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USERS GUIDE FOR TDL'S COMPUTER WORDED FORECAST PROGRAM

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1. INTRODUCTION

The Techniques Development Laboratory has produced a computer program which generates public weather forecasts in worded form from digital forecasts of weather elements. This computer worded forecast (CWF) program was designed to be implemented concurrently with the AFOS (Automation of Field Operations and Services) system. One version of the program operates at NMC (National Meteorological Center) on NOAA's large computer system and sends forecasts over the NDC (National Distribution Circuit); another version can be run on the local AFOS minicomputer.

It is the main intent of this paper to provide detail on the selection and combination of phrases which compose the forecast. The input to the program, the options available in its use, its operation in the AFOS environment, and future plans will also be discussed. It is hoped that if the forecaster is familiar with these items, the utilization of the program will be simplified and its effectiveness will be increased.

2. INPUT TO PROGRAM

A. Weather Forecasts

The most important inputs to the CWF program are, of course, the weather forecasts. For the version of CWF which operates at NMC, these weather forecasts are produced by the MOS (Model Output Statistics) technique (Glahn and Lowry, 1972). For the version of CWF which can be run locally on the AFOS minicomputer these weather forecasts are local forecasts or a combination of MOS and local forecasts.

Fig. 1 shows the MOS forecasts in matrix form. These forecasts were made from a 0000 GMT model run. The three forecast periods--today, tonight, and tomorrow--covered by the CWF are indicated, as well as a fourth period--tomorrow night, which is given for additional guidance only. The appropriate GMT valid times are also shown.

Note that for most elements the first valid time, 1200 GMT (Z), is 12 hours after the initial data time for the numerical model. The MOS forecasts partially rely, in some cases, on surface observations 3 hours after 0000 GMT. The forecast elements are explained briefly below. It should also be noted that not all elements given are used as input. A CWF generated from this sample matrix is shown in Fig. 2.

GUIDANCE MATRIX	DCA																	
		VALID TIME																
ELEMENT	UNITS	12Z		18Z		00Z		06Z		12Z		18Z		00Z		06Z		12Z
		(---TODAY---)				(--TONIGHT--)				(-TOMORROW-)				(-TMW NIGHT-)				
TEMP M/M	DEG F			54				39				55				27		
TEMP	DEG F	39	39	46	52	52	49	48	46	46	45	49	51	49	43	39		
POP(12)	PERCENT						22				84				20			0
POP(6)	PERCENT				3		28		82		53		19		6			
POF(P)	PERCENT		2		2		0		0		0		3		8			
POZR(P)	PERCENT		1		0		0		0		0		0		0			
PREC TYP	CATEGORY		3		3		3		3		3		3		3			
QPF	CATEGORY						1				1				1			
SNOW AMT	CATEGORY						0											
R SHR(L)	PERCENT				22				4				64					
DRZL(L)	PERCENT				9				0				35					
RAIN(L)	PERCENT				69				100				2					
TSTM	PERCENT				0				1				0					
CLOUDS	CATEGORY		3		4		4		4		1		1		1			
FOG	PERCENT																	
WIND D/S	DEG MPH	2205		1906		1404		1707		2908		3015		3311				
CIG	CATEGORY		6		6		5		3									
VIS	CATEGORY		6		6		5		4									

Figure 1. Sample forecast matrix.

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 DCA FORECAST FOR WASHINGTON, DC
WEDNESDAY 29 NOV 1978
CLOUDY TODAY WITH A SLIGHT CHANCE OF RAIN IN THE AFTERNOON.  CHILLY
HIGH IN THE MID 50S.  LIGHT AND VARIABLE WINDS.  TONIGHT--RAIN.  LOW
IN THE UPPER 30S.  LIGHT AND VARIABLE WINDS.  THURSDAY--PARTLY CLOUDY
WITH A SLIGHT CHANCE OF SHOWERS IN THE MORNING.  BREEZY IN THE
AFTERNOON.  HIGH IN THE MID 50S.  PROBABILITY OF PRECIPITATION 20
PERCENT TODAY 80 PERCENT TONIGHT AND 20 PERCENT TOMORROW.
```

Figure 2. Example of a three-period forecast prepared by the CWF program from the digital data shown in Fig. 1.

TEMP M/M--The max temperature is given for today and tomorrow, and the min for tonight and tomorrow night. Actually, these forecasts each cover a 24-h period (midnight to midnight, local time); therefore, the first max is not for just the daylight hours. (For details, see Klein and Hammons, 1975.)

TEMP--A specific-time temperature forecast is currently available for projections of 9, 12, ..., 48, and 51 hours. These forecasts help determine the wording concerning temperature. Since the MOS forecast max is for a 24-h period and the local forecasts are usually for a 12-h "daytime" period, adjustment of the MOS forecast max is sometimes made to conform with an expected daytime max.

POP(12)--These are forecasts of the probability of occurrence of $\geq$.01 in of precipitation (liquid equivalent) in each of the 12-h periods. Besides determining, in large part, what wording to use regarding precipitation, they are used in the probability statements, rounded to tens of percent. (For details, see Lowry and Glahn, 1976 and NWS, 1977a.)

POP(6)--Forecasts for each of the two 6-h periods within the first three 12-h periods are given. They help determine changes in precipitation occurrence and cloudiness within the 12-h periods.

POF(P)--Forecasts of the probability of frozen precipitation, given that precipitation occurs, are available for seven specific times--every 6 hours starting with 1200 GMT. (For details, see Glahn and Bocchieri, 1975 and Bocchieri and Glahn, 1976.)

POZR(P)--Forecasts of the probability of freezing rain, given that precipitation occurs, are available for seven specific times--every 6 hours starting with 1200 GMT. (For details, see NWS, 1978a.) This element is not used in composing the CWF.

PREC TYP--Freezing, frozen, and liquid (rain or mixed types) precipitation are given by category numbers 1 through 3, respectively, for each of the first three 12-h periods. (See NWS 1978a for details.) This element is not used in composing the CWF.

QPF--Categorical forecasts of quantitative precipitation are given for each of the first three 12-h periods. Categories 1 through 5 indicate <.25, .25-.49, .50-.99, 1.0-1.99, and $\geq$2.0 inches respectively. Threshold probabilities were determined for each category 2 through 5 for transforming probability forecasts into categorical forecasts in such a way that the threat score is maximized. (See Bermowitz and Zurndorfer, 1979 for details.)

SNOW AMOUNT--A categorical forecast of heavy snow is given for the first 12-h period. Categories 0 and 4 indicate <4 and $\geq$ 4 inches, respectively. (See NWS, 1978b for details.) This element is not used in composing the CWF.

R SHR(L), DRZL(L), and RAIN(L)--These are forecasts of the probability of rain showers, drizzle, and nonshowery rain, respectively, given that liquid precipitation occurs. There is one forecast of each variable valid in the

middle of the first three 12-h periods. These are mutually exclusive and exhaustive categories; therefore, except for roundoff, the sum of the three probabilities equals unity. These forecasts are not disseminated by teletype or facsimile; the technique was developed specifically for input to the CWF's. (See Carter, 1974 and 1975a for details.)

TSTM--The unconditional probability of a thunderstorm occurring at the station sometime during the first three 12-h periods is given. Actually, this predictand was determined from 3-hourly observations and will, therefore, be biased toward low values. This is no real problem for use in the CWF's, since a correspondingly low threshold can be used to determine when thunderstorms will be mentioned. The threshold is quite arbitrary and must be determined by experience. Relatively little effort has gone into producing these thunderstorm forecasts. (See Carter, 1974 and 1975a.)

CLOUDS--Clear, scattered, broken, and overcast sky conditions are given by category numbers 1 through 4, respectively, for each of seven projections. Probabilities of each of these categories are objectively determined (Carter and Glahn, 1976) and the categories are specified from these probabilities as described by Carter (1976).

FOG--no forecasts are currently being made for this element.

WIND D/S--Wind direction to tens of degrees and speed are given in the usual convention for each of seven projections. A separate regression equation is evaluated for speed and for the U and V components. Direction is determined from the components and the regression estimate of speed is inflated. (See Carter, 1975b for details.)

CIG--A specific time forecast for six categories of ceiling height is given for the 12-, 18-, 24- and 30-h projections. Categories 1 thru 6 correspond to a ceiling <200, 200-400, 500-900, 1000-2900, 3000-7500, and >7500 ft, respectively. (See NWS, 1978c for details.) This element is not used in composing the CWF.

VIS--A specific time forecast for six categories of visibility is given for 12-, 18-, 24- and 30-h projections. Categories 1 thru 6 correspond to a visibility <1/2, 1/2-7/8, 1-2 1/2, 3-4, 5-6, and >6 mi, respectively. (See NWS, 1978c for details.) This element is not used in composing the CWF.

B. Climatological Maximum and Minimum Temperature

Climatological max and min temperatures are provided for each station. They are used in determining temperature phraseology.

C. Current Observations

Surface observations of temperature and weather are input to assist in the determination of precipitation type.

D. Station Directory

The station directory lists station names and identifying numbers for which forecasts are to be made.

E. Text Phrases

Nearly all words and phrases used in the CWF program are read from data sets rather than being "built in" to the program; this increases flexibility.

F. Text Composition Information

Information is provided concerning the order of phrases, their punctuation, and how they are to be connected to other phrases. A brief explanation is given in Glahn (1978).

G. Control Information

Control information for each of the weather elements included in the CWF--wind, temperature, cloud, and precipitation--is provided. It specifies, among other things, the maximum complexity of wording to be used for each element and forecast period. This information is explained more fully in later sections.

3. CHARACTERISTICS OF FORECASTS

The main goal in developing the CWF program was that the resulting forecasts would be saleable and operationally useful. Therefore, no major departures from the forecast format currently in use by local forecasters were made. Generally, the NWS operational manuals were followed,[1] although these have been under revision during recent years and, for that reason, could not provide absolute guidance.

To achieve the above goal, the program was designed to allow considerable flexibility in choice of phrases. For instance, one station or NWS Region might desire quite detailed forecasts while another might want considerably abbreviated forecasts. Also, different preferences may prevail as to what constitutes "windy," "very cold," etc.

Even with the desire to allow flexibility by a "user" in specifying control parameters, certain guidelines had to be adopted. Three of these are:

- four basic weather elements would be included--wind, temperature, cloud, and precipitation;
- the forecasts would be segmented by period--today, tonight, and tomorrow--except for very simple forecasts in which periods could be easily combined; and

[1] For instance, NWS (1972), NWS (1977b), and NWS (1978d).

- the most important elements would be put near the beginning of the segment.

It was soon found that each basic weather element had to be treated differently from all the rest. For instance, a change (or lack thereof) in temperature from the previous day is many times mentioned, but seldom is a change in wind from the previous day mentioned. Also, wind statements are based almost solely upon the wind vector itself (given at the beginning, middle, and end of each period) while the precipitation statement is based on POP(12), POP(6), POF, R SHR(L), DRZL(L), RAIN(L), TSTM, QPF, TEMP M/M, and CLOUDS (some given once per period, some twice, and some three times).

The following sections describe in some detail how the phrases are selected. Even this description may leave questions that only a detailed flow diagram of the computer program could answer.

4. PHRASE SELECTION

The following sections describe the selection of the four major phrases--wind, temperature, cloud, and precipitation. Appendix I, containing the control constants, and Appendix II, listing all the text phrases, will be helpful references.

A. Wind Phrases

In general, wind phrases are complete sentences into which a speed(s) and/or direction(s) may be inserted. Fig. 3 describes the selection of wind phrases. The phrases are for the first (or today) period. Appropriate changes are made to adapt them to the second or third period. The selection of a wind phrase is dependent upon wind speed and direction, max/min temperature, wind complexity constants, and eleven wind control constants (see Appendix I).

For each period, there are three forecasted wind speeds. There is some overlap between periods. For example, the "end of period" wind speed for the today period (24-h projection) is the "beginning of period" wind speed for the tonight period. The wind values that are used in the selection of wind phrases are designated S1, S2, and S3 for the beginning, middle and end of period wind speed. S1, S2, and S3 are, for the most part, the actual forecasted values from the guidance matrix for that particular period. In some cases, however, it is desirable to filter (smooth) some or all of these wind speeds. Fig. 4 outlines these cases.

As with wind speeds, there are three forecasted wind directions for each period with the same overlap as described in wind speeds. The wind directions that are used in the selection of wind phrases are designated as D1, D2, and D3 for the beginning, middle and end of period wind direction. These are unrounded values, and in most cases it is the differences between wind directions from one part of a period to another that influences the selection of the wind phrase.

Text segment	S1	S2	S3	Other Criteria	Phrase
.	>19	>19	≤19	IW=2; S1>S2	Strong D1 winds S1 mph, diminishing to S3 mph by evening.
4	>19	>19	≤19	IW=2; S2>S1	Strong D2 winds S2 mph, diminishing to S3 mph by evening.
4	>19	≤19	≤19	IW=2	Strong D1 winds S1 mph, diminishing to S3 mph by evening.
1	>19		>19	IW=1; |D1-D3|>60°; |S1-S3|>10 mph	Strong D1 winds S1 mph, becoming D3 S3 mph by evening.
2	>19		>19	IW=1; |D1-D3|>60°; |S1-S3|≤10 mph	Strong D1 winds S1 mph, shifting to D3 by evening.
3	>19		>19	IW=1 or IW=2; |D1-D3|≤60°	Strong D1D3 winds [minimum of (S1, S2, S3)] to [maximum of (S1, S2, S3)] mph.
19	>19		>19	IW=3	Windy.
20	>19		≤19	IW=3	Windy.
4	>19		≤19	IW=1; |D1-D3|≤60°	Strong D1D3 winds S1 mph, diminishing to S3 mph by evening.
5	>19		≤19	IW=1; |D1-D3|>60°	Strong D1 winds S1 mph, shifting to D3 S3 mph by evening.
19	<19	>19	≤19	IW=3	Windy.
8	≤19	>19	≤19	IW=1 or IW=2	Strong D2 winds S2 mph by midday.
6	≤19	≤19	>19	IW=2	Strong D3 winds S3 mph developing by evening.
21	≤19		>19	IW=3	Windy.
9	13-19	≤19	13-19	IW=1 or IW=2; |D1-D3|≤60°	D1D3 winds S1S3 mph.
10	13-19	≤19	13-19	|D1-D3|>60°; TEMP<50°F; J=1 or J=3	Winds S1S3 mph.
10	13-19	≤19	13-19	|D1-D3|>60°; TEMP<40°F; J=2	Winds S1S3 mph
10	13-19	≤19	13-19	IW=3; TEMP≤50°F; J=1 or J=3	Winds S1S3 mph.
10	13-19	≤19	13-19	IW=3; J=2; TEMP<40°F	Winds S1S3 mph.
12	13-19	≤19	≤12	IW=3; J=1 or J=3; TEMP≤50°	Winds S1S2 mph in the morning, diminishing by evening.
12	13-19	≤19	≤12	IW=3; J=2; TEMP<40°F	Winds S1S2 mph in the morning, diminishing by evening.
12	13-19	13-19	≤12	|D1-D2|>60°; TEMP≤50°F; J=1 or J=2	Winds S1S2 mph in the morning, diminishing by evening.
12	13-19	13-19	≤12	|D1-D2|>60°; TEMP≤40°F; J=2	Winds S1S2 mph in the morning, diminishing by evening.
9	13-19	13-19	8-12	IW=1 or IW=2; |D1-D2|≤60°	D1D2 winds S1S2 mph.
11	13-19	13-19	≤7	|D1-D2|≤60°	D1D2 winds S1 to S2 mph in the morning, diminishing by evening.
10	13-19	≤12	8-12	IW=1 or IW=2; |D1-D3|>60°	Winds S3 to S1 mph.
9	13-19	≤12	8-12	IW=1 or IW=2; |D1-D3|≤60°	D1D3 winds S3 to S1 mph
11	13-19	≤12	≤7	IW=1 or IW=2	D1 winds S1 to S2 mph in the morning, diminishing by evening.
7	8-19	>19	>19	IW=1	D1 winds S1 mph becoming strong S2 mph with gusts to __ by evening.
7	8-19	≤19	>19	IW=1	D1 winds S1 mph becoming strong S3 mph with gusts to __ by evening.
9	8-12	≤12	13-19	|D1-D3|≤60°	D1D3 winds S1 to S3 mph.
10	8-12	≤12	13-19	|D1-D3|>60°	Winds S1 to S3 mph.
15	8-12	≤12	8-12	|D1-D2|≤60°; |D1-D3|≤60°; |D2-D3|≤60°	Light D1D3 winds.
16	8-12	≤12	8-12	|D1-D2|>60° or |D1-D3|>60° or |D2-D3|>60°	Light winds.
24	8-12	≤12	8-12	IW=1 or IW=2; |D1-D3|>60°; J=1 or J=3; TEMP≥50°F	Breezy.
24	8-12	≤12	8-12	IW=1 or IW=2; |D1-D3|>60°; J=2; TEMP≥40°	Breezy.
16	8-12	8-12	8-12	IW=3	Light winds.
16	8-12	8-12	≤7	|D1-D2|>60°	Light winds.
15	8-12	8-12	≤7	|D1-D2|≤60°	Light D1D2 winds.
16	8-12	≤7	≤7	|D1-D2|>60°; |D1-D3|>60°	Light winds.
15	8-12	≤7	≤7	|D1-D2|≤60°; |D1-D3|≤60°	Light D1 winds.
13	≤12	13-19	13-19	IW=1 or IW=2; |D2-D3|≤60°	D2D3 winds S2 to S3 mph in the afternoon.
13	≤12	13-19	≤12	|S1-S3|<4 mph; |S3-S1|≥4 mph	D2 winds S2 to S3 mph in the afternoon
11	≤12	13-19	≤12	|S1-S3|≥4 mph	D2 winds S1 to S2 mph in the morning, diminishing by evening.
9	≤12	13-19	≤12	IW=1 or IW=2; |S1-S3|<4 mph; |S3-S1|<4 mph; S1<S3	D2 winds S1 to S2 mph.
9	≤12	13-19	≤12	IW=1 or IW=2; |S1-S3|<4 mph; |S3-S1|<4 mph; S1<S3	D2 winds S3 to S2 mph.
14	≤12	≤19	13-19	|D2-D3|>60°; IW=1 or IW=2; J=1 or J=3; TEMP<50°F	Winds S2 to S3 mph in the afternoon.
14	≤12	≤19	13-19	|D2-D3|>60°; IW=1 or IW=2; J=2; TEMP<40°F	Winds S2 to S3 mph in the afternoon.
6	≤7	>19	>19	IW=1	Strong D2 winds S2 mph developing by evening.
15	≤7	8-12	8-12	|D2-D3|≤60°	Light D2D3 winds.
16	≤7	8-12	8-12	|D2-D3|>60°	Light winds.
15	≤7	8-12	≤7	|D1-D2|≤60°; |D1-D3|≤60°	Light D1 winds.
16	≤7	8-12	≤7	|D1-D2|>60° or |D2-D3|>60°; IW=1 or IW=2	Light winds.
13	≤7	≤12	13-19		D3 winds S3 mph in the afternoon.
15	≤7	≤7	8-12	|D2-D3|≤60°; |D1-D3|≤60°	Light D3 winds.
17	≤7	≤7	≤7	S1>3 mph or S2>3 mph or S3>3 mph	Light and variable winds.
22	≤3	≤3	≤3		Very light winds.

Figure 3. Wind phrases as a function of the three wind speeds per period--S1, S2, and S3--and the three wind directions per period--D1, D2, and D3. J refers to the forecast period--1, 2, or 3 for today, tonight, and tomorrow, respectively. IW refers to the wind phrase complexity per period--1, 2, or 3 for complex, intermediate, or simple phrases, respectively. A bar over two speeds or directions (e.g., S1S3) indicates an average of those terms.

|S1-S2| < LW2	|S2-S3| < LW2	|S1-S3| < LW2	Smoothing
0	0	0	none
0	0	1	none
0	1	0	average S2 and S3
0	1	1	average S2 and S3
1	0	0	average S1 and S2
1	0	1	average S1 and S2
1	1	0	none
1	1	1	average S1, S2 and S3

Figure 4. Wind Speed Smoothing.
Smoothing is performed in order to keep small changes in forecast wind speeds during a forecast period from unduly influencing phrase selection. S1, S2, and S3 are, respectively, the wind speeds at the beginning, middle, and end of the forecast period. A "1" means the condition specified at the top of the column is satisfied; a "0" means it is not satisfied. LW2 currently has a value of 5 mph.

Some of the simpler wind text statements require no insertions. For example, text statement 24 (see Appendix II) is "Breezy." However, some statements require insertion of a direction and/or a speed(s) or possibly even a range of speeds. All speeds are rounded to the nearest 5 mph. If an average of speeds is to be inserted, the speeds are averaged first and then rounded. When winds are "strong" the word "gusty" is sometimes inserted and a range of speed indicated such that the lower value is the filtered value and the upper value nearly 1 1/2 times that value.[2] Wind directions are converted to the nearest eight points of the compass.

Text statements 9 thru 14 have the option of including a range of speeds. Wind control constant LW10 together with a random number determines if a range of speeds is to be used. LW10 set equal to 100 (0) indicates always (never) to use a range.

(a) If a range is not desired, a range will be used only occasionally and then when the smoothed speeds indicate it.

(b) If a range is desired, the wind control constant LW11 specifies more information.

(1) LW11 = 0 Use range given by unsmoothed speeds. May occasionally be a single value.

(2) LW11 = 1 Use range of 5 or more if unsmoothed speeds specify such. The range is found by adding 5 to the max value of the speeds.

(3) LW11 = 2 The same as 2 above except the range is determined by subtracting 5 from the min of the speeds.

(4) LW11 = 3 The same as 2 and 3 above except the range is determined by adjusting both ends of the speed values.

(5) LW11 = 4 The same as 4 above except use a range of 5 about 60% of the time and a range of 10 about 40% of the time.

(6) LW11 = 5 The same as 4 above except use a range of 10.

B. Temperature

Temperature information is inserted in two parts--a descriptor, such as "unusually cool" or "little change in temperature," and a statement such as "high in the low 90's." The latter, a categorization of the digital temperature forecasts, is always included for each of the three periods, but the descriptor is sometimes omitted.

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[2]The actual upper value G, before rounding, is computed from the filtered value S and the equation suggested by Tattleman (1975) $G = S(1. + 0.6 \exp(-.011S))$.

Control information for temperature descriptor selection includes a complexity for each period of 1, 2, or 3 and 17 constants LT1, LT2, LT4 through LT17, and LT19. These control constants are explained in Appendix I. Fig. 5 shows all of the max temperature descriptor phrases and how they would be selected as a function of forecast temperature, departure from normal, and change from the day before. The categories are actually determined by the LT constants as shown--the numerical values indicate what these control values are at the present time. This is really a three-dimensional matrix with the third dimension represented by the six phrases in each box corresponding to the key in the lower right corner. The number preceding each phrase is a phrase number, and the three columns of numbers correspond to complexities 1, 2, and 3, respectively. The presence (absence) of a phrase number in a column indicates that the phrase would be used (would not be used) for that complexity. For instance, for a forecast temperature of 70°F, a departure from normal of -8°F, and a change from yesterday of 2°F, "cool" would be used for complexity 1, but no descriptor would be used for complexities 2 and 3. Some combinations have no descriptor defined.

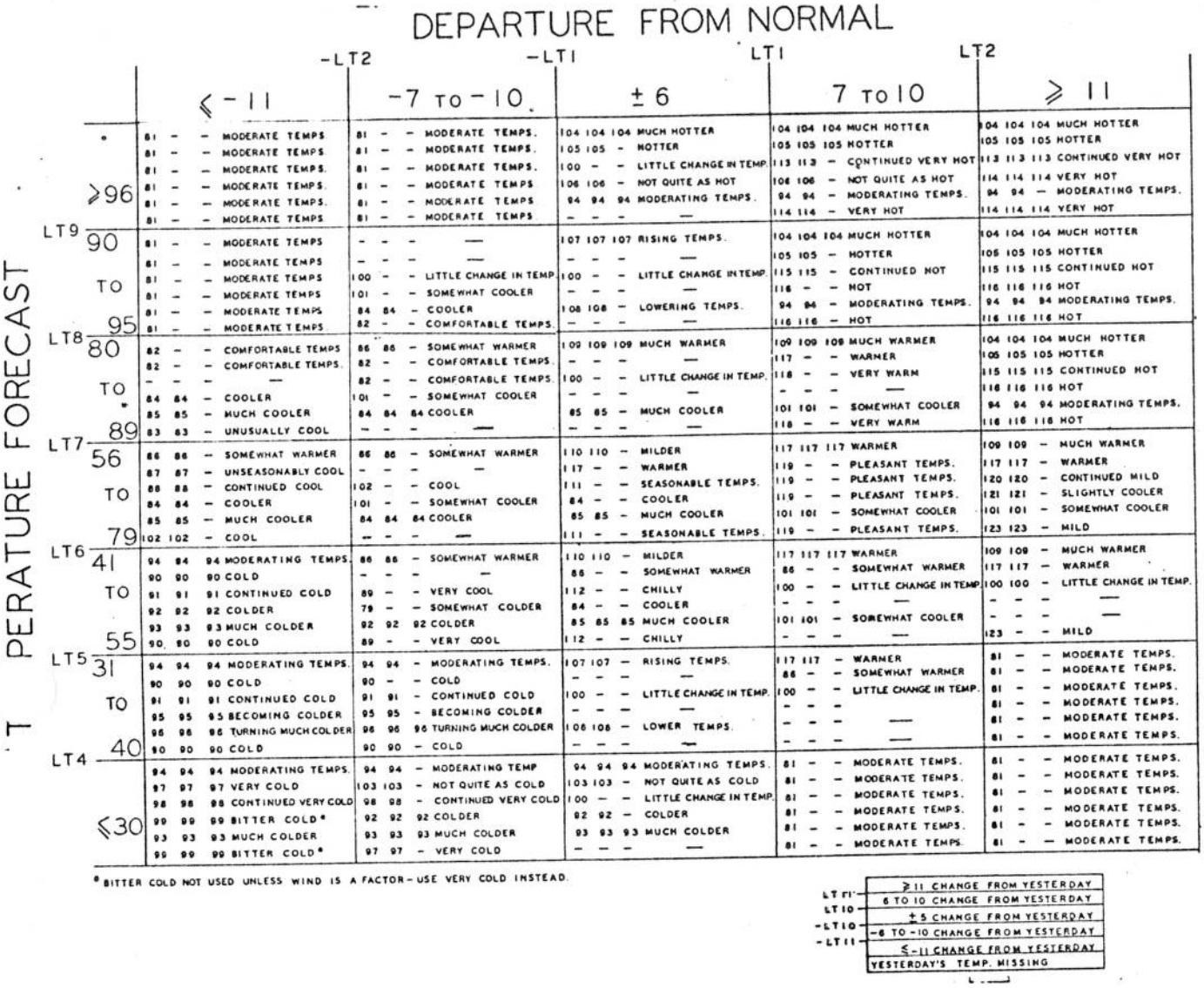
The two-dimensional matrix in Fig. 6 performs the same function for min temperature as the three-dimensional matrix does in Fig. 5 for max temperature. Note that the min temperature phrases and their selection are very simple compared to max temperature.

The digital temperature forecasts are generally presented in four categories--for instance, low 60's (61-63°F), mid 60's (64-66°F), upper 60's (67-69°F), and near 70 (70°F). Departures from this categorization are made for forecasts below 20°F and above 100°F.

Not infrequently, the 3-hourly temperature forecasts indicate the max will not occur in the afternoon. For instance, a warming trend may be indicated by a higher forecast temperature at a projection of 27 or 30 hours than at any other time. Or, a cold frontal passage may be indicated by a higher forecast temperature at 0900 or 1200 GMT than at any later time. Nine different temperature "traces" have been identified. The definitions of these traces and wording that is chosen based on these traces are given in Fig. 7.

C. Cloud Phrases

The selection of cloud phrases is dependent upon the forecast cloud amount at the beginning, middle, and end of the period; the cloud phrase complexity constants; and the period itself. For the cloud amounts, there is some overlap between periods. For example, the "end of period" cloud amount for today (24-h projection) is the "beginning of period" cloud amount for tonight. Cloud amounts are forecast in categories. Categories one through four correspond to clear, scattered, broken, and overcast, respectively. The cloud phrase complexity constants range in value from one through three, where one specifies the most complex wording and three the simplest. Appendix III describes the selection of the cloud phrases and the consistency checks that are made from period to period.



* BITTER COLD NOT USED UNLESS WIND IS A FACTOR - USE VERY COLD INSTEAD.

Figure 5. Maximum temperature descriptors indicated as a function of forecast temperature, departure from normal, and change from the day before. All temperatures are in °F.

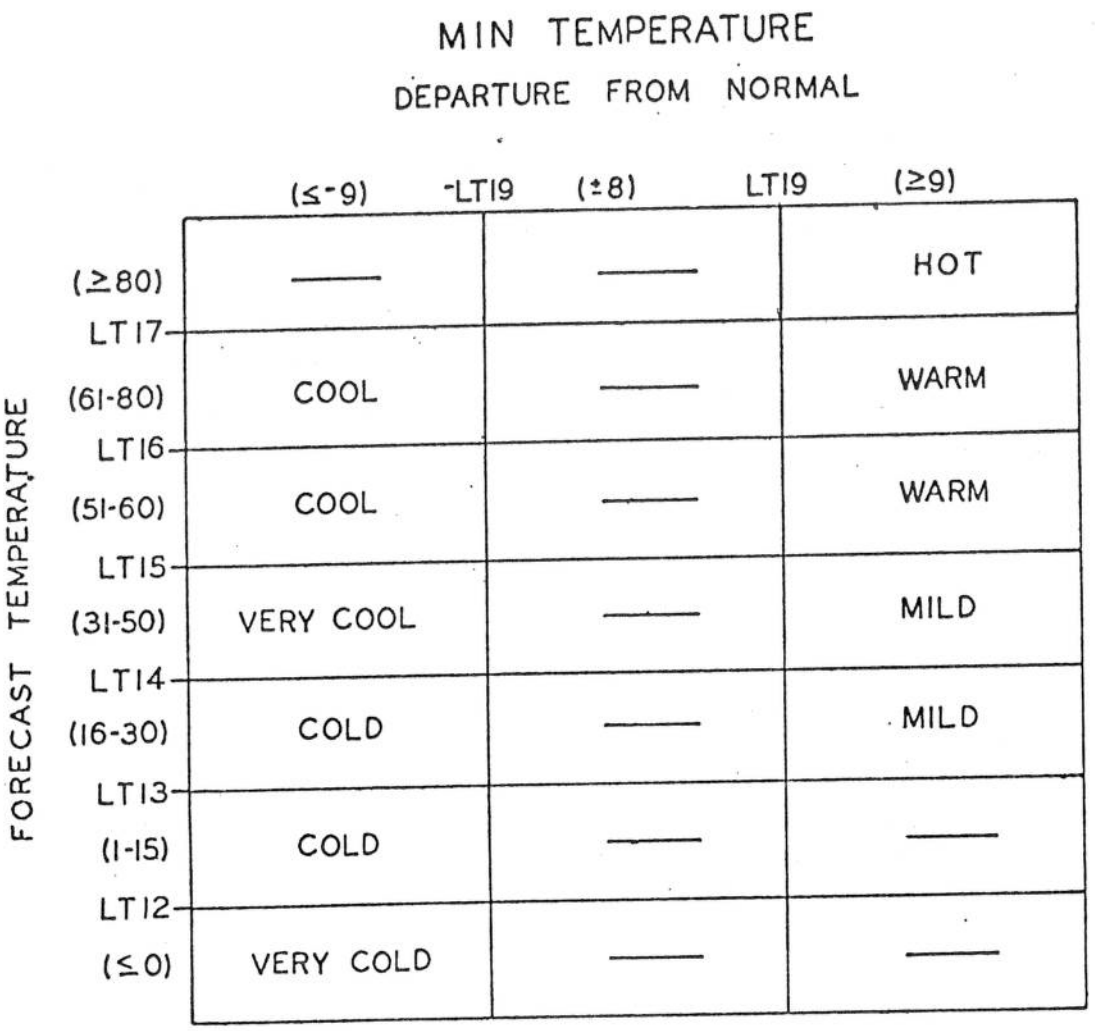


Figure 6. Minimum temperature descriptors indicated as a function of forecast temperature and departure from normal.

T.	Max 3 Hourly Temperature	Other Criteria	Temperature Value in Phrase	Phrase
1	27 or 30Z (30Z central and pacific)	--	the lesser of (- max of 3 Hourly at 15, 18, 21 or 24Z (18, 21, 24, or 27Z pacific) plus 3 degrees or - 24 hour max)	"Daytime high ..."
2	12Z (15Z pacific)	Var* ≥ 5.0	3 hourly temp at 12Z (15Z pacific)	"Early morning high ... "
3	12Z (15Z pacific)	Var* ≥ 5.0 3 Hourly 12Z-3 Hourly 21Z (15 and 24Z pacific) ≥ 8 degrees	3 hourly temp at 12Z (15Z pacific)	"Early morning high ..., becoming cooler during the day."**
4	12Z (15Z pacific)	Var* ≥ 5.0 3 Hourly 12Z-3 Hourly 21Z (15 and 24Z pacific) ≥ 15 degrees	3 hourly temp at 12Z (15Z pacific)	"Early morning high ... , becoming much cooler during the day."**
5	15Z (18Z pacific)	Var* ≥ 5.0	3 hourly temp at 15Z (18Z pacific) plus 2 degrees	"Morning high ... "
6	15Z (18Z pacific)	Var* ≥ 5.0 3 Hourly 15Z-3 Hourly 21Z (18 and 24Z pacific) ≥ 8 degrees	3 hourly temp at 15Z (18Z pacific) plus 2 degrees	"Morning high ... , turning cooler in the afternoon."**
7	15Z (18Z pacific)	Var* ≥ 5.0 3 Hourly 15Z-3 Hourly 21Z (18 and 24Z pacific) ≥ 15 degrees	3 hourly temp at 15Z (18Z pacific) plus 2 degrees	"Morning high ... , turning much cooler in the afternoon."**
8	18, 21 or 24Z (21, 24 or 27Z pacific)	24 hr max-3 Hourly at 24Z (27Z pacific) ≥ 10 degrees and wind shift from beginning to end of period ≥ 60° and the wind direction at end ≥ 270° and todays 24 Hour max-tomorrows 24 Hour max ≥ 8° or today's 24 Hour max-tomorrows 24 hour max ≥ 15 degrees and Var* ≥ 5.0	24 hour max	"..., turning cooler in the late afternoon."**
9	18, 21 or 24Z (21, 24 or 27Z pacific)	as 8 above except the difference of the 24 hour max and the 3 Hourly at 24Z (27Z pacific) ≥ 17 degrees	24 hour max	"..., turning much cooler in the late afternoon."**

Figure 7. 3-hourly temperature traces.
*Var - variance of the first eight (9Z-30Z) 3-hourly temperatures.
**If the 3-hourly temp at 24Z Pacific) is less than LT6 (56), "cooler" is changed to "colder."

D. Precipitation Phrases

Phrase selection for precipitation is more complicated than for the other three elements. It depends on 10 of the 18 variables appearing in the forecast matrix in Fig. 1.

Precipitation phrases can have three parts. One is a qualifier; if it is "chance of" for instance, it will be first; if it is "likely," it will be second. Another part, which can also be first or second, is the precip descriptor, such as "snow" or "showers." The third part, if there is one, is always a time definition such as "in the morning." Besides these basic two-or-three-part phrases, there are also lengthy phrases describing intraperiod changes which are complete within themselves except that the qualifier must be inserted. An example with the qualifier "likely" inserted, is "snow likely in the afternoon turning to rain before evening."

Control information for precip phrase selection includes a complexity for each period of 1, 2, or 3 and 23 control constants, LP1 through LP23. These constants are explained in Appendix I. The selection of precip phrase parts is discussed in the following sections. A number in parentheses following the precip phrase is the phrase number. These numbers correspond to the phrase numbers in Appendix II. The number in parentheses following a constant is the present value of that constant. It should be noted that no precip phrase will be used if 1) the 12-h POP is less than 10 percent or 2) if the 12-h POP is less than LP1(20) and the TSTM is less than LP5(10).

Fig. 8 shows the flow for the selection and combination of precip phrase parts. The different steps in this process are discussed in the following paragraphs.

a. Fig. 9 shows the criteria for determining the appropriate precipitation qualifier. Basically the qualifier is dependent upon the 12-h PoP for the period.

b. The precip descriptor is dependent upon the POF at the beginning, middle, and end of the period; the forecasted max/min temperature; and the forecasted precip for the period. The definitions of these categories are given in Figs. 10, 11, and 12 for POF, temperature, and precip, respectively.

c. Based on the categories determined in b above, the code or phrase number is located in the precip matrices in Fig. 13. Each of these matrices is really three-dimensional matrix with the third dimension represented by the three rows of numbers in each box corresponding to the key in the lower right corner. Numbers greater than 8 are phrase numbers (see Appendix II) and numbers 1 thru 8 are codes which are described in Fig. 14. The three columns of numbers in Fig. 13 correspond to the first, second, and third period, respectively. For instance, if precip was indicated for all of the period, the temperature was in the low range, and if the POF categories were determined to be high, middle, and low for the beginning, middle, and

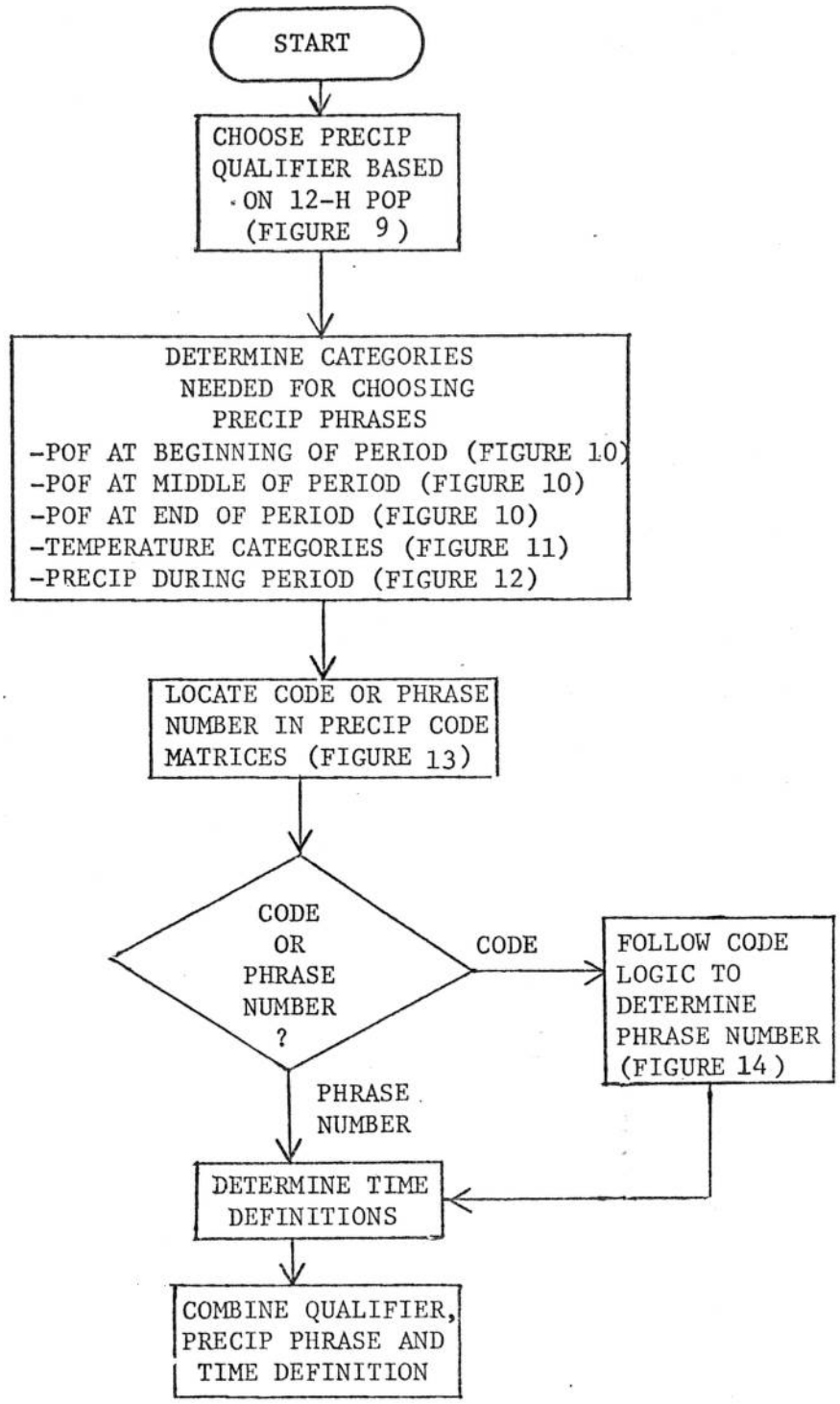


Figure 8. Flow diragram for the selection and combination of precipitation phrase parts.

Criteria	Qualifier
LP1(20) > 12-h POP $\geq$ 10% and TSTM $\geq$ LP5(10)	"slight chance of" (#140)
LP2(25) > 12-h POP $\geq$ LP1(20)	"slight chance of" (#140)
LP3(55) > 12-h POP $\geq$ LP2(25)	"chance of" (#142)
LP4(75) > 12-h POP $\geq$ LP3(55)	"likely" (#143)
12-h POP $\geq$ LP4(75)	no qualifier used

Figure 9. Precipitation qualifiers.

High	POF > LP7(65)
Middle	LP7(65) $\geq$ POF $\geq$ LP9(35)
Low	LP9(35) > POF

Figure 10. POF ranges.

Low	J=1, P = Beg, $TEMP_c$ < LP12(27)
Low	J=1, P $\neq$ Beg, TEMP < LP15(34)
Low	J=3, TEMP < LP14 (34)
High	If none of the above conditions are satisfied.

Figure 11. Temperature categories (TC) are defined by the portion of period in which precip is specified (P) (see Fig. 12), the current temperature ($TEMP_c$), the max/min temperature (TEMP), and the forecast period (J).

rtion of Period	Criteria
Beginning	6-h POP_2< LP17(10); (6-h POP_1-6-h POP_2) >LP18(25)
Beginning	6-h $POP_1 \geq$12% or 6-h $POP_2 \geq$ 12%; 6-h $POP_2 \leq$ 1/2 6-h POP_1; 6-h $POP_2 \leq$ 1/2 12-h POP; $C_1 \geq 3$; $C_1 > C_3$
Beginning	6-h $POP_1 \geq$ 12% or 6-h $POP_2 \geq$12%; J=1; 6-h POP_2 <20%; (6-h POP_1 - 6-h POP_2) > LP18(25); 12-h POP_1 > 12-h POP_2
Beginning	6-h $POP_1 \geq$ 12% or 6-h $POP_2 \geq$ 12%; 6-h $POP_2 \leq$ 1/3 12-h POP; 6-h $POP_2 \leq$ 1/3 6-h POP_1; $C_1 > C_3$
Beginning	6-h $POP_1 \geq$ 12% or 6-h $POP_2 \geq$ 12%; J=2; 6-h POP_2 < 20%; (6-h POP_1 -6-h POP_2) > LP18(25); 12-h POP_1 > 12-h POP_2; 12-h POP_2 > 12-h POP_3
Beginning	6-h $POP_1 \geq$ 12% or 6-h $POP_2 \geq$12%; J=3; 6-h POP_2 < 20% (6-h POP_1 - 6-h POP_2) > LP18(25); 12-h POP_2 > 12-h POP_3
Beginning	6-h $POP_1 \geq$ 12% or 6-h $POP_2 \geq$ 12%; cloud phrase is "clearing" (#51); 6-h POP_2 = (6-h POP_1 - 5%); 6-h POP_2 < 25
End	6-h POP_1 <LP17(10); (6-h POP_2 - 6-h POP_1) >LP18(25)
End	6-h $POP_1 \geq$ 12% or 6-h $POP_2 \geq$ 12%; 6-h $POP_1 \leq$ 1/2 12-h POP; 6-h $POP_1 \leq$ 1/2 6-h POP_2; $C_3 \geq 3$; $C_3 > C_1$
End	6-h $POP_1 \geq$ 12% or 6-h POP_2 >12%; 6-h $POP_1 \leq$ 1/3 12-h POP; 6-h $POP_1 \leq$ 1/3 12-h POP_2; $C_3 > C_1$
End	6-h $POP_1 \geq$ 12% or 6-h $POP_2 \geq$ 12%; J=1; 6-h POP_1 <20% (6-h POP_2 - 6-h POP_1) > LP18(25); 12-h POP_2 > 12-h POP_1
End	6-h $POP_1 \geq$ 12% or 6-h $POP_2 \geq$ 12%; J=2; 6-h POP_1 <20% (6-h POP_2 - 6-h POP_1) > LP18(25); 12-h POP_3 > 12-H POP_2; 12-h POP_2 > 12-h POP_1
End	6-h $POP_1 \geq$ 12% or 6-h $POP_2 \geq$ 12%; J=3; 6-h POP_1 <20%; (6-h POP_2 - 6-h POP_1) > LP18(25); 12-h POP_3 > 12-h POP_2

Figure 12. The portion of the period in which precipitation is specified (P). If none of the above sets of criteria to place the precip at the beginning or end of the period is met, it is assumed to be all the period. C1, C2, and C3 refer to the forecast cloud amount at the beginning, middle, and end of period, respectively. J refers to the forecast period--1, 2, or 3 for today, tonight or tomorrow, respectively. 6-h POP_1 and 6-h POP_2 refer to the first and second 6-h POP of the period respectively. 12-h POP_1, 12-h POP_2, 12-h POP_3 refer to the 12-h POP for the first, second, and third period, respectively.

Precipitation indicated at beginning of period.
Temperature in the high range.

PoF at Middle of Period	PoF at Beginning of Period: High			Middle			Low		
High	1	1	1	2	2	2	5	5	5
	1	1	1	2	2	2	5	5	5
	1	1	1	2	2	2	5	5	5
Middle	1	1	1	2	2	2	4	4	4
	1	1	1	2	2	2	4	4	4
	1	1	1	2	2	2	4	4	4
Low	7	7	7	2	2	2	4	4	4
	7	7	7	2	2	2	4	4	4
	7	7	7	2	2	2	4	4	4

Precipitation indicated at beginning of period.
Temperature in the low range.

PoF at Middle of Period	PoF at Beginning of Period: High			Middle			Low		
High	1	1	1	2	2	2	8	8	8
	1	1	1	2	2	2	8	8	8
	1	1	1	2	2	2	8	8	8
Middle	1	1	1	2	2	2	4	4	4
	1	1	1	2	2	2	4	4	4
	1	1	1	2	2	2	4	4	4
Low	6	6	6	2	2	2	4	4	4
	6	6	6	2	2	2	4	4	4
	6	6	6	2	2	2	4	4	4

Precipitation indicated at end of period.
Temperature in the high range.

PoF	PoF at Beginning of Period: High			Middle			Low		
High	1	1	1	1	1	1	1	1	1
	2	2	2	2	2	2	2	2	2
	170	170	170	170	170	170	170	170	170
Middle	2	2	2	2	2	2	171	321	177
	2	2	2	2	2	2	2	2	2
	171	315	171	2	315	2	2	2	2
Low	173	317	173	173	317	173	173	317	173
	175	319	175	175	319	175	175	319	175
	4	4	4	4	4	4	4	4	4

Precipitation indicated at the end of the period.
Temperature in the low range.

PoF	PoF at Beginning of Period: High			Middle			Low		
High	1	1	1	1	1	1	1	1	1
	2	2	2	2	2	2	2	2	2
	169	169	169	169	169	169	169	169	169
Middle	2	2	2	2	2	2	176	320	176
	2	2	2	2	2	2	2	2	2
	2	2	2	2	2	2	2	2	2
Low	172	316	172	172	316	172	172	316	172
	174	318	174	174	318	174	174	318	174
	3	3	3	3	3	3	3	3	3

Precipitation indicated for all of period.
Temperature in the high range.

PoF at Middle of Period	PoF at Beginning of Period: High			Middle			Low		
High	1	1	1	1	1	1	191	311	216
	199	301	218	2	2	2	191	311	216
	193	303	220	193	303	220	2	2	2
Middle	1	1	1	189	2	2	187	309	214
	181	305	222	2	2	2	183	2	2
	193	303	220	197	2	2	4	4	4
Low	2	2	2	187	309	214	187	309	214
	195	307	224	2	2	2	185	4	4
	194	307	224	4	4	4	4	4	4

Precipitation indicated for all of period.
Temperature in the low range.

PoF at Middle of Period	PoF at Beginning of Period: High			Middle			Low		
High	1	1	1	1	1	1	190	310	215
	198	300	217	2	2	2	190	310	215
	192	302	219	192	302	219	2	2	2
Middle	1	1	1	188	2	2	186	308	213
	180	304	221	2	2	2	182	2	2
	192	302	219	196	2	2	3	3	3
Low	2	2	2	186	308	213	186	308	213
	194	306	223	2	2	2	184	3	3
	194	306	223	3	3	3	3	3	3

High PoF at end of period
Middle PoF at end of period
Low PoF at end of period

Figure 13. Precipitation codes (numbers 1 through 8) or phrase numbers given for the first, second, and third period, respectively.

Code Number	Criteria	Phrase
1	$\overline{POF_P}$ < LP6 (50)	"wet snow" (#145)
	J=1; P≠END; CW=L	"wet snow" (#145)
	if the above criteria are not met	"snow" (#144)
2	TC=HIGH	"snow, sleet, or freezing rain" (#150)
	TC=LOW; POF_P < LP8 (50)	"rain or rain mixed with snow" (#149) or "rain or rain and snow mixed" (#148)
	TC=LOW; $POF_P \geq$ LP8 (50)	"snow or snow mixed with rain" (#147) or "snow or snow and rain mixed" (#146)
3	J=1; P=END; CW=L	"sleet or freezing rain" (#212)
	J=1; P≠END; CW=L; DRZL≥ R SHR; DRZL ≥ RAIN; DRZL ≥ LP10 (40); 12-h $\overline{POP} \geq$ LP10 (40)	"drizzle" (#151
	J=1; P≠END; CW=L; DRZL< R SHR; DRZL<RAIN; DRZL<LP10 (40); R SHR < RAIN; 12-h POP < LP10 (40); and if TSTM > LP16 (10)	"rain" (#153) "rain and thunderstorms" (#158)
	J=1; P≠END; CW=L; DRZL < R SHR; DRZL < RAIN; DRZL < LP10 (40); 12-h POP < LP10; R SHR > RAIN; and if TSTM > LP16 (10)	"showers" (#152) "showers and thunderstorms" (#157)
4	DRZL ≥ RAIN; DRZL > R SHR; DRZL ≥ LP10 (40); 12-h POP ≥ LP10 (40)	"drizzle" (#151)
	RAIN ≥ R SHR and if TSTM > LP16 (10)	"rain" (#153) "rain and thunderstorms" (#158)
	R SHR > RAIN and if TSTM > LP16 (10)	"showers" (#152) "showers and thunderstorms" (#157)
5	J=1; P≠END; CW=S or R and S	"wet snow" (#145)
	if the above criteria are not met	"rain turning to snow" (#206)
6	J=1; P=END; CW=ZR	"sleet or freezing rain" (#212)
	J=1; P≠END; CW=L	use the logic under code 4
	if the above criteria are not met	"snow changing to sleet or freezing rain" (#210)
7	J=1; P≠END; CW=L	use the logic under code 4
	if the above criteria are not met	"snow changing to rain" (#211)
8	J=1; P≠END; CW=S or R and S	use the logic under code 1
	if the above criteria are not met	"sleet or freezing rain turning to snow" (#207)

Figure 14. Description of precipitation codes. J refers to forecast period--1, 2, or 3 for today, tonight, or tomorrow, respectively. P refers to the portion of the period in which precip is indicated--beginning, all, or end. CW refers to the weather field from the hourly observation--L, S, S and R, and ZR for liquid, snow, snow and rain mixed, and freezing rain respectively. $\overline{POF_P}$ refers to the average of the POF's for the portion of the period in which precip is specified. For example, if the precip is indicated at the end of the period (P=END) then POF_P would be the average of the second and third POF's for the period. TC refers to the temperature category (see Fig. 11).

end of period, respectively, the phrase numbers would be 192, 302, and 219 for the first, second, and third period, respectively. Locating these phrase numbers in Appendix II, the phrases are as follows.

First Period

"Snow ... today ... changing to sleet or freezing rain during the afternoon." (#192)

Second Period

"Snow ... turning to sleet or freezing rain after midnight." (#302)

Third Period

"Snow ... turning to sleet or freezing rain during the afternoon." (#219)

d. The selection of the precip descriptor based on the precip codes 1 thru 8 is described in Fig. 14.

e. Time definition for precip phrases depends upon the period and the portion of the period in which precip is expected to occur. The appropriate phrases are chosen from the list below. If the precip phrase complexity for the period is 3, no time definition will be used.

"in the afternoon" (#159)
"in the morning" (#160)
"after midnight" (#161)
"before midnight" (#162)

f. In the more complex precip phrases, only the qualifier needs to be inserted, since intraperiod changes are included. For the basic two or three part phrases, the combination of the qualifier, descriptor, and time definition is determined by the type of phrase.

5. THE FORECASTER AND CWF IN AFOS

For nearly 10 years, the Techniques Development Laboratory has been experimenting with producing public weather forecasts in worded form by computer. These computer worded forecasts have been available to some WSFO's (Weather Service Forecast Offices) for a limited number of stations via the KCRT system for the past several years. However, the AFOS system with adequate computer, display, and communications capability, allows the full implementation of the CWF.

In the AFOS network, each WSFO will receive a CWF and a digital guidance matrix (Fig. 1) for each station in its area of responsibility for which MOS forecasts are made. These products will be produced centrally on the IBM

360/195 at NMC. They will be sent via the NDC and will be available to the public forecaster before the issue time of the early morning forecast.

When MOS forecasts are not available for a particular station and for zones, interpolation will be made from two to four stations for which MOS forecasts are available. Both a CWF and the digital forecast matrix will be transmitted.

A version of the CWF program will also be available for use on the local minicomputer. This will allow four options for the use (or nonuse) of the CWF at the WSFO:

a. Complete Acceptance

If the forecaster is satisfied with both the wording and the digital values in the CWF, he can disseminate the CWF with little more than the push of a button.

b. Minor Revision

If the forecaster wants to make minor changes to the wording or numerical values, that can be done with the text-editing capability of the AFOS equipment.

c. Major Revision

If the forecaster wants to make considerable revision of the digital forecasts, he can do so on the AFOS KCRT and then initiate the CWF program on the local mini. Wording will then be generated which conforms to the amended digital forecast. Options a, b, and d are then available for this locally-produced CWF.

d. Total Disregard

This option is always open.

The CWF application may be tailored to a station's needs or desires by adjustment of both the control constants and the phrase complexity constants for each weather element. For example, one station may want to define a temperature below 10°F as "very cold" while another would not consider a temperature as "very cold" unless it were below 5°F. Adjustment of the temperature control constants would allow this flexibility. Changes such as these would not be made frequently. It is planned that initially each station would receive the assigned values for these constants listed in Appendix I. After a period of time using the CWF program, an update of these constants would be made for all stations desiring it. After the initial update, subsequent updates would be made as needed. All updates would be handled centrally at NWS Headquarters.

In addition to modifying these constants in this manner, the phrase complexity constants may be modified at run time on the AFOS minicomputer. These modifications would apply only to that particular run. (For further detail see NWS, 1978e.)

6. PLANS FOR THE FUTURE

It may turn out, as AFOS implementation nears completion, that all CWF's should be produced on the local minicomputer rather than be sent over the NDC. This option would trade circuit loading for minicomputer time and can be exercised any time it seems appropriate.

The present program does not combine periods when the forecast conditions are much the same for two or more of the periods. This feature will be added at a later date. In addition, terminology dealing with "watch" situations, blizzards and winter storms, and snowfall depths will be added.

The present program produces forecasts for the today, tonight, and tomorrow periods in that order. After we get the initial reaction from field forecasters using it in the AFOS environment and make any necessary modifications, we will write the software to produce CWF's for the tonight, tomorrow, and tomorrow night periods for use in the late afternoon and early evening. Another extension of the effort will be to produce "updates" that can be issued in the late morning and late evening.

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Appendix I
Phrase Control Constants

Wind Control Constants

Constant	Value	Description
LW1	10	If a random number is less than LW1, wind direction without "erly" is used.
LW2	5	If certain speeds are within LW2 of each other they are averaged. See Fig. 4.
LW3	2	If all 3 winds in a period are less than or equal to LW3, the phrase will be "very light winds."
LW4	7	If wind speed is greater than LW4 and less than or equal to LW5, it is in the "light" category but the wind direction may still be mentioned. If the wind speed is less than or equal to LW4, the direction is not mentioned.
LW5	12	If the wind speed is greater than LW5 and less than or equal to LW6, it is in the middle range.
LW6	19	If the wind speed is greater than LW6, it is designated strong or windy.
LW7	60	If the wind direction difference is less than or equal to LW7, only one wind direction is mentioned.
LW8	10	If the wind speed difference is less than or equal to LW8, only one wind speed is mentioned. This is used only for strong winds.
LW9	50	If the forecasted max temperature (today and tomorrow periods) is less than LW9 "Breezy" is not used. If the forecasted min temperature (tonight period) is less than LW9-10 "breezy" is not used.
LW10	100	If LW10 is greater than or equal to a random number, a range of wind speeds is used in text statements 9-14. To always use a range specify LW10 greater than or equal to 100. To never use a range specify LW10 equal to zero.
LW11	0	If a range is desired (see LW10) then 0 - speed range indicated by unsmoothed forecasts 1 - speed range of 5, by increasing max 2 - speed range of 5, by decreasing min 3 - speed range of 5, by changing both max and min 4 - speed range of 5 or 10, about evenly divided, by changing both max and min.

Unsmoothed and unrounded speeds are used for setting range.

IW	1	Complexity value for the today period.
	2	Complexity value for tonight period.
	3	Complexity value for tomorrow period.

Temperature Control Constants

Constant	Value	Description
LT1	6	If the max temperature is within LT1 degrees of normal, the temperature is deemed "normal."
LT2	10	If the max temperature is within LT2 but greater than LT1 degrees of normal, the temperature is unusual but not extreme. If is is greater than LT2, it is extreme.
LT3	15	Wind chill will be considered if it is LT3 degrees below max or min temperature.
LT4	21	Define seven categories of max temperature.
LT5	41	
LT6	56	
LT7	80	
LT8	90	
LT9	96	
LT10	5	If the change of max temperature from yesterday is within LT10 degrees, it is not unusual.
LT11	10	If the change of max temperature from yesterday is within LT11 degrees but greater than LT10 degrees, it is unusual but not extreme. If it is greater than LT11, it is extreme.
LT12	1	Define seven categories of min temperature.
LT13	16	
LT14	31	
LT15	51	
LT16	61	
LT17	80	
LT18	-	Not used
LT19	8	If the min temperature is within LT19 degrees of normal, it is not unusual.
IT	1	Complexity value for today period.
	2	Complexity value for tonight period.
	2	Complexity value for tomorrow period.

Cloud Control Constants

Constant	Value	Description
LC1	0	If a random number is greater than or equal to LC1, "overcast" will be used as originally specified; otherwise, "cloudy" will be substituted. To never use "overcast" set LC1 equal to 100. To always use "overcast," set LC1 equal to 0.
IC	1	Complexity value for today period.
	1	Complexity value for tonight period.
	3	Complexity value for tomorrow period.

Precipitation Control Constants

Constant	Value	Description
LP1	20	If the 12-h POP is greater than or equal to LP1, precip will be mentioned. (See LP5)
LP2	25	If the 12-h POP is greater than or equal to LP1 and less than LP2, the qualifier will be "slight chance of."
LP3	55	If the 12-h POP is greater than or equal to LP2 and less than LP3, the qualifier will be "chance of."
LP4	75	If the 12-h POP is greater than or equal to LP3 and less than LP4, the qualifier will be "likely." If the 12-h POP is greater than or equal to LP4, no qualifier will be used.
LP5	10	If the TSTM is greater than or equal to LP5, precip will be mentioned even if the 12-h POP is less than LP1, provided the 12-h POP is greater than or equal to 10.
LP6	80	If POF is greater than or equal to LP6, the forecast will be "snow" rather than "wet snow."
LP7	65	If POF is greater than LP7, snow is indicated.
LP8	50	The breakpoint to emphasize snow over rain.
LP9	35	If POF is less than LP9, liquid precip is indicated.
LP10	40	"Drizzle" will not be used unless the DRZL is greater than or equal to LP10 and the 12-h POP is greater than or equal to LP10. To negate this effect set LP10 = 0.
LP11	5	The constant controlling the amount by which the 12-h POP's are smoothed before use. This is not rounding. For instance, if the absolute value of the difference between all 3 pairs of POP's is less than or equal to LP11, all 3 POP's are set equal to the average.
LP12	27	If the current surface temperature is less than LP12 and it is the first period, freezing rain or sleet may be mentioned.
LP13	25	If the forecast min temperature is less than LP13 and it is the second period, freezing rain or sleet may be mentioned.

Precipitation Control Constants (cont'd)

Constant	Value	Description
LP14	34	If the forecast max temperature for tomorrow is less than LP14 and it is the third period, freezing rain or sleet may be mentioned.
LP15	34	If the forecast max temperature for today is less than LP15, if it is the first period, and if the precip is limited to the afternoon, sleet or freezing rain may be mentioned.
LP16	10	If the TSTM is greater than LP16, thunderstorms may be mentioned.
LP17	10	If the first 6-h POP is less than LP17 and the second 6-h POP minus the first 6-h POP is greater than LP18, precip may be limited to the last part of the period. Also if the second 6-h POP is less than LP17 and the first 6-h POP minus the second 6-h POP is greater than LP18, the precip may be limited to the first part of the period.
LP18	25	See LP17.
LP19	10	If the period precip complexity is 1, if the period is the first, if the 12-h POP is less than LP1, if the TSTM is greater than LP5, and if the first 6-h POP minus the second 6-h POP is greater than or equal to LP19, the precip is limited to the morning. There is also a similar arrangement for the afternoon.
LP20	5	If the POF is less than LP20 the phrase at the end will be "Probability of rain ..." If the POF is greater than 100-LP20, the phrase will be "Probability of snow ..." Otherwise the phrase will be "Probability of precipitation ..."
LP21	35	If the 12-h POP is less than LP21, precip will not be emphasized.
LP22	2	If the QPF category is greater than or equal to LP22, "heavy at times" will be used in the precip phrase.
LP23	55	If the 12-h POP is greater than LP23, clouds will not be mentioned unless precip is indicated in only part of the period.
IP	1	Complexity value for the first period.
	1	Complexity value for the second period.
	2	Complexity value for the third period.

Appendix II
Text Phrases

```
 1      STRONG ****************************WINDS**********TO**********MPH.
BECOMING ****************************TO**********MPH BY* EVENING.  **
 2      STRONG ****************************WINDS**********TO**********MPH.
SHIFTING TO ****************************BY* EVENING.  **
 3      STRONG ****************************WINDS**********TO**********MPH.
 **
 4      STRONG ****************************WINDS**********TO**********MPH.
DIMINISHING TO**********MPH BY* EVENING.  **
 5      STRONG ****************************WINDS**********TO**********MPH.
SHIFTING TO ****************************MPH BY* EVENING.  **
 6      STRONG ****************************WINDS**********TO**********MPH
DEVELOPING BY **EVENING.  **
 7      ****************WINDS**********MPH BECOMING STRONG ************
**********MPH WITH GUSTS TO**********BY* EVENING.  **
 8      STRONG ****************************WINDS**********TO**********MPH
BY MIDDAY.
 9      ****************WINDS**************************MPH.  **
 10     WINDS**************************MPH.  **
 11     ****************WINDS**************************MPH IN THE MORNING.
DIMINISHING BY *********EVENING.  **
 12     WINDS**************************MPH IN THE MORNING, DIMINISHING BY F
VENING.  ***
 13     ****************WINDS**************************MPH IN THE AFTERNOON
.*
 14     WINDS**********************MPH IN THE AFTERNOON.  *
 15     LIGHT **********************WINDS.
 16     LIGHT WINDS'  **
 17     LIGHT AND VARIABLE WINDS.  *
 18
 19     WINDY***
 20     WINDY***
 21     WINDY***
 22     VERY LIGHT WINDS.  *
 23     GUSTY **
 24     BREEZY**
 25     BREEZY**
 26     BREEZY**
 27
 28
 29
 30
 31     CLEAR***
 32     MOSTLY CLEAR
 33     SUNNY***
 34     MOSTLY SUNNY
 35     PARTLY CLOUDY***
 36     MOSTLY CLOUDY***
 37     CLOUDY**
 38     OVERCAST
 39     VARIABLE CLOUDINESS*
 40     PARTLY SUNNY
 41     CLEAR***
 42     MOSTLY CLEAR
 43     SUNNY***
 44     MOSTLY SUNNY
 45     PARTLY CLOUDY***
 46     MOSTLY CLOUDY***
 47     CLOUDY***
 48     OVERCAST
 49
 50
 51     CLEARING
 52     BECOMING SUNNY**
 53     WITH INCREASING CLOUDINESS**
 54     BECOMING MOSTLY CLOUDY**
 55     WITH SOME SUNSHINE**
 56     BECOMING CLOUDY*
 57     BECOMING OVERCAST***
 58      BY LATE AFTERNOON**
 59
 60
 61      BY NOON
 62      BY EVENING
 63      BY AFTERNOON***
 64      BEFORE EVENING*
 65      THIS AFTERNOON*
 66      BY MIDDAY*
 67      BY MORNING
 68      BY MIDNIGHT
 69      IN THE AFTERNOON***
 70
 71
 72
 73
 74
 75
 76     MORNING
 77     EARLY MORNING **
 78     DAYTIME
 79     SOMEWHAT COOLER*
```

```
 80      CONTINUED CHILLY
 81      MODERATE TEMPERATURES***
 82      COMFORTABLE TEMPERATURES
 83      UNUSUALLY COOL**
 84      COOLER**
 85      MUCH COOLER*
 86      SOMEWHAT WARMER*
 87      UNSEASONABLY COOL***
 88      CONTINUED COOL**
 89      VERY COOL**
 90      COLD
 91      CONTINUED COLD**
 92      COLDER**
 93      MUCH**** COLDER*
 94      MODERATING TEMPERATURES*
 95      BECOMING COLDER*
 96      TURNING MUCH**** COLDER*
 97      VERY COLD**
 98      CONTINUED VERY COLD*
 99      BITTER COLD
100      LITTLE CHANGE IN TEMPERATURE
101      SOMEWHAT COOLER*
102      COOL
103      NOT QUITE AS COLD***
104      MUCH HOTTER*
105      HOTTER**
106      NOT QUITE AS HOT
107      RISING TEMPERATURES*
108      LOWER TEMPERATURES**
109      MUCH WARMER
110      MILDER**
111      SEASONABLE TEMPERATURES*
112      CHILLY**
113      CONTINUED VERY HOT**
114      VERY HOT
115      CONTINUED HOT***
116      HOT*
117      WARMER**
118      VERY WARM**
119      PLEASANT TEMPERATURES***
120      CONTINUED MILD**
121      SLIGHTLY COOLER*
122      WARM
123      MILD
124      CONTINUED COOL**
125      ****
126      HIGH NEAR**
127      HIGH IN THE MID*
128      HIGH IN THE LOWER***
129      HIGH IN THE UPPER***
130      S***
131      BELOW***
132      ABOVE***
133       TEENS**
134      LOW NEAR***
135      LOW IN THE MID**
136      LOW IN THE LOWER****
137      LOW IN THE UPPER****
138      ****
139      ****
140      SLIGHT CHANCE OF ***
141       ENDING ABOUT MIDNIGHT**
142      CHANCE OF **
143       LIKELY*
144      SNOW
145      WET SNOW
146      SNOW OR SNOW AND RAIN MIXED*
147      SNOW OR SNOW MIXED WITH RAIN
148      RAIN OR RAIN AND SNOW MIXED*
149      RAIN OR RAIN MIXED WITH SNOW
150      SNOW, SLEET, OR FREEZING RAIN***
151      DRIZZLE*
152      SHOWERS*
153      RAIN
154      THUNDERSTORMS***
155      THUNDERSHOWERS**
156       ENDING ABOUT NOON**
157      SHOWERS AND THUNDERSTORMS***
158      RAIN AND THUNDERSTORMS**
159       IN THE AFTERNOON***
160       IN THE MORNING*
161       AFTER MIDNIGHT*
162       BEFORE MIDNIGHT
163      PROBABILITY OF PRECIPITATION**********PERCENT*
164      PROBABILITY OF RAIN**********PERCENT*
165      PROBABILITY OF SNOW**********PERCENT*
166      RAIN MIXED WITH SNOW********** IN THE AFTERNOO
N**********CHANGING TO SNOW BEFORE EVENING.  **
167      SLEET OR FREEZING RAIN MIXED WITH SNOW********** IN THE AFTERNOO
N**********CHANGING TO SNOW BEFORE EVENING.  **
168
169      SNOW********** IN THE AFTERNOO
N**********CHANGING TO SLEET OR FREEZING RAIN BEFORE EVENIN
G.
```

```
170     SNOW********************************************** IN THE AFTERNOO
N**********************TURNING TO RAIN BEFORE EVENING.  ***
171     RAIN********************************************** IN THE AFTERNOO
N**********************POSSIBLY STARTING AS SNOW.
172     SLEET OR FREEZING RAIN**************************** IN THE AFTERNOO
N**********************CHANGING TO SNOW BEFORE EVENING.  **
173     RAIN********************************************** IN THE AFTERNOO
N**********************TURNING TO SNOW BEFORE EVENING.  ***
174     SLEET OR FREEZING RAIN**************************** IN THE AFTERNOO
N**********************BECOMING MIXED WITH SNOW BEFORE EVENING.  **
175     RAIN********************************************** IN THE AFTERNOO
N**********************BECOMING MIXED WITH SNOW BEFORE EVENING.  **
176     SNOW********************************************** IN THE AFTERNOO
N**********************POSSIBLY STARTING AS SLEET OR FREEZING RAIN.  **
177     SNOW********************************************** IN THE AFTERNOO
N**********************POSSIBLY STARTING AS RAIN.
178     RAIN********************************************** IN THE AFTERNOO
N**********************CHANGING TO SNOW BEFORE EVENING.  **
179
180     SNOW********************************************** TODAY**********
**********************BECOMING MIXED WITH SLEET OR FREEZING RAIN BY MI
DDAY.  *
181     SNOW********************************************** TODAY**********
**********************BECOMING MIXED WITH RAIN BY MIDDAY.  ***
182     SLEET OR FREEZING RAIN**************************** TODAY**********
**********************BECOMING MIXED WITH SNOW ABOUT MIDDAY.
183     RAIN********************************************** TODAY**********
**********************BECOMING MIXED WITH SNOW BY MIDDAY.  ***
184     SLEET OR FREEZING RAIN**************************** THIS MORNING***
**********************BECOMING MIXED WITH SNOW IN THE AFTERNOON.
185     RAIN********************************************** THIS MORNING***
**********************BECOMING MIXED WITH SNOW IN THE AFTERNOON.
186     SLEET OR FREEZING RAIN**************************** THIS MORNING***
**********************CHANGING TO SNOW IN THE AFTERNOON.
187     RAIN********************************************** THIS MORNING***
**********************CHANGING TO SNOW IN THE AFTERNOON.
188     SLEET OR FREEZING RAIN MIXED WITH SNOW************ THIS MORNING***
**********************TURNING TO SNOW DURING THE AFTERNOON.  *
189     RAIN MIXED WITH SNOW************************************ THIS MORNING***
**********************CHANGING TO SNOW DURING THE AFTERNOON.
190     SLEET OR FREEZING RAIN**************************** THIS MORNING***
**********************CHANGING TO SNOW ABOUT MIDDAY.
191     RAIN********************************************** THIS MORNING***
**********************CHANGING TO SNOW ABOUT MIDDAY.
192     SNOW********************************************** TODAY**********
**********************CHANGING TO SLEET OR FREEZING RAIN DURING THE AF
TERNOON.  **
193     SNOW********************************************** TODAY**********
**********************CHANGING TO RAIN DURING THE AFTERNOON.
194     SNOW********************************************** THIS MORNING***
**********************CHANGING TO SLEET OR FREEZING RAIN ABOUT MIDDAY.
  **
195     SNOW********************************************** THIS MORNING***
**********************CHANGING TO RAIN ABOUT MIDDAY.
196     SLEET OR FREEZING RAIN MIXED WITH SNOW************ TODAY**********
**********************TURNING TO RAIN DURING THE AFTERNOON.  *
197     RAIN MIXED WITH SNOW************************************ TODAY**********
**********************CHANGING TO RAIN DURING THE AFTERNOON.
198     SNOW********************************************** TODAY**********
**********************BECOMING MIXED WITH SLEET OR FREEZING RAIN DURIN
G THE AFTERNOON.  **
199     SNOW********************************************** TODAY**********
**********************BECOMING MIXED WITH RAIN DURING THE AFTERNOON.
200
201       ******** IN THE MORNING. ENDING BY MIDDAY.
202       **************PERCENT TONIGHT.
203       RAIN BECOMING MIXED WITH SNOW***
204         AND**************PERCENT TOMORROW.  *
205       SLEET OR FREEZING RAIN BECOMING MIXED WITH SNOW*
206       RAIN TURNING TO SNOW
207       SLEET OR FREEZING RAIN TURNING TO SNOW**
208         THROUGH TOMORROW.
209         THROUGH TONIGHT
210       SNOW CHANGING TO SLEET OR FREEZING RAIN*
211       SNOW CHANGING TO RAIN***
212       SLEET OR FREEZING RAIN**
213       SLEET OR FREEZING RAIN**********************************TURNING TO S
NOW DURING THE AFTERNOON.  *
214       RAIN************************************************TURNING TO S
NOW DURING THE AFTERNOON.  *
215       SLEET OR FREEZING RAIN**********************************TURNING TO S
NOW BY MIDDAY.
216       RAIN************************************************TURNING TO S
NOW BY MIDDAY.
217       SNOW************************************************BECOMING MIX
ED WITH SLEET OR FREEZING RAIN DURING THE AFTERNOON.  **
218       SNOW************************************************BECOMING MIX
ED WITH RAIN DURING THE AFTERNOON.
219       SNOW************************************************TURNING TO S
LEET OR FREEZING RAIN DURING THE AFTERNOON.  ***
220       SNOW************************************************TURNING TO R
AIN DURING THE AFTERNOON.  *
221       SNOW************************************************BECOMING MIX
ED WITH SLEET OR FREEZING RAIN BY MIDDAY.  *
```

```
222     SNOW**********************************************BECOMING MIX
ED WITH RAIN BY MIDDAY.  ***
223     SNOW**********************************************TURNING TO S
LEET OR FREEZING RAIN BY MIDDAY.  **
224     SNOW**********************************************TURNING TO R
AIN BY MIDDAY.
225
226
227
228
229
230
231
232
233
234     SUNDAY*****
235     MONDAY*****
236     TUESDAY*****
237     WEDNESDAY****
238     THURSDAY*****
239     FRIDAY******
240     SATURDAY*****
241      AND A *
242     * **
243      TODAY,
244     * AND **
245      AND ***
246      TODAY, WITH ***
247     *  *
248      TODAY.  ***
249      WITH **
250      WITH A
251      IN THE EARLY EVENING, *
252      AFTER MIDNIGHT.  **
253      TODAY WITH A **
254      IN THE MORNING.  **
255      IN THE AFTERNOON.
256      THIS MORNING.
257      IN THE MORNING AND
258      THIS MORNING, *
259      IN THE EARLY EVENING.
260      IN THE MORNING, ***
261      ***
262     ####*
263      THIS MORNING WITH *
264      IN THE EARLY EVENING WITH *
265      IN THE MORNING WITH ***
266      TODAY WITH
267
268
269
270
271
272
273
274
275
276     NEAR ***
277     TONIGHT--***
278     --**
279      NEAR***
280      TODAY AND**********************PERCENT TONIGHT AND TOMORROW.  *
281     STRONG ****************************WINDS**********TO**********MPH,
 BECOMING ****************************TO**********MPH BY* MORNING.  **
282     STRONG ********************WINDS**********TO**********MPH,
 SHIFTING TO **********************BY* MORNING.  **
283
284     STRONG ************************WINDS**********TO**********MPH,
 DIMINISHING TO**********MPH BY* MORNING.  **
285     STRONG ************************WINDS**********TO**********MPH,
 SHIFTING TO ********************************MPH BY* MORNING.  **
286     STRONG ****************************WINDS**********TO**********MPH
DEVELOPING BY **MORNING.  **
287      ****************WINDS**********MPH BECOMING STRONG ************
**********MPH WITH GUSTS TO**********BY MORNING.  ***
288     STRONG ****************************WINDS**********TO**********MPH
BY MIDNIGHT.  **
289
290
291      ****************WINDS************************MPH IN THE EARLY EVE
NING, DIMINISHING BY ***MORNING.  **
292     WINDS************************MPH IN THE EARLY EVENING, DIMINISHIN
G BY MORNING.  *
293      ****************WINDS************************MPH AFTER MIDNIGHT.
 ***
294     WINDS************************MPH AFTER MIDNIGHT.  ***
295
296
297
```

```
298
299
300       SNOW**********************************************BECOMING MIX
ED WITH SLEET OR FREEZING RAIN AFTER MIDNIGHT.
301       SNOW**********************************************BECOMING MIX
ED WITH RAIN AFTER MIDNIGHT.  **
302       SNOW**********************************************TURNING TO S
LEET OR FREEZING RAIN AFTER MIDNIGHT.  *
303       SNOW**********************************************TURNING TO R
AIN AFTER MIDNIGHT.  ***
304       SNOW**********************************************BECOMING MIX
ED WITH SLEET OR FREEZING RAIN BY MIDNIGHT.  ***
305       SNOW**********************************************BECOMING MIX
ED WITH RAIN BY MIDNIGHT.  *
306       SNOW**********************************************TURNING TO S
LEET OR FREEZING RAIN BY MIDNIGHT.
307       SNOW**********************************************TURNING TO R
AIN BY MIDNIGHT.  **
308       SLEET OR FREEZING RAIN****************************TURNING TO S
NOW AFTER MIDNIGHT.  ***
309       RAIN**********************************************TURNING TO S
NOW AFTER MIDNIGHT.  ***
310       SLEET OR FREEZING RAIN****************************TURNING TO S
NOW BY MIDNIGHT.  **
311       RAIN**********************************************TURNING TO S
NOW BY MIDNIGHT.  **
312
313
314
315       RAIN************************** AFTER MIDNIGHT*****************
***STARTING AS SNOW.  *
316       SLEET OR FREEZING RAIN********** AFTER MIDNIGHT****************
CHANGING TO SNOW BEFORE MORNING.  **
317       RAIN************************** AFTER MIDNIGHT*****************
CHANGING TO SNOW BEFORE MORNING.  **
318       SLEET OR FREEZING RAIN********** AFTER MIDNIGHT****************
BECOMING MIXED WITH SNOW.  *
319       RAIN************************** AFTER MIDNIGHT*****************
BECOMING MIXED WITH SNOW.  *
320       SNOW************************** AFTER MIDNIGHT*****************
STARTING AS SLEET OR FREEZING RAIN.  ***
321       SNOW************************** AFTER MIDNIGHT*****************
STARTING AS RAIN.  *
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340        ZERO***
341       NORTHEASTERLY **
342       EASTERLY ***
343       SOUTHEASTERLY **
344       SOUTHERLY **
345       SOUTHWESTERLY **
346       WESTERLY ***
347       NORTHWESTERLY **
348       NORTHERLY **
349       NORTHEAST **
350       EAST ***
351       SOUTHEAST **
352       SOUTH **
353       SOUTHWEST **
354       WEST ***
355       NORTHWEST **
356       NORTH **
357       WIND CHILL FACTOR **********DEGREES.  **
358       ##HEAVY AT TIMES@@@
359       ##HEAVY AT TIMES###
360       S***
361       MIDDAY.*
362       MILNIGHT.  *
363       MIDDAY.*
364
365
366
367
368
369
```

```
370
371       MEMORIAL DAY--**
372       4TH OF JULY--***
373       LABOR DAY--*
374       COLUMBUS DAY--**
375       THANKSGIVING DAY--**
376       CHRISTMAS DAY--*
377       NEW YEAR'S DAY--
389       , TURNING COOLER IN THE LATE AFTERNOON.   ***
390       , TURNING COLDER IN THE LATE AFTERNOON.   ***
391       , TURNING MUCH COOLER IN THE LATE AFTERNOON.   **
392       , TURNING MUCH COLDER IN THE LATE AFTERNOON.   **
393       , TURNING COOLER IN THE AFTERNOON.
394       , TURNING COLDER IN THE AFTERNOON.
395       , TURNING MUCH COOLER IN THE AFTERNOON.   ***
396       , TURNING MUCH COLDER IN THE AFTERNOON.   ***
397       , BECOMING COOLER DURING THE DAY.   *
398       , BECOMING COLDER DURING THE DAY.   *
399       , BECOMING MUCH COOLER DURING THE DAY.
400       , BECOMING MUCH COLDER DURING THE DAY.
```

Appendix III
Cloud Phrase Selection

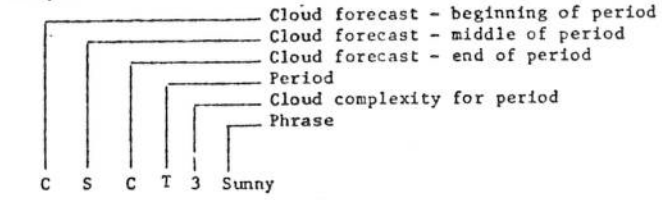
Cloud forecasts

C - clear
S - scattered
B - broken
O - overcast

Forecast Period

D - today
N - tonight
T - tomorrow

Example



C	C	C	D	1	CLEAR
C	C	C	D	2	CLEAR
C	C	C	D	3	CLEAR
C	C	C	N	1	CLEAR
C	C	C	N	2	CLEAR
C	C	C	N	3	CLEAR
C	C	C	T	1	CLEAR
C	C	C	T	2	CLEAR
C	C	C	T	3	CLEAR
S	C	C	D	1	SUNNY
S	C	C	D	2	SUNNY
S	C	C	D	3	SUNNY
S	C	C	N	1	MOSTLY CLEAR
S	C	C	N	2	MOSTLY CLEAR
S	C	C	N	3	MOSTLY CLEAR
S	C	C	T	1	SUNNY
S	C	C	T	2	SUNNY
S	C	C	T	3	SUNNY
B	C	C	D	1	MOSTLY CLOUDY THIS MORNING, CLEARING BY NOON
B	C	C	D	2	MOSTLY SUNNY
B	C	C	D	3	MOSTLY SUNNY
B	C	C	N	1	MOSTLY CLOUDY, CLEARING BY MIDNIGHT
B	C	C	N	2	CLEARING BY MIDNIGHT
B	C	C	N	3	CLEARING
B	C	C	T	1	MOSTLY CLOUDY, CLEARING BY NOON
B	C	C	T	2	CLEARING BY NOON
B	C	C	T	3	CLEARING
O	C	C	D	1	CLOUDY THIS MORNING, CLEARING BY NOON
O	C	C	D	2	VARIABLE CLOUDINESS
O	C	C	D	3	VARIABLE CLOUDINESS
O	C	C	N	1	CLOUDY,CLEARING BY MIDNIGHT
O	C	C	N	2	CLEARING BY MIDNIGHT
O	C	C	N	3	CLEARING
O	C	C	T	1	CLOUDY, CLEARING BY NOON
O	C	C	T	2	CLEARING BY NOON
O	C	C	T	3	CLEARING
	S	C	D	1	SUNNY
	S	C	D	2	SUNNY
	S	C	D	3	SUNNY
C	S	C	N	1	MOSTLY CLEAR
C	S	C	N	2	MOSTLY CLEAR
C	S	C	N	3	MOSTLY CLEAR
C	S	C	T	1	SUNNY
C	S	C	T	2	SUNNY
C	S	C	T	3	SUNNY
S	S	C	D	1	MOSTLY SUNNY
S	S	C	D	2	MOSTLY SUNNY
S	S	C	D	3	MOSTLY SUNNY
S	S	C	N	1	PARTLY CLOUDY
S	S	C	N	2	PARTLY CLOUDY
S	S	C	N	3	PARTLY CLOUDY
S	S	C	T	1	MOSTLY SUNNY
S	S	C	T	2	MOSTLY SUNNY
S	S	C	T	3	MOSTLY SUNNY
B	S	C	D	1	PARTLY CLOUDY THIS MORNING, CLEARING BY EVENING
B	S	C	D	2	PARTLY CLOUDY
B	S	C	D	3	PARTLY CLOUDY
B	S	C	N	1	MOSTLY CLOUDY, CLEARING BY MORNING
B	S	C	N	2	CLEARING BY MORNING
B	S	C	N	3	CLEARING
B	S	C	T	1	MOSTLY CLOUDY, CLEARING BY EVENING
B	S	C	T	2	CLEARING BY EVENING
B	S	C	T	3	CLEARING
O	S	C	D	1	CLOUDY THIS MORNING, CLEARING BY NOON
O	S	C	D	2	PARTLY CLOUDY
O	S	C	D	3	PARTLY CLOUDY
O	S	C	N	1	CLOUDY, CLEARING BY MIDNIGHT
O	S	C	N	2	CLEARING BY MIDNIGHT
O	S	C	N	3	CLEARING
O	S	C	T	1	CLOUDY, CLEARING BY EVENING
O	S	C	T	2	CLEARING BY EVENING
O	S	C	T	3	CLEARING
C	B	C	D	1	VARIABLE CLOUDINESS
C	B	C	D	2	VARIABLE CLOUDINESS
C	B	C	D	3	VARIABLE CLOUDINESS
C	B	C	N	1	VARIABLE CLOUDINESS
C	B	C	N	2	VARIABLE CLOUDINESS
C	B	C	N	3	VARIABLE CLOUDINESS
C	B	C	T	1	VARIABLE CLOUDINESS
C	B	C	T	2	VARIABLE CLOUDINESS
C	B	C	T	3	VARIABLE CLOUDINESS

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S  R  C  D  1    PARTLY CLOUDY THIS MORNING, CLEARING BY EVENING
S  R  C  D  2    PARTLY CLOUDY
   R  C  D  3    PARTLY CLOUDY
   R  C  N  1    PARTLY CLOUDY
   R  C  N  2    PARTLY CLOUDY
   R  C  N  3    PARTLY CLOUDY
   R  C  T  1    PARTLY CLOUDY
S  R  C  T  2    PARTLY CLOUDY
S  R  C  T  3    PARTLY CLOUDY

B  R  C  D  1    MOSTLY CLOUDY THIS MORNING, CLEARING BY EVENING
B  R  C  D  2    MOSTLY CLOUDY
B  R  C  D  3    MOSTLY CLOUDY
B  R  C  N  1    MOSTLY CLOUDY, CLEARING BY MORNING
B  R  C  N  2    MOSTLY CLOUDY
B  R  C  N  3    MOSTLY CLOUDY
B  R  C  T  1    MOSTLY CLOUDY, CLEARING BY EVENING
B  R  C  T  2    MOSTLY CLOUDY
B  R  C  T  3    MOSTLY CLOUDY

O  R  C  D  1    OVERCAST SKIES THIS MORNING, CLEARING BY EVENING
O  R  C  D  2    MOSTLY CLOUDY
O  R  C  D  3    MOSTLY CLOUDY
O  R  C  N  1    CLOUDY, CLEARING BY MORNING
O  R  C  N  2    CLEARING BY MORNING
O  R  C  N  3    CLEARING
O  R  C  T  1    CLOUDY, CLEARING BY EVENING
O  R  C  T  2    CLEARING BY EVENING
O  R  C  T  3    CLEARING

C  O  C  D  1    VARIABLE CLOUDINESS
C  O  C  D  2    VARIABLE CLOUDINESS
C  O  C  D  3    VARIABLE CLOUDINESS
C  O  C  N  1    VARIABLE CLOUDINESS
C  O  C  N  2    VARIABLE CLOUDINESS
C  O  C  N  3    VARIABLE CLOUDINESS
C  O  C  T  1    VARIABLE CLOUDINESS
C  O  C  T  2    VARIABLE CLOUDINESS
C  O  C  T  3    VARIABLE CLOUDINESS

S  O  C  D  1    MOSTLY CLOUDY THIS MORNING, CLEARING BY EVENING
S  O  C  D  2    VARIABLE CLOUDINESS
S  O  C  D  3    VARIABLE CLOUDINESS
S  O  C  N  1    MOSTLY CLOUDY, CLEARING BY MORNING
S  O  C  N  2    VARIABLE CLOUDINESS
   O  C  N  3    VARIABLE CLOUDINESS
   O  C  T  1    VARIABLE CLOUDINESS
   O  C  T  2    VARIABLE CLOUDINESS
   O  C  T  3    VARIABLE CLOUDINESS

B  O  C  D  1    MOSTLY CLOUDY THIS MORNING, CLEARING BY EVENING
B  O  C  D  2    VARIABLE CLOUDINESS
B  O  C  D  3    VARIABLE CLOUDINESS
B  O  C  N  1    MOSTLY CLOUDY, CLEARING BY MORNING
B  O  C  N  2    VARIABLE CLOUDINESS
B  O  C  N  3    VARIABLE CLOUDINESS
B  O  C  T  1    VARIABLE CLOUDINESS
B  O  C  T  2    VARIABLE CLOUDINESS
B  O  C  T  3    VARIABLE CLOUDINESS

O  O  C  D  1    OVERCAST SKIES THIS MORNING, CLEARING BY EVENING
O  O  C  D  2    MOSTLY CLOUDY
O  O  C  D  3    MOSTLY CLOUDY
O  O  C  N  1    CLOUDY, CLEARING BY MORNING
O  O  C  N  2    CLEARING BY MORNING
O  O  C  N  3    CLEARING
O  O  C  T  1    CLOUDY, CLEARING BY EVENING
O  O  C  T  2    CLEARING BY EVENING
O  O  C  T  3    CLEARING

C  C  S  D  1    SUNNY
C  C  S  D  2    SUNNY
C  C  S  D  3    SUNNY
C  C  S  N  1    MOSTLY CLEAR
C  C  S  N  2    MOSTLY CLEAR
C  C  S  N  3    MOSTLY CLEAR
C  C  S  T  1    SUNNY
C  C  S  T  2    SUNNY
C  C  S  T  3    SUNNY

S  C  S  D  1    MOSTLY SUNNY
S  C  S  D  2    MOSTLY SUNNY
S  C  S  D  3    MOSTLY SUNNY
S  C  S  N  1    PARTLY CLOUDY
S  C  S  N  2    PARTLY CLOUDY
S  C  S  N  3    PARTLY CLOUDY
S  C  S  T  1    MOSTLY SUNNY
S  C  S  T  2    MOSTLY SUNNY
S  C  S  T  3    MOSTLY SUNNY
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B	C	S	D	1	PARTLY CLOUDY
B	C	S	D	2	PARTLY CLOUDY
B	C	S	D	3	PARTLY CLOUDY
B	C	S	N	1	PARTLY CLOUDY
B	C	S	N	2	PARTLY CLOUDY
B	C	S	N	3	PARTLY CLOUDY
B	C	S	T	1	PARTLY CLOUDY
B	C	S	T	2	PARTLY CLOUDY
B	C	S	T	3	PARTLY CLOUDY
O	C	S	D	1	CLOUDY THIS MORNING, BECOMING SUNNY BY AFTERNOON
O	C	S	D	2	VARIABLE CLOUDINESS
O	C	S	D	3	VARIABLE CLOUDINESS
O	C	S	N	1	VARIABLE CLOUDINESS
O	C	S	N	2	VARIABLE CLOUDINESS
O	C	S	N	3	VARIABLE CLOUDINESS
O	C	S	T	1	CLOUDY, BECOMING SUNNY BY AFTERNOON
O	C	S	T	2	PARTLY CLOUDY
O	C	S	T	3	PARTLY CLOUDY
C	S	S	D	1	MOSTLY SUNNY
C	S	S	D	2	MOSTLY SUNNY
C	S	S	D	3	MOSTLY SUNNY
C	S	S	N	1	PARTLY CLOUDY
C	S	S	N	2	PARTLY CLOUDY
C	S	S	N	3	PARTLY CLOUDY
C	S	S	T	1	MOSTLY SUNNY
C	S	S	T	2	MOSTLY SUNNY
C	S	S	T	3	MOSTLY SUNNY
S	S	S	D	1	MOSTLY SUNNY
S	S	S	D	2	MOSTLY SUNNY
S	S	S	D	3	MOSTLY SUNNY
S	S	S	N	1	PARTLY CLOUDY
S	S	S	N	2	PARTLY CLOUDY
S	S	S	N	3	PARTLY CLOUDY
S	S	S	T	1	MOSTLY SUNNY
S	S	S	T	2	MOSTLY SUNNY
S	S	S	T	3	MOSTLY SUNNY
B	S	S	D	1	PARTLY CLOUDY
B	S	S	D	2	PARTLY CLOUDY
B	S	S	D	3	PARTLY CLOUDY
B	S	S	N	1	PARTLY CLOUDY
B	S	S	N	2	PARTLY CLOUDY
B	S	S	N	3	PARTLY CLOUDY
B	S	S	T	1	PARTLY CLOUDY
B	S	S	T	2	PARTLY CLOUDY
B	S	S	T	3	PARTLY CLOUDY
O	S	S	D	1	CLOUDY THIS MORNING, BECOMING SUNNY BY AFTERNOON
O	S	S	D	2	VARIABLE CLOUDINESS
O	S	S	D	3	VARIABLE CLOUDINESS
O	S	S	N	1	VARIABLE CLOUDINESS
O	S	S	N	2	VARIABLE CLOUDINESS
O	S	S	N	3	VARIABLE CLOUDINESS
O	S	S	T	1	CLOUDY, BECOMING SUNNY BY AFTERNOON
O	S	S	T	2	PARTLY CLOUDY
O	S	S	T	3	PARTLY CLOUDY
C	B	S	D	1	PARTLY CLOUDY
C	B	S	D	2	PARTLY CLOUDY
C	B	S	D	3	PARTLY CLOUDY
C	B	S	N	1	PARTLY CLOUDY
C	B	S	N	2	PARTLY CLOUDY
C	B	S	N	3	PARTLY CLOUDY
C	B	S	T	1	PARTLY CLOUDY
C	B	S	T	2	PARTLY CLOUDY
C	B	S	T	3	PARTLY CLOUDY
S	B	S	D	1	PARTLY CLOUDY
S	B	S	D	2	PARTLY CLOUDY
S	B	S	D	3	PARTLY CLOUDY
S	B	S	N	1	PARTLY CLOUDY
S	B	S	N	2	PARTLY CLOUDY
S	B	S	N	3	PARTLY CLOUDY
S	B	S	T	1	PARTLY CLOUDY
S	B	S	T	2	PARTLY CLOUDY
S	B	S	T	3	PARTLY CLOUDY
B	B	S	D	1	MOSTLY CLOUDY
B	B	S	D	2	MOSTLY CLOUDY
B	B	S	D	3	MOSTLY CLOUDY
B	B	S	N	1	MOSTLY CLOUDY
B	B	S	N	2	MOSTLY CLOUDY
B	B	S	N	3	MOSTLY CLOUDY
B	B	S	T	1	MOSTLY CLOUDY
B	B	S	T	2	MOSTLY CLOUDY
B	B	S	T	3	MOSTLY CLOUDY

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O  B  S   D  1    OVERCAST SKIES THIS MORNING, BECOMING SUNNY BY EVENING
   B  S   D  2    MOSTLY CLOUDY
   B  S   D  3    MOSTLY CLOUDY
   B  S   N  1    MOSTLY CLOUDY
   B  S   N  2    MOSTLY CLOUDY
O  B  S   N  3    MOSTLY CLOUDY
O  B  S   T  1    MOSTLY CLOUDY
O  B  S   T  2    MOSTLY CLOUDY
O  B  S   T  3    MOSTLY CLOUDY

C  O  S   D  1    VARIABLE CLOUDINESS
C  O  S   D  2    VARIABLE CLOUDINESS
C  O  S   D  3    VARIABLE CLOUDINESS
C  O  S   N  1    VARIABLE CLOUDINESS
C  O  S   N  2    VARIABLE CLOUDINESS
C  O  S   N  3    VARIABLE CLOUDINESS
C  O  S   T  1    VARIABLE CLOUDINESS
C  O  S   T  2    VARIABLE CLOUDINESS
C  O  S   T  3    VARIABLE CLOUDINESS

S  O  S   D  1    VARIABLE CLOUDINESS
S  O  S   D  2    VARIABLE CLOUDINESS
S  O  S   D  3    VARIABLE CLOUDINESS
S  O  S   N  1    VARIABLE CLOUDINESS
S  O  S   N  2    VARIABLE CLOUDINESS
S  O  S   N  3    VARIABLE CLOUDINESS
S  O  S   T  1    VARIABLE CLOUDINESS
S  O  S   T  2    VARIABLE CLOUDINESS
S  O  S   T  3    VARIABLE CLOUDINESS

B  O  S   D  1    MOSTLY CLOUDY
B  O  S   D  2    MOSTLY CLOUDY
B  O  S   D  3    MOSTLY CLOUDY
B  O  S   N  1    MOSTLY CLOUDY
B  O  S   N  2    MOSTLY CLOUDY
B  O  S   N  3    MOSTLY CLOUDY
B  O  S   T  1    MOSTLY CLOUDY
B  O  S   T  2    MOSTLY CLOUDY
B  O  S   T  3    MOSTLY CLOUDY

O  O  S   D  1    OVERCAST SKIES THIS MORNING, BECOMING SUNNY BY EVENING
O  O  S   D  2    MOSTLY CLOUDY
O  O  S   D  3    MOSTLY CLOUDY
O  O  S   N  1    MOSTLY CLOUDY
   O  S   N  2    MOSTLY CLOUDY
   O  S   N  3    MOSTLY CLOUDY
   O  S   T  1    MOSTLY CLOUDY
   O  S   T  2    MOSTLY CLOUDY
O  O  S   T  3    MOSTLY CLOUDY

C  C  B   D  1    CLEAR THIS MORNING, WITH INCREASING CLOUDINESS THIS
                  AFTERNOON
C  C  B   D  2    MOSTLY SUNNY
C  C  B   D  3    MOSTLY SUNNY
C  C  B   N  1    CLEAR, BECOMING CLOUDY BY MORNING
C  C  B   N  2    MOSTLY CLEAR
C  C  B   N  3    MOSTLY CLEAR
C  C  B   T  1    SUNNY, WITH INCREASING CLOUDINESS IN THE AFTERNOON
C  C  B   T  2    MOSTLY SUNNY
C  C  B   T  3    MOSTLY SUNNY

S  C  B   D  1    SUNNY THIS MORNING, WITH INCREASING CLOUDINESS THIS
                  AFTERNOON
S  C  B   D  2    PARTLY CLOUDY
S  C  B   D  3    PARTLY CLOUDY
S  C  B   N  1    PARTLY CLOUDY
S  C  B   N  2    PARTLY CLOUDY
S  C  B   N  3    PARTLY CLOUDY
S  C  B   T  1    PARTLY CLOUDY
S  C  B   T  2    PARTLY CLOUDY
S  C  B   T  3    PARTLY CLOUDY

B  C  B   D  1    VARIABLE CLOUDINESS
B  C  B   D  2    VARIABLE CLOUDINESS
B  C  B   D  3    VARIABLE CLOUDINESS
B  C  B   N  1    VARIABLE CLOUDINESS
B  C  B   N  2    VARIABLE CLOUDINESS
B  C  B   N  3    VARIABLE CLOUDINESS
B  C  B   T  1    VARIABLE CLOUDINESS
B  C  B   T  2    VARIABLE CLOUDINESS
B  C  B   T  3    VARIABLE CLOUDINESS

O  C  B   D  1    VARIABLE CLOUDINESS
O  C  B   D  2    VARIABLE CLOUDINESS
O  C  B   D  3    VARIABLE CLOUDINESS
O  C  B   N  1    VARIABLE CLOUDINESS
O  C  B   N  2    VARIABLE CLOUDINESS
O  C  B   N  3    VARIABLE CLOUDINESS
O  C  B   T  1    VARIABLE CLOUDINESS
O  C  B   T  2    VARIABLE CLOUDINESS
   C  B   T  3    VARIABLE CLOUDINESS
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C	S	R	D	1	CLEAR THIS MORNING, WITH INCREASING CLOUDINESS THIS AFTERNOON
C	S	R	D	2	MOSTLY SUNNY
C	S	R	D	3	MOSTLY SUNNY
C	S	R	N	1	CLEAR, BECOMING CLOUDY BY MORNING
C	S	R	N	2	PARTLY CLOUDY
C	S	R	N	3	PARTLY CLOUDY
C	S	R	T	1	SUNNY, WITH INCREASING CLOUDINESS IN THE AFTERNOON
C	S	R	T	2	MOSTLY SUNNY
C	S	R	T	3	MOSTLY SUNNY
S	S	R	D	1	SUNNY THIS MORNING, WITH INCREASING CLOUDINESS THIS AFTERNOON
S	S	R	D	2	PARTLY CLOUDY
S	S	R	D	3	PARTLY CLOUDY
S	S	R	N	1	PARTLY CLOUDY
S	S	R	N	2	PARTLY CLOUDY
S	S	R	N	3	PARTLY CLOUDY
S	S	R	T	1	PARTLY CLOUDY
S	S	R	T	2	PARTLY CLOUDY
S	S	R	T	3	PARTLY CLOUDY
B	S	R	D	1	MOSTLY CLOUDY
B	S	R	D	2	MOSTLY CLOUDY
B	S	R	D	3	MOSTLY CLOUDY
B	S	R	N	1	MOSTLY CLOUDY
B	S	R	N	2	MOSTLY CLOUDY
B	S	R	N	3	MOSTLY CLOUDY
B	S	R	T	1	MOSTLY CLOUDY
B	S	R	T	2	MOSTLY CLOUDY
B	S	R	T	3	MOSTLY CLOUDY
O	S	R	D	1	MOSTLY CLOUDY
O	S	R	D	2	MOSTLY CLOUDY
O	S	R	D	3	MOSTLY CLOUDY
O	S	R	N	1	MOSTLY CLOUDY
O	S	R	N	2	MOSTLY CLOUDY
O	S	R	N	3	MOSTLY CLOUDY
	S	R	T	1	MOSTLY CLOUDY
	S	R	T	2	MOSTLY CLOUDY
	S	R	T	3	MOSTLY CLOUDY
	B	R	D	1	SUNNY THIS MORNING, BECOMING MOSTLY CLOUDY BY NOON
C	R	R	D	2	VARIABLE CLOUDINESS
C	R	R	D	3	VARIABLE CLOUDINESS
C	R	R	N	1	CLEAR, BECOMING MOSTLY CLOUDY BY MIDNIGHT
C	R	R	N	2	BECOMING MOSTLY CLOUDY BY MIDNIGHT
C	R	R	N	3	BECOMING CLOUDY
C	R	R	T	1	CLEAR, BECOMING MOSTLY CLOUDY BY NOON
C	R	R	T	2	BECOMING MOSTLY CLOUDY BY NOON
C	R	R	T	3	BECOMING CLOUDY
S	B	R	D	1	MOSTLY CLOUDY
S	R	R	D	2	MOSTLY CLOUDY
S	R	R	D	3	MOSTLY CLOUDY
S	R	R	N	1	MOSTLY CLOUDY
S	R	R	N	2	MOSTLY CLOUDY
S	R	R	N	3	MOSTLY CLOUDY
S	R	R	T	1	MOSTLY CLOUDY
S	R	R	T	2	MOSTLY CLOUDY
S	R	R	T	3	MOSTLY CLOUDY
B	R	R	D	1	MOSTLY CLOUDY
B	R	R	D	2	MOSTLY CLOUDY
B	R	R	D	3	MOSTLY CLOUDY
B	R	R	N	1	MOSTLY CLOUDY
B	R	R	N	2	MOSTLY CLOUDY
B	R	R	N	3	MOSTLY CLOUDY
B	R	R	T	1	MOSTLY CLOUDY
B	R	R	T	2	MOSTLY CLOUDY
B	R	R	T	3	MOSTLY CLOUDY
O	R	R	D	1	MOSTLY CLOUDY
O	R	R	D	2	MOSTLY CLOUDY
O	R	R	D	3	MOSTLY CLOUDY
O	R	R	N	1	MOSTLY CLOUDY
O	R	R	N	2	MOSTLY CLOUDY
O	R	R	N	3	MOSTLY CLOUDY
O	R	R	T	1	MOSTLY CLOUDY
O	R	R	T	2	MOSTLY CLOUDY
O	R	R	T	3	MOSTLY CLOUDY
C	O	R	D	1	SUNNY THIS MORNING, BECOMING MOSTLY CLOUDY BY NOON
C	O	R	D	2	VARIABLE CLOUDINESS
C	O	R	D	3	VARIABLE CLOUDINESS
	O	R	N	1	CLEAR, BECOMING MOSTLY CLOUDY BY MIDNIGHT
	O	R	N	2	BECOMING CLOUDY BY MIDNIGHT
	O	R	N	3	BECOMING CLOUDY
	O	R	T	1	CLEAR, BECOMING MOSTLY CLOUDY BY NOON
C	O	R	T	2	BECOMING CLOUDY BY NOON
C	O	R	T	3	BECOMING CLOUDY

S	O	R	D	1	MOSTLY CLOUDY
S	O	R	D	2	MOSTLY CLOUDY
S	O	R	D	3	MOSTLY CLOUDY
S	O	R	N	1	MOSTLY CLOUDY
S	O	R	N	2	MOSTLY CLOUDY
S	O	R	N	3	MOSTLY CLOUDY
S	O	R	T	1	MOSTLY CLOUDY
S	O	R	T	2	MOSTLY CLOUDY
S	O	R	T	3	MOSTLY CLOUDY
B	O	R	D	1	MOSTLY CLOUDY
B	O	R	D	2	MOSTLY CLOUDY
B	O	R	D	3	MOSTLY CLOUDY
B	O	R	N	1	MOSTLY CLOUDY
B	O	R	N	2	MOSTLY CLOUDY
B	O	R	N	3	MOSTLY CLOUDY
B	O	R	T	1	MOSTLY CLOUDY
B	O	R	T	2	MOSTLY CLOUDY
B	O	R	T	3	MOSTLY CLOUDY
O	O	R	D	1	OVERCAST SKIES THIS MORNING, WITH SOME SUNSHINE THIS AFTERNOON
O	O	R	D	2	CLOUDY
O	O	R	D	3	CLOUDY
O	O	R	N	1	CLOUDY
O	O	R	N	2	CLOUDY
O	O	R	N	3	CLOUDY
O	O	R	T	1	CLOUDY
O	O	R	T	2	CLOUDY
O	O	R	T	3	CLOUDY
C	C	O	D	1	CLEAR THIS MORNING, BECOMING CLOUDY BY EVENING
C	C	O	D	2	PARTLY CLOUDY
C	C	O	D	3	PARTLY CLOUDY
C	C	O	N	1	CLEAR, BECOMING CLOUDY BY MORNING
C	C	O	N	2	BECOMING CLOUDY BY MORNING
C	C	O	N	3	BECOMING CLOUDY
C	C	O	T	1	CLEAR, BECOMING CLOUDY BY EVENING
C	C	O	T	2	BECOMING CLOUDY BY EVENING
[illegible]	C	O	T	3	MOSTLY SUNNY
[illegible]	[illegible]	O	D	1	MOSTLY SUNNY THIS MORNING, BECOMING OVERCAST BY EVENING
[illegible]	[illegible]	O	D	2	VARIABLE CLOUDINESS
S	C	O	D	3	VARIABLE CLOUDINESS
S	C	O	N	1	VARIABLE CLOUDINESS
S	C	O	N	2	VARIABLE CLOUDINESS
S	C	O	N	3	VARIABLE CLOUDINESS
S	C	O	T	1	VARIABLE CLOUDINESS
S	C	O	T	2	VARIABLE CLOUDINESS
S	C	O	T	3	VARIABLE CLOUDINESS
B	C	O	D	1	MOSTLY SUNNY THIS MORNING, BECOMING CLOUDY BY EVENING
B	C	O	D	2	VARIABLE CLOUDINESS
B	C	O	D	3	VARIABLE CLOUDINESS
B	C	O	N	1	VARIABLE CLOUDINESS
B	C	O	N	2	VARIABLE CLOUDINESS
B	C	O	N	3	VARIABLE CLOUDINESS
B	C	O	T	1	VARIABLE CLOUDINESS
B	C	O	T	2	VARIABLE CLOUDINESS
B	C	O	T	3	VARIABLE CLOUDINESS
O	C	O	D	1	VARIABLE CLOUDINESS
O	C	O	D	2	VARIABLE CLOUDINESS
O	C	O	D	3	VARIABLE CLOUDINESS
O	C	O	N	1	VARIABLE CLOUDINESS
O	C	O	N	2	VARIABLE CLOUDINESS
O	C	O	N	3	VARIABLE CLOUDINESS
O	C	O	T	1	VARIABLE CLOUDINESS
O	C	O	T	2	VARIABLE CLOUDINESS
O	C	O	T	3	VARIABLE CLOUDINESS
C	S	O	D	1	CLEAR THIS MORNING, BECOMING CLOUDY BY EVENING
C	S	O	D	2	PARTLY CLOUDY
C	S	O	D	3	PARTLY CLOUDY
C	S	O	N	1	CLEAR, BECOMING CLOUDY BY MORNING
C	S	O	N	2	BECOMING CLOUDY BY MORNING
C	S	O	N	3	BECOMING CLOUDY
C	S	O	T	1	SUNNY, WITH INCREASING CLOUDINESS IN THE AFTERNOON
C	S	O	T	2	BECOMING CLOUDY IN THE AFTERNOON
C	S	O	T	3	BECOMING CLOUDY
S	S	O	D	1	MOSTLY SUNNY THIS MORNING, BECOMING OVERCAST BY EVENING
S	S	O	D	2	VARIABLE CLOUDINESS
S	S	O	D	3	VARIABLE CLOUDINESS
S	S	O	N	1	VARIABLE CLOUDINESS
[illegible]	S	O	N	2	VARIABLE CLOUDINESS
[illegible]	S	O	N	3	VARIABLE CLOUDINESS
[illegible]	S	O	T	1	MOSTLY SUNNY, WITH INCREASING CLOUDINESS IN THE AFTERNOON
S	S	O	T	2	VARIABLE CLOUDINESS
S	S	O	T	3	VARIABLE CLOUDINESS

MOSTLY SUNNY THIS MORNING, BECOMING CLOUDY BY EVENING	1	D	C	S
MOSTLY CLOUDY	2	D	C	S
MOSTLY CLOUDY	3	D	C	S
MOSTLY CLOUDY	1	N	C	S
MOSTLY CLOUDY	2	N	C	S
MOSTLY CLOUDY	3	N	C	S
MOSTLY CLOUDY	1	T	C	S
MOSTLY CLOUDY	2	T	C	S
MOSTLY CLOUDY	3	T	C	S
MOSTLY CLOUDY	1	D	C	S
MOSTLY CLOUDY	2	D	C	S
MOSTLY CLOUDY	3	D	C	S
MOSTLY CLOUDY	1	N	C	S
MOSTLY CLOUDY	2	N	C	S
MOSTLY CLOUDY	3	N	C	S
MOSTLY CLOUDY	1	T	C	S
MOSTLY CLOUDY	2	T	C	S
MOSTLY CLOUDY	3	T	C	S
SUNNY THIS MORNING, BECOMING MOSTLY CLOUDY BY NOON	1	D	C	C
MOSTLY CLOUDY	2	D	C	C
MOSTLY CLOUDY	3	D	C	C
CLEAR, BECOMING MOSTLY CLOUDY BY MIDNIGHT	1	N	C	C
BECOMING CLOUDY BY MIDNIGHT	2	N	C	C
BECOMING CLOUDY	3	N	C	C
SUNNY, WITH INCREASING CLOUDINESS IN THE AFTERNOON	1	T	C	C
BECOMING CLOUDY BY NOON	2	T	C	C
BECOMING CLOUDY	3	T	C	C
MOSTLY SUNNY THIS MORNING, BECOMING OVERCAST BY EVENING	1	D	B	S
MOSTLY CLOUDY	2	D	B	S
MOSTLY CLOUDY	3	D	B	S
MOSTLY CLOUDY	1	N	B	S
MOSTLY CLOUDY	2	N	B	S
MOSTLY CLOUDY	3	N	B	S
MOSTLY SUNNY, WITH INCREASING CLOUDINESS IN THE AFTERNOON	1	T	B	S
BECOMING CLOUDY IN THE AFTERNOON	2	T	B	S
BECOMING CLOUDY	3	T	B	S
MOSTLY CLOUDY	1	D	B	B
MOSTLY CLOUDY	2	D	B	B
MOSTLY CLOUDY	3	D	B	B
MOSTLY CLOUDY	1	N	B	B
MOSTLY CLOUDY	2	N	B	B
MOSTLY CLOUDY	3	N	B	B
MOSTLY CLOUDY	1	T	B	B
MOSTLY CLOUDY	2	T	B	B
MOSTLY CLOUDY	3	T	B	B
CLOUDY	1	D	O	B
CLOUDY	2	D	O	B
CLOUDY	3	D	O	B
CLOUDY	1	N	O	B
CLOUDY	2	N	O	B
CLOUDY	3	N	O	B
CLOUDY	1	T	O	B
CLOUDY	2	T	O	B
CLOUDY	3	T	O	B
SUNNY THIS MORNING, BECOMING OVERCAST BY MIDDAY	1	D	C	C
MOSTLY CLOUDY	2	D	C	C
MOSTLY CLOUDY	3	D	C	C
CLEAR, BECOMING CLOUDY BY MIDNIGHT	1	N	C	C
BECOMING CLOUDY BY MIDNIGHT	2	N	C	C
BECOMING CLOUDY	3	N	C	C
SUNNY, BECOMING CLOUDY BY NOON	1	T	C	C
BECOMING CLOUDY BY NOON	2	T	C	C
BECOMING CLOUDY	3	T	C	C
SUNNY THIS MORNING, BECOMING OVERCAST BY MIDDAY	1	D	C	S
MOSTLY CLOUDY	2	D	C	S
MOSTLY CLOUDY	3	D	C	S
MOSTLY CLOUDY	1	N	C	S
BECOMING OVERCAST BY MIDNIGHT	2	N	C	S
BECOMING OVERCAST	3	N	C	S
SUNNY, BECOMING CLOUDY BY NOON	1	T	C	S
BECOMING OVERCAST BY NOON	2	T	C	S
BECOMING OVERCAST	3	T	C	S
CLOUDY	1	D	C	B
CLOUDY	2	D	C	B
CLOUDY	3	D	C	B
CLOUDY	1	N	C	B
CLOUDY	2	N	C	B
CLOUDY	3	N	C	B
CLOUDY	1	T	C	B
CLOUDY	2	T	C	B
CLOUDY	3	T	C	B
OVERCAST	1	D	O	O
OVERCAST	2	D	O	O
OVERCAST	3	D	O	O
OVERCAST	1	N	O	O
OVERCAST	2	N	O	O
OVERCAST	3	N	O	O
OVERCAST	1	T	O	O
OVERCAST	2	T	O	O
OVERCAST	3	T	O	O

Consistency Check for Cloud Phrases from Period to Period.

First Phrase of Pair	Second Phrase of Pair	Second Phrase Changed to
clear	clearing	clear
mostly clear	clearing	mostly clear
sunny	clearing	mostly clear
mostly sunny	clearing	partly cloudy
partly cloudy	clearing	partly cloudy
clear	becoming sunny	sunny
mostly clear	becoming sunny	mostly sunny
overcast	becoming cloudy	cloudy
overcast	becoming overcast	overcast
cloudy	becoming cloudy	cloudy
cloudy	becoming overcast	cloudy
mostly cloudy	becoming mostly cloudy	mostly cloudy
mostly cloudy	becoming cloudy	cloudy
mostly cloudy	increasing cloudiness	mostly cloudy