

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

Final Report

Draft Report Published as NUREG-0324

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

**Pacific Northwest Laboratory**  
Operated by  
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**U.S. Nuclear Regulatory  
Commission**

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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 assistance 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.



## CONTENTS

ABSTRACT . . . . .	iii
SUMMARY . . . . .	v
ACKNOWLEDGMENTS . . . . .	vii
CONTENTS . . . . .	ix
FIGURES . . . . .	xi
TABLES . . . . .	xi
1.0 INTRODUCTION . . . . .	1
2.0 INPUT CARD FORMAT . . . . .	2
3.0 PROGRAM FEATURES . . . . .	2
3.1 MULTIPLE SITE ANALYSIS . . . . .	9
3.2 CONTINUOUS RELEASE ANALYSIS . . . . .	10
3.3 INTERMITTENT RELEASE ANALYSIS . . . . .	10
3.4 PUNCHED DATA OUTPUT. . . . .	10
3.5 EFFECTIVE STACK HEIGHT . . . . .	11
3.6 STANDARD AND SITE-SPECIFIC CORRECTION FACTORS . . . . .	11
3.7 WIND SPEED CLASSES . . . . .	14
3.8 CALMS . . . . .	14
4.0 DESCRIPTION OF PROGRAM XOQDOQ, INCLUDING SUBROUTINES . . . . .	14
4.1 SUBROUTINE ANNUAL . . . . .	16
4.2 SUBROUTINE DEPOS . . . . .	26
4.3 SUBROUTINE PTDEPS . . . . .	27
4.4 SUBROUTINE PURGE . . . . .	27
4.5 SUBROUTINE MIXD15 . . . . .	28
4.6 SUBROUTINE CALC . . . . .	28
4.7 SUBROUTINE ORDER . . . . .	30
4.8 SUBROUTINE CONV . . . . .	30
4.9 SUBROUTINE LSTSQR . . . . .	31
4.10 SUBROUTINE INVERS . . . . .	31
4.11 SUBROUTINES LOGFPT, PPLT, DEVATE, AREA . . . . .	31
4.12 SUBROUTINE SPLINE . . . . .	31
4.13 SUBROUTINE DEPLET . . . . .	31

4.14	SUBROUTINE DEPOST	.	.	.	.	.	.	.	.	.	.	31
4.15	SUBROUTINE ADJUST	.	.	.	.	.	.	.	.	.	.	31
4.16	SUBROUTINE ADJCOR	.	.	.	.	.	.	.	.	.	.	32
4.17	SUBROUTINE ADJWND	.	.	.	.	.	.	.	.	.	.	32
4.18	SUBROUTINE RLSMOD	.	.	.	.	.	.	.	.	.	.	33
4.19	SUBROUTINE HEIGHT	.	.	.	.	.	.	.	.	.	.	33
4.20	SUBROUTINE RISE	.	.	.	.	.	.	.	.	.	.	34
4.21	SUBROUTINE POLYN	.	.	.	.	.	.	.	.	.	.	37
4.22	SUBROUTINE OPENTR	.	.	.	.	.	.	.	.	.	.	38
4.23	SUBROUTINE CORVAR	.	.	.	.	.	.	.	.	.	.	38
4.24	SUBROUTINE PTSOUT	.	.	.	.	.	.	.	.	.	.	38
4.25	SUBROUTINE PRNTIN	.	.	.	.	.	.	.	.	.	.	38
4.26	SUBROUTINE INTCOM	.	.	.	.	.	.	.	.	.	.	38
5.0	DESCRIPTION OF PROGRAM OUTPUT.	.	.	.	.	.	.	.	.	.	.	38
REFERENCES	.	.	.	.	.	.	.	.	.	.	.	39
APPENDIX A	.	.	.	.	.	.	.	.	.	.	.	A.1
APPENDIX B	.	.	.	.	.	.	.	.	.	.	.	B.1
APPENDIX C	.	.	.	.	.	.	.	.	.	.	.	C.1

## FIGURES

3.1	Calculation of Effective Stack Height.	.	.	.	.	.	.	12
3.2	Open Terrain Correction Factor	.	.	.	.	.	.	13
4.1	Flow Chart for XOQDOQ	.	.	.	.	.	.	15
4.2	Flow Chart for Annual	.	.	.	.	.	.	17
4.3	Flow Chart for PTDEPS	.	.	.	.	.	.	18
4.4	Flow Chart for DEPOS	.	.	.	.	.	.	19
4.5	Flow Chart for PURGE	.	.	.	.	.	.	20
4.6	Flow Chart for MIXD15	.	.	.	.	.	.	21
4.7	Flow Chart for CALC.	.	.	.	.	.	.	22
4.8	Subroutine PURGE Calculations	.	.	.	.	.	.	27

## TABLES

2.1	List of Input Data	.	.	.	.	.	.	3
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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 from 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 (Sangendorf 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.

<u>Card Type</u>	<u>Columns</u>	<u>Variable Name</u>	<u>Format</u>	<u>Description</u>
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: 1=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

<u>Card Type</u>	<u>Columns</u>	<u>Variable Name</u>	<u>Format</u>	<u>Description</u>
12	1-25	NPOINT(I) I=1, NPTYPE	5I5	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 intermittent 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 ( $\sigma_y$  and  $\sigma_z$ ) 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

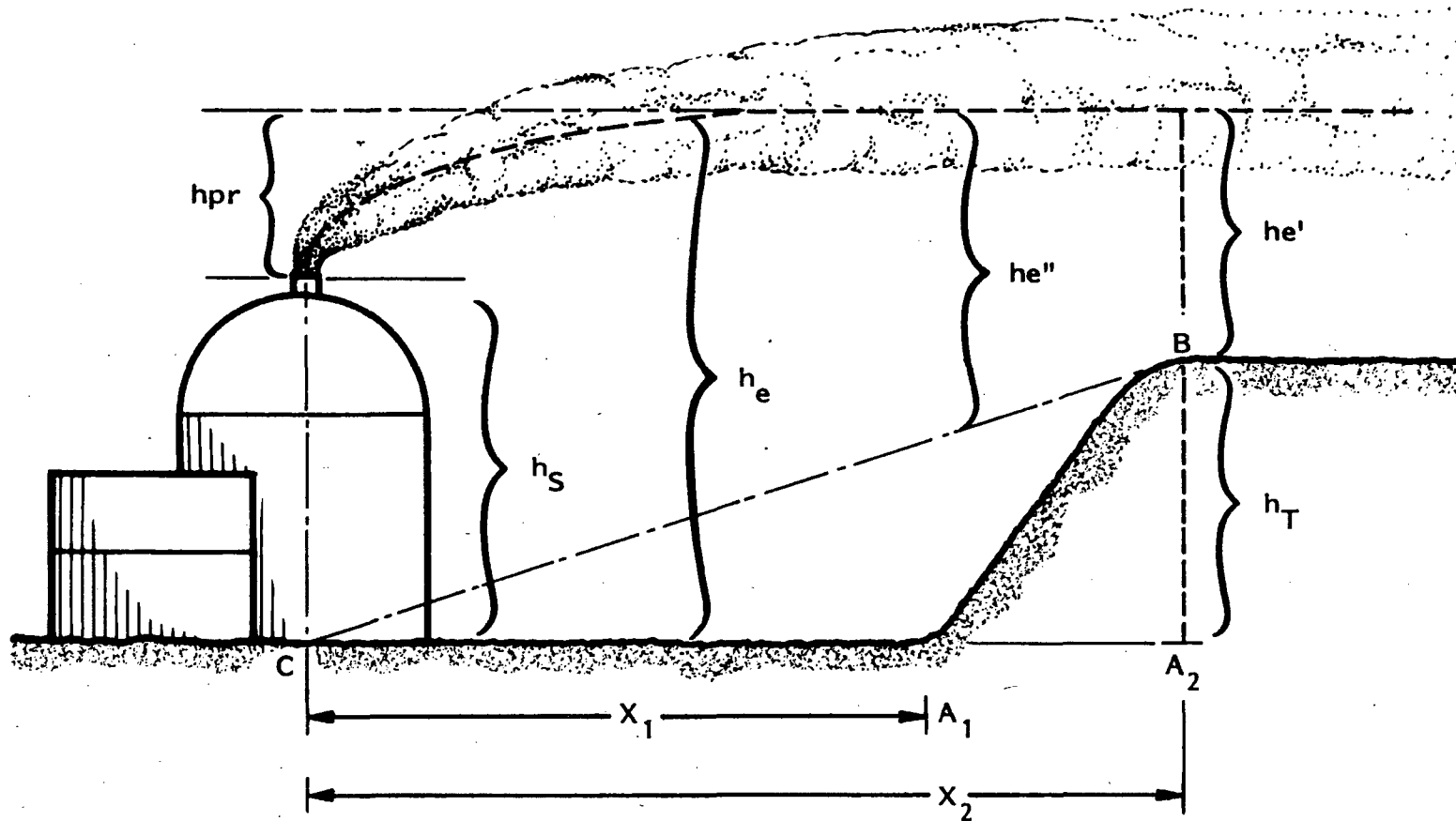
For both an elevated and mixed-mode release an effective stack height is computed. This value, which will vary according to direction and distance from the site, incorporates initial plume rise above the release point, any effects of aerodynamic downwash, and reduced height due to user inputted terrain 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 its 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)
- $h_{pr}$  = HEIGHT DUE TO PLUME RISE
- $h_e$  = EFFECTIVE STACK HEIGHT
- $h_e', h_e''$  = 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

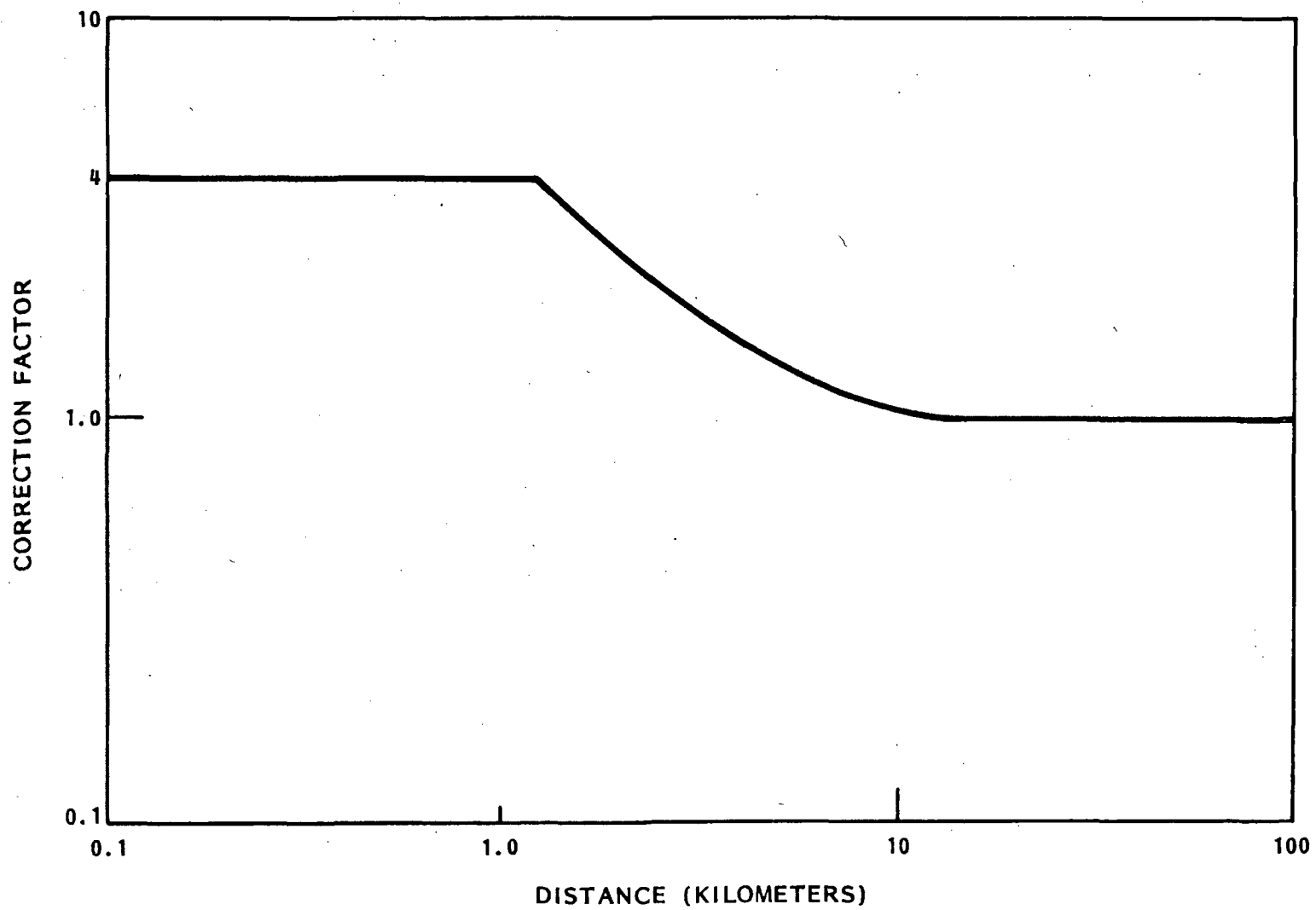


FIGURE 3.2. Open Terrain Correction Factor

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.

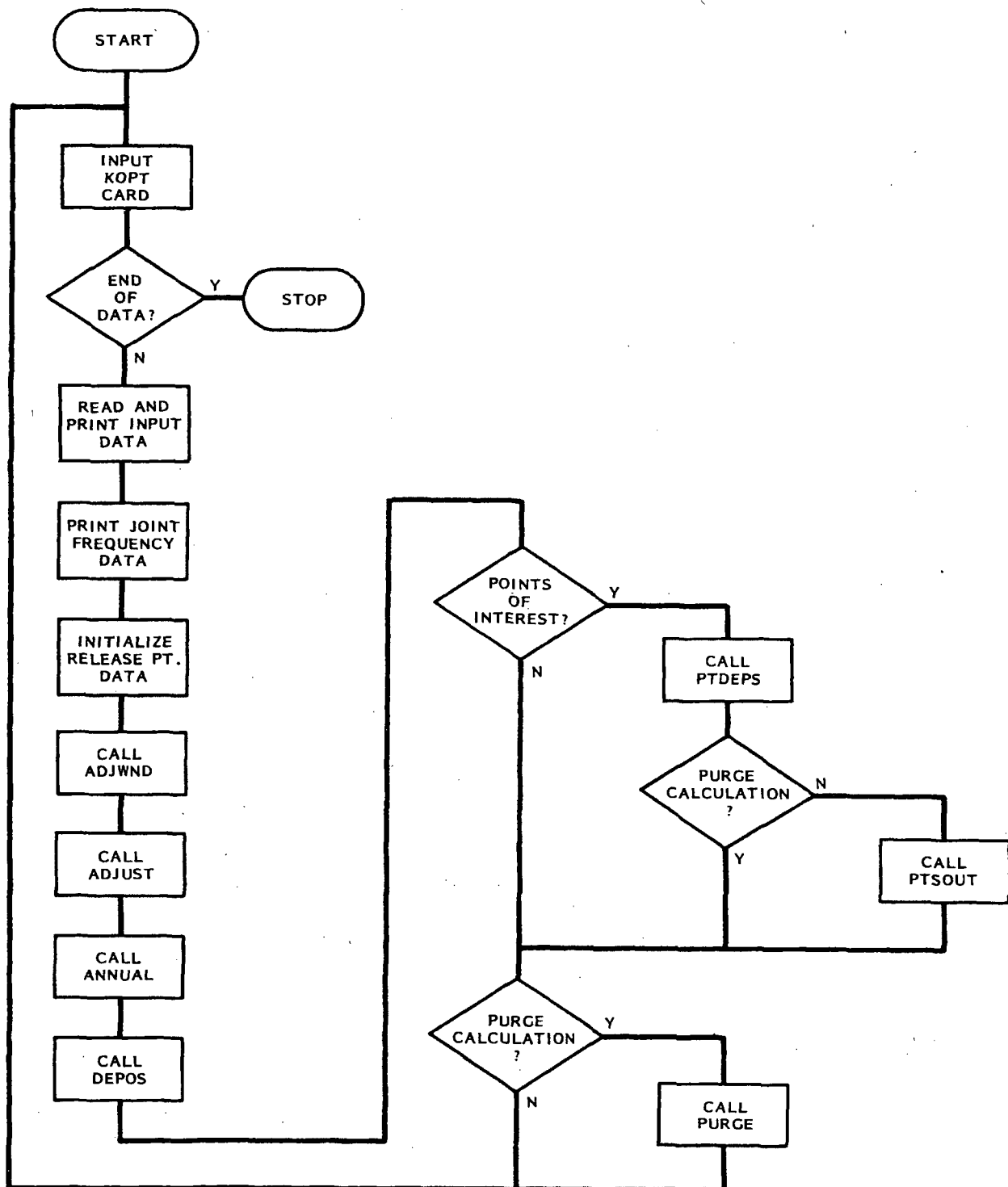


FIGURE 4.1. Flow Chart for XOQDOQ

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:

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

$x$  = the downwind distance (meters)

$i$  = the  $i$ th wind-speed class

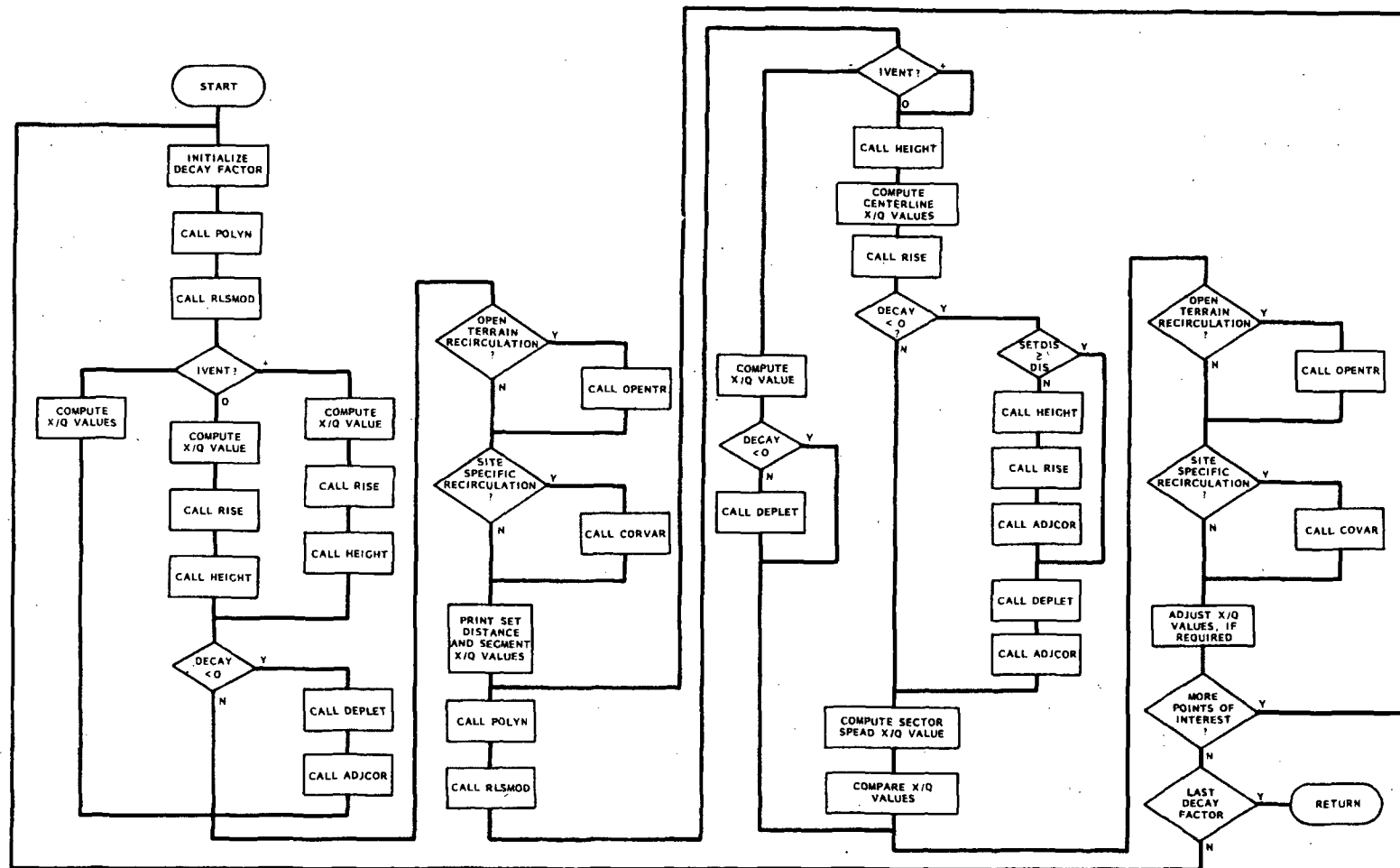


FIGURE 4.2. Flow Chart for ANNUAL

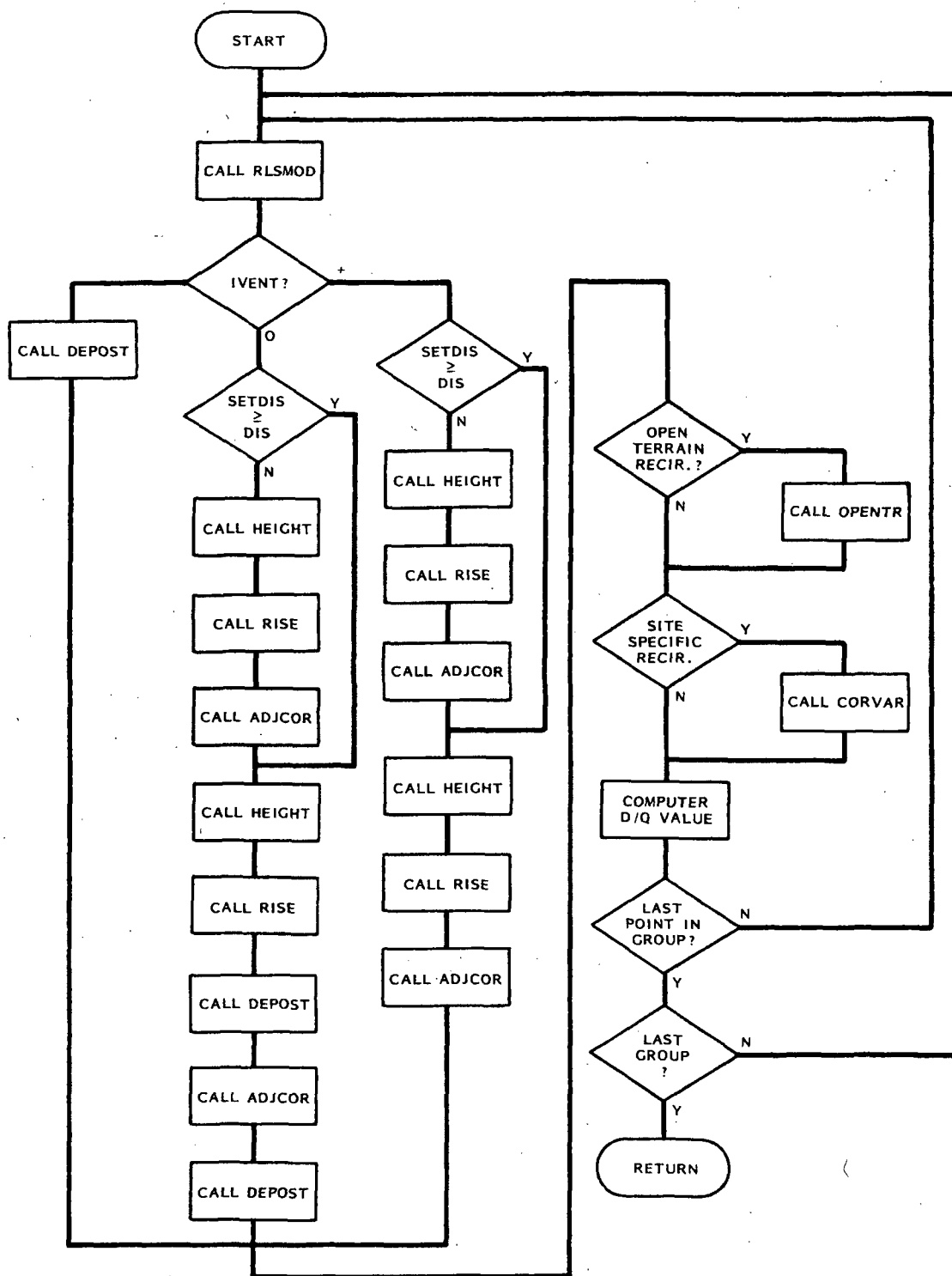


FIGURE 4.3. Flow Chart for PTDEPS



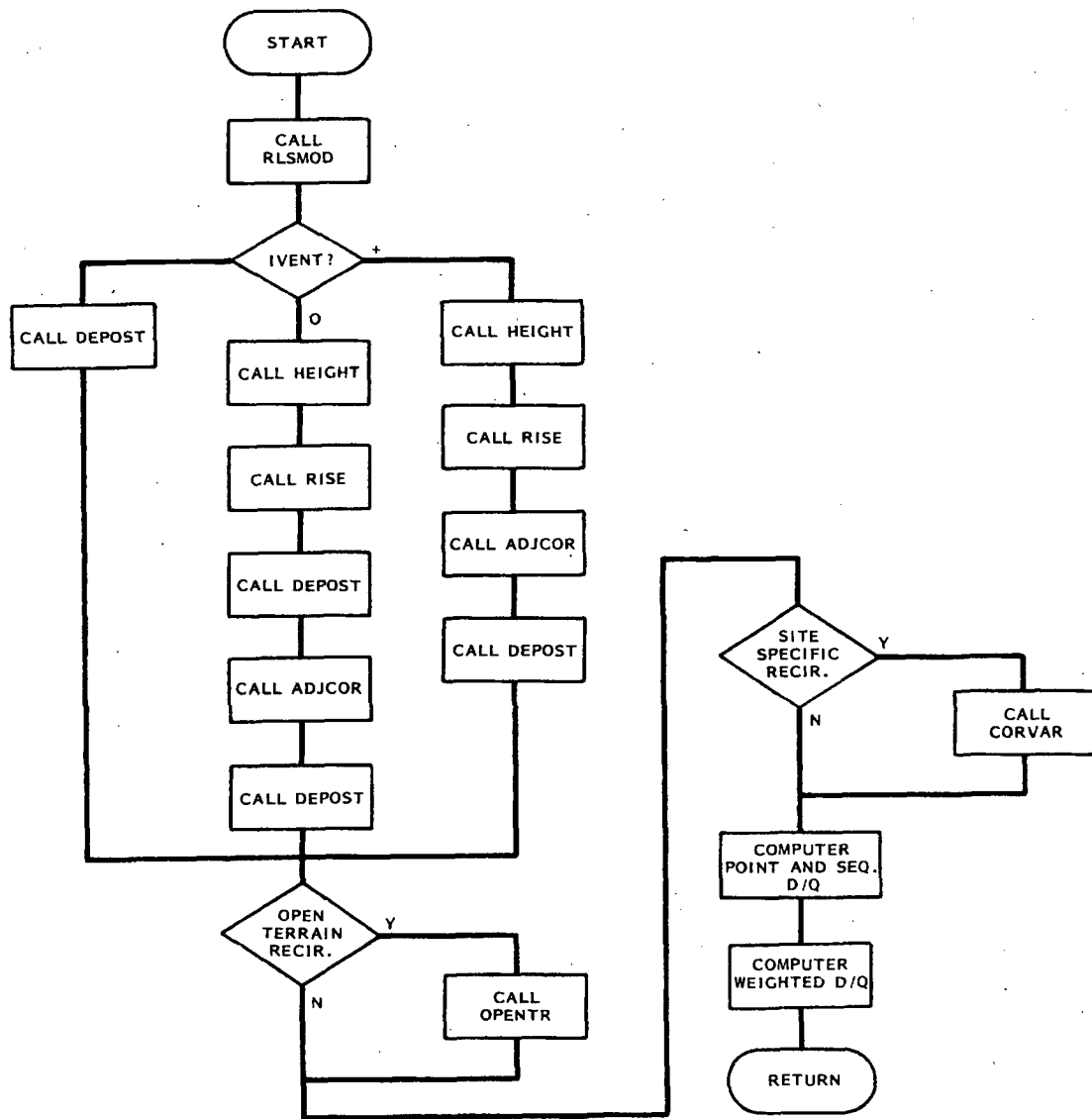


FIGURE 4.4. Flow Chart for DEPOS

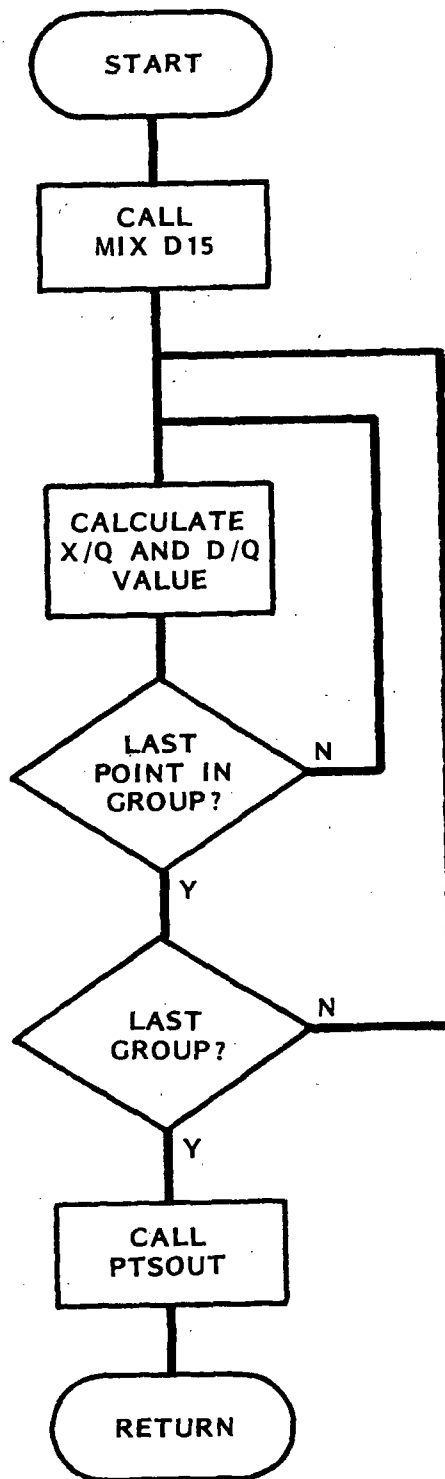


FIGURE 4.5. Flow Chart for PURGE

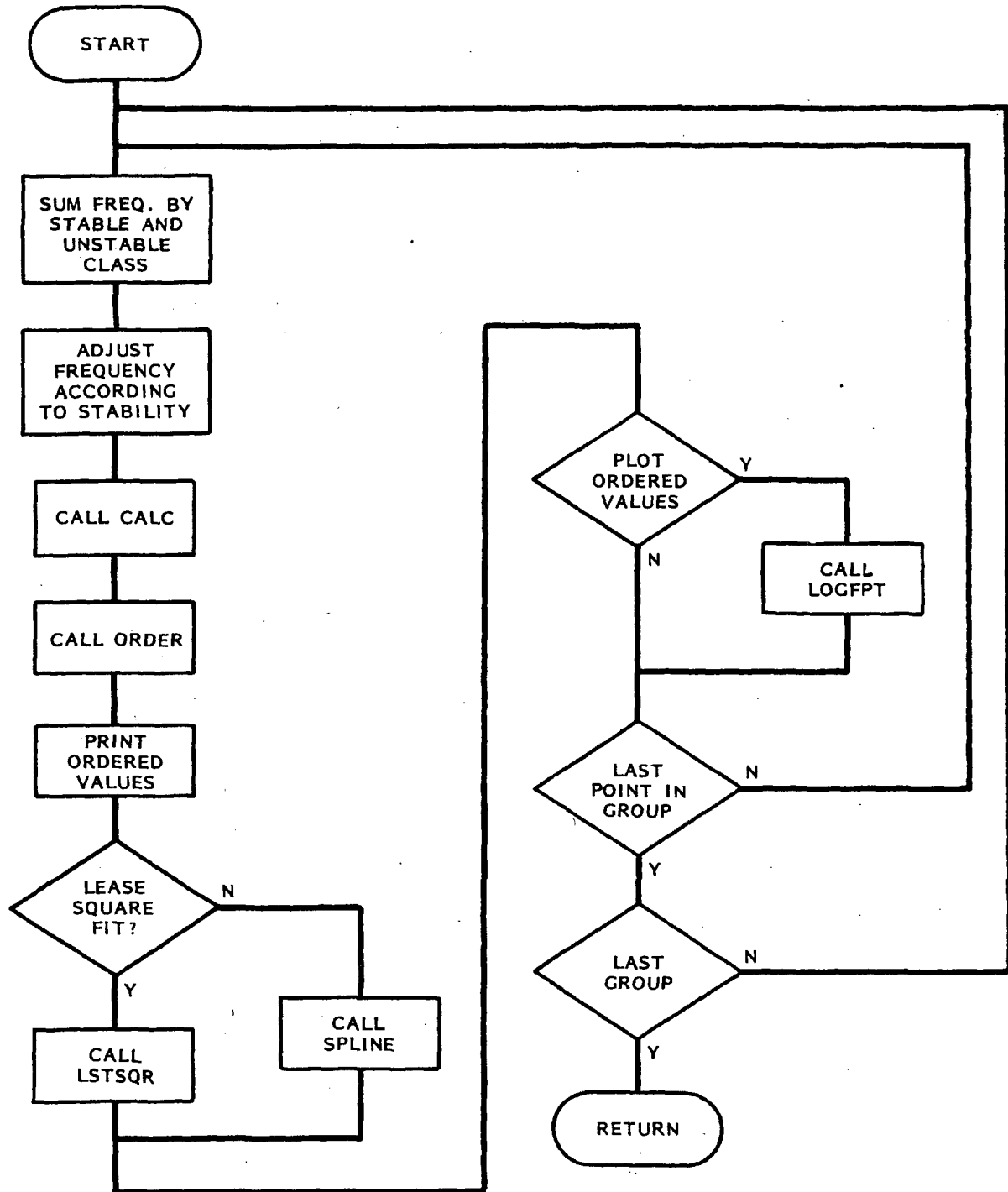


FIGURE 4.6. Flow Chart for MIXD15

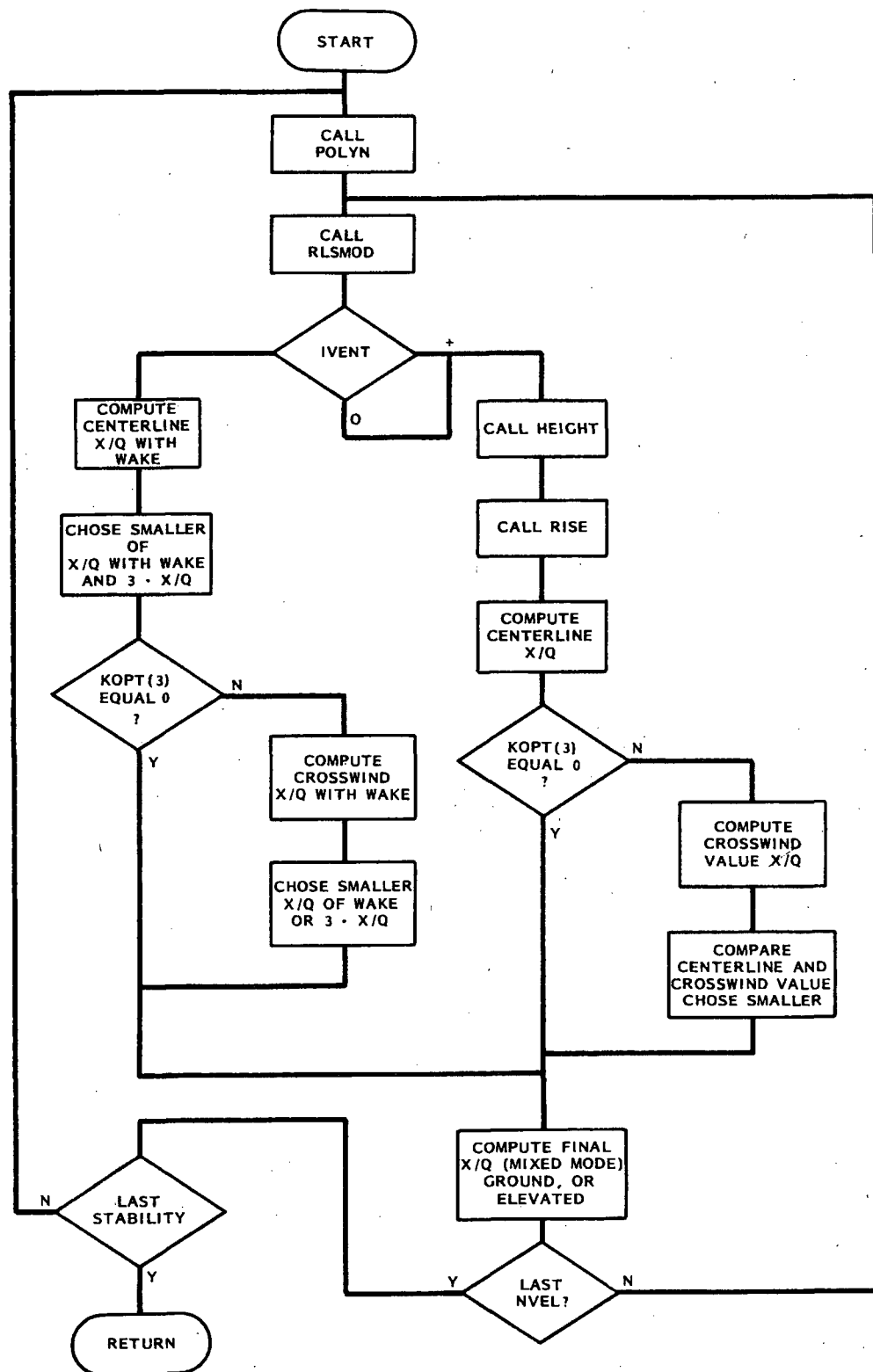


FIGURE 4.7. Flow Chart for CALC

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

K = kth wind-direction class

U<sub>i</sub> = mid-point value of the ith wind-speed class

σ<sub>zj</sub>(x) = the vertical plume spread for stability class j at distance x, determined from subroutine POLYN (meters)

f<sub>ij</sub>(k) = joint probability of occurrence of the ith wind-speed class, jth stability class, and kth wind-direction sector.

h<sub>e</sub> = effective plume height, determined from Subroutine RISE (meters)

DEC<sub>i</sub>(x) = reduction factor due to radioactive decay at distance x for the ith wind-speed class

DEPL<sub>ij</sub>(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):

$$\frac{q}{Q}(x,K) = \frac{2.032}{x} RF(x,K) \sum_{i,j}^{N7} DEPL_{ij}(x,K) DEC_i(x) f_{ij}(K) [U_i(\sigma_{zj}^2(x) + CD_2^2/\pi)^{1/2}]^{-1} \quad (2)$$

and

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

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 Yansky 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  $\bar{X}/Q$  value for the segment 40-50 miles in the North sector represents an average  $\bar{X}/Q$  value for any point north of the site between 40 and 50 miles north of the site.

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

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

where

$X/Q_{\text{seg}}(K)$  = 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

$r_1 \dots r_n$  = 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):

$$DEC_i(x) = \text{EXP} (-0.693 t_i / T) \quad (5)$$

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  $i$ th 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:

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

where

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

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

$f_{ij}(K)$  = joint probability of the  $i$ th wind-speed class,  $j$ th stability class, and  $k$ th wind-direction sector

$x$  = downwind distance, in meters

$\pi = 3.14159265$

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

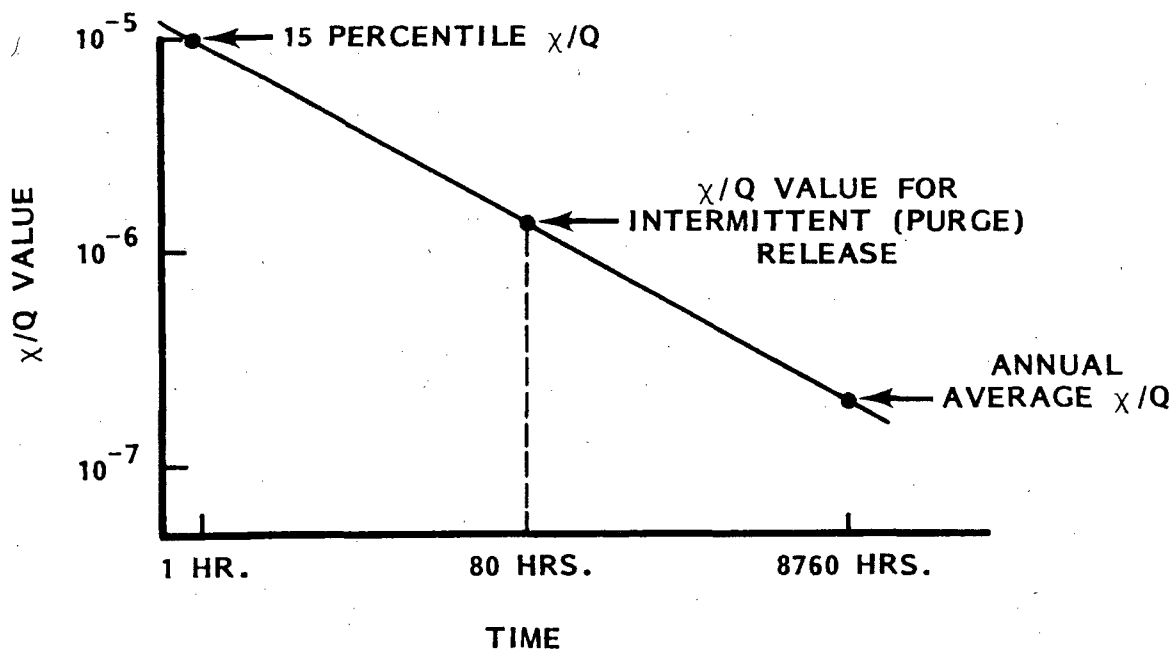


FIGURE 4.8. Subroutine PURGE Calculations

#### 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  $i$ th wind-speed class, inputted by user as  
Card Type 7 (m sec<sup>-1</sup>)

$\sigma_{y_j}(x)$  = horizontal standard deviation of material in the plume  
for stability category  $j$  at distance  $x$ , value computed in Sub-  
routine 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<sup>2</sup>)

$x$  = 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:

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

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

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

where  $X/Q$ ,  $U_i$ ,  $\sigma_{zj}(x)$ ,  $h_e$ ,  $C$ ,  $x$ , 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  $CD_z$  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 SUBROUTINES 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 ADJWIND

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):

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

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:

$$\begin{aligned} E_t &= 1.0 && \text{for } W_o/\bar{u} \leq 1.0 \\ E_t &= 2.58(W_o/\bar{u}) - 1.58 (W_o/\bar{u}) && \text{for } 1.0 < W_o/\bar{u} \leq 1.5 \\ E_t &= 0.3 - 0.06 (W_o/\bar{u}) && \text{for } 1.5 < W_o/\bar{u} \leq 5.0 \\ E_t &= 0.0 && \text{for } W_o/\bar{u} > 5.0 \end{aligned} \tag{14}$$

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

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

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:

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

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:

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



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

$$h_{pr} = 3 \left( \frac{W_0}{u} \right) D \quad (18)$$

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:

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

and

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

where

$$F_m = (W_0 D/2)^2 \quad (21)$$

and

$$S = \frac{g}{T} \frac{\partial \theta}{\partial z} \quad (22)$$

and

$F_m$  = the momentum flux parameter (meters<sup>4</sup>/second<sup>2</sup>)

$S$  = restoring acceleration per unit vertical displacement for adiabatic motion in the atmosphere (seconds<sup>-2</sup>)

$g$  = acceleration of gravity (meters/second<sup>2</sup>)

$T$  = 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  $8.7 \times 10^{-4}$  for E stability,  $1.75 \times 10^{-3}$  for F stability, and  $2.45 \times 10^{-3}$  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,

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

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

where

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

$h_s$  = physical stack height (feet).

For stable conditions,

$$x^* = 2.4 U S^{-1/2} \quad (26)$$

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

1) for  $x < x^*$ ,

$$h_{pr} = 1.6 F^{1/3} u^{-1} x^{2/3} \quad (27)$$

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

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

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

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

with  $S$  as defined for Equation 22.

#### 4.21 SUBROUTINE POLYN

This subroutine calculates values of  $\sigma_y$  and  $\sigma_z$  versus downwind distance, using equations of the form

$$\sigma_z = ax^b + c \quad (30)$$

$$\sigma_y = ax^b \quad (31)$$

where

$\sigma_y, z$  = horizontal crosswind ( $\sigma_y$ ) or vertical ( $\sigma_z$ ) standard deviation of material in the plume due to ambient free-stream turbulence

$\sigma_x$  = downwind distance

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

Both  $\sigma_y$  and  $\sigma_z$  are limited to 1000 meters.

By setting KOPT(10) to 1 on Card Type 1, the  $\sigma_y$  and  $\sigma_z$  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 SUBROUTINE 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.

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

## APPENDIX A

### LISTING OF PROGRAM AND SUBROUTINES





```

1.      PROGRAM XOQDOQ(INPUT,OUTPUT,PUNCH,                                XOQDOQ
2.      1          TAPE5=INPUT,TAPE6=OUTPUT,TAPE7=PUNCH)                XOQDOQ
3.      C*****XOQDOQ
4.      C*****XOQDOQ
5.      C*****XOQDOQ
6.      C*****XOQDOQ
7.      C*****XOQDOQ
8.      C*****XOQDOQ
9.      C*****XOQDOQ
10.     C*****XOQDOQ
11.     C*****XOQDOQ
12.     C*****XOQDOQ
13.     C*****XOQDOQ
14.     C*****XOQDOQ
15.     C *****XOQDOQ
16.     C*****XOQDOQ
17.     C*****XOQDOQ
18.     C*****XOQDOQ
19.     C*****XOQDOQ
20.     COMMON /TITLE/ TITLM                                             VERS2
21.     COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)                    BLANK
22.     1      ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)                BLANK
23.     2      ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)            BLANK
24.     3      ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)                BLANK
25.     4      ,BDY(16),DMX(16),XMX(16),COMP(16),FORD(14)                BLANK
26.     5      ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)            BLANK
27.     6      ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)        BLANK
28.     7      ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE                    BLANK
29.     8      ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL          BLANK
30.     9      ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)      BLANK
31.     1     ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK                    BLANK
32.     DIMENSION TITLM(20),UMIN(14)                                     VERS2
33.     1      ,TOT(7),CALM(7),HEATR(5),SLEV(5),CRSEC(5)                XOQDOQ
34.     2      ,HBLDG(5),HSTACK(5),DIAMTR(5),EXIT(5)                    XOQDOQ
35.     3      ,NPURGE(5),NPRGHR(5),GRNDVT(16),VERSUM(16,7),GRNDHR(14)    XOQDOQ
36.     4      ,HORSUM(14,7),TOTSUM(7),SCLASS(7)                         XOQDOQ
37.     DATA SCLASS/"A","B","C","D","E","F","G"/                        XOQDOQ
38.     1 FORMAT(80I1)                                                    XOQDOQ
39.     2 FORMAT(16I5)                                                    XOQDOQ
40.     3 FORMAT(8F10.0)                                                  XOQDOQ
41.     4 FORMAT(16F5.0)                                                  XOQDOQ
42.     5 FORMAT(20A4)                                                    XOQDOQ
43.     124 FORMAT(8(I5,F5.0))                                            XOQDOQ
44.     C = 0.5                                                            XOQDOQ
45.     C**** C IS THE BUILDING WAKE CONSTANT                            XOQDOQ
46.     NDIR=16                                                            XOQDOQ
47.     C**** NDIR = THE NUMBER OF DIRECTIONS.                            XOQDOQ
48.     C*****XOQDOQ
49.     C*****XOQDOQ
50.     C*****XOQDOQ
51.     C*****XOQDOQ
52.     CALL INTCOM                                                        XOQDOQ
53.     41 READ(5,1) KOPT                                                  XOQDOQ
54.     IF(EOF(5).NE.0) GO TO 40                                          XOQDOQ
55.     CALL DATE(TODAY)                                                  VERS2
56.     CALL TIME(CLOCK)                                                  VERS2
57.     PRINT 960,TODAY,CLOCK                                              VERS2
58.     960 FORMAT(1H1,"USNRC COMPUTER CODE-XOQDOQ,VERSION 2.0",10X,"RUN DATE VERS2
59.     * ",A10,10X,"RUN TIME",A10/)                                     VERS2
60.     PRINT 500                                                         XOQDOQ

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61.	500 FORMAT(1H,"PRINTOUT OF INPUT CARDS")	VERS2
62.	PRINT 501, KOPT	XOQDOQ
63.	501 FORMAT("0 1 ",16(5I1,1X))	XOQDOQ
64.	C**** KOPT IS THE OPTION ARRAY. A VALUE OF 1 IS YES, A 0 MEANS BYPASS.	XOQDOQ
65.	C KOPT(1) TO DISTRIBUTE INPUTTED CALMS AS THE FIRST	VERS2
66.	C WIND SPEED CLASS	VERS2
67.	C KOPT(2) TO INPUT DATA AS PERCENT FREQUENCY	VERS2
68.	C KOPT(3) TO USE SECTOR SPREAD IN INTERMITTENT RELEASE.	XOQDOQ
69.	C KOPT(4) TO PLOT X/Q VS FREQUENCY FOR INTERMITTENT RELEASES.	XOQDOQ
70.	C KOPT(5) TO USE CUBIC SPLINE IN LIEU OF LEAST SQUARES FUNCTION	XOQDOQ
71.	C FOR FITTING INTERMITTENT RELEASE DISTRIBUTION.	XOQDOQ
72.	C KOPT(6) TO PUNCH RADIAL SEGMENT X/Q + D/Q VALUES	VERS2
73.	C KOPT(7) TO PUNCH POINT OF INTEREST X/Q + D/Q VALUES	VERS2
74.	C KOPT(8) TO CORRECT OUTPUT USING STANDARD OPEN TERRAIN FACTORS	VERS2
75.	C KOPT(9) TO CORRECT OUTPUT USING SITE-SPECIFIC FACTORS	VERS2
76.	C KOPT(10) TO USE DESERT SIGMA'S	VERS2
77.	C KOPT(11) TO INPUT DATA WITH 30 DEGREE SECTORS FOR N,E,S,W	VERS2
78.	C AND 20 SECTORS FOR ALL OTHER DIRECTIONS	VERS2
79.	READ 5,TITLM	XOQDOQ
80.	C**** TITLM IS THE MAIN TITLE FOR THE RUN	XOQDOQ
81.	PRINT 502, TITLM	XOQDOQ
82.	502 FORMAT(" 2 ",20A4)	XOQDOQ
83.	READ 2,NVEL,NSTA,NDIS,INC,NPTYPE,NEXIT,NCOR	VERS2
84.	C**** NVEL IS THE NUMBER OF VELOCITY CATEGORIES. (MAXIMUM OF 14)	XOQDOQ
85.	C NSTA IS THE NUMBER OF STABILITY CATEGORIES. (MAXIMUM OF 7)	XOQDOQ
86.	C NDIS IS THE NUMBER OF DISTANCES OF TERRAIN DATA. (MAX OF 10)	XOQDOQ
87.	C IF NDIS=0,DO NOT INPUT DIST OR HT ARRAYS.	XOQDOQ
88.	C INC IS THE PERCENTILE USED FOR THE ONE-HOUR PURGE VALUE.	XOQDOQ
89.	C NPTYPE IS THE NUMBER OF RECEPTOR TYPES. (MAXIMUM OF 5).	XOQDOQ
90.	C IF NPTYPE=0,DO NOT INPUT NPOINT,TITLPT,KDIR,OR PTDIST.	XOQDOQ
91.	C NEXIT IS THE NUMBER OF RELEASE EXIT POINTS. (MAXIMUM OF 5).	XOQDOQ
92.	C NCOR IS THE NUMBER OF DISTANCES OF SITE SPECIFIC CORRECTIONS	XOQDOQ
93.	C (MAX OF 10). IF NCOR=0,DO NOT INPUT VRDIST OR VRCCR ARRAY	XOQDOQ
94.	PRINT 503,NVEL,NSTA,NDIS,INC,NPTYPE,NEXIT,NCOR	VERS2
95.	503 FORMAT(" 3 ",16I5)	XOQDOQ
96.	READ 4, PLEV, (DECAYS(I),I=1,3), PLGRAD	XOQDOQ
97.	C**** PLEV IS THE HEIGHT (METERS) OF THE MEASURED WIND DATA.	XOQDOQ
98.	C DECAYS ARE THE HALF-LIVES (DAYS) CONSIDERED. IF DECAYS>100, NO	XOQDOQ
99.	C DECAY WILL OCCUR. DEPLETION WILL OCCUR BY MAKING THE	XOQDOQ
100.	C HALF/LIFE A NEGATIVE. (MAXIMUM OF 3)	XOQDOQ
101.	C PLGRAD IS PLANT GRADE ELEVATION (FEET ABOVE SEA LEVEL)\	XOQDOQ
102.	C IF PLGRAD=0.0, DIST AND HT MUST BOTH BE INPUTTED	XOQDOQ
103.	C IN METERS\	XOQDOQ
104.	C IF PLGRAD>0.0, INPUT DIST IN MILES AND HT IN FEET	XOQDOQ
105.	C ABOVE PLANT GRADE LEVEL\	XOQDOQ
106.	C IF PLGRAD>0.0, INPUT DIST IN MILES AND HT IN FEET	XOQDOQ
107.	C ABOVE SEA LEVEL.	XOQDOQ
108.	PRINT 504, PLEV, (DECAYS(I),I=1,3), PLGRAD	XOQDOQ
109.	504 FORMAT(" 4 ",16F7.2)	XOQDOQ
110.	READ 4,CALM	XOQDOQ
111.	C**** CALM CONTINS THE FREQUENCIES OF CALM FOR EACH STABILITY CLASS.	XOQDOQ
112.	PRINT 505, CALM	XOQDOQ
113.	505 FORMAT(" 5 ",16F7.3)	XOQDOQ
114.	IST=1	XOQDOQ
115.	IF(KOPT(1).EQ.1) IST=2	XOQDOQ
116.	NCALM=1	XOQDOQ
117.	DO 63 J=1,NSTA	XOQDOQ
118.	IF(CALM(J).GE.0.0001) GO TO 64	XOQDOQ
119.	63 CONTINUE	XOQDOQ
120.	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.	VRCCR(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,VRCCR 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, (VRCCR(K,I),K=1,NDIR)	XOQDOQ
152.	C**** VRDIST CONTAINS THE DISTANCES CORRESPONDING TO THE CORRECTION	XOQDOQ
153.	C FACTORS OF ARRAY VRCCR(METERS),K=1 IS FOR SOUTH, K=2 IS FOR SEE	VERS2
154.	C VRCCR 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, (VRCCR(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

```

181.      PLGRAD=PLGRAD*0.3047                                XOQD0Q
182.      DO 72  I=1,NDIS                                      XOQD0Q
183.      DO 72  K=1,NDIR                                      XOQD0Q
184.      72 HT(K,I)=HT(K,I)-PLGRAD                          XOQD0Q
185.      73 IF(NDIS.EQ.0)  NDIS=1                            XOQD0Q
186.      IF(NPTYPE.EQ.0)  PRINT 5121                         XOQD0Q
187.      5121 FORMAT(" NO POINTS OF INTEREST DATA INPUTTED.") XOQD0Q
188.      IF(NPTYPE.EQ.0)  GO TO 74                            XOQD0Q
189.      READ 2,      (NPOINT(I), I=1,NPTYPE)                XOQD0Q
190.      C****      NPOINT IS THE NUMBER OF POINTS OF INTEREST FOR A PARTICULAR XOQD0Q
191.      C      RECEPTOR TYPE (NPTYPE). (MAXIMUM OF 30)     XOQD0Q
192.      PRINT 512,      (NPOINT(I), I=1,NPTYPE)              XOQD0Q
193.      512 FORMAT("      12      ",16I5)                    XOQD0Q
194.      DO 1234  I=1,NPTYPE                                    XOQD0Q
195.      READ 5,      (TITLPT(I,J), J=1,4)                    XOQD0Q
196.      C****      TITLPT IS THE NAME OF THE RECEPTOR TYPE (MAX OF 16 SPACES) XOQD0Q
197.      PRINT 513,      (TITLPT(I,J), J=1,4)                 XOQD0Q
198.      513 FORMAT("      13      ",20A4)                    XOQD0Q
199.      NP = NPOINT(I)                                         XOQD0Q
200.      READ 124,(KDIR(I,N),PTDIST(I,N), N=1,NP)             XOQD0Q
201.      C****      KDIR IS THE DIRECTION OF INTEREST, 1=SOUTH,2=SSW,...,16=SSE. XOQD0Q
202.      C      PTDIST IS THE DISTANCE, IN METERS, TO THE POINT OF INTEREST     VERS2
203.      1234 PRINT 514,      (KDIR(I,N),PTDIST(I,N), N=1,NP) XOQD0Q
204.      514 FORMAT("      14      ",8(I3,F7.1)/)             VERS2
205.      74 DO 411  I=1,NEXIT                                  XOQD0Q
206.      READ 5,      (TITLE(I,J), J=1,20)                    XOQD0Q
207.      C****      TITLE IS THE OVERALL TITLE FOR THE RESPECTIVE RELEASE POINT XOQD0Q
208.      PRINT 515,      (TITLE(I,J), J=1,20)                 XOQD0Q
209.      515 FORMAT("      15      ",20A4)                    XOQD0Q
210.      READ 4,      EXIT(I), DIAMTR(I), HSTACK(I), HBLDG(I), CRSEC(I), XOQD0Q
211.      1      SLEV(I), HEATR(I)                               XOQD0Q
212.      C****      EXIT  IS THE VENT AVERAGE VELOCITY (METERS/SECOND)          XOQD0Q
213.      C      DIAMTR IS THE VENT INSIDE DIAMETER (METERS)      XOQD0Q
214.      C      HSTACK IS THE HEIGHT OF THE VENT RELEASE POINT (METERS)         XOQD0Q
215.      C      (IF VENT IS A STACK,I.E. ELEVATED RELEASE 100 PERCENT            XOQD0Q
216.      C      OF THE TIME, INPUT HSTACK AS THE NEGATIVE OF THE HEIGHT.         XOQD0Q
217.      C      HBLDG IS THE HEIGHT OF THE VENT'S BUILDING (METERS)             XOQD0Q
218.      C      CRSEC IS THE MINIMUM CROSS-SECTIONAL AREA USED FOR THE VENT'S   XOQD0Q
219.      C      BUILDING (SQUARE METERS)                                         XOQD0Q
220.      C      SLEV IS THE WIND HEIGHT USED FOR THE VENT ELEVATED              XOQD0Q
221.      C      RELEASE (METERS)                                                 XOQD0Q
222.      C      HEATR IS THE VENT HEAT EMISSION RATE (CAL/SEC) (GENERALLY = 0)  XOQD0Q
223.      PRINT 516,      EXIT(I),DIAMTR(I),HSTACK(I),HBLDG(I) XOQD0Q
224.      1      , CRSEC(I),SLEV(I),HEATR(I)                                XOQD0Q
225.      516 FORMAT("      16      ",2F7.3,4F7.1,F6.2)        XOQD0Q
226.      READ 123,      RLSID(I), IPURGE(I), NPURGE(I), NPRGHR(I) XOQD0Q
227.      123 FORMAT(A1,I4,2I5)                                             XOQD0Q
228.      C****      RLSID IS A ONE LETTER IDENTIFICATION FOR THE RELEASE POINT  XOQD0Q
229.      C      IPURGE = 1,2, OR 3, IF THE VENT IS A PURGE RELEASE POINT, CORRE XOQD0Q
230.      C      TO DECAY 1,2, OR 3 USED AS BASE FOR PURGE CALCULATIONS          XOQD0Q
231.      C      (USUALLY NO DECAY/NO DEplete X/Q)\ = 0, IF NO PURGES            XOQD0Q
232.      C      NPURGE IS THE NUMBER OF PURGES PER DATA SET PERIOD              XOQD0Q
233.      C      NPRGHR IS THE NUMBER OF HOURS PER PURGE RELEASE                 XOQD0Q
234.      411 PRINT 517,      RLSID(I),IPURGE(I),NPURGE(I),NPRGHR(I) XOQD0Q
235.      517 FORMAT("      17      ",A1,I4,2I5)                 XOQD0Q
236.      C*****                                                    XOQD0Q
237.      C*****                                                    XOQD0Q
238.      C*****                                                    XOQD0Q
239.      PRINT 960,TODAY,CLOCK                                             VERS2
240.      PRINT 25,      TITLM                                             XOQD0Q

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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))*0.5	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.		XMV(I)=0.	XOQDOQ
282.		DMV(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("JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION	XOQDOQ
297.	1	ATMOSPHERIC STABILITY CLASS ", A1/	XOQDOQ
298.	2	"0UMAX (M/5)",16(3X,A4), " TOTAL")	XOQDOQ
299.		DO 1012 I=1,NVEL	XOQDOQ
300.		DO 1002 K=1,16	XOQDOQ

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 ", 15)	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("WIND 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("OVERALL 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("OVERALL 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("DISTANCES 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("DISTANCES 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

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

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 RLSDMOD(W,U,IVENT,ET,LSTACK)	ANNUAL



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

541.	B=H/SZ	ANNUAL
542.	X SMA(K,M)=X SMA(K,M)+H*FREQ(K,I,J)*FS(K)	ANNUAL
543.	IF(DECAY.GE.0.) GO TO 850	ANNUAL
544.	CALL DEPLET (DIS,J,H,ZH)	ANNUAL
545.	CALL ADJCOR (CR,I8S(K,I,J),I6S(K,I,J),I3S(K,I,J),H,K,I,J,ADD)	ANNUAL
546.	850 EXPO = ZH + ADD	ANNUAL
547.	IF(B.LT.15.) GO TO 90	ANNUAL
548.	IF(IVENT.EQ.0) GO TO 92	ANNUAL
549.	EXPO=0.	ANNUAL
550.	GO TO 85	ANNUAL
551.	92 EVX = 0.0	ANNUAL
552.	GO TO 852	ANNUAL
553.	90 EXPO = EXP(-.5*B*B) * DCY * EXPO	ANNUAL
554.	IF(IVENT.NE.0) GO TO 85	ANNUAL
555.	EVX=FAC*EXPO/(DIS*SZ*U)	ANNUAL
556.	EVXCL=EXPO/U*3.14159265*SY*SZ	ANNUAL
557.	IF(EVX.GT.EVXCL) EVX=EVXCL	ANNUAL
558.	852 XOQ=XOQ1 * EXPOG	ANNUAL
559.	TEMP = FREQ(K,I,J) * (ET*XOQ + (1.-ET)*EVX)	ANNUAL
560.	GO TO 27	ANNUAL
561.	85 TEMP = FREQ(K,I,J) * XOQ1* EXPO	ANNUAL
562.	27 XALL(K,M)=XALL(K,M)+TEMP	ANNUAL
563.	30 CONTINUE	ANNUAL
564.	IF(KOPT(8).EQ.0) GO TO 301	VERS2
565.	DO 300 M=1,22	ANNUAL
566.	DIS = R(M) * 1609.347219	ANNUAL
567.	RECIRC = 1.0000	ANNUAL
568.	CALL OPENTR(DIS,RECIRC)	ANNUAL
569.	DO 300 K=1,NDIR	ANNUAL
570.	300 XALL(K,M) = XALL(K,M) * RECIRC	ANNUAL
571.	301 IF(KOPT(9).EQ.0) GO TO 303	VERS2
572.	DO 302 M=1,22	ANNUAL
573.	DIS = R(M) * 1609.347219	ANNUAL
574.	DO 302 K=1,NDIR	ANNUAL
575.	CALL CORVAR(K,DIS,RECIRC)	ANNUAL
576.	302 XALL(K,M)=XALL(K,M)*RECIRC	ANNUAL
577.	303 CONTINUE	ANNUAL
578.	IF(KOPT(11).EQ.0) GO TO 1111	VERS2
579.	DO 1 K=1,16,4	ANNUAL
580.	DO 1 M=1,22	ANNUAL
581.	1 XALL(K,M)=.667*XALL(K,M)	ANNUAL
582.	1111 CONTINUE	ANNUAL
583.	NBR=2	ANNUAL
584.	MS=2	ANNUAL
585.	DO 31 MM=1,10	ANNUAL
586.	MF=MS+NBR	ANNUAL
587.	SEGD=0.	ANNUAL
588.	DO 10 K=1,NDIR	ANNUAL
589.	XQS(K,MM)=0.	ANNUAL
590.	DO 10 M=MS,MF	ANNUAL
591.	IF(K.EQ.1) SEGD=SEGD+R(M)	ANNUAL
592.	XQS(K,MM)=XQS(K,MM)+R(M)*XALL(K,M)	ANNUAL
593.	IF(HS.GT.1.) HA(K,MM)=HA(K,MM)+R(M)*X SMA(K,M)	ANNUAL
594.	10 CONTINUE	ANNUAL
595.	DO 2 K=1,NDIR	ANNUAL
596.	XQS(K,MM)=XQS(K,MM)/SEGD	ANNUAL
597.	2 HA(K,MM)=HA(K,MM)/SEGD	ANNUAL
598.	MS=MF	ANNUAL
599.	31 CONTINUE	ANNUAL
600.	CALL DATE(TODAY)	VERS2

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

661.	102	FORMAT(" ",A4,1P10E12.3)	ANNUAL
662.		IF(W.LE.0.0.OR.ITHRU.GT.1) GO TO 62	VERS2
663.		PRINT 40	ANNUAL
664.	40	FORMAT("0AVERAGE EFFECTIVE STACK HEIGHT IN METERS FOR EACH SEGMENT	ANNUAL
665.		X"/)	ANNUAL
666.		PRINT 200	ANNUAL
667.		DO 63 K=1,NDIR	ANNUAL
668.	63	PRINT 102, COMP(K), (HA(K,M),M=1,10)	ANNUAL
669.	62	CONTINUE	ANNUAL
670.		IF(LSTACK.EQ.0 .OR. ITHRU.NE.1) GO TO 2000	ANNUAL
671.	C		VERS2
672.	C	**** FOR ELEVATED RELEASE COMPUTE MAXIMUM X/Q- OUTPUT IN PTSOUT.	VERS2
673.	C		VERS2
674.		DO 601 K=1,16	ANNUAL
675.		XMAX=0.0	ANNUAL
676.		DO 601 M=1,22	ANNUAL
677.		IF(XMAX.GT.XALL(K,M)) GO TO 601	ANNUAL
678.		XMAX=XALL(K,M)	ANNUAL
679.		MAXDIS(K)=M	ANNUAL
680.	601	CONTINUE	ANNUAL
681.		NPTYPE=NPTYPE+1	ANNUAL
682.		NPOINT(NPTYPE)=16	ANNUAL
683.		DO 602 K=1,16	ANNUAL
684.		KDIR(NPTYPE,K)=K	ANNUAL
685.	602	PTDIST(NPTYPE,K)=R(MAXDIS(K))*1609.347219	VERS2
686.	2000	CONTINUE	ANNUAL
687.		FC1=FAC	ANNUAL
688.	C		VERS2
689.	C	*****	VERS2
690.	C	LOOP FOR EACH POINT OF INTEREST	VERS2
691.	C	*****	VERS2
692.	C		VERS2
693.		IF(NPTYPE.EQ.0) GO TO 3000	VERS2
694.		DO 23 ITYPE=1,NPTYPE	ANNUAL
695.		DD=1.0	VERS2
696.		AA=1.0	VERS2
697.		NP = NPOINT(ITYPE)	ANNUAL
698.		DO 23 IPOINT=1,NP	ANNUAL
699.		EXPO=1.	ANNUAL
700.		H = 0.0	ANNUAL
701.		ZG=1.	ANNUAL
702.		ZH=1.	ANNUAL
703.		DCYG=1.00	ANNUAL
704.		DCY =1.00	ANNUAL
705.		K = KDIR(ITYPE,IPOINT)	ANNUAL
706.		IF(KOPT(11).EQ.0) GO TO 2222	VERS2
707.		FAC=FC1	ANNUAL
708.		DO 4321 NNMM=1,16,4	ANNUAL
709.		IF(NNMM.EQ.K) FAC=.667*FC1	ANNUAL
710.	4321	CONTINUE	ANNUAL
711.	2222	CONTINUE	ANNUAL
712.		X = 0.0	ANNUAL
713.		DIS=PTDIST(ITYPE,IPOINT)	VERS2
714.		DO 41 J=1,NSTA	ANNUAL
715.		CALL POLYN(J,DIS,SZ,LDSRT)	VERS2
716.		JA=J+7	ANNUAL
717.		CALL POLYN(JA,DIS,SY,LDSRT)	VERS2
718.		DO 41 I=1,NVEL	ANNUAL
719.		I80=0	ANNUAL
720.		I60=0	ANNUAL

721.	I30=0	ANNUAL
722.	U=UAVEEL(I,J)	ANNUAL
723.	CALL RLSDMOD(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-CONTINUOUS 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

781.	766	CONTINUE	VERS2
782.		A=AA*A	VERS2
783.	8	DENCL=DTERM+(C*A)	ANNUAL
784.		DENCL2=3.0*DTERM	ANNUAL
785.		IF(DENCL2.LT.DENCL) DENCL=DENCL2	ANNUAL
786.		GRNDCL=.01/(DENCL*U)	ANNUAL
787.	C		VERS2
788.	C	*****	VERS2
789.	C	**** PROGRAM HAS THE ABILITY TO COMPARE CROSSWIND AND CENTERLINE VALUE	VERS2
790.	C	BUT ONLY FOR CONTINUOUS RELEASES	VERS2
791.	C		VERS2
792.	C	HOWEVER, IF THIS FEATURE IS REQUIRED ACTIVATE THE FOLLOWING	VERS2
793.	C		VERS2
794.	C	IF(XQ*P.GE.GRNDCL) XQ*P=GRNDCL	VERS2
795.	C		VERS2
796.	C	*****	VERS2
797.		IF(DECAY.LT.0.) CALL DEPLET(DIS,J,0.,ZG)	ANNUAL
798.		IF(HFL.GT.100.) GO TO 22	ANNUAL
799.		TT = DIS/(86400.*U)	ANNUAL
800.		DCYG=EXP(-.693*TT/HFL)	ANNUAL
801.	22	EXPO = DCYG * ZG	ANNUAL
802.		IF(IVENT.NE.0) GO TO 21	ANNUAL
803.		X=X+(FREQ(K,I,J)*(XQ+ET*EXPO*XQ*P))	ANNUAL
804.		GO TO 42	ANNUAL
805.	21	X=X+(FREQ(K,I,J)*EXPO*XQ*P)	ANNUAL
806.	42	CONTINUE	VERS2
807.	41	CONTINUE	ANNUAL
808.		RECIRC = 1.0000	ANNUAL
809.		IF(KOPT(8).EQ.1) CALL OPENTR(DIS,RECIRC)	VERS2
810.		IF(KOPT(9).EQ.1) CALL CORVAR(K,DIS,RECIRC)	VERS2
811.		SAVEQS(ITYPE,IPOINT,ITHRU) = X * RECIRC	ANNUAL
812.	23	CONTINUE	ANNUAL
813.	3000	CONTINUE	ANNUAL
814.		RETURN	ANNUAL
815.		END	ANNUAL
816.		SUBROUTINE DEPOS(GRNDVT,JPURGE)	VERS2
817.		COMMON /TITLE/ TITLM	VERS2
818.		COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)	BLANK
819.	1	,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)	BLANK
820.	2	,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)	BLANK
821.	3	,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)	BLANK
822.	4	,BDY(16),DMX(16),XMX(16),COMP(16),FORD(14)	BLANK
823.	5	,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)	BLANK
824.	6	,W,DIA,HS,WINDHT,D,A,Q,PLEV,COR(7),XPO(1764)	BLANK
825.	7	,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE	BLANK
826.	8	,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL	BLANK
827.	9	,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)	BLANK
828.	1	,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK	BLANK
829.		DIMENSION Y(16,22),X(22),DEPSEG(16,10),SAVE(10),GRNDVT(16)	DEPOS
830.		DIMENSION TITLM(20)	VERS2
831.		DATA X/.25,.5,.75,1.,1.5,2.,2.5,3.,3.5,4.,4.5,5.,7.5,10.,15.,20.,	DEPOS
832.	1	25.,30.,35.,40.,45.,50./	DEPOS
833.		DO 200 K=1,NDIR	DEPOS
834.		DO 200 M=1,22	DEPOS
835.		Y(K,M) = 0.0	DEPOS
836.	200	CONTINUE	DEPOS
837.		DO 1000 K=1,NDIR	DEPOS
838.		DO 1000 I=1,NVEL	DEPOS
839.		DO 1000 J=1,NSTA	DEPOS
840.		I80=0	DEPOS

841.	I60=0	DEPOS
842.	I30=0	DEPOS
843.	UBAR=UAVEEL(I,J)	DEPOS
844.	CALL RLSMOD(W,UBAR,IVENT,ET,LSTACK)	DEPOS
845.	IF(IVENT) 111,120,110	DEPOS
846.	111 CONTINUE	DEPOS
847.	DO 1111 M=1,22	DEPOS
848.	DIS = X(M) * 1609.347219	DEPOS
849.	CALL DEPOST (DIS,J,0.0,Z)	DEPOS
850.	ADJY = (Z * FREQ(K,I,J)) / (39.2699 * DIS)	DEPOS
851.	Y(K,M) = Y(K,M) + ADJY	DEPOS
852.	1111 CONTINUE	DEPOS
853.	GO TO 1000	DEPOS
854.	110 CONTINUE	DEPOS
855.	DO 112 M=1,22	DEPOS
856.	DIS = X(M) * 1609.347219	DEPOS
857.	CALL HEIGHT (K,DIS,HGT)	DEPOS
858.	CALL RISE (DH, DIS,UBAR,J,0.,0.,HS,W,DIA)	DEPOS
859.	H = HS + DH - HGT	DEPOS
860.	CALL ADJCOR (CRC,I80,I60,I30,H,K,I,J,ADD)	DEPOS
861.	CALL DEPOST (DIS,J,H,Z)	DEPOS
862.	ADJY = (Z * CRC * FREQ(K,I,J)) / (39.2699 * DIS)	DEPOS
863.	Y(K,M) = Y(K,M) + ADJY	DEPOS
864.	112 CONTINUE	DEPOS
865.	GO TO 1000	DEPOS
866.	120 CONTINUE	DEPOS
867.	122 ETELE = 1.0 - ET	DEPOS
868.	DO 113 M=1,22	DEPOS
869.	DIS = X(M) * 1609.347219	DEPOS
870.	CALL HEIGHT (K,DIS,HGT)	DEPOS
871.	CALL RISE (DH, DIS,UBAR,J,0.,0.,HS,W,DIA)	DEPOS
872.	H = HS + DH - HGT	DEPOS
873.	CALL DEPOST (DIS,J,H,F)	DEPOS
874.	CALL ADJCOR (CRC,I80,I60,I30,H,K,I,J,ADD)	DEPOS
875.	YE = F * CRC * ETELE	DEPOS
876.	CALL DEPOST (DIS,J,0.0,B)	DEPOS
877.	YG = B * ET	DEPOS
878.	Z = YG + YE	DEPOS
879.	ADJY = (Z * FREQ(K,I,J)) / (39.2699 * DIS)	DEPOS
880.	Y(K,M) = Y(K,M) + ADJY	DEPOS
881.	113 CONTINUE	DEPOS
882.	1000 CONTINUE	DEPOS
883.	IF(KOPT(8).EQ.0) GO TO 301	VERS2
884.	DO 300 M=1,22	DEPOS
885.	DIS = X(M) * 1609.347219	DEPOS
886.	RECIRC = 1.0000	DEPOS
887.	CALL OPENTR(DIS,RECIRC)	DEPOS
888.	DO 300 K=1,NDIR	DEPOS
889.	300 Y(K,M) = Y(K,M) * RECIRC	DEPOS
890.	301 IF(KOPT(9).EQ.0) GO TO 303	VERS2
891.	DO 302 M=1,22	DEPOS
892.	DIS=X(M)*1609.347219	DEPOS
893.	DO 302 K=1,NDIR	DEPOS
894.	CALL CORVAR(K,DIS,RECIRC)	DEPOS
895.	302 Y(K,M)=Y(K,M)*RECIRC	DEPOS
896.	303 CONTINUE	DEPOS
897.	CALL DATE(TODAY)	VERS2
898.	CALL TIME(CLOCK)	VERS2
899.	PRINT 950, TODAY,CLOCK	VERS2
900.	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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961.	2221	FORMAT (A4, T6, 1P7E10.3/1P3E10.3)	DEPOS
962.	700	CONTINUE	DEPOS
963.	701	CALL PRNTIN	DEPOS
964.		RETURN	DEPOS
965.		END	DEPOS
966.		SUBROUTINE PTDEPS	PTDEPS
967.		COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)	BLANK
968.	1	,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)	BLANK
969.	2	,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)	BLANK
970.	3	,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)	BLANK
971.	4	,BDY(16),DMX(16),XMX(16),COMP(16),FORD(14)	BLANK
972.	5	,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)	BLANK
973.	6	,W,DIA,HS,WINDHT,D,A,Q,PLEV,COR(7),XPO(1764)	BLANK
974.	7	,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE	BLANK
975.	8	,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL	BLANK
976.	9	,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)	BLANK
977.	1	,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK	BLANK
978.		DIMENSION X(22)	PTDEPS
979.		DATA X/.25,.5,.75,1.,1.5,2.,2.5,3.,3.5,4.,4.5,5.,7.5,10.,15.,	PTDEPS
980.	1	20.,25.,30.,35.,40.,45.,50./	PTDEPS
981.		IF(NPTYPE.EQ.0) GO TO 13	VERS2
982.		DO 12 ITYPE=1,NPTYPE	PTDEPS
983.		NP = NPOINT(ITYPE)	PTDEPS
984.		DO 12 IPOINT=1,NP	PTDEPS
985.		K = KDIR(ITYPE,IPOINT)	PTDEPS
986.		DIS=PTDIST(ITYPE,IPOINT)	VERS2
987.		Y = 0.0	PTDEPS
988.		DO 1000 I=1,NVEL	PTDEPS
989.		DO 1000 J=1,NSTA	PTDEPS
990.		I80=0	PTDEPS
991.		I60=0	PTDEPS
992.		I30=0	PTDEPS
993.		UBAR=UAVEEL(I,J)	PTDEPS
994.		CALL RLSSMOD(W,UBAR,IVENT,ET,LSTACK)	PTDEPS
995.		IF(IVENT) 111,122,110	PTDEPS
996.	111	CALL DEPOST (DIS,J,0.0,Z)	PTDEPS
997.		ADJY = (Z * FREQ(K,I,J)) / (39.2699 * DIS)	PTDEPS
998.		Y = Y + ADJY	PTDEPS
999.		GO TO 1000	PTDEPS
1000.	110	CONTINUE	VERS2
1001.		DO 112 M=1,22	PTDEPS
1002.		SETDIS = X(M) * 1609.347219	PTDEPS
1003.		IF(SETDIS.GE.DIS) GO TO 1121	PTDEPS
1004.		CALL HEIGHT (K,SETDIS,HGT)	PTDEPS
1005.		CALL RISE (DH,SETDIS,UBAR,J,0.,0.,HS,W,DIA)	PTDEPS
1006.		H = HS + DH - HGT	PTDEPS
1007.		CALL ADJCOR (CRC,I80,I60,I30,H,K,I,J,ADD)	PTDEPS
1008.	112	CONTINUE	VERS2
1009.	1121	CALL HEIGHT (K,DIS,HGT)	PTDEPS
1010.		CALL RISE (DH, DIS,UBAR,J,0.,0.,HS,W,DIA)	PTDEPS
1011.		H = HS + DH - HGT	PTDEPS
1012.		CALL DEPOST (DIS,J,H,Z)	PTDEPS
1013.		CALL ADJCOR (CRC,I80,I60,I30,H,K,I,J,ADD)	PTDEPS
1014.		ADJY = (Z * CRC * FREQ(K,I,J)) / (39.2699 * DIS)	PTDEPS
1015.		Y = Y + ADJY	PTDEPS
1016.		GO TO 1000	PTDEPS
1017.	122	ETELE = 1.0 - ET	PTDEPS
1018.		DO 113 M=1,22	PTDEPS
1019.		SETDIS = X(M) * 1609.347219	PTDEPS
1020.		IF(SETDIS.GE.DIS) GO TO 1122	PTDEPS

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

1081.	END	PURGE
1082.	SUBROUTINE MIXD15(INC)	MIXD15
1083.	COMMON /TITLE/ TITLM	VERS2
1084.	COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)	BLANK
1085.	1 ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)	BLANK
1086.	2 ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)	BLANK
1087.	3 ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)	BLANK
1088.	4 ,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)	BLANK
1089.	5 ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)	BLANK
1090.	6 ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)	BLANK
1091.	7 ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE	BLANK
1092.	8 ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL	BLANK
1093.	9 ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)	BLANK
1094.	1 ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK	BLANK
1095.	COMMON /SIGMA /SIG	MIXD15
1096.	DIMENSION XP(49),XX(100),YY(100),FREQ15(14,7),YPF(100)	MIXD15
1097.	DIMENSION XXXS(100),YYYS(100),XQ15S(100),FQ15S(100)	MIXD15
1098.	DATA XP/0.02507,0.05015,0.07527,0.10043,0.12566,0.15097,0.17637,	MIXD15
1099.	1 0.20189,0.22754,0.25335,0.27932,0.30548,0.33185,0.35846,	MIXD15
1100.	2 0.38532,0.41246,0.43991,0.46770,0.49585,0.52440,0.55338,	MIXD15
1101.	3 0.58284,0.61281,0.64335,0.67449,0.70630,0.73885,0.77219,	MIXD15
1102.	4 0.80642,0.84162,0.87790,0.91537,0.95416,0.99446,1.03643,	MIXD15
1103.	5 1.08032,1.12639,1.17499,1.22653,1.28155,1.34076,1.40507,	MIXD15
1104.	6 1.47579,1.55477,1.64485,1.75069,1.88079,2.05375,2.32635/	MIXD15
1105.	DO 9 ITYPE=1,NPTYPE	MIXD15
1106.	NP=NPOINT(ITYPE)	MIXD15
1107.	DO 9 IPOINT=1,NP	MIXD15
1108.	K=KDIR(ITYPE,IPOINT)	MIXD15
1109.	DIS=PTDIST(ITYPE,IPOINT)	VERS2
1110.	AMILES=DIS/1609.347219	VERS2
1111.	CALL DATE(TODAY)	VERS2
1112.	CALL TIME(CLOCK)	VERS2
1113.	PRINT 960,TODAY,CLOCK	VERS2
1114.	960 FORMAT(1H1,"USNRC COMPUTER CODE-XOQDOQ,VERSION 2.0",10X,"RUN DATE	VERS2
1115.	* ",A10,10X,"RUN TIME",A10)	VERS2
1116.	PRINT 824,TITLM	VERS2
1117.	824 FORMAT(1H0,20A4/)	VERS2
1118.	PRINT 99	MIXD15
1119.	99 FORMAT(" SHORT TERM X/Q CALCULATION- MIXED MODE RELEASE")	VERS2
1120.	IF(KOPT(03).EQ.1) PRINT 97	MIXD15
1121.	97 FORMAT(" SECTOR SPREAD VALUE CALCULATED")	MIXD15
1122.	PRINT 96,(TITLE(IEX,J),J=1,20),RLSID(IEX),(TITLPT(ITYPE,J),J=1,4),	MIXD15
1123.	1 COMP(K),AMILES,PTDIST(ITYPE,IPOINT)	VERS2
1124.	96 FORMAT("0",20A4/" ID:",A1,3X,4A4," DIRECTION:",A4," DISTANCE:"	MIXD15
1125.	1 ,F6.2," MILES (" ,F6.0," METERS)")	MIXD15
1126.	TOTA=0.	MIXD15
1127.	TOTS=0.	MIXD15
1128.	DO 12 I=1,NVEL	MIXD15
1129.	DO 12 J=1,NSTA	MIXD15
1130.	IF(J.LT.4) GO TO 12	MIXD15
1131.	TOTS=TOTS+FREQ(K,I,J)	MIXD15
1132.	12 TOTA=TOTA+FREQ(K,I,J)	MIXD15
1133.	IF(TOTA.GT.1.0E-6) GO TO 10	MIXD15
1134.	101 FORMAT("0NO OCCURRENCES IN THIS DIRECTION")	MIXD15
1135.	PRINT 101	MIXD15
1136.	GO TO 9	MIXD15
1137.	10 RHRS=100./TOTA	MIXD15
1138.	TOTS=TOTS*RHRS	MIXD15
1139.	NPER=IFIX(TOTS)	MIXD15
1140.	DO 23 I=1,NVEL	MIXD15

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	MIXD15
1194.	DO 28 L=2,MI	MIXD15
1195.	MIL=MI-L+2	MIXD15
1196.	IF((FQ15(MIL)-FQ15(MIL-1)).LT.5.0) GO TO 28	MIXD15
1197.	NN=MM+1	MIXD15
1198.	DO 26 LL=MIL,MM	MIXD15
1199.	NN=NN-1	MIXD15
1200.	FQ15(NN+1)=FQ15(NN)	MIXD15

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.	XXS(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(XXS,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

1261.	4	,BDY(16), DMX(16), XMX(16), COMP(16), FORD(14)	BLANK
1262.	5	,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)	BLANK
1263.	6	,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764)	BLANK
1264.	7	,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE	BLANK
1265.	8	,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL	BLANK
1266.	9	,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)	BLANK
1267.	1	,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK	BLANK
1268.		DIMENSION FREQ15(14,7)	CALC
1269.		IF(KOPT(10).EQ.1) LDSRT=1	VERS2
1270.		NUM=0	CALC
1271.		DO 1 J=1,NSTA	CALC
1272.		CALL POLYN(J,DIS,SZ,LDSRT)	VERS2
1273.		JY=J+7	CALC
1274.		CALL POLYN(JY,DIS,SY,LDSRT)	VERS2
1275.		DO 1 I=1,NVEL	CALC
1276.		IF(FREQ15(I,J).LE.0) GO TO 1	CALC
1277.		NUM=NUM+1	CALC
1278.		XELV=0.	CALC
1279.		XELVSS=0.	CALC
1280.		XGRD=0.	CALC
1281.		XGRDSS=0.	CALC
1282.		U=UMAXEL(I,J)	CALC
1283.		CALL RLSSMOD(W,U,IVENT,ET,LSTACK)	CALC
1284.		IF(IVENT) 2,3,3	CALC
1285.	3	CALL HEIGHT(K,DIS,HGT)	CALC
1286.		CALL RISE (DH, DIS,U,J,0.,0.,HS,W,DIA)	CALC
1287.		H=HS+DH-HGT	CALC
1288.		IF(H.LT.0.) H=0.	CALC
1289.		B=H/SZ	CALC
1290.		XNUM=0.	CALC
1291.		IF(B.LT.15.) XNUM=EXP(-.5*B*B)	CALC
1292.		XDEN=U*3.1416*SY*SZ	CALC
1293.		XELV=XNUM/XDEN	CALC
1294.		IF(KOPT(03).EQ.0) GO TO 5	CALC
1295.		XDEN=DIS*SZ*U	CALC
1296.		XELVSS=2.032*XNUM/XDEN	CALC
1297.		IF(XELVSS.LT.XELV) XELV=XELVSS	CALC
1298.	5	CONTINUE	CALC
1299.		IF(IVENT.EQ.1) GO TO 8	CALC
1300.	2	U=UMAXGL(I,J)	CALC
1301.		DTERM=U*SY*SZ*3.1416	CALC
1302.	9	XDEN=DTERM+(U*C*A)	CALC
1303.		XDEN2=3.*DTERM	CALC
1304.		IF(XDEN2.LT.XDEN) XDEN=XDEN2	CALC
1305.		XGRD=1./XDEN	CALC
1306.		IF(KOPT(03).EQ.0) GO TO 8	CALC
1307.		ARG=(SZ*SZ)+(D*D*C*0.318310)	CALC
1308.		XDEN=U*DIS*SQRT(ARG)	CALC
1309.		XDEN2=1.73205*U*DIS*SZ	CALC
1310.		IF(XDEN2.LT.XDEN) XDEN=XDEN2	CALC
1311.		XGRDSS=2.032/XDEN	CALC
1312.		IF(XGRDSS.LT.XGRD) XGRD=XGRDSS	CALC
1313.	8	XQ15(NUM)=ET*XGRD+(1.-ET)*XELV	CALC
1314.		FQ15(NUM)=FREQ15(I,J)	CALC
1315.	1	CONTINUE	CALC
1316.		RETURN	CALC
1317.		END	CALC
1318.		SUBROUTINE ORDER(N,KK,OX,OF)	ORDER
1319.		DIMENSION OX(1),OF(1)	ORDER
1320.		C**** THIS ROUTINE USES THE SHELL METHOD TO ORDER AN ARRAY.	ORDER

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

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



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

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

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.	XLMTN=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.XLMTN) 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.XLMTN) 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

1621.	IPRT(I)=IEST	PPLT
1622.	124 MCNT=MCNT+1	PPLT
1623.	125 IF(MCNT.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

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

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

1801.	C	YPL SLOPE DYDX AT X(L)	SPLINE
1802.	C	XF ARRAY OF INDEPENDENT VARIABLE WHERE THE SPLINE	SPLINE
1803.	C	FUNCTION IS TO BE INTERPOLATED. LENGTH .GE. M	SPLINE
1804.	C	M NUMBER OF POINTS IN THE XF ARRAY.	SPLINE
1805.	C	OUTPUT YF ARRAY OF INTERPOLATED VALUES PAIRED AS (XF(I),YF(I))	SPLINE
1806.	C	LENGTH .GE.M	SPLINE
1807.	C	YPF ARRAY OF SLOPES OF THE SPLINE FUNCTION AT THE POINTS	SPLINE
1808.	C	XF. LENGTH .GE. M	SPLINE
1809.	C		SPLINE
1810.	C----	IF L.LE.1, L.GT.LMAX, OR M.LE.0 CONTROL IS RETURNED TO THE CALLING	SPLINE
1811.	C	PROGRAM WITH NO CALCULATIONS MADE.	SPLINE
1812.	C		SPLINE
1813.		DIMENSION X(1),Y(1),XF(1),YF(1),YPF(1)	SPLINE
1814.	C		SPLINE
1815.		DIMENSION C(100),D(100),P(100),Q(100),U(100),V(100),VP(100)	SPLINE
1816.		COMMON /SIGMA /SIG	SPLINE
1817.	C----	LMAX IS THE DIMENSION OF THE ARRAYS C,D,P,Q,U,V, AND VP.	SPLINE
1818.		DATA LMAX/100/	SPLINE
1819.	C		SPLINE
1820.		IF(L.LE. 1) GO TO 16	SPLINE
1821.		IF(L.GT.LMAX) GO TO 16	SPLINE
1822.		IF(M.LE. 0) GO TO 16	SPLINE
1823.	C		SPLINE
1824.	C----	COMPUTE SPLINE PARAMETERS	SPLINE
1825.		LL=L	SPLINE
1826.		DO 1 J=1,LL	SPLINE
1827.		P(J)=X(J)	SPLINE
1828.	1	Q(J)=Y(J)	SPLINE
1829.		YP1I=YP1	SPLINE
1830.		YPLI=YPL	SPLINE
1831.		CALL CURV(LL,P,Q,YP1I,YPLI,C,D,SIG)	SPLINE
1832.		DO 10 J=1,M	SPLINE
1833.		IT=J	SPLINE
1834.		T=XF(J)	SPLINE
1835.		YPF(J)=0.	SPLINE
1836.	10	YF(J)=CURV2(T,LL,P,Q,C,SIG,IT)	SPLINE
1837.	16	RETURN	SPLINE
1838.		END	SPLINE
1839.		SUBROUTINE CURV(N,X,Y,SLP1,SLPN,YP,TEMP,SIGMA)	CURV
1840.		INTEGER N	CURV
1841.		REAL X(N),Y(N),SLP1,SLPN,YP(N),TEMP(N),SIGMA	CURV
1842.	C	THIS SUBROUTINE DETERMINES THE PARAMETERS NECESSARY TO	CURV
1843.	C	COMPUTE AN INTERPOLATORY SPLINE UNDER TENSION THROUGH	CURV
1844.	C	A SEQUENCE OF FUNCTIONAL VALUES. THE SLOPES AT THE TWO	CURV
1845.	C	ENDS OF THE CURVE MAY BE SPECIFIED OR OMITTED. FOR ACTUAL	CURV
1846.	C	COMPUTATION OF POINTS ON THE CURVE IT IS NECESSARY TO CALL	CURV
1847.	C	THE FUNCTION CURV2.	CURV
1848.	C	ON INPUT--	CURV
1849.	C N	IS THE NUMBER OF VALUES TO BE INTERPOLATED (N.GE.2),	CURV
1850.	C X	IS AN ARRAY OF THE N INCREASING ABSCISSAE OF THE	CURV
1851.	C	FUNCTIONAL VALUES,	CURV
1852.	C Y	IS AN ARRAY OF THE N ORDINATES OF THE VALUES,(I.E.Y(K)	CURV
1853.	C	IS THE FUNCTIONAL VALUE CORRESPONDING TO X(K)),	CURV
1854.	C SLP1	AND SLPN CONTAIN THE DESIRED VALUES FOR THE FIRST	CURV
1855.	C	DERIVATIVE OF THE CURVE AT X(1) AND X(N), RESPECTIVELY.	CURV
1856.	C	IF THE QUANTITY SIGMA IS NEGATIVE THESE VALUES WILL BE	CURV
1857.	C	DETERMINED INTERNALLY AND THE USER NEED ONLY FURNISH	CURV
1858.	C	PLACE-HOLDING PARAMETERS FOR SLP1 AND SLPN. SUCH PLACE-	CURV
1859.	C	HOLDING PARAMETERS WILL BE IGNORED BUT NOT DESTROYED,	CURV
1860.	C YP	IS AN ARRAY OF LENGTH AT LEAST N	CURV

1861.	C TEMP IS AN ARRAY OF LENGTH AT LEAST N WHICH IS USED FOR	CURV
1862.	C     SCRATCH STORAGE	CURV
1863.	C     AND	CURV
1864.	C SIGMA CONTAINS THE TENSION FACTOR. THIS IS NON-ZERO AND	CURV
1865.	C     INDICATES THE CURVINESS DESIRED. IF ABS(SIGMA) IS NEARLY	CURV
1866.	C     ZERO (E.G. .001) THE RESULTING CURVE IS APPROXIMATELY A	CURV
1867.	C     CUBIC SPLINE. IF ABS(SIGMA) IS LARGE (E.G. 50.) THE	CURV
1868.	C     RESULTING CURVE IS NEARLY A POLYGONAL LINE. THE SIGN	CURV
1869.	C     OF SIGMA INDICATES WHETHER THE DERIVATIVE INFORMATION	CURV
1870.	C     HAS BEEN INPUT OR NOT. IF SIGMA IS NEGATIVE THE ENDPOINT	CURV
1871.	C     DERIVATIVES WILL BE DETERMINED INTERNALLY. A STANDARD	CURV
1872.	C     VALUE FOR SIGMA IS APPROXIMATELY 1. IN ABSOLUTE VALUE.	CURV
1873.	C ON OUTPUT -	CURV
1874.	C YP    CONTAINS VALUES PROPORTIONAL TO THE SECOND DERIVATIVE	CURV
1875.	C     OF THE CURVE AT THE GIVEN NODES.	CURV
1876.	C	CURV
1877.	C N,X,Y,SLP1,SLPN AND SIGMA ARE UNALTERED.	CURV
1878.	C	CURV
1879.	C	CURV
1880.	C REFERENCE A.K.CLIN; ALGORITHM 476,	CURV
1881.	C     COMM.ACM,VOL.17,NO.4, APRIL 1974, PP.220-223	CURV
1882.	C     AND A.K.CLIN SCALAR- AND PLANAR-VALUED CURVE	CURV
1883.	C     FITTING USING SPLINES UNDER TENSION	CURV
1884.	C     COMM.ACM,VOL.17,NO.4, APRIL 1974, PP.2218-220	CURV
1885.	C	CURV
1886.	NM1=N-1	CURV
1887.	NP1=N+1	CURV
1888.	DELX1=X(2)-X(1)	CURV
1889.	DX1=(Y(2)-Y(1))/DELX1	CURV
1890.	C DETERMINE SLOPES IF NECESSARY	CURV
1891.	SLPP1=SLP1	CURV
1892.	SLPPN=SLPN	CURV
1893.	IF(SIGMA) 50,70,10	CURV
1894.	C DENORMALIZE TENSION FACTOR	CURV
1895.	10 SIGMAP=ABS(SIGMA)*FLOAT(NM1)/(X(N)-X(1))	CURV
1896.	C SET UP RIGHT HAND SIDE AND TRIDIAGONAL SYSTEM FOR YP AND	CURV
1897.	C PERFORM FORWARD ELIMINATION	CURV
1898.	DELS=SIGMAP*DELX1	CURV
1899.	EXPS=EXP(DELS)	CURV
1900.	SINHS=.5*(EXPS-1./EXPS)	CURV
1901.	SINHIN=1./(DELX1*SINHS)	CURV
1902.	DIAG1=SINHIN*(DELS*.5*(EXPS+1./EXPS)-SINHS)	CURV
1903.	DIAGIN=1./DIAG1	CURV
1904.	YP(1)=DIAGIN*(DX1-SLPP1)	CURV
1905.	SPDIAG=SINHIN*(SINHS-DELS)	CURV
1906.	TEMP(1)=DIAGIN*SPDIAG	CURV
1907.	IF(N.EQ.2) GO TO 30	CURV
1908.	DO 20 I=2,NM1	CURV
1909.	DELX2=X(I+1)-X(I)	CURV
1910.	DX2=(Y(I+1)-Y(I))/DELX2	CURV
1911.	DELS=SIGMAP*DELX2	CURV
1912.	EXPS=EXP(DELS)	CURV
1913.	SINHS=.5*(EXPS-1./EXPS)	CURV
1914.	SINHIN=1./(DELX2*SINHS)	CURV
1915.	DIAG2=SINHIN*(DELS*.5*(EXPS+1./EXPS)-SINHS)	CURV
1916.	DIAGIN=1./(DIAG1+DIAG2-SPDIAG*TEMP(I-1))	CURV
1917.	YP(I)=DIAGIN*(DX2-DX1-SPDIAG*YP(I-1))	CURV
1918.	SPDIAG=SINHIN*(SINHS-DELS)	CURV
1919.	TEMP(I)=DIAGIN*SPDIAG	CURV
1920.	DX1=DX2	CURV



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

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.	SINH1=.5*(EXPS1-1./EXPS1)	CURV2
2034.	EXPS=EXP(SIGMAP*DEL2)	CURV2
2035.	SINH2=.5*(EXPS-1./EXPS)	CURV2
2036.	EXPS=EXPS1*EXPS	CURV2
2037.	SINH3=.5*(EXPS-1./EXPS)	CURV2
2038.	CURVE=(YP(I)*SINH1+YP(I-1)*SINH2)/SINH3+	CURV2
2039.	1((Y(I)-YP(I))*DEL1+(Y(I-1)-YP(I-1))*DEL2)/DELS.	CURV2
2040.	I1=I	CURV2

2041.	50 CURV2=CURVE	CURV2
2042.	RETURN	CURV2
2043.	C T .LE. X(1)	CURV2
2044.	60 CURVE=Y(1)	CURV2
2045.	61 I1=2	CURV2
2046.	GO TO 50	CURV2
2047.	C T .GE. X(N)	CURV2
2048.	62 CURVE=Y(N)	CURV2
2049.	GO TO 61	CURV2
2050.	C	CURV2
2051.	C---- ORDINARY CUBIC SPLINE CASE	CURV2
2052.	70 A=(DEL2*Y(I-1)+DEL1*Y(I))/DELS	CURV2
2053.	X2 =T**2	CURV2
2054.	XI2=X(I-1)**2	CURV2
2055.	B=(X2*T-XI2*X(I-1))/DELS	CURV2
2056.	C=3.*X(I-1)*T*DEL1/DELS	CURV2
2057.	D=3.*(X2-XI2)	CURV2
2058.	E=DEL1*DELS	CURV2
2059.	F=6.*X(I-1)*DEL1	CURV2
2060.	G=-B+C+D-2.*E-F	CURV2
2061.	H=B-C-E	CURV2
2062.	CURVE=A+G*YP(I-1)+H*YP(I)	CURV2
2063.	GO TO 50	CURV2
2064.	END	CURV2
2065.	SUBROUTINE DEPOST (DIS,JSTAB,HEIGHT,ANSWER)	DEPOST
2066.	C REVISION 1 - OCTOBER 1976	DEPOST
2067.	DOUBLE PRECISION ANSWER	DEPOST
2068.	DISLN = ALOG(DIS)	DEPOST
2069.	JS= JSTAB - 4	DEPOST
2070.	IF(HEIGHT.LE.15.0) GO TO 1	DEPOST
2071.	IF(HEIGHT.LE.45.0) GO TO 2	DEPOST
2072.	IF(HEIGHT.LE.80.0) GO TO 3	DEPOST
2073.	IF(JS) 4,5,6	DEPOST
2074.	4 IF(DIS.GT.400.0) GO TO 50	DEPOST
2075.	SUM = -57.04822 + (13.82261*DISLN) - (1.019382*DISLN*DISLN)	DEPOST
2076.	GO TO 1000	DEPOST
2077.	50 IF(DIS.GE.3000.0) GO TO 51	DEPOST
2078.	SUM = -35.26215 + (7.297182*DISLN) - (.5343292*DISLN*DISLN)	DEPOST
2079.	GO TO 1000	DEPOST
2080.	51 IF(DIS.GT.30000.0) GO TO 52	DEPOST
2081.	SUM= -1.488902 - (1.694416*DISLN) + (.06353313*DISLN*DISLN)	DEPOST
2082.	GO TO 1000	DEPOST
2083.	52 SUM = -45.70724 + (6.464447*DISLN) - (.3122405*DISLN*DISLN)	DEPOST
2084.	GO TO 1000	DEPOST
2085.	5 IF(DIS.GE.1500.0) GO TO 53	DEPOST
2086.	SUM = -63.81157 + (11.90979*DISLN) - (.6561428*DISLN*DISLN)	DEPOST
2087.	GO TO 1000	DEPOST
2088.	53 IF(DIS.GE.10000.0) GO TO 54	DEPOST
2089.	SUM = -44.54416 + (8.03507*DISLN) - (.4868832*DISLN*DISLN)	DEPOST
2090.	GO TO 1000	DEPOST
2091.	54 SUM = -9.971805 + (.1761891*DISLN) - (.04063289*DISLN*DISLN)	DEPOST
2092.	GO TO 1000	DEPOST
2093.	6 ANSWER = 0.00000	DEPOST
2094.	RETURN	DEPOST
2095.	1 IF(DIS.GT.1000.0) GO TO 55	DEPOST
2096.	SUM = -9.07794 + (.4357604*DISLN) - (.07881594*DISLN*DISLN)	DEPOST
2097.	GO TO 1000	DEPOST
2098.	55 IF(DIS.GT.10000.0) GO TO 56	DEPOST
2099.	SUM = -6.64143 - (.2466506*DISLN) - (.03098147*DISLN*DISLN)	DEPOST
2100.	GO TO 1000	DEPOST

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

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),IPURGE(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,UEU,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

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

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),VRCCR(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

2341.	5	DEPANS=DEPADJ(I4(K,I,J,1))*DEPADJ(I4(K,I,J,2))*DEPADJ(I4(K,I,J,3))	ADJCOR
2342.		DPLANS=DPLTAD(I4(K,I,J,1))+DPLTAD(I4(K,I,J,2))+DPLTAD(I4(K,I,J,3))	ADJCOR
2343.		RETURN	ADJCOR
2344.	6	DEPANS=DEPADJ(I4(K,I,J,2)) * DEPADJ(I4(K,I,J,3))	ADJCOR
2345.		DPLANS=DPLTAD(I4(K,I,J,2))+DPLTAD(I4(K,I,J,3))	ADJCOR
2346.		RETURN	ADJCOR
2347.		END	ADJCOR
2348.		SUBROUTINE ADJWND	ADJWND
2349.		COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)	BLANK
2350.	1	,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)	BLANK
2351.	2	,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)	BLANK
2352.	3	,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)	BLANK
2353.	4	,BDY(16),DMX(16),XMX(16),COMP(16),FORD(14)	BLANK
2354.	5	,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)	BLANK
2355.	6	,W,DIA,HS,WINDHT,D,A,Q,PLEV,COR(7),XPO(1764)	BLANK
2356.	7	,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE	BLANK
2357.	8	,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL	BLANK
2358.	9	,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)	BLANK
2359.	1	,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK	BLANK
2360.		DIMENSION CE(7),CG(7),E(7)	ADJWND
2361.		DATA E/4*0.25,3*0.5/	ADJWND
2362.		DO 1 I=1,NVEL	ADJWND
2363.		DO 1 J=1,NSTA	ADJWND
2364.		CE(J)=(WINDHT/PLEV)**E(J)	ADJWND
2365.		CG(J)=(10.0/PLEV)**E(J)	ADJWND
2366.		UMAXEL(I,J)=UMAX(I)*CE(J)	ADJWND
2367.		UMAXGL(I,J)=UMAX(I)*CG(J)	ADJWND
2368.		UAVEEL(I,J)=UAVE(I)*CE(J)	ADJWND
2369.	1	UAVEGL(I,J)=UAVE(I)*CG(J)	ADJWND
2370.		RETURN	VERS2
2371.		END	ADJWND
2372.		SUBROUTINE RLSMOD(W,U,IVENT,ET,LSTACK)	RLSMOD
2373.		RATIO=W/U	RLSMOD
2374.		IF(RATIO.GE.5.0 .OR. LSTACK.EQ.1) GO TO 2	RLSMOD
2375.		IF(RATIO.LT.1.0) GO TO 1	RLSMOD
2376.		IVENT = 0	RLSMOD
2377.		ET = 0.3 - 0.06 * RATIO	RLSMOD
2378.		IF(RATIO.LE.1.5) ET = 2.58 - 1.58 * RATIO	RLSMOD
2379.		RETURN	RLSMOD
2380.	1	IVENT = -1	RLSMOD
2381.		ET = 1.0	RLSMOD
2382.		RETURN	RLSMOD
2383.	2	IVENT = 1	RLSMOD
2384.		ET = 0	RLSMOD
2385.		RETURN	RLSMOD
2386.		END	RLSMOD
2387.		SUBROUTINE HEIGHT (K,DIS,HGT)	HEIGHT
2388.		COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)	BLANK
2389.	1	,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)	BLANK
2390.	2	,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)	BLANK
2391.	3	,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)	BLANK
2392.	4	,BDY(16),DMX(16),XMX(16),COMP(16),FORD(14)	BLANK
2393.	5	,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)	BLANK
2394.	6	,W,DIA,HS,WINDHT,D,A,Q,PLEV,COR(7),XPO(1764)	BLANK
2395.	7	,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE	BLANK
2396.	8	,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL	BLANK
2397.	9	,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)	BLANK
2398.	1	,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK	BLANK
2399.		HGT = HT(K,NDIS)	HEIGHT
2400.		IF(DIS.GE.DIST(K,NDIS)) RETURN	HEIGHT



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

2461.	200 RETURN	RISE
2462.	END	RISE
2463.	SUBROUTINE POLYN(IC,AVAL,RESULT,LDSRT)	VERS2
2464.	DIMENSION AY(6),AZ(6,3),BZ(6,3),CZ(6,3),DIS(2)	POLYN
2465.	DIMENSION SZ(7,3),AK(11),EX(11),X(7)	VERS2
2466.	DATA SZ/1.114,1.322,1.633,2.0,2.431,2.889,3.398,0.982,1.230,1.519,	VERS2
2467.	1 1.845,2.255,2.69,3.114,0.903,1.130,1.398,1.708,2.079,	VERS2
2468.	2 2.462,2.903/	VERS2
2469.	DATA AK,EX,X/.144,.443,.78,1.38,.519,.348,.297,.449,.279,.294,.303	VERS2
2470.	1 .826,.517,.314,.11,.921,.901,.891,.731,.865,.916,.975	VERS2
2471.	2 2.0,2.301,2.602,2.903,3.204,3.505,3.806/	VERS2
2472.	DATA AY/.3658,.2751,.2089,.1471,.1046,.0722/	POLYN
2473.	DATA AZ/.192,.156,.116,.079,.063,.053,.00066,.0382,.113,.222	POLYN
2474.	X,.211,.086,.00024,.055,.113,1.26,6.73,18.05/	POLYN
2475.	DATA BZ/.936,.922,.905,.881,.871,.814,1.941,1.149,.911,.725	POLYN
2476.	X,.678,.74,2.094,1.098,.911,.516,.305,.18/	POLYN
2477.	DATA CZ/6*0.,9.27,3.3,0.,-1.7,-1.3,-.35,-9.6,2.,0.,-13.,-34.	POLYN
2478.	X,-48.6/	POLYN
2479.	DATA DIS/100.,1000./,BY/.9031/	POLYN
2480.	IF(LDSRT.EQ.1) GO TO 100	VERS2
2481.	IF(IC.LE.7) GO TO 20	POLYN
2482.	IF(IC.EQ.14) GO TO 25	POLYN
2483.	IX=IC-7	POLYN
2484.	RESULT=AY(IX)*AVAL**BY	POLYN
2485.	GO TO 999	POLYN
2486.	25 F=AY(6)*AVAL**BY	POLYN
2487.	E=AY(5)*AVAL**BY	POLYN
2488.	RESULT=2.*ALOG10(F)-ALOG10(E)	POLYN
2489.	GO TO 500	POLYN
2490.	20 DO 2 L=1,2	POLYN
2491.	IF(AVAL.LT.DIS(L)) GO TO 3	POLYN
2492.	2 CONTINUE	POLYN
2493.	L=3	POLYN
2494.	3 IF(IC.EQ.7) GO TO 30	POLYN
2495.	RESULT=AZ(IC,L)*AVAL**BZ(IC,L)+CZ(IC,L)	POLYN
2496.	GO TO 999	POLYN
2497.	30 F=AZ(6,L)*AVAL**BZ(6,L)+CZ(6,L)	POLYN
2498.	E=AZ(5,L)*AVAL**BZ(5,L)+CZ(5,L)	POLYN
2499.	RESULT=2.*ALOG10(F)-ALOG10(E)	POLYN
2500.	GO TO 500	VERS2
2501.	C ***** COMPUTE DESERT TYPE SIGMA" S *****	VERS2
2502.	100 IF(IC.LE.3) GO TO 10	VERS2
2503.	II=IC-3	VERS2
2504.	RESULT=AK(II)*AVAL**EX(II)	VERS2
2505.	GO TO 999	VERS2
2506.	10 RESULT=0.	VERS2
2507.	AVLG=ALOG10(AVAL)	VERS2
2508.	DO 1 J=1,7	VERS2
2509.	XN=1.	VERS2
2510.	XD=1.	VERS2
2511.	DO 4 K=1,7	VERS2
2512.	IF(K.EQ.J) GO TO 4	VERS2
2513.	XN=XN*(AVLG-X(K))	VERS2
2514.	XD=XD*(X(J)-X(K))	VERS2
2515.	4 CONTINUE	VERS2
2516.	1 RESULT=RESULT+SZ(J,IC)*XN/XD	VERS2
2517.	500 RESULT=10.**RESULT	VERS2
2518.	999 IF(RESULT.GT.1000.) RESULT=1000.	VERS2
2519.	RETURN	VERS2
2520.	END	VERS2

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	,TITLE(4),TITLM(20)	VERS2
2580.		DATA TITLE/"MAXI","MUM ","CHI/","Q "/	PTSOUT

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2581. DATA WORD1,WORD2,WORD3,WORD4/" NO","EMPT"," DEC","Y " ,"AY"," " PTSOUT
2582. 1 " " " UN"/ PTSOUT
2583. IF(LSTACK.EQ.0) GO TO 14 VERS2
2584. DO 15 L=1,4 PTSOUT
2585. 15 TITLPT(NPTYPE,L)=TITLEL(L) PTSOUT
2586. 14 CONTINUE PTSOUT
2587. IF(NPTYPE.EQ.0) GO TO 55 VERS2
2588. CALL DATE(TODAY) VERS2
2589. CALL TIME(CLOCK) VERS2
2590. PRINT 950, TODAY,CLOCK VERS2
2591. 950 FORMAT(1H1,"USNRC COMPUTER CODE-XOQDOQ,VERSION 2.0",10X,"RUN DATE VERS2
2592. * ",A10,10X,"RUN TIME",A10) VERS2
2593. PRINT 824,TITLM VERS2
2594. 824 FORMAT(1H0,20A4/) VERS2
2595. PRINT 1, (TITLE(1EX,J), J=1,20) PTSOUT
2596. 1 FORMAT(1H ,20A4) VERS2
2597. IF(KOPT(7).EQ.1) PUNCH 21,(TITLE(1EX,J),J=1,20) VERS2
2598. 21 FORMAT(20A4) PTSOUT
2599. IF(IPG.EQ.1) PRINT 12 PTSOUT
2600. IF(IPG.EQ.1.AND.KOPT(7).EQ.1) PUNCH 12 VERS2
2601. 12 FORMAT(" INTERMITTENT RELEASE CALCULATIONS") PTSOUT
2602. IF(KOPT(8).EQ.1) PRINT 2 VERS2
2603. IF(KOPT(9).EQ.1) PRINT 13 VERS2
2604. IF(KOPT(8).EQ.1.AND.KOPT(7).EQ.1) PUNCH 2 VERS2
2605. IF(KOPT(9).EQ.1.AND.KOPT(7).EQ.1) PUNCH 13 VERS2
2606. 2 FORMAT(" CORRECTED USING STANDARD OPEN TERRAIN FACTORS") PTSOUT
2607. 13 FORMAT(" CORRECTED USING SITE-SPECIFIC FACTORS") PTSOUT
2608. PRINT 3 PTSOUT
2609. 3 FORMAT(" SPECIFIC POINTS OF INTEREST"/ PTSOUT
2610. 1 "ORELEASE TYPE OF DIRECTION DISTANCE",T62, PTSOUT
2611. 2 "X/Q", T78, "X/Q", T94, "X/Q", T110, "D/Q"/ PTSOUT
2612. 3 " ID",T14,"LOCATION",T28,"FROM SITE",T39,"(MILES) (METERS) ( VERS2
2613. 4SEC/CUB.METER) (SEC/CUB.METER) (SEC/CUB.METER) (PER SQ.METER)" VERS2
2614. DO 50 I=1,3 PTSOUT
2615. ABSDK(I) = ABS(DECAYS(I)) PTSOUT
2616. IF(ABSDK(I).LE.100.) GO TO 90 PTSOUT
2617. IWORD = 1 PTSOUT
2618. GO TO 100 PTSOUT
2619. 90 IF(ABSDK(I).LT.1.E-10) GO TO 91 PTSOUT
2620. GO TO 101 PTSOUT
2621. 91 IWORD = 2 PTSOUT
2622. 100 CONTINUE PTSOUT
2623. IF(I.EQ.1) PRINT 4, WORD1(IWORD), WORD2(IWORD), WORD3(IWORD) PTSOUT
2624. IF(I.EQ.2) PRINT 5, WORD1(IWORD), WORD2(IWORD), WORD3(IWORD) PTSOUT
2625. IF(I.EQ.3) PRINT 6, WORD1(IWORD), WORD2(IWORD), WORD3(IWORD) PTSOUT
2626. 4 FORMAT(" ",T57,2A4, A2) VERS2
2627. 5 FORMAT("+",T72,2A4, A2) VERS2
2628. 6 FORMAT("+",T88,2A4, A2) VERS2
2629. GO TO 50 PTSOUT
2630. 101 IF(I.EQ.1) PRINT 7, ABSDK(I) PTSOUT
2631. IF(I.EQ.2) PRINT 8, ABSDK(I) PTSOUT
2632. IF(I.EQ.3) PRINT 9, ABSDK(I) PTSOUT
2633. 7 FORMAT(" ", T55, F6.3, " DAY DECAY") PTSOUT
2634. 8 FORMAT("+", T72, F6.3, " DAY DECAY") PTSOUT
2635. 9 FORMAT("+", T88, F6.3, " DAY DECAY") PTSOUT
2636. 50 CONTINUE PTSOUT
2637. DO 60 I=1,3 PTSOUT
2638. IF(DECAYS(I).LT.0.0) GO TO 80 PTSOUT
2639. WORD(I) = WORD4(2) PTSOUT
2640. GO TO 60 PTSOUT

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2641.	80	WORD(I) = WORD4(1)	PTSOUT
2642.	60	CONTINUE	PTSOUT
2643.		PRINT 10, (WORD(I), I=1,3)	PTSOUT
2644.	10	FORMAT(" ",T56,A4,"DEPLETED",4X,A4,"DEPLETED",4X,A4,"DEPLETED")	PTSOUT
2645.		JA=1	PTSOUT
2646.		DO 51 I=1,NPTYPE	PTSOUT
2647.		NP = NPOINT(I)	PTSOUT
2648.		DO 51 N=1,NP	PTSOUT
2649.		K = KDIR(I,N)	PTSOUT
2650.		DMETRS=PTDIST(I,N)	VERS2
2651.		DMILES=PTDIST(I ,N)/1609.347219	VERS2
2652.	150	CONTINUE	PTSOUT
2653.		PRINT 11,RLSID(IEX),(TITLPT(I,J),J=1,4),COMP(K),DMILES,	VERS2
2654.	1	DMETRS, (SAVEQS(I,N,L), L=1,4)	PTSOUT
2655.	11	FORMAT(" ",3X,A1,5X,4A4,3X,A4,6X,F6.2,3X,F6.0,6X,4(1PE7.1,9X))	PTSOUT
2656.		IF(KOPT(7).EQ.1) PUNCH 22,RLSID(IEX),(TITLPT(I,J),J=1,4)	VERS2
2657.	1	,COMP(K),PTDIST(I,N), (SAVEQS(I,N,L), L=1,4)	PTSOUT
2658.	22	FORMAT(T3,A1,1X,4A4,T19,A4,F7.2,1P4E10.3)	PTSOUT
2659.	51	CONTINUE	PTSOUT
2660.	55	CONTINUE	VERS2
2661.		CALL PRNTIN	PTSOUT
2662.		RETURN	PTSOUT
2663.		END	PTSOUT
2664.		SUBROUTINE PRNTIN	PRNTIN
2665.		COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7)	BLANK
2666.	1	,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5)	BLANK
2667.	2	,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30)	BLANK
2668.	3	,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80)	BLANK
2669.	4	,BDY(16),DMX(16),XMX(16),COMP(16),FORD(14)	BLANK
2670.	5	,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3)	BLANK
2671.	6	,W,DIA,HS,WINDHT,D,A,Q,PLEV,COR(7),XPO(1764)	BLANK
2672.	7	,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE	BLANK
2673.	8	,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL	BLANK
2674.	9	,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7)	BLANK
2675.	1	,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK	BLANK
2676.		URE=W*0.2	PRNTIN
2677.		ARGU=PLEV/WINDHT	PRNTIN
2678.		STABLE=SQRT(ARGU)	PRNTIN
2679.		UNSTBL=SQRT(STABLE)	PRNTIN
2680.		UES=URE*STABLE	PRNTIN
2681.		UGS=W*STABLE	PRNTIN
2682.		UEU=URE*UNSTBL	PRNTIN
2683.		UGU=W*UNSTBL	PRNTIN
2684.		PRINT 1, HS,WINDHT,DIA,D,W,A,Q	PRNTIN
2685.	1	FORMAT("OVENT AND BUILDING PARAMETERS:"/	PRNTIN
2686.	1	" RELEASE HEIGHT (METERS)",F8.2,19X,"REP. WIND HEIGHT"	PRNTIN
2687.	2	,7X,"(METERS)",F11.1/	PRNTIN
2688.	3	" DIAMETER (METERS)",F8.2,19X,"BUILDING HEIGHT"	PRNTIN
2689.	4	,8X,"(METERS)",F11.1/	PRNTIN
2690.	5	" EXIT VELOCITY (METERS)",F8.2,19X,"BLDG.MIN.CRS.SEC"	PRNTIN
2691.	6	,".AREA (SQ.METERS)",F8.1/	PRNTIN
2692.	7	1H ,T57,"HEAT EMISSION RATE (CAL/SEC)",F10.1)	PRNTIN
2693.		IF(LSTACK.EQ.1) GO TO 3	PRNTIN
2694.		IF(W.LT.0.1) GO TO 4	PRNTIN
2695.		PRINT 2, PLEV,URE,UES,UEU,URE,W,UES,UGS,UEU,UGU,W,UGS,UGU	PRNTIN
2696.	2	FORMAT("OAT THE RELEASE HEIGHT:",T50,"" AT THE MEASURED WIND "	PRNTIN
2697.	1	,"HEIGHT (",F5.1," METERS):"/	PRNTIN
2698.	2	" VENT RELEASE MODE WIND SPEED (METERS/SEC) ' "	PRNTIN
2699.	3	," VENT RELEASE MODE WIND SPEED (METERS/SEC)",	PRNTIN
2700.	4	" WIND SPEED (METERS/SEC)"/" ",T50,"'"	PRNTIN

```

2701.      5      ,T73,"STABLE CONDITIONS",T103,"UNSTABLE/NEUTRAL CONDITIONS"/ PRNTIN
2702.      6      "      ELEVATED      LESS THAN",F7.3,T50,"      ELEVATED" PRNTIN
2703.      7      ,T73,"LESS THAN",F7.3,14X,"LESS THAN",F7.3/ PRNTIN
2704.      8      "      MIXED      BETWEEN",F9.3," AND",F7.3," " " PRNTIN
2705.      9      ,      MIXED      BETWEEN",F9.3," AND",F7.3, PRNTIN
2706.      1     "      BETWEEN",F9.3," AND",F7.3/ PRNTIN
2707.      2     "      GROUND LEVEL      ABOVE",F11.3,T50," " " PRNTIN
2708.      3     ,      GROUND LEVEL      ABOVE",F11.3,14X, PRNTIN
2709.      4     "ABOVE",F11.3) PRNTIN
2710.      RETURN PRNTIN
2711.      3 PRINT 10 PRNTIN
2712.      10 FORMAT("OALL ELEVATED RELEASES.") PRNTIN
2713.      RETURN PRNTIN
2714.      4 PRINT 11 PRNTIN
2715.      11 FORMAT("OALL GROUND LEVEL RELEASES.") PRNTIN
2716.      RETURN PRNTIN
2717.      END PRNTIN
2718.      SUBROUTINE INTCOM INTCOM
2719.      COMMON DEPADJ(4704),DPLTAD(4704),XQ(16,14,7) BLANK
2720.      1      ,EFF(16,14,7),FREQ(16,14,7),SAVEQS(8,30,5) BLANK
2721.      2      ,DIST(16,10),HT(16,10),KDIR(8,30),PTDIST(8,30) BLANK
2722.      3      ,TITLE(5,20),FQ(14,7),TITLPT(8,4),KOPT(80) BLANK
2723.      4      ,BDY(16),DMX(16),XMX(16),COMP(16),FORD(14) BLANK
2724.      5      ,UAVE(14),IPURGE(5),RLSID(5),NPOINT(8),DECAYS(3) BLANK
2725.      6      ,W, DIA, HS, WINDHT, D, A, Q, PLEV,COR(7),XPO(1764) BLANK
2726.      7      ,UGU,UGS,UES,UEU,URE,C,NDIR,IEX,NPTYPE BLANK
2727.      8      ,FQ15(100),NSTA,NUM,NDIS,UMAX(14),XQ15(100),NVEL BLANK
2728.      9      ,UMAXEL(14,7),UMAXGL(14,7),UAVEEL(14,7),UAVEGL(14,7) BLANK
2729.      1     ,VRDIST(16,10),VRCR(16,10),NCOR,LSTACK BLANK
2730.      DIMENSION XOMP(16) INTCOM
2731.      DATA XOMP/"      S","SSW","SW","WSW","W","WNW","NW","NNW" INTCOM
2732.      X,"      N","NNE","NE","ENE","E","ESE","SE","SSE"/ INTCOM
2733.      DO 10 I= 1,16 INTCOM
2734.      10 COMP(I) = XOMP(I) INTCOM
2735.      RETURN INTCOM
2736.      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. 101000010000  
 2. XOQDOQ - TEST CASE #1  
 3. 5 7 3 5 3 2 0  
 4. 10.0 101. 2.26 -8.0 0 4 4 4 0 0 0 0 0 0 0 0 0  
 5. 0 0 4 4 4 4 4 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  
 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 0 2 0 0 0 0 0 0 0  
 15. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 16. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 17. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 18. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 19. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 20. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 21. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 22. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 23. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 24. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 25. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 26. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 27. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 28. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 29. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 30. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 31. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 32. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 33. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
 34. -1 1.0 2.0 4.0 8.0 16.0 0 0 0 0 0 0 0 0 0 0  
 35. 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  
 38. 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  
 40. 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 40.0 2000. 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

[illegible]

1. 10100000100  
 2. XOQDOQ - TEST CASE #3  
 3. 5 7 0 5 3 1 4  
 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 0  
 7. 0 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 0  
 9. 0 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 0  
 11. 0 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 0  
 13. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
 14. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 15. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 16. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 17. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 18. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 19. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 20. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 21. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 22. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 23. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 24. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 25. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 26. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 27. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 28. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 29. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 30. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 31. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 32. 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1  
 33. 1 0 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 0 2 0 0 0 0 0 0 0 1  
 35. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10.  
 36. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4.  
 37. 6437 6437 6437 6437 6437 6437 6437 6437 6437 6437 6437 6437 6437 6437 6437  
 38. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4.  
 39. 8047 8047 8047 8047 8047 8047 8047 8047 8047 8047 8047 8047 8047 8047 8047  
 40. 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  
 41. 9656.9656.9656.9656.9656.9656.9656.9656.9656.9656.9656.9656.9656.9656.9656.  
 42. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.  
 43. 3 3 2  
 44. SITE BOUNDARY  
 45. 1 805 1 966 1 1127  
 46. COWS  
 47. 1 1931 8 4989 16 4345  
 48. RESIDENCES  
 49. 1 1931 8 6437  
 50. EXIT ONE - ONE-MIXED MODE RELEASE  
 51. 10.0 2.0 45.0 40.02000. 45.0 0.0  
 52. A 0 0 0

## APPENDIX C



## APPENDIX C

Output from test case runs are provided in this appendix.

## C.2

[illegible]





ATMOSPHERIC STABILITY CLASS F

### JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION

ATMOSPHERIC STABILITY CLASS G

TOTAL HOURS CONSIDERED ARE 100

WIND MEASURED AT 10.0 METERS.

### OVERALL WIND DIRECTION FREQUENCY

### ALL 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:

[illegible]

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  
 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  
 / 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

XOQDOQ - TEST CASE #1

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

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

| DIRECTION<br>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                      | 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

| SECTION<br>1 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   |

## 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 |  |

| C7 | 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 |

## 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)

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

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<br>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                      | 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 |

| C.9 | SECTOR | ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) |           |           |           | DISTANCE IN MILES FROM THE SITE |           |           |           |           |           |           |
|-----|--------|--|-----------|-----------|-----------|---------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
|     |        | 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  
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)

ELEVATED STABLE CONDITIONS  
MIXED LESS THAN 0.943  
GROUND LEVEL BETWEEN 0.943 AND 4.714  
ABOVE 4.714

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

XQDOQ - 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<br>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

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 DIRECTION FROM SITE  
 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  
 C.11  
 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  
 ISW 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  
 ASW 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

XOQDOQ - TEST CASE #1

EXIT ONE - MIXED MODE RELEASE - WITH PURGE RELEASES

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

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| DIRECTION<br>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    |

## 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)

|              |           |                 |
|--------------|-----------|-----------------|
| 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 - XQDDQ, VERSION 2.0

RUN DATE: MONDAY

AUGUST 9, 1982

XQDD  
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 FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

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

LEAST SQUARES FIT:  
CHI/Q PERCENT OF TIME  
SEC/METER CUBED 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

XQD

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 FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

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

LEAST SQUARES FIT:

CHI/Q PERCENT OF TIME  
SEC/METER CUBED 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 |

C.14

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 FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

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

LEAST SQUARES FIT:

CHI/Q PERCENT OF TIME  
SEC/METER CUBED REACHED OR EXCEEDED

|      |           |        |
|------|-----------|--------|
| C.15 | 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

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 FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

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

LEAST SQUARES FIT:

CHI/Q PERCENT OF TIME  
 SEC/METER CUBED 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

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 FREQUENCY 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 PERCENT OF TIME  
SEC/METER CUBED 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

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 FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

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

LEAST SQUARES FIT:

CHI/Q PERCENT OF TIME  
SEC/METER CUBED 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 RESIDENCES DIRECTION: S DISTANCE: 1.20 MILES ( 1931. METERS)

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

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

LEAST SQUARES FIT:

CHI/Q PERCENT OF TIME  
SEC/METER CUBED 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

XQDQ  
 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 FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

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

LEAST SQUARES FIT:

CHI/Q PERCENT OF TIME  
 SEC/METER CUBED 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

XQQDOQ - 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 |          | X/Q             |                 | X/Q             |                 | X/Q             |                 | D/Q     |
|------------|------------------|---------------------|----------|----------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------|
|            |                  |                     | (MILES)  | (METERS) | (SEC/CUB.METER) | (SEC/CUB.METER) | (SEC/CUB.METER) | (SEC/CUB.METER) | (SEC/CUB.METER) | (SEC/CUB.METER) |         |
|            |                  |                     |          |          | NO DECAY        | 2.260 DAY DECAY | 8.000 DAY DECAY |                 |                 |                 |         |
|            |                  |                     |          |          | UNDEPLETED      | UNDEPLETED      | DEPLETED        |                 |                 |                 |         |
| 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:

C.21

|                |                          |
|----------------|--------------------------|
| 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) | WIND SPEED (METERS/SEC)     |
|                   | STABLE CONDITIONS       | 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

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  
 DIAMETER (METERS) 0.0  
 EXIT VELOCITY (METERS) 0.0

REP. WIND HEIGHT (METERS) 10.0  
 BUILDING HEIGHT (METERS) 25.0  
 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<br>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 | 3.060E-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 |

## 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    |
| C.24 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  
 DIAMETER (METERS) 0.0  
 EXIT VELOCITY (METERS) 0.0

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

ALL GROUND LEVEL RELEASES.

USNRC COMPUTER CODE - XQDDQ, VERSION 2.0

RUN DATE: MONDAY

AUGUST 9, 1982

XQDDQ - 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<br>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 |

XQQDOQ - TEST CASE #1

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

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

| C.26<br>SECTOR | ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) |           |           |           | DISTANCE IN MILES FROM THE SITE |           |           |           |           |           |           |  |
|----------------|--|-----------|-----------|-----------|---------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|--|
|                | 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  
 DIAMETER (METERS) 0.0  
 EXIT VELOCITY (METERS) 0.0

REP. WIND HEIGHT (METERS) 10.0  
 BUILDING HEIGHT (METERS) 25.0  
 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<br>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 |

XQQDOQ - TEST CASE #1

EXIT TWO - GROUND LEVEL RELEASE - NO PURGE RELEASES

CORRECTED USING STANDARD OPEN TERRAIN FACTORS

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RELATIVE DEPOSITION PER UNIT

AREA (M<sup>2</sup>-2) AT FIXED POINTS BY DOWNWIND SECTORS

\*\*\*\*\*

DIRECTION

FROM SITE

|     | 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 |

C.28

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

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RELATIVE DEPOSITION PER UNIT AREA (MXX-2) BY DOWNWIND SECTORS  
SEGMENT BOUNDARIES IN MILES

\*\*\*\*\*

| DIRECTION<br>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:

C.29  
RELEASE HEIGHT (METERS) 30.00  
DIAMETER (METERS) 0.0  
EXIT VELOCITY (METERS) 0.0

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

ALL GROUND LEVEL RELEASES.

## 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<br>NO DECAY<br>UNDEPLETED | X/Q<br>2.260 DAY DECAY<br>UNDEPLETED | X/Q<br>8.000 DAY DECAY<br>DEPLETED | D/Q<br>(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  
 DIAMETER (METERS) 0.0  
 EXIT VELOCITY (METERS) 0.0

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

ALL GROUND LEVEL RELEASES.

C.30

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 | 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 | 171 | 172 | 173 | 174 | 175 | 176 | 177 | 178 | 179 | 180 | 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|



ATMOSPHERIC STABILITY CLASS F

[illegible]

ATMOSPHERIC STABILITY CLASS G

[illegible]

TOTAL HOURS CONSIDERED ARE 100

WIND MEASURED AT 10.0 METERS.

### OVERALL WIND DIRECTION FREQUENCY

[illegible]

### 3. RALL WIND SPEED FREQUENCY

| 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:

[illegible]

## 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    |
| C.34           | 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  
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

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<br>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

| SECTION<br>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   |

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  
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

ALL ELEVATED RELEASES.

XOQDOQ - TEST CASE #2

EXIT ONE - CONTINUOUS ELEVATED RELEASE  
2.260 DAY DECAY, UNDEPLETED

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

| DIRECTION<br>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 |

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    |
| C.38 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  
 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

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<br>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 |

XOQDOQ - TEST CASE #2

## EXIT ONE - CONTINUOUS ELEVATED RELEASE

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

| DIRECTION<br>FROM SITE | 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<br>FROM SITE | 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 |

C.40

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 (MXX-2) BY DOWNWIND SECTORS ***** |           |           |           |           |           |           |           |           |           |           |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| SEGMENT BOUNDARIES IN MILES   |           |           |           |           |           |           |           |           |           |           |
| DIRECTION<br>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:

|      |                         |       |                                   |        |
|------|-------------------------|-------|-----------------------------------|--------|
| C.41 | 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.

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<br>NO DECAY<br>UNDEPLETED | X/Q<br>2.260 DAY DECAY<br>UNDEPLETED | X/Q<br>8.000 DAY DECAY<br>DEPLETED | D/Q<br>(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  
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

ALL ELEVATED RELEASES.



| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 | 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 | 171 | 172 | 173 | 174 | 175 | 176 | 177 | 178 | 179 | 180 | 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

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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

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## ATMOSPHERIC STABILITY CLASS A

ATMOSPHERIC STABILITY CLASS B

ATMOSPHERIC STABILITY CLASS C

ATMOSPHERIC STABILITY CLASS D

ATMOSPHERIC STABILITY CLASS E

[illegible]

ATMOSPHERIC STABILITY CLASS F

### JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION

ATMOSPHERIC STABILITY CLASS G

TOTAL HOURS CONSIDERED ARE 100

### OVERALL WIND DIRECTION FREQUENCY

## 2. RALL WIND SPEED FREQUENCY

DISTANCES AND TERRAIN HEIGHTS IN METERS AS FUNCTIONS OF DIRECTION FROM THE SITE:DISTANCES AND SITE-SPECIFIC CORRECTION FACTORS AS FUNCTIONS OF DIRECTION FROM THE SITE:[illegible]

## 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 |           |           |           |           |           |           |           |
|--|-----------|-----------|-----------|---------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| SECTOR                                 | 5.000     | 7.500     | 10.000    | 15.000                          | 20.000    | 25.000    | 30.000    | 35.000    | 40.000    | 45.000    | 50.000    |
| S                                      | 3.672E-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 |

## 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)

/ 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

JULY 13, 1982

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

SEGMENT BOUNDARIES IN MILES FROM THE SITE

| DIRECTION<br>FROM 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 |

C.47

[illegible]

## 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 |           |           |           |           |           |           |           |
|-------------------------------------|-----------|-----------|-----------|---------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| SECTOR                              | 5.000     | 7.500     | 10.000    | 15.000                          | 20.000    | 25.000    | 30.000    | 35.000    | 40.000    | 45.000    | 50.000    |
| S                                   | 3.611E-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  
 / 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

XOQDOQ - TEST CASE #3

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

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

| DIRECTION<br>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 |

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) 45.0  
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)

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  
8.000 DAY DECAY, DEPLETED

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

| DIRECTION<br>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 |

XQQDOQ - 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<br>FROM SITE | 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<br>FROM SITE | 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 |

C.52

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 ***** |           |           |           |           |           |           |           |           |           |           |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| SEGMENT BOUNDARIES IN MILES   |           |           |           |           |           |           |           |           |           |           |
| DIRECTION<br>FROM SITE  | .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:

|      |                         |       |                                   |        |
|------|-------------------------|-------|-----------------------------------|--------|
| C.53 | 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)

|              |           |                 |
|--------------|-----------|-----------------|
| 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                 |

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<br>NO DECAY<br>UNDEPLETED | X/Q<br>2.260 DAY DECAY<br>UNDEPLETED | X/Q<br>8.000 DAY DECAY<br>DEPLETED | D/Q<br>(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:

AT RELEASE MODE WIND SPEED (METERS/SEC)

## / 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

C.54  
ELEVATED LESS THAN 2.000  
MIXED BETWEEN 2.000 AND 10.000  
GROUND LEVEL ABOVE 10.000

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| <b>NRC FORM 335</b><br>(11-81)   |  | <b>U.S. NUCLEAR REGULATORY COMMISSION</b><br><b>BIBLIOGRAPHIC DATA SHEET</b> |  | <b>1. REPORT NUMBER (Assigned by DDC)</b><br>NUREG/CR-2919<br>PNL-4380 |  |
| <b>4. TITLE AND SUBTITLE (Add Volume No., if appropriate)</b><br>User Guide for XOQDOQ: Evaluating Routine Effluent Releases at Commercial Nuclear Power Stations  |  |  |  | <b>2. (Leave blank)</b>  |  |
| <b>7. AUTHOR(S)</b><br>J. F. Sagendorf, J. T. Goll and W. F. Sandusky  |  |  |  | <b>3. RECIPIENT'S ACCESSION NO.</b>                                    |  |
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| <b>15. SUPPLEMENTARY NOTES</b>   |  |  |  | <b>14. (Leave blank)</b>   |  |
| <b>16. ABSTRACT (200 words or less)</b><br>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. |  |  |  |  |  |
| <b>17. KEY WORDS AND DOCUMENT ANALYSIS</b>   |  |  |  |  |  |
| <b>17a. DESCRIPTORS</b>  |  |  |  |  |  |
| <b>17b. IDENTIFIERS/OPEN-ENDED TERMS</b>   |  |  |  |  |  |
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