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XOQDOQ: Computer Program for the Meteorological Evaluation of Routine Effluent Releases at Nuclear Power Stations

Final Report

Draft Report Published as NUREG-0324

Prepared by J. F. Sagendorf, J. T. Goll, W. F. Sandusky

Pacific Northwest Laboratory
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ABSTRACT

Provided is a user's guide for the U. S. Nuclear Regulatory Commission's (NRC) computer program XOQDOQ which implements Regulatory Guide 1.111. This NUREG supercedes NUREG-0324 which was published as a draft in September 1977. This program is used by the NRC meteorology staff in their independent meteorological evaluation of routine or anticipated intermittent releases at nuclear power stations. It operates in a batch input mode and has various options a user may select. Relative atmospheric dispersion and deposition factors are computed for 22 specific distances out to 50 miles from the site for each directional sector. From these results, values for 10 distance segments are computed. The user may also select other locations for which atmospheric dispersion deposition factors are computed. Program features, including required input data and output results, are described. A program listing and test case data input and resulting output are provided.

SUMMARY

A user's guide for the U.S. Nuclear Regulatory Commission computer program XOQDOQ is presented. This program is used by the staff in their independent meteorological evaluation of routine or anticipated, intermittent releases of radionuclides at commercial nuclear power stations. The program is not intended to evaluate the meteorological aspects of the consequences of accidental releases.

The present version of the program operates in a batch-input mode with various options that are user selectable. Relative atmospheric dispersion factors, X/Q values, and deposition factors, D/Q values, are computed for 22 specific distances out to 50 miles from the site. From these values, X/Q and D/Q values for 10 distance segments are computed. Both X/Q and D/Q values are computed for user-inputted specific points of interest.

The program is based on a straight-line trajectory Gaussian plume model. At the user's option, the plume concentration can be depleted by dry deposition and radioactive decay. The computed ground-level concentration can be modified to account for plume recirculation or stagnation. The program computes an effective plume height that accounts for physical release height, aerodynamic downwash, plume rise, and terrain features.

This version of the program was developed on a CDC 7600 computer in Fortran IV language. The structure of the program is such that it should be easily converted to other computer systems.

ACKNOWLEDGMENTS

The enthusiastic support and assistant of Tom Bander of the Pacific Northwest Laboratory in preparing this document is greatly appreciated. Mr. William G. Snell was the NRC Technical Monitor and Mr. Earl H. Markee, Jr., the NRC Project Manager.

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USER GUIDE FOR XOQDOQ: EVALUATING ROUTINE EFFLUENT RELEASES AT COMMERCIAL NUCLEAR POWER STATIONS

1.0 INTRODUCTION

This document provides a user's guide for the computer program XOQDOQ which is used by the Nuclear Regulatory Commission (NRC) in its independent meteorological evaluation of continuous and anticipated intermittent releases from commercial nuclear power reactors. This program has evolved form an earlier program developed by Sangendorf (1974) for NRC's predecessor, the Atomic Energy Commission (AEC). The program described in this document is a revised version of an earlier program (Sagendorf and Goll, 1976) and was developed on a CDC 7600 computer in Fortran IV language. Its structure is such that it could be easily converted to other computer systems. The earlier version of the program was also used by the NRC staff in its evaluations connected with Appendix I to 10 CFR, Part 50.

The program is based on the theory that material released to the atmosphere will be normally distributed (Gaussian) about the plume centerline. In predicting concentrations for longer time periods, the Gaussian distribution is assumed to be evenly distributed within the directional sector. A straight-line trajectory is assumed between the point of release and all receptors.

The program implements the assumptions outlined in Section C (excluding C1a and C1b) of NRC Regulatory Guide 1.111 (USNRC, 1977). In evaluating routine releases from nuclear power plants, it primarily is designed to calculate annual relative effluent concentrations, X/Q values, and annual average relative deposition, D/Q values, at locations specified by the user, and at various standard radial distances and segments for downwind sectors. Evaluations of anticipated intermittent (e.g. containment or purge) releases which occur during routine operation may also be evaluated using the program. Evaluation of intermittent releases provides both X/Q and D/Q values at various standard locations, as well as user-inputted specific points of interest.

It operates in a batch-input mode and has various options that a user may select. They can account for variation in the location of release points, additional plume dispersion due to building wakes, plume depletion via dry deposition and radioactive decay, and adjustments to consider non-straight trajectories. It computes an effective plume height that accounts for physical release height, aerodynamic downwash, plume rise, and terrain features. It cannot handle multiple emission sources, plume depletion via wet deposition, or evaluate the meteorological aspects of the consequences of accidental releases.

Provided in various sections of this user's guide is information on basic program features, format of the required data, a description of the program

and subroutines, and a description of the expected program output. Appendices to this guide include a listing of the program, sample data inputs and the resulting data output.

The program described in this guide is compatible with a CDC 7600 computer system under the NOS 1.0 operating system. Any questions regarding the program or problems encountered should be directed or reported to the Meteorology Staff, U.S. Nuclear Regulatory Commission, Washington, D.C.

2.0 INPUT CARD FORMAT

The required input data for program execution are listed in Table 2.1. The input data are categorized by card types, ranging from 1 to 17. For some card types, more than one physical card will be inputted.

Card Type 1 initializes options, known as KOPT's, for each release point to be evaluated. If multiple sites are to be evaluated with the program, then additional data sets, starting with Card Type 1, are required.

3.0 PROGRAM FEATURES

The program is based on the principle that diffusion of material released to the atmosphere can be described by a Gaussian distribution within the plume with transport described by a straight-line trajectory. A discussion of a Gaussian plume model is provided elsewhere (e.g. Slade, 1968). This model, though, only approximates the actual atmospheric transport and diffusion of effluents. Various terms used in it, namely, the horizontal and vertical dispersion coefficients, are empirically determined, largely from observations at or near ground level. Predicting plume concentrations at locations other than ground level will introduce additional errors into the calculation. Nevertheless, this modelling approach is especially useful for evaluating routine releases of material to the atmosphere and predicting resulting normalized concentrations and deposition amounts over long time periods.

The program has the following options:

1. The release may be

    a. always elevated
    b. always ground level, or
    c. a mixed mode, which is primarily used in the analysis of vent release points at or above the height of adjacent structures.

TABLE 2.1. List of Input Data

Card Type 1 is an array (KOPT) of options, such that 1 = do, 0 = bypass. These options remain in effect for all release points run. Thus, all release points must have the same assumptions.

Card Type	Columns	Variable Name	Format	Description
1	1	KOPT(1)	I1	Option to distribute calms as the first wind-speed class (if calms are already distributed by direction in Card Type 6, KOPT(1) = 0, and Card Type 5 is blank). If KOPT(1) = 1, the calm values of Card Type 5 are distributed by direction in the same proportion as the direction frequency of wind-speed class two.
1	2	KOPT(2)	I1	Option to input joint frequency distribution data as percent frequency.
1	3	KOPT(3)	I1	Option to compute a sector spread for comparison with centerline value in purge calculation (Normally = 1).
1	4	KOPT(4)	I1	Option to plot short-term X/Q values versus probability of occurrence (Normally = 0).
1	5	KOPT(5)	I1	Option to use cubic spline in lieu of least square function for fitting intermittent release distribution (Normally = 1).
1	6	KOPT(6)	I1	Option to punch radial segment X/Q and D/Q values (Normally = 1).
1	7	KOPT(7)	I1	Option to punch output of X/Q and D/Q values of the points of interest (Normally = 1).
1	8	KOPT(8)	I1	Option to correct X/Q and D/Q values for open terrain recirculation.
1	9	KOPT(9)	I1	Option to correct X/Q and D/Q values using site specific terrain recirculation data.

TABLE 2.1. List of Input Data

Card Type	Columns	Variable Name	Format	Description
1	10	KOPT(10)	I1	Option to use desert sigma curves (Normally = 0).
1	11	KOPT(11)	I1	Option to calculate annual X/Q averages with 30 degree sectors for north, east, south and west and 20 degree sectors for all others (Normally = 0, and the code will use 22-1/2 degree sectors).
2	1-80	TITLM	20A4	The main title printed at the beginning of the output.
3	1-5	NVEL	I5	The number of velocity categories (maximum of 14).
3	6-10	NSTA	I5	The number of stability categories (maximum of 7) (1 always equals Pasquill stability class A, 2 = B, ..., 7 = G).
3	11-15	NDIS	I5	The number of distances with terrain data for each sector. The number of distances must be the same for each sector (Card Type 10)(maximum of 10).
3	16-20	INC	I5	The increment in percent for which plotted results are printed out (Normally = 15).
3	21-25	NPTYPE	I5	The number of titles of receptor types (cow, garden, etc.) (Card Type 13)(maximum of eight)
3	26-30	NEXIT	I5	The number of release exit points (maximum of five).
3	31-35	NCOR	I5	The number of distances of site specific correction factors for recirculation (maximum of 10).
4	1-5	PLEV	F5.0	The height (in meters, above ground level) of the measured wind presented in the joint frequency data (Card Type 7). (For elevated/ground-level mixed release, use the 10-meter level winds).

TABLE 2.1. List of Input Data

Card Type	Columns	Variable Name	Format	Description
4	6-20	DECAYS(I) I=1, 3	3F5.0	For each I: The half-life (days) used in the X/Q calculations: if DECAYS > 100, no decay will occur; if DECAYS < 0, depletion factor will be used in the X/Q calculations; if DECAYS = 0, X/Q will not be calculated. (Normally, DECAYS(1) = 101, (2) = 2.26, (3) = -8.00.)
4	21-25	PLGRAD	F5.0	Plant grade elevation (feet above sea level). If PLGRAD = 0.0, DIST and HT data Card Type 10 and 11 must be in meters. If PLGRAD < 0.0, DIST in miles and HT data in feet above plant grade. If PLGRAD > 0.0 above DIST in miles and HT data in feet above sea level.
5	1-35	CALM(I) I=1, NSTA	7F5.0	The number of hours, or percent, of calm for each stability category; if KOPT(1) = 0, insert blank card. (Note: I=1 is stability class A, 2=B, ..., 7=G).
6	1-80	FREQ(K,I,J) K=1, 16 I=1, NVEL (if KOPT(1) = 0) I=2, NVEL (if KOPT(1) = 1) J=1, NSTA		The joint frequency distribution in hours (or percent). The values for 16 (K) sectors are read on each card for each combination of wind-speed class (I) and stability class (J). The loop to read these value cycles first on direction continuing in a clockwise fashion), then on wind class and finally on stability class.
7	1-5	UCOR	F5.0	A correction factor applied to wind-speed classes. If UCOR < 0: no corrections will be made. If UCOR > 100: the wind-speed classes will be converted from miles/hour to meters/second.

TABLE 2.1. List of Input Data

Card Type	Columns	Variable Name	Format	Description
7	6-75	UMAX(I)	14F5.0	The maximum wind speed in each wind-speed class, in either miles/hour or meters/second. (If given in miles/hour, set UCOR > 100.)
Card Types 8 and 9 are read in for each correction factor and distance given, I = 1,NCOR				
8	1-80	VRDIST(K,I) K=1,16	16F5.0	The distance in meters at which correction factors are given. These values are read in beginning with south and proceeding in a clockwise direction (maximum of 10).
9	1-80	VRCR(K,I) K=1,16	16F5.0	Correction factor to be applied to X/Q and D/Q values corresponds to distances specified in VRDIST.
Card Types 8 and 9 are repeated for the remaining distances and correction factors. Card Types 10 and 11 are read in for each terrain distance and height given, I = 1,NDIS.				
10	1-80	DIST(K,I) K=1,16	16F5.0	The distance in meters at which terrain heights are given. These values are read in beginning with south and proceeding in a clockwise direction (maximum of ten distances).
11	1-80	HT(K,I) K=1,16	16F5.0	The terrain heights (in meters, above plant grade level) corresponding to the distances specified in the DIST array (Card Type 10). These values are read in the same order as the DIST array. For a given direction and distance, the terrain height should be the highest elevation between the source and that distance anywhere within the direction sector.
Card Types 10 and 11 are repeated for the remaining distances and heights.				

TABLE 2.1. List of Input Data

Card Type	Columns	Variable Name	Format	Description
12	1-25	NPOINT(I) I=1, NPTYPE	515	The number (maximum of 30) of receptor locations for a particular receptor type (such as the number of cows, gardens, or site boundaries).
Card Types 13 and 14 are read in for each receptor type, thus I=1, NPTYPE				
13	1-16	TITLPT(I,J)	4A4	The title (cows, gardens, etc.) of the receptor type for the receptor locations (Card Type 14) (a maximum of 16 spaces).
14	1-80	KDIR(I,N) PTDIST(I,N) N=1,NPOINT(I)	8(I5, F5.0)	The receptor direction and distance. KDIR is the direction of interest, such that 1 = South, 2 = SSW,..., 16 = SSE, PTDIST is the distance, in meters, to the receptor location.
Card Types 13 and 14 are repeated for the remaining receptor types.				
Card Types 15, 16, and 17 read in for each plant release point, thus I = 1, NEXIT				
15	1-80	TITLE(I,J)	20A4	The title for the release point whose characteristics are described on Card Types 16 and 17.
16	1-5	EXIT(I)	F5.0	The vent average velocity (meters/second). (Note: if a 100% ground-level release is assumed, set EXIT = 0, DIAMTR = 0, and SLEV = 10 meters).
16	6-10	DIAMTR	F5.0	The vent inside diameter (meters).
16	11-15	HSTACK(I)	F5.0	The height of the vent release point (meters, plant grade level). If release is 100% elevated, input negative of height.
16	16-20	HBLDG(I)	F5.0	The height of the vent's building (meters, above plant grade level).

TABLE 2.1. List of Input Data

Card Type	Columns	Variable Name	Format	Description
16	21-25	CRSEC(I)	F5.0	The minimum cross-sectional area for the vent's building (square meters).
16	26-30	SLEV(I)	F5.0	The wind height used for the vent elevated release (meters, above plant grade level).
16	31-35	HEATR(I)	F5.0	The vent heat emission rate (cal/sec) (Normally = 0).
17	1	RLSID(I)	A1	A one letter identification for the release point.
17	2-5	IPURGE(I)	I4	IPURGE = 1, 2 or 3 if the vent has intermittant releases. The 1, 2 or 3 corresponds to DECAYS(1), DECAYS(2), or DECAYS(3) (Card Type 4), respectively, whichever is used as the base for intermittent release calculations (normally no decay/no deplete X/Q, such that IPURGE(I) = 1); if a vent has no intermittent releases, IPURGE = 0.
17	6-10	NPURGE(I)	I5	The number of intermittent releases per year for this release point.
17	11-15	NPRGHR(I)	I5	The average number of hours per intermittent release.

Card Types 15, 16 and 17 are repeated for the remaining release points.
Card Types 1-17 may be repeated for the next case.

2. The effluent plume for elevated releases can undergo plume rise due to momentum and/or buoyancy.

3. Ground-level releases can be affected by additional dispersion due to nearby building wakes.

4. Wind speeds measured at one level may be extrapolated to other elevations for release point evaluation.

5. Plume growth parameters (σ_y and σ_z) can be described by
   a. Pasquill-Gifford curves (Slade, 1968)
   b. desert curves by Markee (Yanskey et al, 1966).

6. For elevated releases, topography can be inputted for use in calculation of the effective plume height.

7. The plume may undergo radioactive decay for varied half-lives.

8. The plume may be depleted via dry deposition.

9. X/Q and D/Q values may be modified by standard or inputted values to account for local air recirculation or air stagnation.

10. X/Q and D/Q values can be punched for predetermined distance segments and for specific points of interest.

11. The joint frequency data may be inputted as a percent frequency of occurrence or as total frequency of occurrence.

Specific information on program capabilities are given in Section 4.0.

Meteorological data is input into the program as a joint frequency table, which is a table of the fractional occurrence during a given time period of a particular combination of stability class type, wind direction, and wind speed class. The wind direction has been broken into sixteen sectors proceeding clockwise from N through NNW. The wind speeds are grouped into classes, with the program allowing up to 14 separate classes, which includes a class for calm wind speeds. Atmospheric stability is grouped according to seven categories from extremely unstable to extremely stable.

3.1 MULTIPLE SITE ANALYSIS

The present version of the program can handle multiple site analysis by simply adding additional data sets. Each data set would begin with the Card Type 1 (KOPT DATA) and include the same type of information as the previous data set. The program terminates by reading an end of file (EOF) card, so within the normal run-time limit of the operating system, an unlimited number of sites can be analyzed. Presently, the program is limited to five separate release points. If more release points for a specific site exist, multiple data sets differing only in release point characteristics could be used.

The advantage of running multiple data sets is to reduce compilation time of the program. However, in most computers which swap jobs in the central processing units (CPU), the job turn-around time will probably increase.

3.2 CONTINUOUS RELEASE ANALYSIS

As noted in Section 4.1, continuous releases are analyzed according to a sector spread version of the Gaussian plume equation. The program also has the ability to compute a centerline concentration value for comparison with the sector spread concentration, with the most conservative value retained. If this comparison is desired appropriate lines commented in Subroutine ANNUAL should be changed to active statements. (See listing in Appendix A.)

For a special case of a continuous ground level release in a desert-type environment, the building wake term will only apply under certain conditions. For unstable and neutral atmospheric conditions, normal building wake calculations prevail. For stable atmospheric conditions, the building wake calculation will be set to zero. This condition applies for both sector spread and centerline calculations at specific points of interest and at set distances. The rationale for this feature is the desert sigmas include the effect of plume meander. During stable atmospheric conditions the effect of plume meander dominates the effects of building wake. These conditions, however, are not used for intermittent releases because these releases may be for short time intervals during which plume meander is not considered to have occurred.

3.3 INTERMITTENT RELEASE ANALYSIS

If a intermittent release point is to be evaluated, the user should set IPURGE = 1 on Card Type 17. The number of intermittent releases per year and average number of hours per release are inputted on Card Type 17 as NPURGE and NPRGHR, respectively. Since the program evaluates intermittent releases in terms of total hours of release, the computed results for two intermittent releases of 10 hours will be the same as 1 intermittent release of 20 hours, if emission height and rate are the same.

A discussion of how X/Q values for intermittent releases are calculated is given in Section 4.6.

3.4 PUNCHED DATA OUTPUT

The user can specify various data to be punched out by the program. If KOPT(6) = 1 on Card Type 1, the segment X/Q and D/Q values will be punched. If KOPT(7) = 1 on Card Type 1, the X/Q and D/Q values for the user-inputted points of interest will be punched.

If a user is evaluating both a continuous and purge release in the same data set, and both KOPT(6) and KOPT(7) = 1, the segment X/Q and D/Q values will only be punched once. If the user desires punched segment X/Q and D/Q values for a purge release calculation, that release point should be evaluated as a separate data set.

3.5 EFFECTIVE STACK HEIGHT

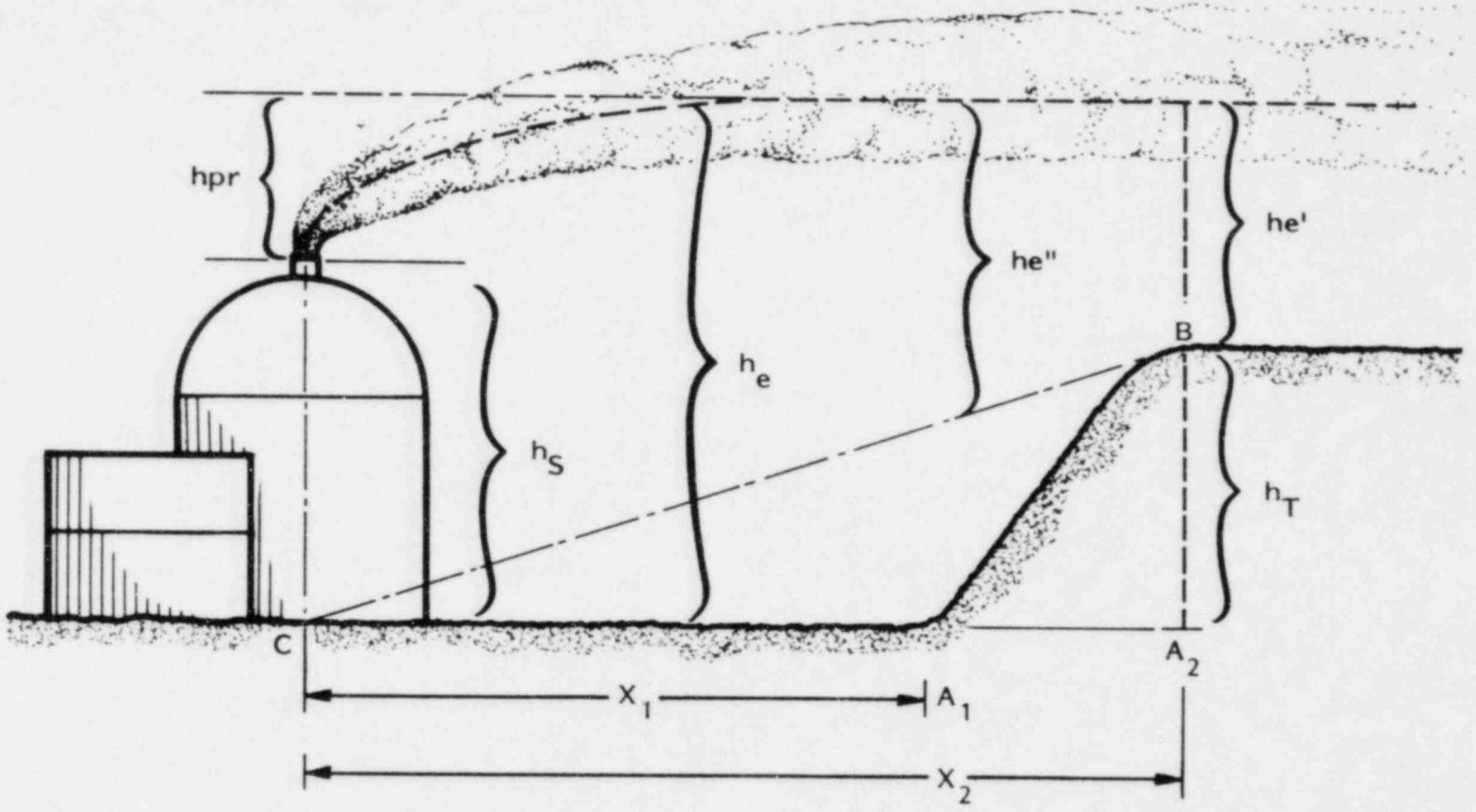
For both an elevated and mixed-mode release an effective stack height is computed. This value, which will vary according to direction and distance from the site, incorporates initial plume rise above the release point, any effects of aerodynamic downwash, and reduced height due to user inputted terrain features. For a particular inputted terrain feature the program linearly interpolates a terrain height from plant grade to the height of the terrain feature. This feature is illustrated in Figure 3.1.

In Figure 3.1 the terrain feature starts at point A_1 at distance X_1 from the site and reaches it's maximum elevation at point A_2 at distance X_2 from the site. The plume centerline is represented by a dashed line and reaches a height that is the sum of the plume rise, h_{pr}, and height of the vent, or stack, h_s. At distances less than x_1 the effective plume height, h_e, is not reduced by terrain features. If the user inputs distance, x_1, with a terrain height equal to plant grade and inputs distance, x_2, with terrain height, h_T, the program will linearly interpolate a terrain height between point x_1 and B with the effective terrain height becoming h_e' at distance x_2. If the user inputs x_2 as the distance for the first terrain height of h_t, the program will interpolate a terrain height as shown by line CB so that the effective terrain height at point A_1 would be h_e'', not h_e. The user will, therefore, have a lower than desired effective plume height and compute conservative X/Q and D/Q values at distance x_1. Once an effective plume height, such as h_e', has been established in the program only an inputted terrain feature higher than h_T will produce an effective plume height less than h_e'.

3.6 STANDARD AND SITE-SPECIFIC CORRECTION FACTORS

Adjustments to represent non-straight line trajectories (recirculation or stagnation) may be accomplished in two ways. First, standard default correction factors for each directional sector can be implemented by setting KOPT(8) = 1 on Card Type 1. If that option is chosen, all values of X/Q and D/Q will be multiplied by a specific factor as a function of the distance that is given in Figure 3.2. This correction is applied uniformly to all directional sectors.

Second, specific adjustments may be known for a site as a result of field diffusion experiments or comparison of results from a variable trajectory model. If such data does exist, the user should set KOPT(9) = 1 on Card Type 1 and input those factors via Card Types 8 and 9. The number of data sets to be entered is set by parameter NCOR on Card Type 3. Specific correction factors to be entered do not have to be at the same distance for each directional sector. The user may enter specific factors in the north sector for, e.g., 1000, 2000, 3000 meters, and specific factors in the south sector at distances of, e.g., 5000, 6000 and 7000 meters. The only restriction is the same number of correction factors must be inputted for each directional sector.



h_S = HEIGHT OF STACK (RELEASE Pt)

hpr = HEIGHT DUE TO PLUME RISE

he = EFFECTIVE STACK HEIGHT

he', he" = EFFECTIVE STACK HEIGHT WITH TERRAIN CORRECTION

h_T = TERRAIN HEIGHT ABOVE PLANT GRADE

X_1, X_2 = DISTANCE TO TERRAIN FEATURES

FIGURE 3.1. Calculation of Effective Stack Height

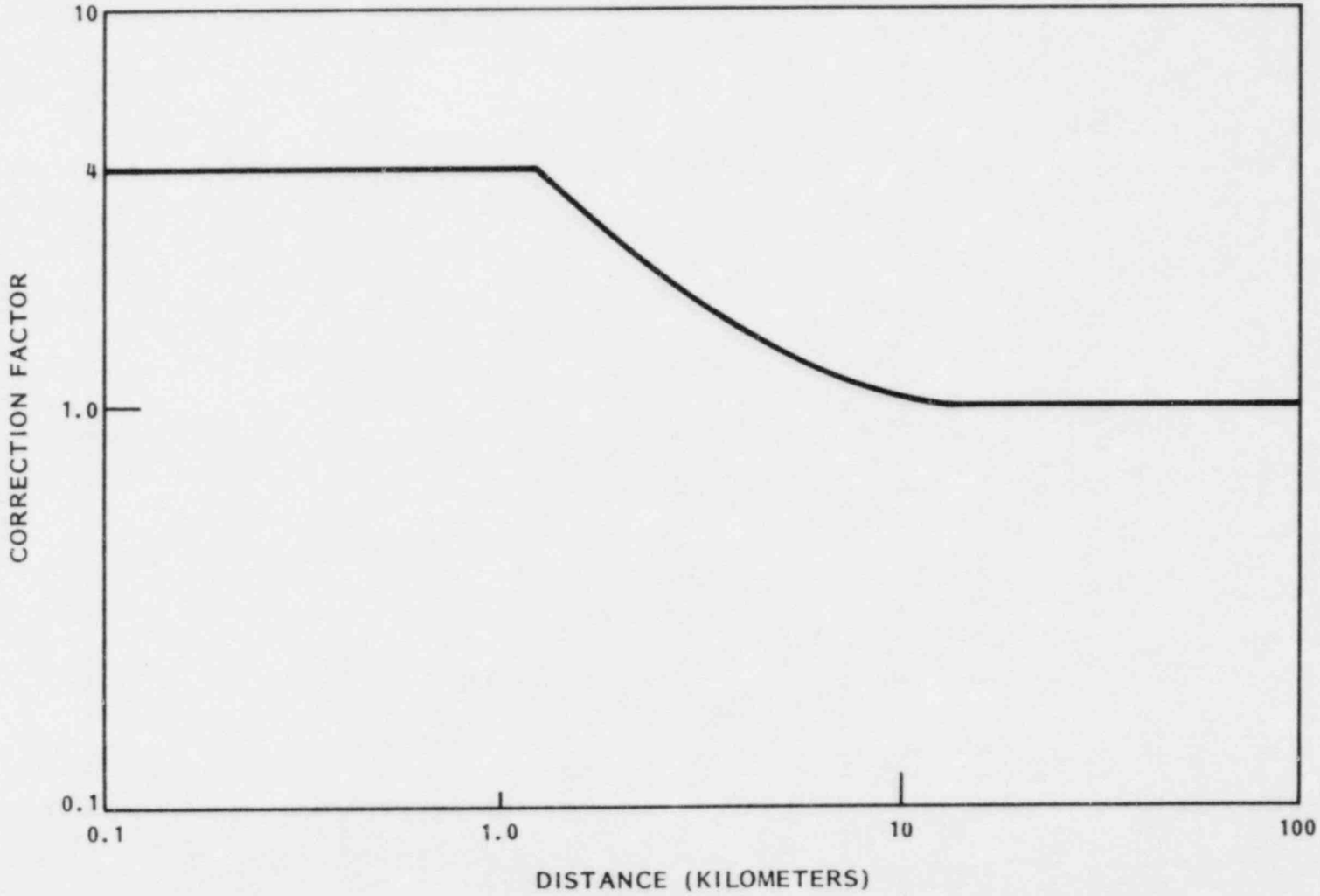


FIGURE 3.2. Open Terrain Correction Factor

If specific correction factors are to be used, the program will use the first correction factor for each directional sector for all computed X/Q and D/Q values to the distance of the first specific correction factor. The program linearly interpolates between correction factors to apply appropriate corrections to those X/Q and D/Q values lying between distances of the correction factors. The X/Q and D/Q values at distances greater than the greatest distance from the site with a correction factor will be adjusted by that correction factor.

3.7 WIND SPEED CLASSES

The maximum value for each wind-speed class is entered via input variable UMAX on Card Type 7. If these values are in miles per hour, the parameter UCOR on Card Type 7 must be set to some value greater than 100. If the values are in meters per second, UCOR should be set to some value less than 0; e.g., -100. The number of maximum wind-speed class values entered must correspond to the number entered for NVEL on Card Type 3.

If the number or frequency of calms occurring for each stability class is being inputted, and KOPT(1) = 1 on Card Type 1, the first value for UMAX on Card Type 7 should represent the starting threshold of the wind speed sensor. If KOPT(1) = 0 on Card Type 1, the first UMAX value is the maximum value of the first non-calm wind speed category.

If the last wind-speed class is of the format, wind speeds > than some value, the user must establish a maximum wind speed for that class. Generally, a value of 5 units greater than the largest wind speed noted is acceptable.

3.8 CALMS

Data on the number or frequency of calms by stability class is inputted to the program via Card Type 5. If calms are included in the first wind-speed class, a blank card should input for Card Type 5. If calm data does exist, the user has two options: (1) to create a separate wind-speed class for the calm data, or (2) to distribute the calms according to the directional distribution of the first non-calm wind-speed class.

If KOPT(1) = 1 on Card Type 1 a separate wind-speed class for the the calm data will be established. The user should remember to add 1 to the value of NVEL that normally exist.

4.0 DESCRIPTION OF PROGRAM XOQDOQ, INCLUDING SUBROUTINES

This program reads in and prints out the inputted data selected by the user. It also calls the subroutines required to evaluate both continuous or purge releases. The main program structure is given in Figure 4.1 in which the basic subroutine calling sequence to evaluate each release point is noted.

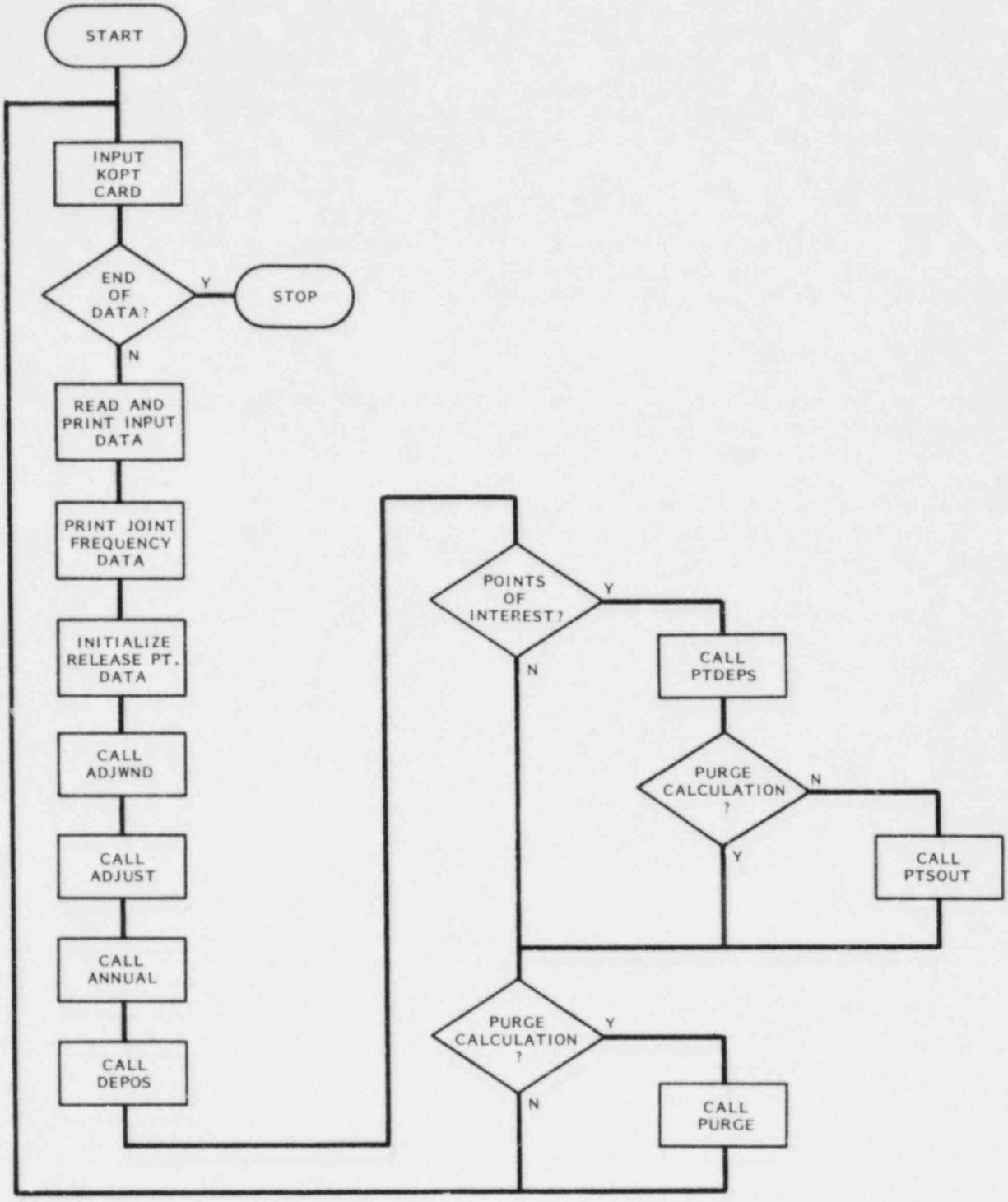


FIGURE 4.1. Flow Chart for XOQDOQ

The program can distribute inputted calms according to the options selected, either as a separate wind-speed class or into the first wind-speed class. A more detailed discussion of the capability is given in Section 3.8.

The program is structured so multiple sites can be evaluated by a single execution of the program. If the program is used in this mode, multiple data sets, including inputted joint frequency distribution data, are required. With a single meteorological data set, a maximum of five release points can be evaluated.

A description of all subroutines is given below. In the descriptions, references are made to the input cards described in Section 2.0. Flow diagrams for each of the major subroutines in the XOQDOQ program are given in Figures 4.2 through 4.5. Flow diagrams for the subroutines MIXD15 and CALC, which are called by PURGE, are given in Figures 4.6 and 4.7.

4.1 SUBROUTINE ANNUAL

This routine calculates long-term or annual average values of X/Q. It assumes a continuous release and that resulting effluent concentrations will be distributed evenly across a 22-1/2 degree direction sector. This subroutine calculates concentrations for ground-level and elevated releases only. If the release is in a mixed mode, concentrations for both elevated and ground-level releases are calculated, and the resultant concentration value is based on the percentage of time each type of release would occur.

For elevated releases, concentrations are predicted using the modified equation from Slade (1968) given below:

$$\frac{\bar{X}}{Q}(x, K) = \frac{2.032}{x} \cdot RF(x, K) \sum_{i,j}^{N,7} \frac{DEPL_{ij}(x, K)\ DEC_i(x)\ f_{ij}(K)}{\bar{U}_i(x)\ \sigma_{zj}(x)} \cdot \exp -0.5\left(\frac{h_e^2}{\sigma_{zj}(x)^2}\right) \quad (1)$$

where:

$X_{(x,K)}$ = average effluent concentration normalized by source strength at distance x in directional sector K (second/cubic meter)

x = the downwind distance (meters)

i = the ith wind-speed class

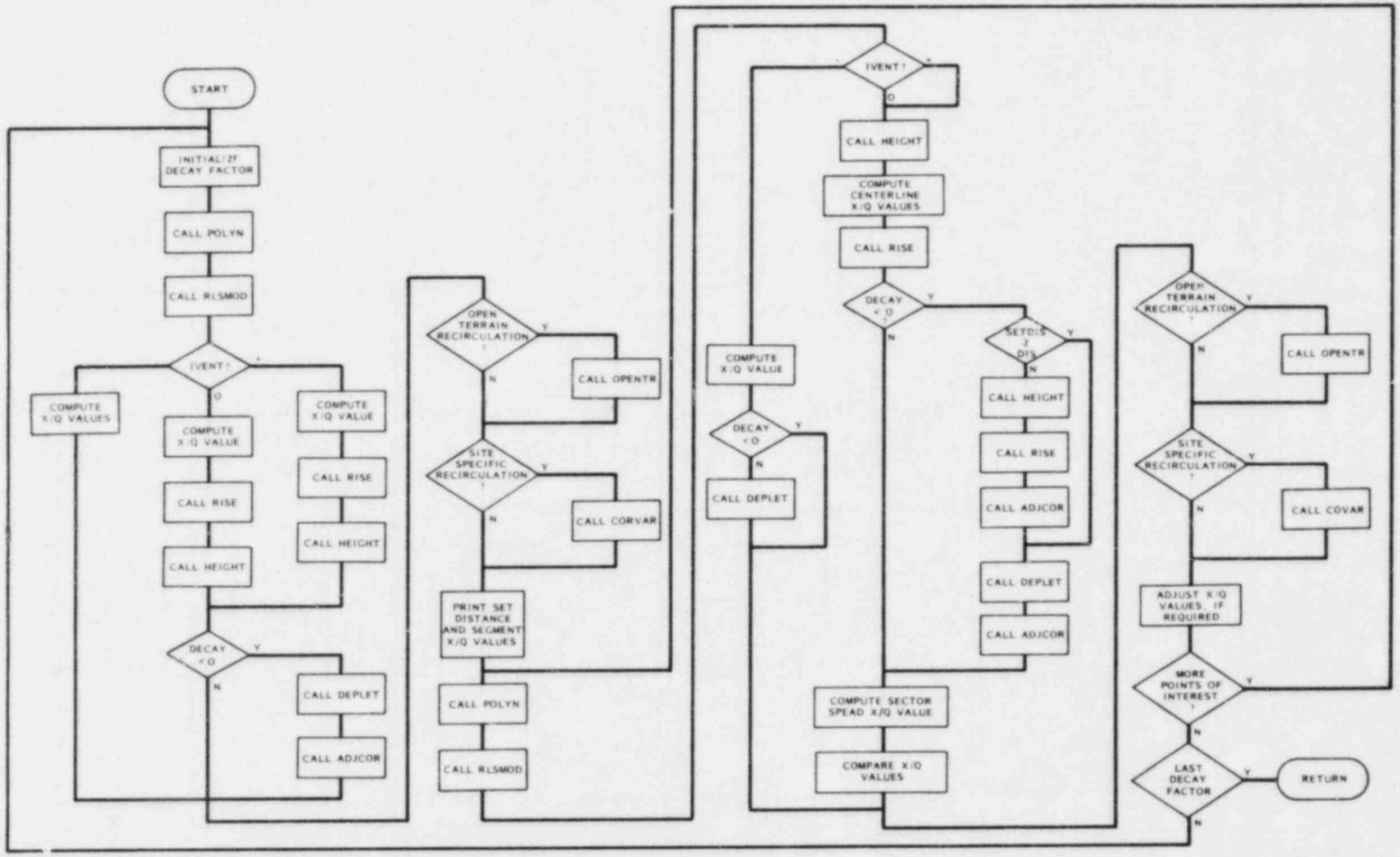


FIGURE 4.2. Flow Chart for ANNUAL

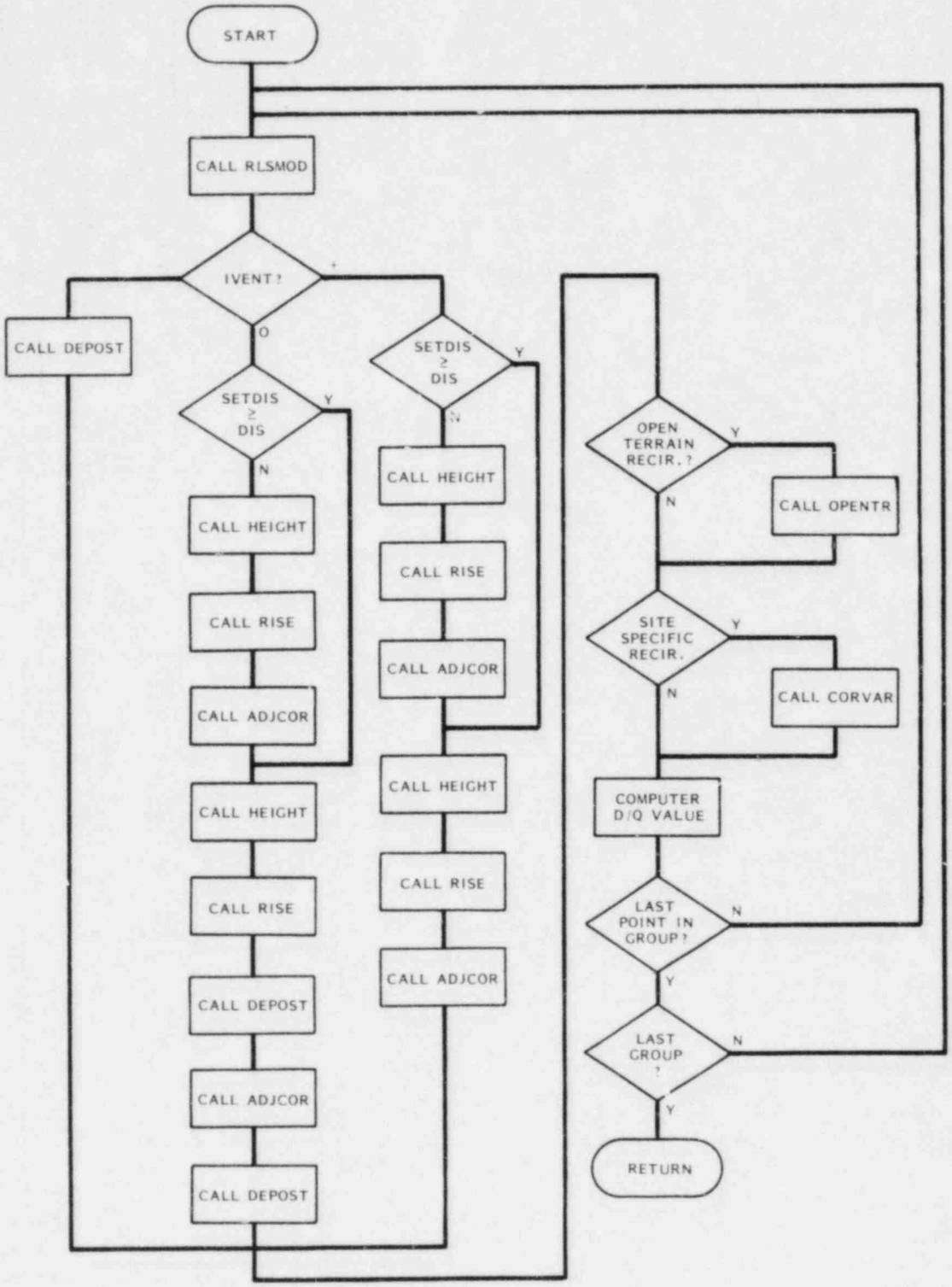


FIGURE 4.3. Flow Chart for PTDEPS

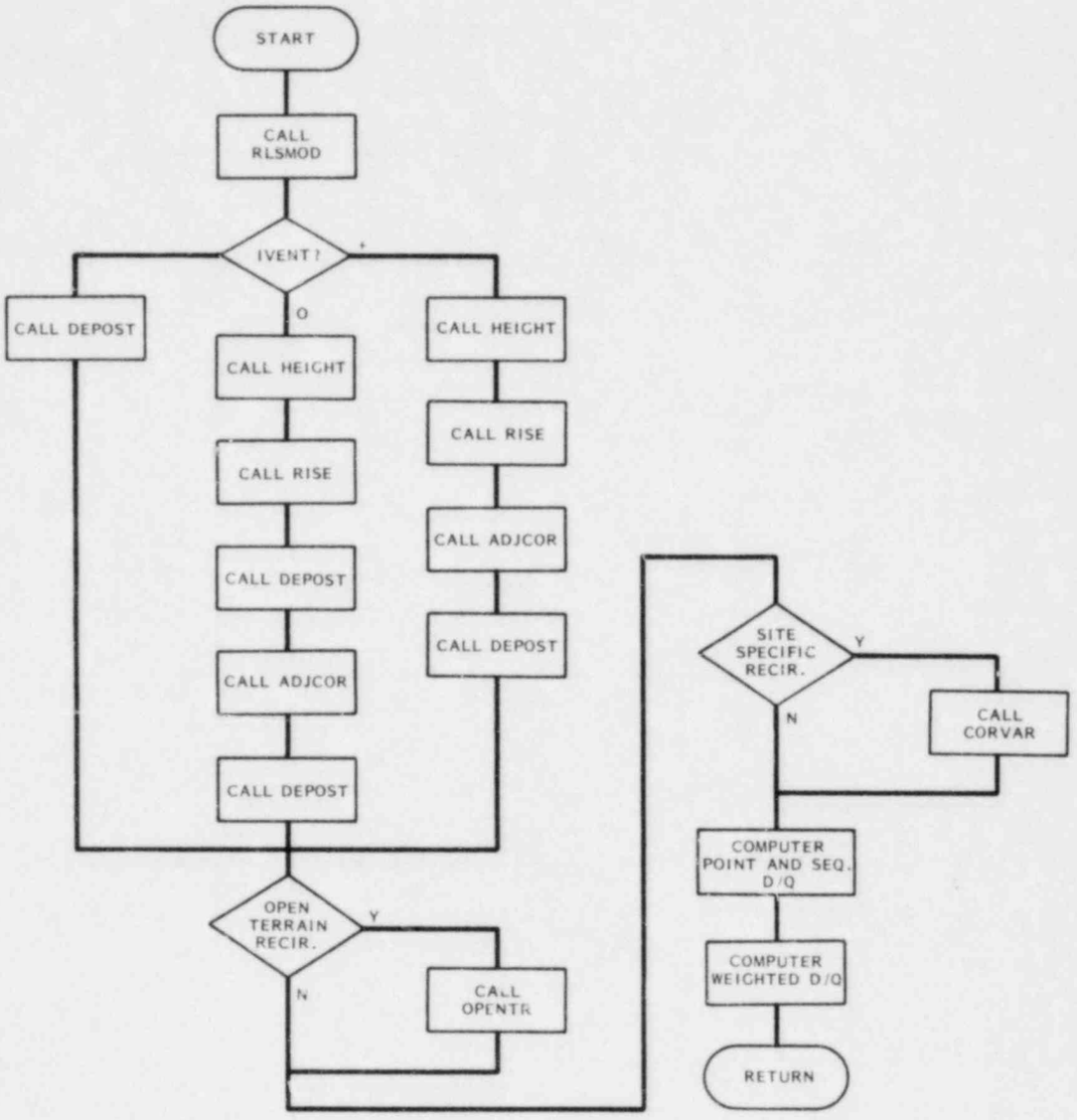


FIGURE 4.4. Flow Chart for DEPOS

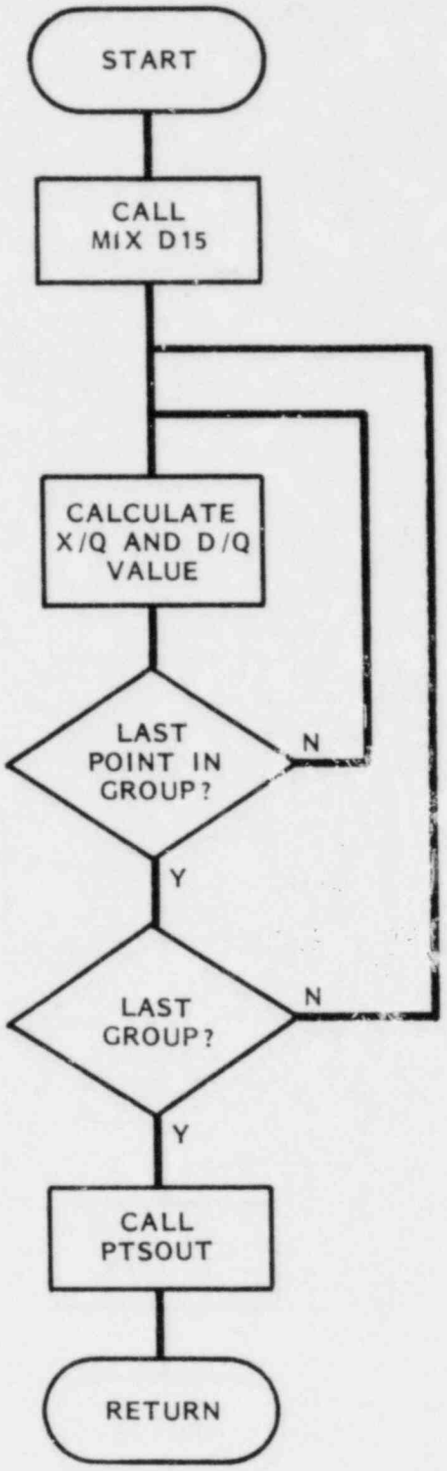


FIGURE 4.5. Flow Chart for PURGE

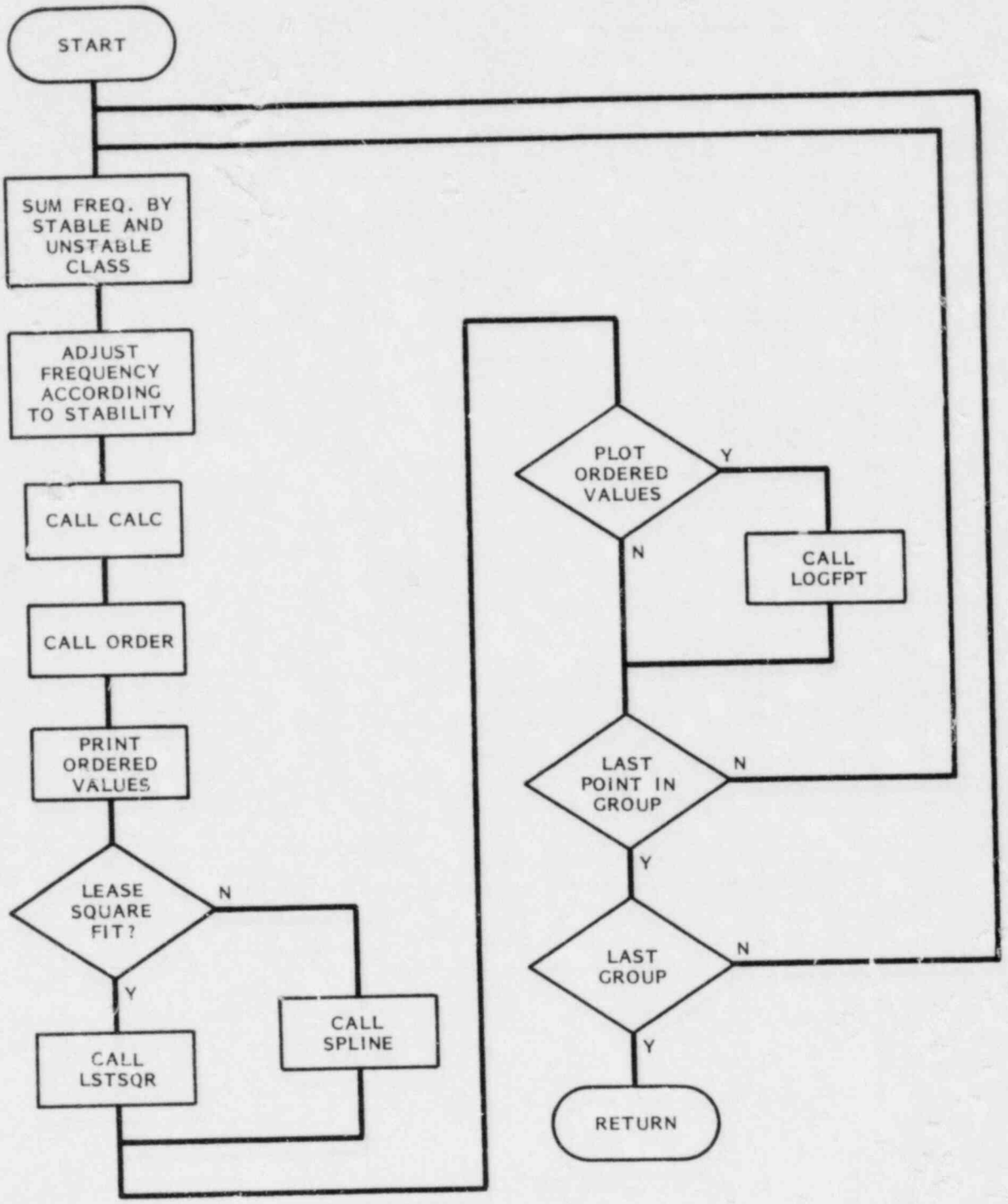


FIGURE 4.6. Flow Chart for MIXD15

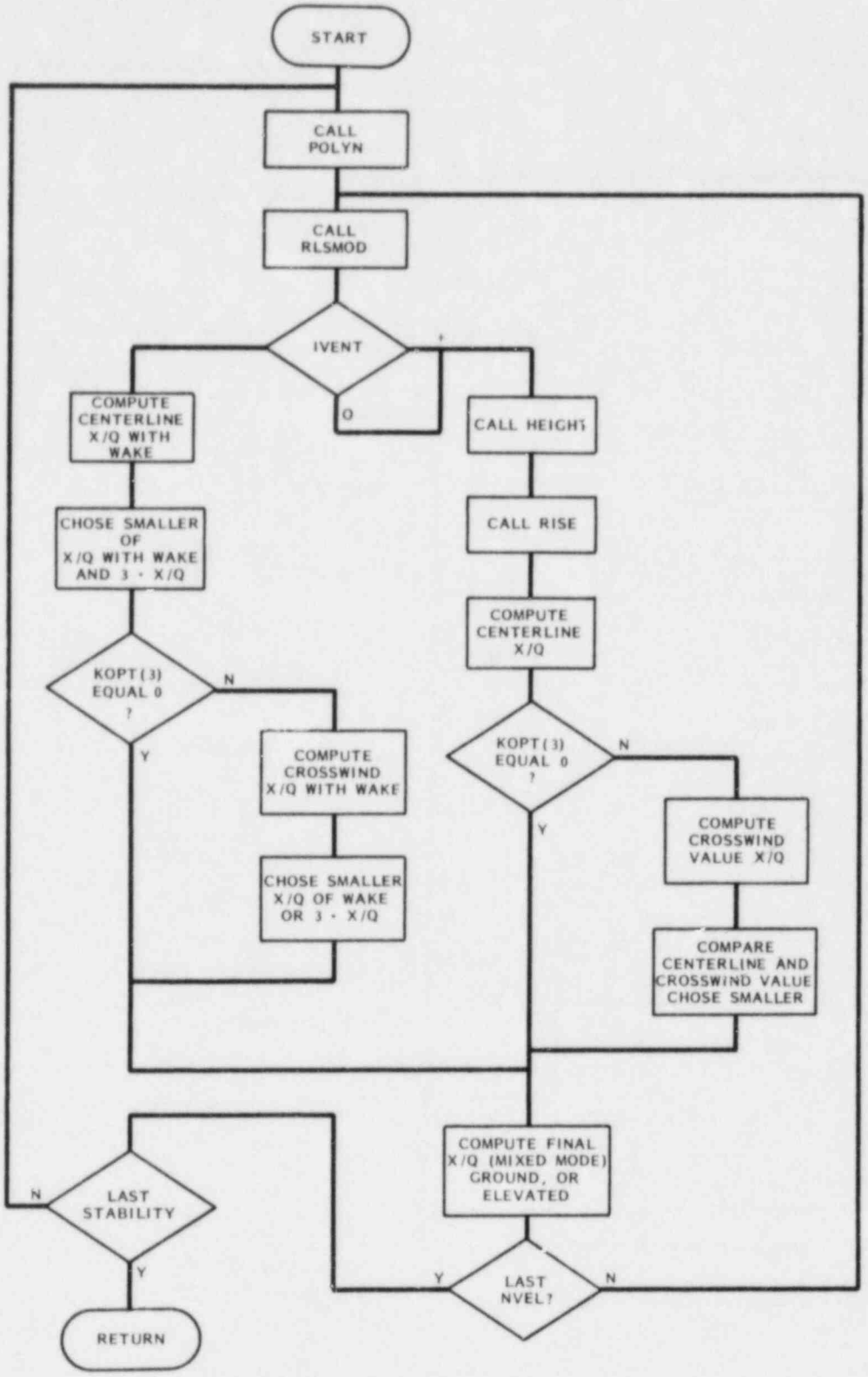


FIGURE 4.7. Flow Chart for CALC

j = the jth atmospheric stability class, grouped into seven classes according to Regulatory Guide 1.23

K = kth wind-direction class

U_i = mid-point value of the ith wind-speed class

$\sigma_{z_j}(x)$ = the vertical plume spread for stability class j at distance x, determined from subroutine POLYN (meters)

$f_{ij}(k)$ = joint probability of occurrence of the ith wind-speed class, jth stability class, and kth wind-direction sector.

h_e = effective plume height, determined from Subroutine RISE (meters)

$DEC_i(x)$ = reduction factor due to radioactive decay at distance x for the ith wind-speed class

$DEPL_{ij}(x,K)$ = reduction factor due to plume depletion at distance x for the ith wind-speed class, jth stability class, and Kth wind-direction class

$RF(x,K)$ = correction factor for recirculation and stagnation at downwind distance x and Kth wind-direction class; standard values can be used [KOPT(8)], inputted by the user [KOPT(9) and Card Type 8 and 9], or not used [KOPT(8) and KOPT(9) = 0].

For elevated release, a plume rise is determined and the effective plume height is calculated for each wind-direction sector, K, as a function of distance, x, from the site. If topography data is inputted, the effective plume height is reduced. A more complete discussion of effective plume height is given in Section 3.5

Ground-level release concentrations are calculated using the following two equations modified from Slade (1968):

$$\frac{\chi}{Q}(x,K) = \frac{2.032}{x} RF(x,K) \sum_{i,j}^{N7} DEPL_{ij}(x,K)\, DEC_i(x)\, f_{ij}(K) \left[\bar{U}_i\left(\sigma_{z_j}^2(x) + CD_z^2/\pi\right)^{1/2}\right]^{-1} \qquad (2)$$

and

$$\frac{\overline{X}}{Q}(x,K) = \frac{2.032}{x} RF(x,K) \sum_{i,j}^{N7} DEPL_{ij}(x,K)\, DEC_i(x)\, f_{ij}(K) \left[\sqrt{3}\overline{U}_i \sigma_{zj}(x)\right]^{-1} \quad (3)$$

where $X/Q(x,K)$, i,j,K, U_i, $\sigma_{zj}(x)$ $f_{ij}(K)$, $DEC_i(x)$, $DEPL_{ij}(x,K)$, and $RF(x,K)$ have been defined previously; and

D_z = building height used to compute additional atmospheric dispersion due to the building wake, based on Yanskey et al. (1966).

Equation 3 represents the maximum additional dispersion due to the building wake. The program compares the results from Equation 2 and 3 and retains the higher (most conservative) X/Q value.

The values obtained from Equation 1 and/or Equations 2 and 3 are a function of downwind distance (x) and wind-direction sector (K). The program is designed to compute concentrations for 22 downwind distances (x) between 0.25 and 50 miles for each of the 16 directional sectors. Therefore, normalized effluent concentrations are predicted at 352 downwind locations.

This subroutine, using the predicted downwind concentrations, computes concentrations for 10 downwind segments for each of the 16 directional sectors. The computed value represents an average concentration for the downwind directional sector bounded by the range of the segment. For example, a $\overline{X}/Q$ value for the segment 40-50 miles in the North sector represents an average $\overline{X}/Q$ value for any point north of the site between 40 and 50 miles north of the site.

The technique for computing the $\overline{X}/Q$ segment values is given by the following relationship:

$$\overline{X}/Q_{seg}(K) = \frac{R_1\ X/Q(R_1,K) + r_1 \cdot X/Q(r_1,K) + \ldots + r_n \cdot X/Q(r_n,K) + R_2 \cdot X/Q(R_n,K)}{R_1 + r_1 \ldots + r_n + R_2} \quad (4)$$

where

$X/Q_{seg}(K)$ = average value of X/Q for the segment for the directional sector K

$X/Q(R_1, K)$ = X/Q value at downwind distance R_1 for the directional sector K

R_1, R_2 = downwind distance of the segment boundaries

$r_1 \ldots r_n$ = selected radii between R_1 and R_2.

In addition to calculating concentrations for the 22 downwind distances for each directional sector, this subroutine will calculate normalized concentrations, X/Q values, at up to 150 individual receptor locations specified by the user. The same techniques described by Equations 1, 2, and 3 are used to calculate concentrations at receptor points.

Equations 1, 2 and 3 require information on a reduction factor due to radioactive decay. That term, $DEC_i(x)$, is calculated by the following relationship as given by Slade (1968):

$$DEC_i(x) = EXP\ (-0.693\ t_i/T) \qquad (5)$$

where

$t_i = x/(86400 \cdot U_i)$
T = half-life, in days, of the radioactive material
t_i = travel time, in days
x = downwind or travel distance, in meters
U_i = Midpoint of the ith wind-speed class in meters/second.

The value for T, half-life in days, is inputted via Card Type 4. Up to three separate decay half-life values can be inputted into the program, with the maximum allowable half-life being 100 days.

Calculated concentrations can include the effect of plume depletion due to dry deposition, using data given in Figures 3 through 6 of Regulatory Guide 1.111 (USNRC, 1977). The depletion factor is adjusted for changes in topography. The technique used in that adjustment is given in Section 4.15. The correction factor to account for non-straight line trajectories can be based on a standard correction factor for open terrain correction (Card Type 1, KOPT(8) = 1) or based on user inputted data (Card Type 1, KOPT(8) = 1, and Card Type 8 and 9). If both KOPT(8) and KOPT(9) = 0, no correction factor will be applied.

4.2 SUBROUTINE DEPOS

This subroutine calculates the relative deposition per unit area, D/Q, by directional sector for 22 downwind specific distances and 10 downwind segments between 0.25 and 50 miles. The specific and segment distances used are the same as those used in ANNUAL to produce X/Q values. Deposition amounts computed assumed the effluent release to be elevated only, ground level only, or a mixed elevated/ground-level release that is determined by computing the ratio of the effluent exit velocity to the exit level wind speed. Information on resultant plume rise, topography, and deposition adjustment factors calculated in subroutine ADJCOR are included in the computational scheme. The resultant deposition amounts can be modified according to standard recirculation factors as produced in subroutine OPENTR or specific correction factors inputted by the user (see discussion for CORVAR).

For each directional sector, relative deposition is computed by the following relationship for a specific downwind distance:

$$\frac{\overline{D}}{Q}(x, K) = \frac{RF(x, K) \sum_{ij}^{N7} D_{ij} f_{ij}(K)}{(2\pi/16)\, x} \qquad (6)$$

where

$D/Q(x,K)$ = average relative deposition per unit area at a downwind distance x and direction K, in meters^{-2}

D_{ij} = the relative deposition rate from Figures 7 through 10 of Regulatory guide 1.111 (USNRC, 1977) for the ith wind-speed class (since plume height is dependent on wind speed) and the jth stability class, in meters.

$f_{ij}(K)$ = joint probability of the ith wind-speed class, jth stability class, and kth wind-direction sector

x = downwind distance, in meters

π = 3.14159265

$RF(x,K)$ = correction factor for air recirculation and stagnation at distance x and Kth wind direction.

D/Q segment values are computed by technique given in Equation 4 except the term X/Q is replaced by D/Q.

4.3 SUBROUTINE PTDEPS

This subroutine computed relative deposition values, D/Q, for inputted receptor locations. This subroutine is basically identical to subroutine DEPOS (Section 4.2).

4.4 SUBROUTINE PURGE

Using the short-term X/Q values calculated in Subroutine MIXD15, and the annual average X/Q values calculated in Subroutine ANNUAL, this subroutine calculates X/Q and D/Q values for intermittent releases for each of the user-specified receptor locations. The user specifies what level short-term percentile values is to be used (Card Type 3, INC, usually 15) and if a decayed and/or depleted annual X/Q values is to be used in the computation (Card Type 17, IPURGE). Normally the user should set IPURGE = 1 so that the undecayed, undepleted annual X/Q value is used. The short term X/Q value that is computed in Subroutine CALC is an undecayed, undepleted value.

A graphic representation of how computational procedure works is illustrated in Figure 4.8. In that figure the abscissa is the time that increases as you move to the right. The ordinate is X/Q values increasing as you go up. The 15 percentile X/Q value, which is larger than the annual X/Q value, is plotted according to 1 hour of time. The annual average value occurs for a standard time period of a year (8,760 hours). The straight line connecting these points represents X/Q values for intermittent, or purge releases, ranging in duration from 1 hour to 8,760 hours. The duration time for each release is the number of times the purge release occurs times the length of the release. In Figure 4.8 a duration time of 80 hours is illustrated which could present 4 purge releases at 20 hours, 2 purge releases at 40 hours or other combinations. The ratio of the X/Q values for intermittent, or purge release, and the annual average X/Q value is used to determine the appropriate X/Q values for the other decay, depletion combinations as well as a value for D/Q. As indicated above IPURGE is normally set to 1, so the ratio is based on undecayed, undepleted X/Q values.

If the 15 percentile X/Q value is less than the annual average X/Q value, or less conservative, the 15 percentile X/Q value will be set to the annual average value X/Q; the slope of the connecting line will be zero, and the X/Q values for purge releases of any duration will be equal to annual average X/Q values. This condition normally could only occur with unique combination of joint frequency of wind speed, wind direction, and atmospheric stability data.

This calculation is repeated for each individual receptor location inputted by the user.

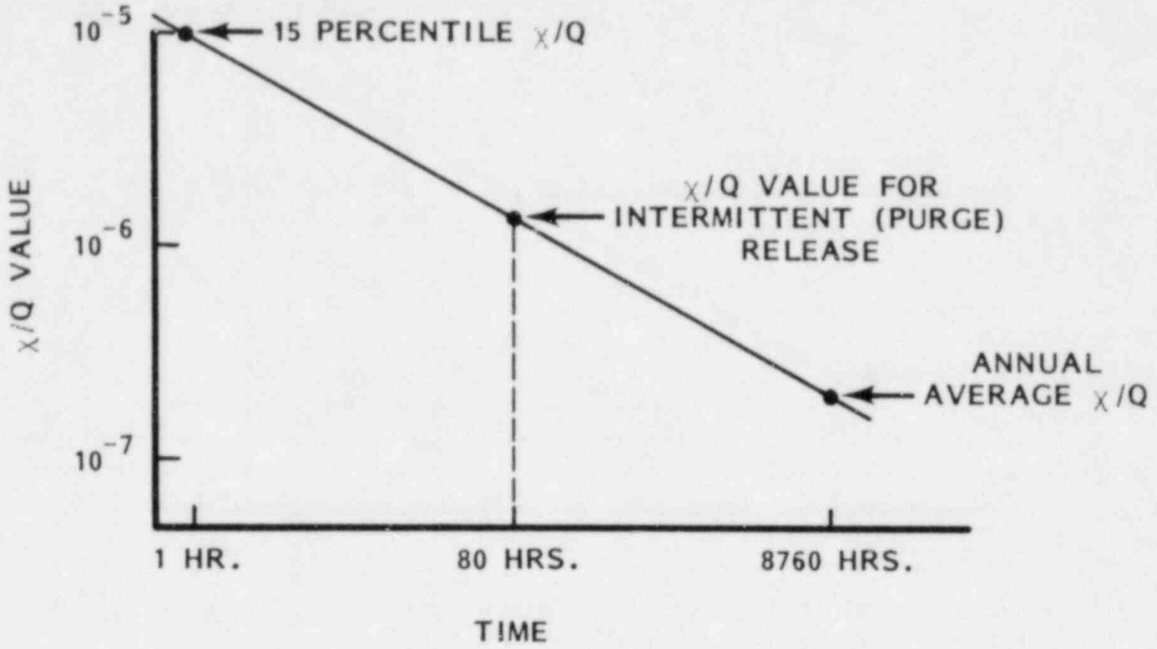


FIGURE 4.8. Subroutine PURGE Calculations

4.5 SUBROUTINE MIXD15

This subroutine coordinates the calculations of the short-term X/Q values used in the intermittent release calculations of subroutine PURGE. Subroutine CALC, which is called by MIXD15, calculates specific short-term X/Q values from all combinations of wind-speed class and stability categories in the inputted joint frequency distribution. The values are then ordered by Subroutine ORDER, from high to low values, and their cumulative frequencies are summed. Subroutine CONV, which is called by MIXD15, then transforms the frequency array onto a probability axis and, either subroutine LSTSQR or SPLINE, depending on the choice of the user, fits a curve to the log (X/Q) values versus transformed frequency data points. This curve is shifted up by two standard deviations to approximate the upper envelope of the X/Q values. The upper envelope X/Q values at five percent frequency increments are printed and can be plotted if desired by the user (Card Type 1, KOPT(4) = 1). The desired percentile value that was requested by the user is then passed to Subroutine PURGE to be used in computing X/Q values for the purge release.

4.6 SUBROUTINE CALC

This subroutine calculates short-term centerline X/Q values at the given individual receptor locations specified by the user. X/Q values are calculated for each combination of wind-speed class and atmospheric stability category. The calculations use the following equations:

$$X/Q = [U_i(\pi\sigma_{y_i}(x)\sigma_{z_j}(x) + CA)]^{-1} \quad (7)$$

and

$$X/Q = [3U_i\pi\sigma_{y_i}(x)\sigma_{z_j}(x)]^{-1} \quad (8)$$

and

$$X/Q = [U_i\pi\sigma_{y_i}(x)\sigma_{z_j}(x)]^{-1} \exp[-1/2(h_e/\sigma_{z_j}(x))^2] \quad (9)$$

where

X/Q = effluent concentration normalized by source strength (sec/cubic meter)

U_i = upper limit of the ith wind-speed class, inputted by user as Card Type 7 ($m\ sec^{-1}$)

$\sigma_{y_j}(x)$ = horizontal standard deviation of material in the plume for stability category j at distance x, value computed in Subroutine POLYN (m)

$\sigma_{z_j}(x)$ = vertical standard deviation of material in the plume for stability category j at distance x, value computed in Subroutine POLYN (m)

h_e = effective plume height, value computed in Subroutine RISE (m)

C = building-wake constant, value set in program to 0.5

A = minimum cross-section area of the reactor building (m^2)

x = downwind distance (m)

The user also has the option, via Card Type 1, to assume the plume is uniformly distributed in the horizontal within a 22-1/2 degree directional sector. This option is appropriate for intermittent releases greater than eight

hours duration or for a large number of shorter period releases. Thus in addition to the computations of Equations 7, 8, and 9, the following computations are completed if the option is selected:

$$X/Q = 2.032\ [xU_i(\sigma_{z_j}{}^2(x) + CD_z{}^2/\pi)^{1/2}] \tag{10}$$

$$X/Q = 2.032\ [\ 3U_i\sigma_{z_j}\ (x)\cdot x]^{-1} \tag{11}$$

$$X/Q = \frac{2.032}{\sigma_z\ (x)U_i\cdot x}\ [\exp(-1/2[h_e/\sigma_{z_j}]^2)] \tag{12}$$

where X/Q, U_i, $\sigma_{z_j}(x)$, h_e, C, x, are given above, and

D_z = height of the building (m),

x = the downwind distance (m).

Equations 9 and 12 are used for elevated releases. The results from these equations are compared and the largest X/Q value is retained. For ground level releases and KOPT(3) = 1, the values from Equations 7, 8, 10, and 11 are compared and the larger value retained. The terms CA in Equation 7 and $CD_z{}^2$ in Equation 12 are the building-wake contributions to dilution (Yanskey et al, 1966). Equations 8 and 11 represent X/Q values considering the maximum allowable building-wake dilution.

4.7 SUBROUTINE ORDER

This subroutine uses the shell method to order the array of X/Q values calculated in Subroutine CALC from the greatest to least value. Associated frequencies are also summed.

4.8 SUBROUTINE CONV

This subroutine transforms the cumulative frequency array generated in Subroutine ORDER onto a probability axis. This subroutine calls a function, GAUSS, that uses a Gauss-Legendre integration technique to integrate the normal function.

4.9 SUBROUTINE LSTSQR

This subroutine is used to perform the least square fit on log (X/Q) values versus frequency data transformed in Subroutine CONV. This routine is considered the standard for fitting log (X/Q) values.

4.10 SUBROUTINE INVERS

This subroutine, which is called by Subroutine LSTSQR, is used to perform a matrix inversion.

4.11 SURROUTINES LOGFPT, PPLT, DEVATE, AREA

These subroutines, which are called in Subroutine MIXD15, are used to plot, on logarithmic versus probability axes, the following data:

1. the X/Q values calculated by subroutine CALC versus probability

2. the X/Q values determined from the upper envelope of X/Q values calculated in Subroutine MIXD15 versus probability.

The plots are not produced unless desired by the user; see Card Type 1, KOPT(4).

4.12 SUBROUTINE SPLINE

As an option to the user, a cubic spline curve fitting technique can be used instead of a least square fitting technique. To use this technique KOPT(5) is set to 1 on Card Type 1.

4.13 SUBROUTINE DEPLET

This subroutine solves polynomial regression equations for the depletion curves of Figures 3 through 6 of Regulatory Guide 1.111 (USNRC, 1977).

4.14 SUBROUTINE DEPOST

This subroutine solves polynomial regression equations for the deposition curves of Figures 7 through 10 of Regulatory Guide 1.111 (USNRC, 1977).

4.15 SUBROUTINE ADJUST

Figures 3 through 10 of Regulatory Guide 1.111 (USNRC, 1977) contain curves for deposition and depletion for plumes 100, 60, 30 and 0 meters above the ground. For plumes between 0 and 15 meters above the ground, the program uses the ground-level release graphs; for those between 15 and 45 meters, it uses the 30 meter curves; between 45 and 80 meters, the 60 meter curves; and for those plumes greater than 80 meters above the ground, it uses the 100 meter curves. The program assumes that, after full plume rise is achieved, the plume cannot get higher from the ground. The derivation of these curves assumed no change in terrain height with downwind distance. But because topography does change with distance, and likewise the vertical distance between the plume

centerline and the ground will change, it is usually necessary to read from more than one depletion or deposition curve of Regulatory Guide 1.111 (USNRC, 1977) as the plume travels with distance.

The actual depletion to a point depends on the depletion rate which the plume has experienced prior to reaching that point. Thus when the plume changes elevation due to topography (i.e., it is necessary to shift from one curve to the next), an adjustment of depletion and deposition estimates must be made to account for the plume's prior history. To approximate the adjustment for deposition in changing terrain, the program assumes that at the point where a new curve is read (i.e., crossover point, the point where the plume is 80, 45, or 15 meters above ground level) the adjustment factor is the ratio of the fraction remaining of the plume from the upper height depletion curve to the fraction remaining in the plume as read on the lower height depleting curve. The deposition values beyond this point are multiplied by this ratio. For depletion, the curve adds the difference in the value of the depletion curves (higher curve minus lower curve) at the crossover point to the values of the lower height curve at distances beyond the crossover distance.

For each combination of wind speed, stability category, and downwind sector, this subroutine determines the downwind distance at which the plume will be 80, 45, and 15 meters above the ground, and determines the respective depletion and deposition adjustment factors.

4.16 SUBROUTINE ADJCOR

This subroutine keeps track of the crossover heights which each plume passes for each direction, wind-speed class, and stability category. It determines which depletion and deposition adjustment factors derived in subroutine ADJUST are needed.

4.17 SUBROUTINE ADJWND

Elevated releases should use winds measured at the release height, and ground-level releases should use 10-meter winds. If the winds were not measured at the proper height, or a mixed elevated-ground level release is being evaluated, the program corrects the wind speeds to reflect the proper elevation. It uses the following relationship from Smith (1968):

$$COR = \left(\frac{SL}{PL}\right)^{EX} \qquad (13)$$

COR = the correction factor applied to the measured wind speeds

PL = the measured wind height

SL = the desired wind height

EX = 0.25, for unstable or neutral atmospheric conditions and

0.50, for stable conditions.

4.18 SUBROUTINE RLSMOD

This subroutine computes the ratio of the plume exit velocity to the wind speed and determines whether the release will be elevated, ground level or a mixture of the two. If a mixture is indicated, the proportion of the plume considered to be elevated and the proportion considered to be ground-level are determined by the following relationships:

$$E_t = 1.0 \qquad \text{for } W_o/\bar{u} \leq 1.0$$

$$E_t = 2.58(W_o/\bar{u}) - 1.58\,(W_o/\bar{u}) \qquad \text{for } 1.0 < W_o/\bar{u} \leq 1.5$$

$$E_t = 0.3 - 0.06\,(W_o/\bar{u}) \qquad \text{for } 1.5 < W_o/\bar{u} \leq 5.0 \qquad (14)$$

$$E_t = 0.0 \qquad \text{for } W_o/\bar{u} > 5.0$$

where

E_t = fraction of the time when the release is ground level

W_o = the plume exit velocity

$\bar{u}$ = average wind speed at the vent height.

4.19 SUBROUTINE HEIGHT

This subroutine linearly interpolates a terrain height for a specific location. For a given direction and distance, the inputted terrain heights should be the highest terrain elevation between the source and the given distance anywhere in the direction sector (Card Type 10 and 11).

4.20 SUBROUTINE RISE

For elevated releases, the program determines the effective stack height from

$$h_e = h_s + h_{pr} - h_t \quad (h_e \geq 0) \tag{15}$$

where

h_e = effective plume height (meters)

h_s = physical stack height (meters)(Card Type 16, HSTACK)

h_{pr} = plume rise (meters)(subroutine RISE)

h_t = terrain height (meters)(subroutine Height).

This routine, using formulae from Briggs (1969), calculates plume rise caused by either momentum or buoyancy.

Nuclear power stations generally have ambient temperature plumes, so the heat emission rate, HEATR (Card Type 16) is read in as zero; and the plume rise is calculated from the momentum equations. Thus for neutral or unstable conditions, plume rise is calculated by the following relationship:

$$h_{pr} = 1.44\left(\frac{W_o}{u}\right)^{2/3} \cdot \left(\frac{x}{D}\right)^{1/3} \cdot D \tag{16}$$

where

h_{pr} = plume rise (meters)

W_o = stack or vent exit velocity (meters/second)(Card Type 16)

x = downwind distance (meters)

U = wind-speed at release height (meters/second)(Card Type 16) and

D = internal stack diameter (meters)(Card Type 16).

When the exit velocity is less than 1.5 times the wind speed, a correction (Gifford, 1972) for downwash is subtracted from Equation 16:

$$C = 3\left(1.5 - \frac{W_o}{u}\right)D \tag{17}$$

where C is the value to be subtracted, and the other terms are defined as in Equation 16. The result from Equation 16, corrected by Equation 17 if necessary, is compared with

$$h_{pr} = 3\left(\frac{W_o}{u}\right) D \tag{18}$$

and the smaller value of h_{pr} is used.

For stable conditions, the results from Equations 16 and 18 are compared with results from the following two equations:

$$h_{pr} = 4\left(\frac{F_m}{S}\right)^{1/4} \tag{19}$$

and

$$h_{pr} = 1.5\left(\frac{F_m}{u}\right)^{1/3} \cdot S^{-1/6} \tag{20}$$

where

$$F_m = (W_o D/2)^2 \tag{21}$$

and

$$S = \frac{g}{T}\frac{\partial\theta}{\partial z} \tag{22}$$

and

F_m = the momentum flux parameter (meters^4/second^2)

S = restoring acceleration per unit vertical displacement for adiabatic motion in the atmosphere (seconds^{-2})

g = acceleration of gravity (meters/second^2)

T = ambient air temperature (degrees Kelvin)

$\partial\theta/\partial z$ = vertical potential temperature gradient (degrees Kelvin/meter).

For the purposes of this routine, S is defined as 8.7×10^{-4} for E stability, 1.75×10^{-3} for F stability, and 2.45×10^{-3} for G stability. The smallest value of h_{pr}, calculated from Equations 16, 18, 19, and 20, is used.

If a value for heat emission rate is inputted, then an additional downwind distance, x*, is computed. For neutral and unstable conditions,

$$x^* = 0.5\, F^{2/5}\, h_s^{3/5} \left[\frac{\text{seconds}^{6/5}}{\text{feet}^{6/5}}\right] \quad \text{when } (h_s < 1{,}000 \text{ ft}) \tag{23}$$

$$x^* = 33\, F^{2/5} \left[\frac{\text{seconds}^{6/5}}{\text{feet}^{3/5}}\right] \quad \text{when } (h_s \geq 1{,}000 \text{ ft}) \tag{24}$$

where

$$F = \text{buoyancy flux parameter} = 4.3 \times 10^{-3}\, Q_h \, \frac{\text{ft}^4/\text{sec}^3}{\text{cal/sec}} \tag{25}$$

h_s = physical stack height (feet).

For stable conditions,

$$X^* = 2.4\, US^{-1/2} \tag{26}$$

Then for buoyant plume rise, the following equations are used:

1) for $x < x^*$,

$$h_{pr} = 1.6\, F^{1/3}\, u^{-1} x^{2/3} \tag{27}$$

2) for $x \geq x^*$ for unstable and neutral conditions,

$$h_{pr} = \frac{1.6\ F^{1/3}\ x^{*2/3}\left[\frac{2}{5} + \frac{16}{25}\ \frac{x}{x^*} + \frac{11}{5}\left(\frac{x}{x^*}\right)^2\right]}{u\ 1\left(+\ \frac{4x}{5x^*}\right)^2} \tag{28}$$

At $x = 5x^*$, the plume is assumed to reach its maximum height; for stable conditions,

$$h_{pr} = 2.4\ (F/uS)^{1/3} \tag{29}$$

with S as defined for Equation 22.

4.21 SUBROUTINE POLYN

This subroutine calculates values of σ_y and σ_z versus downwind distance, using equations of the form

$$\sigma_z = ax^b + C \tag{30}$$

$$\sigma_y = ax^b \tag{31}$$

where

$\sigma_{y,\ z}$ = horizontal crosswind (σ_y) or vertical (σ_z) standard deviation of material in the plume due to ambient free-stream turbulence

σ_x = downwind distance

a,b,c = coefficients, derived by Eimutis and Konicek (1972), as functions of stability class and distances.

Both σ_y and σ_z are limited to 1000 meters.

By setting KOPT(10) to 1 on Card Type 1, the σ_y and σ_z values computed will be representative of desert conditions. Information on how these values were determined is given in Yanskey, et al. 1966.

4.22 SUBROUTINE OPENTR

This subroutine solves a set of polynomial regression equations that describe the curve given in Figure 3.2. The value returned is recirculation correction factor for open terrain. This option is selectable by the user by setting KOPT(8) = 1 on Card Type 1. This feature should be used for all sites unless specific diffusion test, or other data, indicate other factors are more appropriate. In that case the user would input site specific correction factors via Card Types 8 and 9 and set KOPT(9) = 1 on Card Type 1.

4.23 SUBROUTINE CORVAR

If recirculation factors have been determined (e.g. by field experiments) for a specific site, they may be applied to computed X/Q and D/Q values. This option is implemented by setting KOPT(9) equal to 1 on Card Type 1 and inputting correction factors according to card Types 8 and 9. The factors entered are linearly interpolated by this subroutine and applied to computed X/Q and D/Q values.

4.24 SUEROUTINE PTSOUT

This subroutine prints the outputted X/Q and D/Q values obtained in subroutines ANNUAL, PTDEPS, and PURGE, for the input-specified receptor locations.

4.25 SUBROUTINE PRNTIN

This subroutine prints the building, vent, and release-type characteristics after all outputted X/Q and D/Q values.

4.26 SUBROUTINE INTCOM

This subroutine is a DATA statement to label the 16 directional sectors.

5.0 DESCRIPTION OF PROGRAM OUTPUT

The output from the program was designed to present the maximum amount of information on each release point for the user. Each output page is identified as to the version of program, run date, and run time. The sequence of outputted information is as follows.

1. inputted data cards

2. summarized joint frequency data of wind speed and wind direction by stability class

3. for each decay value

   - X/Q values at 22 specific distances ranging from 0.50 to 50 miles from the site
   - X/Q values for 10 distance segments
   - If depletion occurs, D/Q values at 22 specific distances ranging from 0.50 to 50 miles from the site
   - If depletion occurs, D/Q values for 10 distance segments
   - Data on emission, release, height, and physical building dimensions. If a mixed mode release, data on velocities levels producing elevated, ground level, and mixed-mode conditions

4. for purge releases with specific points of interest, ordered short-term X/Q values, a probability distribution of X/Q values, a probability distribution of X/Q values, and percentile value selected by the user to be used in computing X/Q and D/Q values for the release

5. for specific points of interest, X/Q values for specific decays inputted by the user, and a D/Q value if depletion occurs

6. for multiple releases, up to five, Steps 3 through 5 are repeated.

If KOPT(4) = 1 on Card Type 1, then program generated plots of short-term X/Q values versus probability distribution are produced. These plots will only be generated if a purge release is to be evaluated, and specific points of interest have been inputted by the user.

REFERENCES

Briggs, G. A., 1969: Plume Rise. AEC Critical Review Series, TOD-25075, Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.

Eimutis, E. C..and M. G. Konicek, 1972: Derivation of Continuous Functions for the Lateral and Vertical Dispersion Coefficients. Atmospheric Environment. Vol. 6, pp. 859-863.

Gifford, F. A. 1972. "Atmospheric Transport and Diffusion Over Cities," Nuclear Safety, Vol. 13, pp. 391-402.

Sagendorf, S. F. 1974. "A Program for Evaluating Atmospheric Dispersion From a Nuclear Power Station," NOAA Tech Memo ERL-ARL-42.

Sagendorf, J. F. and J. T. Goll. "XQDDOQ--Program of the Meteorological Evaluation of Routine Effluent Releases at Nuclear Power Station," Draft NUREG-0324. U.S. Nuclear Regulatory Commission. 1978.

Slade, D. H. (ed.) 1968: Meteorology and Atomic Energy 1968. TID-24190, National Technical Information Services, Springfield, Va.

Smith, M., 1968: Recommended Guide for the Prediction of the Dispersion of Airborne Effluents. The American Society of Mechanical Engineers, New York, New York.

U.S. Nuclear Regulatory Commission, 1977: Regulatory Guide 1.111, Revision 1. Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors. USNRC Office of Standards Development, Washington, D.C.

Yanskey, G. R. E. H. Markee, Jr. and A. P. Richter, 1966: Climatograhpy of the National Reactor Testing Station. Idaho Operations Office, USAEC, IDO-12048. Idaho Falls, Idaho.

APPENDIX A

LISTING OF PROGRAM AND SUBROUTINES

```
      PROGRAM XOQDOQ(INPUT,OUTPUT,PUNCH,                                XOQDOQ
     1           TAPE5=INPUT,TAPE6=OUTPUT,TAPE7=PUNCH)                  XOQDOQ
C*************************************************************************XOQDOQ
C*************************************************************************XOQDOQ
C*************************************************************************XOQDOQ
C******                                                                  XOQDOQ
C*****                          XOQDOQ                                  XOQDOQ
C*****                PROGRAM FOR THE METEOROLOGICAL EVALUATION         XOQDOQ
C*****                     OF ROUTINE EFFLUENT RELEASES AT              XOQDOQ
C*****                         NUCLEAR POWER STATIONS                   XOQDOQ
C*****                               - J. SAGENDORF   NOAA              XOQDOQ
C*****                                 J. GOLL        USNRC             XOQDOQ
C*****                                 JUNE 1976 - ORIGINAL             XOQDOQ
C*****                                 AUGUST 1977 - REVISION           XOQDOQ
C *****                                APRIL 1982 - REVISION 2           VERS2
C******                                                                  XOQDOQ
C*************************************************************************XOQDOQ
C*************************************************************************XOQDOQ
C*************************************************************************XOQDOQ
      COMMON /TITLE/ TITLM                                               VERS2
       COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                      BLANK
     1      ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)                  BLANK
     2      ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)              BLANK
     3      ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)                  BLANK
     4       ,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)              BLANK
     5      ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)            BLANK
     6       ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)        BLANK
     7       ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE                     BLANK
     8          ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL        BLANK
     9       ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)       BLANK
     1       ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                     BLANK
       DIMENSION TITLM(20),UMIN(14)                                     VERS2
     1          ,TOT(7), CALM(7), HEATR(5), SLEV(5), CRSEC(5)           XOQDOQ
     2          ,HBLDG(5), HSTACK(5), DIAMTR(5), EXIT(5)                XOQDOQ
     3          ,NPURGE(5),NPRGHR(5),GRNDVT(16),VERSUM(16,7),GRNDHR(14) XOQDOQ
     4          ,HORSUM(14,7),TOTSUM(7),SCLASS(7)                       XOQDOQ
       DATA SCLASS/"A","B","C","D","E","F","G"/                         XOQDOQ
     1 FORMAT(80I1)                                                     XOQDOQ
     2 FORMAT(16I5)                                                     XOQDOQ
     3 FORMAT(8F10.0)                                                   XOQDOQ
     4 FORMAT(16F5.0)                                                   XOQDOQ
     5 FORMAT(20A4)                                                     XOQDOQ
   124 FORMAT(8(I5,F5.0))                                               XOQDOQ
       C = 0.5                                                          XOQDOQ
C****    C IS THE BUILDING WAKE CONSTANT                                XOQDOQ
      NDIR=16                                                           XOQDOQ
C**** NDIR = THE NUMBER OF DIRECTIONS.                                  XOQDOQ
C*************************************************************************XOQDOQ
C*************************************************************************XOQDOQ
C*************************  READ IN DATA  ********************************XOQDOQ
C*************************************************************************XOQDOQ
      CALL INTCOM                                                       XOQDOQ
    41 READ(5,1)   KOPT                                                 XOQDOQ
       IF(EOF(5).NE.0)   GO TO 40                                       XOQDOQ
       CALL DATE(TODAY)                                                 VERS2
       CALL TIME(CLOCK)                                                 VERS2
       PRINT 960,TODAY,CLOCK                                            VERS2
   960 FORMAT(1H1,"USNRC COMPUTER CODE-XOQDOQ,VERSION 2.0",10X,"RUN DATE VERS2
      * ",A10,10X,"RUN TIME",A10/)                                       VERS2
       PRINT 500                                                        XOQDOQ
```

```
  500 FORMAT(1H ,"PRINTOUT OF INPUT CARDS")                                VERS2
      PRINT 501,   KOPT                                                    XOQDOQ
  501 FORMAT("0    1     ",16(5I1,1X))                                     XOQDOQ
C**** KOPT IS THE OPTION ARRAY. A VALUE OF 1 IS YES, A 0 MEANS BYPASS.    XOQDOQ
C        KOPT(1)   TO DISTRIBUTE INPUTTED CALMS AS THE FIRST              VERS2
C                  WIND SPEED CLASS                                       VERS2
C        KOPT(2)   TO INPUT DATA AS PERCENT FREQUENCY                     VERS2
C        KOPT(3)   TO USE SECTOR SPREAD IN INTERMITTENT RELEASE.          XOQDOQ
C        KOPT(4)   TO PLOT X/Q VS FREQUENCY FOR INTERMITTENT RELEASES.    XOQDOQ
C        KOPT(5)   TO USE CUBIC SPLINE IN LIEU OF LEAST SQUARES FUNCTION  XOQDOQ
C                        FOR FITTING INTERMITTENT RELEASE DISTRIBUTION.   XOQDOQ
C        KOPT(6)   TO PUNCH RADIAL SEGMENT X/Q + D/Q VALUES               VERS2
C        KOPT(7)   TO PUNCH POINT OF INTEREST X/Q + D/Q VALUES            VERS2
C        KOPT(8)   TO CORRECT OUTPUT USING STANDARD OPEN TERRAIN FACTORS  VERS2
C        KOPT(9)   TO CORRECT OUTPUT USING SITE-SPECFIC FACTORS           VERS2
C        KOPT(10)  TO USE DESERT SIGMA"S                                  VERS2
C        KOPT(11)  TO INPUT DATA WITH 30 DEGREE SECTORS FOR N,E,S,W       VERS2
C                  AND 20 SECTORS FOR ALL OTHER DIRECTIONS                VERS2
      READ 5,TITLM                                                         XOQDOQ
C****    TITLM IS THE MAIN TITLE FOR THE RUN                              XOQDOQ
      PRINT 502,   TITLM                                                   XOQDOQ
  502 FORMAT("     2     ",20A4)                                          XOQDOQ
      READ 2,NVEL,NSTA,NDIS,INC,NPTYPE,NEXIT,NCOR                          VERS2
C****    NVEL   IS THE NUMBER OF VELOCITY CATEGORIES.  (MAXIMUM OF 14)    XOQDOQ
C        NSTA   IS THE NUMBER OF STABILITY CATEGORIES. (MAXIMUM OF 7)     XOQDOQ
C        NDIS   IS THE NUMBER OF DISTANCES OF TERRAIN DATA. (MAX OF 10)   XOQDOQ
C               IF NDIS=0,DO NOT INPUT DIST OR HT ARRAYS.                 XOQDOQ
C        INC    IS THE PERCENTILE USED FOR THE ONE-HOUR PURGE VALUE.      XOQDOQ
C        NPTYPE IS THE NUMBER OF RECEPTOR TYPES.  (MAXIMUM OF 5).         XOQDOQ
C               IF NPTYPE=0,DO NOT INPUT NPOINT,TITLPT,KDIR,OR PTDIST.    XOQDOQ
C        NEXIT IS THE NUMBER OF RELEASE EXIT POINTS.  (MAXIMUM OF 5).     XOQDOQ
C        NCOR   IS THE NUMBER OF DISTANCES OF SITE SPECIFIC CORRECTIONS   XOQDOQ
C               (MAX OF 10). IF NCOR=0,DO NOT INPUT VRDIST OR VRCR ARRAY  XOQDOQ
      PRINT 503,NVEL,NSTA,NDIS,INC,NPTYPE,NEXIT,NCOR                       VERS2
  503 FORMAT("     3     ",16I5)                                          XOQDOQ
      READ 4,   PLEV, (DECAYS(I),I=1,3), PLGRAD                            XOQDOQ
C****    PLEV   IS THE HEIGHT (METERS) OF THE MEASURED WIND DATA.         XOQDOQ
C        DECAYS ARE THE HALF-LIVES (DAYS) CONSIDERED. IF DECAYS>100, NO   XOQDOQ
C               DECAY WILL OCCUR. DEPLETION WILL OCCUR BY MAKING THE      XOQDOQ
C               HALF/LIFE A NEGATIVE.   (MAXIMUM OF 3)                    XOQDOQ
C        PLGRAD IS PLANT GRADE ELEVATION (FEET ABOVE SEA LEVEL)\          XOQDOQ
C               IF PLGRAD=0.0, DIST AND HT MUST BOTH BE INPUTTED          XOQDOQ
C                              IN METERS\                                 XOQDOQ
C               IF PLGRAD)0.0, INPUT DIST IN MILES AND HT IN FEET         XOQDOQ
C                              ABOVE PLANT GRADE LEVEL\                   XOQDOQ
C               IF PLGRAD>0.0, INPUT DIST IN MILES AND HT IN FEET         XOQDOQ
C                              ABOVE SEA LEVEL.                           XOQDOQ
      PRINT 504,  PLEV, (DECAYS(I),I=1,3), PLGRAD                          XOQDOQ
  504 FORMAT("     4     ",16F7.2)                                        XOQDOQ
      READ 4,CALM                                                          XOQDOQ
C**** CALM CONTINS THE FREQUENCIES OF CALM FOR EACH STABILITY CLASS.      XOQDOQ
      PRINT 505,   CALM                                                    XOQDOQ
  505 FORMAT("     5     ",16F7.3)                                        XOQDOQ
      IST=1                                                                XOQDOQ
      IF(KOPT(1).EQ.1)     IST=2                                           XOQDOQ
      NCALM=1                                                              XOQDOQ
      DO 63 J=1,NSTA                                                       XOQDOQ
      IF(CALM(J).GE.0.0001) GO TO 64                                       XOQDOQ
   63 CONTINUE                                                             XOQDOQ
      NCALM=0                                                              XOQDOQ
```

```
121.        64 DO 10 J=1,NSTA                                                  XOQDOQ
122.           TOT(J)=0.                                                       XOQDOQ
123.           DO 10 I=IST,NVEL                                                XOQDOQ
124.           READ 4,(FREQ(K,I,J),K=1,NDIR)                                   XOQDOQ
125.        C****    FREQ IS THE JOINT FREQUENCY DISTRIBUTION AS A FUNCTION OF WIND  XOQDOQ
126.        C              DIRECTION (K), VELOCITY CATEGORY (I), AND STABILITY     XOQDOQ
127.        C              CATEGORY (J).                                           XOQDOQ
128.           10 PRINT 506,   (FREQ(K,I,J), K=1,NDIR)                         XOQDOQ
129.          506 FORMAT("     6     ",16F7.3)                                 XOQDOQ
130.           READ 4,UCOR,UMAX                                                XOQDOQ
131.        C**** UCOR IS A CORRECTION FACTOR TO BE APPLIED TO THE VELOCITIES.      XOQDOQ
132.        C       IF UCOR IS LESS THAN OR EQUAL TO ZERO NO CORRECTION IS NEEDED.  XOQDOQ
133.        C       IF UCOR IS GREATER THAN 100 A CONVERSION FROM MILES/HOUR TO     XOQDOQ
134.        C       METERS/ SECOND WILL BE MADE.                                    XOQDOQ
135.        C     UMAX IS THE ARRAY OF MAXIMUM VELOCITIES IN THE WIND SPEED CATAGORI XOQDOQ
136.        C       THE UMAX VALUES MAY BE READ IN AS EITHER MILES/HR OR METERS /SE XOQDOQ
137.        C       BY USING THE PROPER VALUE OF UCOR.                              XOQDOQ
138.           PRINT 507,   UCOR,UMAX                                          XOQDOQ
139.          507 FORMAT("     7     ",F7.0,14F7.3)                            XOQDOQ
140.           DO 400 L=1,10                                                   XOQDOQ
141.           DO 400 K=1,16                                                   XOQDOQ
142.           VRCR(K,L)=1.0                                                   XOQDOQ
143.           VRDIST(K,L)=0.0                                                 XOQDOQ
144.           DIST(K,L)=0.0                                                   XOQDOQ
145.          400 HT(K,L)=0.0                                                  XOQDOQ
146.           IF(NCOR.EQ.0)   PRINT 5081                                      XOQDOQ
147.         5081 FORMAT(" VRDIST,VRCR NOT INPUTTED.")                         XOQDOQ
148.           IF(NCOR.EQ.0)   GO TO 70                                        XOQDOQ
149.           DO 46   I=1,NCOR                                                XOQDOQ
150.           READ 4, (VRDIST(K,I),K=1,NDIR)                                  XOQDOQ
151.           READ 4, (VRCR(K,I),K=1,NDIR)                                    XOQDOQ
152.        C****    VRDIST CONTAINS THE DISTANCES CORRESPONDING TO THE CORRECTION   XOQDOQ
153.        C       FACTORS OF ARRAY VRCR(METERS),K=1 IS FOR SOUTH, K=2 IS FOR SEE  VERS2
154.        C       VRCR ARE THE SITE-SPECIFIC CORRECTION FACTORS AS A FUNCTION     XOQDOQ
155.        C            OF DIRECTION AND DISTANCE.                                 XOQDOQ
156.           PRINT 508,   (VRDIST(K,I), K=1,NDIR)                            XOQDOQ
157.          508 FORMAT("     8     ",16F7.0)                                 XOQDOQ
158.           46 PRINT 509,   (VRCR(K,I), K=1,NDIR)                           XOQDOQ
159.          509 FORMAT("     9     ",16F7.3)                                 XOQDOQ
160.           70 IF(NDIS.EQ.0)   PRINT 5101                                   XOQDOQ
161.         5101 FORMAT(" NO TERRAIN DATA INPUTTED.")                         XOQDOQ
162.           IF(NDIS.EQ.0)   GO TO 73                                        XOQDOQ
163.           DO 47 I=1,NDIS                                                  XOQDOQ
164.           READ 4, (DIST(K,I),K=1,NDIR)                                    XOQDOQ
165.           READ 4,(HT(K,I),K=1,NDIR)                                       XOQDOQ
166.        C**** DIST(K,N) CONTAINES THE DISTANCES CORRESPONDING TO THE ELEVATIONS XOQDOQ
167.        C       IN THE HT MATRIX. K=1 IS FOR THE SOUTH AS IN BDY                XOQDOQ
168.        C       (SEE DESCRIPTION FOR PLGRAD.)                                   XOQDOQ
169.        C**** HT ARE THE TERRAIN HEIGHTS AS A FUNCTION OF DIRECTION AND DISTANCE XOQDOQ
170.        C              CORRESPONDING TO DIST.                                   XOQDOQ
171.           PRINT 510,   (DIST(K,I), K=1,NDIR)                              XOQDOQ
172.          510 FORMAT("    10     ",16F7.0)                                 XOQDOQ
173.           47 PRINT 511,   (HT(K,I), K=1,NDIR)                             XOQDOQ
174.          511 FORMAT("    11     ",16F7.0)                                 XOQDOQ
175.           IF(PLGRAD.EQ.0.0)   GO TO 73                                    XOQDOQ
176.           DO 71   I=1,NDIS                                                XOQDOQ
177.           DO 71   K=1,NDIR                                                XOQDOQ
178.           DIST(K,I)=DIST(K,I)*1609.35                                     XOQDOQ
179.           71 HT(K,I)=HT(K,I)*0.3047                                       XOQDOQ
180.           IF(PLGRAD.LT.0.0)   GO TO 73                                    XOQDOQ
```

```
      PLGRAD=PLGRAD*0.3047                                                    XOQDOQ
      DO 72   I=1,NDIS                                                        XOQDOQ
      DO 72   K=1,NDIR                                                        XOQDOQ
   72 HT(K,I)=HT(K,I)-PLGRAD                                                  XOQDOQ
   73 IF(NDIS.EQ.0)   NDIS=1                                                  XOQDOQ
       IF(NPTYPE.EQ.0)   PRINT 5121                                           XOQDOQ
 5121 FORMAT(" NO POINTS OF INTEREST DATA INPUTTED.")                         XOQDOQ
       IF(NPTYPE.EQ.0)   GO TO 74                                             XOQDOQ
      READ 2,     (NPOINT(I),  I=1,NPTYPE)                                    XOQDOQ
C****   NPOINT IS THE NUMBER OF POINTS OF INTEREST FOR A PARTICULAR           XOQDOQ
C              RECEPTOR TYPE (NPTYPE). (MAXIMUM OF 30)                        XOQDOQ
      PRINT 512,   (NPOINT(I), I=1,NPTYPE)                                   XOQDOQ
  512 FORMAT("    12     ",16I5)                                             XOQDOQ
      DO 1234   I=1,NPTYPE                                                    XOQDOQ
      READ 5,    (TITLPT(I,J),  J=1,4)                                        XOQDOQ
C****   TITLPT IS THE NAME OF THE RECEPTOR TYPE  (MAX OF 16 SPACES)           XOQDOQ
      PRINT 513,   (TITLPT(I,J), J=1,4)                                       XOQDOQ
  513 FORMAT("    13     ",20A4)                                             XOQDOQ
      NP = NPOINT(I)                                                          XOQDOQ
      READ 124,(KDIR(I,N),PTDIST(I,N), N=1,NP)                                XOQDOQ
C****     KDIR IS THE DIRECTION OF INTEREST, 1=SOUTH,2=SSW,...,16=SSE.        XOQDOQ
C       PTDIST IS THE DISTANCE, IN METERS, TO THE POINT OF INTEREST           VERS2
 1234 PRINT 514,   (KDIR(I,N),PTDIST(I,N), N=1,NP)                            XOQDOQ
  514 FORMAT("    14     ",8(I3,F7.1)/)                                      VERS2
   74 DO 411   I=1,NEXIT                                                      XOQDOQ
      READ 5,   (TITLE(I,J),   J=1,20)                                        XOQDOQ
C****   TITLE IS THE OVERALL TITLE FOR THE RESPECTIVE RELEASE POINT           XOQDOQ
      PRINT 515,   (TITLE(I,J), J=1,20)                                       XOQDOQ
  515 FORMAT("    15     ",20A4)                                             XOQDOQ
      READ 4,  EXIT(I), DIAMTR(I), HSTACK(I), HBLDG(I), CRSEC(I),             XOQDOQ
     1         SLEV(I), HEATR(I)                                              XOQDOQ
C****   EXIT   IS THE VENT AVERAGE VELOCITY  (METERS/SECOND)                  XOQDOQ
C       DIAMTR IS THE VENT INSIDE DIAMETER  (METERS)                          XOQDOQ
C       HSTACK IS THE HEIGHT OF THE VENT RELEASE POINT  (METERS)              XOQDOQ
C              (IF VENT IS A STACK,I.E. ELEVATED RELEASE 100 PERCENT          XOQDOQ
C              OF THE TIME, INPUT HSTACK AS THE NEGATIVE OF THE HEIGHT.       XOQDOQ
C       HBLDG  IS THE HEIGHT OF THE VENT"S BUILDING  (METERS)                 XOQDOQ
C       CRSEC  IS THE MINIMUM CROSS-SECTIONAL AREA USED FOR THE VENT"S        XOQDOQ
C              BUILDING  (SQUARE METERS)                                      XOQDOQ
C       SLEV   IS THE WIND HEIGHT USED FOR THE VENT ELEVATED                  XOQDOQ
C              RELEASE  (METERS)                                              XOQDOQ
C       HEATR  IS THE VENT HEAT EMISSION RATE (CAL/SEC) (GENERALLY = 0)       XOQDOQ
      PRINT 516,   EXIT(I),DIAMTR(I),HSTACK(I),HBLDG(I)                      XOQDOQ
     1                          , CRSEC(I),SLEV(I),HEATR(I)                  XOQDOQ
  516 FORMAT("    16     ",2F7.3,4F7.1,F6.2)                                 XOQDOQ
      READ 123,   RLSID(I), IPURGE(I), NPURGE(I), NPRGHR(I)                   XOQDOQ
  123 FORMAT(A1,I4,2I5)                                                       XOQDOQ
C****   RLSID  IS A ONE LETTER IDENTIFICATION FOR THE RELEASE POINT           XOQDOQ
C       IPURGE = 1,2, OR 3, IF THE VENT IS A PURGE RELEASE POINT, CORRE       XOQDOQ
C                TO DECAY 1,2, OR 3 USED AS BASE FOR PURGE CALCULATIONS       XOQDOQ
C                (USUALLY NO DECAY/NO DEPLETE X/Q)\   = 0, IF NO PURGES       XOQDOQ
C       NPURGE IS THE NUMBER OF PURGES PER DATA SET PERIOD                    XOQDOQ
C       NPRGHR IS THE NUMBER OF HOURS PER PURGE RELEASE                       XOQDOQ
  411 PRINT 517,   RLSID(I),IPURGE(I),NPURGE(I),NPRGHR(I)                    XOQDOQ
  517 FORMAT("    17     ",A1,I4,2I5)                                        XOQDOQ
C*************************************************************************** XOQDOQ
C*************************************************************************** XOQDOQ
C*************************************************************************** XOQDOQ
      PRINT 960,TODAY,CLOCK                                                   VERS2
      PRINT 25,    TITLM                                                      XOQDOQ
```

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241.        25 FORMAT(1H ,4X,20A4/)                                                    VERS2
242.           IF(KOPT(6).EQ.1.OR.KOPT(7).EQ.1) PUNCH 5,TITLM                          VERS2
243.           IF(KOPT(2).EQ.1) GO TO 18                                               VERS2
244.           ITOTAL=0                                                                VERS2
245.           IF(KOPT(10).EQ.1) GO TO 18                                              VERS2
246.           DO 740 J=1,NSTA                                                         VERS2
247.           DO 13 I=1,NVEL                                                          VERS2
248.           DO 13 K=1,NDIR                                                          VERS2
249.        13 ITOTAL=ITOTAL+IFIX(FREQ(K,I,J))                                         VERS2
250.       740 ITOTAL=ITOTAL+IFIX(CALM(J))                                             VERS2
251.           FAC=100./ITOTAL                                                         VERS2
252.           DO 952 J=1,NSTA                                                         VERS2
253.           DO 950 I=1,NVEL                                                         VERS2
254.           DO 950 K=1,NDIR                                                         VERS2
255.       950 FREQ(K,I,J)=FAC*FREQ(K,I,J)                                             VERS2
256.       952 CALM(J)=CALM(J)*FAC                                                     VERS2
257.        18 CONTINUE                                                                VERS2
258.           NHRS=ITOTAL                                                             VERS2
259.           IF(NCALM.EQ.0) GO TO 391                                                XOQDOQ
260.           DO 17 J=1,NSTA                                                          XOQDOQ
261.           DO 17 K=1,NDIR                                                          XOQDOQ
262.           IF(IST.EQ.2) FREQ(K,1,J)=0.                                             XOQDOQ
263.        17 TOT(J)=TOT(J)+FREQ(K,IST,J)                                             XOQDOQ
264.           DO 39 J=1,NSTA                                                          XOQDOQ
265.           IF(TOT(J).LE.0.01) TOT(J)=NDIR                                          XOQDOQ
266.           REV=1./TOT(J)                                                           XOQDOQ
267.           DO 39 K=1,NDIR                                                          XOQDOQ
268.        39 FREQ(K,1,J)=FREQ(K,1,J)+FREQ(K,IST,J)*REV*CALM(J)                       XOQDOQ
269.       391 CONTINUE                                                                XOQDOQ
270.           UMIN(1)=0.                                                              XOQDOQ
271.           IF(UCOR.LE.0.) GO TO 15                                                 XOQDOQ
272.           IF(UCOR.GT.100) UCOR=.44704                                             XOQDOQ
273.           DO 16 I=1,NVEL                                                          XOQDOQ
274.        16 UMAX(I)=UMAX(I)*UCOR                                                    XOQDOQ
275.        15 DO 14 I=1,NVEL                                                          XOQDOQ
276.           UAVE(I)=(UMAX(I)+UMIN(I))*.5                                            XOQDOQ
277.           IF(I.EQ.NVEL) GO TO 14                                                  XOQDOQ
278.           UMIN(I+1)=UMAX(I)                                                       XOQDOQ
279.        14 CONTINUE                                                                XOQDOQ
280.           DO 20 I=1,NDIR                                                          XOQDOQ
281.           XMX(I)=0.                                                               XOQDOQ
282.           DMX(I)=0.                                                               XOQDOQ
283.           GRNDVT(I)=0.0                                                           XOQDOQ
284.           DO 20   J=1,NSTA                                                        XOQDOQ
285.           VERSUM(I,J)=0.0                                                         XOQDOQ
286.        20 CONTINUE                                                                XOQDOQ
287.           DO 24   I=1,NVEL                                                        XOQDOQ
288.           GRNDHR(I)=0.0                                                           XOQDOQ
289.           DO 24   J=1,NSTA                                                        XOQDOQ
290.           HORSUM(I,J)=0.0                                                         XOQDOQ
291.        24 CONTINUE                                                                XOQDOQ
292.           DO 38   J=1,NSTA                                                        XOQDOQ
293.        38 TOTSUM(J)=0.0                                                           XOQDOQ
294.           DO 1000  J=1,NSTA                                                       XOQDOQ
295.           PRINT 1001, SCLASS(J), (COMP(K),K=9,16), (COMP(K),K=1,8)                XOQDOQ
296.      1001 FORMAT("0JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION       XOQDOQ
297.          1          ATMOSPHERIC STABILITY CLASS ", A1/                          XOQDOQ
298.          2       "0UMAX (M/S)",16(3X,A4), "  TOTAL")                           XOQDOQ
299.           DO 1012  I=1,NVEL                                                       XOQDOQ
300.           DO 1002  K=1,16                                                         XOQDOQ
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301.            HORSUM(I,J)=FREQ(K,I,J)+HORSUM(I,J)                                    XOQDOQ
302.         1002 VERSUM(K,J)=FREQ(K,I,J)+VERSUM(K,J)                                  XOQDOQ
303.            TOTSUM(J)=HORSUM(I,J)+TOTSUM(J)                                        XOQDOQ
304.         1012 GRNDHR(I)=HORSUM(I,J)+GRNDHR(I)                                      XOQDOQ
305.            DO 1022  K=1,16                                                        XOQDOQ
306.         1022 GRNDVT(K)=VERSUM(K,J)+GRNDVT(K)                                      XOQDOQ
307.            DO 1003 I=1,NVEL                                                       XOQDOQ
308.            PRINT 1004,  UMAX(I), (FREQ(K,I,J),K=1,16), HORSUM(I,J)                XOQDOQ
309.         1004 FORMAT(" ",F5.2,5X,17F7.3)                                           XOQDOQ
310.         1003 CONTINUE                                                             XOQDOQ
311.            PRINT 1005,  (VERSUM(K,J),K=1,16), TOTSUM(J)                           XOQDOQ
312.         1005 FORMAT(" TOTAL    ",17F7.2/" ")                                      XOQDOQ
313.         1000 CONTINUE                                                             XOQDOQ
314.            DO 961 I=1,16                                                          VERS2
315.          961 SUMTOT=SUMTOT+GRNDVT(I)                                              VERS2
316.            IF(NHRS.EQ.0)   GO TO 84                                               XOQDOQ
317.            PRINT 310,   NHRS                                                      XOQDOQ
318.         310   FORMAT(" TOTAL HOURS CONSIDERED ARE ", I5)                          XOQDOQ
319.            GO TO 85                                                               XOQDOQ
320.           84 PRINT 311                                                           XOQDOQ
321.          311 FORMAT(" HOURS INPUTTED IN PERCENT.")                               XOQDOQ
322.           85 PRINT 261, PLEV                                                     XOQDOQ
323.         261   FORMAT("0WIND MEASURED AT ", F5.1, " METERS.")                     XOQDOQ
324.            PRINT 1006,  (COMP(K),K=9,16), (COMP(K),K=1,8), (GRNDVT(K),K=1,16)  XOQDOQ
325.           1,SUMTOT                                                               VERS2
326.         1006 FORMAT("0OVERALL WIND DIRECTION FREQUENCY"/                         XOQDOQ
327.           1       " WIND DIRECTION:     ",16(2X,A4),2X,"TOTAL"/                  VERS2
328.           2       " FREQUENCY:          ",17F6.1)                                VERS2
329.            PRINT 1007,  (UMAX(I),I=1,NVEL)                                       XOQDOQ
330.         1007 FORMAT("0OVERALL WIND SPEED FREQUENCY"/                             XOQDOQ
331.           1         " MAX WIND SPEED (M/S):   ", 14F7.3)                         XOQDOQ
332.            PRINT 1009,   (UAVE(I),I=1,NVEL)                                      XOQDOQ
333.         1009 FORMAT(" AVE WIND SPEED (M/S):   ", 14F7.3)                         XOQDOQ
334.            PRINT 1008,  (GRNDHR(I),I=1,NVEL)                                     XOQDOQ
335.         1008 FORMAT(" WIND SPEED FREQUENCY:  ", 14F7.2)                          XOQDOQ
336.            IF(UCOR.GT.0.) PRINT 36,UCOR                                          XOQDOQ
337.           36 FORMAT(" THE CONVERSION FACTOR APPLIED TO THE WIND SPEED CLASSES I  XOQDOQ
338.            XS ",F8.3)                                                           XOQDOQ
339.            PRINT 31,  (COMP(K), K=1,NDIR)                                        XOQDOQ
340.         31    FORMAT("0DISTANCES AND TERRAIN HEIGHTS IN METERS AS FUNCTIONS OF " XOQDOQ
341.           1      ,"DIRECTION FROM THE SITE:"/" DIRECTION =",16(A4,2X))          XOQDOQ
342.            DO 32  I=1,NDIS                                                       XOQDOQ
343.            PRINT 35,  (DIST(K,I),  K=1,NDIR), (HT(K,I), K=1,NDIR)                XOQDOQ
344.         35    FORMAT(" DISTANCE ",16F6.0/" ELEVATION",16F6.0)                    XOQDOQ
345.         32    CONTINUE                                                           XOQDOQ
346.            IF(KOPT(9).EQ.0) GO TO 50                                             VERS2
347.            PRINT 51,  (COMP(K),K=1,NDIR)                                         XOQDOQ
348.           51 FORMAT("0DISTANCES AND SITE-SPECIFIC CORRECTION FACTORS AS FUNCTI" XOQDOQ
349.           1      ,"ONS OF DIRECTION FROM THE SITE:"/" DIRECTION =",16(A4,2X))   XOQDOQ
350.            DO 52   I=1,NCOR                                                      XOQDOQ
351.            PRINT 55,  (VRDIST(K,I),K=1,NDIR), (VRCR(K,I), K=1,NDIR)              XOQDOQ
352.           55 FORMAT(" DISTANCE ",16F6.0/" FACTOR   ",16F6.2)                     XOQDOQ
353.           52 CONTINUE                                                           XOQDOQ
354.           50 CONTINUE                                                           XOQDOQ
355.         C                                                                       VERS2
356.         C  ********* BEGIN LOOP FOR EACH RELEASE POINT                          VERS2
357.         C                                                                       VERS2
358.            DO 207 IJ=1,NEXIT                                                     VERS2
359.            IEX=IJ                                                                VERS2
360.            DO 100   I=1,NPTYPE                                                   XOQDOQ
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361.            NP = NPOINT(I)                                                  XOQDOQ
362.            DO 100   N=1,NP                                                 XOQDOQ
363.            DO 100   L=1,5                                                  XOQDOQ
364.          100 SAVEQS(I,N,L) = 0.0                                           XOQDOQ
365.            W=EXIT(IJ)                                                      VERS2
366.            DIA=DIAMTR(IJ)                                                  VERS2
367.            HS=HSTACK(IJ)                                                   VERS2
368.            LSTACK=0                                                        XOQDOQ
369.            IF(HSTACK(IJ).LT.0.0) LSTACK=1                                  VERS2
370.            HS=ABS(HS)                                                      XOQDOQ
371.            WINDHT=SLEV(IJ)                                                 VERS2
372.            D=HBLDG(IJ)                                                     VERS2
373.            A=CRSEC(IJ)                                                     VERS2
374.            Q=HEATR(IJ)                                                     VERS2
375.            NPHR=NPRGHR(IJ)                                                 VERS2
376.            NP=NPURGE(IJ)                                                   VERS2
377.            JPURGE=IPURGE(IJ)                                               VERS2
378.            CALL ADJWND                                                     XOQDOQ
379.            CALL ADJUST                                                     VERS2
380.            DO 19 J=1,NSTA                                                  XOQDOQ
381.            DO 19 I=1,NVEL                                                  XOQDOQ
382.           19 FQ(I,J)=0.                                                    XOQDOQ
383.            DO 21 J=1,NSTA                                                  XOQDOQ
384.            DO 21 I=1,NVEL                                                  XOQDOQ
385.            DO 21 K=1,NDIR                                                  XOQDOQ
386.            EFF(K,I,J)=0.                                                   XOQDOQ
387.            XQ(K,I,J)=0.                                                    XOQDOQ
388.            FQ(I,J)=FQ(I,J)+FREQ(K,I,J)                                     XOQDOQ
389.           21 CONTINUE                                                      XOQDOQ
390.            CALL ANNUAL(GRNDVT,JPURGE)                                      VERS2
391.            CALL DEPOS(GRNDVT,JPURGE)                                       VERS2
392.            IF(NPTYPE.EQ.0) GO TO 206                                       VERS2
393.            CALL PTDEPS                                                     VERS2
394.            IF(JPURGE.NE.0) GO TO 206                                       VERS2
395.            IPG=0                                                           VERS2
396.            CALL PTSOUT(IPG)                                                VERS2
397.          206 CONTINUE                                                      VERS2
398.            IF(JPURGE.NE.0)   CALL PURGE(NP,NPHR,JPURGE,INC)                XOQDOQ
399.          207   CONTINUE                                                    XOQDOQ
400.            GO TO 41                                                        XOQDOQ
401.           40 CONTINUE                                                      XOQDOQ
402.            STOP                                                            XOQDOQ
403.            END                                                             XOQDOQ
404.            SUBROUTINE ANNUAL(GRNDVT,JPURGE)                                VERS2
405.            COMMON /TITLE/ TITLM                                            VERS2
406.             COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                   BLANK
407.            1      ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)              BLANK
408.            2      ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)          BLANK
409.            3      ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)              BLANK
410.            4       ,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)         BLANK
411.            5      ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)        BLANK
412.            6       ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)    BLANK
413.            7       ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE                 BLANK
414.            8          ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL     BLANK
415.            9       ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)   BLANK
416.            1       ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                 BLANK
417.             DIMENSION XQS(16,11),FS(16),SAVE(10),WORD(2)                   ANNUAL
418.            1         ,SSMO(16,10),XALL(16,22),XSMA(16,22),                 ANNUAL
419.            2         R(22),HA(16,10),I8S(16,14,7),I6S(16,14,7),I3S(16,14,7)  ANNUAL
420.            3         ,GRNDVT(16),MAXDIS(16),TITLM(20)                      VERS2
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421.            DATA R/.25,.5,.75,1.,1.5,2.,2.5,3.,3.5,4.,4.5,5.,7.5,10.,15.,20.    ANNUAL
422.           X,25.,30.,35.,40.,45.,50./                                            ANNUAL
423.            DATA WORD/"    ","  UN"/                                             ANNUAL
424.            LDSRT=0                                                             VERS2
425.            IF(KOPT(10).EQ.1) LDSRT=1                                           VERS2
426.      C                                                                         VERS2
427.      C *** LOOP ON VARIOUS DECAY FACTORS,COMPUTE,AND PRINT RESULTS             VERS2
428.      C                                                                         VERS2
429.            DO 3000   ITHRU=1,3                                                 ANNUAL
430.            DECAY = DECAYS(ITHRU)                                               ANNUAL
431.            HFL=ABS(DECAY)                                                      ANNUAL
432.            IF(HFL.LT.1.0E-10)   GO TO 3000                                     ANNUAL
433.            FAC=0.02032                                                         ANNUAL
434.            F4=-1.0                                                             ANNUAL
435.            IF(Q.LT.1.)   GO TO 7                                               ANNUAL
436.            F=0.0043*Q                                                          ANNUAL
437.            F3=F**.333                                                          ANNUAL
438.            F4=F**.4                                                            ANNUAL
439.          7 CONTINUE                                                            VERS2
440.            DO 84 M=1,10                                                        ANNUAL
441.            SAVE(M)=0.                                                          ANNUAL
442.            DO 84 K=1,NDIR                                                      ANNUAL
443.            HA(K,M)=0.                                                          ANNUAL
444.         84 SSMO(K,M)=0.                                                        ANNUAL
445.            DO 1004 L=1,22                                                      ANNUAL
446.            DO 1004  K=1,16                                                     ANNUAL
447.            XSMA(K,L)=0.                                                        ANNUAL
448.       1004 XALL(K,L)=0.                                                        ANNUAL
449.            DO 60 K=1,NDIR                                                      ANNUAL
450.            FS(K)=0.                                                            ANNUAL
451.            DO 60 I=1,NVEL                                                      ANNUAL
452.            DO 60 J=1,NSTA                                                      ANNUAL
453.         60 FS(K)=FS(K)+FREQ(K,I,J)                                             ANNUAL
454.            DO 50 K=1,NDIR                                                      ANNUAL
455.            IF(FS(K).LE.0.) GO TO 50                                            ANNUAL
456.            FS(K)=1./FS(K)                                                      ANNUAL
457.         50 CONTINUE                                                            ANNUAL
458.            DO 66   K=1,16                                                      ANNUAL
459.            DO 66   I=1,14                                                      ANNUAL
460.            DO 66   J=1,7                                                       ANNUAL
461.            I8S(K,I,J) = 0                                                      ANNUAL
462.            I6S(K,I,J) = 0                                                      ANNUAL
463.         66 I3S(K,I,J) = 0                                                      ANNUAL
464.            DO 30   M=1,22                                                      ANNUAL
465.            DIS=R(M)*1609.347219                                                ANNUAL
466.            DD=1.0                                                              VERS2
467.            AA=1.0                                                              VERS2
468.            DO 30 J=1,NSTA                                                      ANNUAL
469.            CALL POLYN(J,DIS,SZ,LDSRT)                                          VERS2
470.            JA=J+7                                                              ANNUAL
471.            CALL POLYN(JA,DIS,SY,LDSRT)                                         VERS2
472.            DO 30 I=1,NVEL                                                      ANNUAL
473.            ADD= 0.0                                                            ANNUAL
474.            H  = 0.0                                                            ANNUAL
475.            ZH = 1.00                                                           ANNUAL
476.            ZG = 1.00                                                           ANNUAL
477.            DCY= 1.00                                                           ANNUAL
478.            DCYG=1.00                                                           ANNUAL
479.            U=UAVEEL(I,J)                                                       ANNUAL
480.            CALL RLSMOD(W,U,IVENT,ET,LSTACK)                                    ANNUAL
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481.           IF(IVENT)   24,24,25                                          ANNUAL
482.        24 U=UAVEGL(I,J)                                                 ANNUAL
483.           IF(HFL.GT.100.)   GO TO 4                                     ANNUAL
484.           TT=DIS/(86400.*U)                                             ANNUAL
485.           DCYG=EXP(-.693*TT/HFL)                                        ANNUAL
486.           IF(IVENT.EQ.-1)   GO TO 4                                     ANNUAL
487.        25 U=UAVEEL(I,J)                                                 ANNUAL
488.           IF(HFL.GT.100.) GO TO 14                                      ANNUAL
489.           TT=DIS/(86400.*U)                                             ANNUAL
490.           DCY=EXP(-.693*TT/HFL)                                         ANNUAL
491.        14 IF(IVENT.LT.1) GO TO 4                                        ANNUAL
492.           DEN=DIS*SZ*U                                                  ANNUAL
493.           DENCL=3.14159265*SY*SZ                                        ANNUAL
494.           GO TO 5                                                       ANNUAL
495.         4 U=UAVEGL(I,J)                                                 ANNUAL
496.     C                                                                   VERS2
497.     C **** IF DESERT SIGMA"S ARE USED, ONLY APPLY BUILDING WAKE CORRECTION VERS2
498.     C      TO UNSTABLE AND NEUTRAL STABILITIES                          VERS2
499.     C                                                                   VERS2
500.           IF(KOPT(10).EQ.0) GO TO 665                                   VERS2
501.           IF(J.GE.5) DD=0.0                                             VERS2
502.       665 CONTINUE                                                      VERS2
503.           D=DD*D                                                        VERS2
504.           ARG = (SZ*SZ) + (C*D*D/3.14159265)                            ANNUAL
505.           DEN=U*DIS*SQRT(ARG)                                           ANNUAL
506.           DEN2=1.732051*U*DIS*SZ                                        ANNUAL
507.           IF(DEN2.LT.DEN) DEN=DEN2                                      ANNUAL
508.           DTERM=3.14159265*SY*SZ                                        ANNUAL
509.     C                                                                   VERS2
510.     C **** IF DESERT SIGMA"S ARE USED, ONLY APPLY BUILDING WAKE CORRECTION VERS2
511.     C      TO UNSTABLE AND NEUTRAL STABILITIES                          VERS2
512.     C                                                                   VERS2
513.           IF(KOPT(10).EQ.0) GO TO 666                                   VERS2
514.           IF(J.GE.5) AA=0.0                                             VERS2
515.       666 CONTINUE                                                      VERS2
516.           A=AA*A                                                        VERS2
517.         6 DENCL=DTERM+(C*A)                                             ANNUAL
518.           DENCL2=3.0*DTERM                                              ANNUAL
519.           IF(DENCL2.LT.DENCL)   DENCL=DENCL2                            ANNUAL
520.         5 XOQ1 = FAC/DEN                                                ANNUAL
521.           XOQ2=0.01/(DENCL*U)                                           ANNUAL
522.     C                                                                   VERS2
523.     C * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * VERS2
524.     C **** PROGRAM HAS THE ABILITY TO COMPARE CROSSWIND AND CENTERLINE VALUE VERS2
525.     C      BUT ONLY FOR CONTINUOUS RELEASES                             VERS2
526.     C                                                                   VERS2
527.     C      HOWEVER, IF REQUIRED CHANGE THE FOLLOWING STATEMENT          VERS2
528.     C      IF(XOQ1.GT.XOQ2) XOQ1=XOQ2                                   VERS2
529.           U=UAVEEL(I,J)                                                 ANNUAL
530.           DO 30   K=1,16                                                ANNUAL
531.           IF(FREQ(K,I,J).LE.0.) GO TO 30                                ANNUAL
532.           IF(DECAY.GE.0.) GO TO 1005                                    ANNUAL
533.           CALL DEPLET(DIS,J,0.,ZG)                                      ANNUAL
534.      1005 EXPO = ZG * DCYG                                              ANNUAL
535.           IF(IVENT.EQ.0)   EXPOG = EXPO                                 ANNUAL
536.           IF(IVENT.EQ.-1)   GO TO 85                                    ANNUAL
537.           CALL RISE (DH,   DIS,U,J,F4,F3,HS,W,DIA)                      ANNUAL
538.           CALL HEIGHT (K,DIS,HGT)                                       ANNUAL
539.           H=HS+DH-HGT                                                   ANNUAL
540.           IF(H.LT.0.) H=0.                                              ANNUAL
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      B=H/SZ                                                                ANNUAL
      XSMA(K,M)=XSMA(K,M)+H*FREQ(K,I,J)*FS(K)                               ANNUAL
      IF(DECAY.GE.0.)   GO TO 850                                           ANNUAL
      CALL DEPLET (DIS,J,H,ZH)                                              ANNUAL
      CALL ADJCOR (CR,I8S(K,I,J),I6S(K,I,J),I3S(K,I,J),H,K,I,J,ADD)         ANNUAL
  850 EXPO = ZH + ADD                                                       ANNUAL
      IF(B.LT.15.) GO TO 90                                                 ANNUAL
      IF(IVENT.EQ.0)   GO TO 92                                             ANNUAL
      EXPO=0.                                                               ANNUAL
      GO TO 85                                                              ANNUAL
   92 EVX = 0.0                                                             ANNUAL
      GO TO 852                                                             ANNUAL
   90 EXPO = EXP(-.5*B*B) * DCY * EXPO                                      ANNUAL
      IF(IVENT.NE.0)   GO TO 85                                             ANNUAL
      EVX=FAC*EXPO/(DIS*SZ*U)                                               ANNUAL
      EVXCL=EXPO/U*3.14159265*SY*SZ                                         ANNUAL
      IF(EVX.GT.EVXCL)   EVX=EVXCL                                          ANNUAL
  852 XOQ=XOQ1 * EXPOG                                                      ANNUAL
      TEMP = FREQ(K,I,J) * (ET*XOQ + (1.-ET)*EVX)                           ANNUAL
      GO TO 27                                                              ANNUAL
   85 TEMP = FREQ(K,I,J) * XOQ1* EXPO                                       ANNUAL
   27 XALL(K,M)=XALL(K,M)+TEMP                                              ANNUAL
   30 CONTINUE                                                              ANNUAL
      IF(KOPT(8).EQ.0) GO TO 301                                            VERS2
      DO 300   M=1,22                                                       ANNUAL
      DIS = R(M) * 1609.347219                                              ANNUAL
      RECIRC = 1.0000                                                       ANNUAL
      CALL OPENTR(DIS,RECIRC)                                               ANNUAL
      DO 300   K=1,NDIR                                                     ANNUAL
  300 XALL(K,M) = XALL(K,M) * RECIRC                                        ANNUAL
  301 IF(KOPT(9).EQ.0) GO TO 303                                            VERS2
      DO 302   M=1,22                                                       ANNUAL
      DIS = R(M) * 1609.347219                                              ANNUAL
      DO 302   K=1,NDIR                                                     ANNUAL
      CALL CORVAR(K,DIS,RECIRC)                                             ANNUAL
  302 XALL(K,M)=XALL(K,M)*RECIRC                                            ANNUAL
  303 CONTINUE                                                              ANNUAL
      IF(KOPT(11).EQ.0) GO TO 1111                                          VERS2
      DO 1 K=1,16,4                                                         ANNUAL
      DO 1 M=1,22                                                           ANNUAL
    1 XALL(K,M)=.667*XALL(K,M)                                              ANNUAL
 1111 CONTINUE                                                              ANNUAL
      NBR=2                                                                 ANNUAL
      MS=2                                                                  ANNUAL
      DO 31 MM=1,10                                                         ANNUAL
      MF=MS+NBR                                                             ANNUAL
      SEGD=0.                                                               ANNUAL
      DO 10 K=1,NDIR                                                        ANNUAL
      XQS(K,MM)=0.                                                          ANNUAL
      DO 10 M=MS,MF                                                         ANNUAL
      IF(K.EQ.1) SEGD=SEGD+R(M)                                             ANNUAL
      XQS(K,MM)=XQS(K,MM)+R(M)*XALL(K,M)                                    ANNUAL
      IF(HS.GT.1.) HA(K,MM)=HA(K,MM)+R(M)*XSMA(K,M)                         ANNUAL
   10 CONTINUE                                                              ANNUAL
      DO 2 K=1,NDIR                                                         ANNUAL
      XQS(K,MM)=XQS(K,MM)/SEGD                                              ANNUAL
    2 HA(K,MM)=HA(K,MM)/SEGD                                                ANNUAL
      MS=MF                                                                 ANNUAL
   31 CONTINUE                                                              ANNUAL
      CALL DATE(TODAY)                                                      VERS2
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601.          CALL TIME(CLOCK)                                                  VERS2
602.          PRINT 950, TODAY,CLOCK                                            VERS2
603.        950 FORMAT(1H1,"USNRC COMPUTER CODE-XOQDOQ,VERSION 2.0",10X,"RUN DATE  VERS2
604.           * ",A10,10X,"RUN TIME",A10)                                      VERS2
605.          PRINT 824,TITLM                                                   VERS2
606.        824 FORMAT(1H0,20A4/)                                               VERS2
607.          PRINT 100,  (TITLE(IEX,J), J=1,20)                                ANNUAL
608.        100 FORMAT(1H ,20A4)                                                VERS2
609.          IWORD = 1                                                         ANNUAL
610.          IF(DECAY.GE.0.0)   IWORD = 2                                      ANNUAL
611.          IF(HFL.GT.100.)   PRINT 400,  WORD(IWORD)                         ANNUAL
612.          IF(HFL.LE.100.)   PRINT 401,  HFL, WORD(IWORD)                    ANNUAL
613.        400 FORMAT(" NO DECAY,", A4, "DEPLETED")                            ANNUAL
614.        401 FORMAT(" ", F7.3, " DAY DECAY,", A4, "DEPLETED")                ANNUAL
615.          IF(KOPT(8).EQ.1) PRINT 109                                        VERS2
616.        109 FORMAT(" CORRECTED USING STANDARD OPEN TERRAIN FACTORS")        ANNUAL
617.          IF(KOPT(9).EQ.1) PRINT 110                                        VERS2
618.        110 FORMAT(" CORRECTED USING SITE-SPECIFIC FACTORS")                ANNUAL
619.          IF(KOPT(6).EQ.0) GO TO 67                                         VERS2
620.          PUNCH 64,  (TITLE(IEX,J),  J=1,20)                                ANNUAL
621.         64 FORMAT(20A4)                                                    ANNUAL
622.          IF(HFL.GT.100.)   PUNCH 400, WORD(IWORD)                          ANNUAL
623.          IF(HFL.LE.100.)   PUNCH 401,  HFL, WORD(IWORD)                    ANNUAL
624.          IF(KOPT(8).EQ.1.AND.JPURGE.EQ.0) PUNCH 109                        VERS2
625.          IF(KOPT(9).EQ.1.AND.JPURGE.EQ.0) PUNCH 110                        VERS2
626.         67 CONTINUE                                                        ANNUAL
627.          PRINT 111,  (R(M),  M=1,11)                                       ANNUAL
628.        111 FORMAT("0ANNUAL AVERAGE CHI/Q (SEC/METER CUBED)",17X,"DISTANCE IN  ANNUAL
629.           1MILES FROM THE SITE"/"   SECTOR",4X,11F10.3/)                   VERS2
630.          DO 70 K=1,NDIR                                                    ANNUAL
631.          DO 210 M=1,22                                                     ANNUAL
632.        210 XPO(M)=XALL(K,M)                                                ANNUAL
633.         70 PRINT 103, COMP(K), (XALL(K,M), M=1,11)                         ANNUAL
634.          PRINT 810                                                         VERS2
635.        810 FORMAT(* *)                                                     VERS2
636.          PRINT 111,(R(M),M=12,22)                                          VERS2
637.          DO 12 K=1,NDIR                                                    ANNUAL
638.         12 PRINT 103, COMP(K), (XALL(K,M), M=12,22)                        ANNUAL
639.        103 FORMAT("    ",A4,7X,1P11E10.3)                                  ANNUAL
640.        108 CONTINUE                                                        ANNUAL
641.          CALL PRNTIN                                                       VERS2
642.          PRINT 950, TODAY,CLOCK                                            VERS2
643.          PRINT 824,TITLM                                                   VERS2
644.          PRINT 951,(TITLE(IEX,J),J=1,20)                                   VERS2
645.        951 FORMAT(1H ,20A4)                                                VERS2
646.          IF(DECAY.GE.0.0) IWORD=2                                          VERS2
647.          IF(HFL.GT.100.) PRINT 400,WORD(IWORD)                             VERS2
648.          IF(HFL.LE.100.) PRINT 401,HFL,WORD(IWORD)                         VERS2
649.          PRINT 101                                                         ANNUAL
650.        101 FORMAT("0CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT"/             ANNUAL
651.           144X,"SEGMENT BOUNDARIES IN MILES FROM THE SITE")                VERS2
652.          PRINT 200                                                         ANNUAL
653.        200 FORMAT(" DIRECTION   ",".5-1",9X,"1-2",9X,"2-3",9X,"3-4",9X,"4-5",  ANNUAL
654.           X8X,"5-10",8X,"10-20",7X,"20-30",7X,"30-40",7X,"40-50"/" FROM SITE"  ANNUAL
655.           X)                                                               ANNUAL
656.          DO 170 K=1,NDIR                                                   ANNUAL
657.          IF(KOPT( 6).EQ.1.AND.JPURGE.EQ.0) PUNCH 65,COMP(K),               VERS2
658.           * (XQS(K,M),M=1,10)                                              VERS2
659.         65 FORMAT(A4,1X,1P7E10.3/8E10.3/8E10.3)                            ANNUAL
660.        170 PRINT 102, COMP(K), (XQS(K,M), M=1,10)                          ANNUAL
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  102 FORMAT("    ",A4,1P10E12.3)                                          ANNUAL
      IF(W.LE.0.0.OR.ITHRU.GT.1) GO TO 62                                  VERS2
      PRINT 40                                                             ANNUAL
   40 FORMAT("0AVERAGE EFFECTIVE STACK HEIGHT IN METERS FOR EACH SEGMENT   ANNUAL
     X"/)                                                                  ANNUAL
      PRINT 200                                                            ANNUAL
      DO 63 K=1,NDIR                                                       ANNUAL
   63 PRINT 102, COMP(K), (HA(K,M),M=1,10)                                 ANNUAL
   62 CONTINUE                                                             ANNUAL
      IF(LSTACK.EQ.0 .OR. ITHRU.NE.1)   GO TO 2000                         ANNUAL
C                                                                          VERS2
C **** FOR ELEVATED RELEASE COMPUTE MAXIMUM X/Q- OUTPUT IN PTSOUT.         VERS2
C                                                                          VERS2
      DO 601   K=1,16                                                      ANNUAL
      XMAX=0.0                                                             ANNUAL
      DO 601   M=1,22                                                      ANNUAL
      IF(XMAX.GT.XALL(K,M))   GO TO 601                                    ANNUAL
      XMAX=XALL(K,M)                                                       ANNUAL
      MAXDIS(K)=M                                                          ANNUAL
  601 CONTINUE                                                             ANNUAL
      NPTYPE=NPTYPE+1                                                      ANNUAL
      NPOINT(NPTYPE)=16                                                    ANNUAL
      DO 602   K=1,16                                                      ANNUAL
      KDIR(NPTYPE,K)=K                                                     ANNUAL
  602 PTDIST(NPTYPE,K)=R(MAXDIS(K))*1609.347219                            VERS2
 2000 CONTINUE                                                             ANNUAL
      FC1=FAC                                                              ANNUAL
C                                                                          VERS2
C * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *   VERS2
C     LOOP FOR EACH POINT OF INTEREST                                      VERS2
C * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *   VERS2
C                                                                          VERS2
      IF(NPTYPE.EQ.0) GO TO 3000                                           VERS2
      DO 23   ITYPE=1,NPTYPE                                               ANNUAL
      DD=1.0                                                               VERS2
      AA=1.0                                                               VERS2
      NP = NPOINT(ITYPE)                                                   ANNUAL
      DO 23   IPOINT=1,NP                                                  ANNUAL
      EXPO=1.                                                              ANNUAL
      H = 0.0                                                              ANNUAL
      ZG=1.                                                                ANNUAL
      ZH=1.                                                                ANNUAL
      DCYG=1.00                                                            ANNUAL
      DCY =1.00                                                            ANNUAL
      K = KDIR(ITYPE,IPOINT)                                               ANNUAL
      IF(KOPT(11).EQ.0) GO TO 2222                                         VERS2
      FAC=FC1                                                              ANNUAL
      DO 4321 NNMM=1,16,4                                                  ANNUAL
      IF(NNMM.EQ.K) FAC=.667*FC1                                           ANNUAL
 4321 CONTINUE                                                             ANNUAL
 2222 CONTINUE                                                             ANNUAL
      X = 0.0                                                              ANNUAL
      DIS=PTDIST(ITYPE,IPOINT)                                             VERS2
      DO 41   J=1,NSTA                                                     ANNUAL
      CALL POLYN(J,DIS,SZ,LDSRT)                                           VERS2
      JA=J+7                                                               ANNUAL
      CALL POLYN(JA,DIS,SY,LDSRT)                                          VERS2
      DO 41 I=1,NVEL                                                       ANNUAL
      I80=0                                                                ANNUAL
      I60=0                                                                ANNUAL
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721.            I30=0                                                          ANNUAL
722.            U=UAVEEL(I,J)                                                  ANNUAL
723.            CALL RLSMOD(W,U,IVENT,ET,LSTACK)                               ANNUAL
724.            IF(IVENT) 16,17,17                                             ANNUAL
725.         17 U=UAVEEL(I,J)                                                  ANNUAL
726.            IF(HFL.GT.100.)   GO TO 15                                     ANNUAL
727.            TT=DIS/(86400.*U)                                              ANNUAL
728.            DCY=EXP(-.693*TT/HFL)                                          ANNUAL
729.         15 CONTINUE                                                       VERS2
730.            CALL HEIGHT (K,DIS,HGT)                                        ANNUAL
731.            XOQPE=FAC/(DIS*SZ*U)                                           ANNUAL
732.            ELECL=.01/(U*3.14159265*SY*SZ)                                 ANNUAL
733.            IF(XOQPE.GT.ELECL)   XOQPE=ELECL                               ANNUAL
734.            CALL RISE (DH,   DIS,U,J,F4,F3,HS,W,DIA)                       ANNUAL
735.            H=HS+DH-HGT                                                    ANNUAL
736.            IF(H.LT.0.) H=0.                                               ANNUAL
737.            B=H/SZ                                                         ANNUAL
738.            IF(B.LT.15.) GO TO 91                                          ANNUAL
739.            EXPO=0.                                                        ANNUAL
740.            GO TO 9                                                        ANNUAL
741.         91 EXPO=EXP(-.5*B*B)*DCY                                          ANNUAL
742.            IF(DECAY.GE.0.) GO TO 9                                        ANNUAL
743.            DO 855 M=1,22                                                  ANNUAL
744.            SETDIS=1609.347*R(M)                                           ANNUAL
745.            IF(SETDIS.GE.DIS) GO TO 856                                    ANNUAL
746.            CALL HEIGHT (K,SETDIS,HGT)                                     ANNUAL
747.            CALL RISE (DH,SETDIS,U,J,F4,F3,HS,W,DIA)                       ANNUAL
748.            HP=HS+DH-HGT                                                   ANNUAL
749.            CALL ADJCOR(CR,I80,I60,I30,HP,K,I,J,ADD)                       ANNUAL
750.        855 CONTINUE                                                       ANNUAL
751.        856 CALL DEPLET(DIS,J,H,ZH)                                        ANNUAL
752.            CALL ADJCOR(CR,I80,I60,I30,H,K,I,J,ADD)                        ANNUAL
753.            EXPO=EXPO*(ZH+ADD)                                             ANNUAL
754.          9 IF(IVENT.EQ.0)   GO TO 28                                      ANNUAL
755.            XOQP=XOQPE                                                     ANNUAL
756.            GO TO 21                                                       ANNUAL
757.         28 XOQ=(1.0-ET)*EXPO*XOQPE                                        ANNUAL
758.         16 U=UAVEGL(I,J)                                                  ANNUAL
759.       C                                                                   VERS2
760.       C **** IF DESERT SIGMA"S ARE USED, ONLY APPLY BUILDING WAKE TO NEUTRAL  VERS2
761.       C      AND UNSTABLE STABILITIES- CONTINUOUS RELEASE                 VERS2
762.       C                                                                   VERS2
763.            IF(JPURGE.EQ.1) GO TO 765                                      VERS2
764.            IF(KOPT(10).EQ.0) GO TO 765                                    VERS2
765.            IF(J.GE.5) DD=0.0                                              VERS2
766.        765 CONTINUE                                                       VERS2
767.            D=DD*D                                                         VERS2
768.            ARG = (SZ*SZ) + (C*D*D/3.14159265)                             ANNUAL
769.            DEN=U*DIS*SQRT(ARG)                                            ANNUAL
770.            DEN2=1.73205*U*DIS*SZ                                          ANNUAL
771.            IF(DEN2.LT.DEN) DEN=DEN2                                       ANNUAL
772.            XOQP=FAC/DEN                                                   ANNUAL
773.            DTERM=3.14159265*SY*SZ                                         ANNUAL
774.       C                                                                   VERS2
775.       C **** IF DESERT SIGMA"S ARE USED, ONLY APPLY BUILDING WAKE CORRECTION T VERS2
776.       C      UNSTABLE AND NEUTRAL STABILITIES-CONTINUUOUS RELEASES        VERS2
777.       C                                                                   VERS2
778.            IF(JPURGE.EQ.1) GO TO 766                                      VERS2
779.            IF(KOPT(10).EQ.0) GO TO 766                                    VERS2
780.            IF(J.GE.5) AA=0.0                                              VERS2
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      766 CONTINUE                                                          VERS2
          A=AA*A                                                            VERS2
        8 DENCL=DTERM+(C*A)                                                 ANNUAL
          DENCL2=3.0*DTERM                                                  ANNUAL
          IF(DENCL2.LT.DENCL)   DENCL=DENCL2                                ANNUAL
          GRNDCL=.01/(DENCL*U)                                              ANNUAL
C                                                                           VERS2
C * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * VERS2
C **** PROGRAM HAS THE ABILITY TO COMPARE CROSSWIND AND CENTERLINE VALUE   VERS2
C      BUT ONLY FOR CONTINUOUS RELEASES                                     VERS2
C                                                                           VERS2
C      HOWEVER, IF THIS FEATURE IS REQUIRED ACTIVATE THE FOLLOWING          VERS2
C                                                                           VERS2
C     IF(XOQP.GE.GRNDCL) XOQP=GRNDCL                                        VERS2
C                                                                           VERS2
C * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * VERS2
          IF(DECAY.LT.0.) CALL DEPLET(DIS,J,0.,ZG)                          ANNUAL
          IF(HFL.GT.100.)   GO TO 22                                        ANNUAL
          TT = DIS/(86400.*U)                                               ANNUAL
          DCYG=EXP(-.693*TT/HFL)                                            ANNUAL
       22 EXPO = DCYG * ZG                                                  ANNUAL
          IF(IVENT.NE.0) GO TO 21                                           ANNUAL
          X=X+(FREQ(K,I,J)*(XOQ+ET*EXPO*XOQP))                              ANNUAL
          GO TO 42                                                          ANNUAL
       21 X=X+(FREQ(K,I,J)*EXPO*XOQP)                                       ANNUAL
       42 CONTINUE                                                          VERS2
       41 CONTINUE                                                          ANNUAL
          RECIRC = 1.0000                                                   ANNUAL
          IF(KOPT(8).EQ.1) CALL OPENTR(DIS,RECIRC)                          VERS2
          IF(KOPT(9).EQ.1) CALL CORVAR(K,DIS,RECIRC)                        VERS2
          SAVEQS(ITYPE,IPOINT,ITHRJ) = X * RECIRC                           ANNUAL
       23 CONTINUE                                                          ANNUAL
     3000 CONTINUE                                                          ANNUAL
          RETURN                                                            ANNUAL
          END                                                               ANNUAL
          SUBROUTINE DEPOS(GRNDVT,JPURGE)                                   VERS2
          COMMON /TITLE/ TITLM                                              VERS2
           COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                     BLANK
         1      ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)                  BLANK
         2      ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)              BLANK
         3      ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)                  BLANK
         4       ,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)              BLANK
         5      ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)            BLANK
         6       ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)        BLANK
         7       ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE                     BLANK
         8          ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL        BLANK
         9       ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)       BLANK
         1       ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                     BLANK
          DIMENSION Y(16,22),X(22),DEPSEG(16,10),SAVE(10),GRNDVT(16)        DEPOS
          DIMENSION TITLM(20)                                               VERS2
          DATA X/.25,.5,.75,1.,1.5,2.,2.5,3.,3.5,4.,4.5,5.,7.5,10.,15.,20., DEPOS
         1        25.,30.,35.,40.,45.,50./                                  DEPOS
          DO 200  K=1,NDIR                                                  DEPOS
          DO 200  M=1,22                                                    DEPOS
          Y(K,M) = 0.0                                                      DEPOS
  200     CONTINUE                                                          DEPOS
          DO 1000  K=1,NDIR                                                 DEPOS
          DO 1000  I=1,NVEL                                                 DEPOS
          DO 1000  J=1,NSTA                                                 DEPOS
          I80=0                                                             DEPOS
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      I60=0                                                              DEPOS
      I30=0                                                              DEPOS
      UBAR=UAVEEL(I,J)                                                   DEPOS
      CALL RLSMOD(W,UBAR,IVENT,ET,LSTACK)                                DEPOS
      IF(IVENT)   111,120,110                                            DEPOS
  111 CONTINUE                                                           DEPOS
      DO 1111   M=1,22                                                   DEPOS
      DIS = X(M) * 1609.347219                                           DEPOS
      CALL DEPOST (DIS,J,0.0,Z)                                          DEPOS
      ADJY = (Z * FREQ(K,I,J)) / (39.2699 * DIS)                         DEPOS
      Y(K,M) = Y(K,M) + ADJY                                             DEPOS
 1111 CONTINUE                                                           DEPOS
      GO TO 1000                                                         DEPOS
  110 CONTINUE                                                           DEPOS
      DO 112   M=1,22                                                    DEPOS
      DIS = X(M) * 1609.347219                                           DEPOS
      CALL HEIGHT (K,DIS,HGT)                                            DEPOS
      CALL RISE (DH,   DIS,UBAR,J,0.,0.,HS,W,DIA)                        DEPOS
      H = HS + DH - HGT                                                  DEPOS
      CALL ADJCOR (CRC,I80,I60,I30,H,K,I,J,ADD)                          DEPOS
      CALL DEPOST (DIS,J,H,Z)                                            DEPOS
      ADJY = (Z * CRC * FREQ(K,I,J)) / (39.2699 * DIS)                   DEPOS
      Y(K,M) = Y(K,M) + ADJY                                             DEPOS
  112 CONTINUE                                                           DEPOS
      GO TO 1000                                                         DEPOS
  120 CONTINUE                                                           DEPOS
  122 ETELE = 1.0 - ET                                                   DEPOS
      DO 113  M=1,22                                                     DEPOS
      DIS = X(M) * 1609.347219                                           DEPOS
      CALL HEIGHT (K,DIS,HGT)                                            DEPOS
      CALL RISE (DH,   DIS,UBAR,J,0.,0.,HS,W,DIA)                        DEPOS
      H = HS + DH - HGT                                                  DEPOS
      CALL DEPOST (DIS,J,H,F)                                            DEPOS
      CALL ADJCOR (CRC,I80,I60,I30,H,K,I,J,ADD)                          DEPOS
      YE = F * CRC * ETELE                                               DEPOS
      CALL DEPOST (DIS,J,0.0,B)                                          DEPOS
      YG = B * ET                                                        DEPOS
      Z = YG + YE                                                        DEPOS
      ADJY = (Z * FREQ(K,I,J)) / (39.2699 * DIS)                         DEPOS
      Y(K,M) = Y(K,M) + ADJY                                             DEPOS
  113 CONTINUE                                                           DEPOS
 1000 CONTINUE                                                           DEPOS
      IF(KOPT(8).EQ.0) GO TO 301                                         VERS2
      DO 300   M=1,22                                                    DEPOS
      DIS = X(M) * 1609.347219                                           DEPOS
      RECIRC = 1.0000                                                    DEPOS
      CALL OPENTR(DIS,RECIRC)                                            DEPOS
      DO 300   K=1,NDIR                                                  DEPOS
  300 Y(K,M) = Y(K,M) * RECIRC                                           DEPOS
  301 IF(KOPT(9).EQ.0) GO TO 303                                         VERS2
      DO 302   M=1,22                                                    DEPOS
      DIS=X(M)*1609.347219                                               DEPOS
      DO 302   K=1,NDIR                                                  DEPOS
      CALL CORVAR(K,DIS,RECIRC)                                          DEPOS
  302 Y(K,M)=Y(K,M)*RECIRC                                               DEPOS
  303 CONTINUE                                                           DEPOS
      CALL DATE(TODAY)                                                   VERS2
      CALL TIME(CLOCK)                                                   VERS2
      PRINT 950, TODAY,CLOCK                                             VERS2
  950 FORMAT(1H1,"USNRC COMPUTER CODE-XOQDOQ,VERSION 2.0",10X,"RUN DATE  VERS2
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901.          * ",A10,10X,"RUN TIME",A10)                                          VERS2
902.           PRINT 824,TITLM                                                     VERS2
903.       824 FORMAT(1H0,20A4/)                                                   VERS2
904.           PRINT 25, (TITLE(IEX,J),  J=1,20)                                   DEPOS
905.        25 FORMAT(1H ,20A4)                                                    VERS2
906.           IF(KOPT(8).EQ.1) PRINT 206                                          VERS2
907.           IF(KOPT(9).EQ.1) PRINT 207                                          VERS2
908.           PRINT 100,   (X(M),  M=1,11)                                        DEPOS
909.       100 FORMAT(" **********************     RELATIVE DEPOSITION PER UNIT ",  DEPOS
910.          1       "AREA (M**-2) AT FIXED POINTS BY DOWNWIND SECTORS     ****"  DEPOS
911.          2      ,"****************"/" DIRECTION", T57, "DISTANCES IN MILES"/    DEPOS
912.          3       " FROM SITE   ", 11F10.2)                                    DEPOS
913.           DO 601   K=1,NDIR                                                   DEPOS
914.       601 PRINT 101,   COMP(K),  (Y(K,M),  M=1,11)                            DEPOS
915.       101 FORMAT("   ", A4, 8X, 1P11E10.3)                                    DEPOS
916.           PRINT 102,   (X(M),  M=12,22)                                       DEPOS
917.       102 FORMAT("0DIRECTION", T57, "DISTANCES IN MILES"/                     DEPOS
918.          1       " FROM SITE   ", 11F10.2)                                    DEPOS
919.           DO 602   K=1,NDIR                                                   DEPOS
920.       602 PRINT 101,   COMP(K),  (Y(K,M),  M=12,22)                           DEPOS
921.         108 CONTINUE                                                          DEPOS
922.           NBR=2                                                               DEPOS
923.           MS=2                                                                DEPOS
924.           DO 31   MM=1,10                                                     DEPOS
925.           MF = MS + NBR                                                       DEPOS
926.           SEGD = 0.                                                           DEPOS
927.           DO 10   K=1, NDIR                                                   DEPOS
928.           DEPSEG(K,MM) =0.                                                    DEPOS
929.           DO 10   M = MS,MF                                                   DEPOS
930.           IF(K.EQ.1)   SEGD = SEGD + X(M)                                     DEPOS
931.           DEPSEG(K,MM) = DEPSEG(K,MM) + (X(M) * Y(K,M))                       DEPOS
932.       10  CONTINUE                                                           DEPOS
933.           DO 2   K=1,NDIR                                                     DEPOS
934.       2   DEPSEG(K,MM) = DEPSEG(K,MM)/SEGD                                    DEPOS
935.           MS = MF                                                             DEPOS
936.       31  CONTINUE                                                           DEPOS
937.           PRINT 950, TODAY,CLOCK                                              VERS2
938.           PRINT 824,TITLM                                                     VERS2
939.           PRINT 951,(TITLE(IEX,J),J=1,20)                                     VERS2
940.         951 FORMAT(1H ,20A4)                                                  VERS2
941.           WRITE (6,205)                                                       DEPOS
942.         205 FORMAT("0************************     RELATIVE DEPOSITION PER ",   DEPOS
943.             1       "UNIT AREA (M**-2) BY DOWNWIND SECTORS     ***********", DEPOS
944.             2       "**********"/ " ", T45, "SEGMENT BOUNDARIES IN MILES"/     DEPOS
945.             3       " DIRECTION    .5-1          1-2          2-3          3-4",  DEPOS
946.             4       "          4-5          5-10         10-20        20-30",  DEPOS
947.             5       "        30-40        40-50"/" FROM SITE")                DEPOS
948.           DO 600  K=1,NDIR                                                    DEPOS
949.           WRITE (6, 2222)     COMP(K),   (DEPSEG(K,M),  M=1,10)               DEPOS
950.       2222 FORMAT (" ", A4, T8, 1P10E12.3)                                    DEPOS
951.       600 CONTINUE                                                            DEPOS
952.           IF(KOPT(6).EQ.0) GO TO 701                                          VERS2
953.           PUNCH 251,(TITLE(IEX,J),  J=1,20)                                   DEPOS
954.       251 FORMAT("          DEPOSITION"/20A4)                                 DEPOS
955.           IF(KOPT(8).EQ.1.AND.JPURGE.EQ.0) PUNCH 206                          VERS2
956.         206 FORMAT(" CORRECTED USING STANDARD OPEN TERRAIN FACTORS")          DEPOS
957.           IF(KOPT(9).EQ.1.AND.JPURGE.EQ.0) PUNCH 207                          VERS2
958.         207 FORMAT(" CORRECTED USING SITE-SPECIFIC FACTORS")                  DEPOS
959.           DO 700  K=1,NDIR                                                    DEPOS
960.           IF(JPURGE.EQ.0) PUNCH 2221,COMP(K),(DEPSEG(K,M),M=1,10)             VERS2
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      2221  FORMAT (A4, T6, 1P7E10.3/1P3E10.3)                                DEPOS
      700   CONTINUE                                                          DEPOS
        701 CALL PRNTIN                                                       DEPOS
            RETURN                                                            DEPOS
            END                                                               DEPOS
            SUBROUTINE PTDEPS                                                 PTDEPS
             COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                     BLANK
           1     ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)                  BLANK
           2     ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)              BLANK
           3     ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)                  BLANK
           4      ,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)             BLANK
           5     ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)            BLANK
           6      ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)        BLANK
           7      ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE                     BLANK
           8         ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL        BLANK
           9      ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)       BLANK
           1      ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                     BLANK
            DIMENSION X(22)                                                   PTDEPS
            DATA X/.25,.5,.75,1.,1.5,2.,2.5,3.,3.5,4.,4.5,5.,7.5,10.,15.,     PTDEPS
           1       20.,25.,30.,35.,40.,45.,50./                               PTDEPS
            IF(NPTYPE.EQ.0) GO TO 13                                          VERS2
            DO 12   ITYPE=1,NPTYPE                                            PTDEPS
            NP = NPOINT(ITYPE)                                                PTDEPS
            DO 12   IPOINT=1,NP                                               PTDEPS
            K = KDIR(ITYPE,IPOINT)                                            PTDEPS
            DIS=PTDIST(ITYPE,IPOINT)                                          VERS2
            Y = 0.0                                                           PTDEPS
            DO 1000  I=1,NVEL                                                 PTDEPS
            DO 1000  J=1,NSTA                                                 PTDEPS
            I80=0                                                             PTDEPS
            I60=0                                                             PTDEPS
            I30=0                                                             PTDEPS
            UBAR=UAVEEL(I,J)                                                  PTDEPS
            CALL RLSMOD(W,UBAR,IVENT,ET,LSTACK)                               PTDEPS
            IF(IVENT)   111,122,110                                           PTDEPS
      111   CALL DEPOST (DIS,J,0.0,Z)                                         PTDEPS
            ADJY = (Z * FREQ(K,I,J)) / (39.2699 * DIS)                        PTDEPS
            Y = Y + ADJY                                                      PTDEPS
            GO TO 1000                                                        PTDEPS
      1000  110 CONTINUE                                                      VERS2
            DO 112   M=1,22                                                   PTDEPS
            SETDIS = X(M) * 1609.347219                                       PTDEPS
            IF(SETDIS.GE.DIS)  GO TO 1121                                     PTDEPS
            CALL HEIGHT (K,SETDIS,HGT)                                        PTDEPS
            CALL RISE (DH,SETDIS,UBAR,J,0.,0.,HS,W,DIA)                       PTDEPS
            H = HS + DH - HGT                                                 PTDEPS
            CALL ADJCOR (CRC,I80,I60,I30,H,K,I,J,ADD)                         PTDEPS
        112 CONTINUE                                                          VERS2
       1121 CALL HEIGHT (K,DIS,HGT)                                           PTDEPS
            CALL RISE (DH,   DIS,UBAR,J,0.,0.,HS,W,DIA)                       PTDEPS
            H = HS + DH - HGT                                                 PTDEPS
            CALL DEPOST (DIS,J,H,Z)                                           PTDEPS
            CALL ADJCOR (CRC,I80,I60,I30,H,K,I,J,ADD)                         PTDEPS
            ADJY = (Z * CRC * FREQ(K,I,J)) / (39.2699 * DIS)                  PTDEPS
            Y = Y + ADJY                                                      PTDEPS
            GO TO 1000                                                        PTDEPS
       122  ETELE = 1.0 - ET                                                  PTDEPS
            DO 113   M=1,22                                                   PTDEPS
            SETDIS = X(M) * 1609.347219                                       PTDEPS
            IF(SETDIS.GE.DIS)  GO TO 1122                                     PTDEPS
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1021.            CALL HEIGHT (K,SETDIS,HGT)                                    PTDEPS
1022.            CALL RISE (DH,SETDIS,UBAR,J,0.,0.,HS,W,DIA)                   PTDEPS
1023.            H = HS + DH - HGT                                             PTDEPS
1024.            CALL ADJCOR (CRC,I80,I60,I30,H,K,I,J,ADD)                     PTDEPS
1025.          113 CONTINUE                                                    VERS2
1026.         1122 CONTINUE                                                    VERS2
1027.            CALL HEIGHT (K,DIS,HGT)                                       PTDEPS
1028.            CALL RISE (DH,   DIS,UBAR,J,0.,0.,HS,W,DIA)                   PTDEPS
1029.            H = HS + DH - HGT                                             PTDEPS
1030.            CALL DEPOST (DIS,J,H,F)                                       PTDEPS
1031.            CALL ADJCOR (CRC,I80,I60,I30,H,K,I,J,ADD)                     PTDEPS
1032.            YE = F * CRC * ETELE                                          PTDEPS
1033.            CALL DEPOST (DIS,J,0.0,B)                                     PTDEPS
1034.            YG = B * ET                                                   PTDEPS
1035.            Z = YG + YE                                                   PTDEPS
1036.            ADJY = (Z * FREQ(K,I,J)) / (39.2699 * DIS)                    PTDEPS
1037.            Y = Y + ADJY                                                  PTDEPS
1038.         1000  CONTINUE                                                   PTDEPS
1039.            RECIRC = 1.0000                                               PTDEPS
1040.            IF(KOPT(8).EQ.1) CALL OPENTR(DIS,RECIRC)                      VERS2
1041.            IF(KOPT(9).EQ.1) CALL CORVAR(K,DIS,RECIRC)                    VERS2
1042.            SAVEQS(ITYPE,IPOINT,4) = Y * RECIRC                           PTDEPS
1043.         12    CONTINUE                                                   PTDEPS
1044.            13 CONTINUE                                                   VERS2
1045.            RETURN                                                        PTDEPS
1046.            END                                                           PTDEPS
1047.            SUBROUTINE PURGE(NPURGE,NPRGHR,JPURGE,INC)                    PURGE
1048.             COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                 BLANK
1049.           1      ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)              BLANK
1050.           2      ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)          BLANK
1051.           3      ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)              BLANK
1052.           4       ,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)         BLANK
1053.           5      ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)        BLANK
1054.           6       ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)    BLANK
1055.           7       ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE                 BLANK
1056.           8          ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL    BLANK
1057.           9       ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)   BLANK
1058.           1       ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                 BLANK
1059.            CALL MIXD15(INC)                                              PURGE
1060.            DO 12   ITYPE=1,NPTYPE                                        PURGE
1061.            NP = NPOINT(ITYPE)                                            PURGE
1062.            DO 12   IPOINT=1,NP                                           PURGE
1063.            ANNMX = SAVEQS(ITYPE,IPOINT,JPURGE)                           PURGE
1064.            IF(ANNMX.LT.1.0E-50)   GO TO 12                               PURGE
1065.            F15MX = SAVEQS(ITYPE,IPOINT,5)                                PURGE
1066.            IF(F15MX.LT.ANNMX) F15MX=ANNMX                                VERS2
1067.            IF(F15MX.GT.ANNMX*1000.0) F15MX=ANNMX                         VERS2
1068.            QUOTNT = ANNMX / F15MX                                        PURGE
1069.            SLOPE = (ALOG(QUOTNT)) / ALOG(8760.)                          PURGE
1070.            NTOTAL = NPRGHR * NPURGE                                      PURGE
1071.            FACTOR = (FLOAT(NTOTAL)/8760.0) ** SLOPE                      PURGE
1072.            DO 13   L=1,4                                                 PURGE
1073.           13 SAVEQS(ITYPE,IPOINT,L) = SAVEQS(ITYPE,IPOINT,L) * FACTOR    PURGE
1074.           12 CONTINUE                                                    PURGE
1075.            IPG=1                                                         PURGE
1076.            CALL PTSOUT (IPG)                                             PURGE
1077.            PRINT 52, NPURGE, NPRGHR                                      PURGE
1078.           52 FORMAT("0TOTAL NUMBER OF PURGES:", I5/                      PURGE
1079.             1       " HOURS PER PURGE:       ", I5)                     PURGE
1080.            RETURN                                                        PURGE
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      END                                                                PURGE
      SUBROUTINE MIXD15(INC)                                             MIXD15
      COMMON /TITLE/ TITLM                                               VERS2
       COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                      BLANK
     1     ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)                    BLANK
     2     ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)                BLANK
     3     ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)                    BLANK
     4      ,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)               BLANK
     5     ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)              BLANK
     6      ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)          BLANK
     7      ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE                       BLANK
     8         ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL          BLANK
     9      ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)         BLANK
     1      ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                       BLANK
       COMMON /SIGMA /SIG                                               MIXD15
       DIMENSION XP(49),XX(100),YY(100),FREQ15(14,7),YPF(100)           MIXD15
       DIMENSION XXXS(100),YYYS(100),XQ15S(100),FQ15S(100)              MIXD15
       DATA XP/0.02507,0.05015,0.07527,0.10043,0.12566,0.15097,0.17637, MIXD15
     1        0.20189,0.22754,0.25335,0.27932,0.30548,0.33185,0.35846,  MIXD15
     2        0.38532,0.41246,0.43991,0.46770,0.49585,0.52440,0.55338,  MIXD15
     3        0.58284,0.61281,0.64335,0.67449,0.70630,0.73885,0.77219,  MIXD15
     4        0.80642,0.84162,0.87790,0.91537,0.95416,0.99446,1.03643,  MIXD15
     5        1.08032,1.12639,1.17499,1.22653,1.28155,1.34076,1.40507,  MIXD15
     6        1.47579,1.55477,1.64485,1.75069,1.88079,2.05375,2.32635/  MIXD15
       DO 9   ITYPE=1,NPTYPE                                            MIXD15
       NP=NPOINT(ITYPE)                                                 MIXD15
       DO 9   IPOINT=1,NP                                               MIXD15
       K=KDIR(ITYPE,IPOINT)                                             MIXD15
       DIS=PTDIST(ITYPE,IPOINT)                                         VERS2
       AMILES=DIS/1609.347219                                           VERS2
       CALL DATE(TODAY)                                                 VERS2
       CALL TIME(CLOCK)                                                 VERS2
       PRINT 960,TODAY,CLOCK                                            VERS2
   960 FORMAT(1H1,"USNRC COMPUTER CODE-XOQDOQ,VERSION 2.0",10X,"RUN DATE VERS2
      * ",A10,10X,"RUN TIME",A10)                                        VERS2
       PRINT 824,TITLM                                                  VERS2
   824 FORMAT(1H0,20A4/)                                                VERS2
       PRINT 99                                                         MIXD15
    99 FORMAT(" SHORT TERM X/Q CALCULATION- MIXED MODE RELEASE")        VERS2
       IF(KOPT(03).EQ.1)     PRINT 97                                   MIXD15
    97 FORMAT(" SECTOR SPREAD VALUE CALCULATED")                        MIXD15
       PRINT 96,(TITLE(IEX,J),J=1,20),RLSID(IEX),(TITLPT(ITYPE,J),J=1,4), MIXD15
     1         COMP(K),AMILES,PTDIST(ITYPE,IPOINT)                      VERS2
    96 FORMAT("0",20A4/" ID:",A1,3X,4A4,"   DIRECTION:",A4,"   DISTANCE:" MIXD15
      1      ,F6.2," MILES (",F6.0," METERS)")                          MIXD15
       TOTA=0.                                                          MIXD15
       TOTS=0.                                                          MIXD15
       DO 12 I=1,NVEL                                                   MIXD15
       DO 12   J=1,NSTA                                                 MIXD15
       IF(J.LT.4) GO TO 12                                              MIXD15
       TOTS=TOTS+FREQ(K,I,J)                                            MIXD15
    12 TOTA=TOTA+FREQ(K,I,J)                                            MIXD15
       IF(TOTA.GT.1.0E-6)   GO TO 10                                    MIXD15
   101 FORMAT("0NO OCCURRENCES IN THIS DIRECTION")                      MIXD15
       PRINT 101                                                        MIXD15
       GO TO 9                                                          MIXD15
    10 RHRS=100./TOTA                                                   MIXD15
       TOTS=TOTS*RHRS                                                   MIXD15
       NPER=IFIX(TOTS)                                                  MIXD15
       DO 23 I=1,NVEL                                                   MIXD15
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1141.          DO 23   J=1,NSTA                                                MIXD15
1142.       23 FREQ15(I,J)=FREQ(K,I,J)*RHRS                                    MIXD15
1143.          CALL CALC (K, DIS,FREQ15)                                       MIXD15
1144.          CALL ORDER (NUM,MM,XQ15,FQ15)                                   MIXD15
1145.          IF(KOPT(04).EQ.0)     GO TO 200                                 MIXD15
1146.          DO 1000 NN=1,MM                                                 MIXD15
1147.          XQ15S(NN)=XQ15(NN)                                              MIXD15
1148.          IF(XQ15S(NN).LE.0.0) XQ15S(NN)=1.0E-50                          MIXD15
1149.     1000 FQ15S(NN)=FQ15(NN)                                              MIXD15
1150.          LDPTS=MM                                                        MIXD15
1151.       200 CONTINUE                                                       MIXD15
1152.          PRINT 100                                                       MIXD15
1153.       100 FORMAT("0BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FRE MIXD15
1154.         XQENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.")           MIXD15
1155.          I=1                                                             MIXD15
1156.       112 LST=I+9                                                        MIXD15
1157.          PRINT 123, (XQ15(NN),NN=I,LST), (FQ15(NN),NN=I,LST)             MIXD15
1158.       123 FORMAT(1H0,1P10E12.3/1H ,0P10F12.3)                            MIXD15
1159.          IF(LST.GE.MM)   GO TO 113                                       MIXD15
1160.          I=I+10                                                          MIXD15
1161.          GO TO 112                                                       MIXD15
1162.       113 IF(KOPT(5).EQ.1)   GO TO 114                                   MIXD15
1163.          DO 41   L=1,49                                                  MIXD15
1164.          XX(50-L)=-XP(L)                                                 MIXD15
1165.       41 XX(50+L)=XP(L)                                                  MIXD15
1166.          XX(50)=0.                                                       MIXD15
1167.          DO 32   L=1,MM                                                  MIXD15
1168.          IF(FQ15(L).GE.TOTS)   GO TO 24                                  MIXD15
1169.       32 XQ15(L)=ALOG10(XQ15(L))                                         MIXD15
1170.       24 L=L-1                                                           MIXD15
1171.          CALL CONV (FQ15,MM)                                             MIXD15
1172.          CALL LSTSQR (FQ15,YY,FQ15,XQ15,L,3,L,101.,101.)                 MIXD15
1173.          LM=0                                                            MIXD15
1174.          DB=0.                                                           MIXD15
1175.          DS=0.                                                           MIXD15
1176.          DO 332 LN=1,L                                                   MIXD15
1177.          IF(XQ15(LN).LT.YY(LN))   GO TO 332                              MIXD15
1178.          LM=LM+1                                                         MIXD15
1179.          DA=YY(LN)-XQ15(LN)                                              MIXD15
1180.          DB=DB+DA                                                        MIXD15
1181.          DS=DS+DA**2                                                     MIXD15
1182.       332 CONTINUE                                                       MIXD15
1183.          RL=FLOAT(LM)                                                    MIXD15
1184.          DB=DB/RL                                                        MIXD15
1185.          DS=DS/RL                                                        MIXD15
1186.          SHIFT=2.*SQRT(RL*(DS-DB**2)/(RL-1.))                            MIXD15
1187.          CALL LSTSQR (XX,YY,FQ15,XQ15,L,3,NPER,101.,101.)                MIXD15
1188.          PRINT 124                                                       MIXD15
1189.       124 FORMAT("0LEAST SQUARES FIT:")                                  MIXD15
1190.          GO TO 115                                                       MIXD15
1191.       114  DO 42   L=1,100                                              MIXD15
1192.        42 XX(L)=L                                                        MIXD15
1193.        27 MI=MM
1194.          DO 28 L=2,MI
1195.          MIL=MI-L+2
1196.          IF((FQ15(MIL)-FQ15(MIL-1)).LT.5.0) GO TO 28
1197.          NN=MM+1
1198.          DO 26 LL=MIL,MM
1199.          NN=NN-1
1200.          FQ15(NN+1)=FQ15(NN)
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1201.            XQ15(NN+1)=XQ15(NN)
1202.          26 CONTINUE
1203.            MM=MM+1
1204.            XQ15(MIL)=0.5*(XQ15(MIL+1)+XQ15(MIL-1))
1205.            FQ15(MIL)=0.5*(FQ15(MIL+1)+FQ15(MIL-1))
1206.            PRINT 128, XQ15(MIL),FQ15(MIL)
1207.          128 FORMAT(1H ,5X,1PE12.3,0PF12.3)
1208.          28 CONTINUE
1209.            IF(MM.GT.MI) GO TO 27
1210.            DO 33   L=1,MM                                                    MIXD15
1211.            IF(XQ15(L).LE.0.0)   XQ15(L)=1.0E-50                              MIXD15
1212.            XQ15(L) = ALOG10(XQ15(L))                                         MIXD15
1213.            IF(FQ15(L).GE.TOTS)   GO TO 25                                    MIXD15
1214.          33 CONTINUE                                                         MIXD15
1215.          25 N=L                                                              MIXD15
1216.            M=NPER                                                            MIXD15
1217.            SHIFT=0.0                                                         MIXD15
1218.            SIG=-25.0                                                         MIXD15
1219.            CALL SPLINE(FQ15,XQ15,N,0.0,0.0,XX,YY,YPF,M)                      MIXD15
1220.            PRINT 125                                                         MIXD15
1221.          125 FORMAT("0CUBIC SPLINE FIT:")                                    MIXD15
1222.          115 PRINT 122                                                       MIXD15
1223.          122 FORMAT(6X,"CHI/Q",10X,"PERCENT OF TIME"/" SEC/METER CUBED",3X,"REA MIXD15
1224.             XCHED OR EXCEEDED"/)                                           MIXD15
1225.            NN1=1                                                           MIXD15
1226.            NN2=3                                                           MIXD15
1227.            NN3=2                                                           MIXD15
1228.            LFPTS=0                                                         MIXD15
1229.            DO 102 N2=1,2                                                   MIXD15
1230.            DO 13 L=NN1,NN2,NN3                                             MIXD15
1231.            YY(L)=YY(L)+SHIFT                                               MIXD15
1232.            XXX=FLOAT(L)                                                    MIXD15
1233.            YYY=10.**YY(L)                                                  MIXD15
1234.            IF(KOPT(04).EQ.0)      GO TO 13                                 MIXD15
1235.            LFPTS=LFPTS+1                                                   MIXD15
1236.            XXXS(LFPTS)=XXX                                                 MIXD15
1237.            YYYS(LFPTS)=YYY                                                 MIXD15
1238.            IF(YYYS(LFPTS).LE.0.0)   YYYS(LFPTS)=1.0E-50                    MIXD15
1239.           13 PRINT 44,YYY,XXX                                              MIXD15
1240.           44 FORMAT(1PE13.3,0PF19.3)                                       MIXD15
1241.            NN1=5                                                           MIXD15
1242.            NN2=NPER                                                        MIXD15
1243.          102 NN3=5                                                         MIXD15
1244.            SAVEQS(ITYPE,IPOINT,5)=10.0**YY(INC)                            MIXD15
1245.            AA=SAVEQS(ITYPE,IPOINT,5)                                       VERS2
1246.            BB=SAVEQS(ITYPE,IPOINT,1)                                       VERS2
1247.            IF(AA.LT.BB) AA=BB                                              VERS2
1248.            IF(AA.GT.BB*1000.0) AA=BB                                       VERS2
1249.            SAVEQS(ITYPE,IPOINT,5)=AA                                       VERS2
1250.            PRINT 45, INC,SAVEQS(ITYPE,IPOINT,5)                            MIXD15
1251.           45 FORMAT("0THE ",I2,"TH PERCENTILE IS:", 1PE9.2)                MIXD15
1252.            IF(KOPT(4).EQ.1) CALL LOGFPT(XXXS,YYYS,XQ15S,FQ15S,LFPTS,LDPTS) MIXD15
1253.            9 CONTINUE                                                      MIXD15
1254.            RETURN                                                          MIXD15
1255.            END                                                             MIXD15
1256.            SUBROUTINE CALC (K, DIS,FREQ15)                                 CALC
1257.             COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                   BLANK
1258.            1     ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)                BLANK
1259.            2     ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)            BLANK
1260.            3     ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)                BLANK
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     4       ,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)                    BLANK
     5      ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)                   BLANK
     6       ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)               BLANK
     7       ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE                            BLANK
     8          ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL               BLANK
     9       ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)              BLANK
     1       ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                            BLANK
      DIMENSION FREQ15(14,7)                                                   CALC
      IF(KOPT(10).EQ.1) LDSRT=1                                                VERS2
      NUM=0                                                                    CALC
      DO 1   J=1,NSTA                                                          CALC
      CALL POLYN(J,DIS,SZ,LDSRT)                                               VERS2
      JY=J+7                                                                   CALC
      CALL POLYN(JY,DIS,SY,LDSRT)                                              VERS2
      DO 1 I=1,NVEL                                                            CALC
      IF(FREQ15(I,J).LE.0)   GO TO 1                                           CALC
      NUM=NUM+1                                                                CALC
      XELV=0.                                                                  CALC
      XELVSS=0.                                                                CALC
      XGRD=0.                                                                  CALC
      XGRDSS=0.                                                                CALC
      U=UMAXEL(I,J)                                                            CALC
      CALL RLSMOD(W,U,IVENT,ET,LSTACK)                                         CALC
      IF(IVENT)  2,3,3                                                         CALC
    3 CALL HEIGHT(K,DIS,HGT)                                                   CALC
      CALL RISE (DH,   DIS,U,J,0.,0.,HS,W,DIA)                                 CALC
      H=HS+DH-HGT                                                              CALC
      IF(H.LT.0.) H=0.                                                         CALC
      B=H/SZ                                                                   CALC
      XNUM=0.                                                                  CALC
      IF(B.LT.15.) XNUM=EXP(-.5*B*B)                                           CALC
      XDEN=U*3.1416*SY*SZ                                                      CALC
      XELV=XNUM/XDEN                                                           CALC
      IF(KOPT(03).EQ.0)      GO TO 5                                           CALC
      XDEN=DIS*SZ*U                                                            CALC
      XELVSS=2.032*XNUM/XDEN                                                   CALC
      IF(XELVSS.LT.XELV)   XELV=XELVSS                                         CALC
    5 CONTINUE                                                                 CALC
      IF(IVENT.EQ.1) GO TO 8                                                   CALC
    2 U=UMAXGL(I,J)                                                            CALC
      DTERM=U*SY*SZ*3.1416                                                     CALC
    9 XDEN=DTERM+(U*C*A)                                                       CALC
      XDEN2=3.*DTERM                                                           CALC
      IF(XDEN2.LT.XDEN) XDEN=XDEN2                                             CALC
      XGRD=1./XDEN                                                             CALC
      IF(KOPT(03).EQ.0)      GO TO 8                                           CALC
      ARG=(SZ*SZ)+(D*D*C*0.318310)                                             CALC
      XDEN=U*DIS*SQRT(ARG)                                                     CALC
      XDEN2=1.73205*U*DIS*SZ                                                   CALC
      IF(XDEN2.LT.XDEN) XDEN=XDEN2                                             CALC
      XGRDSS=2.032/XDEN                                                        CALC
      IF(XGRDSS.LT.XGRD)   XGRD=XGRDSS                                         CALC
    8 XQ15(NUM)=ET*XGRD+(1.-ET)*XELV                                           CALC
      FQ15(NUM)=FREQ15(I,J)                                                    CALC
    1 CONTINUE                                                                 CALC
      RETURN                                                                   CALC
      END                                                                      CALC
      SUBROUTINE ORDER(N,KK,OX,OF)                                             ORDER
      DIMENSION OX(1),OF(1)                                                    ORDER
C**** THIS ROUTINE USES THE SHELL METHOD TO ORDER AN ARRAY.                    ORDER
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1321.           M=N                                                             ORDER
1322.       104 M=M/2                                                           ORDER
1323.           IF(M.EQ.0) GO TO 100                                            ORDER
1324.           K=N-M                                                           ORDER
1325.           J=1                                                             ORDER
1326.       103 I=J                                                             ORDER
1327.       102 L=M+I                                                           ORDER
1328.           IF(OX(I).GE.OX(L)) GO TO 101                                    ORDER
1329.           X=OX(I)                                                         ORDER
1330.           Y=OF(I)                                                         ORDER
1331.           OX(I)=OX(L)                                                     ORDER
1332.           OF(I)=OF(L)                                                     ORDER
1333.           OX(L)=X                                                         ORDER
1334.           OF(L)=Y                                                         ORDER
1335.           I=I-M                                                           ORDER
1336.           IF(I.GE.1) GO TO 102                                            ORDER
1337.       101 J=J+1                                                           ORDER
1338.           IF(J.LE.K) GO TO 103                                            ORDER
1339.           GO TO 104                                                       ORDER
1340.       100 KK=1                                                            ORDER
1341.           II=1                                                            ORDER
1342.       200 II=II+1                                                         ORDER
1343.           IF(II.GT.N) GO TO 201                                           ORDER
1344.           IF(OX(KK).GT.OX(II)) GO TO 202                                  ORDER
1345.           OF(KK)=OF(KK)+OF(II)                                            ORDER
1346.           GO TO 200                                                       ORDER
1347.       202 KK=KK+1                                                         ORDER
1348.           OX(KK)=OX(II)                                                   ORDER
1349.           OF(KK)=OF(II)+OF(KK-1)                                          ORDER
1350.           GO TO 200                                                       ORDER
1351.       201 CONTINUE                                                        ORDER
1352.           II=KK+1                                                         ORDER
1353.           NP=N+9                                                          ORDER
1354.           IF(NP.GT.1008)  NP=1008                                         ORDER
1355.           DO 204 I=II,NP                                                  ORDER
1356.           OX(I)=0.                                                        ORDER
1357.       204 OF(I)=0.                                                        ORDER
1358.           RETURN                                                          ORDER
1359.           END                                                             ORDER
1360.           SUBROUTINE CONV(A,NUM)                                          CONV
1361.           DIMENSION F(49),XF(49),A(1)                                     CONV
1362.           DATA F/.01,.05,.1,.5,1.,2.,3.,4.,5.,6.,7.,8.,9.,10.,12.,14.,16.  CONV
1363.          X,18.,20.,25.,30.,35.,40.,45.,50.,55.,60.,65.,70.,75.,80.,82.,84.  CONV
1364.          X,86.,88.,90.,91.,92.,93.,94.,95.,96.,97.,98.,99.,99.5,99.9,99.95  CONV
1365.          X,99.99/                                                         CONV
1366.           DATA XF/-3.73183,-3.29097,-3.09036,-2.57591,-2.32635,-2.05378    CONV
1367.          X,-1.88081,-1.75069,-1.64485,-1.55477,-1.4758,-1.40507,-1.34076  CONV
1368.          X,-1.28155,-1.17499,-1.08032,-.99446,-.91537,-.84163,-.67499,-.5244 CONV
1369.          X,-.38532,-.25335,-.12566,0.,.12566,.25335,.38532,.5244,.67449   CONV
1370.          X,.84163,.91537,.99446,1.08032,1.17499,1.28155,1.34076,1.40507   CONV
1371.          X,1.4758,1.55477,1.64485,1.75069,1.88081,2.05378,2.32635,2.57591  CONV
1372.          X,3.09036,3.29097,3.73183/                                       CONV
1373.           ZIP=0.                                                          CONV
1374.           EPS=.0001                                                       CONV
1375.         5 NNN=NUM                                                         CONV
1376.           DO 1 J=1,NNN                                                    CONV
1377.           IF(A(J).LT.F(1)) GO TO 3                                        CONV
1378.           IF(A(J).GT.F(49)) A(J)=F(49)                                    CONV
1379.           DO 10 I=2,49                                                    CONV
1380.           IF(A(J).GE.F(I-1) .AND. A(J).LE.F(I)) GO TO 2                   CONV
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1381.       10 CONTINUE                                                    CONV
1382.        3 DO 4 K=2,NUM                                                CONV
1383.        4 A(K-1)=A(K)                                                 CONV
1384.          NUM=NUM-1                                                   CONV
1385.          GO TO 5                                                     CONV
1386.        2 IF(I.GE.25) GO TO 7                                         CONV
1387.          Z1=-XF(I)                                                   CONV
1388.          Z2=-XF(I-1)                                                 CONV
1389.          FI=50.-A(J)                                                 CONV
1390.          GO TO 14                                                    CONV
1391.        7 Z1=XF(I-1)                                                  CONV
1392.          Z2=XF(I)                                                    CONV
1393.          FI=A(J)-50.                                                 CONV
1394.       14 DO 15 N=1,50                                                CONV
1395.          Z=.5*(Z1+Z2)                                                CONV
1396.          FT=39.8942*GAUSS(Z,ZIP)                                     CONV
1397.          FAC=FT-FI                                                   CONV
1398.          IF(ABS(FAC).LE.EPS) GO TO 16                                CONV
1399.          IF(FAC.GT.0.) GO TO 17                                      CONV
1400.          Z1=Z                                                        CONV
1401.          GO TO 15                                                    CONV
1402.       17 Z2=Z                                                        CONV
1403.       15 CONTINUE                                                    CONV
1404.       16 A(J)=Z                                                      CONV
1405.          IF(I.LT.25) A(J)=-Z                                         CONV
1406.        1 CONTINUE                                                    CONV
1407.          RETURN                                                      CONV
1408.          END                                                         CONV
1409.          FUNCTION GAUSS(B,A)                                         GAUSS
1410.          F(X)=EXP(-.125*(X*(B-A)+A+B)*(X*(B-A)+A+B))                 GAUSS
1411.          X1=.93246951                                                GAUSS
1412.          X2=.66120939                                                GAUSS
1413.          X3=.23861919                                                GAUSS
1414.          X4=-X3                                                      GAUSS
1415.          X5=-X2                                                      GAUSS
1416.          X6=-X1                                                      GAUSS
1417.          GAUSS=.1713249*(F(X1)+F(X6))+.36076157*(F(X2)+F(X5))        GAUSS
1418.         X+.46791393*(F(X3)+F(X4))                                    GAUSS
1419.          GAUSS=.5*(B-A)*GAUSS                                        GAUSS
1420.          RETURN                                                      GAUSS
1421.          END                                                         GAUSS
1422.          SUBROUTINE LSTSQR(XX,YY,X,Y,NPTS,NDEG,NR,XS,YS)             LSTSQR
1423.          DIMENSION XX(1),YY(1),X(1),Y(1),A(10,10),B(10),C(600,10)    LSTSQR
1424.          NP1=NDEG+1                                                  LSTSQR
1425.          DO 30 I=1,NPTS                                              LSTSQR
1426.       30 C(I,1)=1.0                                                  LSTSQR
1427.          DO 35 J=2,NP1                                               LSTSQR
1428.          DO 35 I=1,NPTS                                              LSTSQR
1429.       35 C(I,J)=C(I,J-1)*X(I)                                        LSTSQR
1430.          DO 40 I=1,NP1                                               LSTSQR
1431.          DO 40 J=1,NP1                                               LSTSQR
1432.          A(I,J)=0.0                                                  LSTSQR
1433.          DO 40 K=1,NPTS                                              LSTSQR
1434.       40 A(I,J)=A(I,J)+C(K,I)*C(K,J)                                 LSTSQR
1435.          DO 45 I=1,NP1                                               LSTSQR
1436.          B(I)=0.0                                                    LSTSQR
1437.          DO 45 K=1,NPTS                                              LSTSQR
1438.       45 B(I)=B(I)+C(K,I)*Y(K)                                       LSTSQR
1439.          CALL INVERS(A,NP1,B,DET,IFS)                                LSTSQR
1440.          IF(IFS.NE.0) GO TO 53                                       LSTSQR
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1441.          PRINT 54                                                    LSTSQR
1442.       54 FORMAT(" SINGULAR MATRIX")                                  LSTSQR
1443.          GO TO 500                                                   LSTSQR
1444.       53 CONTINUE                                                    LSTSQR
1445.          DO 60 I=1,NR                                                LSTSQR
1446.          YY(I)=B(1)                                                  LSTSQR
1447.          VAL=1.                                                      LSTSQR
1448.          DO 61 J=2,NP1                                               LSTSQR
1449.          VAL=VAL*XX(I)                                               LSTSQR
1450.       61 YY(I)=YY(I)+B(J)*VAL                                        LSTSQR
1451.       60 CONTINUE                                                    LSTSQR
1452.          IF(XS.GT.2.5) GO TO 500                                     LSTSQR
1453.          YS=B(1)                                                     LSTSQR
1454.          VAL=1.                                                      LSTSQR
1455.          DO 20 J=2,NP1                                               LSTSQR
1456.          VAL=VAL*XS                                                  LSTSQR
1457.       20 YS=YS+B(J)*VAL                                              LSTSQR
1458.      500 RETURN                                                      LSTSQR
1459.          END                                                         LSTSQR
1460.          SUBROUTINE INVERS(A,N,B,DET,IFS)                            INVERS
1461.          DIMENSION A(10,10),B(10),IPVOT(10),INDEX(10,2),PIVOT(10)    INVERS
1462.          EQUIVALENCE (IROW,JROW),(ICOL,JCOL)                         INVERS
1463.          IFS=0                                                       INVERS
1464.          DET=1.                                                      INVERS
1465.          DO 17 J=1,N                                                 INVERS
1466.       17 IPVOT(J)=0                                                  INVERS
1467.          DO 135 I=1,N                                                INVERS
1468.          T=0.                                                        INVERS
1469.          DO 9 J=1,N                                                  INVERS
1470.          IF(IPVOT(J).EQ.1) GO TO 9                                   INVERS
1471.          DO 23   K=1,N                                               INVERS
1472.          IF(IPVOT(K)-1) 43,23,81                                     INVERS
1473.       43 IF(ABS(T).GE.ABS(A(J,K))) GO TO 23                          INVERS
1474.          IROW=J                                                      INVERS
1475.          ICOL=K                                                      INVERS
1476.          T=A(J,K)                                                    INVERS
1477.       23 CONTINUE                                                    INVERS
1478.        9 CONTINUE                                                    INVERS
1479.          IPVOT(ICOL)=IPVOT(ICOL)+1                                   INVERS
1480.          IF(IROW.EQ.ICOL) GO TO 109                                  INVERS
1481.          DET=-DET                                                    INVERS
1482.          DO 12 L=1,N                                                 INVERS
1483.          T=A(IROW,L)                                                 INVERS
1484.          A(IROW,L)=A(ICOL,L)                                         INVERS
1485.       12 A(ICOL,L)=T                                                 INVERS
1486.          T=B(IROW)                                                   INVERS
1487.          B(IROW)=B(ICOL)                                             INVERS
1488.          B(ICOL)=T                                                   INVERS
1489.      109 INDEX(I,1)=IROW                                             INVERS
1490.          INDEX(I,2)=ICOL                                             INVERS
1491.          PIVOT(I)=A(ICOL,ICOL)                                       INVERS
1492.          DET=DET*PIVOT(I)                                            INVERS
1493.          IF(DET) 66,81,66                                            INVERS
1494.       66 IFS=1                                                       INVERS
1495.          A(ICOL,ICOL)=1.                                             INVERS
1496.          DO 205 L=1,N                                                INVERS
1497.      205 A(ICOL,L)=A(ICOL,L)/PIVOT(I)                                INVERS
1498.          B(ICOL)=B(ICOL)/PIVOT(I)                                    INVERS
1499.          DO 135   LI=1,N                                             INVERS
1500.          IF(LI.EQ.ICOL) GO TO 135                                    INVERS
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1501.            T=A(LI,ICOL)                                                    INVERS
1502.            A(LI,ICOL)=0.                                                   INVERS
1503.            DO 89 L=1,N                                                     INVERS
1504.         89 A(LI,L)=A(LI,L)-A(ICOL,L)*T                                     INVERS
1505.            B(LI)=B(LI)-B(ICOL)*T                                           INVERS
1506.        135 CONTINUE                                                        INVERS
1507.            DO 3   I=1,N                                                    INVERS
1508.            L=N-I+1                                                         INVERS
1509.            IF(INDEX(L,1).EQ.INDEX(L,2)) GO TO 3                            INVERS
1510.            JROW=INDEX(L,1)                                                 INVERS
1511.            JCOL=INDEX(L,2)                                                 INVERS
1512.            DO 549 K=1,N                                                    INVERS
1513.            T=A(K,JROW)                                                     INVERS
1514.            A(K,JROW)=A(K,JCOL)                                             INVERS
1515.            A(K,JCOL)=T                                                     INVERS
1516.        549 CONTINUE                                                        INVERS
1517.          3 CONTINUE                                                        INVERS
1518.         81 RETURN                                                          INVERS
1519.            END                                                             INVERS
1520.            SUBROUTINE LOGFPT(XXXPLT,YYYPLT,XQ15,FQ15,NXXX,NXQ15)           LOGFPT
1521.      C     SUBROUTINE FOR LOG FREQ PLOTS TO INTERFACE WITH METEOROLOGY      LOGFPT
1522.      C      DISPERSION PROGRAM    R.CODELL USNRC APRIL 1976                 LOGFPT
1523.            DIMENSION XXXPLT(1),YYYPLT(1),XQ15(1),FQ15(1),DEV1(100),DEV2(100) LOGFPT
1524.      C     FIND MAX OF Y OR XQ15                                           LOGFPT
1525.            YMAX=-1.E10                                                     LOGFPT
1526.            DO 1 N=1,NXXX                                                   LOGFPT
1527.          1 IF(YYYPLT(N).GT.YMAX) YMAX=YYYPLT(N)                            LOGFPT
1528.            DO 2 N=1,NXQ15                                                  LOGFPT
1529.          2 IF(XQ15(N).GT.YMAX) YMAX=XQ15(N)                                LOGFPT
1530.      C     ROUND UP EXPONENT AND SUBTRACT 3                                LOGFPT
1531.            IEXP=ALOG10(YMAX)-3                                             LOGFPT
1532.            DO 3 N=1,NXXX                                                   LOGFPT
1533.            CALL DEVATE(XXXPLT(N),DEV1(N))                                  LOGFPT
1534.          3 YYYPLT(N)=ALOG10(YYYPLT(N))                                     LOGFPT
1535.            DO 4 N=1,NXQ15                                                  LOGFPT
1536.            CALL DEVATE(FQ15(N),DEV2(N))                                    LOGFPT
1537.          4 XQ15(N)=ALOG10(XQ15(N))                                         LOGFPT
1538.            PRINT 10                                                        LOGFPT
1539.         10 FORMAT(1H1)                                                     LOGFPT
1540.      C      SORT VALUES WHICH FIT INTO FIRST 3 DECADES                      LOGFPT
1541.            DO 20 N=1,NXXX                                                  LOGFPT
1542.            IF(YYYPLT(N).LT.IEXP) GOTO 21                                   LOGFPT
1543.         20 CONTINUE                                                        LOGFPT
1544.            N=NXXX                                                          LOGFPT
1545.         21 N1=N                                                            LOGFPT
1546.            DO 30 N=1,NXQ15                                                 LOGFPT
1547.            IF(XQ15(N).LT.IEXP) GOTO 31                                     LOGFPT
1548.         30 CONTINUE                                                        LOGFPT
1549.            N=NXQ15                                                         LOGFPT
1550.         31 N2=N                                                            LOGFPT
1551.            CALL PPLT(DEV2,XQ15,DEV1,YYYPLT,IEXP,N2,N1,EX,EY,0)             LOGFPT
1552.            IEXP=ALOG10(YMAX)-6                                             LOGFPT
1553.      C      DATA WHICH FIT INTO SECOND SET OF 3 DECADES                     LOGFPT
1554.            DO 40 N=N1,NXXX                                                 LOGFPT
1555.            M=N-N1+1                                                        LOGFPT
1556.            DEV1(M)=DEV1(N)                                                 LOGFPT
1557.         40 YYYPLT(M)=YYYPLT(N)                                             LOGFPT
1558.            N1=NXXX-N1+1                                                    LOGFPT
1559.            DO 50 N=N2,NXQ15                                                LOGFPT
1560.            M=N-N2+1                                                        LOGFPT
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1561.          DEV2(M)=DEV2(N)                                                  LOGFPT
1562.       50 XQ15(M)=XQ15(N)                                                  LOGFPT
1563.          N2=NXQ15-N2+1                                                    LOGFPT
1564.          CALL PPLT(DEV2,XQ15,DEV1,YYYPLT,IEXP,N2,N1,EX,EY,0)              LOGFPT
1565.          RETURN                                                           LOGFPT
1566.          END                                                              LOGFPT
1567.          SUBROUTINE PPLT(X,Y,DX,DY,IEXP,NPLTS,JPLTS,EX,EY,NMISS)          PPLT
1568.          DIMENSION XSCAL(19),LINE(19),IPRT(122),X(1),Y(1),                PPLT
1569.         1 DX(1),DY(1),EX(1),EY(1)                                         PPLT
1570.          DATA XSCAL/99.9,99.8,99.5,99.,98.,95.,90.,80.,70.,50.,30.,20.,10., PPLT
1571.         .     5., 2., 1., .5, .2,.1/                                      PPLT
1572.          DATA LINE /   2,   6,  12, 17, 22, 30, 37, 45, 51, 61, 71, 77,85, PPLT
1573.         .     92,100,105,110,116,120/                                     PPLT
1574.          DATA IV/1HI/,IBLK/1H /,IDSH/1H-/                                 PPLT
1575.          DATA IHIS/1HO/,IEST/1HE/,ICMP/1HX/,IEXC/1H$/                     PPLT
1576.          XLMTP=3.0904                                                     PPLT
1577.          XLMTN=-3.0904                                                    PPLT
1578.          WRITE(6,30)                                                      PPLT
1579.       30 FORMAT(/59X,20HEXCEEDENCE FREQUENCY)                             PPLT
1580.          WRITE(6,40)(XSCAL(20-I),I=1,19)                                  PPLT
1581.       40 FORMAT(9X,F4.1,F4.1,F6.1,F4.0,F5.0,F8.0,F7.0,F8.0,F6.0,F10.0,    PPLT
1582.         1 F10.0,F6.0,F8.0,F7.0,F8.0,F5.0,F6.1,F6.1,F5.1)                  PPLT
1583.          IEXP=IEXP+3                                                      PPLT
1584.          YVAL=IEXP                                                        PPLT
1585.          YINC=1./18.                                                      PPLT
1586.          YVAL=YVAL+YINC-1./36.                                            PPLT
1587.          NCNT=1                                                           PPLT
1588.          JCNT=1                                                           PPLT
1589.          MCNT=1                                                           PPLT
1590.          DO 210 L=1,55                                                    PPLT
1591.          YVAL=YVAL-YINC                                                   PPLT
1592.          YPVAR=10**(YVAL-FLOAT(IEXP))                                     PPLT
1593.          DO 50 I=1,122                                                    PPLT
1594.          IPRT(I)=IBLK                                                     PPLT
1595.       50 CONTINUE                                                         PPLT
1596.          IF(L.EQ.1.OR.L.EQ.19.OR.L.EQ.37.OR.L.EQ.55) GO TO 55             PPLT
1597.          GO TO 70                                                         PPLT
1598.       55 DO 60 I=3,119                                                    PPLT
1599.          IPRT(I)=IDSH                                                     PPLT
1600.       60 CONTINUE                                                         PPLT
1601.       70 DO 80 II=1,19                                                    PPLT
1602.          I=LINE(II)                                                       PPLT
1603.          IPRT(I)=IV                                                       PPLT
1604.       80 CONTINUE                                                         PPLT
1605.          IF(NCNT.GT.NPLTS) GO TO 130                                      PPLT
1606.       90 IF(Y(NCNT).LT.YVAL) GO TO 130                                    PPLT
1607.          IF(X(NCNT).LE.XLMTP) GO TO 100                                   PPLT
1608.          IPRT(121)=IEXC                                                   PPLT
1609.          GO TO 120                                                        PPLT
1610.      100 IF(X(NCNT).GE.XLMTN) GO TO 110                                   PPLT
1611.          IPRT(1)=IEXC                                                     PPLT
1612.          GO TO 120                                                        PPLT
1613.      110 I=(X(NCNT)-XLMTN)/.05237+2.5                                     PPLT
1614.          IPRT(I)=IHIS                                                     PPLT
1615.      120 NCNT=NCNT+1                                                      PPLT
1616.          IF(MCNT.GT.NMISS) GO TO 125                                      PPLT
1617.          IF(EY(MCNT).LT.YVAL)GO TO 125                                    PPLT
1618.          IF(EX(MCNT).GT.XLMTP) GO TO 124                                  PPLT
1619.          IF(EX(MCNT).LT.XLMTN) GO TO 124                                  PPLT
1620.          IF(EX(MCNT).NE.X(NCNT-1)) GO TO 125                              PPLT
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1621.           IPRT(I)=IEST                                                    PPLT
1622.         124 MCNT=MCNT+1                                                   PPLT
1623.         125 IF(NCNT.LE.NPLTS) GO TO 90                                    PPLT
1624.         130 IF(JCNT.GT.JPLTS) GO TO 170                                   PPLT
1625.           IF(DY(JCNT).LT.YVAL) GO TO 170                                  PPLT
1626.           IF(DX(JCNT).LE.XLMTP) GO TO 140                                 PPLT
1627.           IPRT(121)=IEXC                                                  PPLT
1628.           GO TO 160                                                       PPLT
1629.         140 IF(DX(JCNT).GE.XLMTN) GO TO 150                               PPLT
1630.           IPRT(1)=IEXC                                                    PPLT
1631.           GO TO 160                                                       PPLT
1632.         150 I=(DX(JCNT)-XLMTN)/.05237+2.5                                 PPLT
1633.           IPRT(I)=ICMP                                                    PPLT
1634.         160 JCNT=JCNT+1                                                   PPLT
1635.           GO TO 130                                                       PPLT
1636.         170 IF(L.EQ.1.OR.L.EQ.19.OR.L.EQ.37.OR.L.EQ.55) GO TO 190         PPLT
1637.           ITMP=10.**YVAL                                                  PPLT
1638.           IF(L.GT.4.AND.L.LT.15) GO TO 1170                               PPLT
1639.           IF(ITMP.LT.IYSC) GO TO 195                                      PPLT
1640.           GO TO 179                                                       PPLT
1641.        1170 ITP=L-4                                                       PPLT
1642.         179 WRITE(6,180) YPVAR,(IPRT(123-I),I=1,122)                      PPLT
1643.         180 FORMAT(3X,F5.2,1X,122A1)                                      PPLT
1644.           GO TO 210                                                       PPLT
1645.         190 IYSC=10**IEXP                                                 PPLT
1646.           IEXP=IEXP-1                                                     PPLT
1647.           IYINC=IYSC/5                                                    PPLT
1648.         195 IEX1=IEXP+1                                                   PPLT
1649.           WRITE(6,200) IEX1,(IPRT(123-I),I=1,122)                         PPLT
1650.         200 FORMAT(1X,4H10**,I3,1X,122A1)                                 PPLT
1651.           IYSC=IYSC-IYINC                                                 PPLT
1652.         210 CONTINUE                                                      PPLT
1653.           WRITE(6,220) IHIS,IEST,ICMP,IEXC                                PPLT
1654.         220 FORMAT(10X,A1,15H =RECORDED DATA,5X,A1,20H =RECONSTITUTED DATA ,  PPLT
1655.            .     5X,A1,26H =COMPUTED FREQUENCY CURVE,5X,A1,19H =BEYOND PLOT RA PPLT
1656.            .NGE )                                                         PPLT
1657.           RETURN                                                          PPLT
1658.           END                                                             PPLT
1659.           SUBROUTINE DEVATE(PROB,DEV)                                     DEVATE
1660.       C             INPUT IS EXCEEDENCE FREQUENCY IN PERCENT              DEVATE
1661.       C             OUTPUT IS CORRESPONDING DEVIATE                       DEVATE
1662.           IF(PROB.LT.0.05)   PROB=0.05                                    DEVATE
1663.           IF(PROB.GT.99.95)  PROB=99.95                                   DEVATE
1664.           NEG=0                                                           DEVATE
1665.           TPROB=PROB                                                      DEVATE
1666.           DEV=0.                                                          DEVATE
1667.           IF(TPROB.LE.50.) GO TO 10                                       DEVATE
1668.           TPROB=100.-TPROB                                                DEVATE
1669.           NEG=1                                                           DEVATE
1670.          10 DO 20 I=1,20                                                  DEVATE
1671.           CALL AREA(DEV,CPROB)                                            DEVATE
1672.           TEMP=TPROB-CPROB                                                DEVATE
1673.           IF(ABS(TEMP).LT..00005) GO TO 50                                DEVATE
1674.           DEV=DEV-(TEMP/100.)/(EXP(-.5*DEV**2)/(2.*3.1415926536)**.5)     DEVATE
1675.          20 CONTINUE                                                      DEVATE
1676.           IF(NEG.LT.1) GO TO 30                                           DEVATE
1677.           CPROB=100.-CPROB                                                DEVATE
1678.           DEV=-DEV                                                        DEVATE
1679.          30 WRITE(6,40) PROB,CPROB,DEV                                    DEVATE
1680.          40 FORMAT(/26H DID NOT CONVERGE FOR PROB ,F7.3,5X,15H RESULTS--PROB=  DEVATE
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1681.            1,F7.3,5X,8HDEVIATE= ,F7.3)                                    DEVATE
1682.              RETURN                                                       DEVATE
1683.           50 IF(NEG.GT.0) DEV=-DEV                                        DEVATE
1684.              RETURN                                                       DEVATE
1685.              END                                                          DEVATE
1686.              SUBROUTINE AREA(DEV,PROB)                                    AREA
1687.              DOUBLE PRECISION TMP,TEMP,FAC                                AREA
1688.              CONST=1./(2.*3.1415926536)**.5                               AREA
1689.              NEG=0                                                        AREA
1690.              TMP=DEV                                                      AREA
1691.              IF(DEV.GE.0.) GO TO 8                                        AREA
1692.              TMP=-DEV                                                     AREA
1693.              NEG=1                                                        AREA
1694.            8 PROB=0.                                                      AREA
1695.              IF(TMP.GT.5.) GO TO 25                                       AREA
1696.              PROB=TMP                                                     AREA
1697.              FAC=1.                                                       AREA
1698.              DO 10 I=2,50                                                 AREA
1699.              XI=I                                                         AREA
1700.              FAC=FAC*(XI-1.)                                              AREA
1701.              TMPP=(-1)**(I-1)                                             AREA
1702.              ITP=2*I-1                                                    AREA
1703.              TEMP=TMPP*TMP**ITP/((2.*XI-1.)*FAC*2.**(I-1))                AREA
1704.              PROB=PROB+TEMP                                               AREA
1705.              ERR=DABS(TEMP)                                               AREA
1706.              IF(ERR.LT..0000001) GO TO 20                                 AREA
1707.           10 CONTINUE                                                     AREA
1708.           20 PROB=(.5-PROB*CONST)*100.                                    AREA
1709.           25 IF(NEG.GT.0) PROB=100.-PROB                                  AREA
1710.              RETURN                                                       AREA
1711.              END                                                          AREA
1712.              SUBROUTINE DEPLET (DIS,JSTAB,HEIGHT,ANSWER)                  DEPLET
1713.        C     REVISION 1 - OCTOBER 1976                                    DEPLET
1714.              DISLN = ALOG(DIS)                                            DEPLET
1715.              JS = JSTAB - 4                                               DEPLET
1716.              ANSWER = 1.000000                                            DEPLET
1717.              IF(HEIGHT.LE.15.0) GO TO 1                                   DEPLET
1718.              IF(HEIGHT.LE.45.0) GO TO 2                                   DEPLET
1719.              IF(HEIGHT.LE.80.0) GO TO 3                                   DEPLET
1720.              IF(JS)  4,5,7                                                DEPLET
1721.        4     IF(DIS.LE.600.0)  RETURN                                     DEPLET
1722.              IF(DIS.GT.10000.0)  GO TO 20                                 DEPLET
1723.              ANSWER = .864906 + (.07226318*DISLN) - (.007984452*DISLN*DISLN)  DEPLET
1724.              GO TO 7                                                      DEPLET
1725.           20 IF(DIS.GT.60000.0) GO TO 21                                  DEPLET
1726.              ANSWER = -2.2825 + (.745051*DISLN) - (.04395715*DISLN*DISLN) DEPLET
1727.              GO TO 7                                                      DEPLET
1728.           21 ANSWER = -.7504639 + (.5173622*DISLN) - (.03590246*DISLN*DISLN)  DEPLET
1729.              GO TO 7                                                      DEPLET
1730.        5     IF(DIS.LE.1700.0)  RETURN                                    DEPLET
1731.              IF(DIS.GT.10000.0)  GO TO 22                                 DEPLET
1732.              ANSWER = .1212574 + (.2528144*DISLN) - (.01812868*DISLN*DISLN)  DEPLET
1733.              GO TO 7                                                      DEPLET
1734.           22 IF(DIS.GT.70000.0)  GO TO 23                                 DEPLET
1735.              ANSWER = .3417348 + (.2006985*DISLN) - (.01506006*DISLN*DISLN)  DEPLET
1736.              GO TO 7                                                      DEPLET
1737.           23 ANSWER = 2.533078 - (.1632279*DISLN)                         DEPLET
1738.              GO TO 7                                                      DEPLET
1739.        1     IF(DIS.GT.1000.0)  GO TO 24                                  DEPLET
1740.              ANSWER = .7793717 + (.09578526*DISLN) - (.01132715*DISLN*DISLN)  DEPLET
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1741.            GO TO 7                                                    DEPLET
1742.         24 IF(DIS.GT.10000.0)  GO TO 25                               DEPLET
1743.            ANSWER = .5659763 + (.1425852*DISLN) - (.01363635*DISLN*DISLN)  DEPLET
1744.            GO TO 7                                                    DEPLET
1745.         25 ANSWER = .7203016 + (.1085504*DISLN) - (.01172335*DISLN*DISLN)  DEPLET
1746.            GO TO 7                                                    DEPLET
1747.      2     IF(JS)  8,9,10                                             DEPLET
1748.      8     IF(DIS.LE.180.0) RETURN                                    DEPLET
1749.            IF(DIS.GT.20000.0)  GO TO 26                               DEPLET
1750.            ANSWER = .9535697 + (.04267785*DISLN) - (.0065097*DISLN*DISLN)  DEPLET
1751.            GO TO 7                                                    DEPLET
1752.         26 IF(DIS.GT.50000.0)  GO TO 27                               DEPLET
1753.            ANSWER = -4.521979 + (1.153126*DISLN) - (.06286699*DISLN*DISLN)  DEPLET
1754.            GO TO 7                                                    DEPLET
1755.         27 ANSWER = -1.441149 + (.6080616*DISLN) - (.03878529*DISLN*DISLN)  DEPLET
1756.            GO TO 7                                                    DEPLET
1757.      9     IF(DIS.LE.400.0)  RETURN                                   DEPLET
1758.            ANSWER = .8622019 + (.07496899*DISLN) - (.00873217*DISLN*DISLN)  DEPLET
1759.            GO TO 7                                                    DEPLET
1760.      10    IF(DIS.LE.6000.0)  RETURN                                  DEPLET
1761.            IF(DIS.GT.20000.0) GO TO 28                                DEPLET
1762.            ANSWER = -3.524029 + (1.055262*DISLN) - (.06153549*DISLN*DISLN)  DEPLET
1763.            GO TO 7                                                    DEPLET
1764.         28 ANSWER = 4.247176 - (.4075444*DISLN) + (.007074166*DISLN*DISLN)  DEPLET
1765.            GO TO 7                                                    DEPLET
1766.      3     IF(JS)  11,12,13                                           DEPLET
1767.      11    IF(DIS.LE.300.0) RETURN                                    DEPLET
1768.            IF(DIS.GT.10000.0) GO TO 29                                DEPLET
1769.            ANSWER = .6938609 + (.1123458*DISLN) - (.01046413*DISLN*DISLN)  DEPLET
1770.            GO TO 7                                                    DEPLET
1771.         29 IF(DIS.GE.50000.0)  GO TO 30                               DEPLET
1772.            ANSWER = 2.10853 - (.1364853*DISLN)                        DEPLET
1773.            GO TO 7                                                    DEPLET
1774.         30 ANSWER = -3.952915 + (1.059189*DISLN) - (.05883216*DISLN*DISLN)  DEPLET
1775.            GO TO 7                                                    DEPLET
1776.      12    IF(DIS.LE.1000.0)  RETURN                                  DEPLET
1777.            IF(DIS.GT.10000.0)  GO TO 31                               DEPLET
1778.            ANSWER = .6127362 + (.1386609*DISLN) - (.01197688*DISLN*DISLN)  DEPLET
1779.            GO TO 7                                                    DEPLET
1780.         31 ANSWER = .4809772 + (.1645758*DISLN) - (.0132591*DISLN*DISLN)  DEPLET
1781.            GO TO 7                                                    DEPLET
1782.      13    IF(DIS.LE.60000.0)  RETURN                                 DEPLET
1783.            ANSWER = -8.220195 + (1.694657*DISLN) - (.07789403*DISLN*DISLN)  DEPLET
1784.      7     CONTINUE                                                   DEPLET
1785.            IF(ANSWER.GT.1.00000)   ANSWER = 1.00000                   DEPLET
1786.            RETURN                                                     DEPLET
1787.            END                                                        DEPLET
1788.            SUBROUTINE SPLINE(X,Y,L,YP1,YPL,XF,YF,YPF,M)               SPLINE
1789.      C                                                                SPLINE
1790.      C---- THIS PROGRAM COMPUTES THE CUBIC SPLINE FUNCTION PASSING THRU THE  SPLINE
1791.      C     SEQUENCE OF POINTS (X(1),Y(1)),...,(X(L),Y(L)) HAVING SLOPE YP1 AT SPLINE
1792.      C     X(1) AND SLOPE YPL AT X(L).  IT IS THEN INTERPOLATED AT THE POINTS SPLINE
1793.      C     XF(1),...,XF(M) TO YIELD BOTH THE VALUE YF AND SLOPE YPF AT EACH  SPLINE
1794.      C     POINT.                                                     SPLINE
1795.      C                                                                SPLINE
1796.      C---- INPUT   X   ARRAY OF INDEPENDENT VARIABLE.  LENGTH .GE. L  SPLINE
1797.      C                 X MUST BE MONOTONE INCREASING I.E. X(I) .LT. X(I+1)  SPLINE
1798.      C             Y   ARRAY OF   DEPENDENT VARIABLE.  LENGTH .GE. L  SPLINE
1799.      C             L   NUMBER OF POINTS IN THE X AND Y ARRAYS.        SPLINE
1800.      C             YP1 SLOPE DYDX AT X(1)                             SPLINE
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C              YPL SLOPE DYDX AT X(L)                                          SPLINE
C              XF  ARRAY OF INDEPENDENT VARIABLE WHERE THE SPLINE              SPLINE
C                  FUNCTION IS TO BE INTERPOLATED.  LENGTH .GE. M              SPLINE
C              M   NUMBER OF POINTS IN THE XF ARRAY.                           SPLINE
C     OUTPUT   YF  ARRAY OF INTERPOLATED VALUES PAIRED AS (XF(I),YF(I))        SPLINE
C                  LENGTH .GE.M                                                SPLINE
C              YPF ARRAY OF SLOPES OF THE SPLINE FUNCTION AT THE POINTS        SPLINE
C                  XF.  LENGTH .GE. M                                          SPLINE
C                                                                              SPLINE
C---- IF L.LE.1, L.GT.LMAX, OR M.LE.0 CONTROL IS RETURNED TO THE CALLING       SPLINE
C     PROGRAM WITH NO CALCULATIONS MADE.                                       SPLINE
C                                                                              SPLINE
      DIMENSION X(1),Y(1),XF(1),YF(1),YPF(1)                                   SPLINE
C                                                                              SPLINE
      DIMENSION C(100),D(100),P(100),Q(100),U(100),V(100),VP(100)              SPLINE
      COMMON /SIGMA /SIG                                                       SPLINE
C---- LMAX IS THE DIMENSION OF THE ARRAYS C,D,P,Q,U,V, AND VP.                 SPLINE
      DATA LMAX/100/                                                           SPLINE
C                                                                              SPLINE
      IF(L.LE.   1) GO TO 16                                                   SPLINE
      IF(L.GT.LMAX) GO TO 16                                                   SPLINE
      IF(M.LE.   0) GO TO 16                                                   SPLINE
C                                                                              SPLINE
C---- COMPUTE SPLINE PARAMETERS                                                SPLINE
      LL=L                                                                     SPLINE
      DO 1 J=1,LL                                                              SPLINE
      P(J)=X(J)                                                                SPLINE
    1 Q(J)=Y(J)                                                                SPLINE
      YP1I=YP1                                                                 SPLINE
      YPLI=YPL                                                                 SPLINE
      CALL CURV(LL,P,Q,YP1I,YPLI,C,D,SIG)                                      SPLINE
      DO 10 J=1,M                                                              SPLINE
      IT=J                                                                     SPLINE
      T=XF(J)                                                                  SPLINE
      YPF(J)=0.                                                                SPLINE
   10 YF(J)=CURV2(T,LL,P,Q,C,SIG,IT)                                           SPLINE
   16 RETURN                                                                   SPLINE
      END                                                                      SPLINE
      SUBROUTINE CURV(N,X,Y,SLP1,SLPN,YP,TEMP,SIGMA)                           CURV
      INTEGER N                                                                CURV
      REAL X(N),Y(N),SLP1,SLPN,YP(N),TEMP(N),SIGMA                             CURV
C THIS SUBROUTINE DETERMINES THE PARAMETERS NECESSARY TO                       CURV
C COMPUTE AN INTERPOLATORY SPLINE UNDER TENSION THROUGH                        CURV
C A SEQUENCE OF FUNCTIONAL VALUES. THE SLOPES AT THE TWO                       CURV
C ENDS OF THE CURVE MAY BE SPECIFIED OR OMITTED. FOR ACTUAL                    CURV
C COMPUTATION OF POINTS ON THE CURVE IT IS NECESSARY TO CALL                   CURV
C THE FUNCTION CURV2.                                                          CURV
C ON INPUT--                                                                   CURV
C N     IS THE NUMBER OF VALUES TO BE INTERPOLATED (N.GE.2),                   CURV
C X    IS AN ARRAY OF THE N INCREASING ABSCISSAE OF THE                        CURV
C      FUNCTIONAL VALUES,                                                      CURV
C Y    IS AN ARRAY OF THE N ORDINATES OF THE VALUES,(I.E.Y(K)                  CURV
C      IS THE FUNCTIONAL VALUE CORRESPONDING TO X(K)),                         CURV
C SLP1 AND SLPN CONTAIN THE DESIRED VALUES FOR THE FIRST                       CURV
C      DERIVATIVE OF THE CURVE AT X(1) AND X(N), RESPECTIVELY.                 CURV
C      IF THE QUANTITY SIGMA IS NEGATIVE THESE VALUES WILL BE                  CURV
C      DETERMINED INTERNALLY AND THE USER NEED ONLY FURNISH                    CURV
C      PLACE-HOLDING PARAMETERS FOR SLP1 AND SLPN. SUCH PLACE-                 CURV
C      HOLDING PARAMETERS WILL BE IGNORED BUT NOT DESTROYED,                   CURV
C YP   IS AN ARRAY OF LENGTH AT LEAST N                                        CURV
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C TEMP IS AN ARRAY OF LENGTH AT LEAST N WHICH IS USED FOR                CURV
C      SCRATCH STORAGE                                                   CURV
C   AND                                                                  CURV
C SIGMA CONTAINS THE TENSION FACTOR. THIS IS NON-ZERO AND                CURV
C      INDICATES THE CURVINESS DESIRED. IF ABS(SIGMA) IS NEARLY          CURV
C      ZERO (E.G. .001) THE RESULTING CURVE IS APPROXIMATELY A           CURV
C      CUBIC SPLINE. IF ABS(SIGMA) IS LARGE (E.G. 50.) THE               CURV
C      RESULTING CURVE IS NEARLY A POLYGONAL LINE. THE SIGN              CURV
C      OF SIGMA INDICATES WHETHER THE DERIVATIVE INFORMATION             CURV
C      HAS BEEN INPUT OR NOT. IF SIGMA IS NEGATIVE THE ENDPOINT          CURV
C      DERIVATIVES WILL BE DETERMINED INTERNALLY.  A STANDARD            CURV
C      VALUE FOR SIGMA IS APPROXIMATELY 1. IN ABSOLUTE VALUE.            CURV
C ON OUTPUT -                                                            CURV
C YP   CONTAINS VALUES PROPORTIONAL TO THE SECOND DERIVATIVE             CURV
C      OF THE CURVE AT THE GIVEN NODES.                                  CURV
C                                                                        CURV
C N,X,Y,SLP1,SLPN AND SIGMA ARE UNALTERED.                               CURV
C                                                                        CURV
C                                                                        CURV
C REFERENCE  A.K.CLINE, ALGORITHM 476,                                   CURV
C      COMM.ACM,VOL.17,NO.4, APRIL 1974, PP.220-223                      CURV
C      AND   A.K.CLINE  SCALAR- AND PLANAR-VALUED CURVE                  CURV
C      FITTING USING SPLINES UNDER TENSION                               CURV
C      COMM.ACM,VOL.17,NO.4, APRIL 1974, PP.2218-220                     CURV
C                                                                        CURV
      NM1=N-1                                                            CURV
      NP1=N+1                                                            CURV
      DELX1=X(2)-X(1)                                                    CURV
      DX1=(Y(2)-Y(1))/DELX1                                              CURV
C DETERMINE SLOPES IF NECESSARY                                          CURV
      SLPP1=SLP1                                                         CURV
      SLPPN=SLPN                                                         CURV
      IF(SIGMA) 50,70,10                                                 CURV
C DENORMALIZE TENSION FACTOR                                             CURV
   10 SIGMAP=ABS(SIGMA)*FLOAT(NM1)/(X(N)-X(1))                           CURV
C SET UP RIGHT HAND SIDE AND TRIDIAGONAL SYSTEM FOR YP AND               CURV
C PERFORM FORWARD ELIMINATION                                            CURV
      DELS=SIGMAP*DELX1                                                  CURV
      EXPS=EXP(DELS)                                                     CURV
      SINHS=.5*(EXPS-1./EXPS)                                            CURV
      SINHIN=1./(DELX1*SINHS)                                            CURV
      DIAG1=SINHIN*(DELS*.5*(EXPS+1./EXPS)-SINHS)                        CURV
      DIAGIN=1./DIAG1                                                    CURV
      YP(1)=DIAGIN*(DX1-SLPP1)                                           CURV
      SPDIAG=SINHIN*(SINHS-DELS)                                         CURV
      TEMP(1)=DIAGIN*SPDIAG                                              CURV
      IF(N.EQ.2) GO TO 30                                                CURV
      DO 20 I=2,NM1                                                      CURV
      DELX2=X(I+1)-X(I)                                                  CURV
      DX2=(Y(I+1)-Y(I))/DELX2                                            CURV
      DELS=SIGMAP*DELX2                                                  CURV
      EXPS=EXP(DELS)                                                     CURV
      SINHS=.5*(EXPS-1./EXPS)                                            CURV
      SINHIN=1./(DELX2*SINHS)                                            CURV
      DIAG2=SINHIN*(DELS*.5*(EXPS+1./EXPS)-SINHS)                        CURV
      DIAGIN=1./(DIAG1+DIAG2-SPDIAG*TEMP(I-1))                           CURV
      YP(I)=DIAGIN*(DX2-DX1-SPDIAG*YP(I-1))                              CURV
      SPDIAG=SINHIN*(SINHS-DELS)                                         CURV
      TEMP(I)=DIAGIN*SPDIAG                                              CURV
      DX1=DX2                                                            CURV
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1921.          20 DIAG1=DIAG2                                                  CURV
1922.          30 DIAGIN=1./(DIAG1-SPDIAG*TEMP(N-1))                           CURV
1923.             YP(N)=DIAGIN*(SLPPN-DX2-SPDIAG*YP(N-1))                      CURV
1924.       C PERFORM BACK SUBSTITUTION                                        CURV
1925.             DO 40 I=2,N                                                  CURV
1926.             IBAK=NP1-I                                                   CURV
1927.          40 YP(IBAK)=YP(IBAK)-TEMP(IBAK)*YP(IBAK+1)                      CURV
1928.             RETURN                                                       CURV
1929.          50 IF(N.EQ.2) GO TO 60                                          CURV
1930.       C IF NO DERIVATIVES ARE GIVEN USE SECOND ORDER POLYNOMIAL          CURV
1931.       C INTERPOLATION ON INPUT DATA FOR VALUES AT ENDPOINTS.             CURV
1932.             DELX2=X(3)-X(2)                                              CURV
1933.             DELX12=X(3)-X(1)                                             CURV
1934.             C1=-(DELX12+DELX1)/DELX12/DELX1                              CURV
1935.             C2=DELX12/DELX1/DELX2                                        CURV
1936.             C3=-DELX1/DELX12/DELX2                                       CURV
1937.             SLPP1=C1*Y(1)+C2*Y(2)+C3*Y(3)                                CURV
1938.             DELN=X(N)-X(N-1)                                             CURV
1939.             DELNM1=X(N-1)-X(N-2)                                         CURV
1940.             DELNN=X(N)-X(N-2)                                            CURV
1941.             C1=(DELNN+DELN)/DELNN/DELN                                   CURV
1942.             C2=-DELNN/DELN/DELNM1                                        CURV
1943.             C3=DELN/DELNN/DELNM1                                         CURV
1944.             SLPPN=C3*Y(N-2)+C2*Y(N-1)+C1*Y(N)                            CURV
1945.             PRINT 901, SLPP1,SLPPN                                       CURV
1946.        901  FORMAT(1H0,"SLOPE AT ENDS",2E12.4)                          CURV
1947.             GO TO 10                                                     CURV
1948.       C IF ONLY TWO POINTS AND NO DERIVATIVES ARE GIVEN, USE             CURV
1949.       C STRAIGHT LINE FOR CURVE                                          CURV
1950.          60 YP(1)=0.                                                     CURV
1951.             YP(2)=0.                                                     CURV
1952.             RETURN                                                       CURV
1953.       C                                                                  CURV
1954.       C---- ORDINARY CUBIC SPLINE CASE                                   CURV
1955.          70 DIAG1=2.*DELX1                                               CURV
1956.             DIAGIN=1./DIAG1                                              CURV
1957.             YP(1)=DIAGIN*(DX1-SLPP1)                                     CURV
1958.             SPDIAG=DELX1                                                 CURV
1959.             TEMP(1)=DIAGIN*SPDIAG                                        CURV
1960.             IF(N.EQ.2) GO TO 30                                          CURV
1961.             DO 80 I=2,NM1                                                CURV
1962.             DELX2=X(I+1)-X(I)                                            CURV
1963.             DX2=(Y(I+1)-Y(I))/DELX2                                      CURV
1964.             DIAG2=2.*DELX2                                               CURV
1965.             DIAGIN=1./(DIAG1+DIAG2-SPDIAG*TEMP(I-1))                     CURV
1966.             YP(I)=DIAGIN*(DX2-DX1-SPDIAG*YP(I-1))                        CURV
1967.             SPDIAG=DELX2                                                 CURV
1968.             TEMP(I)=DIAGIN*SPDIAG                                        CURV
1969.             DX1=DX2                                                      CURV
1970.          80 DIAG1=DIAG2                                                  CURV
1971.             GO TO 30                                                     CURV
1972.             END                                                          CURV
1973.             FUNCTION CURV2(T,N,X,Y,YP,SIGMA,IT)                          CURV2
1974.             INTEGER N,IT                                                 CURV2
1975.             REAL T,X(N),Y(N),YP(N),SIGMA                                 CURV2
1976.          C THIS FUNCTION INTERPOLATES A CURVE AT A GIVEN POINT           CURV2
1977.          C        USING A SPLINE UNDER TENSION. THE SUBROUTINE CURV1 SHOULD CURV2
1978.          C        BE CALLED EARLIER TO DETERMINE CERTAIN NECESSARY        CURV2
1979.          C        PARAMETERS.                                             CURV2
1980.          C                                                                CURV2
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1981.      C ON INPUT -                                                    CURV2
1982.      C T       CONTAINS A REAL VALUE TO BE MAPPED ONTO THE INTERPO-  CURV2
1983.      C         LATING CURVE.                                         CURV2
1984.      C N       CONTAINS THE NUMBER OF POINTS WHICH WERE INTERPOLATED CURV2
1985.      C         TO DETERMINE THE CURVE,                               CURV2
1986.      C X AND Y ARE ARRAYS CONTAINING THE ORDINATES AND ABSCISSAS     CURV2
1987.      C         OF THE INTERPOLATED POINTS,                           CURV2
1988.      C YP      IS AN ARRAY WITH VALUES PROPORTIONAL TO THE SECOND    CURV2
1989.      C         DERIVATIVE OF THE CURVE AT THE NODES,                 CURV2
1990.      C SIGMA CONTAINS THE TENSION FACTOR (ITS SIGN IS IGNORED),      CURV2
1991.      C IT      IS AN INTEGER SWITCH. IF IT IS NOT 1 THIS INDICATES   CURV2
1992.      C         THAT THE FUNCTION HAS BEEN CALLED PREVIOUSLY (WITH N,X, CURV2
1993.      C         Y,YP AND SIGMA UNALTERED) AND THAT THIS VALUE OF T    CURV2
1994.      C         EXCEEDS THE PREVIOUS VALUE. WITH SUCH INFORMATION THE CURV2
1995.      C         FUNCTION IS ABLE TO PERFORM THE INTERPOLATION MUCH MORE CURV2
1996.      C         RAPIDLY. IF A USER SEEKS TO INTERPOLATE AT A SEQUENCE CURV2
1997.      C         OF POINTS, EFFICIENCY IS GAINED BY ORDERING THE VALUES CURV2
1998.      C         INCREASING AND SETTING IT TO THE INDEX OF THE CALL.   CURV2
1999.      C         IF IT IS 1 THE SEARCH FOR THE INTERVAL (X(K-1),X(K))  CURV2
2000.      C         CONTAINING T STARTS WITH K=2                          CURV2
2001.      C                                                               CURV2
2002.      C THE PARAMETERS N,X,Y,YP AND SIGMA SHOULD BE INPUT             CURV2
2003.      C         UNALTERED FROM THE OUTPUT OF CURV1.                   CURV2
2004.      C                                                               CURV2
2005.      C ON OUTPUT -                                                   CURV2
2006.      C CURV2 CONTAINS THE INTERPOLATED VALUE. FOR T LESS THAN        CURV2
2007.      C         X(1) CURV2=Y(1). FOR T GREATER THAN X(N) CURV2=Y(N).  CURV2
2008.      C                                                               CURV2
2009.      C NONE OF THE INPUT PARAMETERS ARE ALTERED.                     CURV2
2010.      C                                                               CURV2
2011.            IF(T.LE.X(1)) GO TO 60                                    CURV2
2012.            IF(T.GE.X(N)) GO TO 62                                    CURV2
2013.      C IF IT.NE.1 START SEARCH WHERE PREVIOUSLY TERMINATED.          CURV2
2014.      C OTHERWISE START FROM BEGINNING                                CURV2
2015.            IF(IT.NE.1) GO TO 10                                      CURV2
2016.          1 I1=2                                                      CURV2
2017.      C SEARCH FOR INTERVAL                                           CURV2
2018.         10 DO 20 I=I1,N                                              CURV2
2019.            IF(X(I)-T) 20,20,30                                       CURV2
2020.         20 CONTINUE                                                  CURV2
2021.            I=N                                                       CURV2
2022.      C CHECK TO INSURE CORRECT INTERVAL                              CURV2
2023.         30 IF(X(I-1).GT.T) GO TO 1                                   CURV2
2024.      C SET UP AND PERFORM INTERPOLATION                              CURV2
2025.         40 DEL1=T-X(I-1)                                             CURV2
2026.            DEL2=X(I)-T                                               CURV2
2027.            DELS=X(I)-X(I-1)                                          CURV2
2028.            IF(SIGMA.EQ.0.) GO TO 70                                  CURV2
2029.            S=X(N)-X(1)                                               CURV2
2030.      C DENORMALIZE SIGMA                                             CURV2
2031.            SIGMAP=ABS(SIGMA)*FLOAT(N-1)/S                            CURV2
2032.            EXPS1=EXP(SIGMAP*DEL1)                                    CURV2
2033.            SINHD1=.5*(EXPS1-1./EXPS1)                                CURV2
2034.            EXPS=EXP(SIGMAP*DEL2)                                     CURV2
2035.            SINHD2=.5*(EXPS-1./EXPS)                                  CURV2
2036.            EXPS=EXPS1*EXPS                                           CURV2
2037.            SINHS=.5*(EXPS-1./EXPS)                                   CURV2
2038.            CURVE=(YP(I)*SINHD1+YP(I-1)*SINHD2)/SINHS+                CURV2
2039.           1((Y(I)-YP(I))*DEL1+(Y(I-1)-YP(I-1))*DEL2)/DELS            CURV2
2040.            I1=I                                                      CURV2
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      50 CURV2=CURVE                                                    CURV2
         RETURN                                                         CURV2
C T .LE. X(1)                                                         CURV2
      60 CURVE=Y(1)                                                    CURV2
      61 I1=2                                                          CURV2
         GO TO 50                                                      CURV2
C T .GE. X(N)                                                         CURV2
      62 CURVE=Y(N)                                                    CURV2
         GO TO 61                                                      CURV2
C                                                                     CURV2
C---- ORDINARY CUBIC SPLINE CASE                                      CURV2
      70 A=(DEL2*Y(I-1)+DEL1*Y(I))/DELS                               CURV2
         X2 =T**2                                                     CURV2
         XI2=X(I-1)**2                                                CURV2
         B=(X2*T-XI2*X(I-1))/DELS                                     CURV2
         C=3.*X(I-1)*T*DEL1/DELS                                      CURV2
         D=3.*(X2-XI2)                                                CURV2
         E=DEL1*DELS                                                  CURV2
         F=6.*X(I-1)*DEL1                                             CURV2
         G=-B+C+D-2.*E-F                                              CURV2
         H=B-C-E                                                      CURV2
         CURVE=A+G*YP(I-1)+H*YP(I)                                    CURV2
         GO TO 50                                                     CURV2
         END                                                          CURV2
         SUBROUTINE DEPOST (DIS,JSTAB,HEIGHT,ANSWER)                  DEPOST
C        REVISION 1 - OCTOBER 1976                                    DEPOST
         DOUBLE PRECISION ANSWER                                      DEPOST
         DISLN = ALOG(DIS)                                            DEPOST
         JS= JSTAB - 4                                                DEPOST
         IF(HEIGHT.LE.15.0) GO TO 1                                   DEPOST
         IF(HEIGHT.LE.45.0)  GO TO 2                                  DEPOST
         IF(HEIGHT.LE.80.0) GO TO 3                                   DEPOST
         IF(JS)  4,5,6                                                DEPOST
       4 IF(DIS.GT.400.0) GO TO 50                                    DEPOST
         SUM = -57.04822 + (13.82261*DISLN) - (1.019382*DISLN*DISLN)  DEPOST
         GO TO 1000                                                   DEPOST
      50 IF(DIS.GE.3000.0) GO TO 51                                   DEPOST
         SUM = -35.26215 + (7.297182*DISLN) - (.5343292*DISLN*DISLN)  DEPOST
         GO TO 1000                                                   DEPOST
      51 IF(DIS.GT.30000.0)  GO TO 52                                 DEPOST
         SUM= -1.488902 - (1.694416*DISLN) + (.06353313*DISLN*DISLN)  DEPOST
         GO TO 1000                                                   DEPOST
      52 SUM = -45.70724 + (6.464447*DISLN) - (.3122405*DISLN*DISLN)  DEPOST
         GO TO 1000                                                   DEPOST
       5 IF(DIS.GE.1500.0) GO TO 53                                   DEPOST
         SUM = -63.81157 + (11.90979*DISLN) - (.6561428*DISLN*DISLN)  DEPOST
         GO TO 1000                                                   DEPOST
      53 IF(DIS.GE.10000.0) GO TO 54                                  DEPOST
         SUM = -44.54416 + (8.03507*DISLN) - (.4868832*DISLN*DISLN)   DEPOST
         GO TO 1000                                                   DEPOST
      54 SUM = -9.971805 + (.1761891*DISLN) - (.04063289*DISLN*DISLN) DEPOST
         GO TO 1000                                                   DEPOST
       6 ANSWER = 0.00000                                             DEPOST
         RETURN                                                       DEPOST
       1 IF(DIS.GT.1000.0) GO TO 55                                   DEPOST
         SUM = -9.07794 + (.4357604*DISLN) - (.07881594*DISLN*DISLN)  DEPOST
         GO TO 1000                                                   DEPOST
      55 IF(DIS.GT.10000.0) GO TO 56                                  DEPOST
         SUM = -6.64143 - (.2466506*DISLN) - (.03098147*DISLN*DISLN)  DEPOST
         GO TO 1000                                                   DEPOST
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2101.        56 SUM= -14.06597 + (1.10343*DISLN) - (.09031373*DISLN*DISLN)          DEPOST
2102.           GO TO 1000                                                          DEPOST
2103.            2 IF(JS)  8,9,10                                                   DEPOST
2104.            8 IF(DIS.GE.400.0) GO TO 57                                        DEPOST
2105.              SUM = -35.30917 + (9.57035*DISLN) - (.8727484*DISLN*DISLN)       DEPOST
2106.              GO TO 1000                                                       DEPOST
2107.           57 IF(DIS.GT.2000.0) GO TO 58                                       DEPOST
2108.              SUM = -3.946649 - (.882866*DISLN)                                DEPOST
2109.              GO TO 1000                                                       DEPOST
2110.           58 IF(DIS.GE.5000.0) GO TO 59                                       DEPOST
2111.              SUM = -3.256392 - (1.20884*DISLN) + (.03092014*DISLN*DISLN)      DEPOST
2112.              GO TO 1000                                                       DEPOST
2113.           59 IF(DIS.GE.13000.0) GO TO 60                                      DEPOST
2114.              SUM = -5.975507 - (.6270642*DISLN)                               DEPOST
2115.              GO TO 1000                                                       DEPOST
2116.           60 IF(DIS.GT.20000.0) GO TO 61                                      DEPOST
2117.              SUM = 12.1268 - (4.455138*DISLN) + (.202586*DISLN*DISLN)         DEPOST
2118.              GO TO 1000                                                       DEPOST
2119.           61 IF(DIS.GE.60000.0) GO TO 62                                      DEPOST
2120.              SUM = -10.79479 + (.01276474*DISLN) - (.01497699*DISLN*DISLN)    DEPOST
2121.              GO TO 1000                                                       DEPOST
2122.           62 SUM = -54.18442 + (7.877314*DISLN) - (.3715153*DISLN*DISLN)      DEPOST
2123.              GO TO 1000                                                       DEPOST
2124.            9 IF(DIS.GT.200.0) GO TO 63                                        DEPOST
2125.              SUM = -42.9116 + (8.624134*DISLN) - (.5286823*DISLN*DISLN)       DEPOST
2126.              GO TO 1000                                                       DEPOST
2127.           63 IF(DIS.GT.400.0) GO TO 64                                        DEPOST
2128.              SUM = -45.08005 + (9.502915*DISLN) - (.6178266*DISLN*DISLN)      DEPOST
2129.              GO TO 1000                                                       DEPOST
2130.           64 IF(DIS.GT.1500.0) GO TO 65                                       DEPOST
2131.              SUM = -46.40474 + (10.93155*DISLN) - (.8182561*DISLN*DISLN)      DEPOST
2132.              GO TO 1000                                                       DEPOST
2133.           65 IF(DIS.GT.7000.0) GO TO 66                                       DEPOST
2134.              SUM = -12.06068 + (1.105205*DISLN) - (.1167178*DISLN*DISLN)      DEPOST
2135.              GO TO 1000                                                       DEPOST
2136.           66 IF(DIS.GE.15000.0) GO TO 67                                      DEPOST
2137.              SUM = -4.148934 - (.821923*DISLN)                                DEPOST
2138.              GO TO 1000                                                       DEPOST
2139.           67 SUM = -4.640997 - (.7696691*DISLN)                               DEPOST
2140.              GO TO 1000                                                       DEPOST
2141.           10 IF(DIS.GE.5000.0) GO TO 68                                       DEPOST
2142.              SUM = -156.334 + (29.93037*DISLN) - (1.5483*DISLN*DISLN)         DEPOST
2143.              GO TO 1000                                                       DEPOST
2144.           68 IF(DIS.GT.8400.0) GO TO 69                                       DEPOST
2145.              SUM = -140.62 + (26.18382*DISLN) - (1.324944*DISLN*DISLN)        DEPOST
2146.              GO TO 1000                                                       DEPOST
2147.           69 IF(DIS.GE.42000.0) GO TO 70                                      DEPOST
2148.              SUM = -87.89882 + (15.38889*DISLN) - (.7753119*DISLN*DISLN)      DEPOST
2149.              GO TO 1000                                                       DEPOST
2150.           70 SUM = -12.94973 + (1.265261*DISLN) - (.1098207*DISLN*DISLN)      DEPOST
2151.              GO TO 1000                                                       DEPOST
2152.            3 IF(JS) 11,12,13                                                  DEPOST
2153.           11 IF(DIS.GT.400.0) GO TO 71                                        DEPOST
2154.              SUM = -30.45023 + (5.76941*DISLN) - (.394098*DISLN*DISLN)        DEPOST
2155.              GO TO 1000                                                       DEPOST
2156.           71 IF(DIS.GT.900.0) GO TO 101                                       DEPOST
2157.              SUM = -36.23268 + (8.23023*DISLN) - (.6448782*DISLN*DISLN)       DEPOST
2158.              GO TO 1000                                                       DEPOST
2159.          101 IF(DIS.GT.3000.0) GO TO 72                                      DEPOST
2160.              SUM = -1.56127 - (1.725164*DISLN) + (.0694564*DISLN*DISLN)       DEPOST
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2161.          GO TO 1000                                                    DEPOST
2162.       72 IF(DIS.GT.13000.0) GO TO 73                                   DEPOST
2163.          SUM = -5.807573 - (.6388715*DISLN)                            DEPOST
2164.          GO TO 1000                                                    DEPOST
2165.       73 IF(DIS.GT.50000.0) GO TO 74                                   DEPOST
2166.          SUM = -.2792892 - (1.959056*DISLN) + (.07773757*DISLN*DISLN)  DEPOST
2167.          GO TO 1000                                                    DEPOST
2168.       74 SUM= -58.14337 + ( 8.633218*DISLN) - (.4071184*DISLN*DISLN)   DEPOST
2169.          GO TO 1000                                                    DEPOST
2170.       12 IF(DIS.GE.300.0) GO TO 75                                     DEPOST
2171.          SUM = -177.431 + (55.32239*DISLN) - (4.658777*DISLN*DISLN)    DEPOST
2172.          GO TO 1000                                                    DEPOST
2173.       75 IF(DIS.GT.1000.0) GO TO 76                                    DEPOST
2174.          SUM = -58.73299 + (12.91683*DISLN) - (.8705195*DISLN*DISLN)   DEPOST
2175.          GO TO 1000                                                    DEPOST
2176.       76 IF(DIS.GT.3000.0) GO TO 77                                    DEPOST
2177.          SUM = -45.04643 + (9.088059*DISLN) - (.6027659*DISLN*DISLN)   DEPOST
2178.          GO TO 1000                                                    DEPOST
2179.       77 IF(DIS.GT.20000.0) GO TO 78                                   DEPOST
2180.          SUM = -13.59167 + (1.164582*DISLN) - (.1036683*DISLN*DISLN)   DEPOST
2181.          GO TO 1000                                                    DEPOST
2182.       78 SUM = -4.867893 -(.7430947*DISLN)                             DEPOST
2183.          GO TO 1000                                                    DEPOST
2184.       13 IF(DIS.GE.80000.0) GO TO 79                                   DEPOST
2185.          SUM = -357.2949 + (59.55312*DISLN) - (2.583151*DISLN*DISLN)   DEPOST
2186.          GO TO 1000                                                    DEPOST
2187.       79 SUM = -134.0653 +(20.00078*DISLN) - (.8306277*DISLN*DISLN)    DEPOST
2188.     1000 ANSWER = EXP(SUM)                                             DEPOST
2189.          RETURN                                                        DEPOST
2190.          END                                                           DEPOST
2191.          SUBROUTINE ADJUST                                             ADJUST
2192.           COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                 BLANK
2193.         1      ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)              BLANK
2194.         2      ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)          BLANK
2195.         3      ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)              BLANK
2196.         4       ,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)         BLANK
2197.         5      ,UAVE(14),IPUF E(5),RLSID(5),NPOINT(8),DECAYS(3)        BLANK
2198.         6       ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)    BLANK
2199.         7       ,UGU,UGS,UES,JEU,URE,C,NDIR,IEX,NPTYPE                 BLANK
2200.         8          ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL    BLANK
2201.         9       ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)   BLANK
2202.         1       ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                 BLANK
2203.           DIMENSION SETDIS(10),DST(25),HG(25)                          ADJUST
2204.           DATA SETDIS/1207.,2414.,4023.,5632.,7241.,12068.,24135.,40225.,  ADJUST
2205.         1            56315.,72405./                                   ADJUST
2206.           I4(I,J,K,L)=I+16*(J-1+14*(K-1+7*(L-1)))                      ADJUST
2207.           DO 2000  K=1,NDIR                                            ADJUST
2208.           DO 2000  I=1,NVEL                                            ADJUST
2209.           DO 2000  J=1,NSTA                                            ADJUST
2210.           MD=0                                                         ADJUST
2211.           DO 700  N=1,NDIS                                             ADJUST
2212.           DIS = DIST(K,N)                                              ADJUST
2213.           UBAR=UAVEEL(I,J)                                             ADJUST
2214.           CALL RISE (DH,DIS,UBAR,J,0.,0.,HS,W,DIA)                     ADJUST
2215.           CALL HEIGHT (K,DIS,HGT)                                      ADJUST
2216.           H = HS + DH - HGT                                            ADJUST
2217.           MD = MD+1                                                    ADJUST
2218.           DST(MD) = DIS                                                ADJUST
2219.           HG(MD) = H                                                   ADJUST
2220.           IF(H.LT.15.0)  GO TO 703                                     ADJUST
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2221.      700   CONTINUE                                                    ADJUST
2222.            DO 704  M=1,10                                             ADJUST
2223.            IF(DIST(K,NDIS).GE.SETDIS(M))  GO TO 704                   ADJUST
2224.            DIS = SETDIS(M)                                            ADJUST
2225.            UBAR=UAVEEL(I,J)                                           ADJUST
2226.            CALL RISE (DH,DIS,UBAR,J,0.,0.,HS,W,DIA)                   ADJUST
2227.            CALL HEIGHT (K,DIS,HGT)                                    ADJUST
2228.            H = HS + DH - HGT                                          ADJUST
2229.            MD = MD+1                                                  ADJUST
2230.            DST(MD) = DIS                                              ADJUST
2231.            HG(MD) = H                                                 ADJUST
2232.            IF(H.LT.15.0)  GO TO 703                                   ADJUST
2233.      704   CONTINUE                                                    ADJUST
2234.      703   CONTINUE                                                    ADJUST
2235.            MAX = MD                                                   ADJUST
2236.            DO  707  L=1,3                                             ADJUST
2237.            DPLTAD(I4(K,I,J,L))=0.0                                    ADJUST
2238.        707 DEPADJ(I4(K,I,J,L))=1.0                                    ADJUST
2239.            MD = 1                                                     ADJUST
2240.            IF(HG(MD).GT.80.0)  GO TO 708                              ADJUST
2241.            IF(HG(MD).GT.45.0.AND.HG(MD).LE.80.0)  GO TO 709           ADJUST
2242.            IF(HG(MD).GT.15.0.AND.HG(MD).LE.45.0)  GO TO 710           ADJUST
2243.            GO TO 2000                                                 ADJUST
2244.      710   MD = MD+1                                                   ADJUST
2245.            IF(MD.GT.MAX)   GO TO 2000                                 ADJUST
2246.      711   IF(HG(MD).GE.15.0)  GO TO 710                              ADJUST
2247.            HN = HG(MD-1)                                              ADJUST
2248.            DN = DST(MD-1)                                             ADJUST
2249.            HF = HG(MD)                                                ADJUST
2250.            DF = DST(MD)                                               ADJUST
2251.            HDIF = HF - HN                                             ADJUST
2252.            IF(HDIF.EQ.0.0)   GO TO 314                                ADJUST
2253.            DIS = DN + ((DF-DN)*(15.0-HN)/(HF-HN))                     ADJUST
2254.            GO TO 316                                                  ADJUST
2255.      314   DIS = DN                                                    ADJUST
2256.      316   CONTINUE                                                    ADJUST
2257.            CALL DEPLET (DIS,J,30.0,DPL3)                              ADJUST
2258.            CALL DEPLET (DIS,J,0.0,DPL0)                               ADJUST
2259.            DPLTAD(I4(K,I,J,3))=DPL3-DPL0                              ADJUST
2260.            DEPADJ(I4(K,I,J,3))=DPL3/DPL0                              ADJUST
2261.            GO TO 2000                                                 ADJUST
2262.      709   MD = MD+1                                                   ADJUST
2263.            IF(MD.GT.MAX)   GO TO 2000                                 ADJUST
2264.      712   IF(HG(MD).GE.45.0)  GO TO 709                              ADJUST
2265.            HN = HG(MD-1)                                              ADJUST
2266.            DN = DST(MD-1)                                             ADJUST
2267.            HF = HG(MD)                                                ADJUST
2268.            DF = DST(MD)                                               ADJUST
2269.            HDIF = HF - HN                                             ADJUST
2270.            IF(HDIF.EQ.0.0)   GO TO 344                                ADJUST
2271.            DIS = DN + ((DF-DN)*(45.0-HN)/(HF-HN))                     ADJUST
2272.            GO TO 346                                                  ADJUST
2273.      344   DIS = DN                                                    ADJUST
2274.      346   CONTINUE                                                    ADJUST
2275.            CALL DEPLET (DIS,J,60.0,DPL6)                              ADJUST
2276.            CALL DEPLET (DIS,J,30.0,DPL3)                              ADJUST
2277.            DEPADJ(I4(K,I,J,2))=DPL6/DPL3                              ADJUST
2278.            DPLTAD(I4(K,I,J,2))=DPL6-DPL3                              ADJUST
2279.            GO TO 711                                                  ADJUST
2280.      708   MD = MD+1                                                   ADJUST
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2281.            IF(MD.GT.MAX)   GO TO 2000                                    ADJUST
2282.            IF(HG(MD).GE.80.0)  GO TO 708                                 ADJUST
2283.            HN = HG(MD-1)                                                 ADJUST
2284.            DN = DST(MD-1)                                                ADJUST
2285.            HF = HG(MD)                                                   ADJUST
2286.            DF = DST(MD)                                                  ADJUST
2287.            HDIF = HF - HN                                                ADJUST
2288.            IF(HDIF.EQ.0.0)   GO TO 384                                   ADJUST
2289.            DIS = DN + ((DF-DN)*(80.0-HN)/(HF-HN))                        ADJUST
2290.            GO TO 386                                                     ADJUST
2291.       384  DIS = DN                                                      ADJUST
2292.       386  CONTINUE                                                      ADJUST
2293.            CALL DEPLET (DIS,J,100.0,DPL8)                                ADJUST
2294.            CALL DEPLET (DIS,J,60.0,DPL6)                                 ADJUST
2295.            DEPADJ(I4(K,I,J,1))=DPL8/DPL6                                 ADJUST
2296.            DPLTAD(I4(K,I,J,1))=DPL8-DPL6                                 ADJUST
2297.            GO TO 712                                                     ADJUST
2298.       2000 CONTINUE                                                      ADJUST
2299.            RETURN                                                        ADJUST
2300.            END                                                           ADJUST
2301.            SUBROUTINE ADJCOR (DEPANS,I80,I60,I30,H,K,I,J,DPLANS)         ADJCOR
2302.             COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                 BLANK
2303.           1      ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)              BLANK
2304.           2      ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)          BLANK
2305.           3      ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)              BLANK
2306.           4       ,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)         BLANK
2307.           5      ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)        BLANK
2308.           6       ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)    BLANK
2309.           7       ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE                 BLANK
2310.           8          ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL    BLANK
2311.           9       ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)    BLANK
2312.           1       ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                  BLANK
2313.             I4(I,J,K,L)=I+16*(J-1+14*(K-1+7*(L-1)))                       ADJCOR
2314.             DEPANS = 1.000                                                ADJCOR
2315.             DPLANS = 0.00000                                              ADJCOR
2316.             IF(H.GT.80.0)   GO TO 1                                       ADJCOR
2317.             IF(H.GT.45.0)   GO TO 2                                       ADJCOR
2318.             IF(H.GT.15.0)   GO TO 3                                       ADJCOR
2319.             IF(I80.EQ.1)    GO TO 5                                       ADJCOR
2320.             IF(I60.EQ.1)    GO TO 6                                       ADJCOR
2321.             IF(I30.EQ.0)    RETURN                                        ADJCOR
2322.             DEPANS=DEPADJ(I4(K,I,J,3))                                    ADJCOR
2323.             DPLANS=DPLTAD(I4(K,I,J,3))                                    ADJCOR
2324.             RETURN                                                        ADJCOR
2325.        1    I80=1                                                         ADJCOR
2326.             RETURN                                                        ADJCOR
2327.        2    I60=1                                                         ADJCOR
2328.             IF(I80.EQ.0)   RETURN                                         ADJCOR
2329.             DEPANS=DEPADJ(I4(K,I,J,1))                                    ADJCOR
2330.             DPLANS=DPLTAD(I4(K,I,J,1))                                    ADJCOR
2331.             RETURN                                                        ADJCOR
2332.        3    I30=1                                                         ADJCOR
2333.             IF(I80.EQ.1)   GO TO 4                                        ADJCOR
2334.             IF(I60.EQ.0)   RETURN                                         ADJCOR
2335.             DEPANS=DEPADJ(I4(K,I,J,2))                                    ADJCOR
2336.             DPLANS=DPLTAD(I4(K,I,J,2))                                    ADJCOR
2337.             RETURN                                                        ADJCOR
2338.           4 DEPANS=DEPADJ(I4(K,I,J,1)) * DEPADJ(I4(K,I,J,2))              ADJCOR
2339.             DPLANS=DPLTAD(I4(K,I,J,1))+DPLTAD(I4(K,I,J,2))                ADJCOR
2340.             RETURN                                                        ADJCOR
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     5 DEPANS=DEPADJ(I4(K,I,J,1))*DEPADJ(I4(K,I,J,2))*DEPADJ(I4(K,I,J,3)) ADJCOR
       DPLANS=DPLTAD(I4(K,I,J,1))+DPLTAD(I4(K,I,J,2))+DPLTAD(I4(K,I,J,3)) ADJCOR
       RETURN                                                            ADJCOR
     6 DEPANS=DEPADJ(I4(K,I,J,2)) * DEPADJ(I4(K,I,J,3))                  ADJCOR
       DPLANS=DPLTAD(I4(K,I,J,2))+DPLTAD(I4(K,I,J,3))                    ADJCOR
       RETURN                                                            ADJCOR
       END                                                               ADJCOR
       SUBROUTINE ADJWND                                                 ADJWND
        COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                     BLANK
      1      ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)                  BLANK
      2      ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)              BLANK
      3      ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)                  BLANK
      4       ,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)              BLANK
      5      ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)            BLANK
      6       ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)        BLANK
      7       ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE                     BLANK
      8          ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL        BLANK
      9       ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)       BLANK
      1       ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                     BLANK
        DIMENSION CE(7),CG(7),E(7)                                       ADJWND
        DATA E/4*0.25,3*0.5/                                             ADJWND
        DO 1   I=1,NVEL                                                  ADJWND
        DO 1   J=1,NSTA                                                  ADJWND
        CE(J)=(WINDHT/PLEV)**E(J)                                        ADJWND
        CG(J)=(10.0/PLEV)**E(J)                                          ADJWND
        UMAXEL(I,J)=UMAX(I)*CE(J)                                        ADJWND
        UMAXGL(I,J)=UMAX(I)*CG(J)                                        ADJWND
        UAVEEL(I,J)=UAVE(I)*CE(J)                                        ADJWND
     1  UAVEGL(I,J)=UAVE(I)*CG(J)                                        ADJWND
        RETURN                                                           VERS2
        END                                                              ADJWND
        SUBROUTINE RLSMOD(W,U,IVENT,ET,LSTACK)                           RLSMOD
        RATIO=W/U                                                        RLSMOD
        IF(RATIO.GE.5.0 .OR. LSTACK.EQ.1)   GO TO 2                      RLSMOD
        IF(RATIO.LT.1.0)   GO TO 1                                       RLSMOD
        IVENT = 0                                                        RLSMOD
        ET = 0.3 - 0.06 * RATIO                                          RLSMOD
        IF(RATIO.LE.1.5)  ET = 2.58 - 1.58 * RATIO                       RLSMOD
        RETURN                                                           RLSMOD
     1  IVENT = -1                                                       RLSMOD
        ET = 1.0                                                         RLSMOD
        RETURN                                                           RLSMOD
     2  IVENT = 1                                                        RLSMOD
        ET = 0                                                           RLSMOD
        RETURN                                                           RLSMOD
        END                                                              RLSMOD
        SUBROUTINE HEIGHT (K,DIS,HGT)                                    HEIGHT
        COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                     BLANK
      1      ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)                  BLANK
      2      ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)              BLANK
      3      ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)                  BLANK
      4       ,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)              BLANK
      5      ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)            BLANK
      6       ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)        BLANK
      7       ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE                     BLANK
      8          ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL        BLANK
      9       ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)       BLANK
      1       ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                     BLANK
        HGT = HT(K,NDIS)                                                 HEIGHT
        IF(DIS.GE.DIST(K,NDIS))  RETURN                                  HEIGHT
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2401.           HN = 0.0                                                HEIGHT
2402.           DN = 0.0                                                HEIGHT
2403.           DO 108  M=1,NDIS                                        HEIGHT
2404.           IF(DIST(K,M).GE.DIS)  GO TO 109                         HEIGHT
2405.       108 CONTINUE                                                HEIGHT
2406.           M = NDIS                                                HEIGHT
2407.       109 IF(M.EQ.1)  GO TO 112                                   HEIGHT
2408.           HN = HT(K,M-1)                                          HEIGHT
2409.           DN = DIST(K,M-1)                                        HEIGHT
2410.       112 HF = HT(K,M)                                            HEIGHT
2411.           DF = DIST(K,M)                                          HEIGHT
2412.           HGT = HN + (HF-HN) * (DIS-DN)/(DF-DN)                   HEIGHT
2413.           RETURN                                                  HEIGHT
2414.           END                                                     HEIGHT
2415.           SUBROUTINE RISE (DH,DIS,U,IZ,F4,F3,HS,W,DIA)            RISE
2416.           DH=0.0                                                  RISE
2417.           IF(DIA.LT.1.0E-05)  RETURN                              RISE
2418.           IF(F4.GT.0.) GO TO 101                                  RISE
2419.           DH=1.44*((W/U    )**.667)*((DIS/DIA)**.333)*DIA         RISE
2420.           IF(IZ.LE.4) GO TO 102                                   RISE
2421.           FM=W*W*DIA*DIA*.25                                      RISE
2422.           IF(IZ.EQ.5) S=.000875                                   RISE
2423.           IF(IZ.EQ.6) S=.00175                                    RISE
2424.           IF(IZ.EQ.7) S=.00245                                    RISE
2425.           DKK=4.*(FM/S)**.25                                      VERS2
2426.           IF(DKK.LT.DH)DH=DKK                                     VERS2
2427.           DT=1.5*(FM/U    )**.333/S**.1667                        RISE
2428.           IF(DT.LT.DH) DH=DT                                      RISE
2429.       102 DT=3.*W*DIA/U                                           RISE
2430.           IF(DT.LT.DH) DH=DT                                      RISE
2431.           IF(W.LT.1.5*U    ) DH=DH-3.*(1.5-W/U    )*DIA           RISE
2432.           GO TO 200                                               RISE
2433.       101 CMF=3.28083333                                          RISE
2434.           CFM=.30480061                                           RISE
2435.           DISF=DIS*CMF                                            RISE
2436.           HSF=HS*CMF                                              RISE
2437.           A=16./25.                                               RISE
2438.           B=11./5.                                                RISE
2439.           C=1.6                                                   RISE
2440.           UF=U    *CMF                                            RISE
2441.           IF(HSF.GE.1000.) XSTAR=33.*F4                           RISE
2442.           IF(HSF.LT.1000.) XSTAR=.52*F4*HSF**.6                   RISE
2443.           IF(IZ.GT.4) GO TO 1                                     RISE
2444.           IF(DISF.LE.XSTAR) GO TO 2                               RISE
2445.           XST5=5.*XSTAR                                           RISE
2446.           IF(DISF.GE.XST5) DISF=XST5                              RISE
2447.           P=DISF/XSTAR                                            RISE
2448.           DEN=1.+.8*P                                             RISE
2449.           DH=C*F3*XSTAR**.667*(.4+P*(A+B*P))/(UF*DEN*DEN)         RISE
2450.           GO TO 3                                                 RISE
2451.         1 CONTINUE                                                RISE
2452.           IF(IZ.EQ.5) S=.000875                                   RISE
2453.           IF(IZ.EQ.6) S=.00175                                    RISE
2454.           IF(IZ.EQ.7) S=.00245                                    RISE
2455.           XSTAR=2.4*UF/SQRT(S)                                    RISE
2456.           IF(DISF.LT.XSTAR) GO TO 2                               RISE
2457.           DH=2.9*F3/(UF*S)**.333                                  RISE
2458.           GO TO 3                                                 RISE
2459.         2 DH=C*F3*DISF**.667/UF                                   RISE
2460.         3 DH=DH*CFM                                               RISE
```

```
      200 RETURN                                                        RISE
          END                                                           RISE
          SUBROUTINE POLYN(IC,AVAL,RESULT,LDSRT)                        VERS2
          DIMENSION AY(6),AZ(6,3),BZ(6,3),CZ(6,3),DIS(2)                POLYN
          DIMENSION SZ(7,3),AK(11),EX(11),X(7)                          VERS2
          DATA SZ/1.114,1.322,1.633,2.0,2.431,2.889,3.398,0.982,1.200,1.519, VERS2
         1        1.845,2.255,2.69,3.114,0.903,1.130,1.398,1.708,2.079,  VERS2
         2        2.462,2.903/                                           VERS2
          DATA AK,EX,X/.144,.443,.78,1.38,.519,.348,.297,.449,.279,.29   303 VERS2
         1            ,.826,.517,.314,.11,.921,.901,.891,.731,.865,.918  975 VERS2
         2             ,2.0,2.301,2.602,2.903,3.204,3.505,3.806/         VERS2
          DATA AY/.3658,.2751,.2089,.1471,.1046,.0722/                  POLYN
          DATA AZ/.192,.156,.116,.079,.063,.053,     .00066,.0382,.113,.222 POLYN
         X,.211,.086,     .00024,.055,.113,1.26,6.73,18.05/             POLYN
          DATA BZ/.936,.922,.905,.881,.871,.814,     1.941,1.149,.911,.725 POLYN
         X,.678,.74,     2.094,1.098,.911,.516,.305,.18/                POLYN
          DATA CZ/6*0.,9.27,3.3,0.,-1.7,-1.3,-.35,     -9.6,2.,0.,-13.,  4. POLYN
         X,-48.6/                                                       POLYN
          DATA DIS/100.,1000./,BY/.9031/                                POLYN
          IF(LDSRT.EQ.1) GO TO 100                                      VERS2
          IF(IC.LE.7) GO TO 20                                          POLYN
          IF(IC.EQ.14) GO TO 25                                         POLYN
          IX=IC-7                                                       POLYN
          RESULT=AY(IX)*AVAL**BY                                        POLYN
          GO TO 999                                                     POLYN
       25 F=AY(6)*AVAL**BY                                              POLYN
          E=AY(5)*AVAL**BY                                              POLYN
          RESULT=2.*ALOG10(F)-ALOG10(E)                                 POLYN
          GO TO 500                                                     POLYN
       20 DO 2 L=1,2                                                    POLYN
          IF(AVAL.LT.DIS(L)) GO TO 3                                    POLYN
        2 CONTINUE                                                      POLYN
          L=3                                                           POLYN
        3 IF(IC.EQ.7) GO TO 30                                          POLYN
          RESULT=AZ(IC,L)*AVAL**BZ(IC,L)+CZ(IC,L)                       POLYN
          GO TO 999                                                     POLYN
       30 F=AZ(6,L)*AVAL**BZ(6,L)+CZ(6,L)                               POLYN
          E=AZ(5,L)*AVAL**BZ(5,L)+CZ(5,L)                               POLYN
          RESULT=2.*ALOG10(F)-ALOG10(E)                                 POLYN
          GO TO 500                                                     VERS2
C     ***** COMPUTE DESERT TYPE SIGMA"S *****                           VERS2
      100 IF(IC.LE.3) GO TO 10                                          VERS2
          II=IC-3                                                       VERS2
          RESULT=AK(II)*AVAL**EX(II)                                    VERS2
          GO TO 999                                                     VERS2
       10 RESULT=0.                                                     ERS2
          AVLG=ALOG10(AVAL)                                             VERS2
          DO 1 J=1,7                                                    VERS2
          XN=1.                                                         VERS2
          XD=1.                                                         VERS2
          DO 4 K=1,7                                                    VERS2
          IF(K.EQ.J) GO TO 4                                            VERS2
          XN=XN*(AVLG-X(K))                                             VERS2
          XD=XD*(X(J)-X(K))                                             VERS2
        4 CONTINUE                                                      VERS2
        1 RESULT=RESULT+SZ(J,IC)*XN/XD                                  VERS2
      500 RESULT=10.**RESULT                                            VERS2
      999 IF(RESULT.GT.1000.) RESULT=1000.                              VERS2
          RETURN                                                        VERS2
          END                                                           VERS2
```

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2521.            SUBROUTINE CORVAR(K,DIS,VARCOR)                                CORVAR
2522.             COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                  BLANK
2523.           1      ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)               BLANK
2524.           2      ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)           BLANK
2525.           3      ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)               BLANK
2526.           4       ,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)          BLANK
2527.           5      ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)         BLANK
2528.           6       ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)     BLANK
2529.           7       ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE                  BLANK
2530.           8          ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL      BLANK
2531.           9       ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)     BLANK
2532.           1       ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                   BLANK
2533.            IF(DIS.LE.VRDIST(K,1))  GO TO 1                                CORVAR
2534.            IF(DIS.GE.VRDIST(K,NCOR))  GO TO 2                             CORVAR
2535.            DO 10   M=2,NCOR                                               CORVAR
2536.            IF(VRDIST(K,M).GE.DIS)   GO TO 11                              CORVAR
2537.          10 CONTINUE                                                      CORVAR
2538.          11 VN=ALOG(VRCR(K,M-1))                                          CORVAR
2539.             VF=ALOG(VRCR(K,M))                                            CORVAR
2540.             DN=ALOG(VRDIST(K,M-1))                                        CORVAR
2541.             DF=ALOG(VRDIST(K,M))                                          CORVAR
2542.             DISLN=ALOG(DIS)                                               CORVAR
2543.             VR=VN+((VF-VN)*(DISLN-DN)/(DF-DN))                            CORVAR
2544.             VARCOR=EXP(VR)                                                CORVAR
2545.             RETURN                                                        CORVAR
2546.           1 VARCOR=VRCR(K,1)                                              CORVAR
2547.             RETURN                                                        CORVAR
2548.           2 VARCOR=VRCR(K,NCOR)                                           CORVAR
2549.             RETURN                                                        CORVAR
2550.             END                                                           CORVAR
2551.             SUBROUTINE OPENTR (DIS,FAC)                                   OPENTR
2552.             X = ALOG(DIS)                                                 OPENTR
2553.             IF(DIS.GE.10000.0)  GO TO 1                                   OPENTR
2554.             FAC = EXP(16.125 - (3.18951* X) + (0.1569306 * X * X))        OPENTR
2555.             IF (FAC.GT.4.00)  GO TO 3                                     OPENTR
2556.             RETURN                                                        OPENTR
2557.        1    IF(DIS.GE.16090.0)  GO TO 2                                   OPENTR
2558.             FAC = EXP(1.1865 - (0.1225 * X))                              OPENTR
2559.             RETURN                                                        OPENTR
2560.        2    FAC = 1.00                                                    OPENTR
2561.             RETURN                                                        OPENTR
2562.           3 FAC= 4.00                                                     OPENTR
2563.             RETURN                                                        OPENTR
2564.             END                                                           OPENTR
2565.             SUBROUTINE PTSOUT (IPG)                                       PTSOUT
2566.             COMMON /TITLE/ TITLM                                          VERS2
2567.              COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                 BLANK
2568.           1      ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)               BLANK
2569.           2      ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)           BLANK
2570.           3      ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)               BLANK
2571.           4       ,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)          BLANK
2572.           5      ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)         BLANK
2573.           6       ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)     BLANK
2574.           7       ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE                  BLANK
2575.           8          ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL      BLANK
2576.           9       ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)     BLANK
2577.           1       ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                   BLANK
2578.            DIMENSION WORD1(2),WORD2(2),WORD3(2),WORD4(2),WORD(3),ABSDK(3)  PTSOUT
2579.           1          ,TITLEL(4),TITLM(20)                                  VERS2
2580.            DATA TITLEL/"MAXI","MUM ","CHI/","Q   "/                       PTSOUT
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      DATA WORD1,WORD2,WORD3,WORD4/"  NO","EMPT"," DEC","Y   ","AY","  " PTSOUT
     1                            ,"    "," UN"/                          PTSOUT
      IF(LSTACK.EQ.0) GO TO 14                                            VERS2
      DO 15   L=1,4                                                       PTSOUT
   15 TITLPT(NPTYPE,L)=TITLEL(L)                                          PTSOUT
   14 CONTINUE                                                            PTSOUT
      IF(NPTYPE.EQ.0) GO TO 55                                            VERS2
      CALL DATE(TODAY)                                                    VERS2
      CALL TIME(CLOCK)                                                    VERS2
      PRINT 950, TODAY,CLOCK                                              VERS2
  950 FORMAT(1H1,"USNRC COMPUTER CODE-XOQDOQ,VERSION 2.0",10X,"RUN DATE  VERS2
     * ",A10,10X,"RUN TIME",A10)                                          VERS2
      PRINT 824,TITLM                                                     VERS2
  824 FORMAT(1H0,20A4/)                                                   VERS2
      PRINT 1,  (TITLE(IEX,J),  J=1,20)                                   PTSOUT
    1 FORMAT(1H ,20A4)                                                    VERS2
      IF(KOPT(7).EQ.1) PUNCH 21,(TITLE(IEX,J),J=1,20)                     VERS2
   21  JRMAT(20A4)                                                        PTSOUT
      IF(IPG.EQ.1)  PRINT 12                                              PTSOUT
      IF(IPG.EQ.1.AND.KOPT(7).EQ.1) PUNCH 12                              VERS2
   12 FORMAT(" INTERMITTENT RELEASE CALCULATIONS")                        PTSOUT
      IF(KOPT(8).EQ.1) PRINT 2                                            VERS2
      IF(KOPT(9).EQ.1) PRINT 13                                           VERS2
      IF(KOPT(8).EQ.1.AND.KOPT(7).EQ.1) PUNCH 2                           VERS2
      IF(KOPT(9).EQ.1.AND.KOPT(7).EQ.1) PUNCH 13                          VERS2
    2 FORMAT(" CORRECTED USING STANDARD OPEN TERRAIN FACTORS")            PTSOUT
   13 FORMAT(" CORRECTED USING SITE-SPECIFIC FACTORS")                    PTSOUT
      PRINT 3                                                             PTSOUT
    3 FORMAT(" SPECIFIC POINTS OF INTEREST"/                              PTSOUT
     1   "0RELEASE     TYPE  OF      DIRECTION       DISTANCE",T62,      PTSOUT
     2   "X/Q", T78, "X/Q", T94, "X/Q", T110, "D/Q"/                      PTSOUT
     3   "   ID",T14,"LOCATION",T28,"FROM SITE",T39,"(MILES)  (METERS) (  VERS2
     4SEC/CUB.METER) (SEC/CUB.METER) (SEC/CUB.METER) (PER SQ.METER)")     VERS2
      DO 50   I=1,3                                                       PTSOUT
      ABSDK(I) = ABS(DECAYS(I))                                           PTSOUT
      IF(ABSDK(I).LE.100.)   GO TO 90                                     PTSOUT
      IWORD = 1                                                           PTSOUT
      GO TO 100                                                           PTSOUT
   90 IF(ABSDK(I).LT.1.E-10)   GO TO 91                                   PTSOUT
      GO TO 101                                                           PTSOUT
   91 IWORD = 2                                                           PTSOUT
  100 CONTINUE                                                            PTSOUT
      IF(I.EQ.1)    PRINT 4,  WORD1(IWORD), WORD2(IWORD), WORD3(IWORD)    PTSOUT
      IF(I.EQ.2)    PRINT 5,  WORD1(IWORD), WORD2(IWORD), WORD3(IWORD)    PTSOUT
      IF(I.EQ.3)    PRINT 6,  WORD1(IWORD), WORD2(IWORD), WORD3(IWORD)    PTSOUT
    4 FORMAT(" ",T57,2A4, A2)                                             VERS2
    5 FORMAT("+",T72,2A4, A2)                                             VERS2
    6 FORMAT("+",T88,2A4, A2)                                             VERS2
      GO TO 50                                                            PTSOUT
  101 IF(I.EQ.1)    PRINT 7,  ABSDK(I)                                    PTSOUT
      IF(I.EQ.2)    PRINT 8,  ABSDK(I)                                    PTSOUT
      IF(I.EQ.3)   PRINT 9,  ABSDK(I)                                     PTSOUT
    7 FORMAT(" ", T55, F6.3, " DAY DECAY")                                PTSOUT
    8 FORMAT("+", T72, F6.3, " DAY DECAY")                                PTSOUT
    9 FORMAT("+", T88, F6.3, " DAY DECAY")                                PTSOUT
   50 CONTINUE                                                            PTSOUT
      DO 60   I=1,3                                                       PTSOUT
      IF(DECAYS(I).LT.0.0)    GO TO 80                                    PTSOUT
      WORD(I) = WORD4(2)                                                  PTSOUT
      GO TO 60                                                            PTSOUT
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      80 WORD(I) = WORD4(1)                                                    PTSOUT
      60 CONTINUE                                                              PTSOUT
         PRINT 10,   (WORD(I),  I=1,3)                                         PTSOUT
      10 FORMAT(" ",T56,A4,"DEPLETED",4X,A4,"DEPLETED",4X,A4,"DEPLETED")       PTSOUT
         JA=1                                                                  PTSOUT
         DO 51    I=1,NPTYPE                                                   PTSOUT
         NP = NPOINT(I)                                                        PTSOUT
         DO 51   N=1,NP                                                        PTSOUT
         K = KDIR(I,N)                                                         PTSOUT
         DMETRS=PTDIST(I,N)                                                    VERS2
         DMILES=PTDIST(I ,N)/1609.347219                                       VERS2
     150 CONTINUE                                                              PTSOUT
         PRINT 11,RLSID(IEX),(TITLPT(I,J),J=1,4),COMP(K),DMILES,               VERS2
        1            DMETRS, (SAVEQS(I,N,L),  L=1,4)                          PTSOUT
      11 FORMAT(" ",3X,A1,5X,4A4,3X,A4,6X,F6.2,3X,F6.0,6X,4(1PE7.1,9X))        PTSOUT
         IF(KOPT(7).EQ.1) PUNCH 22,RLSID(IEX),(TITLPT(I,J),J=1,4)              VERS2
        1                  ,COMP(K),PTDIST(I,N), (SAVEQS(I,N,L), L=1,4)       PTSOUT
      22 FORMAT(T3,A1,1X,4A4,T19,A4,F7.2,1P4E10.3)                             PTSOUT
      51 CONTINUE                                                              PTSOUT
      55 CONTINUE                                                              VERS2
         CALL PRNTIN                                                           PTSOUT
         RETURN                                                                PTSOUT
         END                                                                   PTSOUT
         SUBROUTINE PRNTIN                                                     PRNTIN
          COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                         BLANK
        1     ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)                       BLANK
        2     ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)                   BLANK
        3     ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)                       BLANK
        4      ,BDY(16), DMX(16), XMX(16), COMP( 6), FORD(14)                  BLANK
        5     ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)                 BLANK
        6      ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)             BLANK
        7      ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE                          BLANK
        8         ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL             BLANK
        9      ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)            BLANK
        1      ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                          BLANK
         URE=W*0.2                                                             PRNTIN
         ARGU=PLEV/WINDHT                                                      PRNTIN
         STABLE=SQRT(ARGU)                                                     PRNTIN
         UNSTBL=SQRT(STABLE)                                                   PRNTIN
         UES=URE*STABLE                                                        PRNTIN
         UGS=W*STABLE                                                          PRNTIN
         UEU=URE*UNSTBL                                                        PRNTIN
         UGU=W*UNSTBL                                                          PRNTIN
         PRINT 1, HS,WINDHT,DIA,D,W,A,Q                                        PRNTIN
        1 FORMAT("0VENT AND BUILDING PARAMETERS:"/                             PRNTIN
        1       "     RELEASE HEIGHT  (METERS)",F8.2,19X,"REP. WIND HEIGHT"    PRNTIN
        2   ,7X,"(METERS)",F11.1/                                              PRNTIN
        3       "     DIAMETER        (METERS)",F8.2,19X,"BUILDING HEIGHT"     PRNTIN
        4   ,8X,"(METERS)",F11.1/                                              PRNTIN
        5       "     EXIT VELOCITY   (METERS)",F8.2,19X,"BLDG.MIN.CRS.SEC"    PRNTIN
        6      ,".AREA  (SQ.METERS)",F8.1/                                     PRNTIN
        7   1H ,T57,"HEAT EMISSION RATE     (CAL/SEC)",F10.1)                  PRNTIN
         IF(LSTACK.EQ.1)   GO TO 3                                             PRNTIN
         IF(W.LT.0.1)   GO TO 4                                                PRNTIN
         PRINT 2, PLEV,URE,UES,UEU,URE,W,UES,UGS,UEU,UGU,W,UGS,UGU             PRNTIN
        2 FORMAT("0AT THE RELEASE HEIGHT:",T50,"'  AT THE MEASURED WIND "      PRNTIN
        1      ,"HEIGHT (",F5.1," METERS):"/                                   PRNTIN
        2       " VENT RELEASE MODE   WIND SPEED (METERS/SEC)     ' "          PRNTIN
        3      ," VENT RELEASE MODE   WIND SPEED (METERS/SEC)",                PRNTIN
        4                     "       WIND SPEED (METERS/SEC)"/" ",T50,"'"     PRNTIN
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     5      ,T73,"STABLE CONDITIONS",T103,"UNSTABLE/NEUTRAL CONDITIONS"/ PRNTIN
     6       "     ELEVATED          LESS THAN",F7.3,T50,"'      ELEVATED" PRNTIN
     7  ,T73,"LESS THAN",F7.3,14X,"LESS THAN",F7.3/                       PRNTIN
     8       "     MIXED             BETWEEN",F9.3," AND",F7.3," ' "     PRNTIN
     9      ,"     MIXED             BETWEEN",F9.3," AND",F7.3,          PRNTIN
     1                          "    BETWEEN",F9.3," AND",F7.3/          PRNTIN
     2       "     GROUND LEVEL      ABOVE",F11.3,T50,"' "               PRNTIN
     3     , "     GROUND LEVEL      ABOVE",F11.3,14X,                   PRNTIN
     4                              "ABOVE",F11.3)                      PRNTIN
      RETURN                                                            PRNTIN
    3 PRINT 10                                                          PRNTIN
   10 FORMAT("0ALL ELEVATED RELEASES.")                                 PRNTIN
      RETURN                                                            PRNTIN
    4 PRINT 11                                                          PRNTIN
   11 FORMAT("0ALL GROUND LEVEL RELEASES.")                             PRNTIN
      RETURN                                                            PRNTIN
      END                                                               PRNTIN
      SUBROUTINE INTCOM                                                 INTCOM
       COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                     BLANK
     1     ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)                   BLANK
     2     ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)               BLANK
     3     ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)                   BLANK
     4      ,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)              BLANK
     5     ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)             BLANK
     6      ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)         BLANK
     7      ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE                      BLANK
     8         ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL         BLANK
     9      ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)        BLANK
     1      ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                      BLANK
      DIMENSION XOMP(16)                                                INTCOM
      DATA XOMP/"   S"," SSW","  SW"," WSW","   W"," WNW","  NW"," NNW" INTCOM
     X,"   N"," NNE","  NE"," ENE","   E"," ESE","  SE"," SSE"/        INTCOM
      DO 10   I= 1,16                                                   INTCOM
   10 COMP(I) = XOMP(I)                                                 INTCOM
      RETURN                                                            INTCOM
      END                                                               INTCOM
```

APPENDIX B

APPENDIX B

Three test cases were run for the program. The cases considered were:

Mixed Mode Release with Purge and Continuous Ground Level Release. Terrain heights inputted along with specific points of interest. Open terrain recirculation (Test Case 1);

Continuous Elevated Release. Terrain heights inputted along with specific points of interest (Test Case 2), and

Mixed Mode Continuous Release. Site specific recirculation factors inputted (Test Case 3).

A listing of the input cards for each case is given in this appendix. Appendix C provides the output.

```
1.  1010000010000
2.  XOQDOQ - TEST CASE  #1
3.       5     7     3     5     3     2     0
4.    10.0 101. 2.26 -8.0     0
5.       0     0     4     4     4     4     4
6.       0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
7.       0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
8.       0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
9.       0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
10.      0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
11.      0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
12.      0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
13.      0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
14.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
15.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
16.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
17.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
18.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
19.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
20.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
21.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
22.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
23.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
24.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
25.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
26.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
27.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
28.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
29.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
30.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
31.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
32.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
33.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
34.     -1   1.0   2.0   4.0   8.0  16.0
35.    100   100   100   100   100   100   100   100   100   100   100   100   100   100   100   100
36.      0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
37.    800   800   800   800   800   800   800   800   800   800   800   800   800   800   800   800
38.     16    16    16    16    16    16    16    16    16    16    16    16    16    16    16    16
39.  10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000
40.    200   200   200   200   200   200   200   200   200   200   200   200   200   200   200   200
41.      3     3     2
42.  SITE BOUNDARY
43.      1   805     1   966     1  1127
44.  COWS
45.      1  1931     8  4989    16  4345
46.  RESIDENCES
47.      1  1931     8  6437
48.  EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
49.   10.0   2.0  45.0 40.02000. 45.0  0.0
50.  A    1    25     4
51.  EXIT TWO - GROUND LEVEL RELEASE - NO PURGE RELEASES
52.     0.0   0.0  30.0  25.0  900.  10.0  0.0
53.  B    0     0     0
```

```
1.  1010000000000
2.  XOQDOQ - TEST CASE  #2
3.       5     7     3     5     3     1     0
4.    10.0  101.  2.26 -8.0     0
5.       0     0     4     4     4     4     4
6.       0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
7.       0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
8.       0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
9.       0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
10.      0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
11.      0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
12.      0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
13.      0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
14.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
15.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
16.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
17.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
18.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
19.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
20.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
21.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
22.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
23.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
24.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
25.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
26.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
27.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
28.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
29.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
30.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
31.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
32.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
33.      1     0     0     0     0     0     0     2     0     0     0     0     0     0     0     1
34.     -1   1.0   2.0   4.0   8.0  16.0
35.    100   100   100   100   100   100   100   100   100   100   100   100   100   100   100   100
36.      0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
37.    800   800   800   800   800   800   800   800   800   800   800   800   800   800   800   800
38.     16    16    16    16    16    16    16    16    16    16    16    16    16    16    16    16
39.  10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000
40.    200   200   200   200   200   200   200   200   200   200   200   200   200   200   200   200
41.      3     3     2
42.  SITE BOUNDARY
43.      1   805     1   966     1  1127
44.  COWS
45.      1  1931     8  4989    16  4345
46.  RESIDENCES
47.      1  1931     8  6437
48.  EXIT ONE - CONTINUOUS ELEVATED RELEASE
49.    10.0   2.0-45.0 40.02000. 45.0   0.0
50.  B    0     0     0
```

```
10100000100
XOQDOQ - TEST CASE  #3
    5    7    0    5    3    1    4
 10.0 101. 2.26 -8.0    0
    0    0    4    4    4    4    4
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1    0    0    0    0    0    0    2    0    0    0    0    0    0    0    1
    1  1.0  2.0  4.0  8.0 16.0
  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.
 6437 6437 6437 6437 6437 6437 6437 6437 6437 6437 6437 6437 6437 6437 6437 6437
   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.
 8047 8047 8047 8047 8047 8047 8047 8047 8047 8047 8047 8047 8047 8047 8047 8047
  2.0  2.0  2.0  2.0  2.0  2.0  2.0  2.0  2.0  2.0  2.0  2.0  2.0  2.0  2.0  2.0
9656.9656.9656.9656.9656.9656.9656.9656.9656.9656.9656.9656.9656.9656.9656.9656.
   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.
    3    3    2
SITE BOUNDARY
    1  805    1  966    1 1127
COWS
    1 1931    8 4989   16 4345
RESIDENCES
    1 1931    8 6437
EXIT ONE -  ONE-MIXED MODE RELEASE
 10.0  2.0 45.0 40.02000. 45.0  0.0
A   0    0    0
```

APPENDIX C

APPENDIX C

Output from test case runs are provided in this appendix.

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

PRINTOUT OF INPUT CARDS

```
  1     10100 00100 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
  2     XOQDOQ - TEST CASE  #1
  3        5     7     3     5     3     2     0
  4       10.00 101.00   2.26  -8.00   0.0
  5       0.0    0.0    4.000  4.000  4.000  4.000  4.000
  6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  7        -1.   1.000  2.000  4.000  8.000 16.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
VRDIST,VRCR NOT INPUTTED.
 10        100.   100.   100.   100.   100.   100.   100.   100.   100.   100.   100.   100.   100.   100.   100.   100.
 11          0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 10        800.   800.   800.   800.   800.   800.   800.   800.   800.   800.   800.   800.   800.   800.   800.   800.
 11         16.    16.    16.    16.    16.    16.    16.    16.    16.    16.    16.    16.    16.    16.    16.    16.
 10      10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000.
 11        200.   200.   200.   200.   200.   200.   200.   200.   200.   200.   200.   200.   200.   200.   200.   200.
 12        3     3     2
 13     SITE BOUNDARY
 14       1  805.0   1  966.0   1 1127.0
 13     COWS
 14       1 1931.0   8 4989.0 16 4345.0
 13     RESIDENCES
 14       1 1931.0   8 6437.0
 15     EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
 16      10.000  2.000   45.0   40.0 2000.0   45.0  0.0
 17     A    1    25     4
 15     EXIT TWO - GROUND LEVEL RELEASE - NO PURGE RELEASES
 16       0.0    0.0     30.0   25.0  500.0   10.0  0.0
 17     B    0     0     0
```

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS A

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS B

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS C

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
2.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
4.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
8.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
16.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
TOTAL	5.00	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.00	20.00

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS D

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
2.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
4.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
8.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
16.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
TOTAL	5.00	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.00	20.00

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS E

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
2.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
4.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
8.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
16.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
TOTAL	5.00	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.00	20.00

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS F

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
2.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
4.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
8.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
16.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
TOTAL	5.00	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.00	20.00

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS G

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
2.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
4.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
8.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
16.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
TOTAL	5.00	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.00	20.00

TOTAL HOURS CONSIDERED ARE 100

WIND MEASURED AT 10.0 METERS.

OVERALL WIND DIRECTION FREQUENCY

WIND DIRECTION:	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
FREQUENCY:	25.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	100.0

OVERALL WIND SPEED FREQUENCY

WIND SPEED (M/S):	1.000	2.000	4.000	8.000	16.000
WIND SPEED (M/S):	0.500	1.500	3.000	6.000	12.000
SPEED FREQUENCY:	20.00	20.00	20.00	20.00	20.00

DISTANCES AND TERRAIN HEIGHTS IN METERS AS FUNCTIONS OF DIRECTION FROM THE SITE:

DIRECTION =	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
DISTANCE	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.
ELEVATION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
DISTANCE	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.
ELEVATION	16.	16.	16.	16.	16.	16.	16.	16.	16.	16.	16.	16.	16.	16.	16.	16.
DISTANCE	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.
ELEVATION	200.	200.	200.	200.	200.	200.	200.	200.	200.	200.	200.	200.	200.	200.	200.	200.

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
NO DECAY, UNDEPLETED
CORRECTED USING STANDARD OPEN TERRAIN FACTORS

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	2.616E-05	9.857E-06	7.264E-06	5.459E-06	4.084E-06	2.611E-06	1.664E-06	1.164E-06	8.660E-07	6.740E-07	5.431E-07
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	5.233E-05	1.971E-05	1.453E-05	1.092E-05	8.169E-06	5.222E-06	3.328E-06	2.327E-06	1.732E-06	1.348E-06	1.086E-06
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.616E-05	9.857E-06	7.264E-06	5.459E-06	4.084E-06	2.611E-06	1.664E-06	1.164E-06	8.660E-07	6.740E-07	5.431E-07

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	4.499E-07	2.327E-07	1.519E-07	8.856E-08	6.095E-08	4.574E-08	3.624E-08	2.979E-08	2.517E-08	2.170E-08	1.901E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	8.997E-07	4.653E-07	3.039E-07	1.771E-07	1.219E-07	9.149E-08	7.248E-08	5.959E-08	5.033E-08	4.339E-08	3.802E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	4.499E-07	2.327E-07	1.519E-07	8.856E-08	6.095E-08	4.574E-08	3.624E-08	2.979E-08	2.517E-08	2.170E-08	1.901E-08

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	45.00	REP. WIND HEIGHT	(METERS)	45.0
DIAMETER	(METERS)	2.00	BUILDING HEIGHT	(METERS)	40.0
EXIT VELOCITY	(METERS)	10.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2000.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)			
ELEVATED	LESS THAN	2.000		
MIXED	BETWEEN	2.000	AND	10.000
GROUND LEVEL	ABOVE	10.000		

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS				WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS			
ELEVATED	LESS THAN	0.943			LESS THAN	1.373		
MIXED	BETWEEN	0.943	AND	4.714	BETWEEN	1.373	AND	6.866
GROUND LEVEL	ABOVE	4.714			ABOVE	6.866		

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
NO DECAY, UNDEPLETED

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

	SEGMENT BOUNDARIES IN MILES FROM THE SITE									
DIRECTION FROM SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	7.038E-06	3.735E-06	1.716E-06	8.779E-07	5.474E-07	2.451E-07	9.038E-08	4.600E-08	2.987E-08	2.173E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	1.408E-05	7.470E-06	3.433E-06	1.756E-06	1.095E-06	4.901E-07	1.808E-07	9.200E-08	5.975E-08	4.346E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	7.038E-06	3.735E-06	1.716E-06	8.779E-07	5.474E-07	2.451E-07	9.038E-08	4.600E-08	2.987E-08	2.173E-08

AVERAGE EFFECTIVE STACK HEIGHT IN METERS FOR EACH SEGMENT

DIRECTION FROM SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	2.845E+01	1.237E+01	3.786E+00	1.098E+00	0.0	0.0	0.0	0.0	0.0	0.0
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	2.845E+01	1.237E+01	3.786E+00	1.098E+00	0.0	0.0	0.0	0.0	0.0	0.0
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.845E+01	1.237E+01	3.786E+00	1.098E+00	0.0	0.0	0.0	0.0	0.0	0.0

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
2.260 DAY DECAY, UNDEPLETED
CORRECTED USING STANDARD OPEN TERRAIN FACTORS

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	2.616E-05	9.848E-06	7.250E-06	5.443E-06	4.062E-06	2.591E-06	1.648E-06	1.150E-06	8.540E-07	6.634E-07	5.336E-07
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	5.231E-05	1.970E-05	1.450E-05	1.089E-05	8.124E-06	5.182E-06	3.295E-06	2.299E-06	1.708E-06	1.327E-06	1.067E-06
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.616E-05	9.848E-06	7.250E-06	5.443E-06	4.062E-06	2.591E-06	1.648E-06	1.150E-06	8.540E-07	6.634E-07	5.336E-07

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	4.411E-07	2.260E-07	1.462E-07	8.362E-08	5.649E-08	4.161E-08	3.237E-08	2.613E-08	2.167E-08	1.835E-08	1.580E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	8.822E-07	4.519E-07	2.923E-07	1.672E-07	1.130E-07	8.322E-08	6.473E-08	5.226E-08	4.335E-08	3.671E-08	3.159E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	4.411E-07	2.260E-07	1.462E-07	8.362E-08	5.649E-08	4.161E-08	3.237E-08	2.613E-08	2.167E-08	1.835E-08	1.580E-08

C.7

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	45.00	REP. WIND HEIGHT	(METERS)	45.0
DIAMETER	(METERS)	2.00	BUILDING HEIGHT	(METERS)	40.0
EXIT VELOCITY	(METERS)	10.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2000.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)
ELEVATED	LESS THAN 2.000
MIXED	BETWEEN 2.000 AND 10.000
GROUND LEVEL	ABOVE 10.000

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS	WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS
ELEVATED	LESS THAN 0.943	LESS THAN 1.373
MIXED	BETWEEN 0.943 AND 4.714	BETWEEN 1.373 AND 6.866
GROUND LEVEL	ABOVE 4.714	ABOVE 6.866

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 R'N DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
2.260 DAY DECAY, UNDEPLETED

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES FROM THE SITE									
	.5-1	.-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	7.024E-06	3.715E-06	1.700E-06	8.659E-07	5.378E-07	2.383E-07	8.546E-08	4.188E-08	2.621E-08	1.839E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	1.405E-05	7.430E-06	3.400E-06	1.732E-06	1.076E-06	4.766E-07	1.709E-07	8.376E-08	5.243E-08	3.678E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	7.024E-06	3.715E-06	1.700E-06	8.659E-07	5.378E-07	2.383E-07	8.546E-08	4.188E-08	2.621E-08	1.839E-08

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
8.000 DAY DECAY, DEPLETED
CORRECTED USING STANDARD OPEN TERRAIN FACTORS

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	2.478E-05	9.125E-06	6.756E-06	5.146E-06	3.909E-06	2.461E-06	1.539E-06	1.058E-06	7.748E-07	5.942E-07	4.722E-07
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	4.956E-05	1.825E-05	1.351E-05	1.029E-05	7.818E-06	4.923E-06	3.077E-06	2.115E-06	1.550E-06	1.188E-06	9.444E-07
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.478E-05	9.125E-06	6.756E-06	5.146E-06	3.909E-06	2.461E-06	1.539E-06	1.058E-06	7.748E-07	5.942E-07	4.722E-07

UAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

ECTOR	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	3.861E-07	1.897E-07	1.186E-07	6.434E-08	4.177E-08	2.980E-08	2.256E-08	1.780E-08	1.447E-08	1.203E-08	1.019E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	7.722E-07	3.794E-07	2.371E-07	1.287E-07	8.354E-08	5.960E-08	4.513E-08	3.560E-08	2.894E-08	2.407E-08	2.038E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	3.861E-07	1.897E-07	1.186E-07	6.434E-08	4.177E-08	2.980E-08	2.256E-08	1.780E-08	1.447E-08	1.203E-08	1.019E-08

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	45.00	REP. WIND HEIGHT	(METERS)	45.0
DIAMETER	(METERS)	2.00	BUILDING HEIGHT	(METERS)	40.0
EXIT VELOCITY	(METERS)	10.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2000.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)	
ELEVATED	LESS THAN	2.000
MIXED	BETWEEN	2.000 AND 10.000
GROUND LEVEL	ABOVE	10.000

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS			WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS		
ELEVATED	LESS THAN	0.943		LESS THAN	1.373	
MIXED	BETWEEN	0.943 AND	4.714	BETWEEN	1.373 AND	6.866
GROUND LEVEL	ABOVE	4.714		ABOVE	6.866	

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
8.000 DAY DECAY, DEPLETED

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES FROM THE SITE									
	5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	6.567E-06	3.541E-06	1.592E-06	7.868E-07	4.764E-07	2.017E-07	6.636E-08	3.010E-08	1.789E-08	1.207E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	1.313E-05	7.081E-06	3.185E-06	1.574E-06	9.529E-07	4.035E-07	1.327E-07	6.019E-08	3.578E-08	2.414E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	6.567E-06	3.541E-06	1.592E-06	7.868E-07	4.764E-07	2.017E-07	6.636E-08	3.010E-08	1.789E-08	1.207E-08

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
CORRECTED USING STANDARD OPEN TERRAIN FACTORS
********** RELATIVE DEPOSITION PER UNIT AREA (M**-2) AT FIXED POINTS BY DOWNWIND SECTORS **********

DIRECTION FROM SITE	DISTANCES IN MILES 0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50
S	2.860E-07	1.105E-07	5.833E-08	2.903E-08	1.518E-08	8.946E-09	5.279E-09	3.480E-09	2.504E-09	1.856E-09	1.430E-09
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	5.721E-07	2.209E-07	1.167E-07	5.806E-08	3.037E-08	1.789E-08	1.056E-08	6.960E-09	5.009E-09	3.712E-09	2.860E-09
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.860E-07	1.105E-07	5.833E-08	2.903E-08	1.518E-08	8.946E-09	5.279E-09	3.480E-09	2.504E-09	1.856E-09	1.430E-09

DIRECTION FROM SITE	DISTANCES IN MILES 5.00	7.50	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
S	1.136E-09	5.048E-10	3.058E-10	1.545E-10	9.354E-11	6.272E-11	4.494E-11	3.374E-11	2.624E-11	2.096E-11	1.711E-11
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	2.272E-09	1.010E-09	6.115E-10	3.091E-10	1.871E-10	1.254E-10	8.988E-11	6.749E-11	5.247E-11	4.192E-11	3.421E-11
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	1.136E-09	5.048E-10	3.058E-10	1.545E-10	9.354E-11	6.272E-11	4.494E-11	3.374E-11	2.624E-11	2.096E-11	1.711E-11

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES

********** RELATIVE DEPOSITION PER UNIT AREA (M**-2) BY DOWNWIND SECTORS **********

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES .5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	5.689E-08	1.549E-08	5.537E-09	2.536E-09	1.447E-09	5.566E-10	1.610E-10	6.382E-11	3.408E-11	2.110E-11
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	1.138E-07	3.098E-08	1.107E-08	5.072E-09	2.895E-09	1.113E-09	3.221E-10	1.276E-10	6.817E-11	4.219E-11
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	5.689E-08	1.549E-08	5.537E-09	2.536E-09	1.447E-09	5.566E-10	1.610E-10	6.382E-11	3.408E-11	2.110E-11

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	45.00	REP. WIND HEIGHT	(METERS)	45.0
DIAMETER	(METERS)	2.00	BUILDING HEIGHT	(METERS)	40.0
EXIT VELOCITY	(METERS)	10.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2000.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

C.12

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)
ELEVATED	LESS THAN 2.000
MIXED	BETWEEN 2.000 AND 10.000
GROUND LEVEL	ABOVE 10.000

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS			WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS		
ELEVATED	LESS THAN	0.943		LESS THAN	1.373	
MIXED	BETWEEN	0.943 AND	4.714	BETWEEN	1.373 AND	6.866
GROUND LEVEL	ABOVE	4.714		ABOVE	6.866	

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQD
SHORT TERM X/Q CALCULATION- MIXED MODE RELEASE
SECTOR SPREAD VALUE CALCULATED

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
ID:A SITE BOUNDARY DIRECTION: S DISTANCE: 0.50 MILES (805. METERS)

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

3.453E-05	2.405E-05	2.294E-05	1.943E-05	1.590E-05	1.525E-05	1.301E-05	1.296E-05	1.202E-05	1.187E-05
4.000	8.000	12.000	16.000	20.000	24.000	28.000	32.000	36.000	40.000
1.018E-05	1.015E-05	1.004E-05	9.082E-06	8.431E-06	7.948E-06	7.474E-06	6.478E-06	5.996E-06	5.074E-06
44.000	48.000	52.000	56.000	60.000	64.000	68.000	72.000	76.000	80.000
4.420E-06	3.300E-06	2.998E-06	2.263E-06	2.061E-06	0.0	0.0	0.0	0.0	0.0
84.000	88.000	92.000	96.000	100.000	0.0	0.0	0.0	0.0	0.0

LEAST SQUARES FIT:

CHI/Q SEC/METER CUBED	PERCENT OF TIME REACHED OR EXCEEDED
7.324E-05	1.000
4.215E-05	3.000
3.310E-05	5.000
2.409E-05	10.000
2.002E-05	15.000
1.750E-05	20.000
1.571E-05	25.000
1.430E-05	30.000
1.314E-05	35.000
1.213E-05	40.000
1.123E-05	45.000
1.040E-05	50.000
9.621E-06	55.000
8.865E-06	60.000
8.120E-06	65.000
7.368E-06	70.000
6.593E-06	75.000
5.771E-06	80.000

THE 5TH PERCENTILE IS: 3.31E-05

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQD
SHORT TERM X/Q CALCULATION- MIXED MODE RELEASE
SECTOR SPREAD VALUE CALCULATED

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
ID:A SITE BOUNDARY DIRECTION: S DISTANCE: 0.60 MILES (966. METERS)

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

2.489E-05	1.842E-05	1.732E-05	1.545E-05	1.289E-05	1.256E-05	1.099E-05	9.972E-06	9.754E-06	9.699E-06
4.000	8.000	12.000	16.000	20.000	24.000	28.000	32.000	36.000	40.000
9.686E-06	8.662E-06	8.564E-06	7.747E-06	7.601E-06	6.963E-06	6.278E-06	5.761E-06	4.986E-06	4.383E-06
44.000	48.000	52.000	56.000	60.000	64.000	68.000	72.000	76.000	80.000
4.288E-06	3.800E-06	2.424E-06	2.381E-06	2.144E-06	0.0	0.0	0.0	0.0	0.0
84.000	88.000	92.000	96.000	100.000	0.0	0.0	0.0	0.0	0.0

LEAST SQUARES FIT:

CHI/Q SEC/METER CUBED	PERCENT OF TIME REACHED OR EXCEEDED
5.253E-05	1.000
3.027E-05	3.000
2.410E-05	5.000
1.815E-05	10.000
1.551E-05	15.000
1.388E-05	20.000
1.269E-05	25.000
1.175E-05	30.000
1.094E-05	35.000
1.022E-05	40.000
9.553E-06	45.000
8.911E-06	50.000
8.280E-06	55.000
7.644E-06	60.000
6.992E-06	65.000
6.310E-06	70.000
5.583E-06	75.000
4.793E-06	80.000

THE 5TH PERCENTILE IS: 2.41E-05

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQD
SHORT TERM X/Q CALCULATION- MIXED MODE RELEASE
SECTOR SPREAD VALUE CALCULATED

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
ID:A SITE BOUNDARY DIRECTION: S DISTANCE: 0.70 MILES (1127. METERS)

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

1.869E-05	1.539E-05	1.292E-05	1.271E-05	1.174E-05	1.018E-05	9.678E-06	9.618E-06	9.392E-06	8.309E-06
4.000	8.000	12.000	16.000	20.000	24.000	28.000	32.000	36.000	40.000
8.229E-06	7.959E-06	7.952E-06	6.937E-06	6.464E-06	6.461E-06	5.953E-06	5.090E-06	4.518E-06	3.980E-06
44.000	48.000	52.000	56.000	60.000	64.000	68.000	72.000	76.000	80.000
3.915E-06	3.221E-06	2.976E-06	1.864E-06	1.610E-06	0.0	0.0	0.0	0.0	0.0
84.000	88.000	92.000	96.000	100.000	0.0	0.0	0.0	0.0	0.0

LEAST SQUARES FIT:

CHI/Q SEC/METER CUBED	PERCENT OF TIME REACHED OR EXCEEDED
3.527E-05	1.000
2.195E-05	3.000
1.817E-05	5.000
1.445E-05	10.000
1.276E-05	15.000
1.169E-05	20.000
1.088E-05	25.000
1.021E-05	30.000
9.612E-06	35.000
9.056E-06	40.000
8.517E-06	45.000
7.981E-06	50.000
7.435E-06	55.000
6.869E-06	60.000
6.273E-06	65.000
5.638E-06	70.000
4.950E-06	75.000
4.197E-06	80.000

THE 5TH PERCENTILE IS: 1.82E-05

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQD
SHORT TERM X/Q CALCULATION- MIXED MODE RELEASE
SECTOR SPREAD VALUE CALCULATED

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
ID:A COWS DIRECTION: S DISTANCE: 1.20 MILES (1931. METERS)

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

1.413E-05	1.220E-05	1.175E-05	1.061E-05	1.044E-05	9.690E-06	9.197E-06	8.372E-06	7.415E-06	6.651E-06
4.000	8.000	12.000	16.000	20.000	24.000	28.000	32.000	36.000	40.000
6.158E-06	6.054E-06	5.925E-06	4.861E-06	3.765E-06	3.533E-06	3.296E-06	3.079E-06	2.529E-06	2.430E-06
44.000	48.000	52.000	56.000	60.000	64.000	68.000	72.000	76.000	80.000
1.767E-06	1.750E-06	1.265E-06	1.170E-06	5.850E-07	0.0	0.0	0.0	0.0	0.0
84.000	88.000	92.000	96.000	100.000	0.0	0.0	0.0	0.0	0.0

LEAST SQUARES FIT:

CHI/Q SEC/METER CUBED	PERCENT OF TIME REACHED OR EXCEEDED
1.463E-05	1.000
1.471E-05	3.000
1.430E-05	5.000
1.308E-05	10.000
1.193E-05	15.000
1.087E-05	20.000
9.889E-06	25.000
8.983E-06	30.000
8.137E-06	35.000
7.341E-06	40.000
6.589E-06	45.000
5.875E-06	50.000
5.194E-06	55.000
4.544E-06	60.000
3.920E-06	65.000
3.319E-06	70.000
2.740E-06	75.000
2.179E-06	80.000

THE 5TH PERCENTILE IS: 1.43E-05

C.16

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQD
SHORT TERM X/Q CALCULATION- MIXED MODE RELEASE
SECTOR SPREAD VALUE CALCULATED

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
ID:A COWS DIRECTION: NNW DISTANCE: 3.10 MILES (4989. METERS)

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

8.948E-06	5.576E-06	4.917E-06	3.468E-06	3.336E-06	3.149E-06	3.143E-06	2.288E-06	1.985E-06	1.889E-06
4.000	8.000	12.000	16.000	20.000	24.000	28.000	32.000	36.000	40.000
1.635E-06	1.489E-06	1.324E-06	1.058E-06	9.445E-07	8.694E-07	8.527E-07	6.620E-07	5.631E-07	5.518E-07
44.000	48.000	52.000	56.000	60.000	64.000	68.000	72.000	76.000	80.000
4.347E-07	2.883E-07	2.816E-07	1.923E-07	9.617E-08	0.0	0.0	0.0	0.0	0.0
84.000	88.000	92.000	96.000	100.000	0.0	0.0	0.0	0.0	0.0

LEAST SQUARES FIT:

CHI/Q SEC/METER CUBED	PERCENT OF TIME REACHED OR EXCEEDED
1.844E-05	1.000
1.103E-05	3.000
8.569E-06	5.000
5.909E-06	10.000
4.624E-06	15.000
3.804E-06	20.000
3.212E-06	25.000
2.752E-06	30.000
2.377E-06	35.000
2.062E-06	40.000
1.790E-06	45.000
1.551E-06	50.000
1.337E-06	55.000
1.144E-06	60.000
9.671E-07	65.000
8.042E-07	70.000
6.525E-07	75.000
5.104E-07	80.000

THE 5TH PERCENTILE IS: 8.57E-06

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQD
SHORT TERM X/Q CALCULATION- MIXED MODE RELEASE
SECTOR SPREAD VALUE CALCULATED

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
ID:A COWS DIRECTION: SSE DISTANCE: 2.70 MILES (4345. METERS)

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

1.082E-05	6.799E-06	5.923E-06	4.264E-06	3.975E-06	3.917E-06	3.830E-06	2.766E-06	2.437E-06	2.243E-06
4.000	8.000	12.000	16.000	20.000	24.000	28.000	32.000	36.000	40.000
2.038E-06	1.822E-06	1.598E-06	1.378E-06	1.121E-06	1.063E-06	1.062E-06	7.988E-07	7.185E-07	7.000E-07
44.000	48.000	52.000	56.000	60.000	64.000	68.000	72.000	76.000	80.000
5.316E-07	3.753E-07	3.500E-07	2.503E-07	1.252E-07	0.0	0.0	0.0	0.0	0.0
84.000	88.000	92.000	96.000	100.000	0.0	0.0	0.0	0.0	0.0

LEAST SQUARES FIT:

CHI/Q SEC/METER CUBED	PERCENT OF TIME REACHED OR EXCEEDED
2.202E-05	1.000
1.337E-05	3.000
1.043E-05	5.000
7.221E-06	10.000
5.656E-06	15.000
4.655E-06	20.000
3.931E-06	25.000
3.370E-06	30.000
2.913E-06	35.000
2.529E-06	40.000
2.198E-06	45.000
1.907E-06	50.000
1.648E-06	55.000
1.414E-06	60.000
1.200E-06	65.000
1.002E-06	70.000
8.181E-07	75.000
6.452E-07	80.000

THE 5TH PERCENTILE IS: 1.04E-05

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQD
SHORT TERM X/Q CALCULATION- MIXED MODE RELEASE
SECTOR SPREAD VALUE CALCULATED

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
ID:A RESIDE[illegible] DIRECTION: S DISTANCE: 1.20 MILES (1931. METERS)

BELOW ARE [illegible]ERED VALUES OF CHI/Q AND THE FREQENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

1.413E	[illegible]175E-05	1.061E-05	1.044E-05	9.690E-06	9.197E-06	8.372E-06	7.415E-06	6.651E-06
4.[illegible]	12.000	16.000	20.000	24.000	28.000	32.000	36.000	40.000
6.158E-06	[illegible].054E-06	5.925E-06	4.861E-06	3.765E-06	3.533E-06	3.296E-06	3.079E-06	2.529E-06	2.430E-06
44.000	48.000	52.000	56.000	60.000	64.000	68.000	72.000	76.000	80.000
1.767E-06	1.750E-06	1.265E-06	1.170E-06	5.850E-07	0.0	0.0	0.0	0.0	0.0
84.000	88.000	92.000	96.000	100.000	0.0	0.0	0.0	0.0	0.0

LEAST SQUARES FIT:

CHI/Q SEC/METER CUBED	PERCENT OF TIME REACHED OR EXCEEDED
1.463E-05	1.000
1.471E-05	3.000
1.430E-05	5.000
1.308E-05	10.000
1.193E-05	15.000
1.087E-05	20.000
9.889E-06	25.000
8.983E-06	30.000
8.137E-06	35.000
7.341E-06	40.000
6.589E-06	45.000
5.875E-06	50.000
5.194E-06	55.000
4.544E-06	60.000
3.920E-06	65.000
3.319E-06	70.000
2.740E-06	75.000
2.179E-06	80.000

THE 5TH PERCENTILE IS: 1.43E-05

C.19

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQD
SHORT TERM X/Q CALCULATION- MIXED MODE RELEASE
SECTOR SPREAD VALUE CALCULATED

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
ID:A RESIDENCES DIRECTION: NNW DISTANCE: 4.00 MILES (6437. METERS)

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

6.339E-06	3.888E-06	3.506E-06	2.420E-06	2.380E-06	2.204E-06	2.098E-06	1.617E-06	1.378E-06	1.365E-06
4.000	8.000	12.000	16.000	20.000	24.000	28.000	32.000	36.000	40.000
1.092E-06	1.028E-06	9.384E-07	6.889E-07	6.504E-07	6.014E-07	5.698E-07	4.692E-07	3.774E-07	3.391E-07
44.000	48.000	52.000	56.000	60.000	64.000	68.000	72.000	76.000	80.000
3.007E-07	1.887E-07	1.772E-07	1.183E-07	5.913E-08	0.0	0.0	0.0	0.0	0.0
84.000	88.000	92.000	96.000	100.000	0.0	0.0	0.0	0.0	0.0

LEAST SQUARES FIT:

CHI/Q SEC/METER CUBED	PERCENT OF TIME REACHED OR EXCEEDED
1.237E-05	1.000
7.489E-06	3.000
5.833E-06	5.000
4.017E-06	10.000
3.133E-06	15.000
2.569E-06	20.000
2.161E-06	25.000
1.845E-06	30.000
1.589E-06	35.000
1.374E-06	40.000
1.189E-06	45.000
1.028E-06	50.000
8.838E-07	55.000
7.544E-07	60.000
6.367E-07	65.000
5.286E-07	70.000
4.285E-07	75.000
3.351E-07	80.000

THE 5TH PERCENTILE IS: 5.83E-06

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES
INTERMITTENT RELEASE CALCULATIONS
CORRECTED USING STANDARD OPEN TERRAIN FACTORS
SPECIFIC POINTS OF INTEREST

RELEASE ID	TYPE OF LOCATION	DIRECTION FROM SITE	DISTANCE (MILES)	DISTANCE (METERS)	X/Q (SEC/CUB.METER) NO DECAY UNDEPLETED	X/Q (SEC/CUB.METER) 2.260 DAY DECAY UNDEPLETED	X/Q (SEC/CUB.METER) 8.000 DAY DECAY DEPLETED	D/Q (PER SQ.METER)
A	SITE BOUNDARY	S	0.50	805.	1.8E-05	1.8E-05	1.7E-05	2.0E-07
A	SITE BOUNDARY	S	0.60	966.	1.4E-05	1.4E-05	1.3E-05	1.4E-07
A	SITE BOUNDARY	S	0.70	1127.	1.2E-05	1.2E-05	1.1E-05	1.0E-07
A	COWS	S	1.20	1931.	8.3E-06	8.2E-06	7.9E-06	3.1E-08
A	COWS	NNW	3.10	4989.	4.3E-06	4.2E-06	3.9E-06	1.3E-08
A	COWS	SSE	2.70	4345.	3.8E-06	3.8E-06	3.5E-06	1.2E-08
A	RESIDENCES	S	1.20	1931.	8.3E-06	8.2E-06	7.9E-06	3.1E-08
A	RESIDENCES	NNW	4.00	6437.	2.8E-06	2.7E-06	2.4E-06	7.6E-09

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	45.00	REP. WIND HEIGHT	(METERS)	45.0
DIAMETER	(METERS)	2.00	BUILDING HEIGHT	(METERS)	40.0
EXIT VELOCITY	(METERS)	10.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2000.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

AT THE RELEASE HEIGHT:

T RELEASE MODE	WIND SPEED (METERS/SEC)
ELEVATED	LESS THAN 2.000
MIXED	BETWEEN 2.000 AND 10.000
GROUND LEVEL	ABOVE 10.000

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS	WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS
ELEVATED	LESS THAN 0.943	LESS THAN 1.373
MIXED	BETWEEN 0.943 AND 4.714	BETWEEN 1.373 AND 6.866
GROUND LEVEL	ABOVE 4.714	ABOVE 6.866

TOTAL NUMBER OF PURGES: 25
HOURS PER PURGE: 4

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT TWO - GROUND LEVEL RELEASE - NO PURGE RELEASES
NO DECAY, UNDEPLETED
CORRECTED USING STANDARD OPEN TERRAIN FACTORS

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	2.447E-04	8.110E-05	4.366E-05	2.180E-05	8.571E-06	4.601E-06	2.906E-06	2.026E-06	1.509E-06	1.177E-06	9.517E-07
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	4.893E-04	1.622E-04	8.733E-05	4.361E-05	1.714E-05	9.202E-06	5.812E-06	4.052E-06	3.017E-06	2.355E-06	1.903E-06
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.447E-04	8.110E-05	4.366E-05	2.180E-05	8.571E-06	4.601E-06	2.906E-06	2.026E-06	1.509E-06	1.177E-06	9.517E-07

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	7.903E-07	4.122E-07	2.706E-07	1.586E-07	1.094E-07	8.229E-08	6.528E-08	5.373E-08	4.542E-08	3.919E-08	3.436E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	1.581E-06	8.244E-07	5.411E-07	3.172E-07	2.189E-07	1.646E-07	1.306E-07	1.075E-07	9.084E-08	7.838E-08	6.871E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	7.903E-07	4.122E-07	2.706E-07	1.586E-07	1.094E-07	8.229E-08	6.528E-08	5.373E-08	4.542E-08	3.919E-08	3.436E-08

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	30.00	REP. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	0.0	BUILDING HEIGHT	(METERS)	25.0
EXIT VELOCITY	(METERS)	0.0	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	900.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

ALL GROUND LEVEL RELEASES.

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT TWO - GROUND LEVEL RELEASE - NO PURGE RELEASES
NO DECAY, UNDEPLETED

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES FROM THE SITE									
	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	4.227E-05	9.748E-06	3.006E-06	1.530E-06	9.588E-07	4.333E-07	1.616E-07	8.273E-08	5.386E-08	3.925E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	8.454E-05	1.950E-05	6.012E-06	2.060E-06	1.918E-06	8.665E-07	3.233E-07	1.655E-07	1.077E-07	7.849E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	4.227E-05	9.748E-06	3.006E-06	1.530E-06	9.588E-07	4.333E-07	1.616E-07	8.273E-08	5.386E-08	3.925E-08

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT TWO - GROUND LEVEL RELEASE - NO PURGE RELEASES
2.260 DAY DECAY, UNDEPLETED
CORRECTED USING STANDARD OPEN TERRAIN FACTORS

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	2.442E-04	8.077E-05	4.340E-05	2.163E-05	8.469E-06	4.528E-06	2.848E-06	1.978E-06	1.467E-06	1.140E-06	9.179E-07
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	4.883E-04	1.615E-04	8.680E-05	4.326E-05	1.694E-05	9.056E-06	5.696E-06	3.955E-06	2.933E-06	2.280E-06	1.836E-06
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.442E-04	8.077E-05	4.340E-05	2.163E-05	8.469E-06	4.528E-06	2.848E-06	1.978E-06	1.467E-06	1.140E-06	9.179E-07

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	7.592E-07	3.882E-07	2.498E-07	1.408E-07	9.349E-08	6.766E-08	5.169E-08	4.099E-08	3.340E-08	2.779E-08	2.351E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	1.518E-06	7.764E-07	4.996E-07	2.817E-07	1.870E-07	1.353E-07	1.034E-07	8.198E-08	6.681E-08	5.559E-08	4.702E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	7.592E-07	3.882E-07	2.498E-07	1.408E-07	9.349E-08	6.766E-08	5.169E-08	4.099E-08	3.340E-08	2.779E-08	2.351E-08

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	30.00	REP. WIND HEIGHT	(METERS) 10.0
DIAMETER	(METERS)	0.0	BUILDING HEIGHT	(METERS) 25.0
EXIT VELOCITY	(METERS)	0.0	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS) 900.0
			HEAT EMISSION RATE	(CAL/SEC) 0.0

ALL GROUND LEVEL RELEASES.

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT TWO - GROUND LEVEL RELEASE - NO PURGE RELEASES
2.260 DAY DECAY, UNDEPLETED

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES FROM THE SITE									
	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	4.203E-05	9.642E-06	2.948E-06	1.488E-06	9.250E-07	4.091E-07	1.440E-07	6.816E-08	4.116E-08	2.787E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	8.406E-05	1.928E-05	5.896E-06	2.977E-06	1.850E-06	8.183E-07	2.880E-07	1.363E-07	8.231E-08	5.574E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	4.203E-05	9.642E-06	2.948E-06	1.488E-06	9.250E-07	4.091E-07	1.440E-07	6.816E-08	4.116E-08	2.787E-08

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT TWO - GROUND LEVEL RELEASE - NO PURGE RELEASES
8.000 DAY DECAY, DEPLETED
CORRECTED USING STANDARD OPEN TERRAIN FACTORS

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	2.314E-04	7.398E-05	3.884E-05	1.904E-05	7.255E-06	3.793E-06	2.341E-06	1.598E-06	1.168E-06	8.957E-07	7.122E-07
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	4.628E-04	1.480E-04	7.769E-05	3.809E-05	1.451E-05	7.585E-06	4.681E-06	3.196E-06	2.336E-06	1.791E-06	1.424E-06
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.314E-04	7.398E-05	3.884E-05	1.904E-05	7.255E-06	3.793E-06	2.341E-06	1.598E-06	1.168E-06	8.957E-07	7.122E-07

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	5.824E-07	2.857E-07	1.777E-07	9.533E-08	6.109E-08	4.303E-08	3.218E-08	2.507E-08	2.013E-08	1.654E-08	1.384E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	1.165E-06	5.714E-07	3.554E-07	1.907E-07	1.222E-07	8.607E-08	6.435E-08	5.014E-08	4.026E-08	3.308E-08	2.768E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	5.824E-07	2.857E-07	1.777E-07	9.533E-08	6.109E-08	4.303E-08	3.218E-08	2.507E-08	2.013E-08	1.654E-08	1.384E-08

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	30.00	REP. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	0.0	BUILDING HEIGHT	(METERS)	25.0
EXIT VELOCITY	(METERS)	0.0	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	900.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

ALL GROUND LEVEL RELEASES.

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT TWO - GROUND LEVEL RELEASE - NO PURGE RELEASES
8.000 DAY DECAY, DEPLETED

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES FROM THE SITE .5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	3.785E-05	8.336E-06	2.431E-06	1.187E-06	7.185E-07	3.036E-07	9.841E-08	4.351E-08	2.522E-08	1.661E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	7.570E-05	1.667E-05	4.862E-06	2.374E-06	1.437E-06	6.072E-07	1.968E-07	8.701E-08	5.044E-08	3.321E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	3.785E-05	8.336E-06	2.431E-06	1.187E-06	7.185E-07	3.036E-07	9.841E-08	4.351E-08	2.522E-08	1.661E-08

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT TWO - GROUND LEVEL RELEASE - NO PURGE RELEASES
CORRECTED USING STANDARD OPEN TERRAIN FACTORS

********** RELATIVE DEPOSITION PER UNIT AREA (M**-2) AT FIXED POINTS BY DOWNWIND SECTORS **********

DIRECTION FROM SITE	DISTANCES IN MILES 0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50
S	5.790E-07	1.958E-07	1.005E-07	4.779E-08	1.717E-08	8.514E-09	5.013E-09	3.283E-09	2.310E-09	1.712E-09	1.319E-09
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	1.158E-06	3.916E-07	2.011E-07	9.559E-08	3.434E-08	1.703E-08	1.003E-08	6.565E-09	4.619E-09	3.423E-09	2.638E-09
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	5.790E-07	1.958E-07	1.005E-07	4.779E-08	1.717E-08	8.514E-09	5.013E-09	3.283E-09	2.310E-09	1.712E-09	1.319E-09

DIRECTION FROM SITE	DISTANCES IN MILES 5.00	7.50	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
S	1.048E-09	4.655E-10	2.820E-10	1.425E-10	8.627E-11	5.784E-11	4.145E-11	3.112E-11	2.420E-11	1.933E-11	1.578E-11
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	2.096E-09	9.311E-10	5.640E-10	2.851E-10	1.725E-10	1.157E-10	8.289E-11	6.224E-11	4.840E-11	3.866E-11	3.155E-11
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	1.048E-09	4.655E-10	2.820E-10	1.425E-10	8.627E-11	5.784E-11	4.145E-11	3.112E-11	2.420E-11	1.933E-11	1.578E-11

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ - TEST CASE #1

EXIT TWO - GROUND LEVEL RELEASE - NO PURGE RELEASES

RELATIVE DEPOSITION PER UNIT AREA (M**-2) BY DOWNWIND SECTORS

SEGMENT BOUNDARIES IN MILES

DIRECTION FROM SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	9.826E-08	2.013E-08	5.254E-09	2.360E-09	1.335E-09	5.134E-10	1.485E-10	5.886E-11	3.143E-11	1.946E-11
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	1.965E-07	4.025E-08	1.051E-08	4.720E-09	2.670E-09	1.027E-09	2.970E-10	1.177E-10	6.287E-11	3.891E-11
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	9.826E-08	2.013E-08	5.254E-09	2.360E-09	1.335E-09	5.134E-10	1.485E-10	5.886E-11	3.143E-11	1.946E-11

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	30.00	REP. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	0.0	BUILDING HEIGHT	(METERS)	25.0
EXIT VELOCITY	(METERS)	0.0	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	900.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

ALL GROUND LEVEL RELEASES.

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: MONDAY AUGUST 9, 1982

XOQDOQ TEST CASE #1

EXIT TWO - GROUND LEVEL RELEASE - NO PURGE RELEASES
CORRECTED USING STANDARD OPEN TERRAIN FACTORS
SPECIFIC POINTS OF INTEREST

RELEASE ID	TYPE OF LOCATION	DIRECTION FROM SITE	DISTANCE (MILES)	DISTANCE (METERS)	X/Q (SEC/CUB.METER) NO DECAY UNDEPLETED	X/Q (SEC/CUB.METER) 2.260 DAY DECAY UNDEPLETED	X/Q (SEC/CUB.METER) 8.000 DAY DECAY DEPLETED	D/Q (PER SQ.METER)
B	SITE BOUNDARY	S	0.50	805.	8.1E-05	8.1E-05	7.4E-05	2.0E-07
B	SITE BOUNDARY	S	0.60	966.	6.2E-05	6.1E-05	5.6E-05	1.5E-07
B	SITE BOUNDARY	S	0.70	1127.	4.9E-05	4.8E-05	4.3E-05	1.1E-07
B	COWS	S	1.20	1931.	1.4E-05	1.4E-05	1.2E-05	3.0E-08
B	COWS	NNW	3.10	4989.	3.8E-06	3.7E-06	3.0E-06	6.1E-09
B	COWS	SSE	2.70	4345.	2.5E-06	2.4E-06	2.0E-06	4.2E-09
B	RESIDENCES	S	1.20	1931.	1.4E-05	1.4E-05	1.2E-05	3.0E-08
B	RESIDENCES	NNW	4.00	6437.	2.4E-06	2.3E-06	1.8E-06	3.4E-09

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	30.00	REP. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	0.0	BUILDING HEIGHT	(METERS)	25.0
EXIT VELOCITY	(METERS)	0.0	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	900.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

ALL GROUND LEVEL RELEASES.

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

PRINTOUT OF INPUT CARDS

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 1     10100 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
 2     XOQDOQ - TEST CASE  #2
 3         5     7     3     5     3     1     0
 4       10.00 101.00   2.26  -8.00   0.0
 5       0.0    0.0    4.000  4.000  4.000  4.000  4.000
 6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
 6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
 6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
 6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
 6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
 6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
 6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
 6       0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 6       1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
 7        -1.   1.000  2.000  4.000  8.000 16.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
VRDIST,VRCR NOT INPUTTED.
10       100.   100.   100.   100.   100.   100.   100.   100.   100.   100.   100.   100.   100.   100.   100.   100.
11         0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
10       800.   800.   800.   800.   800.   800.   800.   800.   800.   800.   800.   800.   800.   800.   800.   800.
11        16.    16.    16.    16.    16.    16.    16.    16.    16.    16.    16.    16.    16.    16.    16.    16.
10     10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000. 10000.
11       200.   200.   200.   200.   200.   200.   200.   200.   200.   200.   200.   200.   200.   200.   200.   200.
12         3     3     2
13     SITE BOUNDARY
14       1  805.0  1  966.0  1 1127.0
13     COWS
14       1 1931.0  8 4989.0 16 4345.0
13     RESIDENCES
14       1 1931.0  8 6437.0
15     EXIT ONE - CONTINUOUS ELEVATED RELEASE
16      10.000  2.000  -45.0   40.0 2000.0   45.0  0.0
17     B    0     0     0
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USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #2

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS A

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS B

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS C

X (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
8.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
16.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
TOTAL	5.00	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.00	20.00

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS D

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
2.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
4.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
8.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
16.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
TOTAL	5.00	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.00	20.00

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS E

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
2.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
4.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
8.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
16.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
TOTAL	5.00	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.00	20.00

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS F

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
2.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
4.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
8.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
16.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
TOTAL	5.00	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.00	20.00

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS G

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
2.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
4.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
8.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
16.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
TOTAL	5.00	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.00	20.00

TOTAL HOURS CONSIDERED ARE 100

WIND MEASURED AT 10.0 METERS.

OVERALL WIND DIRECTION FREQUENCY

WIND DIRECTION:	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
FREQUENCY:	25.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	100.0

OVERALL WIND SPEED FREQUENCY

WIND SPEED (M/S):	1.000	2.000	4.000	8.000	16.000
WIND SPEED (M/S):	0.500	1.500	3.000	6.000	12.000
WIND SPEED FREQUENCY:	20.00	20.00	20.00	20.00	20.00

DISTANCES AND TERRAIN HEIGHTS IN METERS AS FUNCTIONS OF DIRECTION FROM THE SITE:

DIRECTION =	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
DISTANCE	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.
ELEVATION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
DISTANCE	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.
ELEVATION	16.	16.	16.	16.	16.	16.	16.	16.	16.	16.	16.	16.	16.	16.	16.	16.
DISTANCE	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.	10000.
ELEVATION	200.	200.	200.	200.	200.	200.	200.	200.	200.	200.	200.	200.	200.	200.	200.	200.

C.33

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 ..JN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #2

EXIT ONE - CONTINUOUS ELEVATED RELEASE
NO DECAY, UNDEPLETED

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	2.372E-07	6.713E-07	1.045E-06	1.377E-06	1.670E-06	1.322E-06	9.637E-07	7.438E-07	5.969E-07	4.929E-07	4.166E-07
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	4.744E-07	1.343E-06	2.090E-06	2.754E-06	3.340E-06	2.643E-06	1.927E-06	1.488E-06	1.194E-06	9.858E-07	8.331E-07
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.372E-07	6.713E-07	1.045E-06	1.377E-06	1.670E-06	1.322E-06	9.637E-07	7.438E-07	5.969E-07	4.929E-07	4.166E-07

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	3.588E-07	2.037E-07	1.374E-07	7.982E-08	5.484E-08	4.111E-08	3.254E-08	2.673E-08	2.257E-08	1.945E-08	1.703E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	7.175E-07	4.074E-07	2.748E-07	1.596E-07	1.097E-07	8.221E-08	6.507E-08	5.346E-08	4.513E-08	3.889E-08	3.406E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	3.588E-07	2.037E-07	1.374E-07	7.982E-08	5.484E-08	4.111E-08	3.254E-08	2.673E-08	2.257E-08	1.945E-08	1.703E-08

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	45.00	REP. WIND HEIGHT	(METERS)	45.0
DIAMETER	(METERS)	2.00	BUILDING HEIGHT	(METERS)	40.0
EXIT VELOCITY	(METERS)	10.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2000.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

ALL ELEVATED RELEASES.

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #2

EXIT ONE - CONTINUOUS ELEVATED RELEASE
NO DECAY, UNDEPLETED

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES FROM THE SITE .5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	1.109E-06	1.450E-06	9.712E-07	5.993E-07	4.178E-07	2.087E-07	8.151E-08	4.134E-08	2.680E-08	1.948E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	2.219E-06	2.900E-06	1.942E-06	1.199E-06	8.356E-07	4.174E-07	1.630E-07	8.268E-08	5.361E-08	3.895E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	1.109E-06	1.450E-06	9.712E-07	5.993E-07	4.178E-07	2.087E-07	8.151E-08	4.134E-08	2.680E-08	1.948E-08

AVERAGE EFFECTIVE STACK HEIGHT IN METERS FOR EACH SEGMENT

ECTION M SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	3.392E+01	1.314E+01	3.786E+00	1.093E+00	0.0	0.0	0.0	0.0	0.0	0.0
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	3.392E+01	1.314E+01	3.786E+00	1.093E+00	0.0	0.0	0.0	0.0	0.0	0.0
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	3.392E+01	1.314E+01	3.786E+00	1.093E+00	0.0	0.0	0.0	0.0	0.0	0.0

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #2

EXIT ONE - CONTINUOUS ELEVATED RELEASE
2.260 DAY DECAY, UNDEPLETED

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	2.371E-07	6.706E-07	1.043E-06	1.372E-06	1.661E-06	1.311E-06	9.539E-07	7.347E-07	5.884E-07	4.849E-07	4.090E-07
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	4.743E-07	1.341E-06	2.085E-06	2.745E-06	3.322E-06	2.622E-06	1.908E-06	1.469E-06	1.177E-06	9.698E-07	8.179E-07
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.371E-07	6.706E-07	1.043E-06	1.372E-06	1.661E-06	1.311E-06	9.539E-07	7.347E-07	5.884E-07	4.849E-07	4.090E-07

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	3.515E-07	1.976E-07	1.320E-07	7.518E-08	5.065E-08	3.724E-08	2.891E-08	2.331E-08	1.930E-08	1.632E-08	1.403E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	7.030E-07	3.952E-07	2.639E-07	1.504E-07	1.013E-07	7.448E-08	5.783E-08	4.661E-08	3.861E-08	3.265E-08	2.806E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	3.515E-07	1.976E-07	1.320E-07	7.518E-08	5.065E-08	3.724E-08	2.891E-08	2.331E-08	1.930E-08	1.632E-08	1.403E-08

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	45.00	REP. WIND HEIGHT	(METERS)	45.0
DIAMETER	(METERS)	2.00	BUILDING HEIGHT	(METERS)	40.0
EXIT VELOCITY	(METERS)	10.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2000.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

ALL ELEVATED RELEASES.

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #2

EXIT ONE - CONTINUOUS ELEVATED RELEASE
2.260 DAY DECAY, UNDEPLETED

CHI/Q (SEC METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES FROM THE SITE .5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	1.107E-06	1.441E-06	9.615E-07	5.908E-07	4.102E-07	2.026E-07	7.690E-08	3.748E-08	2.338E-08	1.636E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	2.213E-06	2.882E-06	1.923E-06	1.182E-06	8.204E-07	4.053E-07	1.538E-07	7.497E-08	4.677E-08	3.272E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	1.107E-06	1.441E-06	9.615E-07	5.908E-07	4.102E-07	2.026E-07	7.690E-08	3.748E-08	2.338E-08	1.636E-08

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #2

EXIT ONE - CONTINUOUS ELEVATED RELEASE
8.000 DAY DECAY, DEPLETED

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	2.336E-07	6.595E-07	1.029E-06	1.357E-06	1.643E-06	1.277E-06	9.140E-07	6.939E-07	5.485E-07	4.466E-07	3.724E-07
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	4.673E-07	1.319E-06	2.057E-06	2.715E-06	3.286E-06	2.553E-06	1.828E-06	1.388E-06	1.097E-06	8.931E-07	7.449E-07
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.336E-07	6.595E-07	1.029E-06	1.357E-06	1.643E-06	1.277E-06	9.140E-07	6.939E-07	5.485E-07	4.466E-07	3.724E-07

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	3.168E-07	1.713E-07	1.107E-07	6.008E-08	3.901E-08	2.785E-08	2.111E-08	1.666E-08	1.356E-08	1.129E-08	9.565E-09
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	6.336E-07	3.426E-07	2.215E-07	1.202E-07	7.803E-08	5.570E-08	4.221E-08	3.333E-08	2.712E-08	2.257E-08	1.913E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	3.168E-07	1.713E-07	1.107E-07	6.008E-08	3.901E-08	2.785E-08	2.111E-08	1.666E-08	1.356E-08	1.129E-08	9.565E-09

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	45.00	REP. WIND HEIGHT	(METERS)	45.0
DIAMETER	(METERS)	2.00	BUILDING HEIGHT	(METERS)	40.0
EXIT VELOCITY	(METERS)	10.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2000.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

ALL ELEVATED RELEASES.

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #2

EXIT ONE - CONTINUOUS ELEVATED RELEASE
8.000 DAY DECAY, DEPLETED

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES FROM THE SITE .5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	1.093E-06	1.417E-06	9.226E-07	5.512E-07	3.738E-07	1.767E-07	6.198E-08	2.813E-08	1.675E-08	1.132E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	2.185E-06	2.833E-06	1.845E-06	1.102E-06	7.476E-07	3.534E-07	1.240E-07	5.626E-08	3.350E-08	2.264E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	1.093E-06	1.417E-06	9.226E-07	5.512E-07	3.738E-07	1.767E-07	6.198E-08	2.813E-08	1.675E-08	1.132E-08

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #2

EXIT ONE - CONTINUOUS ELEVATED RELEASE

RELATIVE DEPOSITION PER UNIT AREA (M**-2) AT FIXED POINTS BY DOWNWIND SECTORS

DIRECTION FROM SITE	DISTANCES IN MILES 0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50
S	2.385E-08	1.270E-08	6.974E-09	9.129E-09	7.167E-09	5.125E-09	3.472E-09	2.532E-09	1.968E-09	1.550E-09	1.255E-09
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	4.769E-08	2.539E-08	1.395E-08	1.826E-08	1.433E-08	1.025E-08	6.945E-09	5.065E-09	3.935E-09	3.100E-09	2.510E-09
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.385E-08	1.270E-08	6.974E-09	9.129E-09	7.167E-09	5.125E-09	3.472E-09	2.532E-09	1.968E-09	1.550E-09	1.255E-09

DIRECTION FROM SITE	DISTANCES IN MILES 5.00	7.50	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
S	1.038E-09	5.087E-10	3.192E-10	1.613E-10	9.764E-11	6.547E-11	4.691E-11	3.522E-11	2.739E-11	2.188E-11	1.786E-11
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	2.076E-09	1.017E-09	6.383E-10	3.227E-10	1.953E-10	1.309E-10	9.382E-11	7.045E-11	5.478E-11	4.376E-11	3.571E-11
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	1.038E-09	5.087E-10	3.192E-10	1.613E-10	9.764E-11	6.547E-11	4.691E-11	3.522E-11	2.739E-11	2.188E-11	1.786E-11

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #2

EXIT ONE - CONTINUOUS ELEVATED RELEASE

********** RELATIVE DEPOSITION PER UNIT AREA (M**-2) BY DOWNWIND SECTORS **********

SEGMENT BOUNDARIES IN MILES

DIRECTION FROM SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	9.204E-09	6.696E-09	3.537E-09	1.970E-09	1.262E-09	5.421E-10	1.681E-10	6.662E-11	3.558E-11	2.202E-11
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	1.841E-08	1.339E-08	7.074E-09	3.940E-09	2.524E-09	1.084E-09	3.362E-10	1.332E-10	7.116E-11	4.404E-11
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	9.204E-09	6.696E-09	3.537E-09	1.970E-09	1.262E-09	5.421E-10	1.681E-10	6.662E-11	3.558E-11	2.202E-11

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	45.00	REP. WIND HEIGHT	(METERS)	45.0
DIAMETER	(METERS)	2.00	BUILDING HEIGHT	(METERS)	40.0
EXIT VELOCITY	(METERS)	10.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2000.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

ALL ELEVATED RELEASES.

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #2

EXIT ONE - CONTINUOUS ELEVATED RELEASE
SPECIFIC POINTS OF INTEREST

RELEASE ID	TYPE OF LOCATION	DIRECTION FROM SITE	DISTANCE (MILES)	DISTANCE (METERS)	X/Q (SEC/CUB.METER) NO DECAY UNDEPLETED	X/Q (SEC/CUB.METER) 2.260 DAY DECAY UNDEPLETED	X/Q (SEC/CUB.METER) 8.000 DAY DECAY DEPLETED	D/Q (PER SQ.METER)
B	SITE BOUNDARY	S	0.50	805.	6.7E-07	6.7E-07	6.6E-07	1.3E-08
B	SITE BOUNDARY	S	0.60	966.	8.2E-07	8.2E-07	8.1E-07	9.8E-09
B	SITE BOUNDARY	S	0.70	1127.	9.7E-07	9.7E-07	9.6E-07	7.8E-09
B	COWS	S	1.20	1931.	1.6E-06	1.6E-06	1.6E-06	6.9E-09
B	COWS	NNW	3.10	4989.	1.4E-06	1.4E-06	1.3E-06	4.8E-09
B	COWS	SSE	2.70	4345.	8.6E-07	8.5E-07	8.1E-07	3.1E-09
B	RESIDENCES	S	1.20	1931.	1.6E-06	1.6E-06	1.6E-06	6.9E-09
B	RESIDENCES	NNW	4.00	6437.	9.9E-07	9.7E-07	8.9E-07	3.1E-09
B	MAXIMUM CHI/Q	S	1.50	2414.	1.7E-06	1.7E-06	1.6E-06	7.2E-09
B	MAXIMUM CHI/Q	SSW	50.00	80467.	0.0	0.0	0.0	0.0
B	MAXIMUM CHI/Q	SW	50.00	80467.	0.0	0.0	0.0	0.0
B	MAXIMUM CHI/Q	WSW	50.00	80467.	0.0	0.0	0.0	0.0
B	MAXIMUM CHI/Q	W	50.00	80467.	0.0	0.0	0.0	0.0
B	MAXIMUM CHI/Q	WNW	50.00	80467.	0.0	0.0	0.0	0.0
B	MAXIMUM CHI/Q	NW	50.00	80467.	0.0	0.0	0.0	0.0
B	MAXIMUM CHI/Q	NNW	1.50	2414.	3.3E-06	3.3E-06	3.3E-06	1.4E-08
B	MAXIMUM CHI/Q	N	50.00	80467.	0.0	0.0	0.0	0.0
B	MAXIMUM CHI/Q	NNE	50.00	80467.	0.0	0.0	0.0	0.0
B	MAXIMUM CHI/Q	NE	50.00	80467.	0.0	0.0	0.0	0.0
B	MAXIMUM CHI/Q	ENE	50.00	80467.	0.0	0.0	0.0	0.0
B	MAXIMUM CHI/Q	E	50.00	80467.	0.0	0.0	0.0	0.0
B	MAXIMUM CHI/Q	ESE	50.00	80467.	0.0	0.0	0.0	0.0
B	MAXIMUM CHI/Q	SE	50.00	80467.	0.0	0.0	0.0	0.0
B	MAXIMUM CHI/Q	SSE	1.50	2414.	1.7E-06	1.7E-06	1.6E-06	7.2E-09

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	45.00	REP. WIND HEIGHT	(METERS)	45.0
DIAMETER	(METERS)	2.00	BUILDING HEIGHT	(METERS)	40.0
EXIT VELOCITY	(METERS)	10.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2000.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

ALL ELEVATED RELEASES.

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0   RUN DATE: TUESDAY   JULY 13, 1982

PRINTOUT OF INPUT CARDS

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  1      10100 00010 00000 00000 00030 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
  2      XOQDOQ - TEST CASE  #3
  3         5     7     0     5     3     1     4
  4        10.00 101.00   2.26  -8.00   0.0
  5        0.0    0.0    4.000  4.000  4.000  4.000  4.000
  6        0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6        0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6        0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6        0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6        0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6        0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6        0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6        0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  6        1.000  0.0    0.0    0.0    0.0    0.0    0.0    2.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.000
  7          -1.   1.000  2.000  4.000  8.000 16.000  0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
  8         10.    10.    10.    10.    10.    10.    10.    10.    10.    10.    10.    10.    10.    10.    10.    10.
  9        4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000
  8        6437.  6437.  6437.  6437.  6437.  6437.  6437.  6437.  6437.  6437.  6437.  6437.  6437.  6437.  6437.  6437.
  9        4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000  4.000
  8        8047.  8047.  8047.  8047.  8047.  8047.  8047.  8047.  8047.  8047.  8047.  8047.  8047.  8047.  8047.  8047.
  9        2.000  2.000  2.000  2.000  2.000  2.000  2.000  2.000  2.000  2.000  2.000  2.000  2.000  2.000  2.000  2.000
  8        9656.  9656.  9656.  9656.  9656.  9656.  9656.  9656.  9656.  9656.  9656.  9656.  9656.  9656.  9656.  9656.
  9        1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
NO TERRAIN DATA INPUTTED.
 12         3     3     2
 13      SITE BOUNDARY
 14        1  805.0  1  966.0  1 1127.0
 13      COWS
 14        1 1931.0  8 4989.0 16 4345.0
 13      RESIDENCES
 14        1 1931.0  8 6437.0
 15      EXIT ONE -  ONE-MIXED MODE RELEASE
 16       10.000  2.000   45.0   40.0 2000.0   45.0   0.0
 17      A    0     0     0
```

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #3

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS A

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS B

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS C

C((M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
.44)0	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
)0	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
8.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
16.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
TOTAL	5.00	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
																5.00	20.00

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS D

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
2.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
4.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
8.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
16.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
TOTAL	5.00	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
																5.00	20.00

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS E

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
2.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
4.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
8.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
16.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
TOTAL	5.00	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
																5.00	20.00

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS F

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
2.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
4.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
8.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
16.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
TOTAL	5.00	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.00	20.00

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS G

UMAX (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
2.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
4.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
8.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
16.00	1.000	0.0	0.0	0.0	0.0	0.0	0.0	2.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	4.000
TOTAL	5.00	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.00	20.00

TOTAL HOURS CONSIDERED ARE 100

WIND MEASURED AT 10.0 METERS.

OVERALL WIND DIRECTION FREQUENCY

WIND DIRECTION:	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
FREQUENCY:	25.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	100.0

OVERALL WIND SPEED FREQUENCY

WIND SPEED (M/S):	1.000	2.000	4.000	8.000	16.000
WIND SPEED (M/S):	0.500	1.500	3.000	6.000	12.000
WIND SPEED FREQUENCY:	20.00	20.00	20.00	20.00	20.00

DISTANCES AND TERRAIN HEIGHTS IN METERS AS FUNCTIONS OF DIRECTION FROM THE SITE:

DIRECTION =	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
DISTANCE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ELEVATION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

DISTANCES AND SITE-SPECIFIC CORRECTION FACTORS AS FUNCTIONS OF DIRECTION FROM THE SITE:

DIRECTION =	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
DISTANCE	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.
FACTOR	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
DISTANCE	6437.	6437.	6437.	6437.	6437.	6437.	6437.	6437.	6437.	6437.	6437.	6437.	6437.	6437.	6437.	6437.
FACTOR	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
DISTANCE	8047.	8047.	8047.	8047.	8047.	8047.	8047.	8047.	8047.	8047.	8047.	8047.	8047.	8047.	8047.	8047.
FACTOR	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
DISTANCE	9656.	9656.	9656.	9656.	9656.	9656.	9656.	9656.	9656.	9656.	9656.	9656.	9656.	9656.	9656.	9656.
FACTOR	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #3

EXIT ONE - ONE-MIXED MODE RELEASE
NO DECAY, UNDEPLETED
CORRECTED USING SITE-SPECIFIC FACTORS

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	2.596E-05	8.917E-06	5.286E-06	3.885E-06	2.584E-06	1.934E-06	1.539E-06	1.272E-06	1.081E-06	9.361E-07	5.715E-07
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	5.192E-05	1.783E-05	1.057E-05	7.769E-06	5.168E-06	3.867E-06	3.077E-06	2.544E-06	2.161E-06	1.872E-06	1.143E-06
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.596E-05	8.917E-06	5.286E-06	3.885E-06	2.584E-06	1.934E-06	1.539E-06	1.272E-06	1.081E-06	9.361E-07	5.715E-07

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

ECTOR	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	3.672E-07	1.169E-07	8.431E-08	5.311E-08	3.836E-08	2.976E-08	2.416E-08	2.024E-08	1.736E-08	1.517E-08	1.343E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	7.343E-07	2.337E-07	1.686E-07	1.062E-07	7.673E-08	5.951E-08	4.831E-08	4.049E-08	3.473E-08	3.033E-08	2.687E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	3.672E-07	1.169E-07	8.431E-08	5.311E-08	3.836E-08	2.976E-08	2.416E-08	2.024E-08	1.736E-08	1.517E-08	1.343E-08

C.46

*VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	45.00	REP. WIND HEIGHT	(METERS)	45.0
DIAMETER	(METERS)	2.00	BUILDING HEIGHT	(METERS)	40.0
EXIT VELOCITY	(METERS)	10.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2000.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)		
ELEVATED	LESS THAN	2.000	
MIXED	BETWEEN	2.000 AND 10.000	
GROUND LEVEL	ABOVE	10.000	

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS		
ELEVATED	LESS THAN	0.943	
MIXED	BETWEEN	0.943 AND	4.714
GROUND LEVEL	ABOVE	4.714	

WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS		
LESS THAN	1.373	
BETWEEN	1.373 AND	6.866
ABOVE	6.866	

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #3

EXIT ONE - ONE-MIXED MODE RELEASE
NO DECAY, UNDEPLETED

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES FROM THE SITE .5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	5.470E-06	2.584E-06	1.537E-06	1.080E-06	6.039E-07	1.580E-07	5.349E-08	2.981E-08	2.026E-08	1.518E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	1.094E-05	5.168E-06	3.075E-06	2.161E-06	1.208E-06	3.160E-07	1.070E-07	5.962E-08	4.053E-08	3.035E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	5.470E-06	2.584E-06	1.537E-06	1.080E-06	6.039E-07	1.580E-07	5.349E-08	2.981E-08	2.026E-08	1.518E-08

AVERAGE EFFECTIVE STACK HEIGHT IN METERS FOR EACH SEGMENT

ECTION 1 SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01	4.608E+01

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #3

EXIT ONE - ONE-MIXED MODE RELEASE
2.260 DAY DECAY, UNDEPLETED
CORRECTED USING SITE-SPECIFIC FACTORS

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	2.595E-05	8.909E-06	5.279E-06	3.876E-06	2.574E-06	1.923E-06	1.527E-06	1.260E-06	1.069E-06	9.241E-07	5.631E-07
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	5.190E-05	1.782E-05	1.056E-05	7.752E-06	5.148E-06	3.845E-06	3.054E-06	2.521E-06	2.137E-06	1.848E-06	1.126E-06
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.595E-05	8.909E-06	5.279E-06	3.876E-06	2.574E-06	1.923E-06	1.527E-06	1.260E-06	1.069E-06	9.241E-07	5.631E-07

UAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

ECTOR	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	3.611E-07	1.139E-07	8.146E-08	5.042E-08	3.578E-08	2.727E-08	2.176E-08	1.792E-08	1.511E-08	1.297E-08	1.130E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	7.223E-07	2.278E-07	1.629E-07	1.008E-07	7.156E-08	5.454E-08	4.351E-08	3.584E-08	3.022E-08	2.594E-08	2.259E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	3.611E-07	1.139E-07	8.146E-08	5.042E-08	3.578E-08	2.727E-08	2.176E-08	1.792E-08	1.511E-08	1.297E-08	1.130E-08

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	45.00
DIAMETER	(METERS)	2.00
EXIT VELOCITY	(METERS)	10.00

REP. WIND HEIGHT	(METERS)	45.0
BUILDING HEIGHT	(METERS)	40.0
BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2000.0
HEAT EMISSION RATE	(CAL/SEC)	0.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)
ELEVATED	LESS THAN 2.000
MIXED	BETWEEN 2.000 AND 10.000
GROUND LEVEL	ABOVE 10.000

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS	WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS
ELEVATED	LESS THAN 0.943	LESS THAN 1.373
MIXED	BETWEEN 0.943 AND 4.714	BETWEEN 1.373 AND 6.866
GROUND LEVEL	ABOVE 4.714	ABOVE 6.866

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #3

EXIT ONE - ONE-MIXED MODE RELEASE
2.260 DAY DECAY, UNDEPLETED

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES FROM THE SITE .5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	5.462E-06	2.574E-06	1.526E-06	1.068E-06	5.953E-07	1.544E-07	5.081E-08	2.733E-08	1.794E-08	1.298E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	1.092E-05	5.148E-06	3.052E-06	2.137E-06	1.191E-06	3.089E-07	1.016E-07	5.467E-08	3.589E-08	2.597E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	5.462E-06	2.574E-06	1.526E-06	1.068E-06	5.953E-07	1.544E-07	5.081E-08	2.733E-08	1.794E-08	1.298E-08

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #3

EXIT ONE - ONE-MIXED MODE RELEASE
8.000 DAY DECAY, DEPLETED
CORRECTED USING SITE-SPECIFIC FACTORS

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	2.458E-05	8.197E-06	4.799E-06	3.506E-06	2.313E-06	1.721E-06	1.363E-06	1.121E-06	9.484E-07	8.183E-07	4.976E-07
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	4.915E-05	1.639E-05	9.598E-06	7.012E-06	4.627E-06	3.442E-06	2.725E-06	2.243E-06	1.897E-06	1.637E-06	9.952E-07
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.458E-05	8.197E-06	4.799E-06	3.506E-06	2.313E-06	1.721E-06	1.363E-06	1.121E-06	9.484E-07	8.183E-07	4.976E-07

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	3.185E-07	9.994E-08	7.118E-08	4.391E-08	3.114E-08	2.377E-08	1.902E-08	1.572E-08	1.325E-08	1.140E-08	9.930E-09
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	6.371E-07	1.999E-07	1.424E-07	8.781E-08	6.228E-08	4.754E-08	3.804E-08	3.144E-08	2.651E-08	2.280E-08	1.986E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	3.185E-07	9.994E-08	7.118E-08	4.391E-08	3.114E-08	2.377E-08	1.902E-08	1.572E-08	1.325E-08	1.140E-08	9.930E-09

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	45.00	REP. WIND HEIGHT	(METERS)	45.0
DIAMETER	(METERS)	2.00	BUILDING HEIGHT	(METERS)	40.0
EXIT VELOCITY	(METERS)	10.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2000.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)
ELEVATED	LESS THAN 2.000
MIXED	BETWEEN 2.000 AND 10.000
GROUND LEVEL	ABOVE 10.000

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS			WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS		
ELEVATED	LESS THAN	0.943		LESS THAN	1.373	
MIXED	BETWEEN	0.943 AND	4.714	BETWEEN	1.373 AN	..866
GROUND LEVEL	ABOVE	4.714		ABOVE	6.866	

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #3

EXIT ONE - ONE-MIXED MODE RELEASE
8.000 DAY DECAY, DEPLETED

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES FROM THE SITE .5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	4.979E-06	2.315E-06	1.362E-06	9.482E-07	5.263E-07	1.357E-07	4.429E-08	2.384E-08	1.572E-08	1.140E-08
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	9.959E-06	4.630E-06	2.723E-06	1.896E-06	1.053E-06	2.715E-07	8.859E-08	4.767E-08	3.145E-08	2.281E-08
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	4.979E-06	2.315E-06	1.362E-06	9.482E-07	5.263E-07	1.357E-07	4.429E-08	2.384E-08	1.572E-08	1.140E-08

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #3

EXIT ONE - ONE-MIXED MODE RELEASE
CORRECTED USING SITE-SPECIFIC FACTORS

********** RELATIVE DEPOSITION PER UNIT AREA (M**-2) AT FIXED POINTS BY DOWNWIND SECTORS **********

DIRECTION FROM SITE	DISTANCES IN MILES 0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50
S	2.811E-07	1.039E-07	5.560E-08	3.519E-08	1.813E-08	1.123E-08	7.707E-09	5.650E-09	4.336E-09	3.441E-09	1.944E-09
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	5.622E-07	2.078E-07	1.112E-07	7.038E-08	3.625E-08	2.246E-08	1.541E-08	1.130E-08	8.673E-09	6.883E-09	3.889E-09
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	2.811E-07	1.039E-07	5.560E-08	3.519E-08	1.813E-08	1.123E-08	7.707E-09	5.650E-09	4.336E-09	3.441E-09	1.944E-09

DIRECTION FROM SITE	DISTANCES IN MILES 5.00	7.50	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
S	1.166E-09	2.896E-10	1.817E-10	9.317E-11	5.772E-11	4.013E-11	3.000E-11	2.359E-11	1.927E-11	1.613E-11	1.385E-11
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	2.331E-09	5.792E-10	3.633E-10	1.863E-10	1.154E-10	8.025E-11	5.999E-11	4.717E-11	3.854E-11	3.226E-11	2.770E-11
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	1.166E-09	2.896E-10	1.817E-10	9.317E-11	5.772E-11	4.013E-11	3.000E-11	2.359E-11	1.927E-11	1.613E-11	1.385E-11

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #3

EXIT ONE - ONE-MIXED MODE RELEASE

********** RELATIVE DEPOSITION PER UNIT AREA (M**-2) BY DOWNWIND SECTORS **********

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES .5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	5.726E-08	1.885E-08	7.824E-09	4.371E-09	2.100E-09	4.363E-10	9.708E-11	4.077E-11	2.377E-11	1.622E-11
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	1.145E-07	3.771E-08	1.565E-08	8.742E-09	4.199E-09	8.725E-10	1.942E-10	8.154E-11	4.755E-11	3.243E-11
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	5.726E-08	1.885E-08	7.824E-09	4.371E-09	2.100E-09	4.363E-10	9.708E-11	4.077E-11	2.377E-11	1.622E-11

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	45.00	REP. WIND HEIGHT	(METERS)	45.0
DIAMETER	(METERS)	2.00	BUILDING HEIGHT	(METERS)	40.0
EXIT VELOCITY	(METERS)	10.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2000.0
			HEAT EMISSION RATE	(CAL/SEC)	0.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)
ELEVATED	LESS THAN 2.000
MIXED	BETWEEN 2.000 AND 10.000
GROUND LEVEL	ABOVE 10.000

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS			WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS		
ELEVATED	LESS THAN	0.943		LESS THAN	1.373	
MIXED	BETWEEN	0.943 AND	4.714	BETWEEN	1.373 AND	6.866
GROUND LEVEL	ABOVE	4.714		ABOVE	6.866	

USNRC COMPUTER CODE - XOQDOQ, VERSION 2.0 RUN DATE: TUESDAY JULY 13, 1982

XOQDOQ - TEST CASE #3

EXIT ONE - ONE-MIXED MODE RELEASE
CORRECTED USING SITE-SPECIFIC FACTORS
SPECIFIC POINTS OF INTEREST

RELEASE ID	TYPE OF LOCATION	DIRECTION FROM SITE	DISTANCE (MILES)	DISTANCE (METERS)	X/Q (SEC/CUB.METER) NO DECAY UNDEPLETED	X/Q (SEC/CUB.METER) 2.260 DAY DECAY UNDEPLETED	X/Q (SEC/CUB.METER) 8.000 DAY DECAY DEPLETED	D/Q (PER SQ.METER)
A	SITE BOUNDARY	S	0.50	805.	8.9E-06	8.9E-06	8.2E-06	1.0E-07
A	SITE BOUNDARY	S	0.60	966.	7.0E-06	7.0E-06	6.4E-06	7.9E-08
A	SITE BOUNDARY	S	0.70	1127.	5.7E-06	5.7E-06	5.2E-06	6.2E-08
A	COWS	S	1.20	1931.	3.2E-06	3.2E-06	2.9E-06	2.6E-08
A	COWS	NNW	3.10	4989.	2.5E-06	2.4E-06	2.2E-06	1.1E-08
A	COWS	SSE	2.70	4345.	1.4E-06	1.4E-06	1.3E-06	6.8E-09
A	RESIDENCES	S	1.20	1931.	3.2E-06	3.2E-06	2.9E-06	2.6E-08
A	RESIDENCES	NNW	4.00	6437.	1.9E-06	1.8E-06	1.6E-06	6.9E-09

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	45.00
DIAMETER	(METERS)	2.00
EXIT VELOCITY	(METERS)	10.00

REP. WIND HEIGHT	(METERS)	45.0
BUILDING HEIGHT	(METERS)	40.0
BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2000.0
HEAT EMISSION RATE	(CAL/SEC)	0.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)
ELEVATED	LESS THAN 2.000
MIXED	BETWEEN 2.000 AND 10.000
GROUND LEVEL	ABOVE 10.000

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS	WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS
ELEVATED	LESS THAN 0.943	LESS THAN 1.373
MIXED	BETWEEN 0.943 AND 4.714	BETWEEN 1.373 AND 6.866
GROUND LEVEL	ABOVE 4.714	ABOVE 6.866

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Provided is a user's guide for the U. S. Nuclear Regulatory Commissions's (NRC) computer program XOQDOQ which implements Regulatory Guide 1.111. This NUREG supercedes NUREG-0324 which was published as a draft in September 1977. This program is used by the NRC meteorology staff in their independent meteorological evaluation of routine or anticipated intermittent releases at nuclear power stations. It operates in a batch input mode and has various options a user may select. Relative atmospheric dispersion and deposition factors are computed for 22 specific distances out to 50 miles from the site for each directional sector. From these results, values for 10 distance segments are computed. The user may also select other locations for which atmospheric dispersion deposition factors are computed. Program features, including required input data and output results, are described. A program listing and test case data input and resulting output are provided.

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