

Report # 57

MILDOS INPUT DATA

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DRAFT
D'Appolonia
September 16, 1981
UNC Mining & Milling
Project NM81-433

9804300032 810916
PDR ADOCK 04008907
C PDR

D'APPOLONIA

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C-----MIL00081
C          GLOSSARY OF INPUT DATA          MIL00082
C*****MIL00083
C  FREQ(I,J,K) IS THE FRACTIONAL JOINT FREQUENCY OF WIND FROM DIREC- MIL00084
C  TION I; IN WIND SPEED CLASS J; IN STABILITY CLASS K          MIL00085
C  NSORCE IS THE NUMBER OF EFFLUENT SOURCES INPUT          MIL00086
C  NSORCE          MIL00087
C  NSORCE          MIL00088
C  SOURCE(I,J) IS SOURCE TERM DATA FOR SOURCE J          MIL00089
C  SOURCE(1,J) IS THE X LOCATION COORDINATE, KM          MIL00090
C  SOURCE(2,J) IS THE Y LOCATION COORDINATE, KM          MIL00091
C  SOURCE(3,J) IS THE Z (HEIGHT) COORDINATE, M          MIL00092
C  SOURCE(4,J) IS THE SOURCE AREA, KM2          MIL00093
C  SOURCE(5-9,J) ARE RELEASE RATES OF U-238, TH-230, RA-226, PB-210, MIL00094
C  AND RM-222, RESPECTIVELY, CI/YR --PARTICULATE RELEASE RATES          MIL00095
C  RECOMPUTED BY CODE IFF SOURCE(10,J)=2000 OR HIGHER.          MIL00096
C  SOURCE(10,J) IS THE SOURCE ID NUMBER          MIL00097
C  SOURCE(11,J) IS THE ASSIGNED PARTICLE SIZE DISTRIBUTION, INTEGER          MIL00098
C  SOURCE(12,J) IS THE EXIT VELOCITY, M/SEC          MIL00099
C  DM IS THE ANNUAL AVERAGE ATMOSPHERIC MIXING HEIGHT, M          MIL00100
C  DM          MIL00101
C  DM          MIL00102
C  PACT(I,J) IS THE BULK SPECIFIC ACTIVITY OF ISOTOPE J IN SOURCE I;          MIL00103
C  J=1-4 FOR U-238, TH-230, RA-226, AND PB-210, RESPECTIVELY, PCI/GM          MIL00104
C  PACT(I,J)          MIL00105
C  IPACT(I) IS THE PACT VALUE SET ASSIGNED FOR SOURCE NUMBER I          MIL00106
C  IPACT(I)          MIL00107
C  TSTART IS THE YEAR EFFLUENT RELEASES BEGIN, E.G., 1981.5          MIL00108
C  TSTART          MIL00109
C  IFTODO(1) MUST EQUAL 1 FOR CALCULATION AND PRINT OF DOSE AND          MIL00110
C  CONCENTRATION DATA FOR TIME STEP 1          MIL00111
C  IFTODO(1)          MIL00112
C  FPR(I) IS THE AREAL FOOD PRODUCTION RATE OF FOOD TYPE I; I=1-3          MIL00113
C  FOR VEGETABLES, MEAT, AND MILK, RESPECTIVELY, KG/KM2-YR          MIL00114
C  FPR(I)          MIL00115
C  FFORI IS THE FRACTION OF ANNUAL ANIMAL FEED OBTAINED BY GRAZING,          MIL00116
C  FOR USE IN CALCULATING INDIVIDUAL DOSES          MIL00117
C  FFORI          MIL00118
C  FHAYI IS THE FRACTION OF ANNUAL ANIMAL FEED CONSISTING OF LOCALLY          MIL00119
C  GROWN STORED FEED, FOR USE IN CALCULATING INDIVIDUAL DOSES          MIL00120
C  FHAYI          MIL00121
C  FFORP AND FHAYP ARE SAME AS FFORI AND FHAYI EXCEPT THAT THEY ARE          MIL00122
C  FOR USE IN CALCULATING POPULATION DOSES          MIL00123
C  FFORP          MIL00124
C  FFORP          MIL00125
C  IADD IS THE NUMBER OF INDIVIDUAL RECEPTOR LOCATIONS INPUT          MIL00126
C  IADD          MIL00127
C  INTYPE(I) SPECIFIES DESIRED OUTPUT FOR INDIVIDUAL RECEPTOR I          MIL00128
C  INTYPE(1)=NEGATIVE NUMBER FOR NO PRINT          MIL00129
C  INTYPE(1)=0 FOR DOSE/20 MPC COMPLIANCE CHECK          MIL00130
C  INTYPE(1)=1 FOR PRINT OF TOTAL DOSES OVER ALL PATHWAYS, ONLY          MIL00131
C  INTYPE(1)=10 FOR PRINT OF DOSES BY EXPOSURE PATHWAY (NOT ALLOWED)          MIL00132
C  UNLESS JC(7)=1 )          MIL00133
C  INTYPE(1)          MIL00134
C  INTYPE(1)          MIL00135
C  D INPOP(I,J) IS THE INPUT POPULATION FOR ANNULUS I, IN DIRECTION J          MIL00136
C  INPOP(I,J)          MIL00137
C  JC(1) MUST BE INPUT AS 1 TO UTILIZE PROGRAM OPTION 1          MIL00138
C  JC(1)=1 TO USE TAILPS SUBROUTINE (VALUES OF TAILP IN ABOVE DATA          MIL00139
C  STATEMENT USED OTHERWISE, IF NEEDED)          MIL00140
C  JC(2)=1 TO COMPUTE 100-YR ENVIRONMENTAL DOSE COMMITMENTS          MIL00141
C  JC(3)=1 TO OBTAIN POPDOS CONCENTRATION DATA PRINT          MIL00142
C  JC(4)=1 TO OBTAIN POPDOS DOSE PRINT BY GRID SEGMENT          MIL00143
C  JC(5)=1 TO OBTAIN CHWU PRINT OF X/Q DATA          MIL00144
C  JC(6)=1 TO OBTAIN WRITER PRINT OF DOSE AND OTHER FACTORS          MIL00145
C  JC(7)=1 TO OBTAIN UNIDOS PRINT OF DOSES BY EXPOSURE PATHWAY          MIL00146
C  JC(8)=1 TO INCLUDE MILK PATHWAY IN UNIDOS CALCULATIONS          MIL00147
C  JC(9)=1 TO OBTAIN UNIDOS PRINT OF CONCENTRATION DATA          MIL00148
C  JC(10) IS NOT CURRENTLY IN USE          MIL00149
C  XRECEP(I,J) IS A LOCATION COORDINATE FOR INDIVIDUAL RECEPTOR J          MIL00150
C  XRECEP(1,J) IS THE X COORDINATE, KM          MIL00151
C  XRECEP(2,J) IS THE Y COORDINATE, KM          MIL00152
C  XRECEP(3,J) IS THE Z COORDINATE, M          MIL00153
C  QAJUST(I,J,K) IS A FACTOR FOR MULTIPLYING THE INPUT SOURCE          MIL00154
C  STRENGTH OF SOURCE K TO GET THE DESIRED SOURCE STRENGTH OF          MIL00155
C  SOURCE K FOR THE DURATION OF TIME STEP I; J=1 FOR PARTICULATES          MIL00156
C  AND J=2 FOR RADON          MIL00157
C  TSTEP(I) IS THE DURATION OF TIME STEP I, YRS          MIL00158
C  TSTEP(I)          MIL00159
C  NSTEP IS THE NUMBER OF TIME STEPS TO BE UTILIZED          MIL00160
C  NSTEP          MIL00161
C  NSTEP          MIL00162
C  FRADON(I) IS THE FRACTION OF RADON RELEASES FOR WHICH DOSES BEYOND          MIL00163
C  80 KM ARE CALCULATED USING DOSE/KCI COEFFICIENTS FOR RELEASE          MIL00164
C  POINT II I=1-4 FOR CASPER, FALLS CITY, GRANTS, AND WELLPIT          MIL00165
C  FRADON(I)          MIL00166
C  PAJUST(I) IS THE RATIO OF THE U.S. POPULATION DURING TIME STEP I          MIL00167
C  TO THAT DURING THE YEAR 1978          MIL00168
C  PAJUST(I)          MIL00169

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PARAMETERS

FREQ (I, J, K)
SOURCE
(I, J)

INPUT DATA SUMMARY

INPUT DATA REFERENCE

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Attachment A

Tables 1 to 5

Tables 1 to 5

Item 1 and calculation

Tables 3 and 6

As needed

1981

As needed

Item 5

Item 5

5

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INPUT DATA SUMMARYINPUT PARAMETERSINPUT DATA REFERENCE

1. FREQ (I, J, K)	Attachment A
2. NSOURCE	Tables 1 to 5
3. SORCE (I, J)	Tables 1 to 5
4. DM	Item 1 and calculation (MILDOS proc.)
5. PACT (I, J)	Tables 3 and 6
6. IPACT (I)	As needed
7. TSTART	1981
8. IFTODO (I)	As needed
9. FPR (I)	Item 5
10. FFORI	Item 5
11. FHAYI	Item 5
12. FFORP, FHAYP	As specified
13. IADD	Table 7
14. IRTYEE (I)	As needed
15. IPOP (I, J)	Item 6
16. JC (I)	As needed
17. XRECEP (I, J)	Table 7
18. QAJUST (I, J, K)	Item 4c
19. TSTEP (I)	Item 4b
20. NSTEP	Item 4b
21. FRANDON (I)	Item 2f
22. PAJUST (I)	Item 8

MILDOS INPUT DATA

The data supplied by D'Appolonia to BDM for input to MILDOS follows:

1. METEOROLOGICAL DATA

- a. Mean annual morning mixing height - 370 meters.
- b. Mean annual afternoon mixing height - 2680 meters.
Reference: Holzworth, G. C., 1972, Mixing Heights, Wind Speeds, and Potential for Urban Pollution Throughout the Contiguous United States: U. S. EPA, Research Triangle Park, North Carolina.
- c. Fractional Joint Frequency of wind from 16 wind directions in the six windspeed classes and six stability classes at the Mill site - See meteorological data from Gallup, New Mexico from 1973 through 1975 (Copy to BDM). (Attachment A)

2. Sources

- a. The sources have been located and are listed in Table 1.

References:

1. UNC map Sec. 2T.16N, R.16 W., NMPM 1" = 200', July 28, 1981
2. UNC map SEc. 2T.16N, R.16 W., NMPM 1" = 200', March 25, 1978
3. Aerial photos showing stack locations at the mill from Gus Swanquist. (2maps) 8/11/81
4. Memos from Gus Swanquist with stack elevations.

- b. The area of each areal source has been calculated and is as follows:

<u>Source</u>	<u>Area (m²)</u>
South pond (liquid)	4,096.7
(solids)	164,795.3
Central pond (liquid)	10,757.8
(solids)	179,519.9
North pond (liquid)	668.9
(solids)	64,769.9
Ore piles (total)	3,344.4

- c. Annual average release rates in curies/year of U-Natural, Th-230, Ra-226, and Pb-210 for stacks is given on Table 2. Bulk specified activity and release rates for stacks (U-Natural, Ra-226, Th-230, Pb-210, Po-210) are given on Table 3. Stack particulate data and stack flow rates are given on Table 4.

2. SOURCES (cont.)d. Exit Velocities of Stacks.

1. dryer stack	range: 4391 - 9134 m ³ /hr	Impinget scrubber
2. packaging stack	range: 1567 - 1762 m ³ /hr	Venturi type scrubber
3. ore grinding and leaching stack		Wet scrubber
4. stacks from laboratory		Straight discharge

The stack diameters are given in Kramer, Callahan and Associates reports as:

(Dryer Exhausted Stack = 33.5")
(Packing Exhaust stack = 11.25")

e. Dryer stack	yellowcake
Packaging stack	yellowcake
Ore grinding and leaching stack	ore
Stacks (9) from laboratory	non-radioactive effluents ⁽¹⁾
Tailings pile	tailings
Ore pile	ore
Note: (1)	miscellaneous chemicals.

f. Radon release beyond 80 km - FRADON (3) Grants MILDOS, 1981 p.4.10

3. TAILINGS DATA

Tailings radon release rate and tailings solids bulk specific activities (U-total, Ra-226, Th-230, Pb-210) are given on Tables 5 and 6.

4. TIME STEPS ASSIGNED

- Major changes in ore grade have not occurred through July, 1981.
Average ore grade = 0.120% U₃O₈.
- Three time steps
 - 1981-1985
 - 1985-2001
 - 2001-2006
- All release rates similar through 2,001.
Stack and ore pad releases end in 2,001.

5. GRAZING PARAMETERS

- a. Vegetables production = 207 kg/km²/yr
- b. Meat production = 86 kg/km²/yr
- c. Milk production = 109 kg/km²/yr
- Total feed requirement satisfied by grazing = 100% (input = 1.0).
- Feed requirement satisfied by stored feed = 0% (input = 0.0).

References:

1. New Mexico Agricultural Statistics, 1979. U.S. Department of Agriculture, New Mexico Crop and Livestock Reporting Service, New Mexico State University, Las Cruces.
2. Aerial reconnaissance notes, July 9, 1981. Made by J.S. Hart and K. G. Kennedy.
3. Telephone conference notes of June 24, 1981. Livestock data from Mr. Jim Henderson of the Navajo research and Statistics Office.
4. New Mexico Department of Agriculture, New Mexico State University, Las Cruces, telephone conversation with B. Ellis, 8/6/81.
5. Telephone conference notes, September 8, 1981. Information from Mr. Jim Henderson (see reference 3).

6. POPULATION DISTRIBUTION

Two distribution maps were submitted to BDM.

References:

1. Field observations
2. University of New Mexico, Bureau of Business and Economic Research, Automated Data Acquisition Service, 1980.
3. Personal communication 1981, Ron Faich, statistician
4. U.S. Dept. of Commerce, Census Bureau, 1981. Enumeration District Maps for McKinley Cty, San Juan Cty and Valencia Cty, NM.

7. RECEPTOR PARAMETERS

See Table 7.

8. POPULATION PROJECTIONS

	%increase
(1980-1985)	32
(1985-2001)	44
(2001-2006)	2

Reference: Calculated from those listed in Item 6 above

Table 1. Locations of Sources

Source	Coordinates					
	x		y		z (3)	
	ft.	m.	ft.	m.	ft.	m.
Ore piles ⁽¹⁾	+525.0	+160.02	+75.0	+22.86		+2.28
Tailings pile ⁽²⁾	A	+2237.5	+682.01	-87.5	-26.67	(4)
	B	+3675.0	+1120.17	-1762.5	-537.22	
	C	-150.0	-45.72	-3300.0	-1005.87	(4)
Yellowcake Dryer Stack	0.0	0.0	0.0	0.0	+61.0	+18.59
Yellowcake Packaging Stack	+31.25	+9.52	0.0	0.0	+57.0	+17.37
Ore Grinding and Leaching Stack	+162.50	+49.53	-68.75	-20.95	+53.5	+16.30
Laboratory Stacks						
#4	-179.70	-54.77	-387.00	-117.96	+26	+7.93
#5	-177.30	-54.04	-393.00	-119.79	+26	+7.93
#6	-172.50	-52.58	-399.30	-121.71	+33	+10.06
#7	-175.00	-53.34	-405.00	-123.45	+33	+10.06
#8	-176.70	-53.86	-420.30	-128.11	+33	+10.06
#9	-183.00	-55.78	-425.40	-129.67	+26	+7.93
#10	-175.50	-53.49	-455.10	-138.72	+26.5	+8.08
#11	-149.0	-45.42	-458.70	-139.82	+30.0	+9.14
#12	-142.50	-43.43	-388.50	-118.42	+9.25	+8.92

Note: Ground elevation at the mill site is 7000 ft. = 2133.67 m.

Notes: (1) Location of largest ore pile on UNC map Sec. 2 T. 16N, R. 16W., NMPM 1" = 200', July 28, 1981.

(2) Tailings area represented by three locations; A, B, and C.

(3) Elevations from UNC map Sec. 2 T. 16N., R. 16N., NMPM 1" = 200', May 3, 1978 by Koogle & Poole, Inc.

(4) Average elevation of tailings ponds is 6947.5 ft. (-16m) with respect to the mill origin elevation. Three elevations, 6933.8, 6954.4 and 6954.5 ft. taken from UNC aerial photo May 3, 1978, 1" = 200' by Koogle & Poole, Inc.

Table 2. Average Annual Release Rates for Stacks

Based on 1st and 2nd quarter data

	<u>Dryer</u> <u>Ci/yr</u>	<u>Packaging</u> <u>Ci/yr</u>
U natural	5.14×10^{-1}	1.62×10^{-3}
Ra-226	1.12×10^{-2}	9.90×10^{-4}
Th-230	6.45×10^{-4}	5.73×10^{-5}
Pb-210	4.06×10^{-4}	3.89×10^{-5}
Po-210	1.14×10^{-4}	1.70×10^{-5}

Based on 1st, 2nd, and 3rd quarter data

	<u>Dryer</u> <u>Ci/yr</u>	<u>Packaging</u> <u>Ci/yr</u>
U natural	6.74	3.67×10^{-2}
Ra-226	7.59×10^{-3}	$<6.89 \times 10^{-4}$
Th-230	$<4.36 \times 10^{-4}$	$<3.94 \times 10^{-5}$
Pb-210	$<2.73 \times 10^{-4}$	$<2.62 \times 10^{-5}$
Po-210	$<7.81 \times 10^{-5}$	$<1.15 \times 10^{-5}$

Both sets of values were supplied since the 3rd quarter data became available after the initial sdata package was delivered to BDM.

Reference: Kramer, Callahan and Associates, 1981. Analyses of Yellowcake Dryer and Packaging Exhaust Emissions at United Nuclear Uranium Mill, Gallup, New Mexico. Three quarterly reports (January, May, August), Albuquerque, NM.

Table 3. Stack Data - Bulk Specific Activity and Release Rates
*U Nat

Test Date	Test	Stack	g/DSCM*	pCi/g part.**	pCi/hr
3/81	1	Dryer	3.9×10^{-2}	4.13×10^4	1.16×10^8
3/81	2	Pkgng	1.84×10^{-4}	2.02×10^4	1.89×10^3
3/81	3	Pkgng	2.67×10^{-5}	4.94×10^4	2.89×10^5
3/81	4	Pkgng	2.0×10^{-5}	4.14×10^3	2.13×10^4
3/81	5	Dryer	9.24×10^{-4}	1.01×10^4	3.21×10^6
3/81	6	Dryer	3.87×10^{-4}	8.19×10^3	1.28×10^6
Quarterly Means:					
		Dryer	1.34×10^{-2}	1.99×10^4	4.02×10^7
		Pkgng	7.69×10^{-5}	2.46×10^4	1.04×10^5
5/81	1	Pkgng	2.8×10^{-5}	4.12×10^3	3.35×10^4
5/81	2	Pkgng	2.69×10^{-4}	3.44×10^4	3.07×10^5
5/81	3	Dryer	3.5×10^{-2}	4.5×10^5	2.03×10^8
5/81	4	Dryer	1.2×10^{-3}	2.37×10^4	7.42×10^6
5/81	5	Dryer	3.47×10^{-3}	7.8×10^4	2.12×10^7
5/81	6	Pkgng	3.99×10^{-4}	4.82×10^4	4.53×10^5
Quarterly Means:					
		Dryer	1.32×10^{-2}	1.84×10^5	7.72×10^7
		Pkgng	2.32×10^{-4}	2.89×10^4	2.65×10^5
8/81	1	Pkgng	9.06×10^{-3}	2.92×10^5	1.05×10^7
8/81	2	Dryer	0.0258	5.14×10^5	1.56×10^8
8/81	3	Dryer	0.022	5.38×10^5	1.33×10^8
8/81	4	Dryer	0.0102	2.85×10^5	6.29×10^7
8/81	5	Pkgng	1.65×10^{-2}	4.71×10^4	1.96×10^7
8/81	6	Pkgng	5.89×10^{-3}	3.79×10^5	6.59×10^6
Quarterly Means:					
		Dryer	0.019	4.46×10^5	1.17×10^8
		Pkgng	1.04×10^{-2}	3.81×10^5	1.22×10^7

* Dry standard (STP) cubic meter

** particulate

Table 3 (cont)
Ra-226

Test Date	Test	Stack	g/DSCM	pCi/g part.**	pCi/hr
3/81	1	Dryer	1.17+0.24	1.82	5137
3/81	2	Pkgng	0.39+0.08	63.1	611
3/81	3	Pkgng	<0.042+0.008	<11.5	<67.1
3/81	4	Pkgng	<0.028+0.006	<8.56	<44.2
3/81	5	Dryer	0.126+0.025	2.03	645
3/81	6	Dryer	0.166+0.033	5.19	812
Quarterly Means:					
		Dryer	0.487	3.01	2198
		Pkgng	<0.153	<27.72	240.8
5/81	1	Pkgng	33+0.6	7.17x10 ³	5.81x10 ⁴
5/81	2	Pkgng	253+51	4.77x10 ⁴	4.27x10 ⁵
5/81	3	Dryer	605+121	1.15x10 ⁴	5.19x10 ⁶
5/81	4	Dryer	209+42	6.09x10 ³	1.91x10 ⁶
5/81	5	Dryer	65+13	2.17x10 ³	5.89x10 ⁵
5/81	6	Pkgng	115+23	2.05x10 ⁴	1.93x10 ⁵
Quarterly Means:					
		Dryer	293	6.59x10 ³	2.56x10 ⁶
		Pkgng	134	2.51x10 ⁴	2.26x10 ⁵
8/81	1	Pkgng	8.42	401	1.45x10 ⁴
8/81	2	Dryer	0.475	14.01	4.24x10 ³
8/81	3	Dryer	7.95	287	7.09x10 ⁴
8/81	4	Dryer	4.00	165	3.63x10 ⁴
8/81	5	Pkgng	5.00	210	8735
8/81	6	Pkgng	3.71	353	6147
Quarterly Means:					
		Dryer	4.14	155	3.71x10 ⁴
		Pkgng	5.71	321	9.79x10 ³

Table 3 (cont)
Pb-210

Test Date	Test	Stack	<u>g/DSCM</u>	<u>pCi/g part.**</u>	<u>pCi/hr</u>
3/81	1	Dryer	$<0.05+0.008$	<0.078	<220
3/81	2	Pkgng	$0.084+0.017$	13.6	132
3/81	3	Pkgng	$<0.042+0.008$	<11.5	<67.1
3/81	4	Pkgng	$<0.042+0.008$	<12.8	<66.2
3/81	5	Dryer	$<0.044+0.008$	<0.71	<225
3/81	6	Dryer	$<0.047+0.009$	<1.46	<230
Quarterly Means:					
		Dryer	<0.047	<0.749	<225
		Pkgng	<0.056	<12.63	<88.4
5/81	1	Pkgng	$2.2+0.23$	478	3876
5/81	2	Pkgng	$10.6+1.1$	2000	1.79×10^4
5/81	3	Dryer	$20.9+2.2$	397	1.79×10^5
5/81	4	Dryer	$8.4+0.9$	245	7.67×10^4
5/81	5	Dryer	$2.4+0.25$	80	2.18×10^4
5/81	6	Pkgng	$2.75+0.29$	491	4620
Quarterly Means:					
		Dryer	10.57	241	9.25×10^4
		Pkgng	5.18	990	8.80×10^3
8/81	1	Pkgng	0.294	14.00	506
8/81	2	Dryer	<0.14	<4.13	<1251
8/81	3	Dryer	0.332	11.99	2962
8/81	4	dryer	0.219	9.01	1990
8/81	5	Pkgng	0.262	11.00	458
8/81	6	Pkgng	0.168	16.00	278
Quarterly Means:					
		Dryer	<0.23	<8.38	<2067
		Pkgng	0.24	13.67	414

Table 3 (cont)
Th-230

Test Date	Test	Stack	g/DSCM	pCi/g part.	pCi/hr
3/81	1	Dryer	$<0.05+0.008$	<0.078	<220
3/81	2	Pkgng	$0.06+0.012$	9.87	95.6
3/81	3	Pkgng	$<0.042+0.008$	<11.5	<67.1
3/81	4	Pkgng	$<0.042+0.008$	<12.8	<66.2
3/81	5	Dryer	$<0.044+0.008$	<0.71	<225
3/81	6	Dryer	$<0.047+0.009$	<1.46	<230
Quarterly Means:					
		Dryer	<0.047	<0.749	<225
		Pkgng	<0.048	<11.39	<76.3
5/81	1	Pkgng	$2.6+0.24$	565	4581
5/81	2	Pkgng	$15.9+1.3$	3000	2.68×10^4
5/81	3	Dryer	$31+2.9$	589	2.66×10^5
5/81	4	Dryer	$15.9+1.5$	464	1.45×10^5
5/81	5	Dryer	$3.15+0.3$	105	2.86×10^4
5/81	6	Pkgng	$4.6+0.44$	821	7.73×10^3
Quarterly Means:					
		Dryer	16.68	386	1.47×10^5
		Pkgng	7.7	1462	1.30×10^4
8/81	1	Pkgng	0.063	3.00	108
8/81	2	Dryer	<0.24	<7.08	<2144
8/81	3	Dryer	0.11	3.97	9.82
8/81	4	Dryer	0.05	2.06	454
8/81	5	Pkgng	0.048	2.02	83.86
8/81	6	Pkgng	0.032	3.05	51.02
Quarterly Means:					
		Dryer	<0.13	<4.37	<869
		Pkgng	0.048	2.69	81.63

Table 3 (cont)
Po-210

Test Date	Test	Stack	<u>g/DSCM</u>	<u>pCi/g part.</u>	<u>pCi/hr</u>
3/81	1	Dryer	$<0.05+0.008$	<0.078	<220
3/81	2	Pkgng	$<0.042+0.008$	<6.80	<65.8
3/81	3	Pkgng	$<0.042+0.008$	<11.5	<67.1
3/81	4	Pkgng	$<0.042+0.008$	<12.8	<66.2
3/81	5	Dryer	$<0.044+0.008$	<0.71	<225
3/81	6	Dryer	$<0.047+0.009$	<1.46	<230
Quarterly Means:					
		Dryer	<0.047	<0.749	<225
		Pkgng	<0.042	<10.37	<66.37
5/81	1	Pkgng	$0.92+0.1$	200	1621
5/81	2	Pkgng	$4.7+0.53$	887	7924
5/81	3	Dryer	$5.4+0.6$	103	4.63×10^4
5/81	4	Dryer	$3.0+0.34$	87.5	2.74×10^4
5/81	5	Dryer	$0.42+0.05$	14	3.81×10^3
5/81	6	Pkgng	$1.12+0.13$	200	1.88×10^3
Quarterly Means:					
		Dryer	2.94	68.2	2.58×10^4
		Pkgng	2.25	429	3.81×10^3
8/81	1	Pkgng	<0.05	<2.38	<86
8/81	2	Dryer	<0.14	<4.13	<1251
8/81	3	Dryer	<0.05	<1.81	<446
8/81	4	Dryer	<0.05	<2.06	<454
8/81	5	Pkgng	<0.05	<2.1	<87.4
8/81	6	Pkgng	<0.03	<2.86	<49.71
Quarterly Means:					
		Dryer	<0.08	<2.67	<717
		Pkgng	<0.04	<2.45	<74.4

Table 4. Stack Data: Particulate and Average Stack Flow Rates
 ref: Kramer, Callahan and Associates, 1981

First Quarter, 1981

<u>DRYER STACK</u>			
Test	Particulate conc. in stack gas gram/DSCM*	Particulate effluent rate gram/hr	Average stack gas flow rate meter ³ /hr (dry)
1	0.64	2836.36	4391
5	0.062	318.18	5122
6	0.032	159.09	4899
Mean	0.24	1104.54	4804

<u>PACKAGING STACK</u>			
Test	Particulate conc. in stack gas gram/DSCM*	Particulate effluent rate gram/hr	Average stack gas flow rate meter ³ /hr (dry)
2	0.0062	9.09	1567
3	0.0037	5.91	1598
4	0.0033	5.0	1577
Mean	0.0044	6.67	1581

Table 4 (cont)

Second Quarter, 1981

<u>DRYER STACK</u>			
Test	Particulate conc. in stack gas gram/DSCM*	Particulate effluent rate gram/hr	Average stack gas flow rate meter ³ /hr (dry)
3	0.053	454.55	8582
4	0.034	313.64	9134
5	0.030	275.0	9069
Mean	0.039	347.73	8928

<u>Packaging Stack</u>			
Test	Particulate conc. in stack gas gram/DSCM*	Particulate effluent rate gram/hr	Average stack gas flow rate meter ³ /hr (dry)
1	0.0046	8.18	1762
2	0.0053	8.82	1686
6	0.0056	9.45	1683
Mean	0.0052	8.82	1710

Table 4 (cont)

Third Quarter, 1981

DRYER STACK

Test	Particulate conc. in stack gas gram/DSCM*	Particulate effluent rate gram/hr	Average stack gas flow rate meter ³ /hr (dry)
2	0.034	303.6	8939
3	0.028	248.2	8927
4	0.024	220.9	9090
Mean	0.028	257.6	8985

T

PACKAGING AND PRECIPITATION STACK

Test	Particulate conc. in stack gas gram/DSCM*	Particulate effluent rate gram/hr	Average stack gas flow rate meter ³ /hr (dry)
1	0.021	36.4	1722
5	0.024	405.2	1748
6	0.010	17.3	1658
Mean	0.018	152.9	1709

R

D

Table 5. Tailings Radon Release Rate

The final Generic Environmental Impact Statement on Uranium Milling (9/80) provides the following model values for radon emissions. These are "upper bound" or "worst case" situations.

	Ra-222 (Ci/yr)
Ore hauling and storage	
Ore crushing and grinding	68
Yellowcake drying and packaging	negligible
Tailings pile	4400
Dispersed ore and tailings	48*
	4516 Ci/yr = 0.5 Ci/hr

*after 15 years operation

Reference:
Final GEIS Uranium Milling pp. 5-7 to 5-8.

Table 6. Tailings Solids: Bulk Specific Activity

Date	S-4			
	U Total (Ci/gm)x10 ⁻⁶	Th-230 (Ci/gm)x10 ⁻⁶	Ra-226 (Ci/gm)x10 ⁻⁶	Pb-210 (Ci/gm)x10 ⁻⁶
4/23/80	0.0093	1.1±0.1	0.45±0.07	680±10
5/14/80	ND*	1.6±0.1	38±4	172±4
5/21/80	ND	27±2	220±33	37±1
5/28/80	0.0042	0.6±0.1	226±10	71.4±2.8
6/4/80	ND	<0.6	300±45	190±4
6/11/80	0.0014	1.5±0.8	654±98	<0.1
6/18/80	0.0035	256±0.14	328±49.2	88±2
7/9/80	0.0226	1.2±0.1	270±41	69.2±1.0
7/16/80	ND	214±20.4	255.6±7.7	296±4
7/23/80	0.0119	184±45.2	261.7±8.1	178.7±3.4
7/30/80	ND	566±62	191.7±6.6	140.8±4.2
8/6/80	ND	218±28	82.8±3.9	241.6±5.1
8/20/80	ND	4406.0±184.0	10.4±0.8	367.4±6.2
8/28/80	ND	321.1±16.0	139.1±4.0	252.6±4.8
9/18/80	ND	351.9±40.7	112.9±4.5	340.4±12.3
9/25/80	ND	ND	32.4±11.9	265.6±14.4
A				
1/7/81 (1/81) 0.0098		299±34	13±1	131±17
1/14/81		1454±204	76±4	532±65
2/4/81		328±80	241±4	363±41
2/11/81		381±81	230±10	440±100
3/81	0.0119			
4/81	0.0101			
5/81	0.0102			
6/81	0.0085			
7/81	0.0077			
CYCLONE				
1/14/81		950±146	90±7	116±93
2/4/81		209±61	154±4	243±82
2/11/81		132±50	103±4	600±80
Average of				
Means	0.0093±0.0054	468.4±945	188.3±145.1	252.9±180.6

*ND No Data

Reference: UNC data for tailings solids

Table 7. Receptors and Locations

<u>Receptors</u>	<u>Coordinates</u>
*Receptors at the UNC property boundary,	
A1	0, 0.077, 6.096
A2	1.15, 0.077, -3.048
A3	1.15, -1.38, 36.576
A4	-0.46, -1.38, - 6.096
Mill site working locations,	
B1	0.039, 0.039, 0
B2	0.039, -0.153, 0
B3	-0.153, -0.153, 0
*Nearest resident, C1	-0.039, 1.303, 12.192
*Nearest resident downwind, D1	2.568, 1.993, 18.288
*Nearest Community, E1	5.365, -5.21, 1.21
*Nearest Community, downwind Crownpoint F1	31.807, 3.98, -18.288
*Nearest grazing area, G1	0.307, -0.613, -18.288
*Springstead Trading Post, H1	-6.284, -7.664, -48.768
*Gallup, H2	-20.448, -14.768, 0
Red Rock State Park, H3	-7.952, -13.632, -60.96
Grants, H4	56.799, -54.527, -152.4
Arizona St. Line, H5	-46.575, 0, -91.44
Zuni, H6	-29.535, -61.343, -152.4
Fort Wingate, H7	-4.544, -17.04, 0
Chaco Canyon Headquarters, H8	48.847, 42.031, -121.92

Note: coordinates in m/km, m.

*Receptor locations currently anticipated

ATTACHMENT A

N.C.C. FILE COPY

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

JOB NO. 52176 (W-1379)

SEASONAL & ANNUAL
~~WIND DISTRIBUTION OF PASQUILL STABILITY CLASS~~ (5)
STAR PROGRAM

STATION: #23081 Gallup, NM

PERIOD: 1/73-12/75 (8 Obs/Day)

SOURCE: TDF 1440

DATE Mar. 24, 1976

NATIONAL CLIMATIC CENTER
FEDERAL BUILDING, ASHEVILLE, N.C.

60P.

SEASONAL & ANNUAL
WIND DIRECTION BY PASQUILL STABILITY CLASSES (STAR PROGRAM)
5 Classes

Station: #23081 Gallup, NM

Period of Record: 1/73-12/75 (8 Obs/Day)

Data are presented by stability classes and also combined for the period indicated; first, as a bivariate frequency distribution of wind direction vs. wind speed, and second, as normalized values (i.e., relative frequency). Stability classes are based on Pasquill's class structure (see Journal of Applied Meteorology, February 1964), as follows:

Stability Class (Regular STAR)	Identified in lower left corner in this tabulation as:	Definition
1	A	Extremely Unstable
2	B	Unstable
3	C	Slightly Unstable
4	D	Neutral
5	E	Slightly Stable
6	F	Stable
7	G	Extremely Stable

Stability Class (Day/Night STAR)	Identified in lower left corner in this tabulation as:	Definition
1	A	Extremely Unstable
2	B	Unstable
3	C	Slightly Unstable
4	D	Neutral/Day
5	E	Neutral/Night
6	F	Slightly Stable
7	G	Stable
8	H	Extremely Stable

Tabulations can also be prepared for the Regular STAR in 5 classes (E, F, G combined), 6 classes (F, G combined), or 7 classes

The Day/Night STAR can be prepared for 6 classes (F, G, H combined), 7 classes (G, H combined), or 8 classes. The Day/Night STAR is normally used in the climatological display model (CDM)

Average wind speed in knots, to tenths, for each direction and each speed class. Overall average wind speed is computed by: $\frac{\text{Sum of Wind Speed}}{\text{Number of Occurrences}}$

NUMBER OF OCCURRENCES: Number of DIR/SPD observations, plus number of calms (winds are tabulated to 16 points; speeds are in knots.)

RELATIVE FREQUENCY OF OCCURRENCES: $\frac{\text{Number of occurrences/stability class}}{\text{Total number of observations}}$

TOTAL NUMBER OF OBSERVATIONS: Number of observations in each month, season, annual or period.

TOTAL RELATIVE FREQUENCY OF OBSERVATIONS: $\frac{\text{Total number of observations}}{\text{Total number of observations}} = 1.00000$

This normalized (relative frequency) table is self explanatory, except that calm values have been distributed in the 0-3 speed category based on the number of observations in speed categories 1-3 and 4-6 as shown below.

Because of the importance of calm winds in air pollution studies, their occurrences are distributed into 0-3 speed category of the percentage frequency (normalized) tables using a ratio based on the number of observations of speeds of 1-6 knots in each direction category.

Example:

Season:	MAM
R Total Obs for Season (all Stabilities):	3680
S Stability Class:	"C"
T Total Obs. Class "C" - Speeds 1-3	21
U Total Obs. Class "C" - Speeds 4-6	142
V Total Calms - Class "C" (Season: MAM)	8

To find the distribution of calms into a direction category we must also know the number of observations in that direction that had speeds of 1-3 and 4-6 knots. In our example let us assume we want to find how the calms were distributed into the south direction.

W	Total Obs. S Direction (Season: MAH) "C" Stability Speeds 1-3	3
X	Total Obs. S Direction (Season: MAH) "C" Stability Speeds 4-6	6

Symbolically the Distribution Factor =

$$\left(\frac{V}{R}\right) \left(\frac{W+X}{T+U}\right) + \left(\frac{W}{R}\right)$$

In our example then: Z Frequency South Spd 0-3 "C" = $\left(\frac{8}{3680}\right) \left(\frac{3+6}{21+142}\right) + \left(\frac{3}{3680}\right) = (.002174) (.55215) + (.000815) = .000935$

Percentages for Monthly or Annual tables may be determined in a like manner by substituting the proper values.

TABLE A-1. STABILITY CLASS AS A FUNCTION OF NET RADIATION AND WIND SPEED

WIND SPEED (KNOTS)	NET RADIATION INDEX						
	4	3	2	1	0	-1	-2
0, 1	1	1	2	3	4	6	7
2, 3	1	2	2	3	4	6	7
4, 5	1	2	3	4	4	5	6
6	2	2	3	4	4	5	6
7	2	2	3	4	4	4	5
8, 9	2	3	3	4	4	4	5
10	3	3	4	4	4	4	5
11	3	3	4	4	4	4	4
≥12	3	4	4	4	4	4	4

TABLE A-2. INSOLATION AS A FUNCTION OF SOLAR ALTITUDE

SOLAR ALTITUDE (a)	INSOLATION	INSOLATION CLASS NUMBER
60° < a	Strong	4
35° < a ≤ 60°	Moderate	3
15° < a ≤ 35°	Slight	2
a ≤ 15°	Weak	1

A STABILITY CLASSIFICATION BASED ON HOURLY AIRPORT OBSERVATIONS

The following explanation of the Pasquill Stability classification has been extracted from an article by D. Bruce Turner in the February 1964 Journal of Applied Meteorology.

This system of classifying stability on an hourly basis for research in air pollution is based upon work accomplished by Dr. F. Pasquill of the British Meteorological Office (1961). Stability near the ground is dependent primarily upon net radiation and wind speed. Without the influence of clouds, insolation (incoming radiation) during the day is dependent upon solar altitude, which is a function of time of day and time of year. When clouds exist their cover and thickness decrease incoming and outgoing radiation. In this system insolation is estimated by solar altitude and modified for existing conditions of total cloud cover and cloud ceiling height. At night estimates of outgoing radiation are made by considering cloud cover. This stability classification system has been made completely objective so that an electronic computer can be used to compute stability classes. The stability classes are as follows: 1) Extremely unstable, 2) Unstable, 3) Slightly unstable, 4) Neutral, 5) Slightly stable, 6) Stable, 7) Extremely stable. Table A-1 gives the stability class as a function of wind speed and net radiation. The net radiation index ranges from 4, highest positive net radiation (directed toward the ground), to -2, highest negative net radiation (directed away from the earth). Instability occurs with high positive net radiation and low wind speed, stability with high negative net radiation and light winds, and neutral conditions with cloudy skies or high wind speeds.

The net radiation index used with wind speed to obtain stability class is determined by the following procedure:

- 1) If the total cloud cover is 10/10 and the ceiling is less than 7000 feet, use net radiation index equal to 0 (whether day or night).
- 2) For night-time (night is defined as the period from one hour before sunset to one hour after sunrise):
 - a) If total cloud cover $\leq 4/10$, use net radiation index equal to -2.
 - b) If total cloud cover $> 4/10$, use net radiation index equal to -1.
- 3) For daytime:
 - a) Determine the insolation class number as a function of solar altitude from Table A-2.
 - b) If total cloud cover $\leq 5/10$, use the net radiation index in Table A-1 corresponding to the insolation class number.
 - c) If cloud cover $> 5/10$, modify the insolation class number by following these six steps:
 - 1) Ceiling < 7000 ft, subtract 2.
 - 2) Ceiling ≥ 7000 ft but $< 16,000$ ft, subtract 1.
 - 3) Total cloud cover equal 10/10, subtract 1. (This will only apply to ceilings ≥ 7000 ft since cases with 10/10 coverage below 7000 ft are considered in item 1 above.)
 - 4) If insolation class number has not been modified by steps (1), (2), or (3) above, assume modified class number equal to insolation class number.
 - 5) If modified insolation class number is less than 1, let it equal 1.
 - 6) Use the net radiation index in Table A-1 corresponding to the modified insolation class number.

Since urban areas do not become as stable in the lower layers as non-urban areas, stability classes 5, 6 and 7 computed using the STAR program may be combined into a single class (5), or classes 6 and 7 may be combined and identified as class 6.

THIS TABULATION WAS PREPARED USING THE FOLLOWING HEADLINE INFORMATION

STATION NUMBER 23081

STATION NAME 60111P N MEX 6 DMS 1973-75

LATITUDE 35.517

LONGITUDE 102.783

TIME ZONE 4.5.0

THIS IS A TIGULIN STAR RUN

HEMISPHERE WESTERN

NUMBER OF STABILITY CLASSES 5

INPUT 8 SACRIFICIAL TAP DUCK FAMILY 14 USRLE 8.0

OUTPUT 8 SEASONAL AND ANNUAL

PERIOD OF RECORD 7501 7512

NUMBER OF HOURS USED 8 OBSERVATIONS PER DAY BEGINNING WITH HOUR 02

A TAP, CONTAINING INDIVIDUAL STABILITY OBSERVATIONS WAS NOT REQUESTED

ANNUAL

FREQUENCY DISTRIBUTION

STATION #23081 GALLUP N MEX & OBS 1974-75

SPEED (KTS)

DIRECTION	1-3	4-6	7-10	11-16	17-21	GREATER THAN 21	AVG SPD	TOTAL
N	0	4	0	0	0	0	5.0	4
NNE	0	0	0	0	0	0	5.0	0
NE	0	5	0	0	0	0	4.8	5
NNE	0	3	0	0	0	0	5.0	3
E	0	2	0	0	0	0	5.0	2
ESE	0	1	0	0	0	0	5.0	1
SE	0	1	0	0	0	0	5.0	1
SSE	0	2	0	0	0	0	4.5	2
S	0	5	0	0	0	0	5.0	5
SSW	0	4	0	0	0	0	5.0	4
SW	0	5	0	0	0	0	4.8	5
WSW	0	8	0	0	0	0	4.9	8
W	0	9	0	0	0	0	4.8	9
WNW	0	10	0	0	0	0	4.6	10
NW	0	5	0	0	0	0	4.8	5
NNW	1	2	0	0	0	0	3.7	3
AVG	3.0	4.8	0.0	0.0	0.0	0.0	2.0	
TOTAL	1	72	0	0	0	0		

NUMBER OF OCCURRENCES OF A STABILITY = 176

NUMBER OF CALDS WITH A STABILITY = 103

1973-75

STATION #23081 CALLUP N MEX 8 UBS

RELATIVE FREQUENCY DISTRIBUTION

ANNUAL

SPEED (KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.000649	0.000460	0.000000	0.000000	0.000000	0.000000	0.001108
NNE	0.000973	0.000690	0.000000	0.000000	0.000000	0.000000	0.001663
NE	0.000811	0.000575	0.000000	0.000000	0.000000	0.000000	0.001385
NNE	0.000486	0.000345	0.000000	0.000000	0.000000	0.000000	0.000831
E	0.000324	0.000230	0.000000	0.000000	0.000000	0.000000	0.000554
ESE	0.000162	0.000115	0.000000	0.000000	0.000000	0.000000	0.000277
SE	0.000162	0.000115	0.000000	0.000000	0.000000	0.000000	0.000277
SSE	0.000324	0.000230	0.000000	0.000000	0.000000	0.000000	0.000554
S	0.000811	0.000575	0.000000	0.000000	0.000000	0.000000	0.001385
SSW	0.000649	0.000460	0.000000	0.000000	0.000000	0.000000	0.001108
SW	0.000811	0.000575	0.000000	0.000000	0.000000	0.000000	0.001385
WSW	0.001297	0.000919	0.000000	0.000000	0.000000	0.000000	0.002217
W	0.001459	0.001034	0.000000	0.000000	0.000000	0.000000	0.002494
WNW	0.001621	0.001149	0.000000	0.000000	0.000000	0.000000	0.002771
NW	0.000811	0.000575	0.000000	0.000000	0.000000	0.000000	0.001385
NNW	0.000601	0.000230	0.000000	0.000000	0.000000	0.000000	0.000831
TOTAL	0.011953	0.008275	0.000000	0.000000	0.000000	0.000000	0.020228

RELATIVE FREQUENCY OF OCCURRENCE OF A STABILITY = 0.011838

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH A STABILITY = 0.011838

SPEEDS (KTS)

DIRECTION	1-3	4-6	7-10	11-16	17-21	GREATER THAN 21	AVG SPD	TOTAL
N	0	8	9	0	0	0	6.4	17
NNE	0	13	5	0	0	0	6.2	18
NE	1	11	2	0	0	0	5.8	14
ENE	0	7	7	0	0	0	6.5	14
E	0	10	5	0	0	0	6.1	15
ESE	0	2	1	0	0	0	6.0	3
SE	1	3	1	0	0	0	4.8	5
SSE	0	0	2	0	0	0	7.0	2
S	0	8	6	0	0	0	6.6	14
SSW	0	15	12	0	0	0	6.1	27
SW	0	19	12	0	0	0	6.4	34
WSW	0	39	19	0	0	0	6.2	58
W	0	21	17	0	0	0	6.3	44
WNW	0	12	8	0	0	0	6.1	23
NW	0	10	6	0	0	0	6.1	16
NNW	0	11	2	0	0	0	5.5	13
AVG	3.0	5.5	7.5	0.0	0.0	0.0	6.8	
TOTAL	2	128	117	0	0	0		

NUMBER OF OCCURRENCES OF B STABILITY = 695

NUMBER OF CALMS WITH B STABILITY = 3/8

ANNUAL

RELATIVE FREQUENCY DISTRIBUTION

STATION = 23081 GALLUP N MEX & OBS 1973-75

SPEED (KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.001738	0.000919	0.001024	0.000000	0.000000	0.000000	0.003692
NNE	0.002824	0.001494	0.000575	0.000000	0.000000	0.000000	0.004893
NE	0.002722	0.001264	0.000230	0.000000	0.000000	0.000000	0.004216
ENE	0.001521	0.000805	0.000805	0.000000	0.000000	0.000000	0.003130
E	0.002172	0.001149	0.000575	0.000000	0.000000	0.000000	0.003896
ESE	0.000434	0.000230	0.000115	0.000000	0.000000	0.000000	0.000779
SE	0.000984	0.000345	0.000115	0.000000	0.000000	0.000000	0.001444
SSE	0.000000	0.000000	0.000230	0.000000	0.000000	0.000000	0.000230
S	0.001738	0.000919	0.000690	0.000000	0.000000	0.000000	0.003347
SSW	0.003258	0.001724	0.001379	0.000000	0.000000	0.000000	0.006361
SW	0.004127	0.002184	0.001724	0.000000	0.000000	0.000000	0.008035
WSW	0.008471	0.004482	0.002184	0.000000	0.000000	0.000000	0.015137
W	0.005865	0.003103	0.001954	0.000000	0.000000	0.000000	0.010922
WNW	0.003158	0.001724	0.000919	0.000000	0.000000	0.000000	0.005902
WW	0.002172	0.001149	0.000690	0.000000	0.000000	0.000000	0.004011
NNW	0.002389	0.001264	0.000230	0.000000	0.000000	0.000000	0.003883
TOTAL	0.043673	0.022756	0.013447	0.000000	0.000000	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF B STABILITY = 0.179870

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH B STABILITY = 0.043443

ANNUAL

FREQUENCY DISTRIBUTION

STATION 23081 GALLUP N.M. 8 UBS 1973-75

SPEED (KTS)

DIRECTION	1-3	4-6	7-10	11-16	17-21	GREATER THAN 21	AVG SPD	TOTAL
N	0	17	21	3	0	0	7.6	41
NNE	0	23	21	3	0	0	7.3	47
NE	0	30	12	4	0	0	6.6	46
NNE	0	24	26	0	0	0	6.9	50
E	0	12	20	1	0	0	7.0	33
ESE	0	1	6	0	0	0	7.7	7
SE	0	5	4	1	0	0	6.9	10
SSE	0	4	5	0	0	0	7.1	9
S	0	25	22	5	0	0	7.4	52
SSW	0	20	45	11	7	1	9.7	84
SW	1	34	64	37	8	2	9.8	151
WSW	0	45	74	27	18	0	9.6	164
W	0	54	62	20	4	1	8.4	141
WNW	0	22	30	9	0	0	8.2	61
NW	0	12	9	4	0	0	7.6	25
NNW	0	10	18	1	0	0	7.5	29
AVG	3.0	2.1	8.7	13.5	19.1	24.5	7.4	
TOTAL	1	342	439	126	37	4		

NUMBER OF OCCURRENCES OF C STABILITY = 1091

NUMBER OF CASES WITH C STABILITY = 142

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.000000	0.001924	0.002414	0.000345	0.000000	0.000000	0.005521
NNE	0.001024	0.002043	0.002414	0.000345	0.000000	0.000000	0.006496
NLE	0.001427	0.003440	0.001379	0.000460	0.000000	0.000000	0.006714
ENE	0.001094	0.002043	0.002980	0.000000	0.000000	0.000000	0.006726
E	0.000571	0.001379	0.002299	0.000115	0.000000	0.000000	0.004364
ESE	0.000044	0.000115	0.000679	0.000000	0.000000	0.000000	0.000852
SE	0.000238	0.000575	0.000460	0.000115	0.000000	0.000000	0.001387
SSE	0.000190	0.000460	0.000575	0.000000	0.000000	0.000000	0.001225
S	0.001190	0.002873	0.002528	0.000575	0.000000	0.000000	0.007166
SSW	0.000952	0.002299	0.005172	0.001264	0.000805	0.000115	0.010006
SW	0.002018	0.004482	0.007355	0.004252	0.000919	0.000230	0.019258
WSW	0.002141	0.005172	0.008505	0.003103	0.002069	0.000000	0.020909
W	0.002569	0.006200	0.007126	0.002299	0.000460	0.000115	0.018774
WNW	0.001047	0.002528	0.003448	0.001034	0.000000	0.000000	0.008057
WW	0.000571	0.001379	0.001034	0.000460	0.000000	0.000000	0.003444
WNW	0.000476	0.001149	0.002069	0.000115	0.000000	0.000000	0.003809
TOTAL	0.016435	0.039306	0.050454	0.014481	0.004252	0.000460	

RELATIVE FREQUENCY OF OCCURRENCE OF C STABILITY = 0.125388

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH C STABILITY = 0.016320

ANNUAL

FREQUENCY DISTRIBUTION

STATION #23081 GALLUP N MEX H UPS 1973-75

SPEEDINTS

DIRECTION	1 - 3	4 - 6	7 - 10	11-16	17-21	GREATER THAN 21	AVG SPD	TOTAL
N	0	26	39	19	2	0	9.1	86
NNE	0	20	28	21	5	1	10.0	75
NE	0	17	27	12	1	0	8.9	57
NNE	0	10	59	32	2	0	9.8	111
E	0	9	45	31	1	0	10.0	86
ESE	0	3	8	9	2	1	11.9	23
SE	1	11	16	14	2	1	10.0	45
SSE	0	14	27	12	3	0	9.5	56
S	0	29	73	59	12	2	10.6	175
SSW	0	31	121	102	27	6	11.5	287
SW	1	33	155	293	86	11	13.1	579
WSW	1	47	168	272	88	18	12.9	594
W	2	34	69	139	41	2	12.2	307
WNW	0	8	38	70	11	0	12.1	128
W	0	6	12	31	3	0	11.9	52
WNW	0	8	18	10	1	0	9.3	38
AVG	2.8	5.1	9.0	13.7	18.0	25.4	11.1	
TOTAL	5	416	923	1126	287	42		

NUMBER OF OCCURRENCES OF 0 STABILITY = 2875

NUMBER OF CALMS WITH 0 STABILITY = 176

1973-75

STATION #23081 GALLUP N MEX 8 URS

RELATIVE FREQUENCY DISTRIBUTION

ANNUAL

SPEED (KTS)

TOTAL

GREATER THAN 21

11 - 16

7 - 10

4 - 6

0 - 3

DIRECTION

0.01122

0.000000

0.002184

0.004402

0.002988

0.001628

N

0.009680

0.000115

0.002414

0.003218

0.002299

0.001260

NNE

0.007622

0.000000

0.001379

0.003103

0.001954

0.001071

NE

0.013691

0.000000

0.003678

0.006781

0.002069

0.001134

ENE

0.010451

0.000000

0.003563

0.002172

0.001034

0.000267

E

0.002832

0.000115

0.001034

0.000919

0.000345

0.000189

ESE

0.005928

0.000115

0.001609

0.001839

0.001264

0.000871

SE

0.007318

0.000000

0.001379

0.003103

0.001609

0.000887

SSE

0.021940

0.000230

0.006781

0.008390

0.003334

0.001827

S

0.034934

0.000690

0.011723

0.013906

0.003563

0.001953

SSW

0.066687

0.001264

0.033674

0.017814

0.003793

0.002257

SW

0.071293

0.002069

0.031261

0.019308

0.005402

0.002140

WSW

0.037552

0.000230

0.015975

0.010229

0.003908

0.002428

W

0.015278

0.000000

0.008045

0.004367

0.001034

0.000567

WNW

0.006354

0.000000

0.003563

0.001379

0.000690

0.000378

NW

0.004934

0.000000

0.001149

0.002069

0.001034

0.000567

NNW

0.004827

0.000000

0.129410

0.100080

0.036318

0.020802

TOTAL

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH D STABILITY = 0.020228

RELATIVE FREQUENCY OF OCCURRENCE OF D STABILITY = 0.330422

ANNUAL

FREQUENCY DISTRIBUTION

STATION #23091 GALLUP N. MEX. B. JULY 1973-75

SPEED (KTS)

DIRECTION	1-3	4-6	7-10	11-16	17-21	GREATER THAN 21	AVG SPD	TOTAL
N	0	58	18	0	0	0	6.2	76
NNE	0	68	13	0	0	0	5.7	81
NE	1	74	36	0	0	0	5.6	87
NNE	2	64	26	0	0	0	5.9	93
E	3	66	16	0	0	0	5.4	85
ESE	1	42	2	0	0	0	4.8	45
SE	4	43	5	0	0	0	5.0	52
SSE	0	64	12	0	0	0	5.9	56
S	2	98	34	0	0	0	6.2	154
SSW	2	59	63	0	0	0	6.7	124
SW	1	94	11	0	0	0	6.8	176
WSW	4	103	53	0	0	0	6.3	159
W	1	54	30	0	0	0	6.2	85
WNW	0	17	16	0	0	0	6.8	33
NW	0	13	13	0	0	0	6.8	26
NNW	0	14	12	0	0	0	6.7	26
AVG	3.0	2.1	8.4	0.0	0.0	0.0	2.1	
TOTAL	21	489	528	0	0	0		

NUMBER OF OCCURRENCES OF E STABILITY = 2804

NUMBER OF TALLS WITH E STABILITY = 4526

ANNUAL

FREQUENCY DISTRIBUTION

STATION #23081 GALLUP N.M. 1974-75

SPINDRITS

DIRECTION	1-3	4-6	7-10	11-15	17-21	GRIFFIN THIN 21	AVG SPD	TOTAL
N	0	112	87	22	2	0	7.5	224
NNE	0	110	67	24	5	1	7.6	207
NE	2	135	55	16	1	0	6.7	209
ENE	3	115	118	32	2	0	7.7	270
E	3	99	86	32	1	0	7.5	221
ESE	1	69	17	9	2	1	7.1	172
SE	0	63	26	15	2	1	7.2	113
SSE	0	64	46	12	3	0	7.6	125
S	2	105	155	64	12	2	8.3	400
SSW	2	129	241	113	34	7	9.7	526
SW	3	190	315	330	94	13	11.1	945
WSW	4	242	314	299	106	18	10.8	983
W	3	178	198	159	45	3	9.8	586
WNW	0	73	92	79	11	0	9.7	255
W	0	46	40	35	3	0	8.9	124
WNW	1	46	20	11	1	0	7.6	109
AVG	2.9	251	8.7	12.7	19.0	22.3	5.8	
TOTAL	30	1817	1907	1252	324	46		

TOTAL NUMBER OF OBSERVATIONS = 8701

TOTAL NUMBER OF CALMS = 3325

ANNUAL

RELATIVE FREQUENCY DISTRIBUTION

STATION = 23081 CALUP N MEX 8 UPS 1974-75

SPEEDS (KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.023379	0.012907	0.009999	0.002528	0.000230	0.000000	0.049124
NNE	0.022759	0.012642	0.007700	0.002758	0.000575	0.000115	0.046549
NE	0.020575	0.015515	0.006321	0.001939	0.000115	0.000000	0.052365
ENE	0.024759	0.013217	0.013562	0.003678	0.000230	0.000000	0.055445
E	0.021448	0.011378	0.009884	0.003678	0.000115	0.000000	0.046503
ESE	0.010460	0.005632	0.001754	0.001034	0.000230	0.000115	0.019424
SE	0.014966	0.007241	0.002988	0.001724	0.000230	0.000115	0.027263
SSE	0.013241	0.007355	0.005287	0.001379	0.000345	0.000000	0.027608
S	0.034782	0.018963	0.017814	0.007355	0.001379	0.000230	0.080524
SSW	0.027333	0.014826	0.027698	0.012987	0.003908	0.000805	0.087556
SW	0.040276	0.021837	0.036203	0.037927	0.010803	0.001494	0.148539
WSW	0.051357	0.027813	0.036088	0.034364	0.012193	0.002069	0.163872
W	0.037793	0.020457	0.022756	0.018274	0.005172	0.000345	0.104797
WNW	0.015104	0.008390	0.010573	0.009079	0.001264	0.000000	0.044411
NW	0.009517	0.005787	0.004597	0.004023	0.000345	0.000000	0.023769
NNW	0.009839	0.005287	0.005746	0.001264	0.000115	0.000000	0.022251
TOTAL	0.385588	0.208826	0.219170	0.143891	0.037237	0.005287	

TOTAL RELATIVE FREQUENCY OF OBSERVATIONS = 1.000001

TOTAL RELATIVE FREQUENCY OF CALMS DISTRIBUTED ANNUAL = 0.362140

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION 23081 CALLUP N MEX & UPS 1973-74

SPEED (KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.018503	0.000000	0.002009	0.000000	0.000000	0.000000	0.027238
NNE	0.015313	0.005517	0.001594	0.000000	0.000000	0.000000	0.022224
NE	0.023404	0.008275	0.001009	0.000000	0.000000	0.000000	0.033288
ENE	0.021719	0.007352	0.002988	0.000000	0.000000	0.000000	0.032063
E	0.022357	0.007285	0.001839	0.000000	0.000000	0.000000	0.031782
ESE	0.013833	0.004827	0.000230	0.000000	0.000000	0.000000	0.018890
SE	0.015454	0.004942	0.000575	0.000000	0.000000	0.000000	0.020970
SSE	0.014037	0.005051	0.001375	0.000000	0.000000	0.000000	0.020473
S	0.032132	0.011263	0.000206	0.000000	0.000000	0.000000	0.049601
SSW	0.019690	0.006781	0.007241	0.000000	0.000000	0.000000	0.033712
SW	0.030422	0.010803	0.009309	0.000000	0.000000	0.000000	0.050535
WSW	0.034161	0.011038	0.006091	0.000000	0.000000	0.000000	0.052090
W	0.017111	0.006206	0.003448	0.000000	0.000000	0.000000	0.027315
WNW	0.005423	0.001954	0.001839	0.000000	0.000000	0.000000	0.009216
W	0.004147	0.001494	0.001494	0.000000	0.000000	0.000000	0.007135
NNW	0.004460	0.001609	0.001379	0.000000	0.000000	0.000000	0.007454
TOTAL	0.292725	0.102172	0.049190	0.000000	0.000000	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF E STABILITY = 0.444087

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH E STABILITY = 0.290312