E-07	1.69E-07	1.37E-07	9.78E-08	6.84E-08	4.55E-08	2.95E-08	1.95E-08
67	1.60E-07	1.55E-07	1.60E-07	1.82E-07	1.99E-07	1.95E-07	1.67E-07	1.35E-07	9.53E-08	6.66E-08	4.35E-08	2.76E-08	1.79E-08
68	1.65E-07	1.38E-07	1.44E-07	1.70E-07	1.92E-07	1.91E-07	1.65E-07	1.33E-07	9.40E-08	6.50E-08	4.27E-08	2.73E-08	1.77E-08
69	1.73E-07	1.45E-07	1.41E-07	1.72E-07	1.94E-07	1.93E-07	1.67E-07	1.34E-07	9.53E-08	6.54E-08	4.34E-08	2.80E-08	1.84E-08
70	2.29E-07	1.86E-07	1.68E-07	1.87E-07	2.08E-07	2.05E-07	1.77E-07	1.43E-07	1.01E-07	6.94E-08	4.55E-08	2.91E-08	1.88E-08
71	2.91E-07	2.49E-07	2.25E-07	2.37E-07	2.50E-07	2.40E-07	2.03E-07	1.63E-07	1.14E-07	7.87E-08	5.12E-08	3.25E-08	2.08E-08
72	4.03E-07	3.46E-07	3.17E-07	3.18E-07	3.18E-07	2.96E-07	2.46E-07	1.97E-07	1.38E-07	9.55E-08	6.29E-08	4.04E-08	2.65E-08

Figure 5 continued

ARRIVAL TIME IN SECONDS

I \ J	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
2	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
3	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
4	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
5	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
6	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
7	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
8	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
9	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
10	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
11	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
12	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
13	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
14	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
15	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
16	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
17	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
18	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
19	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
20	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
21	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
22	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
23	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
24	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
25	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
26	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
27	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
28	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
29	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
30	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
31	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
32	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
33	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
34	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
35	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
36	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
37	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
38	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
39	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
40	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
41	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03

Figure 5 continued

42	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
43	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
44	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
45	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
46	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
47	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
48	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
49	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
50	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
51	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
52	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
53	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
54	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
55	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
56	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
57	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
58	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
59	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
60	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
61	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
62	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
63	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
64	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
65	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
66	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
67	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
68	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
69	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
70	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
71	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03
72	1.06E+02	1.70E+02	2.66E+02	3.72E+02	4.89E+02	6.59E+02	8.93E+02	1.15E+03	1.57E+03	2.08E+03	2.79E+03	3.72E+03	4.89E+03

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