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DETERMINATION OF X/Qs FOR SOLID WASTE FACILITY MSAR

C. H. HUANG

Fluor Daniel Northwest, Inc., Richland, WA 99352
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Abstract: This document provides the X/Qs for the solid waste facilities in the 200 Area and for the Solid Waste Dispersal Facilities Master Safety Analysis Report.

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DETERMINATION OF X/Qs FOR SOLID WASTE FACILITY MSAR

C. H. Huang

May 13, 1997

1.0 INTRODUCTION

The purpose of this document is to provide a single referenceable document that provides the X/Qs for the solid waste facilities in the 200 Area, that is to provide the X/Qs for the Solid Waste Dispersal Facilities Master Safety Analysis Report (WHC-SD-WM-MSAR-001, REV. 0, 1996). The X/Qs will be used for the radiological dose estimates in the accident safety analyses. Thus, this document is also to provide the information necessary to perform bounding estimates of the radiological consequences for hypothetical accidents for various solid waste facilities.

This document is to examine the variations in the plume dispersion factors associated with the various solid waste facilities. Specifically examined are X/Qs associated with different receptors located in different sectors and at different distances. Examination of one facility included a large area X/Q, while examination of another facility included an elevated release. Generally, the X/Qs are determined for ground releases with and without building wake.

In addition, sensitivity of how plume characteristics were affected by using different meteorological data was examined. Each receptor described in this document was evaluated for both 99.5% and 50% meteorological data. Attributes such as plume meander, plume rise, settling and wash-out are not considered in this document.

2.0 RECEPTOR LOCATIONS

The receptor locations for various solid waste facilities are described in this section. The solid waste facilities are in the 200 E and 200 W Areas.

2.1 CENTRAL WASTE COMPLEX

The ground-level release dispersion factors (X/Q) were calculated for onsite facility and offsite receptors at the site boundary, near river bank, and Highway 240. The release location is at Central Waste Complex in the 200 West Area.

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Acute ground level release 99.5 percentile and 50 percentile (nominal) dispersion factors (X/Q) were generated using the GXQ (B. Hey, 1994a).

The distances from the Central Waste Complex to the receptors at Highway 240, the near river bank, and the site boundary were given in Table 1a. In Table 1b, the distances to the site boundary from the Central Waste Complex were taken from Nguyen (1994). The receptor location at Highway 240 was given in the document (WHC-SD-WM-CN-016, Rev.0, Huang, 1996a). The distances from the Central Waste Complex to the onsite receptors (100 m and 800 m) were also given in the GXQ run files in Appendix A. The receptor location at 800 m SE sector was specified by the customer.

The receptor locations in the worst sector for onsite, offsite, and Highway 240, and near river bank for 50 percentile (nominal) and 99.5% percentile meteorology are given in Table 1b. The same receptor distances were used to calculate X/Q values for both 99.5% and 50% meteorology.

The dimensions of Building P4 are 15 m in W x 24 m in L x 6 m in H.

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Table 1a. Receptor Location at Each Sector for Offsite, Near River only, and Highway 240 for Central Waste Complex.

NO.	Sector	Highway 240 (km)	Near River Bank (km)	Site Boundary (km)
1	S	5.13	15.4	15.4
2	SSW	4.53	17.4	17.4
3	SW	4.00	14.8	14.8
4	WSW	3.85	12.0	12.0
5	W	4.07	11.7	11.7
6	WNW	6.09	12.0	12.0
7	NW	8.00	15.7	15.7
8	NNW		9.64	16.1
9	N		9.19	18.5
10	NNE		10.53	25.0
11	NE		19.04	29.0
12	ENE		18.93	26.0
13	E		20.16	26.0
14	ESE		28.93	31.5
15	SE	10.30	26.0	26.0
16	SSE	5.67	19.4	19.4

Table 1b. Receptors Locations in the Worst Sector for Onsite Facility, Offsite, and Highway 240.

Table 1b. Receptors Associated with the Central Waste Complex			
Meteorology	Worst-Case Receptor Locations		
	Description	Distance	Direction
50 %	onsite	100 m	N
	onsite*	800 m	SE
	Highway 240	3.85 km	WSW
	Near River	9.19 km	N
	Offsite	16.1 km	NNW
99.5 %	onsite	100 m	E
	onsite*	800 m	SE
	Highway 240	4.07 km	W
	Near River	9.19 km	N
	Offsite	11.7 km	W

Note: * indicates that this receptor was specified by the customer, not the worst case.

2.2 T PLANT

The ground-level release dispersion factors (X/Q) were calculated for onsite facility and offsite receptors at the site boundary, near river and at Highway 240. The release location is at the T Plant Complex in the 200 W Area.

The dimensions of T-Plant are 259 m long by 20.7 m wide by 22.6 m high.

The receptor locations at each sector for offsite, near river bank, and Highway 240 are given in Table 2a. The receptor locations in the worst sector for onsite, offsite, and Highway 240, and near river for 50 percentile (nominal) and 99.5 percentile meteorological data are given in Table 2b and Table 2c for elevated releases.

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Table 2a. Receptor Location at Each Sector for Offsite, Near River Only, and Highway 240.

NO.	Sector	Highway 240 (km)	Site Boundary (km)	Near River Bank (km)
1	S	6.06	15.39	15.39
2	SSW	6.06	15.65	15.65
3	SW	5.77	15.69	15.69
4	WSW	5.57	13.38	13.38
5	W	5.89	13.09	13.09
6	WNW	8.44	13.45	13.45
7	NW	10.06	15.25	11.59
8	NNW		16.29	8.87
9	N		17.54	8.98
10	NNE		25.86	11.56
11	NE		25.65	17.45
12	ENE		22.93	17.21
13	E		22.60	18.19
14	ESE		27.09	27.09
15	SE	13.94	24.17	24.17
16	SSE	7.56	21.07	21.07

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Table 2b. Receptors Associated with the T-Plant			
Meteorology	Worst-Case Receptor Locations for ground level releases		
	Description	Distance	Direction
50 %	onsite	100 m	N
	onsite	500 m	N
	Highway 240	5.57 km	WSW
	Near River	8.98 km	N
	Offsite	16.29 km	NNW
99.5 %	onsite	100 m	E
	onsite	500 m	E
	Highway 240	5.89 km	W
	Near River	8.98 km	N
	Offsite	13.09 km	W

Table 2c. Receptors Associated with the T-Plant			
Meteorology	Worst-Case Receptor Locations for elevated releases		
	Description	Distance	Direction
50 %	onsite	100 m	NA
	onsite	500 m	WSW
	Highway 240	5.57 km	WSW
	Near River	8.98 km	N
	Offsite	13.09 km	W
99.5 %	onsite	100 m	NA
	onsite	500 m	W
	Highway 240	5.89 km	W
	Near River	8.98 km	N
	Offsite	16.29 km	NNW

2.3 WRAP 1 FACILITY

The WRAP 1 facility is in the 200 W Area. The release duration for all releases will be one hour (see Appendix C).

The WRAP 1 building is approximately 200 ft (60.9 m) by 240 ft (73.1 m) by 32 ft (9.8 m) high.

The release location for the WRAP 1 facility is at the SW corner of the intersection of 23rd and Dayton, in the 200 W Area, within the Solid Waste Complex. Thus, the offsite receptor location of the Solid Waste Complex is also used for the WRAP 1 facility. The receptor locations at the onsite facility and the offsite boundary for acute ground level releases at the WRAP 1 facility are given in Table 3a (Huang, 1996c). Table 3b gives the receptor locations at each sector for Highway 240 and for the near river bank.

Table 3a. Various Receptor Locations.

Receptor	Distance
Onsite Facility 231-Z	800 m SE
Offsite	11.7 km W
Near River Bank	9620 m N
Highway 240	4070 m W

Table 3b. Receptor Location at Each Sector for Highway 240
And the Site Boundary Near the River Bank.

NO.	Sector	Highway 240 (m)	Near River Bank (m)
1	S	5550	15400
2	SSW	4810	17400
3	SW	4160	14800
4	WSW	4160	12000
5	W	4070	11700
6	WNW	6660	12000
7	NW	8140	15700
8	NNW		10170
9	N		9620
10	NNE		10540
11	NE		19790
12	ENE		20160
13	E		21640
14	ESE		30890
15	SE	12400	26000
16	SSE	6480	19400

The receptor locations in the worst sector for onsite, offsite, and Highway 240, and near river for 50 percentile (nominal) and 99.5 percentile meteorology are given in Table 3c.

Table 3c. Different Receptors Associated with the WRAP 1 Facility			
Meteorology	Worst-Case Receptor Locations		
	Description	Distance	Direction
50 %	onsite	100 m	N
	onsite	800 m	SE
	Highway 240	4.07 km	W
	Near River	9.62 km	N
	Offsite	16.1 km	NNW
99.5 %	onsite	100 m	E
	onsite	800 m	SE
	Highway 240	4.07 km	W
	Near River	9.62 km	N
	Offsite	11.70 km	W

2.4 TRUSAF FACILITY

The TRUSAF facility is the building 224-T located in the 200 West Area. The facility is near T Plant.

The TRUSAF facility is approximately 60 m long by 18.3 m wide by 12.2 m high.

The distances to the site boundary from the TRUSAF were taken from Hey (1994b) and given in Table 4a. The receptor distances for Highway 240 and near river at T Plant were adopted here as also shown in Table 4a.

The receptor locations in the worst sector for onsite, offsite, and Highway 240, and near river for 50 percentile (nominal) and 99.5 percentile meteorological data are given in Table 4b.

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Table 4a. Hanford Site Boundary Distance for 224-T Building.
Receptor Location at Each Sector for Offsite, Near River,
and Highway 240.

NO.	Sector	Highway 240 (km)	Near River Bank (km)	Site Boundary (km)
1	S	6.06	15.39	15.38
2	SSW	6.06	15.65	15.63
3	SW	5.77	15.69	15.70
4	WSW	5.57	13.38	13.40
5	W	5.89	13.09	13.11
6	WNW	8.44	13.45	13.47
7	NW	10.06	11.59	15.28
8	NNW		8.87	16.32
9	N		8.98	17.56
10	NNE		11.56	25.88
11	NE		17.45	25.64
12	ENE		17.21	22.92
13	E		18.19	22.57
14	ESE		27.09	27.17
15	SE	13.94	24.17	24.14
16	SSE	7.56	21.07	21.04

Table 4b. Receptors Associated with the TRUSAF Facility			
Meteorology	Worst-Case Receptor Locations		
	Description	Distance	Direction
50 %	onsite	100 m	N
	onsite	500 m	N
	Highway 240	5.57 km	WSW
	Near River	8.98 km	N
	Offsite	16.32 km	NNW
99.5 %	onsite	100 m	E
	onsite	500 m	E
	Highway 240	5.89 km	W
	Near River	8.98 km	N
	Offsite	13.11 km	W

2.5 LOW LEVEL Solid WASTE BURIAL GROUND

The Low Level Solid Waste Burial Ground is in the 200 West area. The distances to the site boundary from the Low Level Solid Waste Burial Ground were taken from WHC-SD-WM-SARR-028 REV 1 (Medsker, 1994). Table 5a shows the receptor locations and distances at the offsite boundary and near river bank for the Solid Waste Burial Ground. The receptor distances for Highway 240 are also shown in Table 5a. The receptor locations at Highway 240 were taken as the shortest distances from the Burial Ground 218-W to Highway 240 and are given in Appendix E.

The receptor locations in the worst sector for onsite, offsite, and Highway 240, and near river for 50 percentile (nominal) and 99.5 percentile meteorology are given in Table 5b.

Table 5a. Receptor Location at Each Sector for Offsite, Highway 240, and Near River.

NO.	Sector	Highway 240 (km)	Near River Bank (km)	Site Boundary (km)
1	S	4.25	13.6 km	13.6 km
2	SSW	4.25	13.9 km	14.0 km
3	SW	3.89	13.5 km	13.6 km
4	WSW	3.89	11.4 km	11.4 km
5	W	3.89	11.1 km	11.1 km
6	WNW	4.07	11.4 km	11.4 km
7	NW	9.06	11.1 km	14.0 km
8	NNW		8.5 km	15.1 km
9	N		8.4 km	16.4 km
10	NNE		10.3 km	24.8 km
11	NE		17.7 km	25.9 km
12	ENE		17.4 km	22.9 km
13	E		18.7 km	22.6 km
14	ESE		27.3 km	28.1 km
15	SE	10.17	23.1 km	23.2 km
16	SSE	4.07	18.8 km	18.9 km

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Table 5b. Receptors Associated with the 200-W Low Level Waste Burial Ground			
Meteorology	Worst-Case Receptor Location		
	Description	Distance	Direction
50 %	onsite	100 m	N
	Highway 240	3.89 km	W
	Near River	8.40 km	N
	Offsite	15.1 km	NNW
99.5 %	onsite	100 m	E
	Highway 240	3.89 km	W
	Near River	8.40 km	N
	Offsite	11.1 km	W

2.6 SUBMARINE REACTOR COMPARTMENT BURIAL GROUND

The Submarine Reactor Compartment Burial Ground is in the 200 East Area. The receptor distances for onsite, and Highway 240 and near river for Submarine Reactor Compartment Burial Ground were taken from the 218-E 10 trench as shown in Table 6a. The receptor distances at the site boundary were taken from WHC-SD-WM-SARR-028 Rev.1 (Medsker 1994).

The receptor locations in the worst sector for onsite, offsite, and Highway 240, and near river bank for 50 percentile (nominal) and 100 percentile meteorological data are given in Table 6b.

Table 6a. Receptor Location at Each Sector for Offsite, Near River only, and Highway 240.

NO.	Sector	Highway 240 (km)	Near River Bank (km)	Site Boundary (km)
1	S	9.80	22.38	21.10
2	SSW	8.88	18.13	18.00
3	SW	10.73	19.42	19.00
4	WSW	11.28	19.98	20.80
5	W	11.47	19.42	20.30
6	WNW	14.61	19.61	21.00
7	NW		10.54	19.70
8	NNW		10.54	19.90
9	N		11.84	23.00
10	NNE		12.58	23.30
11	NE		9.62	18.30
12	ENE		9.62	15.60
13	E		11.28	15.40
14	ESE		22.20	19.80
15	SE	28.12	27.56	23.50
16	SSE	13.13	22.57	21.30

Table 6b. Different Receptors Associated with the 200-E Submarine Reactor Compartment Burial			
Meteorology	Worst-Case Receptor Locations		
	Description	Distance	Direction
50 %	onsite	100 m	N
	Highway 240	11.28 km	WSW
	Near River	10.54 km	NNW
	Offsite	15.40 km	E
99.5 %	onsite	100 m	E
	Highway 240	11.47 km	W
	Near River	11.28 km	E
	Offsite	15.40 km	E

METHODOLOGIES AND ASSUMPTIONS

The acute ground level dispersion factors (X/Q) were calculated using the GXQ (Hey, 1994a) for each sector at the onsite facility (for 100 m and 500 m) and offsite locations for 16 sectors around the site boundary, and for the locations at Highway 240 and near river. The X/Q refers to the concentration of airborne contamination. It is the ratio of contaminant concentration at a specific receptor location to contaminant release rate. The receptor of concern is normally defined as a human having a standard breathing rate and metabolism. The product of X/Q and breathing rate is a nondimensional quantity representing the fraction of contaminant inhaled to contaminant released. Inhalation is the dominant pathway to human exposure for the types of releases of interest here.

RECEPTOR DESCRIPTIONS

•Onsite (Facility): Acute ground level release dispersion factors (X/Q) were generated using the GXQ dosimetry code for the onsite receptor location at a distance of 100 m or the nearest occupied facility for various cases with and without plume wake effects.

•Site Boundary: Receptor at the site boundary in the worst direction. Where the site is bounded by the Columbia River, the site boundary is taken to be at the near bank of the river. Atmospheric dispersion factors (X/Q) were generated for 16 sectors location around the site boundary.

- Near River: Receptor at the near bank of the Columbia River in the worst direction. Atmosphere dispersion factors (X/Q) were generated for sectors along the river for the cases with and without building wake effect.

- Highway 240: Receptor at Highway 240 in the worst direction. Atmosphere dispersion factors (X/Q) were generated for all sectors containing Highway 240 for the cases with and without building wake effect.

CODE DOCUMENTATION

- o GXQ version 4.0 (11/19/94)
- o Joint Frequency Data: 200 Area, 10 m or 61 m, Pasquill A-G (1983-1991 Average).

GXQ input and output files are attached in Appendices A, B, C, D, E, and F.

3. RESULTS

Calculations of Atmospheric Dispersion Factors (X/Q)

The solid waste facilities are located in the 200 E and 200 W Areas. The calculated X/Q values for various solid waste facilities are given in the following tables (Tables 3-1 to 3-6).

The X/Qs were calculated for various solid waste facilities and for different onsite and offsite receptor locations in the worst meteorological direction. The X/Q values for the acute ground level release at various receptor locations were calculated for the facilities for the conditions with and without wake effects. Tables 3-1 to 3-6 show the calculated X/Q values for receptor locations at onsite, offsite, Highway 240, and the site boundary near the river bank. The X/Q values are used for radiological dose calculations associated with solid waste facilities.

The X/Qs were calculated for 99.5% and 50% meteorological data.

CENTRAL WASTE COMPLEX

The X/Qs for the point source and area source releases with and without wake effects are shown in Tables 3-1a and 3-1b, respectively. For point source ground level releases, the dimensions of the building are 15 m wide and 6 m (Huang, 1996a) height. For the area source ground level releases, the dimension of the building array of 330 m (1100 ft) along with the building height of 6.1 m (20 ft) were assumed for the initial plume dimensions at the source for calculation of X/Q at the site boundary (Himes, 1996).

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Table 3-1a. Dispersion Factors for Different Receptors Associated with the Central Waste Complex					
Meteorology	Worst-Case Receptor Locations			χ/Q for Ground Level Release (s/m^3)	
	Description	Distance	Direction	Point Source Release Without Building Wake	Point Source Release With Building Wake
50 %	onsite	100 m	N	5.33 E-03	2.14 E-03
	onsite	800 m	SE	7.52 E-05	6.82 E-05
	Highway 240	3.85 km	WSW	6.96 E-06	6.82 E-06
	Near River	9.19 km	N	4.15 E-06	4.12 E-06
	Offsite	16.1 km	NNW	1.88 E-06	1.87 E-06
99.5 %	onsite	100 m	E	3.41 E-02	1.03 E-02
	onsite	800 m	SE	8.99 E-04	6.90 E-04
	Highway 240	4.07 km	W	6.98 E-05	6.64 E-05
	Near River	9.19 km	N	2.66 E-05	2.61 E-05
	Offsite	11.7 km	W	1.76 E-05	1.73 E-05

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Table 3-1b. Dispersion Factors for Different Receptors Associated with the Central Waste Complex				
Meteorology	Worst-Case Receptor Locations			Area Source Release Without Building Wake
	Description	Distance	Direction	
50 %	onsite	100 m	N	N/A
	onsite	800 m	SE	3.13 E-05
	Highway 240	3.85 km	WSW	5.30 E-06
	Near River	9.19 km	N	3.65 E-06
	Offsite	16.1 km	NNW	1.72 E-06
99.5 %	onsite	100 m	E	N/A
	onsite	800 m	SE	2.13 E-04
	Highway 240	4.07 km	W	3.91 E-05
	Near River	9.19 km	N	2.06 E-05
	Offsite	11.7 km	W	1.38 E-05

T PLANT

The X/Qs for the point source releases with and without wake effects are shown in Table 3-2a. The X/Qs for elevated source releases at a stack height of 61 m is given in Table 3-2b.

Table 3-2a. Dispersion Factors for Different Receptors Associated with the T-Plant					
Meteorology	Worst-Case Receptor Locations			y/Q for Ground Level Release (s/m ³)	
	Description	Distance	Direction	Point Source Release Without Building Wake	Point Source Release With Building Wake
50 %	onsite	100 m	N	5.33 E-03	8.68 E-04
	onsite	500 m	N	3.36 E-04	1.87 E-04
	Highway 240	5.57 km	WSW	4.09 E-06	3.94 E-06
	Near River	8.98 km	N	4.29 E-06	4.18 E-06
	Offsite	16.29 km	NNW	1.86 E-06	1.83 E-06
99.5 %	onsite	100 m	E	3.41 E-02	3.41 E-03
	onsite	500 m	E	2.18 E-03	9.21 E-04
	Highway 240	5.89 km	W	4.26 E-05	3.83 E-05
	Near River	8.98 km	N	2.74 E-05	2.59 E-05
	Offsite	13.09 km	W	1.52 E-05	1.46 E-05

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Table 3-2b. Dispersion Factors for Different Receptors Associated with the T-Plant				
Meteorology	Worst-Case Receptor Locations			x/Q for 61 m Elevated Release (s/m^3)
	Description	Distance	Direction	Point Source Release Without Building Wake
50 %	onsite	100 m	WSW	N/A
	onsite	500 m	WSW	2.11 E-06
	Highway 240	5.57 km	WSW	2.66 E-06
	Near River	8.98 km	N	1.62 E-06
	Offsite	13.09 km	W	9.22 E-07
99.5 %	onsite	100 m	W	NA
	onsite	500 m	W	2.37 E-05
	Highway 240	5.89 km	W	1.16 E-05
	Near River	8.98 km	N	8.33 E-06
	Offsite	16.29 km	NNW	5.72 E-06

WRAP 1 FACILITY

The X/Qs for point source releases with and without wake effects are shown in Table 3-3.

Table 3-3. Dispersion Factors for Different Receptors Associated with the WRAP Facility					
Meteorology	Worst-Case Receptor Locations			x/Q for Ground Level Release (s/m^3)	
	Description	Distance	Direction	Point Source Release Without Building Wake	Point Source Release With Building Wake
50 %	onsite	100 m	N	5.33 E-03	1.75 E-03
	onsite	800 m	SE	7.52 E-05	7.02 E-05
	Highway 240	4.07 km	W	6.52 E-06	6.47 E-06
	Near River	9.62 km	N	3.90 E-06	3.89 E-06
	Offsite	16.1 km	NNW	1.88 E-06	1.88 E-06
99.5 %	onsite	100 m	E	3.41 E-02	1.14 E-02
	onsite	800 m	SE	8.99 E-04	6.07 E-04
	Highway 240	4.07 km	W	6.98 E-05	6.62 E-05
	Near River	9.62 km	N	2.51 E-05	2.48 E-05
	Offsite	11.70 km	W	1.76 E-05	1.73 E-05

TRUSAF

The X/Qs for point source releases with and without wake effects are shown in Table 3-4.

Table 3-4. Dispersion Factors for Different Receptors Associated with the TRUSAF Facility					
Meteorology	Worst-Case Receptor Locations			χ/Q for Ground Level Release (s/m^3)	
	Description	Distance	Direction	Point Source Release Without Building Wake	Point Source Release With Building Wake
50 %	onsite	100 m	N	5.33 E-03	1.37 E-03
	onsite	500 m	N	3.36 E-04	2.36 E-04
	Highway 240	5.57 km	WSW	4.09 E-06	4.00 E-06
	Near River	8.98 km	N	4.29 E-06	4.23 E-06
	Offsite	16.32 km	NNW	1.85 E-06	1.83 E-06
99.5 %	onsite	100 m	E	3.41 E-02	5.96 E-03
	onsite	500 m	E	2.18 E-03	1.28 E-03
	Highway 240	5.89 km	W	4.26 E-05	4.01 E-05
	Near River	8.98 km	N	2.74 E-05	2.66 E-05
	Offsite	13.11 km	W	1.52 E-05	1.48 E-05

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LOW LEVEL WASTE BURIAL GROUND

The X/Qs for point source ground level releases (without wake effect) are shown in Table 3-5.

Table 3-5. Dispersion Factors for Different Receptors Associated with the 200-W Low Level Burial Ground				
Meteorology	Worst-Case Receptor Locations			X/Q for Ground Level Release (s/m ³)
	Description	Distance	Direction	Point Source Release Without Building Wake
50 %	onsite	100 m	N	5.33 E-03
	Highway 240	3.89 km	W	6.96 E-06
	Near River	8.40 km	N	4.70 E-06
	Offsite	15.1 km	NNW	2.05 E-06
99.5 %	onsite	100 m	E	3.41 E-02
	Highway 240	3.89 km	W	7.42 E-05
	Near River	8.40 km	N	2.98 E-05
	Offsite	11.1 km	W	1.88 E-05

HNF-SD-WM-CN-109 Rev.0

SUBMARINE REACTOR COMPARTMENT BURIAL GROUND

The X/Qs for point source ground level releases (without wake effect) are shown in Table 3-6.

Table 3-6. Dispersion Factors for Different Receptors Associated with the 200-E Submarine Reactor Compartment Burial				
Meteorology	Worst-Case Receptor Locations			X/Q for Ground Level Release (s/m ³)
	Description	Distance	Direction	Point Source Release Without Building Wake
50 %	onsite	100 m	N	5.33 E-03
	Highway 240	11.28 km	WSW	1.52 E-06
	Near River	10.54 km	NNW	3.28 E-06
	Offsite	15.40 km	E	1.95 E-06
99.5 %	onsite	100 m	E	3.41 E-02
	Highway 240	11.47 km	W	1.80 E-05
	Near River	11.28 km	E	2.23 E-05
	Offsite	15.40 km	E	1.51 E-05

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APPENDIX A
CENTRAL WASTE COMPLEX
GXQ INPUT AND OUTPUT FILES

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```

CWC Solid Waste Storage P4 to P7 X/Qs, cwcm.41.  ground level
c GXQ Version 4.0 Input File
c  mode
  1
c
c  MODE CHOICE:
c  mode = 1 then X/Q based on Hanford site specific meteorology
c  mode = 2 then X/Q based on atmospheric stability class and wind speed
c  mode = 3 then X/Q plot file is created
c
c  LOGICAL CHOICES:
c  ifox  inorm  icdf  ichk  isite  ipop
    t      f      f      f      f      f
c  ifox = t then joint frequency used to compute frequency to exceed X/Q
c  = f then joint frequency used to compute annual average X/Q
c  inorm = t then joint frequency data is normalized (as in GENII)
c  = f then joint frequency data is un-normalized
c  icdf = t then cumulative distribution file created (CDF.OUT)
c  = f then no cumulative distribution file created
c  ichk = t then X/Q parameter print option turned on
c  = f then no parameter print
c  isite = t then X/Q based on joint frequency data for all 16 sectors
c  = f then X/Q based on joint frequency data of individual sectors
c  ipop = t then X/Q is population weighted
c  = f then no population weighting
c
c  X/Q AND WIND SPEED ADJUSTMENT MODELS:
c  ipuff  idep  isrc  iwind
    0      0      0      0
c  DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c  iwake  ipm   iflow  ientr
    0      0      0      0
c  EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c  (irise igrnd)iwash igrav
    0      0      0      0
c  ipuff = 1 then X/Q calculated using puff model
c  = 0 then X/Q calculated using default continuous plume model
c  idep = 1 then plume depletion model turned on (Chamberlain model)
c  isrc = 1 then X/Q multiplied by scalar
c  = 2 then X/Q adjusted by wind speed function
c  iwind = 1 then wind speed corrected for plume height
c  iwake = 1 then NRC RG 1.145 building wake model turned on
c  = 2 then MACCS virtual distance building wake model turned on
c  ipm = 1 then NRC RG 1.145 plume meander model turned on
c  = 2 then 5th Power Law plume meander model turned on
c  = 3 then sector average model turned on
c  iflow = 1 then sigmas adjusted for volume flow rate
c  ientr = 1 then method of Pasquill used to account for entrainment
c  irise = 1 then MACCS buoyant plume rise model turned on
c  = 2 then ISC2 momentum/buoyancy plume rise model turned on

```


c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c = 0 unless specified otherwise, 0 turns model off

PARAMETER INPUT:

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)	
0	10	1000	0.5	
initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
15.	6.	1.	0.001	0.001
ambient temperature Tamb(C)	initial plume temperature TO(C)	initial plume flow rate VO(m3/s)	release diameter d(m)	convective heat release rate(1) qh(w)
20	20	1	1	0

c (1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1	.78

c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xmin power

c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)

```

c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size
0      100    0
0      800    0
14     498    0
5      11700   0
5      4070   0
1      14680   0
2      15010   0
3      13800   0
4      11740   0
5      11500   0
6      11800   0
7      11830   0
8      9640    0
9      9190    0
10     10530   0
11     19040   0
12     18930   0
13     20160   0
14     28930   0
15     24600   0
16     19150   0

```

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 03/07/97
Run Time = 10:24:40.93

INPUT ECHO:
CWC Solid Waste Storage P4 to P7 XQs, cwcsm.41. ground level
c GXQ Version 4.0 Input File
c mode
1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
T F F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
0 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on

```

c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c      release      reference      mixing      frequency
c      height      anemometer     height     to
c      hs(m)       ha(m)          hm(m)     exceed
c                                     CX(%)
c      0.00000E+00  1.00000E+01  1.00000E+03  5.00000E-01
c
c      initial      initial      release      deposition      gravitational
c      plume        plume        duration     velocity        settling
c      width        height       trd(hr)      velocity        velocity
c      Wb(m)        Hb(m)        (m/s)        vg(m/s)
c      1.50000E+01  6.00000E+00  1.00000E+00  1.00000E-03  1.00000E-03
c
c      ambient      initial      initial      release      convective
c      temperature  plume        plume        heat         heat
c      Tamb(C)      temperature  flow rate    diameter     release
c                  T0(C)        V0(m3/s)     d(m)         rate(1)
c                  0.00000E+00  1.00000E+00  1.00000E+00  0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q          Wind
c      scaling      Speed
c      factor       Exponent
c      c(?)         a(?)
c      1.00000E+00  7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

No normalization of joint frequency.

X/Q calculated for single sector.

MODELS SELECTED:

HNF-SD-WM-CN-109 Rev.0

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

CWC Solid Waste Storage P4 to P7 Xqs, cwcm.41. ground level

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	6.30	1	1.56E-02	1.56E-02	E	0.89
SSW	100	0	4.53	1	1.13E-02	1.13E-02	F	2.65
SW	100	0	2.93	1	1.21E-02	1.21E-02	F	2.65
WSW	100	0	2.72	1	1.22E-02	1.22E-02	F	2.65
W	100	0	4.80	1	2.80E-02	2.80E-02	G	2.65
WNW	100	0	3.98	1	1.60E-02	1.60E-02	G	4.70
NW	100	0	4.72	1	2.89E-02	2.89E-02	G	2.65
NNW	100	0	4.58	1	2.90E-02	2.90E-02	G	2.65
N	100	0	4.36	1	3.12E-02	3.12E-02	G	2.65
NNE	100	0	2.49	1	1.54E-02	1.54E-02	E	0.89
NE	100	0	3.90	1	1.57E-02	1.57E-02	E	0.89
ENE	100	0	6.17	1	2.52E-02	2.52E-02	G	2.65
E	100	0	14.05	1	3.41E-02	3.41E-02	F	0.89
ESE	100	0	18.80	1	3.25E-02	3.25E-02	F	0.89
SE	100	0	10.83	1	3.07E-02	3.07E-02	G	2.65
SSE	100	0	4.78	1	1.58E-02	1.58E-02	G	4.70
S	800	0	6.30	1	4.56E-04	4.56E-04	E	0.89
SSW	800	0	4.53	1	3.29E-04	3.29E-04	F	2.65
SW	800	0	2.93	1	3.55E-04	3.55E-04	F	2.65
WSW	800	0	2.72	1	3.56E-04	3.56E-04	F	2.65
W	800	0	4.80	1	8.18E-04	8.18E-04	G	2.65
WNW	800	0	3.98	1	4.68E-04	4.68E-04	G	4.70
NW	800	0	4.72	1	8.47E-04	8.47E-04	G	2.65
NNW	800	0	4.58	1	8.50E-04	8.50E-04	G	2.65
N	800	0	4.36	1	9.13E-04	9.13E-04	G	2.65
NNE	800	0	2.49	1	4.50E-04	4.50E-04	E	0.89
NE	800	0	3.90	1	4.59E-04	4.59E-04	E	0.89
ENE	800	0	6.17	1	7.39E-04	7.39E-04	G	2.65
E	800	0	14.05	1	9.97E-04	9.97E-04	F	0.89
ESE	800	0	18.80	1	9.50E-04	9.50E-04	F	0.89
SE	800	0	10.83	1	8.99E-04	8.99E-04	G	2.65
SSE	800	0	4.78	1	4.60E-04	4.60E-04	G	4.70
ESE	498	0	18.80	1	2.10E-03	2.10E-03	F	0.89
W	11700	0	4.80	1	1.76E-05	1.76E-05	G	2.65
W	4070	0	4.80	1	6.98E-05	6.98E-05	G	2.65
S	14680	0	6.30	1	6.90E-06	6.90E-06	E	0.89
SSW	15010	0	4.53	1	4.23E-06	4.23E-06	F	2.65
SW	13800	0	2.93	1	6.03E-06	6.03E-06	F	2.65
WSW	11740	0	2.72	1	7.43E-06	7.43E-06	F	2.65
W	11500	0	4.80	1	1.80E-05	1.80E-05	G	2.65
WNW	11800	0	3.98	1	9.79E-06	9.79E-06	G	4.70
NW	11830	0	4.72	1	1.80E-05	1.80E-05	G	2.65
NNW	9640	0	4.58	1	2.34E-05	2.34E-05	G	2.65
N	9190	0	4.36	1	2.66E-05	2.66E-05	G	2.65
NNE	10530	0	2.49	1	1.02E-05	1.02E-05	E	0.89
NE	19040	0	3.90	1	5.05E-06	5.05E-06	E	0.89
ENE	18930	0	6.17	1	8.72E-06	8.72E-06	G	2.65
E	20160	0	14.05	1	1.08E-05	1.08E-05	F	0.89
ESE	28930	0	18.80	1	6.63E-06	6.63E-06	F	0.89
SE	24600	0	10.83	1	7.67E-06	7.67E-06	G	2.65
SSE	19150	0	4.78	1	5.05E-06	5.05E-06	G	4.70

```

CWC Solid Waste Storage P4 to P7 XQs, cwcm42.in  wake effect
c GXQ Version 4.0 Input File
c  mode
c    1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c  ifox  inorm icdf  ichk  isite ipop
c    t    f    f    f    f    f
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c      = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c      = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c      = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c      = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c      = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c      = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c  ipuff idep isrc iwind
c    0    0    0    0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c  iwake ipm  iflow ientr
c    2    0    0    0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c  (irise igrnd)iwash igrav
c    0    0    0    0
c ipuff = 1 then X/Q calculated using puff model
c      = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c      = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c      = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c      = 2 then 5th Power Law plume meander model turned on
c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on

```

c = 2 then ISC2 momentum/buoyancy plume rise model turned on
 c igrnd = 1 then Mills buoyant plume rise modification for ground effects
 c iwash = 1 then stack downwash model turned on
 c igrav = 1 then gravitational settling model turned on
 c = 0 unless specified otherwise, 0 turns model off

c PARAMETER INPUT:

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)	
0	10	1000	0.5	

initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
15.	6.	1.0	0.001	0.001

ambient temperature Tamb(C)	initial plume temperature T0(C)	initial plume flow rate V0(m3/s)	release diameter d(m)	convective heat release rate(1) qh(w)
20	20	1	1	0

c (1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1	.78

c RECEPTOR DEPENDENT DATA (no line limit)

c FOR MODE make RECEPTOR DEPENDENT DATA
 c 1 (site specific) sector distance receptor-height
 c 2 (by class & wind speed) class windspeed distance offset receptor-height
 c 3 (create plot file) class windspeed xmax imax ymax jmax xqmin power

c RECEPTOR PARAMETER DESCRIPTION

c sector = 0, 1, 2... (all, S, SSW, etc.)
 c distance = receptor distance (m)
 c receptor height = height of receptor (m)
 c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
 c windspeed = anemometer wind speed (m/s)
 c offset = offset from plume centerline (m)

c xmax = maximum distance to plot or calculate to (m)
 c imax = distance intervals
 c ymax = maximum offset to plot (m)
 c jmax = offset intervals
 c xqmin = minimum scaled X/Q to calculate
 c power = exponent in power function step size

0	100	0
0	800	0
14	498	0
5	11700	0
5	4070	0
1	14680	0
2	15010	0
3	13800	0
4	11740	0
5	11500	0
6	11800	0
7	11830	0
8	9640	0
9	9190	0
10	10530	0
11	19040	0
12	18930	0
13	20160	0
14	28930	0
15	24600	0
16	19150	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 03/07/97
Run Time = 10:40:55.69

```

INPUT ECHO:
CWC Solid Waste Storage P4 to P7 XQs, cwcw42.in wake effect
c GXQ Version 4.0 Input File
c mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
  T   F   F   F   F   F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c      = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c      = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c      = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c      = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c      = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c      = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
  0   0   0   0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
  2   0   0   0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
  0   0   0   0
c ipuff = 1 then X/Q calculated using puff model
c      = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c      = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c      = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c      = 2 then 5th Power Law plume meander model turned on
c      = 3 then sector average model turned on
  
```

```

c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c   release      reference      mixing      frequency
c   height      anemometer     height     to
c   hs(m)       ha(m)          hm(m)      exceed
c                                     Cx(%)
c
c   0.00000E+00  1.00000E+01  1.00000E+03  5.00000E-01
c
c   initial      initial      release      deposition      gravitational
c   plume        plume        duration     velocity        settling
c   width        height       trd(hr)      vd(m/s)         velocity
c   Wb(m)        Hb(m)                                     vg(m/s)
c
c   1.50000E+01  6.00000E+00  1.00000E+00  1.00000E-03  1.00000E-03
c
c   ambient      initial      initial      release      convective
c   temperature  plume        plume        diameter    heat release
c   Tamb(C)      T0(C)        flow rate   d(m)         rate(1)
c                                     V0(m3/s)    qh(w)
c
c   2.00000E+01  2.00000E+01  1.00000E+00  1.00000E+00  0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c   X/Q          Wind
c   scaling      Speed
c   factor        Exponent
c   c(?)         a(?)
c
c   1.00000E+00  7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax ymax xmax xmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xmin = minimum scaled X/Q to calculate
c power = exponent in power function step size
c
MODE:
Site specific X/Q calculated.

LOGICAL CHOICES:
Joint frequency used to calculate X/Q based on frequency of exceedance.
No normalization of joint frequency.
X/Q calculated for single sector.

MODELS SELECTED:
MACCS Virtual source building wake model selected.

```

HNF-SD-WM-CN-109 Rev.0

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:

200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)

Created 8/26/92 KR

CWC Solid Waste Storage P4 to P7 XQs, cwc42.in wake effect

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	6.30	1	6.81E-03	6.81E-03	E	0.89
SSW	100	0	4.53	1	5.10E-03	5.10E-03	G	2.65
SW	100	0	2.93	1	5.29E-03	5.29E-03	G	2.65
WSW	100	0	2.72	1	5.27E-03	5.27E-03	G	2.65
W	100	0	4.80	1	8.29E-03	8.29E-03	E	0.89
WNW	100	0	3.98	1	6.91E-03	6.91E-03	E	0.89
NW	100	0	4.72	1	7.38E-03	7.38E-03	E	0.89
NNW	100	0	4.58	1	7.21E-03	7.21E-03	E	0.89
N	100	0	4.36	1	8.74E-03	8.74E-03	F	0.89
NNE	100	0	2.49	1	5.88E-03	5.88E-03	G	2.65
NE	100	0	3.90	1	6.11E-03	6.11E-03	E	0.89
ENE	100	0	6.17	1	6.55E-03	6.55E-03	E	0.89
E	100	0	14.05	1	1.03E-02	1.03E-02	F	0.89
ESE	100	0	18.80	1	8.74E-03	8.74E-03	F	0.89
SE	100	0	10.83	1	8.45E-03	8.45E-03	E	0.89
SSE	100	0	4.78	1	6.67E-03	6.67E-03	E	0.89
S	800	0	6.30	1	4.61E-04	4.61E-04	E	0.89
SSW	800	0	4.53	1	2.73E-04	2.73E-04	F	2.65
SW	800	0	2.93	1	2.97E-04	2.97E-04	F	2.65
WSW	800	0	2.72	1	2.98E-04	2.98E-04	F	2.65
W	800	0	4.80	1	6.01E-04	6.01E-04	G	2.65
WNW	800	0	3.98	1	5.24E-04	5.24E-04	G	2.65
NW	800	0	4.72	1	6.22E-04	6.22E-04	G	2.65
NNW	800	0	4.58	1	6.27E-04	6.27E-04	G	2.65
N	800	0	4.36	1	7.08E-04	7.08E-04	G	2.65
NNE	800	0	2.49	1	4.03E-04	4.03E-04	E	0.89
NE	800	0	3.90	1	4.51E-04	4.51E-04	E	0.89
ENE	800	0	6.17	1	5.78E-04	5.78E-04	G	2.65
E	800	0	14.05	1	8.17E-04	8.17E-04	F	0.89
ESE	800	0	18.80	1	7.56E-04	7.56E-04	F	0.89
SE	800	0	10.83	1	6.90E-04	6.90E-04	G	2.65
SSE	800	0	4.78	1	4.84E-04	4.84E-04	E	0.89
ESE	498	0	18.80	1	1.47E-03	1.47E-03	F	0.89
W	11700	0	4.80	1	1.73E-05	1.73E-05	G	2.65
W	4070	0	4.80	1	6.64E-05	6.64E-05	G	2.65
S	14680	0	6.30	1	6.85E-06	6.85E-06	E	0.89
SSW	15010	0	4.53	1	4.20E-06	4.20E-06	F	2.65
SW	13800	0	2.93	1	5.99E-06	5.99E-06	F	2.65
WSW	11740	0	2.72	1	7.37E-06	7.37E-06	F	2.65
W	11500	0	4.80	1	1.77E-05	1.77E-05	G	2.65
WNW	11800	0	3.98	1	9.65E-06	9.65E-06	G	4.70
NW	11830	0	4.72	1	1.77E-05	1.77E-05	G	2.65
NNW	9640	0	4.58	1	2.29E-05	2.29E-05	G	2.65
N	9190	0	4.36	1	2.61E-05	2.61E-05	G	2.65
NNE	10530	0	2.49	1	1.02E-05	1.02E-05	E	0.89
NE	19040	0	3.90	1	5.01E-06	5.01E-06	E	0.89
ENE	18930	0	6.17	1	8.64E-06	8.64E-06	G	2.65
E	20160	0	14.05	1	1.07E-05	1.07E-05	F	0.89
ESE	28930	0	18.80	1	6.60E-06	6.60E-06	F	0.89
SE	24600	0	10.83	1	7.62E-06	7.62E-06	G	2.65
SSE	19150	0	4.78	1	5.02E-06	5.02E-06	G	4.70

```

CWC, cwcm51.in 50% Met. ground level
c GXQ Version 4.0 Input File
c mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
  t   t   f   f   f   f
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c       = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c       = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c       = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c       = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c       = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c       = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
  0   0   0   0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
  0   0   0   0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
  0   0   0   0
c ipuff = 1 then X/Q calculated using puff model
c       = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c       = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c       = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c       = 2 then 5th Power Law plume meander model turned on
c       = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c       = 2 then ISC2 momentum/buoyancy plume rise model turned on

```

c igrnd = 1 then Mills buoyant plume rise modification for ground effects
 c iwash = 1 then stack downwash model turned on
 c igrav = 1 then gravitational settling model turned on
 c = 0 unless specified otherwise, 0 turns model off

c PARAMETER INPUT:

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)	
0	10	1000	50.	
initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
15.	6.	1.	0.001	0.001
ambient temperature Tamb(C)	initial plume temperature TO(C)	initial plume flow rate VO(m3/s)	release diameter d(m)	convective heat release rate(1) qh(w)
20	20	1	1	0

c (1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1	.78

c RECEPTOR DEPENDENT DATA (no line limit)

c FOR MODE make RECEPTOR DEPENDENT DATA
 c 1 (site specific) sector distance receptor-height
 c 2 (by class & wind speed) class windspeed distance offset receptor-height
 c 3 (create plot file) class windspeed xmax imax ymax jmax xmin power

c RECEPTOR PARAMETER DESCRIPTION

c sector = 0, 1, 2... (all, S, SSW, etc.)
 c distance = receptor distance (m)
 c receptor height = height of receptor (m)
 c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
 c windspeed = anemometer wind speed (m/s)
 c offset = offset from plume centerline (m)
 c xmax = maximum distance to plot or calculate to (m)

```

c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size
0      100  0
0      800  0
14     498  0
5      11700 0
5      4070 0
1      5130 0
2      4530 0
3      4000 0
4      3850 0
5      4070 0
6      6090 0
7      8000 0
8      9640 0
9      9190 0
10     10530 0
11     19040 0
12     18930 0
13     20160 0
14     28930 0
15     10300 0
16     5670 0
1      15400 0
2      17400 0
3      14800 0
4      12000 0
5      11700 0
6      12000 0
7      15700 0
8      16100 0
9      18500 0
10     25000 0
11     29000 0
12     26000 0
13     26000 0
14     31500 0
15     26000 0
16     19400 0

```

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 05/08/97
Run Time = 09:10:30.65

INPUT ECHO:

CWC, cwcml51.in 50% Met. ground level
c GXQ Version 4.0 Input File

c mode
1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop
T T F F F F

c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting

c

c X/Q AND WIND SPEED ADJUSTMENT MODELS:

c ipuff idep isrc iwind
0 0 0 0

c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:

c iwake ipm iflow ientr
0 0 0 0

c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:

c (irise igrnd)iwash igrav
0 0 0 0

c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on

```

c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c   release      reference      mixing      frequency
c   height      anemometer     height     to
c   hs(m)       ha(m)          hm(m)      exceed
c                                     Cx(%)
c
c   0.00000E+00  1.00000E+01  1.00000E+03  5.00000E+01
c
c   initial      initial      release      deposition      gravitational
c   plume        plume        duration     velocity        settling
c   width        height      trd(hr)      velocity        velocity
c   Wb(m)        Hb(m)          vd(m/s)      vg(m/s)
c
c   1.50000E+01  6.00000E+00  1.00000E+00  1.00000E-03  1.00000E-03
c
c   ambient      initial      initial      release      convective
c   temperature  plume        plume        heat release
c   Tamb(C)      T0(C)        flow rate   diameter      rate(1)
c                                     V0(m3/s)     d(m)          qh(w)
c
c   2.00000E+01  2.00000E+01  1.00000E+00  1.00000E+00  0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c   X/Q          Wind
c   scaling      Speed
c   factor        Exponent
c   c(?)          a(?)
c
c   1.00000E+00  7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file)   class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

Joint frequency data normalized.

X/Q calculated for single sector.

MODELS SELECTED:

HNF-SD-WM-CN-109 Rev.0

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

CWC, cwcms1.in 50% Met. ground level

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	100.00	1	2.35E-03	2.35E-03	F	15.60
SSW	100	0	100.00	1	1.73E-03	1.73E-03	F	19.00
SW	100	0	100.00	1	2.86E-03	2.86E-03	E	4.70
WSW	100	0	100.00	1	3.36E-03	3.36E-03	C	0.89
W	100	0	100.00	1	2.97E-03	2.97E-03	E	4.70
WNW	100	0	100.00	1	3.07E-03	3.07E-03	E	4.70
NW	100	0	100.00	1	3.19E-03	3.19E-03	E	4.70
NNW	100	0	100.00	1	4.92E-03	4.92E-03	E	2.65
N	100	0	100.00	1	5.33E-03	5.33E-03	E	2.65
NNE	100	0	100.00	1	3.91E-03	3.91E-03	C	0.89
NE	100	0	100.00	1	2.41E-03	2.41E-03	D	2.65
E	100	0	100.00	1	1.98E-03	1.98E-03	E	7.15
ESE	100	0	100.00	1	4.65E-03	4.65E-03	F	7.15
SE	100	0	100.00	1	2.89E-03	2.89E-03	E	4.70
SSE	100	0	100.00	1	2.81E-03	2.81E-03	D	2.65
S	800	0	100.00	1	2.86E-03	2.86E-03	E	4.70
SSW	800	0	100.00	1	6.48E-05	6.48E-05	F	15.60
SW	800	0	100.00	1	4.30E-05	4.30E-05	D	4.70
WSW	800	0	100.00	1	7.78E-05	7.78E-05	C	0.89
W	800	0	100.00	1	8.16E-05	8.16E-05	C	0.89
WNW	800	0	100.00	1	8.14E-05	8.14E-05	C	0.89
NW	800	0	100.00	1	8.20E-05	8.20E-05	C	0.89
NNW	800	0	100.00	1	8.41E-05	8.41E-05	E	4.70
N	800	0	100.00	1	1.43E-04	1.43E-04	E	2.65
NNE	800	0	100.00	1	1.55E-04	1.55E-04	E	2.65
NE	800	0	100.00	1	1.14E-04	1.14E-04	E	4.70
E	800	0	100.00	1	6.56E-05	6.56E-05	D	2.65
ESE	800	0	100.00	1	5.71E-05	5.71E-05	E	7.15
SE	800	0	100.00	1	1.36E-04	1.36E-04	F	7.15
SSE	800	0	100.00	1	8.41E-05	8.41E-05	E	4.70
S	498	0	100.00	1	7.52E-05	7.52E-05	D	2.65
SSW	498	0	100.00	1	7.89E-05	7.89E-05	C	0.89
SW	11700	0	100.00	1	1.82E-04	1.82E-04	E	4.70
WSW	4070	0	100.00	1	1.48E-06	1.48E-06	E	4.70
W	5130	0	100.00	1	6.52E-06	6.52E-06	E	4.70
WNW	4530	0	100.00	1	3.62E-06	3.62E-06	F	15.60
NW	4000	0	100.00	1	2.84E-06	2.84E-06	E	9.80
NNW	3850	0	100.00	1	6.06E-06	6.06E-06	D	2.65
N	4070	0	100.00	1	<u>6.96E-06</u>	6.96E-06	E	4.70
NNE	6090	0	100.00	1	6.52E-06	6.52E-06	E	4.70
NE	8000	0	100.00	1	3.77E-06	3.77E-06	E	4.70
E	9640	0	100.00	1	2.73E-06	2.73E-06	E	4.70
ESE	9190	0	100.00	1	<u>3.69E-06</u>	3.69E-06	E	2.65
SE	10530	0	100.00	1	<u>4.15E-06</u>	4.15E-06	E	2.65
SSE	19040	0	100.00	1	2.57E-06	2.57E-06	E	4.70
S	18930	0	100.00	1	5.77E-07	5.77E-07	E	7.15
SSW	20160	0	100.00	1	5.74E-07	5.74E-07	E	7.15
SW	28930	0	100.00	1	1.39E-06	1.39E-06	F	7.15
WSW	10300	0	100.00	1	4.88E-07	4.88E-07	E	4.70
W	5670	0	100.00	1	1.45E-06	1.45E-06	D	2.65
WNW	15400	0	100.00	1	3.83E-06	3.83E-06	D	2.65
NW		0	100.00	1	7.62E-07	7.62E-07	E	7.15

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SSW	17400	0 100.00	1	3.75E-07	3.75E-07 D	4.70
SW	14800	0 100.00	1	9.02E-07	9.02E-07 D	2.65
WSW	12000	0 100.00	1	1.40E-06	1.40E-06 E	4.70
W	11700	0 100.00	1	1.48E-06	1.48E-06 E	4.70
WNW	12000	0 100.00	1	1.48E-06	1.48E-06 E	4.70
NW	15700	0 100.00	1	1.11E-06	1.11E-06 E	4.70
NNW	16100	0 100.00	1	1.88E-06	1.88E-06 E	2.65
N	18500	0 100.00	1	1.62E-06	1.62E-06 E	2.65
NNE	25000	0 100.00	1	8.21E-07	8.21E-07 E	4.70
NE	29000	0 100.00	1	3.21E-07	3.21E-07 D	2.65
ENE	26000	0 100.00	1	3.72E-07	3.72E-07 D	2.65
E	26000	0 100.00	1	1.01E-06	1.01E-06 F	7.15
ESE	31500	0 100.00	1	4.37E-07	4.37E-07 E	4.70
SE	26000	0 100.00	1	3.77E-07	3.77E-07 E	7.15
SSE	19400	0 100.00	1	6.77E-07	6.77E-07 D	2.65

```

CWC, cwcm52.in 50% Met. building wake
c GXQ Version 4.0 Input File
c mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
  t    t    f    f    f    f
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c      = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c      = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c      = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c      = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c       = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c      = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
  0    0    0    0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
  2    0    0    0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
  0    0    0    0
c ipuff = 1 then X/Q calculated using puff model
c       = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c       = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c       = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c      = 2 then 5th Power Law plume meander model turned on
c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c       = 2 then ISC2 momentum/buoyancy plume rise model turned on

```

c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c = 0 unless specified otherwise, 0 turns model off

PARAMETER INPUT:

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)	
0	10	1000	50.	
initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
15.	6.	1.	0.001	0.001
ambient temperature Tamb(C)	initial plume temperature T0(C)	initial plume flow rate V0(m3/s)	release diameter d(m)	convective heat release rate(1) qh(w)
20	20	1	1	0

(1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1	.78

RECEPTOR DEPENDENT DATA (no line limit)

FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xmin power

RECEPTOR PARAMETER DESCRIPTION

c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)

c imax = distance intervals
 c ymax = maximum offset to plot (m)
 c jmax = offset intervals
 c xqmin = minimum scaled X/Q to calculate
 c power = exponent in power function step size

0	100	0
0	800	0
14	498	0
5	11700	0
5	4070	0
1	5130	0
2	4530	0
3	4000	0
4	3850	0
5	4070	0
6	6090	0
7	8000	0
8	9640	0
9	9190	0
10	10530	0
11	19040	0
12	18930	0
13	20160	0
14	28930	0
15	10300	0
16	5670	0
1	15400	0
2	17400	0
3	14800	0
4	12000	0
5	11700	0
6	12000	0
7	15700	0
8	16100	0
9	18500	0
10	25000	0
11	29000	0
12	26000	0
13	26000	0
14	31500	0
15	26000	0
16	19400	0

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GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 05/09/97
Run Time = 09:43:25.82

INPUT ECHO:
CWC, cwcms2.in 50% Met. building wake
c GXQ Version 4.0 Input File
c mode
c 1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
c T T F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
c 0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
c 2 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
c 0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on
c = 3 then sector average model turned on

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```

c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c   release      reference      mixing      frequency
c   height      anemometer     height     to
c   hs(m)       ha(m)          hm(m)      exceed
c
c   0.00000E+00  1.00000E+01    1.00000E+03  5.00000E+01
c
c   initial      initial      release      deposition      gravitational
c   plume        plume        duration     velocity        settling
c   width        height       trd(hr)      vd(m/s)         velocity
c   Wb(m)        Hb(m)                                     vg(m/s)
c
c   1.50000E+01  6.00000E+00    1.00000E+00  1.00000E-03    1.00000E-03
c
c   ambient      initial      initial      release      convective
c   temperature  plume        plume        flow rate   heat release
c   Tamb(C)      T0(C)        V0(m3/s)    diameter    rate(1)
c
c   2.00000E+01  2.00000E+01    1.00000E+00  1.00000E+00    0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c   X/Q          Wind
c   scaling      Speed
c   factor       Exponent
c   c(?)         a(?)
c
c   1.00000E+00  7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file)   class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

Joint frequency data normalized.

X/Q calculated for single sector.

MODELS SELECTED:

MACCS Virtual source building wake model selected.

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Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

CWC, cwc52.in 50% Met. building wake

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL	AVERAGE	ATM. STAB. CLASS	WIND SPEED (m/s)
					POPULATION SCALED X/Q (s/m3)	INDIVIDUAL SCALED X/Q (s/m3)		
S	100	0	100.00	1	1.37E-03	1.37E-03	B	0.89
SSW	100	0	100.00	1	8.46E-04	8.46E-04	A	0.89
SW	100	0	100.00	1	1.66E-03	1.66E-03	D	2.65
WSW	100	0	100.00	1	2.09E-03	2.09E-03	F	4.70
W	100	0	100.00	1	1.96E-03	1.96E-03	F	4.70
WNW	100	0	100.00	1	1.96E-03	1.96E-03	F	4.70
NW	100	0	100.00	1	1.92E-03	1.92E-03	F	4.70
NNW	100	0	100.00	1	2.07E-03	2.07E-03	F	4.70
N	100	0	100.00	1	2.14E-03	2.14E-03	E	2.65
NNE	100	0	100.00	1	2.03E-03	2.03E-03	F	4.70
NE	100	0	100.00	1	1.07E-03	1.07E-03	E	4.70
ENE	100	0	100.00	1	8.36E-04	8.36E-04	A	0.89
E	100	0	100.00	1	1.85E-03	1.85E-03	F	4.70
ESE	100	0	100.00	1	1.30E-03	1.30E-03	F	7.15
SE	100	0	100.00	1	1.31E-03	1.31E-03	F	7.15
SSE	100	0	100.00	1	1.62E-03	1.62E-03	D	2.65
S	800	0	100.00	1	5.81E-05	5.81E-05	E	7.15
SSW	800	0	100.00	1	3.81E-05	3.81E-05	D	4.70
SW	800	0	100.00	1	7.15E-05	7.15E-05	E	4.70
WSW	800	0	100.00	1	7.64E-05	7.64E-05	C	0.89
W	800	0	100.00	1	7.51E-05	7.51E-05	E	4.70
WNW	800	0	100.00	1	7.54E-05	7.54E-05	E	4.70
NW	800	0	100.00	1	7.58E-05	7.58E-05	E	4.70
NNW	800	0	100.00	1	1.25E-04	1.25E-04	E	2.65
N	800	0	100.00	1	1.36E-04	1.36E-04	E	2.65
NNE	800	0	100.00	1	8.92E-05	8.92E-05	C	0.89
NE	800	0	100.00	1	5.93E-05	5.93E-05	D	2.65
ENE	800	0	100.00	1	5.08E-05	5.08E-05	E	7.15
E	800	0	100.00	1	1.16E-04	1.16E-04	F	7.15
ESE	800	0	100.00	1	7.43E-05	7.43E-05	E	4.70
SE	800	0	100.00	1	6.82E-05	6.82E-05	D	2.65
SSE	800	0	100.00	1	7.19E-05	7.19E-05	E	4.70
ESE	498	0	100.00	1	1.51E-04	1.51E-04	E	4.70
W	11700	0	100.00	1	1.47E-06	1.47E-06	E	4.70
W	4070	0	100.00	1	6.40E-06	6.40E-06	E	4.70
S	5130	0	100.00	1	3.54E-06	3.54E-06	F	15.60
SSW	4530	0	100.00	1	2.80E-06	2.80E-06	E	9.80
SW	4000	0	100.00	1	5.95E-06	5.95E-06	D	2.65
WSW	3850	0	100.00	1	6.82E-06	6.82E-06	E	4.70
W	4070	0	100.00	1	6.40E-06	6.40E-06	E	4.70
WNW	6090	0	100.00	1	3.72E-06	3.72E-06	E	4.70
NW	8000	0	100.00	1	2.70E-06	2.70E-06	E	4.70
NNW	9640	0	100.00	1	3.66E-06	3.66E-06	E	2.65
N	9190	0	100.00	1	4.12E-06	4.12E-06	E	2.65
NNE	10530	0	100.00	1	2.55E-06	2.55E-06	E	4.70
NE	19040	0	100.00	1	5.75E-07	5.75E-07	E	7.15
ENE	18930	0	100.00	1	5.72E-07	5.72E-07	E	7.15
E	20160	0	100.00	1	1.38E-06	1.38E-06	F	7.15
ESE	28930	0	100.00	1	4.87E-07	4.87E-07	E	4.70
SE	10300	0	100.00	1	1.44E-06	1.44E-06	D	2.65
SSE	5670	0	100.00	1	3.78E-06	3.78E-06	D	2.65
S	15400	0	100.00	1	7.59E-07	7.59E-07	E	7.15

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SSW	17400	0 100.00	1	3.74E-07	3.74E-07 D	4.70
SW	14800	0 100.00	1	8.98E-07	8.98E-07 D	2.65
WSW	12000	0 100.00	1	1.39E-06	1.39E-06 E	4.70
W	11700	0 100.00	1	1.47E-06	1.47E-06 E	4.70
WNW	12000	0 100.00	1	1.47E-06	1.47E-06 E	4.70
NW	15700	0 100.00	1	1.10E-06	1.10E-06 E	4.70
NNW	16100	0 100.00	1	1.87E-06	1.87E-06 E	2.65
N	18500	0 100.00	1	1.61E-06	1.61E-06 E	2.65
NNE	25000	0 100.00	1	8.19E-07	8.19E-07 E	4.70
NE	29000	0 100.00	1	3.20E-07	3.20E-07 D	2.65
ENE	26000	0 100.00	1	3.72E-07	3.72E-07 D	2.65
E	26000	0 100.00	1	1.00E-06	1.00E-06 F	7.15
ESE	31500	0 100.00	1	4.36E-07	4.36E-07 E	4.70
SE	26000	0 100.00	1	3.76E-07	3.76E-07 E	7.15
SSE	19400	0 100.00	1	6.74E-07	6.74E-07 D	2.65

CWC Solid Waste Storage XQs, cwc42a.in Area Source

c GXQ Version 4.0 Input File

c mode

1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology

c mode = 2 then X/Q based on atmospheric stability class and wind speed

c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop

t f f f f f

c ifox = t then joint frequency used to compute frequency to exceed X/Q

c = f then joint frequency used to compute annual average X/Q

c inorm = t then joint frequency data is normalized (as in GENII)

c = f then joint frequency data is un-normalized

c icdf = t then cumulative distribution file created (CDF.OUT)

c = f then no cumulative distribution file created

c ichk = t then X/Q parameter print option turned on

c = f then no parameter print

c isite = t then X/Q based on joint frequency data for all 16 sectors

c = f then X/Q based on joint frequency data of individual sectors

c ipop = t then X/Q is population weighted

c = f then no population weighting

c

c X/Q AND WIND SPEED ADJUSTMENT MODELS:

c ipuff idep isrc iwind

0 0 0 0

c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:

c iwake ipm iflow ientr

2 0 0 0

c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:

c (irise igrnd)iwash igrav

0 0 0 0

c ipuff = 1 then X/Q calculated using puff model

c = 0 then X/Q calculated using default continuous plume model

c idep = 1 then plume depletion model turned on (Chamberlain model)

c isrc = 1 then X/Q multiplied by scalar

c = 2 then X/Q adjusted by wind speed function

c iwind = 1 then wind speed corrected for plume height

c iwake = 1 then NRC RG 1.145 building wake model turned on

c = 2 then MACCS virtual distance building wake model turned on

c ipm = 1 then NRC RG 1.145 plume meander model turned on

c = 2 then 5th Power Law plume meander model turned on

c = 3 then sector average model turned on

c iflow = 1 then sigmas adjusted for volume flow rate

c ientr = 1 then method of Pasquill used to account for entrainment

c irise = 1 then MACCS buoyant plume rise model turned on

c = 2 then ISC2 momentum/buoyancy plume rise model turned on

c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c = 0 unless specified otherwise, 0 turns model off

PARAMETER INPUT:

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)	
0	10	1000	0.5	
initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
330.	6.1	1.0	0.001	0.001
ambient temperature Tamb(C)	initial plume temperature TO(C)	initial plume flow rate VO(m3/s)	release diameter d(m)	convective heat release rate(1) qh(w)
20	20	1	1	0

(1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1	.78

RECEPTOR DEPENDENT DATA (no line limit)

FOR MODE make RECEPTOR DEPENDENT DATA
1 (site specific) sector distance receptor-height
2 (by class & wind speed) class windspeed distance offset receptor-height
3 (create plot file) class windspeed xmax imax ymax jmax xmin power

RECEPTOR PARAMETER DESCRIPTION

sector = 0, 1, 2... (all, S, SSW, etc.)
distance = receptor distance (m)
receptor height = height of receptor (m)
class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
windspeed = anemometer wind speed (m/s)
offset = offset from plume centerline (m)
xmax = maximum distance to plot or calculate to (m)

```

c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size
0      100    0
0      800    0
14     498    0
5      11700  0
5      4070   0
1      14680  0
2      15010  0
3      13800  0
4      11740  0
5      11500  0
6      11800  0
7      11830  0
8      9640   0
9      9190   0
10     10530  0
11     19040  0
12     18930  0
13     20160  0
14     28930  0
15     24600  0
16     19150  0

```

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WMC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WMC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Rey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 03/10/97
Run Time = 11:25:44.35

INPUT ECHO:
CWC Solid Waste Storage XQs, cwc42a.in Area Source
c GXQ Version 4.0 Input File
c mode
c 1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
c T F F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
c 0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
c 2 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
c 0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then WDCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power law plume meander model turned on
c = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate

HNF-SD-WM-CN-109 Rev.0

```

c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c      release      reference      mixing      frequency
c      height      height      height      to
c      hs(m)        ha(m)        hm(m)      exceed
c                                     Cx(%)
c
c      0.00000E+00    1.00000E+01    1.00000E+03    5.00000E-01
c
c      initial      initial      release      deposition      gravitational
c      plume        plume        duration     velocity        settling
c      width        height      trd(hr)      velocity        velocity
c      Wb(m)        Hb(m)        trd(hr)      vd(m/s)         vg(m/s)
c
c      3.30000E+02    6.10000E+00    1.00000E+00    1.00000E-03    1.00000E-03
c
c      initial      initial      release      convective
c      plume        plume        plume        heat release
c      temperature  temperature  flow rate    rate(1)
c      Tamb(C)      T0(C)        V0(m3/s)     d(m)         qh(w)
c
c      2.00000E+01    2.00000E+01    1.00000E+00    1.00000E+00    0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q          Wind
c      scaling      Speed
c      factor       Exponent
c      c(?)         a(?)
c
c      1.00000E+00    7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size
c
MODE:
Site specific X/Q calculated.

LOGICAL CHOICES:
Joint frequency used to calculate X/Q based on frequency of exceedance.
No normalization of joint frequency.
X/Q calculated for single sector.

MODELS SELECTED:
MACCS Virtual source building wake model selected.
Default Gaussian plume model selected.

```

HNF-SD-WM-CN-109 Rev.0

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

CWC Solid Waste Storage XQs, cwc42a.in Area Source

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	6.30	1	7.76E-04	7.76E-04	E	0.89
SSW	100	0	4.53	1	6.86E-04	6.86E-04	E	0.89
SW	100	0	2.93	1	7.02E-04	7.02E-04	E	0.89
WSW	100	0	2.72	1	7.02E-04	7.02E-04	E	0.89
W	100	0	4.80	1	8.63E-04	8.63E-04	E	0.89
WNW	100	0	3.98	1	7.82E-04	7.82E-04	E	0.89
NW	100	0	4.72	1	8.09E-04	8.09E-04	E	0.89
NNW	100	0	4.58	1	7.99E-04	7.99E-04	E	0.89
N	100	0	4.36	1	8.89E-04	8.89E-04	F	0.89
NNE	100	0	2.49	1	7.01E-04	7.01E-04	E	0.89
NE	100	0	3.90	1	7.21E-04	7.21E-04	E	0.89
ENE	100	0	6.17	1	7.61E-04	7.61E-04	E	0.89
E	100	0	14.05	1	9.78E-04	9.78E-04	F	0.89
ESE	100	0	18.80	1	8.89E-04	8.89E-04	F	0.89
SE	100	0	10.83	1	8.72E-04	8.72E-04	E	0.89
SSE	100	0	4.78	1	7.68E-04	7.68E-04	E	0.89
S	800	0	6.30	1	1.70E-04	1.70E-04	E	0.89
SSW	800	0	4.53	1	1.40E-04	1.40E-04	G	2.65
SW	800	0	2.93	1	1.49E-04	1.49E-04	G	2.65
WSW	800	0	2.72	1	1.48E-04	1.48E-04	G	2.65
W	800	0	4.80	1	2.08E-04	2.08E-04	E	0.89
WNW	800	0	3.98	1	1.72E-04	1.72E-04	E	0.89
NW	800	0	4.72	1	1.85E-04	1.85E-04	E	0.89
NNW	800	0	4.58	1	1.80E-04	1.80E-04	E	0.89
N	800	0	4.36	1	2.20E-04	2.20E-04	F	0.89
NNE	800	0	2.49	1	1.56E-04	1.56E-04	G	2.65
NE	800	0	3.90	1	1.58E-04	1.58E-04	E	0.89
ENE	800	0	6.17	1	1.63E-04	1.63E-04	E	0.89
E	800	0	14.05	1	2.59E-04	2.59E-04	F	0.89
ESE	800	0	18.80	1	2.20E-04	2.20E-04	F	0.89
SE	800	0	10.83	1	2.13E-04	2.13E-04	E	0.89
SSE	800	0	4.78	1	1.66E-04	1.66E-04	E	0.89
ESE	498	0	18.80	1	3.31E-04	3.31E-04	F	0.89
W	11700	0	4.80	1	1.38E-05	1.38E-05	G	2.65
W	4070	0	4.80	1	3.91E-05	3.91E-05	G	2.65
S	14680	0	6.30	1	6.04E-06	6.04E-06	E	0.89
SSW	15010	0	4.53	1	3.72E-06	3.72E-06	F	2.65
SW	13800	0	2.93	1	5.29E-06	5.29E-06	F	2.65
WSW	11740	0	2.72	1	6.39E-06	6.39E-06	F	2.65
W	11500	0	4.80	1	1.41E-05	1.41E-05	G	2.65
NNW	11800	0	3.98	1	7.87E-06	7.87E-06	G	4.70
NW	11830	0	4.72	1	1.42E-05	1.42E-05	G	2.65
NNW	9640	0	4.58	1	1.76E-05	1.76E-05	G	2.65
N	9190	0	4.36	1	2.06E-05	2.06E-05	G	2.65
NNE	10530	0	2.49	1	8.87E-06	8.87E-06	E	0.89
NE	19040	0	3.90	1	4.50E-06	4.50E-06	E	0.89
ENE	18930	0	6.17	1	7.44E-06	7.44E-06	G	2.65
E	20160	0	14.05	1	9.77E-06	9.77E-06	F	0.89
ESE	28930	0	18.80	1	6.12E-06	6.12E-06	F	0.89
SE	24600	0	10.83	1	6.89E-06	6.89E-06	G	2.65
SSE	19150	0	4.78	1	4.49E-06	4.49E-06	G	4.70

```

CWC, cwcm42b.in 50% Met. ground level
c GXQ Version 4.0 Input File
c mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
  t   t   f   f   f   f
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c       = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c       = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c       = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c       = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c       = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c       = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
  0   0   0   0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
  2   0   0   0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
  0   0   0   0
c ipuff = 1 then X/Q calculated using puff model
c       = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c       = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c       = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c       = 2 then 5th Power Law plume meander model turned on
c       = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c       = 2 then ISC2 momentum/buoyancy plume rise model turned on

```


c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c = 0 unless specified otherwise, 0 turns model off

PARAMETER INPUT:

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)	
0	10	1000	50.	
initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
330.	6.1	1.	0.001	0.001
ambient temperature Tamb(C)	initial plume temperature TO(C)	initial plume flow rate VO(m3/s)	release diameter d(m)	convective heat release rate(1) qh(w)
20	20	1	1	0

(1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1	.78

RECEPTOR DEPENDENT DATA (no line limit)

c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xmin power

RECEPTOR PARAMETER DESCRIPTION

c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)

c imax = distance intervals
 c ymax = maximum offset to plot (m)
 c jmax = offset intervals
 c xqmin = minimum scaled X/Q to calculate
 c power = exponent in power function step size

0	100	0
0	800	0
14	498	0
5	11700	0
5	4070	0
1	5130	0
2	4530	0
3	4000	0
4	3850	0
5	4070	0
6	6090	0
7	8000	0
8	9640	0
9	9190	0
10	10530	0
11	19040	0
12	18930	0
13	20160	0
14	28930	0
15	10300	0
16	5670	0
1	15400	0
2	17400	0
3	14800	0
4	12000	0
5	11700	0
6	12000	0
7	15700	0
8	16100	0
9	18500	0
10	25000	0
11	29000	0
12	26000	0
13	26000	0
14	31500	0
15	26000	0
16	19400	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 05/08/97
Run Time = 09:44:44.70

INPUT ECHO:
CWC, cwcM42b.in 50% Met. ground Level
c GXQ Version 4.0 Input File
c mode
1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
T T F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
2 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on
c = 3 then sector average model turned on

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```

c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c   release      reference      mixing      frequency
c   height      anemometer     height     to
c   hs(m)       ha(m)          hm(m)      exceed
c
c   0.00000E+00  1.00000E+01    1.00000E+03  5.00000E+01
c
c   initial      initial      release      deposition      gravitational
c   plume        plume        duration     velocity        settling
c   width        height       trd(hr)      vd(m/s)         velocity
c   Wb(m)        Hb(m)                                     vg(m/s)
c
c   3.30000E+02  6.10000E+00    1.00000E+00  1.00000E-03    1.00000E-03
c
c   ambient      initial      initial      release      convective
c   temperature  plume        plume        diameter    heat release
c   Tamb(C)      T0(C)        flow rate   d(m)         rate(1)
c               V0(m3/s)                                     qh(w)
c
c   2.00000E+01  2.00000E+01    1.00000E+00  1.00000E+00    0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c   X/Q          Wind
c   scaling      Speed
c   factor        Exponent
c   c(?)         a(?)
c
c   1.00000E+00  7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file)   class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size
c
MODE:
Site specific X/Q calculated.

LOGICAL CHOICES:
Joint frequency used to calculate X/Q based on frequency of exceedance.
Joint frequency data normalized.
X/Q calculated for single sector.

MODELS SELECTED:
MACCS Virtual source building wake model selected.

```

HNF-SD-WM-CN-109 Rev.0

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

CWC, cwc42b.in 50% Met. ground level

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	100.00	1	2.05E-04	2.05E-04	D	2.65
SSW	100	0	100.00	1	1.43E-04	1.43E-04	E	4.70
SW	100	0	100.00	1	2.44E-04	2.44E-04	E	2.65
WSW	100	0	100.00	1	2.87E-04	2.87E-04	B	0.89
W	100	0	100.00	1	2.52E-04	2.52E-04	E	2.65
WNW	100	0	100.00	1	2.45E-04	2.45E-04	E	2.65
NW	100	0	100.00	1	2.37E-04	2.37E-04	A	0.89
NNW	100	0	100.00	1	2.35E-04	2.35E-04	A	0.89
N	100	0	100.00	1	2.48E-04	2.48E-04	E	2.65
NNE	100	0	100.00	1	2.40E-04	2.40E-04	A	0.89
NE	100	0	100.00	1	1.43E-04	1.43E-04	E	4.70
ENE	100	0	100.00	1	1.27E-04	1.27E-04	F	7.15
E	100	0	100.00	1	1.99E-04	1.99E-04	D	2.65
ESE	100	0	100.00	1	1.51E-04	1.51E-04	G	7.15
SE	100	0	100.00	1	1.82E-04	1.82E-04	F	4.70
SSE	100	0	100.00	1	2.32E-04	2.32E-04	G	4.70
S	800	0	100.00	1	3.09E-05	3.09E-05	E	4.70
SSW	800	0	100.00	1	1.96E-05	1.96E-05	E	7.15
SW	800	0	100.00	1	3.72E-05	3.72E-05	D	2.65
WSW	800	0	100.00	1	4.39E-05	4.39E-05	C	0.89
W	800	0	100.00	1	4.23E-05	4.23E-05	C	0.89
WNW	800	0	100.00	1	4.28E-05	4.28E-05	C	0.89
NW	800	0	100.00	1	4.32E-05	4.32E-05	C	0.89
NNW	800	0	100.00	1	5.18E-05	5.18E-05	F	4.70
N	800	0	100.00	1	5.30E-05	5.30E-05	E	2.65
NNE	800	0	100.00	1	5.08E-05	5.08E-05	F	4.70
NE	800	0	100.00	1	2.54E-05	2.54E-05	B	0.89
ENE	800	0	100.00	1	2.08E-05	2.08E-05	E	7.15
E	800	0	100.00	1	4.81E-05	4.81E-05	F	4.70
ESE	800	0	100.00	1	3.19E-05	3.19E-05	D	2.65
SE	800	0	100.00	1	3.13E-05	3.13E-05	E	4.70
SSE	800	0	100.00	1	3.71E-05	3.71E-05	D	2.65
ESE	498	0	100.00	1	4.89E-05	4.89E-05	F	7.15
W	11700	0	100.00	1	1.34E-06	1.34E-06	E	4.70
W	4070	0	100.00	1	5.00E-06	5.00E-06	E	4.70
S	5130	0	100.00	1	2.77E-06	2.77E-06	E	7.15
SSW	4530	0	100.00	1	2.29E-06	2.29E-06	D	4.70
SW	4000	0	100.00	1	4.82E-06	4.82E-06	D	2.65
WSW	3850	0	100.00	1	5.30E-06	5.30E-06	E	4.70
W	4070	0	100.00	1	5.00E-06	5.00E-06	E	4.70
WNW	6090	0	100.00	1	3.11E-06	3.11E-06	E	4.70
NW	8000	0	100.00	1	2.33E-06	2.33E-06	E	4.70
NNW	9640	0	100.00	1	3.18E-06	3.18E-06	E	2.65
N	9190	0	100.00	1	3.65E-06	3.65E-06	E	2.65
NNE	10530	0	100.00	1	2.27E-06	2.27E-06	E	4.70
NE	19040	0	100.00	1	5.43E-07	5.43E-07	E	7.15
ENE	18930	0	100.00	1	5.36E-07	5.36E-07	E	7.15
E	20160	0	100.00	1	1.28E-06	1.28E-06	F	7.15
ESE	28930	0	100.00	1	4.66E-07	4.66E-07	E	4.70
SE	10300	0	100.00	1	1.32E-06	1.32E-06	D	2.65
SSE	5670	0	100.00	1	3.19E-06	3.19E-06	D	2.65
S	15400	0	100.00	1	7.04E-07	7.04E-07	E	7.15

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SSW	17400	0 100.00	1	3.55E-07	3.55E-07 D	4.70
SW	14800	0 100.00	1	8.43E-07	8.43E-07 D	2.65
WSW	12000	0 100.00	1	1.27E-06	1.27E-06 E	4.70
W	11700	0 100.00	1	1.34E-06	1.34E-06 E	4.70
WNW	12000	0 100.00	1	1.34E-06	1.34E-06 E	4.70
NW	15700	0 100.00	1	1.02E-06	1.02E-06 E	4.70
NNW	16100	0 100.00	1	1.72E-06	1.72E-06 E	2.65
N	18500	0 100.00	1	1.51E-06	1.51E-06 E	2.65
NNE	25000	0 100.00	1	7.79E-07	7.79E-07 E	4.70
NE	29000	0 100.00	1	3.10E-07	3.10E-07 D	2.65
ENE	26000	0 100.00	1	3.59E-07	3.59E-07 D	2.65
E	26000	0 100.00	1	9.43E-07	9.43E-07 F	7.15
ESE	31500	0 100.00	1	4.19E-07	4.19E-07 E	4.70
SE	26000	0 100.00	1	3.60E-07	3.60E-07 E	7.15
SSE	19400	0 100.00	1	6.39E-07	6.39E-07 D	2.65

APPENDIX B

T-PLANT

GXQ INPUT AND OUTPUT FILES

HNF-SD-WM-CN-109 Rev.0

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TP99.5 T PLANT XQs,Case 1-tp1.in, Acute Ground Level Release, no plume meander
c GXQ Version 4.0 Input File
c  mode
c  1
c
c  MODE CHOICE:
c  mode = 1 then X/Q based on Hanford site specific meteorology
c  mode = 2 then X/Q based on atmospheric stability class and wind speed
c  mode = 3 then X/Q plot file is created
c
c  LOGICAL CHOICES:
c  ifox  inorm icdf  ichk  isite ipop
c  t      f      f      f      f      f
c  ifox = t then joint frequency used to compute frequency to exceed X/Q
c        = f then joint frequency used to compute annual average X/Q
c  inorm = t then joint frequency data is normalized (as in GENII)
c        = f then joint frequency data is un-normalized
c  icdf  = t then cumulative distribution file created (CDF.OUT)
c        = f then no cumulative distribution file created
c  ichk  = t then X/Q parameter print option turned on
c        = f then no parameter print
c  isite = t then X/Q based on joint frequency data for all 16 sectors
c        = f then X/Q based on joint frequency data of individual sectors
c  ipop  = t then X/Q is population weighted
c        = f then no population weighting
c
c  X/Q AND WIND SPEED ADJUSTMENT MODELS:
c  ipuff idep isrc iwind
c  0      0      0      0
c  DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c  iwake ipm  iflow ientr
c  0      0      0      0
c  EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c  (irise igrnd)iwash igrav
c  0      0      0      0
c  ipuff = 1 then X/Q calculated using puff model
c        = 0 then X/Q calculated using default continuous plume model
c  idep  = 1 then plume depletion model turned on (Chamberlain model)
c  isrc  = 1 then X/Q multiplied by scalar
c        = 2 then X/Q adjusted by wind speed function
c  iwind = 1 then wind speed corrected for plume height
c  iwake = 1 then NRC RG 1.145 building wake model turned on
c        = 2 then MACCS virtual distance building wake model turned on
c  ipm   = 1 then NRC RG 1.145 plume meander model turned on
c        = 2 then 5th Power Law plume meander model turned on
c        = 3 then sector average model turned on
c  iflow = 1 then sigmas adjusted for volume flow rate
c  ientr = 1 then method of Pasquill used to account for entrainment
c  irise = 1 then MACCS buoyant plume rise model turned on

```

```

c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c      reference frequency
c release      anemometer      mixing      to
c height      height      height      exceed
c hs(m)      ha(m)      hm(m)      Cx(%)
c
c      0      10      1000      0.5
c
c initial      initial      release      deposition      gravitational
c plume      plume      duration      velocity      settling
c width      height      trd(hr)      velocity      velocity
c Wb(m)      Hb(m)      vd(m/s)      vg(m/s)
c
c      0      0      1.0      0.001      0.001
c
c      initial      initial      release      convective
c ambient      plume      plume      heat release
c temperature      temperature      flow rate      rate(1)
c Tamb(C)      T0(C)      V0(m3/s)      d(m)      qh(w)
c
c      20      20      1      1      0
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c X/Q      Wind
c scaling      Speed
c factor      Exponent
c c(?)      a(?)
c
c      1      .78
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed)      class windspeed distance offset receptor-height
c 3 (create plot file)      class windspeed xmax imax ymax jmax xmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals

```

c ymax = maximum offset to plot (m)
 c jmax = offset intervals
 c xqmin = minimum scaled X/Q to calculate
 c power = exponent in power function step size

0	100	0
0	500	0
0	1000	0
1	15390	0
3	15690	0
4	13380	0
5	13090	0
6	13450	0
7	15250	0
8	16290	0
9	17540	0
10	25860	0
11	25650	0
12	22930	0
13	22600	0
14	27090	0
15	24170	0
16	21070	0
1	15390	0
2	15650	0
3	15690	0
4	13380	0
5	13090	0
6	13450	0
7	11590	0
8	8870	0
9	8980	0
10	11560	0
11	17450	0
12	17210	0
13	18190	0
14	27090	0
15	24170	0
16	21070	0
1	6060	0
2	6060	0
3	5770	0
4	5570	0
5	5890	0
6	8440	0
7	10060	0
8	16290	0
9	17540	0
10	25860	0
11	25650	0
12	22930	0

13	22600	0
14	27090	0
15	13940	0
16	7560	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Key
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 06/11/96
Run Time = 13:50:22.47

INPUT ECHO:
TP99.5 T PLANT XQs,Case 1-tp1.in, Acute Ground Level Release, no plume meander
c GXQ Version 4.0 Input File
c mode
1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
T F F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
0 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on
c = 3 then sector average model turned on

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```

c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downdraft model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off

c      release      reference      mixing      to
c      height      anemometer      height      exceed
c      hs(m)      ha(m)      hm(m)      Cx(%)
c
c      0.00000E+00      1.00000E+01      1.00000E+03      5.00000E-01
c
c      initial      initial      release      deposition      gravitational
c      plume      plume      duration      velocity      settling
c      width      height      trd(hr)      vd(m/s)      velocity
c      Wb(m)      Hb(m)      vd(m/s)      vd(m/s)      vg(m/s)
c
c      0.00000E+00      0.00000E+00      1.00000E+00      1.00000E-03      1.00000E-03
c
c      ambient      initial      initial      release      convective
c      temperature      plume      plume      diameter      heat release
c      Tamb(C)      T0(C)      flow rate      d(m)      rate(1)
c                  V0(m3/s)      d(m)      qh(w)
c
c      2.00000E+01      2.00000E+01      1.00000E+00      1.00000E+00      0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q      Wind
c      scaling      Speed
c      factor      Exponent
c      c(?)      a(?)
c
c      1.00000E+00      7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

MODE:
Site specific X/Q calculated.

LOGICAL CHOICES:
Joint frequency used to calculate X/Q based on frequency of exceedance.
No normalization of joint frequency.
X/Q calculated for single sector.

MODELS SELECTED:
Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

```

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JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

TP99.5 T PLANT XQs,Case 1-tp1.in, Acute Ground Level Release, no plume meander

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION X/Q (s/m ³)	AVERAGE INDIVIDUAL X/Q (s/m ³)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	6.30	1	1.56E-02	1.56E-02	E	0.89
SSW	100	0	4.53	1	1.13E-02	1.13E-02	F	2.65
SW	100	0	2.93	1	1.21E-02	1.21E-02	F	2.65
WSW	100	0	2.72	1	1.22E-02	1.22E-02	F	2.65
W	100	0	4.80	1	2.80E-02	2.80E-02	G	2.65
WNW	100	0	3.98	1	1.60E-02	1.60E-02	G	4.70
NW	100	0	4.72	1	2.89E-02	2.89E-02	G	2.65
NNW	100	0	4.58	1	2.90E-02	2.90E-02	G	2.65
N	100	0	4.36	1	3.12E-02	3.12E-02	G	2.65
NNE	100	0	2.49	1	1.54E-02	1.54E-02	E	0.89
NE	100	0	3.90	1	1.57E-02	1.57E-02	E	0.89
ENE	100	0	6.17	1	2.52E-02	2.52E-02	G	2.65
E	100	0	14.05	1	3.41E-02	3.41E-02	F	0.89
ESE	100	0	18.80	1	3.25E-02	3.25E-02	F	0.89
SE	100	0	10.83	1	3.07E-02	3.07E-02	G	2.65
SSE	100	0	4.78	1	1.58E-02	1.58E-02	G	4.70
S	500	0	6.30	1	9.91E-04	9.91E-04	E	0.89
SSW	500	0	4.53	1	7.21E-04	7.21E-04	F	2.65
SW	500	0	2.93	1	7.75E-04	7.75E-04	F	2.65
WSW	500	0	2.72	1	7.78E-04	7.78E-04	F	2.65
W	500	0	4.80	1	1.79E-03	1.79E-03	G	2.65
WNW	500	0	3.98	1	1.02E-03	1.02E-03	G	4.70
NW	500	0	4.72	1	1.86E-03	1.86E-03	G	2.65
NNW	500	0	4.58	1	1.86E-03	1.86E-03	G	2.65
N	500	0	4.36	1	2.00E-03	2.00E-03	G	2.65
NNE	500	0	2.49	1	9.73E-04	9.73E-04	E	0.89
NE	500	0	3.90	1	9.99E-04	9.99E-04	E	0.89
ENE	500	0	6.17	1	1.62E-03	1.62E-03	G	2.65
E	500	0	14.05	1	2.18E-03	2.18E-03	F	0.89
ESE	500	0	18.80	1	2.08E-03	2.08E-03	F	0.89
SE	500	0	10.83	1	1.97E-03	1.97E-03	G	2.65
SSE	500	0	4.78	1	1.00E-03	1.00E-03	G	4.70
S	1000	0	6.30	1	3.16E-04	3.16E-04	E	0.89
SSW	1000	0	4.53	1	2.27E-04	2.27E-04	F	2.65
SW	1000	0	2.93	1	2.45E-04	2.45E-04	F	2.65
WSW	1000	0	2.72	1	2.46E-04	2.46E-04	F	2.65
W	1000	0	4.80	1	5.65E-04	5.65E-04	G	2.65
WNW	1000	0	3.98	1	3.23E-04	3.23E-04	G	4.70
NW	1000	0	4.72	1	5.84E-04	5.84E-04	G	2.65
NNW	1000	0	4.58	1	5.86E-04	5.86E-04	G	2.65
N	1000	0	4.36	1	6.30E-04	6.30E-04	G	2.65
NNE	1000	0	2.49	1	3.13E-04	3.13E-04	E	0.89
NE	1000	0	3.90	1	3.18E-04	3.18E-04	E	0.89
ENE	1000	0	6.17	1	5.10E-04	5.10E-04	G	2.65
E	1000	0	14.05	1	6.88E-04	6.88E-04	F	0.89
ESE	1000	0	18.80	1	6.55E-04	6.55E-04	F	0.89
SE	1000	0	10.83	1	6.20E-04	6.20E-04	G	2.65
SSE	1000	0	4.78	1	3.19E-04	3.19E-04	G	4.70
S	15390	0	6.30	1	6.49E-06	6.49E-06	E	0.89
SW	15690	0	2.93	1	5.13E-06	5.13E-06	F	2.65
WSW	13380	0	2.72	1	6.29E-06	6.29E-06	F	2.65
W	13090	0	4.80	1	1.52E-05	1.52E-05	G	2.65
WNW	13450	0	3.98	1	8.29E-06	8.29E-06	G	4.70
NW	13250	0	4.72	1	1.31E-05	1.31E-05	G	2.65
NNW	16290	0	4.58	1	1.21E-05	1.21E-05	G	2.65
N	17540	0	4.36	1	1.18E-05	1.18E-05	G	2.65

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NNE	25860	0	2.49	1	3.17E-06	3.17E-06	E	0.89
NE	25650	0	3.90	1	3.46E-06	3.46E-06	E	0.89
ENE	22930	0	6.17	1	6.89E-06	6.89E-06	G	2.65
E	22600	0	14.05	1	9.38E-06	9.38E-06	F	0.89
ESE	27090	0	18.80	1	7.18E-06	7.18E-06	F	0.89
SE	24170	0	10.83	1	7.83E-06	7.83E-06	G	2.65
SSE	21070	0	4.78	1	4.48E-06	4.48E-06	G	4.70
S	15390	0	6.30	1	6.49E-06	6.49E-06	E	0.89
SSW	15650	0	4.53	1	4.02E-06	4.02E-06	F	2.65
SW	15690	0	2.93	1	5.13E-06	5.13E-06	F	2.65
WSW	13380	0	2.72	1	6.29E-06	6.29E-06	F	2.65
W	13090	0	4.80	1	1.52E-05	1.52E-05	G	2.65
WNW	13450	0	3.98	1	8.29E-06	8.29E-06	G	4.70
NW	11590	0	4.72	1	1.84E-05	1.84E-05	G	2.65
NNW	8870	0	4.58	1	2.60E-05	2.60E-05	G	2.65
N	8980	0	4.36	1	2.74E-05	2.74E-05	G	2.65
NNE	11560	0	2.49	1	9.05E-06	9.05E-06	E	0.89
NE	17450	0	3.90	1	5.64E-06	5.64E-06	E	0.89
ENE	17210	0	6.17	1	9.81E-06	9.81E-06	G	2.65
E	18190	0	14.05	1	1.23E-05	1.23E-05	F	0.89
ESE	27090	0	18.80	1	7.18E-06	7.18E-06	F	0.89
SE	24170	0	10.83	1	7.83E-06	7.83E-06	G	2.65
SSE	21070	0	4.78	1	4.48E-06	4.48E-06	G	4.70
S	6060	0	6.30	1	2.22E-05	2.22E-05	E	0.89
SSW	6060	0	4.53	1	1.35E-05	1.35E-05	F	2.65
SW	5770	0	2.93	1	1.87E-05	1.87E-05	F	2.65
WSW	5570	0	2.72	1	1.96E-05	1.96E-05	F	2.65
W	5890	0	4.80	1	4.26E-05	4.26E-05	G	2.65
WNW	8440	0	3.98	1	1.51E-05	1.51E-05	G	4.70
NW	10060	0	4.72	1	2.21E-05	2.21E-05	G	2.65
NNW	16290	0	4.58	1	1.21E-05	1.21E-05	G	2.65
N	17540	0	4.36	1	1.18E-05	1.18E-05	G	2.65
NNE	25860	0	2.49	1	3.17E-06	3.17E-06	E	0.89
NE	25650	0	3.90	1	3.46E-06	3.46E-06	E	0.89
ENE	22930	0	6.17	1	6.89E-06	6.89E-06	G	2.65
E	22600	0	14.05	1	9.38E-06	9.38E-06	F	0.89
ESE	27090	0	18.80	1	7.18E-06	7.18E-06	F	0.89
SE	13940	0	10.83	1	1.55E-05	1.55E-05	G	2.65
SSE	7560	0	4.78	1	1.68E-05	1.68E-05	G	4.70


```

TP99.5 T PLANT XQs,Case 1-tp1s.in, Stack Release, no plume meander
c GXQ Version 4.0 Input File
c mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c   ifox inorm icdf ichk isite ipop
c   t     f     f     f     f     f
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c      = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c      = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c      = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c      = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c      = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c      = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c   ipuff idep isrc iwind
c   0       0   0    0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c   iwake ipm iflow ientr
c   0     0  0    0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c   (irise igrnd)iwash igrav
c   0       0  0    0
c ipuff = 1 then X/Q calculated using puff model
c      = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c      = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c      = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c      = 2 then 5th Power Law plume meander model turned on
c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on

```

```

c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c      reference frequency
c  release      anemometer      mixing      to
c  height       height         height      exceed
c  hs(m)        ha(m)          hm(m)     Cx(%)
c
c  61           10           1000         0.5
c
c  initial      initial      release      deposition      gravitational
c  plume        plume        duration     velocity        settling
c  width        height      trd(hr)        velocity        velocity
c  Wb(m)        Hb(m)                vd(m/s)        vg(m/s)
c
c  0            0            1.0           0.001         0.001
c
c  ambient      initial      initial      release      convective
c  temperature  plume        plume        diameter    heat release
c  Tamb(C)      temperature  flow rate    d(m)         rate(1)
c              T0(C)         V0(m3/s)                qh(w)
c
c  20           20           1            1            0
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c  X/Q          Wind
c  scaling      Speed
c  factor       Exponent
c  c(?)         a(?)
c
c  1            .78
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals

```

c ymax = maximum offset to plot (m)
 c jmax = offset intervals
 c xqmin = minimum scaled X/Q to calculate
 c power = exponent in power function step size

0	100	0
0	500	0
0	1000	0
1	15390	0
3	15690	0
4	13380	0
5	13090	0
6	13450	0
7	15250	0
8	16290	0
9	17540	0
10	25860	0
11	25650	0
12	22930	0
13	22600	0
14	27090	0
15	24170	0
16	21070	0
1	15390	0
2	15650	0
3	15690	0
4	13380	0
5	13090	0
6	13450	0
7	11590	0
8	8870	0
9	8980	0
10	11560	0
11	17450	0
12	17210	0
13	18190	0
14	27090	0
15	24170	0
16	21070	0
1	6060	0
2	6060	0
3	5770	0
4	5570	0
5	5890	0
6	8440	0
7	10060	0
8	16290	0
9	17540	0
10	25860	0
11	25650	0
12	22930	0

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13	22600	0
14	27090	0
15	13940	0
16	7560	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 03/18/97
Run Time = 09:16:30.63

```

INPUT ECHO:
TP99.5 T PLANT XQs,Case 1-tp1s.in, Stack Release, no plume meander
c GXQ Version 4.0 Input File
c  mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
  T   F   F   F   F   F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c      = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c      = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c      = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c      = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c      = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c      = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
  0   0   0   0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
  0   0   0   0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (iirse igrnd)iwash igrav
  0   0   0   0
c ipuff = 1 then X/Q calculated using puff model
c      = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c      = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c      = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c      = 2 then 5th Power Law plume meander model turned on
c      = 3 then sector average model turned on
  
```

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```

c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c      reference      frequency
c      release        anemometer      mixing      to
c      height         height          height     exceed
c      hs(m)          ha(m)           hm(m)      Cx(%)
c
c      6.10000E+01    1.00000E+01    1.00000E+03    5.00000E-01
c
c      initial        initial
c      plume          plume
c      width          height          release      deposition    gravitational
c      Wb(m)          Hb(m)           trd(hr)      velocity      settling
c                                     vd(m/s)      velocity
c                                     vg(m/s)
c
c      0.00000E+00    0.00000E+00    1.00000E+00    1.00000E-03    1.00000E-03
c
c      ambient        initial
c      temperature    plume
c      Tamb(C)        temperature
c
c      2.00000E+01    2.00000E+01    1.00000E+00    1.00000E+00    0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q            Wind
c      scaling        Speed
c      factor          Exponent
c      c(?)           a(?)
c
c      1.00000E+00    7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax ymax xmax xmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:
Site specific X/Q calculated.

LOGICAL CHOICES:
Joint frequency used to calculate X/Q based on frequency of exceedance.
No normalization of joint frequency.
X/Q calculated for single sector.

MODELS SELECTED:
Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

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JOINT FREQUENCY DATA:
200 AREA (HMS) - 61 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

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SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m ³)	AVERAGE INDIVIDUAL SCALED X/Q (s/m ³)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	6.11	1	6.52E-08	6.52E-08	A	2.65
SSW	100	0	4.33	1	3.39E-08	3.39E-08	A	2.65
SW	100	0	2.79	1	2.66E-08	2.66E-08	A	4.70
WSW	100	0	2.54	1	3.14E-08	3.14E-08	A	2.65
W	100	0	4.56	1	6.87E-08	6.87E-08	A	2.65
WNW	100	0	3.80	1	3.96E-08	3.96E-08	A	2.65
NW	100	0	4.58	1	3.26E-08	3.26E-08	A	2.65
NNW	100	0	4.51	1	1.56E-08	1.56E-08	A	7.15
N	100	0	4.31	1	1.19E-08	1.19E-08	A	9.80
NNE	100	0	2.48	1	1.36E-18	1.36E-18	C	7.15
NE	100	0	3.95	1	9.72E-09	9.72E-09	A	9.80
ENE	100	0	6.33	1	1.82E-08	1.82E-08	A	7.15
E	100	0	14.39	1	2.12E-08	2.12E-08	A	4.70
ESE	100	0	19.39	1	2.25E-08	2.25E-08	A	4.70
SE	100	0	11.01	1	2.97E-08	2.97E-08	A	4.70
SSE	100	0	4.75	1	3.45E-08	3.45E-08	A	2.65
S	500	0	6.11	1	2.19E-05	2.19E-05	A	0.89
SSW	500	0	4.33	1	1.27E-05	1.27E-05	C	2.65
SW	500	0	2.79	1	8.66E-06	8.66E-06	B	4.70
WSW	500	0	2.54	1	1.47E-05	1.47E-05	B	2.65
W	500	0	4.56	1	2.37E-05	2.37E-05	A	0.89
WNW	500	0	3.80	1	1.40E-05	1.40E-05	B	2.65
NW	500	0	4.58	1	1.07E-05	1.07E-05	C	2.65
NNW	500	0	4.51	1	8.27E-06	8.27E-06	A	2.65
N	500	0	4.31	1	7.28E-06	7.28E-06	C	4.70
NNE	500	0	2.48	1	2.17E-06	2.17E-06	A	9.80
NE	500	0	3.95	1	4.34E-06	4.34E-06	B	9.80
ENE	500	0	6.33	1	5.42E-06	5.42E-06	B	7.15
E	500	0	14.39	1	8.07E-06	8.07E-06	A	2.65
ESE	500	0	19.39	1	8.61E-06	8.61E-06	A	2.65
SE	500	0	11.01	1	1.07E-05	1.07E-05	C	2.65
SSE	500	0	4.75	1	1.25E-05	1.25E-05	C	2.65
S	1000	0	6.11	1	2.24E-05	2.24E-05	D	0.89
SSW	1000	0	4.33	1	2.04E-05	2.04E-05	B	0.89
SW	1000	0	2.79	1	1.98E-05	1.98E-05	B	0.89
WSW	1000	0	2.54	1	2.10E-05	2.10E-05	B	0.89
W	1000	0	4.56	1	2.25E-05	2.25E-05	D	0.89
WNW	1000	0	3.80	1	2.03E-05	2.03E-05	B	0.89
NW	1000	0	4.58	1	1.65E-05	1.65E-05	B	0.89
NNW	1000	0	4.51	1	9.24E-06	9.24E-06	D	2.65
N	1000	0	4.31	1	7.68E-06	7.68E-06	D	2.65
NNE	1000	0	2.48	1	5.40E-06	5.40E-06	E	0.89
NE	1000	0	3.95	1	5.58E-06	5.58E-06	E	0.89
ENE	1000	0	6.33	1	6.20E-06	6.20E-06	C	4.70
E	1000	0	14.39	1	9.22E-06	9.22E-06	D	2.65
ESE	1000	0	19.39	1	1.06E-05	1.06E-05	C	2.65
SE	1000	0	11.01	1	2.02E-05	2.02E-05	B	0.89
SSE	1000	0	4.75	1	1.99E-05	1.99E-05	B	0.89
S	15390	0	6.11	1	2.75E-06	2.75E-06	F	2.65
SW	15690	0	2.79	1	2.26E-06	2.26E-06	D	0.89
WSW	13380	0	2.54	1	2.77E-06	2.77E-06	D	0.89
W	13090	0	4.56	1	5.45E-06	5.45E-06	E	0.89
WNW	13450	0	3.80	1	4.84E-06	4.84E-06	E	0.89
NW	15250	0	4.58	1	5.34E-06	5.34E-06	E	0.89
NNW	16290	0	4.51	1	5.72E-06	5.72E-06	G	0.89
N	17540	0	4.31	1	5.67E-06	5.67E-06	G	0.89

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NNE	25860	0	2.48	1	1.79E-06	1.79E-06	F	2.65
NE	25650	0	3.95	1	1.82E-06	1.82E-06	G	2.65
ENE	22930	0	6.33	1	2.41E-06	2.41E-06	G	2.65
E	22600	0	14.39	1	5.39E-06	5.39E-06	F	0.89
ESE	27090	0	19.39	1	3.10E-06	3.10E-06	E	0.89
SE	24170	0	11.01	1	2.74E-06	2.74E-06	E	0.89
SSE	21070	0	4.75	1	2.23E-06	2.23E-06	F	2.65
S	15390	0	6.11	1	2.75E-06	2.75E-06	F	2.65
SSW	15650	0	4.33	1	2.25E-06	2.25E-06	D	0.89
SW	15690	0	2.79	1	2.26E-06	2.26E-06	D	0.89
WSW	13380	0	2.54	1	2.77E-06	2.77E-06	D	0.89
W	13090	0	4.56	1	5.45E-06	5.45E-06	E	0.89
WNW	13450	0	3.80	1	4.84E-06	4.84E-06	E	0.89
NW	11590	0	4.58	1	6.40E-06	6.40E-06	G	0.89
NNW	8870	0	4.51	1	8.13E-06	8.13E-06	E	0.89
N	8980	0	4.31	1	8.33E-06	8.33E-06	E	0.89
NNE	11560	0	2.48	1	3.33E-06	3.33E-06	F	2.65
NE	17450	0	3.95	1	2.48E-06	2.48E-06	F	2.65
ENE	17210	0	6.33	1	3.52E-06	3.52E-06	E	0.89
E	18190	0	14.39	1	6.32E-06	6.32E-06	G	0.89
ESE	27090	0	19.39	1	3.10E-06	3.10E-06	E	0.89
SE	24170	0	11.01	1	2.74E-06	2.74E-06	E	0.89
SSE	21070	0	4.75	1	2.23E-06	2.23E-06	F	2.65
S	6060	0	6.11	1	9.87E-06	9.87E-06	D	0.89
SSW	6060	0	4.33	1	7.11E-06	7.11E-06	D	0.89
SW	5770	0	2.79	1	7.36E-06	7.36E-06	D	0.89
WSW	5570	0	2.54	1	8.16E-06	8.16E-06	D	0.89
W	5890	0	4.56	1	1.16E-05	1.16E-05	E	0.89
WNW	8440	0	3.80	1	5.47E-06	5.47E-06	G	0.89
NW	10060	0	4.58	1	6.72E-06	6.72E-06	G	0.89
NNW	16290	0	4.51	1	5.72E-06	5.72E-06	G	0.89
N	17540	0	4.31	1	5.67E-06	5.67E-06	G	0.89
NNE	25860	0	2.48	1	1.79E-06	1.79E-06	F	2.65
NE	25650	0	3.95	1	1.82E-06	1.82E-06	G	2.65
ENE	22930	0	6.33	1	2.41E-06	2.41E-06	G	2.65
E	22600	0	14.39	1	5.39E-06	5.39E-06	F	0.89
ESE	27090	0	19.39	1	3.10E-06	3.10E-06	E	0.89
SE	13940	0	11.01	1	5.22E-06	5.22E-06	E	0.89
SSE	7560	0	4.75	1	6.84E-06	6.84E-06	D	0.89

TP99.5 T PLANT XQs,Case 1-tplw.in, Acute Ground Level Release, wake effect
c GXQ Version 4.0 Input File

c mode

1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology

c mode = 2 then X/Q based on atmospheric stability class and wind speed

c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop

t f f f f f

c ifox = t then joint frequency used to compute frequency to exceed X/Q

c = f then joint frequency used to compute annual average X/Q

c inorm = t then joint frequency data is normalized (as in GENII)

c = f then joint frequency data is un-normalized

c icdf = t then cumulative distribution file created (CDF.OUT)

c = f then no cumulative distribution file created

c ichk = t then X/Q parameter print option turned on

c = f then no parameter print

c isite = t then X/Q based on joint frequency data for all 16 sectors

c = f then X/Q based on joint frequency data of individual sectors

c ipop = t then X/Q is population weighted

c = f then no population weighting

c

c X/Q AND WIND SPEED ADJUSTMENT MODELS:

c ipuff idep isrc iwind

0 0 0 0

c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:

c iwake ipm iflow ientr

2 0 0 0

c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:

c (irise igrnd)iwash igrav

0 0 0 0

c ipuff = 1 then X/Q calculated using puff model

c = 0 then X/Q calculated using default continuous plume model

c idep = 1 then plume depletion model turned on (Chamberlain model)

c isrc = 1 then X/Q multiplied by scalar

c = 2 then X/Q adjusted by wind speed function

c iwind = 1 then wind speed corrected for plume height

c iwake = 1 then NRC RG 1.145 building wake model turned on

c = 2 then MACCS virtual distance building wake model turned on

c ipm = 1 then NRC RG 1.145 plume meander model turned on

c = 2 then 5th Power Law plume meander model turned on

c = 3 then sector average model turned on

c iflow = 1 then sigmas adjusted for volume flow rate

c ientr = 1 then method of Pasquill used to account for entrainment

c irise = 1 then MACCS buoyant plume rise model turned on

```

c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c      reference frequency
c release anemometer mixing to
c height height height exceed
c hs(m) ha(m) hm(m) Cx(%)
c
c _____
c 0 10 1000 0.5
c
c initial initial release deposition gravitational
c plume plume duration velocity settling
c width height trd(hr) velocity velocity
c Wb(m) Hb(m) vd(m/s) vg(m/s)
c
c _____
c 20.7 22.6 1.0 0.001 0.001
c
c initial initial
c plume plume
c ambient temperature flow rate release convective
c temperature T0(C) V0(m3/s) diameter heat release
c Tamb(C) qh(w)
c
c _____
c 20 20 1 1 0
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c X/Q Wind
c scaling Speed
c factor Exponent
c c(?) a(?)
c
c _____
c 1 .78
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals

```

c ymax = maximum offset to plot (m)
 c jmax = offset intervals
 c xqmin = minimum scaled X/Q to calculate
 c power = exponent in power function step size

0	100	0
0	500	0
0	1000	0
1	15390	0
3	15690	0
4	13380	0
5	13090	0
6	13450	0
7	15250	0
8	16290	0
9	17540	0
10	25860	0
11	25650	0
12	22930	0
13	22600	0
14	27090	0
15	24170	0
16	21070	0
1	15390	0
2	15650	0
3	15690	0
4	13380	0
5	13090	0
6	13450	0
7	11590	0
8	8870	0
9	8980	0
10	11560	0
11	17450	0
12	17210	0
13	18190	0
14	27090	0
15	24170	0
16	21070	0
1	6060	0
2	6060	0
3	5770	0
4	5570	0
5	5890	0
6	8440	0
7	10060	0
8	16290	0
9	17540	0
10	25860	0
11	25650	0
12	22930	0

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13	22600	0
14	27090	0
15	13940	0
16	7560	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 03/18/97
Run Time = 15:13:37.56

```

INPUT ECHO:
TP99.5 T PLANT XQs,Case 1-tp1w.in, Acute Ground Level Release, wake effect
c GXQ Version 4.0 Input File
c mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ickh isite ipop
  T   F   F   F   F   F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c      = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c      = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c      = f then no cumulative distribution file created
c ickh  = t then X/Q parameter print option turned on
c      = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c      = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c      = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
  0   0   0   0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
  2   0   0   0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
  0   0   0   0
c ipuff = 1 then X/Q calculated using puff model
c      = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c      = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c      = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c      = 2 then 5th Power Law plume meander model turned on
c      = 3 then sector average model turned on
  
```

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```

c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c      reference      frequency
c      release        anemometer      mixing      to
c      height         height          height     exceed
c      hs(m)          ha(m)           hm(m)      Cx(%)
c
c      0.00000E+00    1.00000E+01    1.00000E+03    5.00000E-01
c
c      initial        initial
c      plume          plume
c      width          height          release      deposition    gravitational
c      Wb(m)          Hb(m)           trd(hr)      velocity      settling
c                                     vd(m/s)      velocity
c                                     vg(m/s)
c
c      2.07000E+01    2.26000E+01    1.00000E+00    1.00000E-03    1.00000E-03
c
c      ambient        initial
c      temperature    plume
c      Tamb(C)        T0(C)           plume        release      convective
c                                     flow rate     diameter    heat release
c                                     V0(m3/s)      d(m)         rate(1)
c                                     qh(w)
c
c      2.00000E+01    2.00000E+01    1.00000E+00    1.00000E+00    0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q            Wind
c      scaling        Speed
c      factor          Exponent
c      c(?)           a(?)
c
c      1.00000E+00    7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:
Site specific X/Q calculated.

LOGICAL CHOICES:
Joint frequency used to calculate X/Q based on frequency of exceedance.
No normalization of joint frequency.
X/Q calculated for single sector.

MODELS SELECTED:
MACCS Virtual source building wake model selected.
Default Gaussian plume model selected.

HNF-SD-WM-CN-109 Rev.0

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

TP99.5 T PLANT XQs,Case 1-tp1w.in, Acute Ground Level Release, wake effect

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	6.30	1	2.71E-03	2.71E-03	E	0.89
SSW	100	0	4.53	1	2.30E-03	2.30E-03	E	0.89
SW	100	0	2.93	1	2.38E-03	2.38E-03	E	0.89
WSW	100	0	2.72	1	2.38E-03	2.38E-03	E	0.89
W	100	0	4.80	1	3.01E-03	3.01E-03	E	0.89
WNW	100	0	3.98	1	2.73E-03	2.73E-03	E	0.89
NW	100	0	4.72	1	2.83E-03	2.83E-03	E	0.89
NNW	100	0	4.58	1	2.79E-03	2.79E-03	E	0.89
N	100	0	4.36	1	3.10E-03	3.10E-03	F	0.89
NNE	100	0	2.49	1	2.38E-03	2.38E-03	E	0.89
NE	100	0	3.90	1	2.47E-03	2.47E-03	E	0.89
ENE	100	0	6.17	1	2.66E-03	2.66E-03	E	0.89
E	100	0	14.05	1	3.41E-03	3.41E-03	F	0.89
ESE	100	0	18.80	1	3.10E-03	3.10E-03	F	0.89
SE	100	0	10.83	1	3.05E-03	3.05E-03	E	0.89
SSE	100	0	4.78	1	2.69E-03	2.69E-03	E	0.89
S	500	0	6.30	1	5.98E-04	5.98E-04	E	0.89
SSW	500	0	4.53	1	5.06E-04	5.06E-04	G	2.65
SW	500	0	2.93	1	5.44E-04	5.44E-04	G	2.65
WSW	500	0	2.72	1	5.40E-04	5.40E-04	G	2.65
W	500	0	4.80	1	7.37E-04	7.37E-04	E	0.89
WNW	500	0	3.98	1	6.07E-04	6.07E-04	E	0.89
NW	500	0	4.72	1	6.52E-04	6.52E-04	E	0.89
NNW	500	0	4.58	1	6.36E-04	6.36E-04	E	0.89
N	500	0	4.36	1	7.79E-04	7.79E-04	F	0.89
NNE	500	0	2.49	1	5.59E-04	5.59E-04	G	2.65
NE	500	0	3.90	1	5.62E-04	5.62E-04	E	0.89
ENE	500	0	6.17	1	5.73E-04	5.73E-04	E	0.89
E	500	0	14.05	1	9.21E-04	9.21E-04	F	0.89
ESE	500	0	18.80	1	7.79E-04	7.79E-04	F	0.89
SE	500	0	10.83	1	7.52E-04	7.52E-04	E	0.89
SSE	500	0	4.78	1	5.85E-04	5.85E-04	E	0.89
S	1000	0	6.30	1	2.50E-04	2.50E-04	E	0.89
SSW	1000	0	4.53	1	1.45E-04	1.45E-04	F	2.65
SW	1000	0	2.93	1	1.60E-04	1.60E-04	F	2.65
WSW	1000	0	2.72	1	1.61E-04	1.61E-04	F	2.65
W	1000	0	4.80	1	2.87E-04	2.87E-04	G	2.65
WNW	1000	0	3.98	1	2.67E-04	2.67E-04	G	2.65
NW	1000	0	4.72	1	2.97E-04	2.97E-04	G	2.65
NNW	1000	0	4.58	1	2.99E-04	2.99E-04	G	2.65
N	1000	0	4.36	1	3.55E-04	3.55E-04	G	2.65
NNE	1000	0	2.49	1	2.35E-04	2.35E-04	E	0.89
NE	1000	0	3.90	1	2.47E-04	2.47E-04	E	0.89
ENE	1000	0	6.17	1	2.81E-04	2.81E-04	G	2.65
E	1000	0	14.05	1	4.29E-04	4.29E-04	F	0.89
ESE	1000	0	18.80	1	3.87E-04	3.87E-04	F	0.89
SE	1000	0	10.83	1	3.43E-04	3.43E-04	G	2.65
SSE	1000	0	4.78	1	2.56E-04	2.56E-04	E	0.89
S	15390	0	6.30	1	6.34E-06	6.34E-06	E	0.89
SW	15690	0	2.93	1	5.03E-06	5.03E-06	F	2.65
WSW	13380	0	2.72	1	6.15E-06	6.15E-06	F	2.65
W	13090	0	4.80	1	1.46E-05	1.46E-05	G	2.65
WNW	13450	0	3.98	1	7.97E-06	7.97E-06	G	4.70
NW	15250	0	4.72	1	1.26E-05	1.26E-05	G	2.65

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NNW	16290	0	4.58	1	1.17E-05	1.17E-05 G	2.65
N	17540	0	4.36	1	1.15E-05	1.15E-05 G	2.65
NNE	25860	0	2.49	1	3.14E-06	3.14E-06 E	0.89
NE	25650	0	3.90	1	3.41E-06	3.41E-06 E	0.89
ENE	22930	0	6.17	1	6.72E-06	6.72E-06 G	2.65
E	22600	0	14.05	1	9.25E-06	9.25E-06 F	0.89
ESE	27090	0	18.80	1	7.08E-06	7.08E-06 F	0.89
SE	24170	0	10.83	1	7.68E-06	7.68E-06 G	2.65
SSE	21070	0	4.78	1	4.39E-06	4.39E-06 G	4.70
S	15390	0	6.30	1	6.34E-06	6.34E-06 E	0.89
SSW	15650	0	4.53	1	3.94E-06	3.94E-06 F	2.65
SW	15690	0	2.93	1	5.03E-06	5.03E-06 F	2.65
WSW	13380	0	2.72	1	6.15E-06	6.15E-06 F	2.65
W	13090	0	4.80	1	1.46E-05	1.46E-05 G	2.65
WNW	13450	0	3.98	1	7.97E-06	7.97E-06 G	4.70
NW	11590	0	4.72	1	1.75E-05	1.75E-05 G	2.65
NNW	8870	0	4.58	1	2.43E-05	2.43E-05 G	2.65
N	8980	0	4.36	1	2.59E-05	2.59E-05 G	2.65
NNE	11560	0	2.49	1	8.84E-06	8.84E-06 E	0.89
NE	17450	0	3.90	1	5.51E-06	5.51E-06 E	0.89
ENE	17210	0	6.17	1	9.48E-06	9.48E-06 G	2.65
E	18190	0	14.05	1	1.20E-05	1.20E-05 F	0.89
ESE	27090	0	18.80	1	7.08E-06	7.08E-06 F	0.89
SE	24170	0	10.83	1	7.68E-06	7.68E-06 G	2.65
SSE	21070	0	4.78	1	4.39E-06	4.39E-06 G	4.70
S	6060	0	6.30	1	2.08E-05	2.08E-05 E	0.89
SSW	6060	0	4.53	1	1.53E-05	1.53E-05 F	2.65
SW	5770	0	2.93	1	1.76E-05	1.76E-05 F	2.65
WSW	5570	0	2.72	1	1.85E-05	1.85E-05 F	2.65
W	5890	0	4.80	1	3.83E-05	3.83E-05 G	2.65
WNW	8440	0	3.98	1	1.41E-05	1.41E-05 G	4.70
NW	10060	0	4.72	1	2.08E-05	2.08E-05 G	2.65
NNW	16290	0	4.58	1	1.17E-05	1.17E-05 G	2.65
N	17540	0	4.36	1	1.15E-05	1.15E-05 G	2.65
NNE	25860	0	2.49	1	3.14E-06	3.14E-06 E	0.89
NE	25650	0	3.90	1	3.41E-06	3.41E-06 E	0.89
ENE	22930	0	6.17	1	6.72E-06	6.72E-06 G	2.65
E	22600	0	14.05	1	9.25E-06	9.25E-06 F	0.89
ESE	27090	0	18.80	1	7.08E-06	7.08E-06 F	0.89
SE	13940	0	10.83	1	1.49E-05	1.49E-05 G	2.65
SSE	7560	0	4.78	1	1.58E-05	1.58E-05 G	4.70

TP50% T PLANT XQs,Case 1-tp11.in, Acute Ground Level Release, no plume meander
c GXQ Version 4.0 Input File

c mode
1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop
t t f f f f

c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting

c

c X/Q AND WIND SPEED ADJUSTMENT MODELS:

c ipuff idep isrc iwind
0 0 0 0

c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:

c iwake ipm iflow ientr
0 0 0 0

c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:

c (irise igrnd)iwash igrav
0 0 0 0

c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on
c = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on

```

c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c      reference frequency
c release      anemometer      mixing      to
c height      height      height      exceed
c hs(m)      ha(m)      hm(m)      Cx(%)
c
c      0      10      1000      50
c
c initial      initial      release      deposition      gravitational
c plume      plume      duration      velocity      settling
c width      height      trd(hr)      velocity      velocity
c Wb(m)      Hb(m)      vd(m/s)      vg(m/s)
c
c      0      0      1.0      0.001      0.001
c
c      initial      initial      release      convective
c ambient      plume      plume      heat release
c temperature      temperature      flow rate      diameter      rate(1)
c Tamb(C)      TO(C)      VO(m3/s)      d(m)      qh(w)
c
c      20      20      1      1      0
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c X/Q      Wind
c scaling      Speed
c factor      Exponent
c c(?)      a(?)
c
c      1      .78
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed)      class windspeed distance offset receptor-height
c 3 (create plot file)      class windspeed xmax imax ymax jmax xmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals

```

c ymax = maximum offset to plot (m)
 c jmax = offset intervals
 c xqmin = minimum scaled X/Q to calculate
 c power = exponent in power function step size

0	100	0
0	500	0
0	1000	0
1	15390	0
3	15690	0
4	13380	0
5	13090	0
6	13450	0
7	15250	0
8	16290	0
9	17540	0
10	25860	0
11	25650	0
12	22930	0
13	22600	0
14	27090	0
15	24170	0
16	21070	0
1	15390	0
2	15650	0
3	15690	0
4	13380	0
5	13090	0
6	13450	0
7	11590	0
8	8870	0
9	8980	0
10	11560	0
11	17450	0
12	17210	0
13	18190	0
14	27090	0
15	24170	0
16	21070	0
1	6060	0
2	6060	0
3	5770	0
4	5570	0
5	5890	0
6	8440	0
7	10060	0
8	16290	0
9	17540	0
10	25860	0
11	25650	0
12	22930	0

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13	22600	0
14	27090	0
15	13940	0
16	7560	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 04/29/97
Run Time = 16:14:30.60

INPUT ECHO:
TP50% T PLANT XQs,Case 1-tp11.in, Acute Ground Level Release, no plume meander
c GXQ Version 4.0 Input File
c mode
1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
T T F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
0 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on

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```

c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c      reference frequency
c release      anemometer      mixing      to
c height      height      height      exceed
c hs(m)      ha(m)      hm(m)      Cx(%)
c
c 0.00000E+00      1.00000E+01      1.00000E+03      5.00000E+01
c
c initial      initial      release      deposition      gravitational
c plume      plume      duration      velocity      settling
c width      height      trd(hr)      vd(m/s)      velocity
c Wb(m)      Hb(m)      vd(m/s)      vg(m/s)
c
c 0.00000E+00      0.00000E+00      1.00000E+00      1.00000E-03      1.00000E-03
c
c      initial      initial      release      convective
c ambient      plume      plume      heat release
c temperature      temperature      flow rate      diameter      rate(1)
c Tamb(C)      T0(C)      V0(m3/s)      d(m)      qh(w)
c
c 2.00000E+01      2.00000E+01      1.00000E+00      1.00000E+00      0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c X/Q      Wind
c scaling      Speed
c factor      Exponent
c c(?)      a(?)
c
c 1.00000E+00      7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

Joint frequency data normalized.

X/Q calculated for single sector.

MODELS SELECTED:

Default Gaussian plume model selected.

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WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

TP50% T PLANT XQs, Case 1-tp11.in, Acute Ground Level Release, no plume meander

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	100.00	1	2.35E-03	2.35E-03	F	15.60
SSW	100	0	100.00	1	1.73E-03	1.73E-03	F	19.00
SW	100	0	100.00	1	2.86E-03	2.86E-03	E	4.70
WSW	100	0	100.00	1	3.36E-03	3.36E-03	C	0.89
W	100	0	100.00	1	2.97E-03	2.97E-03	E	4.70
WNW	100	0	100.00	1	3.07E-03	3.07E-03	E	4.70
NW	100	0	100.00	1	3.19E-03	3.19E-03	E	4.70
NNW	100	0	100.00	1	4.92E-03	4.92E-03	E	2.65
N	100	0	100.00	1	5.33E-03	5.33E-03	E	2.65
NNE	100	0	100.00	1	3.91E-03	3.91E-03	C	0.89
NE	100	0	100.00	1	2.41E-03	2.41E-03	D	2.65
ENE	100	0	100.00	1	1.98E-03	1.98E-03	E	7.15
E	100	0	100.00	1	4.65E-03	4.65E-03	F	7.15
ESE	100	0	100.00	1	2.89E-03	2.89E-03	E	4.70
SE	100	0	100.00	1	2.81E-03	2.81E-03	D	2.65
SSE	100	0	100.00	1	2.86E-03	2.86E-03	E	4.70
S	500	0	100.00	1	1.43E-04	1.43E-04	F	15.60
SSW	500	0	100.00	1	9.22E-05	9.22E-05	B	0.89
SW	500	0	100.00	1	1.74E-04	1.74E-04	E	4.70
WSW	500	0	100.00	1	1.89E-04	1.89E-04	C	0.89
W	500	0	100.00	1	1.83E-04	1.83E-04	E	4.70
WNW	500	0	100.00	1	1.85E-04	1.85E-04	E	4.70
NW	500	0	100.00	1	1.87E-04	1.87E-04	E	4.70
NNW	500	0	100.00	1	3.11E-04	3.11E-04	E	2.65
N	500	0	100.00	1	3.36E-04	3.36E-04	E	2.65
NNE	500	0	100.00	1	2.21E-04	2.21E-04	C	0.89
NE	500	0	100.00	1	1.44E-04	1.44E-04	D	2.65
ENE	500	0	100.00	1	1.24E-04	1.24E-04	E	7.15
E	500	0	100.00	1	2.95E-04	2.95E-04	F	7.15
ESE	500	0	100.00	1	1.81E-04	1.81E-04	E	4.70
SE	500	0	100.00	1	1.65E-04	1.65E-04	D	2.65
SSE	500	0	100.00	1	1.75E-04	1.75E-04	E	4.70
S	1000	0	100.00	1	4.47E-05	4.47E-05	F	15.60
SSW	1000	0	100.00	1	2.97E-05	2.97E-05	D	4.70
SW	1000	0	100.00	1	5.27E-05	5.27E-05	C	0.89
WSW	1000	0	100.00	1	5.45E-05	5.45E-05	C	0.89
W	1000	0	100.00	1	5.44E-05	5.44E-05	C	0.89
WNW	1000	0	100.00	1	5.47E-05	5.47E-05	C	0.89
NW	1000	0	100.00	1	5.82E-05	5.82E-05	E	4.70
NNW	1000	0	100.00	1	9.95E-05	9.95E-05	E	2.65
N	1000	0	100.00	1	1.08E-04	1.08E-04	E	2.65
NNE	1000	0	100.00	1	7.94E-05	7.94E-05	E	4.70
NE	1000	0	100.00	1	4.53E-05	4.53E-05	D	2.65
ENE	1000	0	100.00	1	3.97E-05	3.97E-05	E	7.15
E	1000	0	100.00	1	9.40E-05	9.40E-05	F	7.15
ESE	1000	0	100.00	1	5.82E-05	5.82E-05	E	4.70
SE	1000	0	100.00	1	5.15E-05	5.15E-05	D	2.65
SSE	1000	0	100.00	1	5.32E-05	5.32E-05	C	0.89
S	15390	0	100.00	1	7.63E-07	7.63E-07	E	7.15
SW	15690	0	100.00	1	8.30E-07	8.30E-07	D	2.65
WSW	13380	0	100.00	1	1.20E-06	1.20E-06	E	4.70
W	13090	0	100.00	1	1.27E-06	1.27E-06	E	4.70
WNW	13450	0	100.00	1	1.27E-06	1.27E-06	E	4.70
NW	15250	0	100.00	1	1.15E-06	1.15E-06	E	4.70

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NNW	16290	0	100.00	1	1.86E-06	1.86E-06	E	2.65
N	17540	0	100.00	1	1.74E-06	1.74E-06	E	2.65
NNE	25860	0	100.00	1	7.86E-07	7.86E-07	E	4.70
NE	25650	0	100.00	1	3.81E-07	3.81E-07	D	2.65
ENE	22930	0	100.00	1	4.46E-07	4.46E-07	D	2.65
E	22600	0	100.00	1	1.20E-06	1.20E-06	F	7.15
ESE	27090	0	100.00	1	5.32E-07	5.32E-07	E	4.70
SE	24170	0	100.00	1	4.16E-07	4.16E-07	E	7.15
SSE	21070	0	100.00	1	6.04E-07	6.04E-07	D	2.65
S	15390	0	100.00	1	7.63E-07	7.63E-07	E	7.15
SSW	15650	0	100.00	1	4.38E-07	4.38E-07	D	4.70
SW	15690	0	100.00	1	8.30E-07	8.30E-07	D	2.65
WSW	13380	0	100.00	1	1.20E-06	1.20E-06	E	4.70
W	13090	0	100.00	1	1.27E-06	1.27E-06	E	4.70
WNW	13450	0	100.00	1	1.27E-06	1.27E-06	E	4.70
NW	11590	0	100.00	1	1.65E-06	1.65E-06	E	4.70
NNW	8870	0	100.00	1	4.12E-06	4.12E-06	E	2.65
N	8980	0	100.00	1	4.29E-06	4.29E-06	E	2.65
NNE	11560	0	100.00	1	2.27E-06	2.27E-06	E	4.70
NE	17450	0	100.00	1	6.50E-07	6.50E-07	E	7.15
ENE	17210	0	100.00	1	6.51E-07	6.51E-07	E	7.15
E	18190	0	100.00	1	1.58E-06	1.58E-06	F	7.15
ESE	27090	0	100.00	1	5.32E-07	5.32E-07	E	4.70
SE	24170	0	100.00	1	4.16E-07	4.16E-07	E	7.15
SSE	21070	0	100.00	1	6.04E-07	6.04E-07	D	2.65
S	6060	0	100.00	1	2.89E-06	2.89E-06	F	15.60
SSW	6060	0	100.00	1	1.88E-06	1.88E-06	E	9.80
SW	5770	0	100.00	1	3.53E-06	3.53E-06	D	2.65
WSW	5570	0	100.00	1	4.09E-06	4.09E-06	E	4.70
W	5890	0	100.00	1	3.85E-06	3.85E-06	E	4.70
WNW	8440	0	100.00	1	2.40E-06	2.40E-06	E	4.70
NW	10060	0	100.00	1	2.00E-06	2.00E-06	E	4.70
NNW	16290	0	100.00	1	1.86E-06	1.86E-06	E	2.65
N	17540	0	100.00	1	1.74E-06	1.74E-06	E	2.65
NNE	25860	0	100.00	1	7.86E-07	7.86E-07	E	4.70
NE	25650	0	100.00	1	3.81E-07	3.81E-07	D	2.65
ENE	22930	0	100.00	1	4.46E-07	4.46E-07	D	2.65
E	22600	0	100.00	1	1.20E-06	1.20E-06	F	7.15
ESE	27090	0	100.00	1	5.32E-07	5.32E-07	E	4.70
SE	13940	0	100.00	1	9.30E-07	9.30E-07	D	2.65
SSE	7560	0	100.00	1	2.54E-06	2.54E-06	D	2.65


```

TP50% T PLANT XQs,Case 1-tp11s.in, Stack Release, no plume meander
c GXQ Version 4.0 Input File
c mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
  t   t   f   f   f   f
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c       = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c       = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c       = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c       = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c       = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c       = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
  0   0   0   0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
  0   0   0   0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
  0   0   0   0
c ipuff = 1 then X/Q calculated using puff model
c       = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c       = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c       = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c       = 2 then 5th Power Law plume meander model turned on
c       = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on

```

```

c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c      reference frequency
c release      anemometer      mixing      to
c height      height      height      exceed
c hs(m)      ha(m)      hm(m)      Cx(%)
c
c      61      10      1000      50
c
c initial      initial      release      deposition      gravitational
c plume      plume      duration      velocity      settling
c width      height      trd(hr)      velocity      velocity
c Wb(m)      Hb(m)      vd(m/s)      vg(m/s)
c
c 0      0      1.0      0.001      0.001
c
c ambient      initial      initial      release      convective
c temperature      plume      plume      diameter      heat release
c Tamb(C)      T0(C)      flow rate      d(m)      rate(1)
c      qh(w)
c
c 20      20      1      1      0
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c X/Q      Wind
c scaling      Speed
c factor      Exponent
c c(?)      a(?)
c
c 1      .78
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed)      class windspeed distance offset receptor-height
c 3 (create plot file)      class windspeed xmax imax ymax jmax xmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals

```

c ymax = maximum offset to plot (m)
 c jmax = offset intervals
 c xqmin = minimum scaled X/Q to calculate
 c power = exponent in power function step size

0	100	0
0	500	0
0	1000	0
1	15390	0
3	15690	0
4	13380	0
5	13090	0
6	13450	0
7	15250	0
8	16290	0
9	17540	0
10	25860	0
11	25650	0
12	22930	0
13	22600	0
14	27090	0
15	24170	0
16	21070	0
1	15390	0
2	15650	0
3	15690	0
4	13380	0
5	13090	0
6	13450	0
7	11590	0
8	8870	0
9	8980	0
10	11560	0
11	17450	0
12	17210	0
13	18190	0
14	27090	0
15	24170	0
16	21070	0
1	6060	0
2	6060	0
3	5770	0
4	5570	0
5	5890	0
6	8440	0
7	10060	0
8	16290	0
9	17540	0
10	25860	0
11	25650	0
12	22930	0

13	22600	0
14	27090	0
15	13940	0
16	7560	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hoy

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 05/08/97
Run Time = 15:26:23.33

INPUT ECHO:
TP50% T PLANT XQs,Case 1-tp11s.in, Stack Release, no plume meander
c GXQ Version 4.0 Input File
c mode
1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
T T F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
0 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on

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```

c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c      reference frequency
c release      anemometer      mixing      to
c height      height      height      exceed
c hs(m)      ha(m)      hm(m)      Cx(%)
c
c 6.10000E+01      1.00000E+01      1.00000E+03      5.00000E+01
c
c initial      initial      release      deposition      gravitational
c plume      plume      duration      velocity      settling
c width      height      trd(hr)      velocity      velocity
c Wb(m)      Hb(m)      trd(hr)      vd(m/s)      vg(m/s)
c
c 0.00000E+00      0.00000E+00      1.00000E+00      1.00000E-03      1.00000E-03
c
c      initial      initial      release      convective
c ambient      plume      plume      heat release
c temperature      temperature      flow rate      diameter      rate(1)
c Tamb(C)      TO(C)      VO(m3/s)      d(m)      qh(w)
c
c 2.00000E+01      2.00000E+01      1.00000E+00      1.00000E+00      0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c X/Q      Wind
c scaling      Speed
c factor      Exponent
c c(?)      a(?)
c
c 1.00000E+00      7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c Windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size
c
MODE:
Site specific X/Q calculated.

LOGICAL CHOICES:
Joint frequency used to calculate X/Q based on frequency of exceedance.
Joint frequency data normalized.
X/Q calculated for single sector.

MODELS SELECTED:
Default Gaussian plume model selected.

```

HNF-SD-WM-CN-109 Rev.0

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 61 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

TP50% T PLANT XQs, Case 1-tp11s.in, Stack Release, no plume meander

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	100.00	1	6.93E-42	6.93E-42	D	0.89
SSW	100	0	100.00	1	7.25E-42	7.25E-42	D	0.89
SW	100	0	100.00	1	8.46E-42	8.46E-42	D	0.89
WSW	100	0	100.00	1	3.11E-19	3.11E-19	D	0.89
W	100	0	100.00	1	7.55E-42	7.55E-42	D	0.89
WNW	100	0	100.00	1	5.36E-42	5.36E-42	D	2.65
NW	100	0	100.00	1	2.28E-42	2.28E-42	D	4.70
NNW	100	0	100.00	1	6.07E-43	6.07E-43	D	12.70
N	100	0	100.00	1	5.34E-43	5.34E-43	D	12.70
NNE	100	0	100.00	1	4.27E-43	4.27E-43	D	19.00
NE	100	0	100.00	1	6.01E-43	6.01E-43	D	15.60
ENE	100	0	100.00	1	5.97E-43	5.97E-43	D	15.60
E	100	0	100.00	1	2.10E-43	2.10E-43	E	2.65
ESE	100	0	100.00	1	2.55E-43	2.55E-43	D	19.00
SE	100	0	100.00	1	8.03E-43	8.03E-43	D	12.70
SSE	100	0	100.00	1	3.12E-42	3.12E-42	D	2.65
S	500	0	100.00	1	1.14E-06	1.14E-06	A	19.00
SSW	500	0	100.00	1	1.46E-06	1.46E-06	A	15.60
SW	500	0	100.00	1	1.88E-06	1.88E-06	A	12.70
WSW	500	0	100.00	1	2.11E-06	2.11E-06	D	0.89
W	500	0	100.00	1	1.46E-06	1.46E-06	D	0.89
WNW	500	0	100.00	1	1.04E-06	1.04E-06	D	2.65
NW	500	0	100.00	1	4.43E-07	4.43E-07	D	4.70
NNW	500	0	100.00	1	1.36E-08	1.36E-08	E	0.89
N	500	0	100.00	1	9.57E-09	9.57E-09	E	2.65
NNE	500	0	100.00	1	3.22E-08	3.22E-08	E	0.89
NE	500	0	100.00	1	1.16E-07	1.16E-07	D	15.60
ENE	500	0	100.00	1	1.16E-07	1.16E-07	D	15.60
E	500	0	100.00	1	1.83E-09	1.83E-09	E	7.15
ESE	500	0	100.00	1	1.79E-09	1.79E-09	E	7.15
SE	500	0	100.00	1	1.56E-07	1.56E-07	D	12.70
SSE	500	0	100.00	1	6.04E-07	6.04E-07	D	2.65
S	1000	0	100.00	1	4.15E-06	4.15E-06	C	7.15
SSW	1000	0	100.00	1	2.63E-06	2.63E-06	B	7.15
SW	1000	0	100.00	1	4.33E-06	4.33E-06	D	4.70
WSW	1000	0	100.00	1	5.42E-06	5.42E-06	E	0.89
W	1000	0	100.00	1	4.34E-06	4.34E-06	D	4.70
WNW	1000	0	100.00	1	4.17E-06	4.17E-06	A	0.89
NW	1000	0	100.00	1	2.19E-06	2.19E-06	D	9.80
NNW	1000	0	100.00	1	1.50E-06	1.50E-06	A	2.65
N	1000	0	100.00	1	1.40E-06	1.40E-06	A	2.65
NNE	1000	0	100.00	1	1.39E-06	1.39E-06	A	2.65
NE	1000	0	100.00	1	1.27E-06	1.27E-06	D	15.60
ENE	1000	0	100.00	1	9.50E-07	9.50E-07	B	19.00
E	1000	0	100.00	1	5.83E-07	5.83E-07	A	7.15
ESE	1000	0	100.00	1	5.56E-07	5.56E-07	A	7.15
SE	1000	0	100.00	1	1.36E-06	1.36E-06	B	12.70
SSE	1000	0	100.00	1	3.57E-06	3.57E-06	B	4.70
S	15390	0	100.00	1	4.27E-07	4.27E-07	D	4.70
SW	15690	0	100.00	1	6.02E-07	6.02E-07	E	7.15
WSW	13380	0	100.00	1	8.16E-07	8.16E-07	D	2.65
W	13090	0	100.00	1	9.22E-07	9.22E-07	D	2.65
WNW	13450	0	100.00	1	9.23E-07	9.23E-07	D	2.65
NW	15250	0	100.00	1	7.65E-07	7.65E-07	D	2.65

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NNW	16290	0 100.00	1	7.93E-07	7.93E-07	G	7.15
N	17540	0 100.00	1	8.09E-07	8.09E-07	E	4.70
NNE	25860	0 100.00	1	4.12E-07	4.12E-07	D	2.65
NE	25650	0 100.00	1	2.16E-07	2.16E-07	C	0.89
ENE	22930	0 100.00	1	2.43E-07	2.43E-07	D	4.70
E	22600	0 100.00	1	4.62E-07	4.62E-07	D	2.65
ESE	27090	0 100.00	1	2.91E-07	2.91E-07	F	15.60
SE	24170	0 100.00	1	2.66E-07	2.66E-07	E	9.80
SSE	21070	0 100.00	1	4.54E-07	4.54E-07	F	12.70
S	15390	0 100.00	1	4.27E-07	4.27E-07	D	4.70
SSW	15650	0 100.00	1	3.39E-07	3.39E-07	E	12.70
SW	15690	0 100.00	1	6.02E-07	6.02E-07	E	7.15
WSW	13380	0 100.00	1	8.16E-07	8.16E-07	D	2.65
W	13090	0 100.00	1	9.22E-07	9.22E-07	D	2.65
WNW	13450	0 100.00	1	9.23E-07	9.23E-07	D	2.65
NW	11590	0 100.00	1	1.11E-06	1.11E-06	D	2.65
NNW	8870	0 100.00	1	1.58E-06	1.58E-06	D	2.65
N	8980	0 100.00	1	1.62E-06	1.62E-06	E	4.70
NNE	11560	0 100.00	1	1.12E-06	1.12E-06	D	2.65
NE	17450	0 100.00	1	3.61E-07	3.61E-07	D	4.70
ENE	17210	0 100.00	1	3.61E-07	3.61E-07	D	4.70
E	18190	0 100.00	1	5.92E-07	5.92E-07	D	2.65
ESE	27090	0 100.00	1	2.91E-07	2.91E-07	F	15.60
SE	24170	0 100.00	1	2.66E-07	2.66E-07	E	9.80
SSE	21070	0 100.00	1	4.54E-07	4.54E-07	F	12.70
S	6060	0 100.00	1	1.43E-06	1.43E-06	D	4.70
SSW	6060	0 100.00	1	9.65E-07	9.65E-07	F	12.70
SW	5770	0 100.00	1	1.98E-06	1.98E-06	C	0.89
WSW	5570	0 100.00	1	2.66E-06	2.66E-06	F	4.70
W	5890	0 100.00	1	2.63E-06	2.63E-06	F	4.70
WNW	8440	0 100.00	1	1.69E-06	1.69E-06	D	2.65
NW	10060	0 100.00	1	1.34E-06	1.34E-06	D	2.65
NNW	16290	0 100.00	1	7.93E-07	7.93E-07	G	7.15
N	17540	0 100.00	1	8.09E-07	8.09E-07	E	4.70
NNE	25860	0 100.00	1	4.12E-07	4.12E-07	D	2.65
NE	25650	0 100.00	1	2.16E-07	2.16E-07	C	0.89
ENE	22930	0 100.00	1	2.43E-07	2.43E-07	D	4.70
E	22600	0 100.00	1	4.62E-07	4.62E-07	D	2.65
ESE	27090	0 100.00	1	2.91E-07	2.91E-07	F	15.60
SE	13940	0 100.00	1	5.01E-07	5.01E-07	E	9.80
SSE	7560	0 100.00	1	1.58E-06	1.58E-06	F	7.15


```

TP50% T PLANT XQs,Case 1-tp1lw.in, Acute Ground Level Release, wake effect
c GXQ Version 4.0 Input File
c   mode
c     1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c   ifox  inorm  icdf  ichk  isite  ipop
c     t    t    f    f    f    f
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c       = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c       = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c       = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c       = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c       = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c       = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c   ipuff  idep  isrc  iwind
c     0     0     0     0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c   iwake  ipm  iflow  ientr
c     2     0     0     0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c   (irise igrnd)iwash igrav
c     0     0     0     0
c ipuff = 1 then X/Q calculated using puff model
c       = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c       = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c       = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c       = 2 then 5th Power Law plume meander model turned on
c       = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on

```

```

c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c      reference frequency
c release      anemometer      mixing      to
c height      height      height      exceed
c hs(m)      ha(m)      hm(m)      Cx(%)
c
c      0      10      1000      50
c
c initial      initial      release      deposition      gravitational
c plume      plume      duration      velocity      settling
c width      height      trd(hr)      velocity      velocity
c Wb(m)      Hb(m)      trd(hr)      vd(m/s)      vg(m/s)
c
c      20.7      22.6      1.0      0.001      0.001
c
c ambient      initial      initial      release      convective
c temperature      plume      plume      diameter      heat release
c Tamb(C)      T0(C)      V0(m3/s)      d(m)      rate(l)
c
c      20      20      1      1      0
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c X/Q      Wind
c scaling      Speed
c factor      Exponent
c c(?)      a(?)
c
c      1      .78
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals

```

c ymax = maximum offset to plot (m)
 c jmax = offset intervals
 c xqmin = minimum scaled X/Q to calculate
 c power = exponent in power function step size

0	100	0
0	500	0
0	1000	0
1	15390	0
3	15690	0
4	13380	0
5	13090	0
6	13450	0
7	15250	0
8	16290	0
9	17540	0
10	25860	0
11	25650	0
12	22930	0
13	22600	0
14	27090	0
15	24170	0
16	21070	0
1	15390	0
2	15650	0
3	15690	0
4	13380	0
5	13090	0
6	13450	0
7	11590	0
8	8870	0
9	8980	0
10	11560	0
11	17450	0
12	17210	0
13	18190	0
14	27090	0
15	24170	0
16	21070	0
1	6060	0
2	6060	0
3	5770	0
4	5570	0
5	5890	0
6	8440	0
7	10060	0
8	16290	0
9	17540	0
10	25860	0
11	25650	0
12	22930	0

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13	22600	0
14	27090	0
15	13940	0
16	7560	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 04/29/97
Run Time = 16:16:30.39

INPUT ECHO:
TP50% T PLANT XQs,Case 1-tp11w.in, Acute Ground Level Release, wake effect
c GXQ Version 4.0 Input File
c mode
 1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
 T T F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
 0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
 2 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
 0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on
c = 3 then sector average model turned on

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```

c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c      release      reference      mixing      frequency
c      height      anemometer      height      to
c      hs(m)        ha(m)          hm(m)       cx(%)
c
c      0.00000E+00   1.00000E+01   1.00000E+03   5.00000E+01
c
c      initial      initial      release      deposition      gravitational
c      plume        plume        duration     velocity        settling
c      width        height       trd(hr)      velocity        velocity
c      Wb(m)         Hb(m)              vd(m/s)       vg(m/s)
c
c      2.07000E+01   2.26000E+01   1.00000E+00   1.00000E-03   1.00000E-03
c
c      ambient      initial      initial      release      convective
c      temperature  plume        plume        flow rate    heat release
c      Tamb(C)      T0(C)         V0(m3/s)     d(m)          rate(1)
c                  qh(w)
c
c      2.00000E+01   2.00000E+01   1.00000E+00   1.00000E+00   0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q          Wind
c      scaling      Speed
c      factor       Exponent
c      c(?)         a(?)
c
c      1.00000E+00   7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:
Site specific X/Q calculated.

LOGICAL CHOICES:
Joint frequency used to calculate X/Q based on frequency of exceedance.
Joint frequency data normalized.
X/Q calculated for single sector.

MODELS SELECTED:
MACCS Virtual source building wake model selected.
Default Gaussian plume model selected.

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WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

TP50% T PLANT XGs, Case 1-tp11w.in, Acute Ground Level Release, wake effect

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	100.00	1	6.01E-04	6.01E-04	A	0.89
SSW	100	0	100.00	1	5.01E-04	5.01E-04	E	4.70
SW	100	0	100.00	1	6.58E-04	6.58E-04	F	4.70
WSW	100	0	100.00	1	8.77E-04	8.77E-04	E	2.65
W	100	0	100.00	1	8.56E-04	8.56E-04	B	0.89
WNW	100	0	100.00	1	8.49E-04	8.49E-04	B	0.89
NW	100	0	100.00	1	7.45E-04	7.45E-04	F	4.70
NNW	100	0	100.00	1	8.41E-04	8.41E-04	B	0.89
N	100	0	100.00	1	8.68E-04	8.68E-04	B	0.89
NNE	100	0	100.00	1	8.50E-04	8.50E-04	B	0.89
NE	100	0	100.00	1	5.01E-04	5.01E-04	E	4.70
ENE	100	0	100.00	1	4.09E-04	4.09E-04	C	2.65
E	100	0	100.00	1	6.56E-04	6.56E-04	F	4.70
ESE	100	0	100.00	1	5.38E-04	5.38E-04	G	7.15
SE	100	0	100.00	1	5.59E-04	5.59E-04	A	0.89
SSE	100	0	100.00	1	6.54E-04	6.54E-04	F	4.70
S	500	0	100.00	1	1.07E-04	1.07E-04	E	4.70
SSW	500	0	100.00	1	6.73E-05	6.73E-05	E	7.15
SW	500	0	100.00	1	1.21E-04	1.21E-04	D	2.65
WSW	500	0	100.00	1	1.41E-04	1.41E-04	C	0.89
W	500	0	100.00	1	1.36E-04	1.36E-04	C	0.89
WNW	500	0	100.00	1	1.38E-04	1.38E-04	C	0.89
NW	500	0	100.00	1	1.39E-04	1.39E-04	C	0.89
NNW	500	0	100.00	1	1.83E-04	1.83E-04	F	4.70
N	500	0	100.00	1	1.87E-04	1.87E-04	E	2.65
NNE	500	0	100.00	1	1.80E-04	1.80E-04	F	4.70
NE	500	0	100.00	1	8.57E-05	8.57E-05	B	0.89
ENE	500	0	100.00	1	7.14E-05	7.14E-05	E	7.15
E	500	0	100.00	1	1.64E-04	1.64E-04	F	4.70
ESE	500	0	100.00	1	1.08E-04	1.08E-04	D	2.65
SE	500	0	100.00	1	1.08E-04	1.08E-04	E	4.70
SSE	500	0	100.00	1	1.20E-04	1.20E-04	D	2.65
S	1000	0	100.00	1	4.05E-05	4.05E-05	F	9.80
SSW	1000	0	100.00	1	2.31E-05	2.31E-05	D	4.70
SW	1000	0	100.00	1	4.29E-05	4.29E-05	E	4.70
WSW	1000	0	100.00	1	4.61E-05	4.61E-05	C	0.89
W	1000	0	100.00	1	4.43E-05	4.43E-05	E	4.70
WNW	1000	0	100.00	1	4.48E-05	4.48E-05	E	4.70
NW	1000	0	100.00	1	4.53E-05	4.53E-05	E	4.70
NNW	1000	0	100.00	1	7.19E-05	7.19E-05	E	2.65
N	1000	0	100.00	1	7.87E-05	7.87E-05	E	2.65
NNE	1000	0	100.00	1	5.38E-05	5.38E-05	C	0.89
NE	1000	0	100.00	1	3.59E-05	3.59E-05	D	2.65
ENE	1000	0	100.00	1	3.00E-05	3.00E-05	E	7.15
E	1000	0	100.00	1	6.45E-05	6.45E-05	F	7.15
ESE	1000	0	100.00	1	4.38E-05	4.38E-05	E	4.70
SE	1000	0	100.00	1	4.17E-05	4.17E-05	D	2.65
SSE	1000	0	100.00	1	4.30E-05	4.30E-05	E	4.70
S	15390	0	100.00	1	7.53E-07	7.53E-07	E	7.15
SW	15690	0	100.00	1	8.20E-07	8.20E-07	D	2.65
WSW	13380	0	100.00	1	1.18E-06	1.18E-06	E	4.70
W	13090	0	100.00	1	1.25E-06	1.25E-06	E	4.70
WNW	13450	0	100.00	1	1.25E-06	1.25E-06	E	4.70
NW	15250	0	100.00	1	1.13E-06	1.13E-06	E	4.70

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NNW	16290	0 100.00	1	1.83E-06	1.83E-06 E	2.65
N	17540	0 100.00	1	1.72E-06	1.72E-06 E	2.65
NNE	25860	0 100.00	1	7.80E-07	7.80E-07 E	4.70
NE	25650	0 100.00	1	3.79E-07	3.79E-07 D	2.65
ENE	22930	0 100.00	1	4.43E-07	4.43E-07 E	7.15
E	22600	0 100.00	1	1.19E-06	1.19E-06 F	7.15
ESE	27090	0 100.00	1	5.28E-07	5.28E-07 E	4.70
SE	24170	0 100.00	1	4.12E-07	4.12E-07 E	7.15
SSE	21070	0 100.00	1	5.98E-07	5.98E-07 D	2.65
S	15390	0 100.00	1	7.53E-07	7.53E-07 E	7.15
SSW	15650	0 100.00	1	4.32E-07	4.32E-07 D	4.70
SW	15690	0 100.00	1	8.20E-07	8.20E-07 D	2.65
WSW	13380	0 100.00	1	1.18E-06	1.18E-06 E	4.70
W	13090	0 100.00	1	1.25E-06	1.25E-06 E	4.70
WNW	13450	0 100.00	1	1.25E-06	1.25E-06 E	4.70
NW	11590	0 100.00	1	1.62E-06	1.62E-06 E	4.70
NNW	8870	0 100.00	1	4.01E-06	4.01E-06 E	2.65
N	8980	0 100.00	1	4.18E-06	4.18E-06 E	2.65
NNE	11560	0 100.00	1	2.22E-06	2.22E-06 E	4.70
NE	17450	0 100.00	1	6.43E-07	6.43E-07 E	7.15
ENE	17210	0 100.00	1	6.43E-07	6.43E-07 E	7.15
E	18190	0 100.00	1	1.56E-06	1.56E-06 F	7.15
ESE	27090	0 100.00	1	5.28E-07	5.28E-07 E	4.70
SE	24170	0 100.00	1	4.12E-07	4.12E-07 E	7.15
SSE	21070	0 100.00	1	5.98E-07	5.98E-07 D	2.65
S	6060	0 100.00	1	2.74E-06	2.74E-06 F	15.60
SSW	6060	0 100.00	1	1.82E-06	1.82E-06 E	9.80
SW	5770	0 100.00	1	3.41E-06	3.41E-06 D	2.65
WSW	5570	0 100.00	1	3.94E-06	3.94E-06 E	4.70
W	5890	0 100.00	1	3.71E-06	3.71E-06 E	4.70
WNW	8640	0 100.00	1	2.33E-06	2.33E-06 E	4.70
NW	10060	0 100.00	1	1.96E-06	1.96E-06 E	4.70
NNW	16290	0 100.00	1	1.83E-06	1.83E-06 E	2.65
N	17540	0 100.00	1	1.72E-06	1.72E-06 E	2.65
NNE	25860	0 100.00	1	7.80E-07	7.80E-07 E	4.70
NE	25650	0 100.00	1	3.79E-07	3.79E-07 D	2.65
ENE	22930	0 100.00	1	4.43E-07	4.43E-07 E	7.15
E	22600	0 100.00	1	1.19E-06	1.19E-06 F	7.15
ESE	27090	0 100.00	1	5.28E-07	5.28E-07 E	4.70
SE	13940	0 100.00	1	9.18E-07	9.18E-07 D	2.65
SSE	7560	0 100.00	1	2.47E-06	2.47E-06 D	2.65

HNF-SD-WM-CN-109 Rev.0

APPENDIX C

WRAP 1

GXQ INPUT AND OUTPUT FILES

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WRAP1 XQs, case 1. Acute Ground level Releases, no effect
c GXQ Version 4.0 Input File
c mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c   ifox   inorm icdf   ichk   isite ipop
c     t     f     f     f     f     f
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c       = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c       = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c       = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c       = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c       = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c       = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c   ipuff idep isrc iwind
c     0     0     0     0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c   iwake ipm  iflow ientr
c     0     0     0     0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c   (irise igrnd)iwash igrav
c     0     0     0     0
c ipuff = 1 then X/Q calculated using puff model
c       = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c       = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c       = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c       = 2 then 5th Power Law plume meander model turned on
c       = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on

```

```

c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c      release      reference      mixing      frequency
c      height      height      height      to
c      hs(m)      ha(m)      hm(m)      exceed
c
c      0          10          1000          0.5
c
c      initial      initial      release      deposition      gravitational
c      plume      plume      duration      velocity      settling
c      width      height      trd(hr)      vd(m/s)      velocity
c      Wb(m)      Hb(m)      trd(hr)      vd(m/s)      vg(m/s)
c
c      60.9          9.8          1          0.001          0.001
c
c      ambient      initial      initial      release      convective
c      temperature      plume      plume      diameter      heat release
c      Tamb(C)      T0(C)      flow rate      d(m)      rate(1)
c
c      20          20          1          1          0
c
c      1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q      Wind
c      scaling      Speed
c      factor      Exponent
c      c(?)      a(?)
c
c      1          .78
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed)      class windspeed distance offset receptor-height
c 3 (create plot file)      class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)

```

c xmax = maximum distance to plot or calculate to (m)
 c imax = distance intervals
 c ymax = maximum offset to plot (m)
 c jmax = offset intervals
 c xqmin = minimum scaled X/Q to calculate
 c power = exponent in power function step size
 0 100 0
 0 500 0
 15 800 0
 6 12600 0
 5 4070 0
 9 9620 0
 5 11700 0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Key
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 03/19/97
Run Time = 09:13:37.18

INPUT ECHO:

WRAP1 XQs, case 1. Acute Ground level Releases, no effect

c GXQ Version 4.0 Input File

c mode

1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology

c mode = 2 then X/Q based on atmospheric stability class and wind speed

c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop

T F F F F F

c ifox = t then joint frequency used to compute frequency to exceed X/Q

c = f then joint frequency used to compute annual average X/Q

c inorm = t then joint frequency data is normalized (as in GENII)

c = f then joint frequency data is un-normalized

c icdf = t then cumulative distribution file created (CDF.OUT)

c = f then no cumulative distribution file created

c ichk = t then X/Q parameter print option turned on

c = f then no parameter print

c isite = t then X/Q based on joint frequency data for all 16 sectors

c = f then X/Q based on joint frequency data of individual sectors

c ipop = t then X/Q is population weighted

c = f then no population weighting

c

c X/Q AND WIND SPEED ADJUSTMENT MODELS:

c ipuff idep isrc iwind

0 0 0 0

c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:

c iwake ipm iflow ientr

0 0 0 0

c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:

c (irise igrnd)iwash igrav

0 0 0 0

c ipuff = 1 then X/Q calculated using puff model

c = 0 then X/Q calculated using default continuous plume model

c idep = 1 then plume depletion model turned on (Chamberlain model)

c isrc = 1 then X/Q multiplied by scalar

c = 2 then X/Q adjusted by wind speed function

c iwind = 1 then wind speed corrected for plume height

c iwake = 1 then NRC RG 1.145 building wake model turned on

c = 2 then MACCS virtual distance building wake model turned on

c ipm = 1 then NRC RG 1.145 plume meander model turned on

c = 2 then 5th Power Law plume meander model turned on

```

c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c      release      reference      mixing      frequency
c      height      anemometer     height     to
c      hs(m)       ha(m)          hm(m)      exceed
c                                     Cx(%)
c
c      0.00000E+00  1.00000E+01  1.00000E+03  5.00000E-01
c
c      initial      initial      release      deposition      gravitational
c      plume        plume        duration     velocity        settling
c      width        height       trd(hr)      velocity        velocity
c      Wb(m)        Hb(m)         vd(m/s)     vg(m/s)
c
c      6.09000E+01  9.80000E+00  1.00000E+00  1.00000E-03  1.00000E-03
c
c      ambient      initial      initial      release      convective
c      temperature  plume        plume        heat         heat
c      Tamb(C)      T0(C)        flow rate   diameter     release
c                                     V0(m3/s)    d(m)         rate(l)
c                                     qh(w)
c
c      2.00000E+01  2.00000E+01  1.00000E+00  1.00000E+00  0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q          Wind
c      scaling      Speed
c      factor       Exponent
c      c(?)         a(?)
c
c      1.00000E+00  7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

No normalization of joint frequency.

X/Q calculated for single sector.

MODELS SELECTED:

HNF-SD-WM-CN-109 Rev.0

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

WRAP1 XQs, case 1. Acute Ground level Releases, no effect

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	6.30	1	1.56E-02	1.56E-02	E	0.89
SSW	100	0	4.53	1	1.13E-02	1.13E-02	F	2.65
SW	100	0	2.93	1	1.21E-02	1.21E-02	F	2.65
WSW	100	0	2.72	1	1.22E-02	1.22E-02	F	2.65
W	100	0	4.80	1	2.80E-02	2.80E-02	G	2.65
WNW	100	0	3.98	1	1.60E-02	1.60E-02	G	4.70
NW	100	0	4.72	1	2.89E-02	2.89E-02	G	2.65
NNW	100	0	4.58	1	2.90E-02	2.90E-02	G	2.65
N	100	0	4.36	1	3.12E-02	3.12E-02	G	2.65
NNE	100	0	2.49	1	1.54E-02	1.54E-02	E	0.89
NE	100	0	3.90	1	1.57E-02	1.57E-02	E	0.89
ENE	100	0	6.17	1	2.52E-02	2.52E-02	G	2.65
E	100	0	14.05	1	3.41E-02	3.41E-02	F	0.89
ESE	100	0	18.80	1	3.25E-02	3.25E-02	F	0.89
SE	100	0	10.83	1	3.07E-02	3.07E-02	G	2.65
SSE	100	0	4.78	1	1.58E-02	1.58E-02	G	4.70
S	500	0	6.30	1	9.91E-04	9.91E-04	E	0.89
SSW	500	0	4.53	1	7.21E-04	7.21E-04	F	2.65
SW	500	0	2.93	1	7.75E-04	7.75E-04	F	2.65
WSW	500	0	2.72	1	7.78E-04	7.78E-04	F	2.65
W	500	0	4.80	1	1.79E-03	1.79E-03	G	2.65
WNW	500	0	3.98	1	1.02E-03	1.02E-03	G	4.70
NW	500	0	4.72	1	1.86E-03	1.86E-03	G	2.65
NNW	500	0	4.58	1	1.86E-03	1.86E-03	G	2.65
N	500	0	4.36	1	2.00E-03	2.00E-03	G	2.65
NNE	500	0	2.49	1	9.73E-04	9.73E-04	E	0.89
NE	500	0	3.90	1	9.99E-04	9.99E-04	E	0.89
ENE	500	0	6.17	1	1.62E-03	1.62E-03	G	2.65
E	500	0	14.05	1	2.18E-03	2.18E-03	F	0.89
ESE	500	0	18.80	1	2.08E-03	2.08E-03	F	0.89
SE	500	0	10.83	1	1.97E-03	1.97E-03	G	2.65
SSE	500	0	4.78	1	1.80E-03	1.80E-03	G	4.70
S	800	0	10.83	1	8.99E-04	8.99E-04	G	2.65
WNW	12600	0	3.98	1	9.00E-04	9.00E-04	G	4.70
W	4070	0	4.80	1	6.98E-05	6.98E-05	G	2.65
N	9620	0	4.36	1	2.51E-05	2.51E-05	G	2.65
W	11700	0	4.80	1	1.76E-05	1.76E-05	G	2.65


```

WRAP1 XQs, case 2. Acute Releases, wake effect
c GXQ Version 4.0 Input File
c mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c   ifox  inorm  icdf  ichk  isite  ipop
c   t     f     f     f     f     f
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c      = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c      = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c      = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c      = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c      = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c      = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c   ipuff  idep  isrc  iwind
c   0      0    0    0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c   iwake  ipm   iflow  ientr
c   1      0    0    0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c   (irise igrnd)iwash igrav
c   0      0    0    0
c ipuff = 1 then X/Q calculated using puff model
c      = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c      = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c      = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c      = 2 then 5th Power Law plume meander model turned on
c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on

```

c = 2 then ISC2 momentum/buoyancy plume rise model turned on
 c igrnd = 1 then Mills buoyant plume rise modification for ground effects
 c iwash = 1 then stack downwash model turned on
 c igrav = 1 then gravitational settling model turned on
 c = 0 unless specified otherwise, 0 turns model off

c PARAMETER INPUT:

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)	
0	10	1000	0.5	

initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
60.9	9.8	1	0.001	0.001

ambient temperature Tamb(C)	initial plume temperature T0(C)	initial plume flow rate V0(m3/s)	release diameter d(m)	convective heat release rate(1) qh(w)
20	20	1	1	0

(1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1	.78

c RECEPTOR DEPENDENT DATA (no line limit)

c FOR MODE make RECEPTOR DEPENDENT DATA
 c 1 (site specific) sector distance receptor-height
 c 2 (by class & wind speed) class windspeed distance offset receptor-height
 c 3 (create plot file) class windspeed xmax imax ymax jmax xmin power

c RECEPTOR PARAMETER DESCRIPTION

c sector = 0, 1, 2... (all, S, SSW, etc.)
 c distance = receptor distance (m)
 c receptor height = height of receptor (m)
 c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
 c windspeed = anemometer wind speed (m/s)
 c offset = offset from plume centerline (m)

c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

0	100	0
0	500	0
15	800	0
6	12600	0
5	4070	0
9	9620	0
5	11700	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 03/19/97
Run Time = 09:34:10.53

```

INPUT ECHO:
WRAP1 XGs, case 2. Acute Releases, wake effect
c GXQ Version 4.0 Input File
c mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
  T   F   F   F   F   F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c      = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c      = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c      = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c      = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c      = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c      = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
  0   0   0   0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
  1   0   0   0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
  0   0   0   0
c ipuff = 1 then X/Q calculated using puff model
c      = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c      = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c      = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c      = 2 then 5th Power Law plume meander model turned on
c      = 3 then sector average model turned on

```

HNH-SD-WM-CN-109 Rev.0

```

c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c   release      reference      mixing      frequency
c   height      anemometer     height     to
c   hs(m)       ha(m)          hm(m)      exceed
c                                     Cx(%)
c
c   0.00000E+00   1.00000E+01   1.00000E+03   5.00000E-01
c
c   initial      initial      release      deposition      gravitational
c   plume        plume        duration     velocity        settling
c   width        height       trd(hr)      vd(m/s)         velocity
c   Wb(m)        Hb(m)                                     vg(m/s)
c
c   6.09000E+01   9.80000E+00   1.00000E+00   1.00000E-03   1.00000E-03
c
c   ambient      initial      initial      release      convective
c   temperature  plume        plume        diameter    heat release
c   Tamb(C)      T0(C)        flow rate    d(m)         rate(1)
c                                     V0(m3/s)
c                                     qh(w)
c
c   2.00000E+01   2.00000E+01   1.00000E+00   1.00000E+00   0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c   X/Q          Wind
c   scaling      Speed
c   factor        Exponent
c   c(?)         a(?)
c
c   1.00000E+00   7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file)   class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size
c
MODE:
Site specific X/Q calculated.

LOGICAL CHOICES:
Joint frequency used to calculate X/Q based on frequency of exceedance.
No normalization of joint frequency.
X/Q calculated for single sector.

MODELS SELECTED:
NRC RG 1.145 building wake model selected.

```

HNF-SD-WM-CN-109 Rev.0

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

WRAP1 XQs, case 2. Acute Releases, wake effect

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	TOTAL POPULATION X/Q (s/m ³)	AVERAGE INDIVIDUAL X/Q (s/m ³)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	6.30	1	5.21E-03	E	0.89
SSW	100	0	4.53	1	3.77E-03	F	2.65
SW	100	0	2.93	1	4.04E-03	F	2.65
WSW	100	0	2.72	1	4.06E-03	F	2.65
W	100	0	4.80	1	9.32E-03	G	2.65
WNW	100	0	3.98	1	5.33E-03	G	4.70
NW	100	0	4.72	1	9.64E-03	G	2.65
NNW	100	0	4.58	1	9.68E-03	G	2.65
N	100	0	4.36	1	1.04E-02	G	2.65
NNE	100	0	2.49	1	5.14E-03	E	0.89
NE	100	0	3.90	1	5.24E-03	E	0.89
ENE	100	0	6.17	1	8.41E-03	G	2.65
E	100	0	14.05	1	1.14E-02	F	0.89
ESE	100	0	18.80	1	1.08E-02	F	0.89
SE	100	0	10.83	1	1.02E-02	G	2.65
SSE	100	0	4.78	1	5.25E-03	G	4.70
S	500	0	6.30	1	8.17E-04	E	0.89
SSW	500	0	4.53	1	4.64E-04	F	2.65
SW	500	0	2.93	1	6.69E-04	G	2.65
WSW	500	0	2.72	1	6.44E-04	G	2.65
W	500	0	4.80	1	1.04E-03	E	0.89
WNW	500	0	3.98	1	8.33E-04	E	0.89
NW	500	0	4.72	1	9.05E-04	E	0.89
NNW	500	0	4.58	1	8.79E-04	E	0.89
N	500	0	4.36	1	1.11E-03	F	0.89
NNE	500	0	2.49	1	7.58E-04	G	2.65
NE	500	0	3.90	1	7.62E-04	E	0.89
ENE	500	0	6.17	1	7.78E-04	E	0.89
E	500	0	14.05	1	1.34E-03	F	0.89
ESE	500	0	18.80	1	1.11E-03	F	0.89
SE	500	0	10.83	1	1.07E-03	E	0.89
SSE	500	0	4.78	1	7.97E-04	E	0.89
SE	800	0	10.83	1	6.07E-04	G	2.65
WNW	12600	0	3.98	1	8.91E-06	G	4.70
W	4070	0	4.80	1	6.62E-05	G	2.65
N	9620	0	4.36	1	2.48E-05	G	2.65
W	11700	0	4.80	1	1.73E-05	G	2.65

```

wrapl 50%, wrapnl.in, ground level release
c GXQ Version 4.0 Input File
c  mode
c    1
c
c  MODE CHOICE:
c  mode = 1 then X/Q based on Hanford site specific meteorology
c  mode = 2 then X/Q based on atmospheric stability class and wind speed
c  mode = 3 then X/Q plot file is created
c
c  LOGICAL CHOICES:
c    ifox  inorm icdf  ichk  isite ipop
c      t    t    f    f    f    f
c  ifox  = t then joint frequency used to compute frequency to exceed X/Q
c        = f then joint frequency used to compute annual average X/Q
c  inorm = t then joint frequency data is normalized (as in GENII)
c        = f then joint frequency data is un-normalized
c  icdf  = t then cumulative distribution file created (CDF.OUT)
c        = f then no cumulative distribution file created
c  ichk  = t then X/Q parameter print option turned on
c        = f then no parameter print
c  isite = t then X/Q based on joint frequency data for all 16 sectors
c        = f then X/Q based on joint frequency data of individual sectors
c  ipop  = t then X/Q is population weighted
c        = f then no population weighting
c
c  X/Q AND WIND SPEED ADJUSTMENT MODELS:
c    ipuff idep isrc iwind
c      0    0    0    0
c  DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c    iwake ipm  iflow ientr
c      0    0    0    0
c  EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c    (irise igrnd)iwash igrav
c      0    0    0    0
c  ipuff = 1 then X/Q calculated using puff model
c        = 0 then X/Q calculated using default continuous plume model
c  idep  = 1 then plume depletion model turned on (Chamberlain model)
c  isrc  = 1 then X/Q multiplied by scalar
c        = 2 then X/Q adjusted by wind speed function
c  iwind = 1 then wind speed corrected for plume height
c  iwake = 1 then NRC RG 1.145 building wake model turned on
c        = 2 then MACCS virtual distance building wake model turned on
c  ipm   = 1 then NRC RG 1.145 plume meander model turned on
c        = 2 then 5th Power Law plume meander model turned on
c        = 3 then sector average model turned on
c  iflow = 1 then sigmas adjusted for volume flow rate
c  ientr = 1 then method of Pasquill used to account for entrainment
c  irise = 1 then MACCS buoyant plume rise model turned on
c        = 2 then ISC2 momentum/buoyancy plume rise model turned on

```

c igrnd = 1 then Mills buoyant plume rise modification for ground effects
 c iwash = 1 then stack downwash model turned on
 c igrav = 1 then gravitational settling model turned on
 c = 0 unless specified otherwise, 0 turns model off

c PARAMETER INPUT:

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)	
0	10	1000	50	

initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
60.9	9.8	0.5	0.001	0.001

ambient temperature Tamb(C)	initial plume temperature T0(C)	initial plume flow rate V0(m3/s)	release diameter d(m)	convective heat release rate(1) qh(w)
20	20	1	1	0

(1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1	.78

c RECEPTOR DEPENDENT DATA (no line limit)

FOR MODE	make	RECEPTOR DEPENDENT DATA
1 (site specific)		sector distance receptor-height
2 (by class & wind speed)		class windspeed distance offset receptor-height
3 (create plot file)		class windspeed xmax imax ymax jmax xqmin power

c RECEPTOR PARAMETER DESCRIPTION

c sector = 0, 1, 2... (all, S, SSW, etc.)
 c distance = receptor distance (m)
 c receptor height = height of receptor (m)
 c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
 c windspeed = anemometer wind speed (m/s)
 c offset = offset from plume centerline (m)
 c xmax = maximum distance to plot or calculate to (m)


```

c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size
0      100      0
0      500      0
0      800      0
6      12600     0
5      4070      0
9      9620      0
5      11700     0
1      5550      0
2      4810      0
3      4160      0
4      4160      0
5      4070      0
6      6660      0
7      8140      0
8      10170     0
9      9620      0
10     10540     0
11     19790     0
12     20160     0
13     21640     0
14     30890     0
15     12400     0
16     6480      0
1      15400     0
2      17400     0
3      14800     0
4      12000     0
5      11700     0
6      12000     0
7      15700     0
8      16100     0
9      18500     0
10     25000     0
11     29000     0
12     26000     0
13     26000     0
14     31500     0
15     26000     0
16     19400     0

```

HNF-SD-WM-CN-109 Rev.0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 05/09/97
Run Time = 12:24:03.38

INPUT ECHO:
wrap1 50%, wrapn1.in, ground level release
c GXQ Version 4.0 Input File
c mode
c 1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
c T T F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENI1)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
c 0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
c 0 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
c 0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on

HNF-SD-WM-CN-109 Rev.0

```

c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off

c
c PARAMETER INPUT:
c      reference      frequency
c      release      anemometer      mixing      to
c      height      height      height      exceed
c      hs(m)      ha(m)      hm(m)      Cx(%)
c
c      0.00000E+00      1.00000E+01      1.00000E+03      5.00000E+01
c
c      initial      initial      release      deposition      gravitational
c      plume      plume      duration      velocity      settling
c      width      height      trd(hr)      velocity      velocity
c      Wb(m)      Hb(m)      trd(hr)      vd(m/s)      vg(m/s)
c
c      6.09000E+01      9.80000E+00      5.00000E-01      1.00000E-03      1.00000E-03
c
c      initial      initial      release      convective
c      ambient      plume      plume      heat release
c      temperature      temperature      flow rate      diameter      rate(1)
c      Tamb(C)      T0(C)      V0(m3/s)      d(m)      qh(w)
c
c      2.00000E+01      2.00000E+01      1.00000E+00      1.00000E+00      0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q      Wind
c      scaling      Speed
c      factor      Exponent
c      c(?)      a(?)
c
c      1.00000E+00      7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed)      class windspeed distance offset receptor-height
c 3 (create plot file)      class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

MODE:
Site specific X/Q calculated.

LOGICAL CHOICES:
Joint frequency used to calculate X/Q based on frequency of exceedance.
Joint frequency data normalized.
X/Q calculated for single sector.

MODELS SELECTED:

```

HNF-SD-WM-CN-109 Rev.0

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

wrap1 50%, wrapn1.in, ground level release

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION	AVERAGE INDIVIDUAL	ATM. STAB. CLASS	WIND SPEED (m/s)
					SCALED X/Q (s/m3)	SCALED X/Q (s/m3)		
S	100	0	100.00	1	2.35E-03	2.35E-03	F	15.60
SSW	100	0	100.00	1	1.73E-03	1.73E-03	F	19.00
SW	100	0	100.00	1	2.86E-03	2.86E-03	E	4.70
WSW	100	0	100.00	1	3.36E-03	3.36E-03	C	0.89
W	100	0	100.00	1	2.97E-03	2.97E-03	E	4.70
WNW	100	0	100.00	1	3.07E-03	3.07E-03	E	4.70
NW	100	0	100.00	1	3.19E-03	3.19E-03	E	4.70
NNW	100	0	100.00	1	4.92E-03	4.92E-03	E	2.65
N	100	0	100.00	1	5.33E-03	5.33E-03	E	2.65
NNE	100	0	100.00	1	3.91E-03	3.91E-03	C	0.89
NE	100	0	100.00	1	2.41E-03	2.41E-03	D	2.65
ENE	100	0	100.00	1	1.98E-03	1.98E-03	E	7.15
E	100	0	100.00	1	4.65E-03	4.65E-03	F	7.15
ESE	100	0	100.00	1	2.89E-03	2.89E-03	E	4.70
SE	100	0	100.00	1	2.81E-03	2.81E-03	D	2.65
SSE	100	0	100.00	1	2.86E-03	2.86E-03	E	4.70
S	500	0	100.00	1	1.43E-04	1.43E-04	F	15.60
SSW	500	0	100.00	1	9.22E-05	9.22E-05	B	0.89
SW	500	0	100.00	1	1.74E-04	1.74E-04	E	4.70
WSW	500	0	100.00	1	1.89E-04	1.89E-04	C	0.89
W	500	0	100.00	1	1.83E-04	1.83E-04	E	4.70
WNW	500	0	100.00	1	1.85E-04	1.85E-04	E	4.70
NW	500	0	100.00	1	1.87E-04	1.87E-04	E	4.70
NNW	500	0	100.00	1	3.11E-04	3.11E-04	E	2.65
N	500	0	100.00	1	3.36E-04	3.36E-04	E	2.65
NNE	500	0	100.00	1	2.21E-04	2.21E-04	C	0.89
NE	500	0	100.00	1	1.44E-04	1.44E-04	D	2.65
ENE	500	0	100.00	1	1.24E-04	1.24E-04	E	7.15
E	500	0	100.00	1	2.95E-04	2.95E-04	F	7.15
ESE	500	0	100.00	1	1.81E-04	1.81E-04	E	4.70
SE	500	0	100.00	1	1.65E-04	1.65E-04	D	2.65
SSE	500	0	100.00	1	1.75E-04	1.75E-04	E	4.70
S	800	0	100.00	1	6.48E-05	6.48E-05	F	15.60
SSW	800	0	100.00	1	4.30E-05	4.30E-05	D	4.70
SW	800	0	100.00	1	7.78E-05	7.78E-05	C	0.89
WSW	800	0	100.00	1	8.16E-05	8.16E-05	C	0.89
W	800	0	100.00	1	8.14E-05	8.14E-05	C	0.89
WNW	800	0	100.00	1	8.20E-05	8.20E-05	C	0.89
NW	800	0	100.00	1	8.41E-05	8.41E-05	E	4.70
NNW	800	0	100.00	1	1.43E-04	1.43E-04	E	2.65
N	800	0	100.00	1	1.55E-04	1.55E-04	E	2.65
NNE	800	0	100.00	1	1.14E-04	1.14E-04	E	4.70
NE	800	0	100.00	1	6.56E-05	6.56E-05	D	2.65
ENE	800	0	100.00	1	5.71E-05	5.71E-05	E	7.15
E	800	0	100.00	1	1.36E-04	1.36E-04	F	7.15
ESE	800	0	100.00	1	8.41E-05	8.41E-05	E	4.70
SE	800	0	100.00	1	7.52E-05	7.52E-05	D	2.65
SSE	800	0	100.00	1	7.89E-05	7.89E-05	C	0.89
WNW	12600	0	100.00	1	1.39E-06	1.39E-06	E	4.70
W	4070	0	100.00	1	6.52E-06	6.52E-06	E	4.70
N	9620	0	100.00	1	3.90E-06	3.90E-06	E	2.65
W	11700	0	100.00	1	1.48E-06	1.48E-06	E	4.70

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S	5550	0 100.00	1	3.26E-06	3.26E-06 F	15.60
SSW	4810	0 100.00	1	2.61E-06	2.61E-06 E	9.80
SW	4160	0 100.00	1	5.71E-06	5.71E-06 D	2.65
WSW	4160	0 100.00	1	6.22E-06	6.22E-06 E	4.70
W	4070	0 100.00	1	6.52E-06	6.52E-06 E	4.70
WNW	6660	0 100.00	1	3.33E-06	3.33E-06 E	4.70
NW	8140	0 100.00	1	2.66E-06	2.66E-06 E	4.70
NNW	10170	0 100.00	1	3.44E-06	3.44E-06 E	2.65
N	9620	0 100.00	1	3.90E-06	3.90E-06 E	2.65
NNE	10540	0 100.00	1	2.56E-06	2.56E-06 E	4.70
NE	19790	0 100.00	1	5.47E-07	5.47E-07 E	7.15
ENE	20160	0 100.00	1	5.29E-07	5.29E-07 E	7.15
E	21640	0 100.00	1	1.27E-06	1.27E-06 F	7.15
ESE	30890	0 100.00	1	4.49E-07	4.49E-07 E	4.70
SE	12400	0 100.00	1	1.10E-06	1.10E-06 D	2.65
SSE	6480	0 100.00	1	3.16E-06	3.16E-06 D	2.65
S	15400	0 100.00	1	7.62E-07	7.62E-07 E	7.15
SSW	17400	0 100.00	1	3.75E-07	3.75E-07 D	4.70
SW	14800	0 100.00	1	9.02E-07	9.02E-07 D	2.65
WSW	12000	0 100.00	1	1.40E-06	1.40E-06 E	4.70
W	11700	0 100.00	1	1.48E-06	1.48E-06 E	4.70
WNW	12000	0 100.00	1	1.48E-06	1.48E-06 E	4.70
NW	15700	0 100.00	1	1.11E-06	1.11E-06 E	4.70
NNW	16100	0 100.00	1	1.88E-06	1.88E-06 E	2.65
N	18500	0 100.00	1	1.62E-06	1.62E-06 E	2.65
NNE	25000	0 100.00	1	8.21E-07	8.21E-07 E	4.70
NE	29000	0 100.00	1	3.21E-07	3.21E-07 D	2.65
ENE	26000	0 100.00	1	3.72E-07	3.72E-07 D	2.65
E	26000	0 100.00	1	1.01E-06	1.01E-06 F	7.15
ESE	31500	0 100.00	1	4.37E-07	4.37E-07 E	4.70
SE	26000	0 100.00	1	3.77E-07	3.77E-07 E	7.15
SSE	19400	0 100.00	1	6.77E-07	6.77E-07 D	2.65

```

wrap1 50%, wrapn2.in, ground level release; wake effect
c GXQ Version 4.0 Input File
c mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c   ifox inorm icdf ichk isite ipop
c     t   t   f   f   f   f
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c       = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c       = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c       = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c       = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c       = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c       = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c   ipuff idep isrc iwind
c     0     0     0     0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c   iwake ipm iflow ientr
c     1     0     0     0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c   (irise igrnd)iwash igrav
c     0       0     0     0
c ipuff = 1 then X/Q calculated using puff model
c       = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c       = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c       = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c       = 2 then 5th Power Law plume meander model turned on
c       = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c       = 2 then ISC2 momentum/buoyancy plume rise model turned on

```

c igrnd = 1 then Mills buoyant plume rise modification for ground effects
 c iwash = 1 then stack downwash model turned on
 c igrav = 1 then gravitational settling model turned on
 c = 0 unless specified otherwise, 0 turns model off

c
 c PARAMETER INPUT:

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)	
0	10	1000	50	

initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
60.9	9.8	0.5	0.001	0.001

ambient temperature Tamb(C)	initial plume temperature T0(C)	initial plume flow rate V0(m3/s)	release diameter d(m)	convective heat release rate(l) qh(w)
20	20	1	1	0

c (1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1	.78

c
 c RECEPTOR DEPENDENT DATA (no line limit)
 c FOR MODE make RECEPTOR DEPENDENT DATA
 c 1 (site specific) sector distance receptor-height
 c 2 (by class & wind speed) class windspeed distance offset receptor-height
 c 3 (create plot file) class windspeed xmax imax ymax jmax xmin power

c RECEPTOR PARAMETER DESCRIPTION

c sector = 0, 1, 2... (all, S, SSW, etc.)
 c distance = receptor distance (m)
 c receptor height = height of receptor (m)
 c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
 c windspeed = anemometer wind speed (m/s)
 c offset = offset from plume centerline (m)
 c xmax = maximum distance to plot or calculate to (m)

c imax = distance intervals
 c ymax = maximum offset to plot (m)
 c jmax = offset intervals
 c xqmin = minimum scaled X/Q to calculate
 c power = exponent in power function step size

0	100	0
0	500	0
0	800	0
6	12600	0
5	4070	0
9	9620	0
5	11700	0
1	5550	0
2	4810	0
3	4160	0
4	4160	0
5	4070	0
6	6660	0
7	8140	0
8	10170	0
9	9620	0
10	10540	0
11	19790	0
12	20160	0
13	21640	0
14	30890	0
15	12400	0
16	6480	0
1	15400	0
2	17400	0
3	14800	0
4	12000	0
5	11700	0
6	12000	0
7	15700	0
8	16100	0
9	18500	0
10	25000	0
11	29000	0
12	26000	0
13	26000	0
14	31500	0
15	26000	0
16	19400	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WMC-SD-GN-SWD-30002 Rev. 1.

Validation documented in WMC-SD-GN-SWD-30003 Rev. 1.

Code Custodian is: Brit E. Hey

Westinghouse Hanford Company

P.O. Box 1970

Richland, WA 99352

(509) 376-2921

Run Date = 05/08/97

Run Time = 12:20:39.11

INPUT ECHO:

wrap1 50%, wrapn2.in, ground level release; wake effect

c GXQ Version 4.0 Input File

c mode

1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology

c mode = 2 then X/Q based on atmospheric stability class and wind speed

c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop

T T F F F F

c ifox = t then joint frequency used to compute frequency to exceed X/Q

c = f then joint frequency used to compute annual average X/Q

c inorm = t then joint frequency data is normalized (as in GENII)

c = f then joint frequency data is un-normalized

c icdf = t then cumulative distribution file created (CDF.OUT)

c = f then no cumulative distribution file created

c ichk = t then X/Q parameter print option turned on

c = f then no parameter print

c isite = t then X/Q based on joint frequency data for all 16 sectors

c = f then X/Q based on joint frequency data of individual sectors

c ipop = t then X/Q is population weighted

c = f then no population weighting

c

c X/Q AND WIND SPEED ADJUSTMENT MODELS:

c ipuff idep isrc iwind

0 0 0 0

c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:

c iwake ipm iflow ientr

1 0 0 0

c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:

c (irise igrnd)iwash igrav

0 0 0 0

c ipuff = 1 then X/Q calculated using puff model

c = 0 then X/Q calculated using default continuous plume model

c idep = 1 then plume depletion model turned on (Chamberlain model)

c isrc = 1 then X/Q multiplied by scalar

c = 2 then X/Q adjusted by wind speed function

c iwind = 1 then wind speed corrected for plume height

c iwake = 1 then NRC RG 1.145 building wake model turned on

c = 2 then MACCS virtual distance building wake model turned on

c ipm = 1 then NRC RG 1.145 plume meander model turned on

c = 2 then 5th Power Law plume meander model turned on

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```

c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c      release      reference      mixing      frequency
c      height      anemometer     height     to
c      hs(m)       ha(m)          hm(m)     exceed
c                                     Cx(%)
c
c      0.00000E+00    1.00000E+01    1.00000E+03    5.00000E+01
c
c      initial      initial      release      deposition      gravitational
c      plume        plume        duration     velocity        settling
c      width        height       trd(hr)      velocity        velocity
c      Wb(m)        Hb(m)         vd(m/s)     vg(m/s)
c
c      6.09000E+01    9.80000E+00    5.00000E-01    1.00000E-03    1.00000E-03
c
c      ambient      initial      initial      release      convective
c      temperature  plume        plume        plume        heat release
c      Tamb(C)      T0(C)        flow rate   diameter     rate(1)
c                                     V0(m3/s)    d(m)         qh(w)
c
c      2.00000E+01    2.00000E+01    1.00000E+00    1.00000E+00    0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q          Wind
c      scaling      Speed
c      factor       Exponent
c      c(?)         a(?)
c
c      1.00000E+00    7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

Joint frequency data normalized.

X/Q calculated for single sector.

MODELS SELECTED:

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NRC RG 1.145 building wake model selected.
Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

wrap1 50%, wrapn2.in, ground level release; wake effect

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION	AVERAGE INDIVIDUAL	ATM. STAB. CLASS	WIND SPEED (m/s)
					SCALED X/Q (s/m3)	SCALED X/Q (s/m3)		
S	100	0	100.00	1	9.20E-04	9.20E-04	D	2.65
SSW	100	0	100.00	1	8.07E-04	8.07E-04	A	0.89
SW	100	0	100.00	1	9.86E-04	9.86E-04	E	4.70
WSW	100	0	100.00	1	1.62E-03	1.62E-03	E	2.65
W	100	0	100.00	1	1.37E-03	1.37E-03	B	0.89
WNW	100	0	100.00	1	1.32E-03	1.32E-03	B	0.89
NW	100	0	100.00	1	1.26E-03	1.26E-03	B	0.89
NNW	100	0	100.00	1	1.68E-03	1.68E-03	E	2.65
N	100	0	100.00	1	1.75E-03	1.75E-03	E	2.65
NNE	100	0	100.00	1	1.43E-03	1.43E-03	B	0.89
NE	100	0	100.00	1	8.79E-04	8.79E-04	A	0.89
ENE	100	0	100.00	1	7.61E-04	7.61E-04	A	0.89
E	100	0	100.00	1	1.56E-03	1.56E-03	F	7.15
ESE	100	0	100.00	1	9.65E-04	9.65E-04	E	4.70
SE	100	0	100.00	1	9.40E-04	9.40E-04	D	2.65
SSE	100	0	100.00	1	9.61E-04	9.61E-04	E	4.70
S	500	0	100.00	1	1.34E-04	1.34E-04	F	9.80
SSW	500	0	100.00	1	8.67E-05	8.67E-05	B	0.89
SW	500	0	100.00	1	1.45E-04	1.45E-04	E	4.70
WSW	500	0	100.00	1	1.71E-04	1.71E-04	C	0.89
W	500	0	100.00	1	1.49E-04	1.49E-04	E	4.70
WNW	500	0	100.00	1	1.55E-04	1.55E-04	E	4.70
NW	500	0	100.00	1	1.61E-04	1.61E-04	E	4.70
NNW	500	0	100.00	1	2.39E-04	2.39E-04	E	2.65
N	500	0	100.00	1	2.58E-04	2.58E-04	E	2.65
NNE	500	0	100.00	1	1.99E-04	1.99E-04	C	0.89
NE	500	0	100.00	1	1.23E-04	1.23E-04	D	2.65
ENE	500	0	100.00	1	9.96E-05	9.96E-05	E	7.15
E	500	0	100.00	1	2.14E-04	2.14E-04	C	0.89
ESE	500	0	100.00	1	1.45E-04	1.45E-04	E	4.70
SE	500	0	100.00	1	1.44E-04	1.44E-04	D	2.65
SSE	500	0	100.00	1	1.45E-04	1.45E-04	E	4.70
S	800	0	100.00	1	5.94E-05	5.94E-05	E	7.15
SSW	800	0	100.00	1	3.89E-05	3.89E-05	D	4.70
SW	800	0	100.00	1	7.29E-05	7.29E-05	E	4.70
WSW	800	0	100.00	1	7.88E-05	7.88E-05	C	0.89
W	800	0	100.00	1	7.60E-05	7.60E-05	E	4.70
WNW	800	0	100.00	1	7.67E-05	7.67E-05	E	4.70
NW	800	0	100.00	1	7.76E-05	7.76E-05	E	4.70
NNW	800	0	100.00	1	1.25E-04	1.25E-04	E	2.65
N	800	0	100.00	1	1.36E-04	1.36E-04	E	2.65
NNE	800	0	100.00	1	9.19E-05	9.19E-05	C	0.89
NE	800	0	100.00	1	6.07E-05	6.07E-05	D	2.65
ENE	800	0	100.00	1	5.13E-05	5.13E-05	E	7.15
E	800	0	100.00	1	1.14E-04	1.14E-04	F	7.15
ESE	800	0	100.00	1	7.50E-05	7.50E-05	E	4.70
SE	800	0	100.00	1	7.02E-05	7.02E-05	D	2.65
SSE	800	0	100.00	1	7.31E-05	7.31E-05	E	4.70
WNW	12600	0	100.00	1	1.38E-06	1.38E-06	E	4.70
W	4070	0	100.00	1	6.47E-06	6.47E-06	E	4.70
N	9620	0	100.00	1	3.89E-06	3.89E-06	E	2.65

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W	11700	0 100.00	1	1.48E-06	1.48E-06 E	4.70
S	5550	0 100.00	1	3.21E-06	3.21E-06 F	15.60
SSW	4810	0 100.00	1	2.59E-06	2.59E-06 E	9.80
SW	4160	0 100.00	1	5.68E-06	5.68E-06 D	2.65
WSW	4160	0 100.00	1	6.17E-06	6.17E-06 E	4.70
W	4070	0 100.00	1	6.47E-06	6.47E-06 E	4.70
WNW	6660	0 100.00	1	3.31E-06	3.31E-06 E	4.70
NW	8140	0 100.00	1	2.65E-06	2.65E-06 E	4.70
NNW	10170	0 100.00	1	3.43E-06	3.43E-06 E	2.65
N	9620	0 100.00	1	3.89E-06	3.89E-06 E	2.65
NNE	10540	0 100.00	1	2.56E-06	2.56E-06 E	4.70
NE	19790	0 100.00	1	5.46E-07	5.46E-07 E	7.15
ENE	20160	0 100.00	1	5.28E-07	5.28E-07 E	7.15
E	21640	0 100.00	1	1.27E-06	1.27E-06 F	7.15
ESE	30890	0 100.00	1	4.48E-07	4.48E-07 E	4.70
SE	12400	0 100.00	1	1.10E-06	1.10E-06 D	2.65
SSE	6480	0 100.00	1	3.15E-06	3.15E-06 D	2.65
S	15400	0 100.00	1	7.61E-07	7.61E-07 E	7.15
SSW	17400	0 100.00	1	3.75E-07	3.75E-07 D	4.70
SW	14800	0 100.00	1	9.01E-07	9.01E-07 D	2.65
WSW	12000	0 100.00	1	1.39E-06	1.39E-06 E	4.70
W	11700	0 100.00	1	1.48E-06	1.48E-06 E	4.70
WNW	12000	0 100.00	1	1.48E-06	1.48E-06 E	4.70
NW	15700	0 100.00	1	1.10E-06	1.10E-06 E	4.70
NNW	16100	0 100.00	1	1.88E-06	1.88E-06 E	2.65
N	18500	0 100.00	1	1.62E-06	1.62E-06 E	2.65
NNE	25000	0 100.00	1	8.21E-07	8.21E-07 E	4.70
NE	29000	0 100.00	1	3.21E-07	3.21E-07 D	2.65
ENE	26000	0 100.00	1	3.72E-07	3.72E-07 D	2.65
E	26000	0 100.00	1	1.01E-06	1.01E-06 F	7.15
ESE	31500	0 100.00	1	4.37E-07	4.37E-07 E	4.70
SE	26000	0 100.00	1	3.76E-07	3.76E-07 E	7.15
SSE	19400	0 100.00	1	6.76E-07	6.76E-07 D	2.65

```

WRAP1, Highway 240 , case 3. ground level release;no effect
c GXQ Version 4.0 Input File
c  mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c  ifox  inorm  icdf  ichk  isite  ipop
    t    f    f    f    f    f
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c      = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c      = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c      = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c      = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c      = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c      = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c  ipuff  idep  isrc  iwind
    0     0     0     0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c  iwake  ipm   iflow  ientr
    0     0     0     0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c  (irise igrnd)iwash igrav
    0     0     0     0
c ipuff = 1 then X/Q calculated using puff model
c      = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c      = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c      = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c      = 2 then 5th Power Law plume meander model turned on
c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on

```

c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c = 0 unless specified otherwise, 0 turns model off

PARAMETER INPUT:

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)	
0	10	1000	0.5	
initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
60.9	9.8	0.5	0.001	0.001
ambient temperature Tamb(C)	initial plume temperature TO(C)	initial plume flow rate VO(m3/s)	release diameter d(m)	convective heat release rate(l) qh(w)
20	20	1	1	0

(1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1	.78

RECEPTOR DEPENDENT DATA (no line limit)

c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xqmin power

RECEPTOR PARAMETER DESCRIPTION

c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)

c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

1	5550	0
2	4810	0
3	4160	0
4	4160	0
5	4070	0
6	6660	0
7	8140	0
8	10170	0
9	9620	0
10	10540	0
11	19790	0
12	20160	0
13	21640	0
14	30890	0
15	12400	0
16	6480	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 07/17/96
Run Time = 09:03:19.10

INPUT ECHO:
CWC Solid Waste Storage, Highway 240 , case 3. ground level release;no effect
c GXQ Version 4.0 Input File
c mode
1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
T F F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
0 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on
c = 3 then sector average model turned on


```

c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c   release      reference      mixing      frequency
c   height      anemometer     height     to
c   hs(m)       ha(m)          hm(m)      exceed
c
c   0.00000E+00  1.00000E+01    1.00000E+03  5.00000E-01
c
c   initial      initial      release      deposition      gravitational
c   plume        plume        duration     velocity        settling
c   width        height      trd(hr)      vd(m/s)         velocity
c   hb(m)        Hb(m)                                     vg(m/s)
c
c   6.09000E+01  9.80000E+00    5.00000E-01  1.00000E-03    1.00000E-03
c
c   ambient      initial      initial      release      convective
c   temperature  plume        plume        flow rate    heat release
c   Tamb(C)      T0(C)        V0(m3/s)    diameter     rate(1)
c               T0(C)        V0(m3/s)    d(m)         qh(w)
c
c   2.00000E+01  2.00000E+01    1.00000E+00  1.00000E+00    0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c   X/Q          Wind
c   scaling      Speed
c   factor        Exponent
c   c(?)          a(?)
c
c   1.00000E+00  7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax qxmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c qxmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

No normalization of joint frequency.

X/Q calculated for single sector.

MODELS SELECTED:

Default Gaussian plume model selected.

HNF-SD-WM-CN-109 Rev.0

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:

200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

CWC Solid Waste Storage, Highway 240 , case 3. ground level release;no effect

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION	AVERAGE INDIVIDUAL	ATM. STAB. CLASS	WIND SPEED (m/s)
					SCALED X/Q (s/m3)	SCALED X/Q (s/m3)		
S	5550	0	6.30	1	2.50E-05	2.50E-05	E	0.89
SSW	4810	0	4.53	1	2.21E-05	2.21E-05	F	2.65
SW	4160	0	2.93	1	2.90E-05	2.90E-05	F	2.65
WSW	4160	0	2.72	1	2.91E-05	2.91E-05	F	2.65
W	4070	0	4.80	1	6.98E-05	6.98E-05	G	2.65
WNW	6660	0	3.98	1	2.05E-05	2.05E-05	G	4.70
NW	8140	0	4.72	1	2.89E-05	2.89E-05	G	2.65
NNW	10170	0	4.58	1	2.18E-05	2.18E-05	G	2.65
N	9620	0	4.36	1	2.51E-05	2.51E-05	G	2.65
NNE	10540	0	2.49	1	1.02E-05	1.02E-05	E	0.89
NE	19790	0	3.90	1	4.80E-06	4.80E-06	E	0.89
E	20160	0	6.17	1	8.07E-06	8.07E-06	G	2.65
ENE	21640	0	14.05	1	9.90E-06	9.90E-06	F	0.89
ESE	30890	0	18.80	1	6.12E-06	6.12E-06	F	0.89
SE	12400	0	10.83	1	1.79E-05	1.79E-05	G	2.65
SSE	6480	0	4.78	1	2.06E-05	2.06E-05	G	4.70

APPENDIX D

TRUSAF

GXQ INPUT AND OUTPUT FILES

HNF-SD-WM-CN-109 Rev.0

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TP99.5 TRUSAF XQs, Case 1-trusaf1.in, Acute Ground Level Release, no plume meander

c GXQ Version 4.0 Input File

c mode

1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology

c mode = 2 then X/Q based on atmospheric stability class and wind speed

c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop

t f f f f f

c ifox = t then joint frequency used to compute frequency to exceed X/Q

c = f then joint frequency used to compute annual average X/Q

c inorm = t then joint frequency data is normalized (as in GENII)

c = f then joint frequency data is un-normalized

c icdf = t then cumulative distribution file created (CDF.OUT)

c = f then no cumulative distribution file created

c ichk = t then X/Q parameter print option turned on

c = f then no parameter print

c isite = t then X/Q based on joint frequency data for all 16 sectors

c = f then X/Q based on joint frequency data of individual sectors

c ipop = t then X/Q is population weighted

c = f then no population weighting

c

c X/Q AND WIND SPEED ADJUSTMENT MODELS:

c ipuff idep isrc iwind

0 0 0 0

c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:

c iwake ipm iflow ientr

0 0 0 0

c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:

c (irise igrnd) iwash igrav

0 0 0 0

c ipuff = 1 then X/Q calculated using puff model

c = 0 then X/Q calculated using default continuous plume model

c idep = 1 then plume depletion model turned on (Chamberlain model)

c isrc = 1 then X/Q multiplied by scalar

c = 2 then X/Q adjusted by wind speed function

c iwind = 1 then wind speed corrected for plume height

c iwake = 1 then NRC RG 1.145 building wake model turned on

c = 2 then MACCS virtual distance building wake model turned on

c ipm = 1 then NRC RG 1.145 plume meander model turned on

c = 2 then 5th Power Law plume meander model turned on

c = 3 then sector average model turned on

c iflow = 1 then sigmas adjusted for volume flow rate

c ientr = 1 then method of Pasquill used to account for entrainment

```

c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off

c      reference frequency
c      release anemometer mixing to
c      height height height exceed
c      hs(m) ha(m) hm(m) Cx(%)
c
c      0 10 1000 0.5

c      initial initial release deposition gravitational
c      plume plume duration velocity settling
c      width height duration velocity velocity
c      Wb(m) Hb(m) trd(hr) vd(m/s) vg(m/s)
c
c      0 0 1.0 0.001 0.001

c      initial initial release convective
c      ambient plume plume heat release
c      temperature temperature flow rate diameter rate(1)
c      Tamb(C) T0(C) V0(m3/s) d(m) qh(w)
c
c      20 20 1 1 0

c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q Wind
c      scaling Speed
c      factor Exponent
c      c(?) a(?)
c
c      1 .78

c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)

```

```

c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

0	100	0
0	500	0
1	15380	0
2	15630	0
3	15700	0
4	13400	0
5	13110	0
6	13470	0
7	15280	0
8	16320	0
9	17560	0
10	25880	0
11	25640	0
12	22920	0
13	22570	0
14	27170	0
15	24140	0
16	21040	0
1	15390	0
2	15650	0
3	15690	0
4	13380	0
5	13090	0
6	13450	0
7	11590	0
8	8870	0
9	8980	0
10	11560	0
11	17450	0
12	17210	0
13	18190	0
14	27090	0
15	24170	0
16	21070	0
1	6060	0
2	6060	0
3	5770	0
4	5570	0
5	5890	0
6	8440	0
7	10060	0
8	16290	0
9	17540	0
10	25860	0
11	25650	0

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12	22930	0
13	22600	0
14	27090	0
15	13940	0
16	7560	0

6X0 Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company
Users guide documented in WHC-SD-GN-SMD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SMD-30003 Rev. 1.
Code Custodian is: Brlt E. Hey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921
Run Date = 03/19/97
Run Time = 11:25:13.92
INPUT ECHO:
TP99.5 TRUSAF XD,Case 1-trusaf1.in, Acute Ground Level Release, no plume meand
c 6X0 Version 4.0 Input file
c mode
1
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c LOGICAL CHOICES:
c ifox norm icdf ichk site pop
f f f f f
c ifox = f then joint frequency used to compute annual average X/Q
c inorm = f then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = f then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = f then X/Q parameter print option turned on
c = f then no parameter print
c isite = f then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q is population weighting
c idop = f then X/Q is population weighting
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c iduff dep isrc iwind
0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iduff = 1 then X/Q calculated using puff model
0 0 0
c idep = 1 then plume depletion using default turned on (Chamberlain model)
c = 0 then X/Q calculated using default turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC R6 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC R6 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on

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```

c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c      reference      mixing      frequency
c      release      anemometer      to
c      height      height      exceed
c      hs(m)      ha(m)      hm(m)      Cx(%)
c      0.00000E+00      1.00000E+01      1.00000E+03      5.00000E-01
c
c      initial      initial      release      deposition      settling
c      plume      plume      duration      velocity      velocity
c      width      height      trd(hr)      vd(m/s)      vg(m/s)
c      Wb(m)      Hb(m)      trd(hr)      vd(m/s)      vg(m/s)
c      0.00000E+00      0.00000E+00      1.00000E+00      1.00000E-03      1.00000E-03
c
c      initial      initial      release      convective
c      ambient      plume      plume      heat release
c      temperature      temperature      flow rate      diameter      rate(1)
c      Tamb(C)      T0(C)      V0(m3/s)      d(m)      qh(w)
c      2.00000E+01      2.00000E+01      1.00000E+00      1.00000E+00      0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q      Wind
c      scaling      Speed
c      factor      Exponent
c      c(?)      a(?)
c      1.00000E+00      7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed)      class windspeed distance offset receptor-height
c 3 (create plot file)      class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-E stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.
 No normalization of joint frequency.
 X/Q calculated for single sector.

MODELS SELECTED:

Default Gaussian plume model selected.

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WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

TP99.5 TRUSAF XQs,Case 1-trusaf1.in, Acute Ground Level Release, no plume meande

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	6.30	1	1.56E-02	1.56E-02	E	0.89
SSW	100	0	4.53	1	1.13E-02	1.13E-02	F	2.65
SW	100	0	2.93	1	1.21E-02	1.21E-02	F	2.65
WSW	100	0	2.72	1	1.22E-02	1.22E-02	F	2.65
W	100	0	4.80	1	2.80E-02	2.80E-02	G	2.65
WNW	100	0	3.98	1	1.60E-02	1.60E-02	G	4.70
NW	100	0	4.72	1	2.89E-02	2.89E-02	G	2.65
NNW	100	0	4.58	1	2.90E-02	2.90E-02	G	2.65
N	100	0	4.36	1	3.12E-02	3.12E-02	G	2.65
NNE	100	0	2.49	1	1.54E-02	1.54E-02	E	0.89
NE	100	0	3.90	1	1.57E-02	1.57E-02	E	0.89
ENE	100	0	6.17	1	2.52E-02	2.52E-02	G	2.65
E	100	0	14.05	1	3.41E-02	3.41E-02	F	0.89
ESE	100	0	18.80	1	3.25E-02	3.25E-02	F	0.89
SE	100	0	10.83	1	3.07E-02	3.07E-02	G	2.65
SSE	100	0	4.78	1	1.58E-02	1.58E-02	G	4.70
S	500	0	6.30	1	9.91E-04	9.91E-04	E	0.89
SSW	500	0	4.53	1	7.21E-04	7.21E-04	F	2.65
SW	500	0	2.93	1	7.75E-04	7.75E-04	F	2.65
WSW	500	0	2.72	1	7.78E-04	7.78E-04	F	2.65
W	500	0	4.80	1	1.79E-03	1.79E-03	G	2.65
WNW	500	0	3.98	1	1.02E-03	1.02E-03	G	4.70
NW	500	0	4.72	1	1.86E-03	1.86E-03	G	2.65
NNW	500	0	4.58	1	1.86E-03	1.86E-03	G	2.65
N	500	0	4.36	1	2.00E-03	2.00E-03	G	2.65
NNE	500	0	2.49	1	9.73E-04	9.73E-04	E	0.89
NE	500	0	3.90	1	9.99E-04	9.99E-04	E	0.89
ENE	500	0	6.17	1	1.62E-03	1.62E-03	G	2.65
E	500	0	14.05	1	2.18E-03	2.18E-03	F	0.89
ESE	500	0	18.80	1	2.08E-03	2.08E-03	F	0.89
SE	500	0	10.83	1	1.97E-03	1.97E-03	G	2.65
SSE	500	0	4.78	1	1.00E-03	1.00E-03	G	4.70
S	15380	0	6.30	1	6.50E-06	6.50E-06	E	0.89
SSW	15630	0	4.53	1	4.02E-06	4.02E-06	F	2.65
SW	15700	0	2.93	1	5.13E-06	5.13E-06	F	2.65
WSW	13400	0	2.72	1	6.28E-06	6.28E-06	F	2.65
W	13110	0	4.80	1	1.52E-05	1.52E-05	G	2.65
WNW	13470	0	3.98	1	8.27E-06	8.27E-06	G	4.70
NW	15280	0	4.72	1	1.30E-05	1.30E-05	G	2.65
NNW	16320	0	4.58	1	1.21E-05	1.21E-05	G	2.65
N	17560	0	4.36	1	1.18E-05	1.18E-05	G	2.65
NNE	25880	0	2.49	1	3.17E-06	3.17E-06	E	0.89
NE	25640	0	3.90	1	3.46E-06	3.46E-06	E	0.89
ENE	22920	0	6.17	1	6.89E-06	6.89E-06	G	2.65
E	22570	0	14.05	1	9.40E-06	9.40E-06	F	0.89
ESE	27170	0	18.80	1	7.15E-06	7.15E-06	F	0.89
SE	24140	0	10.83	1	7.85E-06	7.85E-06	G	2.65
SSE	21040	0	4.78	1	4.48E-06	4.48E-06	G	4.70
S	15390	0	6.30	1	6.49E-06	6.49E-06	E	0.89
SSW	15650	0	4.53	1	4.02E-06	4.02E-06	F	2.65
SW	15690	0	2.93	1	5.13E-06	5.13E-06	F	2.65
WSW	13380	0	2.72	1	6.29E-06	6.29E-06	F	2.65
W	13090	0	4.80	1	1.52E-05	1.52E-05	G	2.65
WNW	13450	0	3.98	1	8.29E-06	8.29E-06	G	4.70

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NW	11590	0	4.72	1	1.84E-05	1.84E-05	G	2.65
NNW	8870	0	4.58	1	2.60E-05	2.60E-05	G	2.65
N	8980	0	4.36	1	2.74E-05	2.74E-05	G	2.65
NNE	11560	0	2.49	1	9.05E-06	9.05E-06	E	0.89
NE	17450	0	3.90	1	5.64E-06	5.64E-06	E	0.89
ENE	17210	0	6.17	1	9.81E-06	9.81E-06	G	2.65
E	18190	0	14.05	1	1.23E-05	1.23E-05	F	0.89
ESE	27090	0	18.80	1	7.18E-06	7.18E-06	F	0.89
SE	24170	0	10.83	1	7.83E-06	7.83E-06	G	2.65
SSE	21070	0	4.78	1	4.48E-06	4.48E-06	G	4.70
S	6060	0	6.30	1	2.22E-05	2.22E-05	E	0.89
SSW	6060	0	4.53	1	1.35E-05	1.35E-05	F	2.65
SW	5770	0	2.93	1	1.87E-05	1.87E-05	F	2.65
WSW	5570	0	2.72	1	1.96E-05	1.96E-05	F	2.65
W	5890	0	4.80	1	4.26E-05	4.26E-05	G	2.65
WNW	8440	0	3.98	1	1.51E-05	1.51E-05	G	4.70
NW	10060	0	4.72	1	2.21E-05	2.21E-05	G	2.65
NNW	16290	0	4.58	1	1.21E-05	1.21E-05	G	2.65
N	17540	0	4.36	1	1.18E-05	1.18E-05	G	2.65
NNE	25860	0	2.49	1	3.17E-06	3.17E-06	E	0.89
NE	25650	0	3.90	1	3.46E-06	3.46E-06	E	0.89
ENE	22930	0	6.17	1	6.89E-06	6.89E-06	G	2.65
E	22600	0	14.05	1	9.38E-06	9.38E-06	F	0.89
ESE	27090	0	18.80	1	7.18E-06	7.18E-06	F	0.89
SE	13940	0	10.83	1	1.55E-05	1.55E-05	G	2.65
SSE	7560	0	4.78	1	1.68E-05	1.68E-05	G	4.70

TP99.5 TRUSAF XQs,Case 1-trusaf11.in, Acute Ground Level Release, wake effect
c GXQ Version 4.0 Input File

c mode
1

c
c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created

c
c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop
t f f f f f

c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting

c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:

c ipuff idep isrc iwind
0 0 0 0

c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:

c iwake ipm iflow ientr
2 0 0 0

c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:

c (irise igrnd)iwash igrav
0 0 0 0

c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on
c = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c = 2 then ISC2 momentum/buoyancy plume rise model turned on

```
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
```

```
c iwash = 1 then stack downwash model turned on
```

```
c igrav = 1 then gravitational settling model turned on
```

```
c      = 0 unless specified otherwise, 0 turns model off
```

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)
----------------------------	--	---------------------------	------------------------------------

0	10	1000	0.5
---	----	------	-----

initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
------------------------------------	-------------------------------------	--------------------------------	-----------------------------------	--

18.3	12.2	1.0	0.001	0.001
------	------	-----	-------	-------

ambient temperature Tamb(C)	initial plume temperature TO(C)	initial plume flow rate VO(m3/s)	release diameter d(m)	convective heat release rate(1) qh(w)
-----------------------------------	--	---	-----------------------------	--

20	20	1	1	0
----	----	---	---	---

```
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
```

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
----------------------------------	-----------------------------------

1	.78
---	-----

```
c RECEPTOR DEPENDENT DATA (no line limit)
```

```
c FOR MODE make RECEPTOR DEPENDENT DATA
```

```
c 1 (site specific) sector distance receptor-height
```

```
c 2 (by class & wind speed) class windspeed distance offset receptor-height
```

```
c 3 (create plot file) class windspeed xmax imax ymax jmax xmin power
```

```
c RECEPTOR PARAMETER DESCRIPTION
```

```
c sector = 0, 1, 2... (all, S, SSW, etc.)
```

```
c distance = receptor distance (m)
```

```
c receptor height = height of receptor (m)
```

```
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
```

```
c windspeed = anemometer wind speed (m/s)
```

```
c offset = offset from plume centerline (m)
```

```
c xmax = maximum distance to plot or calculate to (m)
```

```
c imax = distance intervals
```

```
c ymax = maximum offset to plot (m)
```

```

c jmax = offset intervals
c xmin = minimum scaled X/Q to calculate
c power = exponent in power function step size
0      100      0
0      500      0
1      15380     0
2      15630     0
3      15700     0
4      13400     0
5      13110     0
6      13470     0
7      15280     0
8      16320     0
9      17560     0
10     25880     0
11     25640     0
12     22920     0
13     22570     0
14     27170     0
15     24140     0
16     21040     0
1      15390     0
2      15650     0
3      15690     0
4      13380     0
5      13090     0
6      13450     0
7      11590     0
8      8870      0
9      8980      0
10     11560     0
11     17450     0
12     17210     0
13     18190     0
14     27090     0
15     24170     0
16     21070     0
1      6060      0
2      6060      0
3      5770      0
4      5570      0
5      5890      0
6      8440      0
7      10060     0
8      16290     0
9      17540     0
10     25860     0
11     25650     0
12     22930     0
13     22600     0

```

14	27090	0
15	13940	0
16	7560	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SMD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SMD-30003 Rev. 1.
Code Custodian is: Brit E. Hey

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 03/20/97
Run Time = 08:00:40.49

INPUT ECHO:
TP99.5 TRUSAF XQs,Case 1-trusaf11.in, Acute Ground Level Release, wake effect
c GXQ Version 4.0 Input File
c mode
1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
T F F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
2 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on

```

c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off

c      release      reference      mixing      frequency
c      height      anemometer      height      to
c      hs(m)      height      ha(m)      hm(m)      exceed
c                      ha(m)      hm(m)      Cx(%)
c
c      0.00000E+00      1.00000E+01      1.00000E+03      5.00000E-01

c
c      initial      initial      release      deposition      gravitational
c      plume      plume      duration      velocity      settling
c      width      height      trd(hr)      velocity      velocity
c      Wb(m)      Hb(m)      trd(hr)      vd(m/s)      vg(m/s)
c
c      1.83000E+01      1.22000E+01      1.00000E+00      1.00000E-03      1.00000E-03

c
c      ambient      initial      initial      release      convective
c      temperature      plume      plume      heat release
c      Tamb(C)      T0(C)      flow rate      diameter      rate(1)
c                      T0(C)      V0(m3/s)      d(m)      qh(w)
c
c      2.00000E+01      2.00000E+01      1.00000E+00      1.00000E+00      0.00000E+00

c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q      Wind
c      scaling      Speed
c      factor      Exponent
c      c(?)      a(?)
c
c      1.00000E+00      7.80000E-01

c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed)      class windspeed distance offset receptor-height
c 3 (create plot file)      class windspeed xmax imax ymax jmax xqmin power

c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

No normalization of joint frequency.

X/Q calculated for single sector.

MODELS SELECTED:

MACCS Virtual source building wake model selected.

Default Gaussian plume model selected.

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WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

TP99.5 TRUSAF XQs,Case 1-trusaf11.in, Acute Ground Level Release, wake effect

SECTOR	DISTANCE (m)	RECEIPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	6.30	1	4.40E-03	4.40E-03	E	0.89
SSW	100	0	4.53	1	3.61E-03	3.61E-03	E	0.89
SW	100	0	2.93	1	3.76E-03	3.76E-03	E	0.89
WSW	100	0	2.72	1	3.75E-03	3.75E-03	E	0.89
W	100	0	4.80	1	5.07E-03	5.07E-03	E	0.89
WNW	100	0	3.98	1	4.45E-03	4.45E-03	E	0.89
NW	100	0	4.72	1	4.66E-03	4.66E-03	E	0.89
NNW	100	0	4.58	1	4.59E-03	4.59E-03	E	0.89
N	100	0	4.36	1	5.28E-03	5.28E-03	F	0.89
NNE	100	0	2.49	1	3.75E-03	3.75E-03	E	0.89
NE	100	0	3.90	1	3.93E-03	3.93E-03	E	0.89
ENE	100	0	6.17	1	4.29E-03	4.29E-03	E	0.89
E	100	0	14.05	1	5.96E-03	5.96E-03	F	0.89
ESE	100	0	18.80	1	5.28E-03	5.28E-03	F	0.89
SE	100	0	10.83	1	5.15E-03	5.15E-03	E	0.89
SSE	100	0	4.78	1	4.34E-03	4.34E-03	E	0.89
S	500	0	6.30	1	7.31E-04	7.31E-04	E	0.89
SSW	500	0	4.53	1	4.35E-04	4.35E-04	F	2.65
SW	500	0	2.93	1	4.79E-04	4.79E-04	F	2.65
WSW	500	0	2.72	1	4.82E-04	4.82E-04	F	2.65
W	500	0	4.80	1	8.03E-04	8.03E-04	G	2.65
WNW	500	0	3.98	1	7.63E-04	7.63E-04	G	2.65
NW	500	0	4.72	1	8.30E-04	8.30E-04	G	2.65
NNW	500	0	4.58	1	8.40E-04	8.40E-04	G	2.65
N	500	0	4.36	1	1.03E-03	1.03E-03	G	2.65
NNE	500	0	2.49	1	7.01E-04	7.01E-04	E	0.89
NE	500	0	3.90	1	7.26E-04	7.26E-04	E	0.89
ENE	500	0	6.17	1	7.91E-04	7.91E-04	G	2.65
E	500	0	14.05	1	1.28E-03	1.28E-03	F	0.89
ESE	500	0	18.80	1	1.14E-03	1.14E-03	F	0.89
SE	500	0	10.83	1	9.87E-04	9.87E-04	G	2.65
SSE	500	0	4.78	1	7.42E-04	7.42E-04	E	0.89
S	15380	0	6.30	1	6.41E-06	6.41E-06	E	0.89
SSW	15630	0	4.53	1	3.98E-06	3.98E-06	F	2.65
SW	15700	0	2.93	1	5.07E-06	5.07E-06	F	2.65
WSW	13400	0	2.72	1	6.20E-06	6.20E-06	F	2.65
W	13110	0	4.80	1	1.48E-05	1.48E-05	G	2.65
WNW	13470	0	3.98	1	8.09E-06	8.09E-06	G	4.70
NW	15280	0	4.72	1	1.28E-05	1.28E-05	G	2.65
NNW	16320	0	4.58	1	1.18E-05	1.18E-05	G	2.65
N	17560	0	4.36	1	1.16E-05	1.16E-05	G	2.65
NNE	25880	0	2.49	1	3.15E-06	3.15E-06	E	0.89
NE	25640	0	3.90	1	3.43E-06	3.43E-06	E	0.89
ENE	22920	0	6.17	1	6.80E-06	6.80E-06	G	2.65
E	22570	0	14.05	1	9.32E-06	9.32E-06	F	0.89
ESE	27170	0	18.80	1	7.10E-06	7.10E-06	F	0.89
SE	24140	0	10.83	1	7.76E-06	7.76E-06	G	2.65
SSE	21040	0	4.78	1	4.43E-06	4.43E-06	G	4.70
S	15390	0	6.30	1	6.41E-06	6.41E-06	E	0.89
SSW	15650	0	4.53	1	3.97E-06	3.97E-06	F	2.65
SW	15690	0	2.93	1	5.08E-06	5.08E-06	F	2.65
WSW	13380	0	2.72	1	6.21E-06	6.21E-06	F	2.65
W	13090	0	4.80	1	1.49E-05	1.49E-05	G	2.65
WNW	13450	0	3.98	1	8.11E-06	8.11E-06	G	4.70

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NW	11590	0	4.72	1	1.79E-05	1.79E-05	G	2.65
NNW	8870	0	4.58	1	2.50E-05	2.50E-05	G	2.65
N	8980	0	4.36	1	2.66E-05	2.66E-05	G	2.65
NNE	11560	0	2.49	1	8.93E-06	8.93E-06	E	0.89
NE	17450	0	3.90	1	5.56E-06	5.56E-06	E	0.89
ENE	17210	0	6.17	1	9.63E-06	9.63E-06	G	2.65
E	18190	0	14.05	1	1.21E-05	1.21E-05	F	0.89
ESE	27090	0	18.80	1	7.12E-06	7.12E-06	F	0.89
SE	24170	0	10.83	1	7.75E-06	7.75E-06	G	2.65
SSE	21070	0	4.78	1	4.43E-06	4.43E-06	G	4.70
S	6060	0	6.30	1	2.14E-05	2.14E-05	E	0.89
SSW	6060	0	4.53	1	1.57E-05	1.57E-05	F	2.65
SW	5770	0	2.93	1	1.80E-05	1.80E-05	F	2.65
WSW	5570	0	2.72	1	1.90E-05	1.90E-05	F	2.65
W	5890	0	4.80	1	4.01E-05	4.01E-05	G	2.65
WNW	8440	0	3.98	1	1.45E-05	1.45E-05	G	4.70
NW	10060	0	4.72	1	2.13E-05	2.13E-05	G	2.65
NNW	16290	0	4.58	1	1.18E-05	1.18E-05	G	2.65
N	17540	0	4.36	1	1.16E-05	1.16E-05	G	2.65
NNE	25860	0	2.49	1	3.15E-06	3.15E-06	E	0.89
NE	25650	0	3.90	1	3.43E-06	3.43E-06	E	0.89
ENE	22930	0	6.17	1	6.79E-06	6.79E-06	G	2.65
E	22600	0	14.05	1	9.31E-06	9.31E-06	F	0.89
ESE	27090	0	18.80	1	7.12E-06	7.12E-06	F	0.89
SE	13940	0	10.83	1	1.52E-05	1.52E-05	G	2.65
SSE	7560	0	4.78	1	1.62E-05	1.62E-05	G	4.70

TP50% TRUSAF XQs,Case 1-trusaf2.in, Acute Ground Level Release, no effect
c GXQ Version 4.0 Input File

c mode
1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology

c mode = 2 then X/Q based on atmospheric stability class and wind speed

c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop
t t f f f f

c ifox = t then joint frequency used to compute frequency to exceed X/Q

c = f then joint frequency used to compute annual average X/Q

c inorm = t then joint frequency data is normalized (as in GENII)

c = f then joint frequency data is un-normalized

c icdf = t then cumulative distribution file created (CDF.OUT)

c = f then no cumulative distribution file created

c ichk = t then X/Q parameter print option turned on

c = f then no parameter print

c isite = t then X/Q based on joint frequency data for all 16 sectors

c = f then X/Q based on joint frequency data of individual sectors

c ipop = t then X/Q is population weighted

c = f then no population weighting

c

c X/Q AND WIND SPEED ADJUSTMENT MODELS:

c ipuff idep isrc iwind
0 0 0 0

c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:

c iwake ipm iflow ientr
0 0 0 0

c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:

c (irise igrnd)iwash igrav
0 0 0 0

c ipuff = 1 then X/Q calculated using puff model

c = 0 then X/Q calculated using default continuous plume model

c idep = 1 then plume depletion model turned on (Chamberlain model)

c isrc = 1 then X/Q multiplied by scalar

c = 2 then X/Q adjusted by wind speed function

c iwind = 1 then wind speed corrected for plume height

c iwake = 1 then NRC RG 1.145 building wake model turned on

c = 2 then MACCS virtual distance building wake model turned on

c ipm = 1 then NRC RG 1.145 plume meander model turned on

c = 2 then 5th Power Law plume meander model turned on

c = 3 then sector average model turned on

c iflow = 1 then sigmas adjusted for volume flow rate

c ientr = 1 then method of Pasquill used to account for entrainment

c irise = 1 then MACCS buoyant plume rise model turned on

c = 2 then ISC2 momentum/buoyancy plume rise model turned on

c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c = 0 unless specified otherwise, 0 turns model off

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)
0	10	1000	50

initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
0	0	1.0	0.001	0.001

ambient temperature Tamb(C)	initial plume temperature TO(C)	initial plume flow rate VO(m3/s)	release diameter d(m)	convective heat release rate(1) qh(w)
20	20	1	1	0

c (1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1	.78

c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xmin power

c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)

c jmax = offset intervals
 c xqmin = minimum scaled X/Q to calculate
 c power = exponent in power function step size

0	100	0
0	500	0
1	15380	0
2	15630	0
3	15700	0
4	13400	0
5	13110	0
6	13470	0
7	15280	0
8	16320	0
9	17560	0
10	25880	0
11	25640	0
12	22920	0
13	22570	0
14	27170	0
15	24140	0
16	21040	0
1	15390	0
2	15650	0
3	15690	0
4	13380	0
5	13090	0
6	13450	0
7	11590	0
8	8870	0
9	8980	0
10	11560	0
11	17450	0
12	17210	0
13	18190	0
14	27090	0
15	24170	0
16	21070	0
1	6060	0
2	6060	0
3	5770	0
4	5570	0
5	5890	0
6	8440	0
7	10060	0
8	16290	0
9	17540	0
10	25860	0
11	25650	0
12	22930	0
13	22600	0

14	27090	0
15	13940	0
16	7560	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 04/29/97
Run Time = 18:00:25.97

INPUT ECHO:
TP50% TRUSAF XQs,Case 1-trusaf2.in, Acute Ground Level Release, wake effect
c GXQ Version 4.0 Input File
c mode
 1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
 T T F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
 0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
 0 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (iirse igrnd)iwash igrav
 0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on
c = 3 then sector average model turned on

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```

c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c lwash = 1 then stack downwash model turned on
c lgrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off

c      reference      frequency
c      release        anemometer      mixing      to
c      height         height          height     exceed
c      hs(m)          ha(m)           hm(m)      Cx(%)
c
c      0.00000E+00    1.00000E+01    1.00000E+03    5.00000E+01

c      initial      initial      release      deposition      gravitational
c      plume        plume        duration      velocity      settling
c      width        height      trd(hr)       vd(m/s)        velocity
c      Wb(m)        Hb(m)                vg(m/s)
c
c      0.00000E+00    0.00000E+00    1.00000E+00    1.00000E-03    1.00000E-03

c      ambient      initial      initial      release      convective
c      temperature  plume        plume        flow rate   heat release
c      Tamb(C)      T0(C)        V0(m3/s)     diameter    rate(1)
c                  T0(C)        V0(m3/s)     d(m)        qh(w)
c
c      2.00000E+01    2.00000E+01    1.00000E+00    1.00000E+00    0.00000E+00

c (1) If zero then buoyant flux based on plume/ambient temperature difference.

c      X/Q          Wind
c      scaling      Speed
c      factor        Exponent
c      (?)           a(?)
c
c      1.00000E+00    7.80000E-01

c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-6 stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

Joint frequency data normalized.

X/Q calculated for single sector.

MODELS SELECTED:

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

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JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

TP50% TRUSAF XQS, Case 1-trusaf2.in, Acute Ground Level Release, ~~wake effect~~

SECTOR	DISTANCE (m)	RECEIPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	100.00	1	2.35E-03	2.35E-03	F	15.60
SSW	100	0	100.00	1	1.73E-03	1.73E-03	F	19.00
SW	100	0	100.00	1	2.86E-03	2.86E-03	E	4.70
WSW	100	0	100.00	1	3.36E-03	3.36E-03	C	0.89
W	100	0	100.00	1	2.97E-03	2.97E-03	E	4.70
WNW	100	0	100.00	1	3.07E-03	3.07E-03	E	4.70
NW	100	0	100.00	1	3.19E-03	3.19E-03	E	4.70
NNW	100	0	100.00	1	4.92E-03	4.92E-03	E	2.65
N	100	0	100.00	1	5.33E-03	5.33E-03	E	2.65
NNE	100	0	100.00	1	3.91E-03	3.91E-03	C	0.89
NE	100	0	100.00	1	2.41E-03	2.41E-03	D	2.65
ENE	100	0	100.00	1	1.98E-03	1.98E-03	E	7.15
E	100	0	100.00	1	4.65E-03	4.65E-03	F	7.15
ESE	100	0	100.00	1	2.89E-03	2.89E-03	D	4.70
SE	100	0	100.00	1	2.81E-03	2.81E-03	D	2.65
SSE	100	0	100.00	1	2.86E-03	2.86E-03	E	4.70
S	500	0	100.00	1	1.43E-04	1.43E-04	F	15.60
SSW	500	0	100.00	1	9.22E-05	9.22E-05	B	0.89
SW	500	0	100.00	1	1.74E-04	1.74E-04	E	4.70
WSW	500	0	100.00	1	1.89E-04	1.89E-04	C	0.89
W	500	0	100.00	1	1.83E-04	1.83E-04	E	4.70
WNW	500	0	100.00	1	1.85E-04	1.85E-04	E	4.70
NW	500	0	100.00	1	1.87E-04	1.87E-04	E	4.70
NNW	500	0	100.00	1	3.11E-04	3.11E-04	E	2.65
N	500	0	100.00	1	3.36E-04	3.36E-04	E	2.65
NNE	500	0	100.00	1	2.21E-04	2.21E-04	C	0.89
NE	500	0	100.00	1	1.44E-04	1.44E-04	D	2.65
ENE	500	0	100.00	1	1.24E-04	1.24E-04	E	7.15
E	500	0	100.00	1	2.95E-04	2.95E-04	F	7.15
ESE	500	0	100.00	1	1.81E-04	1.81E-04	E	4.70
SE	500	0	100.00	1	1.65E-04	1.65E-04	D	2.65
SSE	500	0	100.00	1	1.75E-04	1.75E-04	E	4.70
S	15380	0	100.00	1	7.64E-07	7.64E-07	E	7.15
SSW	15630	0	100.00	1	4.38E-07	4.38E-07	D	4.70
SW	15700	0	100.00	1	8.29E-07	8.29E-07	D	2.65
WSW	13400	0	100.00	1	1.20E-06	1.20E-06	E	4.70
W	13110	0	100.00	1	1.27E-06	1.27E-06	E	4.70
WNW	13470	0	100.00	1	1.27E-06	1.27E-06	E	4.70
NW	15280	0	100.00	1	1.15E-06	1.15E-06	E	4.70
NNW	16320	0	100.00	1	1.85E-06	1.85E-06	E	2.65
N	17560	0	100.00	1	1.74E-06	1.74E-06	E	2.65
NNE	25880	0	100.00	1	7.85E-07	7.85E-07	E	4.70
NE	25640	0	100.00	1	3.82E-07	3.82E-07	D	2.65
ENE	22920	0	100.00	1	4.47E-07	4.47E-07	D	2.65
E	22570	0	100.00	1	1.20E-06	1.20E-06	F	7.15
ESE	27170	0	100.00	1	5.30E-07	5.30E-07	E	4.70
SE	24140	0	100.00	1	4.17E-07	4.17E-07	E	7.15
SSE	21040	0	100.00	1	6.05E-07	6.05E-07	D	2.65
S	15390	0	100.00	1	7.63E-07	7.63E-07	E	7.15
SSW	15650	0	100.00	1	4.38E-07	4.38E-07	D	4.70
SW	15690	0	100.00	1	8.30E-07	8.30E-07	D	2.65
WSW	13380	0	100.00	1	1.20E-06	1.20E-06	E	4.70
W	13090	0	100.00	1	1.27E-06	1.27E-06	E	4.70
WNW	13450	0	100.00	1	1.27E-06	1.27E-06	E	4.70
NW	11590	0	100.00	1	1.65E-06	1.65E-06	E	4.70
NNW	8870	0	100.00	1	4.12E-06	4.12E-06	E	2.65

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N	8980	0 100.00	1	4.29E-06	4.29E-06 E	2.65
NNE	11560	0 100.00	1	2.27E-06	2.27E-06 E	4.70
NE	17450	0 100.00	1	6.50E-07	6.50E-07 E	7.15
ENE	17210	0 100.00	1	6.51E-07	6.51E-07 E	7.15
E	18190	0 100.00	1	1.58E-06	1.58E-06 F	7.15
ESE	27090	0 100.00	1	5.32E-07	5.32E-07 E	4.70
SE	24170	0 100.00	1	4.16E-07	4.16E-07 E	7.15
SSE	21070	0 100.00	1	6.04E-07	6.04E-07 D	2.65
S	6060	0 100.00	1	2.89E-06	2.89E-06 F	15.60
SSW	6060	0 100.00	1	1.88E-06	1.88E-06 E	9.80
SW	5770	0 100.00	1	3.53E-06	3.53E-06 D	2.65
WSW	5570	0 100.00	1	4.09E-06	4.09E-06 E	4.70
W	5890	0 100.00	1	3.85E-06	3.85E-06 E	4.70
WNW	8440	0 100.00	1	2.40E-06	2.40E-06 E	4.70
NW	10060	0 100.00	1	2.00E-06	2.00E-06 E	4.70
NNW	16290	0 100.00	1	1.86E-06	1.86E-06 E	2.65
N	17540	0 100.00	1	1.74E-06	1.74E-06 E	2.65
NNE	25860	0 100.00	1	7.86E-07	7.86E-07 E	4.70
NE	25650	0 100.00	1	3.81E-07	3.81E-07 D	2.65
ENE	22930	0 100.00	1	4.46E-07	4.46E-07 D	2.65
E	22600	0 100.00	1	1.20E-06	1.20E-06 F	7.15
ESE	27090	0 100.00	1	5.32E-07	5.32E-07 E	4.70
SE	13940	0 100.00	1	9.30E-07	9.30E-07 D	2.65
SSE	7560	0 100.00	1	2.54E-06	2.54E-06 D	2.65

TP50% TRUSAF XQs, Case 1-trusaf21.in, Acute Ground Level Release, wake effect
 c GXQ Version 4.0 Input File

c mode
 1

c
 c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology
 c mode = 2 then X/Q based on atmospheric stability class and wind speed
 c mode = 3 then X/Q plot file is created

c
 c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop
 t t f f f f
 c ifox = t then joint frequency used to compute frequency to exceed X/Q
 c = f then joint frequency used to compute annual average X/Q
 c inorm = t then joint frequency data is normalized (as in GENII)
 c = f then joint frequency data is un-normalized
 c icdf = t then cumulative distribution file created (CDF.OUT)
 c = f then no cumulative distribution file created
 c ichk = t then X/Q parameter print option turned on
 c = f then no parameter print
 c isite = t then X/Q based on joint frequency data for all 16 sectors
 c = f then X/Q based on joint frequency data of individual sectors
 c ipop = t then X/Q is population weighted
 c = f then no population weighting

c
 c X/Q AND WIND SPEED ADJUSTMENT MODELS:

c ipuff idep isrc iwind
 0 0 0 0

c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:

c iwake ipm iflow ientr
 2 0 0 0

c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:

c (irise igrnd)iwash igrav
 0 0 0 0

c ipuff = 1 then X/Q calculated using puff model
 c = 0 then X/Q calculated using default continuous plume model
 c idep = 1 then plume depletion model turned on (Chamberlain model)
 c isrc = 1 then X/Q multiplied by scalar
 c = 2 then X/Q adjusted by wind speed function
 c iwind = 1 then wind speed corrected for plume height
 c iwake = 1 then NRC RG 1.145 building wake model turned on
 c = 2 then MACCS virtual distance building wake model turned on
 c ipm = 1 then NRC RG 1.145 plume meander model turned on
 c = 2 then 5th Power Law plume meander model turned on
 c = 3 then sector average model turned on
 c iflow = 1 then sigmas adjusted for volume flow rate
 c ientr = 1 then method of Pasquill used to account for entrainment
 c irise = 1 then MACCS buoyant plume rise model turned on
 c = 2 then ISC2 momentum/buoyancy plume rise model turned on

```

c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c      reference      mixing      frequency
c      release        anemometer   to
c      height         height        exceed
c      hs(m)          ha(m)         hm(m)      Cx(%)
c
c      0              10           1000         50
c
c      initial        initial      release      deposition      gravitational
c      plume          plume         duration     velocity       settling
c      width          height        trd(hr)      vd(m/s)        velocity
c      Wb(m)          Hb(m)         trd(hr)      vd(m/s)        vg(m/s)
c
c      18.3           12.2          1.0          0.001          0.001
c
c      ambient        initial      initial      release        convective
c      temperature    plume         plume        diameter      heat release
c      Tamb(C)        T0(C)         flow rate    d(m)           rate(1)
c                        T0(C)         V0(m3/s)      qh(w)
c
c      20             20            1            1              0
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q            Wind
c      scaling        Speed
c      factor          Exponent
c      c(?)            a(?)
c
c      1              .78
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)

```

```

c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size
0      100    0
0      500    0
1      15380   0
2      15630   0
3      15700   0
4      13400   0
5      13110   0
6      13470   0
7      15280   0
8      16320   0
9      17560   0
10     25880   0
11     25640   0
12     22920   0
13     22570   0
14     27170   0
15     24140   0
16     21040   0
1      15390   0
2      15650   0
3      15690   0
4      13380   0
5      13090   0
6      13450   0
7      11590   0
8      8870    0
9      8980    0
10     11560   0
11     17450   0
12     17210   0
13     18190   0
14     27090   0
15     24170   0
16     21070   0
1      6060    0
2      6060    0
3      5770    0
4      5570    0
5      5890    0
6      8440    0
7      10060   0
8      16290   0
9      17540   0
10     25860   0
11     25650   0
12     22930   0
13     22600   0

```

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14	27090	0
15	13940	0
16	7560	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 04/29/97
Run Time = 18:01:46.82

INPUT ECHO:
TP50% TRUSAF Xqs,Case 1-trusaf21.in, Acute Ground Level Release, wake effect
c GXQ Version 4.0 Input File
c mode
1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
T T F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENI1)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
2 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on
c = 3 then sector average model turned on

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```

c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c      reference frequency
c      release anemometer mixing to
c      height height height exceed
c      hs(m) ha(m) hm(m) Cx(%)
c
c      0.00000E+00 1.00000E+01 1.00000E+03 5.00000E+01
c
c      initial initial release deposition gravitational
c      plume plume duration velocity settling
c      width height trd(hr) velocity velocity
c      Wb(m) Hb(m) vd(m/s) vg(m/s)
c
c      1.83000E+01 1.22000E+01 1.00000E+00 1.00000E-03 1.00000E-03
c
c      ambient initial initial convective
c      temperature plume plume heat release
c      Tamb(C) T0(C) flow rate diameter rate(1)
c      qh(w)
c
c      2.00000E+01 2.00000E+01 1.00000E+00 1.00000E+00 0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q Wind
c      scaling Speed
c      factor Exponent
c      c(?) a(?)
c
c      1.00000E+00 7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-6 stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

Joint frequency data normalized.

X/Q calculated for single sector.

MODELS SELECTED:

MACCS Virtual source building wake model selected.

Default Gaussian plume model selected.

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WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 RR

TP50% TRUSAF XQs,Case 1-trusaf21.in, Acute Ground Level Release, wake effect

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	100.00	1	8.72E-04	8.72E-04	E	4.70
SSW	100	0	100.00	1	6.93E-04	6.93E-04	A	0.89
SW	100	0	100.00	1	1.08E-03	1.08E-03	B	0.89
WSW	100	0	100.00	1	1.29E-03	1.29E-03	F	4.70
W	100	0	100.00	1	1.15E-03	1.15E-03	F	4.70
WNW	100	0	100.00	1	1.14E-03	1.14E-03	F	4.70
NW	100	0	100.00	1	1.12E-03	1.12E-03	B	0.89
NNW	100	0	100.00	1	1.26E-03	1.26E-03	F	4.70
N	100	0	100.00	1	1.37E-03	1.37E-03	E	2.65
NNE	100	0	100.00	1	1.20E-03	1.20E-03	F	4.70
NE	100	0	100.00	1	7.77E-04	7.77E-04	F	7.15
ENE	100	0	100.00	1	5.78E-04	5.78E-04	C	2.65
E	100	0	100.00	1	1.14E-03	1.14E-03	F	4.70
ESE	100	0	100.00	1	8.92E-04	8.92E-04	D	2.65
SE	100	0	100.00	1	8.63E-04	8.63E-04	E	4.70
SSE	100	0	100.00	1	1.05E-03	1.05E-03	B	0.89
S	500	0	100.00	1	1.22E-04	1.22E-04	F	9.80
SSW	500	0	100.00	1	7.55E-05	7.55E-05	F	15.60
SW	500	0	100.00	1	1.30E-04	1.30E-04	E	4.70
WSW	500	0	100.00	1	1.52E-04	1.52E-04	C	0.89
W	500	0	100.00	1	1.35E-04	1.35E-04	E	4.70
WNW	500	0	100.00	1	1.39E-04	1.39E-04	E	4.70
NW	500	0	100.00	1	1.45E-04	1.45E-04	E	4.70
NNW	500	0	100.00	1	2.15E-04	2.15E-04	E	2.65
N	500	0	100.00	1	2.36E-04	2.36E-04	E	2.65
NNE	500	0	100.00	1	1.77E-04	1.77E-04	C	0.89
NE	500	0	100.00	1	1.09E-04	1.09E-04	D	2.65
ENE	500	0	100.00	1	9.02E-05	9.02E-05	E	7.15
E	500	0	100.00	1	1.93E-04	1.93E-04	F	7.15
ESE	500	0	100.00	1	1.32E-04	1.32E-04	E	4.70
SE	500	0	100.00	1	1.27E-04	1.27E-04	D	2.65
SSE	500	0	100.00	1	1.30E-04	1.30E-04	E	4.70
S	15380	0	100.00	1	7.57E-07	7.57E-07	E	7.15
SSW	15630	0	100.00	1	4.35E-07	4.35E-07	D	4.70
SW	15700	0	100.00	1	8.23E-07	8.23E-07	D	2.65
WSW	13400	0	100.00	1	1.19E-06	1.19E-06	E	4.70
W	13110	0	100.00	1	1.26E-06	1.26E-06	E	4.70
WNW	13470	0	100.00	1	1.25E-06	1.25E-06	E	4.70
NW	15280	0	100.00	1	1.14E-06	1.14E-06	E	4.70
NNW	16320	0	100.00	1	1.83E-06	1.83E-06	E	2.65
N	17560	0	100.00	1	1.72E-06	1.72E-06	E	2.65
NNE	25880	0	100.00	1	7.82E-07	7.82E-07	E	4.70
NE	25640	0	100.00	1	3.80E-07	3.80E-07	D	2.65
ENE	22920	0	100.00	1	4.45E-07	4.45E-07	D	2.65
E	22570	0	100.00	1	1.19E-06	1.19E-06	F	7.15
ESE	27170	0	100.00	1	5.27E-07	5.27E-07	E	4.70
SE	24140	0	100.00	1	4.15E-07	4.15E-07	E	7.15
SSE	21040	0	100.00	1	6.02E-07	6.02E-07	D	2.65
S	15390	0	100.00	1	7.57E-07	7.57E-07	E	7.15
SSW	15650	0	100.00	1	4.35E-07	4.35E-07	D	4.70
SW	15690	0	100.00	1	8.24E-07	8.24E-07	D	2.65
WSW	13380	0	100.00	1	1.19E-06	1.19E-06	E	4.70
W	13090	0	100.00	1	1.26E-06	1.26E-06	E	4.70
WNW	13450	0	100.00	1	1.26E-06	1.26E-06	E	4.70

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NW	11590	0 100.00	1	1.64E-06	1.64E-06 E	4.70
NNW	8870	0 100.00	1	4.06E-06	4.06E-06 E	2.65
N	8980	0 100.00	1	4.23E-06	4.23E-06 E	2.65
NNE	11560	0 100.00	1	2.24E-06	2.24E-06 E	4.70
NE	17450	0 100.00	1	6.46E-07	6.46E-07 E	7.15
ENE	17210	0 100.00	1	6.46E-07	6.46E-07 E	7.15
E	18190	0 100.00	1	1.57E-06	1.57E-06 F	7.15
ESE	27090	0 100.00	1	5.29E-07	5.29E-07 E	4.70
SE	24170	0 100.00	1	4.14E-07	4.14E-07 E	7.15
SSE	21070	0 100.00	1	6.00E-07	6.00E-07 D	2.65
S	6060	0 100.00	1	2.80E-06	2.80E-06 F	15.60
SSW	6060	0 100.00	1	1.84E-06	1.84E-06 E	9.80
SW	5770	0 100.00	1	3.46E-06	3.46E-06 D	2.65
WSW	5570	0 100.00	1	4.00E-06	4.00E-06 E	4.70
W	5890	0 100.00	1	3.77E-06	3.77E-06 E	4.70
WNW	8440	0 100.00	1	2.36E-06	2.36E-06 E	4.70
NW	10060	0 100.00	1	1.97E-06	1.97E-06 E	4.70
NNW	16290	0 100.00	1	1.84E-06	1.84E-06 E	2.65
N	17540	0 100.00	1	1.73E-06	1.73E-06 E	2.65
NNE	25860	0 100.00	1	7.82E-07	7.82E-07 E	4.70
NE	25650	0 100.00	1	3.80E-07	3.80E-07 D	2.65
ENE	22930	0 100.00	1	4.44E-07	4.44E-07 D	2.65
E	22600	0 100.00	1	1.19E-06	1.19E-06 F	7.15
ESE	27090	0 100.00	1	5.29E-07	5.29E-07 E	4.70
SE	13940	0 100.00	1	9.23E-07	9.23E-07 D	2.65
SSE	7560	0 100.00	1	2.50E-06	2.50E-06 D	2.65

APPENDIX E

LOW LEVEL WASTE BURIAL GROUND

GXQ INPUT AND OUTPUT FILES

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```

SWBG lswbg.in ground level, no effect
c GXQ Version 4.0 Input File
c mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c   ifox inorm icdf ichk isite ipop
c   t    f    f    f    f    f
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c      = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c      = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c      = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c      = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c      = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c      = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c   ipuff idep isrc iwind
c   0     0     0     0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c   iwake ipm iflow ientr
c   0     0     0     0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c   (irise igrnd)iwash igrav
c   0     0     0     0
c ipuff = 1 then X/Q calculated using puff model
c      = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c      = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c      = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c      = 2 then 5th Power Law plume meander model turned on
c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on

```

c = 2 then ISC2 momentum/buoyancy plume rise model turned on
 c igrnd = 1 then Mills buoyant plume rise modification for ground effects
 c iwash = 1 then stack downwash model turned on
 c igrav = 1 then gravitational settling model turned on
 c = 0 unless specified otherwise, 0 turns model off

c PARAMETER INPUT:

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)	
0	10	1000	0.5	

initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
0	0	1.	0.001	0.001

ambient temperature Tamb(C)	initial plume temperature TO(C)	initial plume flow rate VO(m3/s)	release diameter d(m)	convective heat release rate(1) qh(w)
20	20	1	1	0

c (1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1	.78

c RECEPTOR DEPENDENT DATA (no line limit)

FOR MODE	make	RECEPTOR DEPENDENT DATA
1 (site specific)		sector distance receptor-height
2 (by class & wind speed)		class windspeed distance offset receptor-height
3 (create plot file)		class windspeed xmax imax ymax jmax xqmin power

c RECEPTOR PARAMETER DESCRIPTION

c sector = 0, 1, 2... (all, S, SSW, etc.)
 c distance = receptor distance (m)
 c receptor height = height of receptor (m)
 c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
 c windspeed = anemometer wind speed (m/s)
 c offset = offset from plume centerline (m)

c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

0	100	0
0	500	0
5	11100	0
9	8400	0
1	4250	0
2	4250	0
3	3890	0
4	3890	0
5	3890	0
6	4070	0
7	9060	0
15	10170	0
16	4070	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 05/08/97
Run Time = 13:28:44.36

INPUT ECHO:
SWBG lswbg1.in ground level, no effect
c GXQ Version 4.0 Input File
c mode
1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
T F F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
0 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on

```

c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c      reference      frequency
c      release        anemometer      mixing      to
c      height         height          height     exceed
c      hs(m)          ha(m)           hm(m)      Cx(%)
c
c      0.00000E+00    1.00000E+01    1.00000E+03    5.00000E-01
c
c      initial        initial          release      deposition      gravitational
c      plume          plume            duration    velocity        settling
c      width          height           trd(hr)      vd(m/s)         velocity
c      Wb(m)          Hb(m)            rate(m/s)    rate(1)         rate(1)
c
c      0.00000E+00    0.00000E+00    1.00000E+00    1.00000E-03    1.00000E-03
c
c      ambient        initial          initial      release        convective
c      temperature    plume            plume        release        heat release
c      Tamb(C)        T0(C)            flow rate   diameter       rate(1)
c                   V0(m3/s)           d(m)        qh(w)
c
c      2.00000E+01    2.00000E+01    1.00000E+00    1.00000E+00    0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q            Wind
c      scaling        Speed
c      factor         Exponent
c      c(?)           a(?)
c
c      1.00000E+00    7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.
No normalization of joint frequency.
X/Q calculated for single sector.

MODELS SELECTED:

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Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

SWBG lswbg1.in ground level, no effect

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m ³)	AVERAGE INDIVIDUAL SCALED X/Q (s/m ³)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	6.30	1	1.56E-02	1.56E-02	E	0.89
SSW	100	0	4.53	1	1.13E-02	1.13E-02	F	2.65
SW	100	0	2.93	1	1.21E-02	1.21E-02	F	2.65
WSW	100	0	2.72	1	1.22E-02	1.22E-02	F	2.65
W	100	0	4.80	1	2.80E-02	2.80E-02	G	2.65
WNW	100	0	3.98	1	1.60E-02	1.60E-02	G	4.70
NW	100	0	4.72	1	2.89E-02	2.89E-02	G	2.65
NNW	100	0	4.58	1	2.90E-02	2.90E-02	G	2.65
N	100	0	4.36	1	3.12E-02	3.12E-02	G	2.65
NNE	100	0	2.49	1	1.54E-02	1.54E-02	E	0.89
NE	100	0	3.90	1	1.57E-02	1.57E-02	E	0.89
ENE	100	0	6.17	1	2.52E-02	2.52E-02	G	2.65
E	100	0	14.05	1	3.41E-02	3.41E-02	F	0.89
ESE	100	0	18.80	1	3.25E-02	3.25E-02	F	0.89
SE	100	0	10.83	1	3.07E-02	3.07E-02	G	2.65
SSE	100	0	4.78	1	1.58E-02	1.58E-02	G	4.70
S	500	0	6.30	1	9.91E-04	9.91E-04	E	0.89
SSW	500	0	4.53	1	7.21E-04	7.21E-04	F	2.65
SW	500	0	2.93	1	7.75E-04	7.75E-04	F	2.65
WSW	500	0	2.72	1	7.78E-04	7.78E-04	F	2.65
W	500	0	4.80	1	1.79E-03	1.79E-03	G	2.65
WNW	500	0	3.98	1	1.02E-03	1.02E-03	G	4.70
NW	500	0	4.72	1	1.86E-03	1.86E-03	G	2.65
NNW	500	0	4.58	1	1.86E-03	1.86E-03	G	2.65
N	500	0	4.36	1	2.00E-03	2.00E-03	G	2.65
NNE	500	0	2.49	1	9.73E-04	9.73E-04	E	0.89
NE	500	0	3.90	1	9.99E-04	9.99E-04	E	0.89
ENE	500	0	6.17	1	1.62E-03	1.62E-03	G	2.65
E	500	0	14.05	1	2.18E-03	2.18E-03	F	0.89
ESE	500	0	18.80	1	2.08E-03	2.08E-03	F	0.89
SE	500	0	10.83	1	1.97E-03	1.97E-03	G	2.65
SSE	500	0	4.78	1	1.00E-03	1.00E-03	G	4.70
W	11100	0	4.80	1	1.88E-05	1.88E-05	G	2.65
N	8400	0	4.36	1	2.98E-05	2.98E-05	G	2.65
S	4250	0	6.30	1	3.60E-05	3.60E-05	E	0.89
SSW	3890	0	4.53	1	2.61E-05	2.61E-05	F	2.65
SW	3890	0	2.93	1	3.18E-05	3.18E-05	F	2.65
WSW	3890	0	2.72	1	3.19E-05	3.19E-05	F	2.65
W	3890	0	4.80	1	7.42E-05	7.42E-05	G	2.65
WNW	4070	0	3.98	1	3.97E-05	3.97E-05	G	4.70
NW	9060	0	4.72	1	2.52E-05	2.52E-05	G	2.65
SE	10170	0	10.83	1	2.30E-05	2.30E-05	G	2.65
SSE	4070	0	4.78	1	3.88E-05	3.88E-05	G	4.70

SWBG 50% lswbg2.in ground level, no effect

c GXQ Version 4.0 Input File

c mode

1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology

c mode = 2 then X/Q based on atmospheric stability class and wind speed

c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop

t t f f f f

c ifox = t then joint frequency used to compute frequency to exceed X/Q

c = f then joint frequency used to compute annual average X/Q

c inorm = t then joint frequency data is normalized (as in GENII)

c = f then joint frequency data is un-normalized

c icdf = t then cumulative distribution file created (CDF.OUT)

c = f then no cumulative distribution file created

c ichk = t then X/Q parameter print option turned on

c = f then no parameter print

c isite = t then X/Q based on joint frequency data for all 16 sectors

c = f then X/Q based on joint frequency data of individual sectors

c ipop = t then X/Q is population weighted

c = f then no population weighting

c

c X/Q AND WIND SPEED ADJUSTMENT MODELS:

c ipuff idep isrc iwind

0 0 0 0

c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:

c iwake ipm iflow ientr

0 0 0 0

c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:

c (irise igrnd)iwash igrav

0 0 0 0

c ipuff = 1 then X/Q calculated using puff model

c = 0 then X/Q calculated using default continuous plume model

c idep = 1 then plume depletion model turned on (Chamberlain model)

c isrc = 1 then X/Q multiplied by scalar

c = 2 then X/Q adjusted by wind speed function

c iwind = 1 then wind speed corrected for plume height

c iwake = 1 then NRC RG 1.145 building wake model turned on

c = 2 then MACCS virtual distance building wake model turned on

c ipm = 1 then NRC RG 1.145 plume meander model turned on

c = 2 then 5th Power Law plume meander model turned on

c = 3 then sector average model turned on

c iflow = 1 then sigmas adjusted for volume flow rate

c ientr = 1 then method of Pasquill used to account for entrainment

c irise = 1 then MACCS buoyant plume rise model turned on

c = 2 then ISC2 momentum/buoyancy plume rise model turned on

c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c = 0 unless specified otherwise, 0 turns model off

PARAMETER INPUT:

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)	
0	10	1000	50	
initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
0	0	1.	0.001	0.001
ambient temperature Tamb(C)	initial plume temperature TO(C)	initial plume flow rate VO(m3/s)	release diameter d(m)	convective heat release rate(l) qh(w)
20	20	1	1	0

(1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1	.78

RECEPTOR DEPENDENT DATA (no line limit)

FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xmin power

RECEPTOR PARAMETER DESCRIPTION

c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)

c imax = distance intervals
 c ymax = maximum offset to plot (m)
 c jmax = offset intervals
 c xqmin = minimum scaled X/Q to calculate
 c power = exponent in power function step size

0	100	0
0	500	0
5	11100	0
9	8400	0
1	4250	0
2	4250	0
3	3890	0
4	3890	0
5	3890	0
6	4070	0
7	9060	0
15	10170	0
16	4070	0
1	13600	0
2	13900	0
3	13500	0
4	11400	0
5	11100	0
6	11400	0
7	11100	0
8	8500	0
9	8400	0
10	10300	0
11	17700	0
12	17400	0
13	18700	0
14	27300	0
15	23100	0
16	18800	0
1	13600	0
2	14000	0
3	13600	0
4	11400	0
5	11100	0
6	11400	0
7	14000	0
8	15100	0
9	16400	0
10	24800	0
11	25900	0
12	22900	0
13	22600	0
14	28100	0
15	23200	0
16	18900	0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 05/08/97
Run Time = 13:45:16.04

INPUT ECHO:
SWBG 50% lswbg2.in ground level, no effect
c GXQ Version 4.0 Input File
c mode
1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
T T F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
0 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on


```

c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c      release      reference      mixing      frequency
c      height      anemometer     height     to
c      hs(m)       ha(m)          hm(m)      exceed
c
c      0.00000E+00  1.00000E+01  1.00000E+03  5.00000E+01
c
c      initial      initial      release      deposition      gravitational
c      plume        plume        duration     velocity        settling
c      width        height       trd(hr)      velocity        velocity
c      Wb(m)        Hb(m)        (m/s)       vd(m/s)         vg(m/s)
c
c      0.00000E+00  0.00000E+00  1.00000E+00  1.00000E-03  1.00000E-03
c
c      ambient      initial      initial      release      convective
c      temperature  plume        plume        diameter    heat release
c      Tamb(C)      T0(C)        flow rate   d(m)         rate(1)
c                  V0(m3/s)
c                  qh(w)
c
c      2.00000E+01  2.00000E+01  1.00000E+00  1.00000E+00  0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q          Wind
c      scaling      Speed
c      factor        Exponent
c      c(?)          a(?)
c
c      1.00000E+00  7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.
Joint frequency data normalized.
X/Q calculated for single sector.

MODELS SELECTED:

HNF-SD-WM-CN-109 Rev.0

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

SWBG 50% lswbg2.in ground level, no effect

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	100.00	1	2.35E-03	2.35E-03	F	15.60
SSW	100	0	100.00	1	1.73E-03	1.73E-03	F	19.00
SW	100	0	100.00	1	2.86E-03	2.86E-03	E	4.70
WSW	100	0	100.00	1	3.36E-03	3.36E-03	C	0.89
W	100	0	100.00	1	2.97E-03	2.97E-03	E	4.70
WNW	100	0	100.00	1	3.07E-03	3.07E-03	E	4.70
NW	100	0	100.00	1	3.19E-03	3.19E-03	E	4.70
NNW	100	0	100.00	1	4.92E-03	4.92E-03	E	2.65
N	100	0	100.00	1	5.33E-03	5.33E-03	E	2.65
NNE	100	0	100.00	1	3.91E-03	3.91E-03	C	0.89
NE	100	0	100.00	1	2.41E-03	2.41E-03	D	2.65
ENE	100	0	100.00	1	1.98E-03	1.98E-03	E	7.15
E	100	0	100.00	1	4.65E-03	4.65E-03	F	7.15
ESE	100	0	100.00	1	2.89E-03	2.89E-03	E	4.70
SE	100	0	100.00	1	2.81E-03	2.81E-03	D	2.65
SSE	100	0	100.00	1	2.86E-03	2.86E-03	E	4.70
S	500	0	100.00	1	1.43E-04	1.43E-04	F	15.60
SSW	500	0	100.00	1	9.22E-05	9.22E-05	B	0.89
SW	500	0	100.00	1	1.74E-04	1.74E-04	E	4.70
WSW	500	0	100.00	1	1.89E-04	1.89E-04	C	0.89
W	500	0	100.00	1	1.83E-04	1.83E-04	E	4.70
WNW	500	0	100.00	1	1.85E-04	1.85E-04	E	4.70
NW	500	0	100.00	1	1.87E-04	1.87E-04	E	4.70
NNW	500	0	100.00	1	3.11E-04	3.11E-04	E	2.65
N	500	0	100.00	1	3.36E-04	3.36E-04	E	2.65
NNE	500	0	100.00	1	2.21E-04	2.21E-04	C	0.89
NE	500	0	100.00	1	1.44E-04	1.44E-04	D	2.65
ENE	500	0	100.00	1	1.24E-04	1.24E-04	E	7.15
E	500	0	100.00	1	2.95E-04	2.95E-04	F	7.15
ESE	500	0	100.00	1	1.81E-04	1.81E-04	E	4.70
SE	500	0	100.00	1	1.65E-04	1.65E-04	D	2.65
SSE	500	0	100.00	1	1.75E-04	1.75E-04	E	4.70
W	11100	0	100.00	1	1.59E-06	1.59E-06	E	4.70
N	8400	0	100.00	1	4.70E-06	4.70E-06	E	2.65
S	4250	0	100.00	1	4.68E-06	4.68E-06	F	15.60
SSW	4250	0	100.00	1	3.12E-06	3.12E-06	E	9.80
SW	3890	0	100.00	1	6.31E-06	6.31E-06	D	2.65
WSW	3890	0	100.00	1	6.86E-06	6.86E-06	E	4.70
W	3890	0	100.00	1	6.96E-06	6.96E-06	E	4.70
WNW	4070	0	100.00	1	6.66E-06	6.66E-06	E	4.70
NW	9060	0	100.00	1	2.30E-06	2.30E-06	E	4.70
SE	10170	0	100.00	1	1.47E-06	1.47E-06	D	2.65
SSE	4070	0	100.00	1	6.20E-06	6.20E-06	D	2.65
S	13600	0	100.00	1	9.02E-07	9.02E-07	E	7.15
SSW	13900	0	100.00	1	5.20E-07	5.20E-07	D	4.70
SW	13500	0	100.00	1	1.03E-06	1.03E-06	D	2.65
WSW	11400	0	100.00	1	1.50E-06	1.50E-06	E	4.70
W	11100	0	100.00	1	1.59E-06	1.59E-06	E	4.70
WNW	11400	0	100.00	1	1.59E-06	1.59E-06	E	4.70
NW	11100	0	100.00	1	1.75E-06	1.75E-06	E	4.70
NNW	8500	0	100.00	1	4.37E-06	4.37E-06	E	2.65
N	8400	0	100.00	1	4.70E-06	4.70E-06	E	2.65

HNF-SD-WM-CN-109 Rev.0

NNE	10300	0 100.00	1	2.64E-06	2.64E-06 E	4.70
NE	17700	0 100.00	1	6.38E-07	6.38E-07 E	7.15
ENE	17400	0 100.00	1	6.42E-07	6.42E-07 E	7.15
E	18700	0 100.00	1	1.53E-06	1.53E-06 F	7.15
ESE	27300	0 100.00	1	5.26E-07	5.26E-07 E	4.70
SE	23100	0 100.00	1	4.42E-07	4.42E-07 E	7.15
SSE	18800	0 100.00	1	7.07E-07	7.07E-07 D	2.65
S	13600	0 100.00	1	9.02E-07	9.02E-07 E	7.15
SSW	14000	0 100.00	1	5.14E-07	5.14E-07 D	4.70
SW	13600	0 100.00	1	1.02E-06	1.02E-06 D	2.65
WSW	11400	0 100.00	1	1.50E-06	1.50E-06 E	4.70
W	11100	0 100.00	1	1.59E-06	1.59E-06 E	4.70
WNW	11400	0 100.00	1	1.59E-06	1.59E-06 E	4.70
NW	14000	0 100.00	1	1.29E-06	1.29E-06 E	4.70
NNW	15100	0 100.00	1	2.05E-06	2.05E-06 E	2.65
N	16400	0 100.00	1	1.90E-06	1.90E-06 E	2.65
NNE	24800	0 100.00	1	8.30E-07	8.30E-07 E	4.70
NE	25900	0 100.00	1	3.76E-07	3.76E-07 D	2.65
ENE	22900	0 100.00	1	4.47E-07	4.47E-07 D	2.65
E	22600	0 100.00	1	1.20E-06	1.20E-06 F	7.15
ESE	28100	0 100.00	1	5.07E-07	5.07E-07 E	4.70
SE	23200	0 100.00	1	4.40E-07	4.40E-07 E	7.15
SSE	18900	0 100.00	1	7.02E-07	7.02E-07 D	2.65

APPENDIC F

SUBMARINE REACTOR COMPARTMENT BURIAL GROUND

GXQ INPUT AND OUTPUT FILES

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```

SWBG 99.5% src1.in ground level, no effect
c GXQ Version 4.0 Input File
c mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
  t   f   f   f   f   f
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c      = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c      = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c      = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c      = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c      = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c      = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
  0   0   0   0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
  0   0   0   0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
  0   0   0   0
c ipuff = 1 then X/Q calculated using puff model
c      = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c      = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c      = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c      = 2 then 5th Power Law plume meander model turned on
c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on

```

c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c = 0 unless specified otherwise, 0 turns model off

PARAMETER INPUT:

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)	
0	10	1000	0.5	
initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
0	0	1.	0.001	0.001
ambient temperature Tamb(C)	initial plume temperature T0(C)	initial plume flow rate V0(m3/s)	release diameter d(m)	convective heat release rate(1) qh(w)
20	20	1	1	0

c (1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1	.78

c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax imax ymax jmax xmin power

c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)

```

c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size
0      100  0
0      500  0
1      21100 0
2      18000 0
3      19000 0
4      20800 0
5      20300 0
6      21000 0
7      19700 0
8      19900 0
9      23000 0
10     23300 0
11     18300 0
12     15600 0
13     15400 0
14     19800 0
15     23500 0
16     21300 0
10     12580 0
11     9620  0
12     9620  0
13     11280 0
7      10540 0
8      10540 0
9      11840 0
1      9800  0
2      8880  0
3      10730 0
4      11280 0
5      11470 0
6      14610 0
15     28120 0
16     13130 0

```


HNFDSDWM SN109 Rev.0

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.

Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.

Code Custodian is: Brit E. Hey

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 05/08/97

Run Time = 14:45:16.63

INPUT ECHO:

SWBG 99.5% src1.in ground level, no effect

c GXQ Version 4.0 Input File

c mode

c 1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology

c mode = 2 then X/Q based on atmospheric stability class and wind speed

c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop

c T F F F F F

c ifox = t then joint frequency used to compute frequency to exceed X/Q

c = f then joint frequency used to compute annual average X/Q

c inorm = t then joint frequency data is normalized (as in GENI1)

c = f then joint frequency data is un-normalized

c icdf = t then cumulative distribution file created (CDF.OUT)

c = f then no cumulative distribution file created

c ichk = t then X/Q parameter print option turned on

c = f then no parameter print

c isite = t then X/Q based on joint frequency data for all 16 sectors

c = f then X/Q based on joint frequency data of individual sectors

c ipop = t then X/Q is population weighted

c = f then no population weighting

c

c X/Q AND WIND SPEED ADJUSTMENT MODELS:

c ipuff idep isrc iwind

c 0 0 0 0

c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:

c iwake ipm iflow ientr

c 0 0 0 0

c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:

c (irise igrnd)iwash igrav

c 0 0 0 0

c ipuff = 1 then X/Q calculated using puff model

c = 0 then X/Q calculated using default continuous plume model

c idep = 1 then plume depletion model turned on (Chamberlain model)

c isrc = 1 then X/Q multiplied by scalar

c = 2 then X/Q adjusted by wind speed function

c iwind = 1 then wind speed corrected for plume height

c iwake = 1 then NRC RG 1.145 building wake model turned on

c = 2 then MACCS virtual distance building wake model turned on

c ipm = 1 then NRC RG 1.145 plume meander model turned on

c = 2 then 5th Power Law plume meander model turned on

c 3 then sector average model turned on
 c flow = 1 then stigmas adjusted for volume flow rate
 c entr = 1 then method of Pasquill used to account for entrainment
 c rise = 1 then MACCS buoyant plume rise model turned on
 c = 2 then ISC2 momentum/buoyancy plume rise model turned on
 c = 1 then Mlls buoyant plume rise modification for ground effects
 c wash = 1 then stack downwash model turned on
 c grav = 1 then gravitational settling model turned on
 c = 0 unless specified otherwise, 0 turns model off

c PARAMETER INPUT:
 c reference
 c frequency
 c mixing
 c height
 c hsm) height
 c hsm) hsm)
 c 0.00000E+00 1.00000E+01 1.00000E+03 5.00000E-01
 c initial
 c plume
 c width
 c Hb(m) Hb(m)
 c trd(hr) trd(hr)
 c vdm/s) vdm/s)
 c 0.00000E+00 1.00000E-03 1.00000E+00 1.00000E-03
 c convective
 c heat release
 c rate(1) rate(1)
 c qh(m) qh(m)
 c 2.00000E+01 2.00000E+01 1.00000E+00 1.00000E+00 0.00000E+00
 c ambient
 c temperature
 c T0(C) T0(C)
 c V0(m/s) V0(m/s)
 c flow rate flow rate
 c diameter diameter
 c 2.00000E+01 2.00000E+01 1.00000E+00 1.00000E+00 0.00000E+00
 c X/Q
 c scaling
 c speed
 c exponent
 c a(?) a(?)
 c 1.00000E+00 7.80000E-01
 c RECEPTOR DEPENDENT DATA (no line limit)
 c FOR MODE make
 c 1 (site specific)
 c 2 (by class & wind speed)
 c 3 (create plot file)
 c class windspeed xmax ymax xqmin power
 c RECEPTOR PARAMETER DESCRIPTION
 c sector = 0, 1, 2,... (all, S, SSW, etc.)
 c distance = receptor distance (m)
 c receptor height = height of receptor (m)
 c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
 c windspeed = anemometer wind speed (m/s)
 c offset = offset from plume centerline (m)
 c xmax = maximum distance to plot or calculate to (m)
 c ymax = maximum offset to plot (m)
 c jmax = offset intervals
 c qmin = minimum scaled X/Q to calculate
 c power = exponent in power function step size

MODE:
 Site specific X/Q calculated.
 LOGICAL CHOICES:
 No normalization of joint frequency.
 Joint frequency used to calculate X/Q based on frequency of exceedance.
 X/Q calculated for single sector.
 MODELS SELECTED:

HNF-SD-WM-SN-109 Rev.0

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

SWBG 99.5% src1.in ground level, no effect

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	6.30	1	1.56E-02	1.56E-02 E	0.89
SSW	100	0	4.53	1	1.13E-02	1.13E-02 F	2.65
SW	100	0	2.93	1	1.21E-02	1.21E-02 F	2.65
WSW	100	0	2.72	1	1.22E-02	1.22E-02 F	2.65
W	100	0	4.80	1	2.80E-02	2.80E-02 G	2.65
WNW	100	0	3.98	1	1.60E-02	1.60E-02 G	4.70
NW	100	0	4.72	1	2.89E-02	2.89E-02 G	2.65
NNW	100	0	4.58	1	2.90E-02	2.90E-02 G	2.65
N	100	0	4.36	1	3.12E-02	3.12E-02 G	2.65
NNE	100	0	2.49	1	1.54E-02	1.54E-02 E	0.89
NE	100	0	3.90	1	1.57E-02	1.57E-02 E	0.89
ENE	100	0	6.17	1	2.52E-02	2.52E-02 G	2.65
E	100	0	14.05	1	3.41E-02	3.41E-02 F	0.89
ESE	100	0	18.80	1	3.25E-02	3.25E-02 F	0.89
SE	100	0	10.83	1	3.07E-02	3.07E-02 G	2.65
SSE	100	0	4.78	1	1.58E-02	1.58E-02 G	4.70
S	500	0	6.30	1	9.91E-04	9.91E-04 E	0.89
SSW	500	0	4.53	1	7.21E-04	7.21E-04 F	2.65
SW	500	0	2.93	1	7.75E-04	7.75E-04 F	2.65
WSW	500	0	2.72	1	7.78E-04	7.78E-04 F	2.65
W	500	0	4.80	1	1.79E-03	1.79E-03 G	2.65
WNW	500	0	3.98	1	1.02E-03	1.02E-03 G	4.70
NW	500	0	4.72	1	1.86E-03	1.86E-03 G	2.65
NNW	500	0	4.58	1	1.86E-03	1.86E-03 G	2.65
N	500	0	4.36	1	2.00E-03	2.00E-03 G	2.65
NNE	500	0	2.49	1	9.73E-04	9.73E-04 E	0.89
NE	500	0	3.90	1	9.99E-04	9.99E-04 E	0.89
ENE	500	0	6.17	1	1.62E-03	1.62E-03 G	2.65
E	500	0	14.05	1	2.18E-03	2.18E-03 F	0.89
ESE	500	0	18.80	1	2.08E-03	2.08E-03 F	0.89
SE	500	0	10.83	1	1.97E-03	1.97E-03 G	2.65
SSE	500	0	4.78	1	1.00E-03	1.00E-03 G	4.70
S	21100	0	6.30	1	4.34E-06	4.34E-06 E	0.89
SSW	18000	0	4.53	1	3.38E-06	3.38E-06 F	2.65
SW	19000	0	2.93	1	4.04E-06	4.04E-06 F	2.65
WSW	20800	0	2.72	1	3.62E-06	3.62E-06 F	2.65
W	20300	0	4.80	1	8.83E-06	8.83E-06 G	2.65
WNW	21000	0	3.98	1	4.74E-06	4.74E-06 G	4.70
NW	19700	0	4.72	1	9.51E-06	9.51E-06 G	2.65
NNW	19900	0	4.58	1	9.43E-06	9.43E-06 G	2.65
N	23000	0	4.36	1	8.44E-06	8.44E-06 G	2.65
NNE	23300	0	2.49	1	3.63E-06	3.63E-06 E	0.89
NE	18300	0	3.90	1	5.31E-06	5.31E-06 E	0.89
ENE	15600	0	6.17	1	1.11E-05	1.11E-05 G	2.65
E	15400	0	14.05	1	1.51E-05	1.51E-05 F	0.89
ESE	19800	0	18.80	1	1.05E-05	1.05E-05 F	0.89
SE	23500	0	10.83	1	8.11E-06	8.11E-06 G	2.65
SSE	21300	0	4.78	1	4.42E-06	4.42E-06 G	4.70
S	22380	0	6.30	1	4.02E-06	4.02E-06 E	0.89
SSW	18130	0	4.53	1	3.35E-06	3.35E-06 F	2.65
SW	19420	0	2.93	1	3.93E-06	3.93E-06 F	2.65
WSW	19980	0	2.72	1	3.80E-06	3.80E-06 F	2.65

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W	19420	0	4.80	1	9.33E-06	9.33E-06	G	2.65
WNW	19610	0	3.98	1	5.16E-06	5.16E-06	G	4.70
NW	10540	0	4.72	1	2.08E-05	2.08E-05	G	2.65
NNW	10540	0	4.58	1	2.09E-05	2.09E-05	G	2.65
N	11840	0	4.36	1	1.93E-05	1.93E-05	G	2.65
NNE	12580	0	2.49	1	8.10E-06	8.10E-06	E	0.89
NE	9620	0	3.90	1	1.22E-05	1.22E-05	E	0.89
ENE	9620	0	6.17	1	2.04E-05	2.04E-05	G	2.65
E	11280	0	14.05	1	2.23E-05	2.23E-05	F	0.89
ESE	22200	0	18.80	1	9.16E-06	9.16E-06	F	0.89
SE	27560	0	10.83	1	6.67E-06	6.67E-06	G	2.65
SSE	22570	0	4.78	1	4.10E-06	4.10E-06	G	4.70
S	9800	0	6.30	1	1.17E-05	1.17E-05	E	0.89
SSW	8880	0	4.53	1	8.22E-06	8.22E-06	F	2.65
SW	10730	0	2.93	1	8.31E-06	8.31E-06	F	2.65
WSW	11280	0	2.72	1	7.82E-06	7.82E-06	F	2.65
W	11470	0	4.80	1	1.80E-05	1.80E-05	G	2.65
WNW	14610	0	3.98	1	7.47E-06	7.47E-06	G	4.70
SE	28120	0	10.83	1	6.51E-06	6.51E-06	G	2.65
SSE	13130	0	4.78	1	8.18E-06	8.18E-06	G	4.70

```

SWBG 50% src2.in ground level, no effect
c GXQ Version 4.0 Input File
c mode
  1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
  t   t   f   f   f   f
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c       = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c       = f then joint frequency data is un-normalized
c icdf  = t then cumulative distribution file created (CDF.OUT)
c       = f then no cumulative distribution file created
c ichk  = t then X/Q parameter print option turned on
c       = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c       = f then X/Q based on joint frequency data of individual sectors
c ipop  = t then X/Q is population weighted
c       = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
  0   0   0   0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
  0   0   0   0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd)iwash igrav
  0   0   0   0
c ipuff = 1 then X/Q calculated using puff model
c       = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c       = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c       = 2 then MACCS virtual distance building wake model turned on

```

```

c ipm = 1 then NRC RG 1.145 plume meander model turned on
c      = 2 then 5th Power Law plume meander model turned on
c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off

```

PARAMETER INPUT:

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)	
0	10	1000	50	
initial plume width Wb(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
0	0	1.	0.001	0.001
ambient temperature Tamb(C)	initial plume temperature T0(C)	initial plume flow rate V0(m3/s)	release diameter d(m)	convective heat release rate(1) qh(w)
20	20	1	1	0

(1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1	.78

RECEPTOR DEPENDENT DATA (no line limit)

```

c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax ymax jmax xmin power

```

RECEPTOR PARAMETER DESCRIPTION

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```

c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size
0      100  0
0      500  0
1      21100 0
2      18000 0
3      19000 0
4      20800 0
5      20300 0
6      21000 0
7      19700 0
8      19900 0
9      23000 0
10     23300 0
11     18300 0
12     15600 0
13     15400 0
14     19800 0
15     23500 0
16     21300 0
10     12580 0
11     9620  0
12     9620  0
13     11280 0
7      10540 0
8      10540 0
9      11840 0
1      9800  0
2      8880  0
3      10730 0
4      11280 0
5      11470 0
6      14610 0
15     28120 0
16     13130 0

```

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 05/08/97
Run Time = 14:50:47.88

INPUT ECHO:
SWBG 50% src2.in ground level, no effect
c GXQ Version 4.0 Input File
c mode
1
c
c MODE CHOICE:
c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created
c
c LOGICAL CHOICES:
c ifox inorm icdf ichk isite ipop
T T F F F F
c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting
c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c ipuff idep isrc iwind
0 0 0 0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c iwake ipm iflow ientr
0 0 0 0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c (irise igrnd) iwash igrav
0 0 0 0
c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on

HNF-SD-WM-SN-109 Rev.0

```

c      = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c      = 2 then ISC2 momentum/buoyancy plume rise model turned on
c ijrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c      = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c      reference      frequency
c      release        anemometer      mixing      to
c      height         height          height     exceed
c      hs(m)          ha(m)           hm(m)      Cx(%)
c
c      0.00000E+00    1.00000E+01    1.00000E+03    5.00000E+01
c
c      initial        initial          deposition    settling
c      plume          plume            duration     velocity
c      width          height           trd(hr)      vd(m/s)     vg(m/s)
c      Wb(m)          Hb(m)
c
c      0.00000E+00    0.00000E+00    1.00000E+00    1.00000E-03    1.00000E-03
c
c      initial        initial          convective
c      plume          plume            heat release
c      temperature    temperature     rate(1)
c      Tamb(C)        T0(C)           V0(m3/s)      diameter    qh(w)
c
c      2.00000E+01    2.00000E+01    1.00000E+00    1.00000E+00    0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q           Wind
c      scaling       Speed
c      factor        Exponent
c      c(?)          a(?)
c
c      1.00000E+00    7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE make RECEPTOR DEPENDENT DATA
c 1 (site specific) sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file) class windspeed xmax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

Joint frequency data normalized.

X/Q calculated for single sector.

MODELS SELECTED:

HNH-SD-WM-SN-109 Rev.0

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:
200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR

SWBG 50% src2.in ground level, no effect

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	100	0	100.00	1	2.35E-03	2.35E-03 F	15.60
SSW	100	0	100.00	1	1.73E-03	1.73E-03 F	19.00
SW	100	0	100.00	1	2.86E-03	2.86E-03 E	4.70
WSW	100	0	100.00	1	3.36E-03	3.36E-03 C	0.89
W	100	0	100.00	1	2.97E-03	2.97E-03 E	4.70
WNW	100	0	100.00	1	3.07E-03	3.07E-03 E	4.70
NW	100	0	100.00	1	3.19E-03	3.19E-03 E	4.70
NNW	100	0	100.00	1	4.92E-03	4.92E-03 E	2.65
N	100	0	100.00	1	5.33E-03	5.33E-03 E	2.65
NNE	100	0	100.00	1	3.91E-03	3.91E-03 C	0.89
NE	100	0	100.00	1	2.41E-03	2.41E-03 D	2.65
ENE	100	0	100.00	1	1.98E-03	1.98E-03 E	7.15
E	100	0	100.00	1	4.65E-03	4.65E-03 F	7.15
ESE	100	0	100.00	1	2.89E-03	2.89E-03 E	4.70
SE	100	0	100.00	1	2.81E-03	2.81E-03 D	2.65
SSE	100	0	100.00	1	2.86E-03	2.86E-03 E	4.70
S	500	0	100.00	1	1.43E-04	1.43E-04 F	15.60
SSW	500	0	100.00	1	9.22E-05	9.22E-05 B	0.89
SW	500	0	100.00	1	1.74E-04	1.74E-04 E	4.70
WSW	500	0	100.00	1	1.89E-04	1.89E-04 C	0.89
W	500	0	100.00	1	1.83E-04	1.83E-04 E	4.70
WNW	500	0	100.00	1	1.85E-04	1.85E-04 E	4.70
NW	500	0	100.00	1	1.87E-04	1.87E-04 E	4.70
NNW	500	0	100.00	1	3.11E-04	3.11E-04 E	2.65
N	500	0	100.00	1	3.36E-04	3.36E-04 E	2.65
NNE	500	0	100.00	1	2.21E-04	2.21E-04 C	0.89
NE	500	0	100.00	1	1.44E-04	1.44E-04 D	2.65
ENE	500	0	100.00	1	1.24E-04	1.24E-04 E	7.15
E	500	0	100.00	1	2.95E-04	2.95E-04 F	7.15
ESE	500	0	100.00	1	1.81E-04	1.81E-04 E	4.70
SE	500	0	100.00	1	1.65E-04	1.65E-04 D	2.65
SSE	500	0	100.00	1	1.75E-04	1.75E-04 E	4.70
S	21100	0	100.00	1	4.99E-07	4.99E-07 E	7.15
SSW	18000	0	100.00	1	3.57E-07	3.57E-07 D	4.70
SW	19000	0	100.00	1	6.32E-07	6.32E-07 D	2.65
WSW	20800	0	100.00	1	6.58E-07	6.58E-07 E	4.70
W	20300	0	100.00	1	7.02E-07	7.02E-07 E	4.70
WNW	21000	0	100.00	1	6.98E-07	6.98E-07 E	4.70
NW	19700	0	100.00	1	8.20E-07	8.20E-07 E	4.70
NNW	19900	0	100.00	1	1.43E-06	1.43E-06 E	2.65
N	23000	0	100.00	1	1.21E-06	1.21E-06 E	2.65
NNE	23300	0	100.00	1	9.00E-07	9.00E-07 E	4.70
NE	18300	0	100.00	1	6.09E-07	6.09E-07 E	7.15
ENE	15600	0	100.00	1	7.41E-07	7.41E-07 E	7.15
E	15400	0	100.00	1	1.95E-06	1.95E-06 F	7.15
ESE	19800	0	100.00	1	7.96E-07	7.96E-07 E	4.70
SE	23500	0	100.00	1	4.32E-07	4.32E-07 E	7.15
SSE	21300	0	100.00	1	5.95E-07	5.95E-07 D	2.65
S	22380	0	100.00	1	4.62E-07	4.62E-07 E	7.15
SSW	18130	0	100.00	1	3.54E-07	3.54E-07 D	4.70
SW	19420	0	100.00	1	6.12E-07	6.12E-07 D	2.65
WSW	19980	0	100.00	1	6.95E-07	6.95E-07 E	4.70

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W	19420	0 100.00	1	7.45E-07	7.45E-07 E	4.70
WNW	19610	0 100.00	1	7.64E-07	7.64E-07 E	4.70
NW	10540	0 100.00	1	1.88E-06	1.88E-06 E	4.70
NNW	10540	0 100.00	1	3.28E-06	3.28E-06 E	2.65
N	11840	0 100.00	1	2.95E-06	2.95E-06 E	2.65
NNE	12580	0 100.00	1	2.02E-06	2.02E-06 E	4.70
NE	9620	0 100.00	1	1.49E-06	1.49E-06 E	7.15
ENE	9620	0 100.00	1	1.41E-06	1.41E-06 E	7.15
E	11280	0 100.00	1	2.92E-06	2.92E-06 F	7.15
ESE	22200	0 100.00	1	6.85E-07	6.85E-07 E	4.70
SE	27560	0 100.00	1	3.48E-07	3.48E-07 E	7.15
SSE	22570	0 100.00	1	5.49E-07	5.49E-07 D	2.65
S	9800	0 100.00	1	1.54E-06	1.54E-06 F	15.60
SSW	8880	0 100.00	1	1.03E-06	1.03E-06 C	0.89
SW	10730	0 100.00	1	1.43E-06	1.43E-06 D	2.65
WSW	11280	0 100.00	1	1.52E-06	1.52E-06 E	4.70
W	11470	0 100.00	1	1.52E-06	1.52E-06 E	4.70
WNW	14610	0 100.00	1	1.13E-06	1.13E-06 E	4.70
SE	28120	0 100.00	1	3.38E-07	3.38E-07 E	7.15
SSE	13130	0 100.00	1	1.16E-06	1.16E-06 D	2.65

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CHECKLIST FOR PEER REVIEW

Document Reviewed: "DETERMINATION OF X/Qs FOR SOLID WASTE FACILITY MSAR,"
May 13, 1997. HNF-SD-WM-CN-109 Rev.0

Scope of Review: Entire Document

Yes No NA

☐	☐	☒	*	Previous reviews complete and cover analysis, up to scope of this review, with no gaps.
☒	☐	☐		Problem completely defined.
☒	☐	☒		Accident scenarios developed in a clear and logical manner.
☒	☐	☐		Necessary assumptions explicitly stated and supported.
☒	☐	☐		Computer codes and data files documented.
☒	☐	☐		Data used in calculations explicitly stated in document.
☒	☐	☐		Data checked for consistency with original source information as applicable.
☐	☐	☒		Mathematical derivations checked including dimensional consistency of results.
☒	☐	☐		Models appropriate and used within range of validity or use outside range of established validity justified.
☒	☐	☐		Hand calculations checked for errors. Spreadsheet results should be treated exactly the same as hand calculations.
☒	☐	☐		Software input correct and consistent with document reviewed.
☒	☐	☐		Software output consistent with input and with results reported in document reviewed.
☐	☐	☒		Limits/criteria/guidelines applied to analysis results are appropriate and referenced. Limits/criteria/guidelines checked against references.
☐	☐	☒		Safety margins consistent with good engineering practices.
☒	☐	☐		Conclusions consistent with analytical results and applicable limits.
☒	☐	☐		Results and conclusions address all points required in the problem statement.
☐	☐	☒		Format consistent with appropriate NRC Regulatory Guide or other standards
☐	☐	☒	*	Review calculations, comments, and/or notes are attached.
☒	☐	☐		Document approved.

DA Hines 5/13/97
Reviewer (Printed Name and Signature) Date

214
F17
ew

HEDOP REVIEW CHECKLIST
for
Radiological and Nonradiological Release Calculations

Document Reviewed: "DETERMINATION OF X/Qs FOR SOLID WASTE FACILITY MSAR,"
May 13, 1997.

Submitted by: C. H. HUANG
Date Submitted: May 13, 1997

Scope of Review: Entire Document

YES NO* N/A

☒	☐	☐	1. A detailed technical review and approval of the environmental transport and dose calculation portion of the analysis has been performed and documented.
☐	☐	☒	2. Detailed technical review(s) and approval(s) of scenario and release determinations have been performed and documented.
☐	☐	☒	3. HEDOP-approved code(s) were used.
☐	☐	☒	4. Receptor locations were selected according to HEDOP recommendations.
☐	☐	☒	5. All applicable environmental pathways and code options were included and are appropriate for the calculations.
☒	☐	☒	6. Hanford site data were used.
☒	☐	☒	7. Model adjustments external to the computer program were justified and performed correctly.
☒	☐	☒	8. The analysis is consistent with HEDOP recommendations.
☒	☐	☒	9. Supporting notes, calculations, comments, comment resolutions, or other information is attached. (Use the "Page 1 of X" page numbering format and sign and date each added page.)
☒	☐		10. Approval is granted on behalf of the Hanford Environmental Dose Overview Panel.

* All "NO" responses must be explained and use of nonstandard methods justified.

D.A. Himes
HEDOP-Approved Reviewer (Printed Name and Signature)

5/13/97
Date

COMMENTS (add additional signed and dated pages if necessary):

275 F18 CW

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R.B. Bendixsen	C.H. Huang	Date 5/13/97			
Project Title/Work Order		EDT No. 621237			
DETERMINATION OF X/Qs FOR SOLID WASTE FACILITY MSAR		ECN No. N/A			
Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
R.B. Bendixsen	A2-26	X			
C.H. Huang	A3-34	X			
D.R. Portan	A2-26	X			
D.J. Schmitt	A2-26	X			
J.C. Van Keuren	A3-34	X			
Central Files	A3-88	X			