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AN AUTOMATED PROCEDURE FOR COMPOSITION OF SEVERE WEATHER WATCH
AREAL REDEFINING STATEMENTS

Gordon A. Hammons
Regional Computer Management Group
Fort Worth, Texas

Scientific Services Division
Southern Region
Fort Worth, Texas
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UNITED STATES
DEPARTMENT OF COMMERCE
Malcolm Baldrige, Secretary

National Oceanic and
Atmospheric Administration
John V. Byrne, Administrator

National Weather
Service
Richard E. Hallgren, Director



An Automated Procedure for Composition of Severe
Weather Watch Area Redefining Statements

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I Current National Weather Service (NWS) policy requires that when a Tornado or Severe Thunderstorm Watch (commonly referred to as a "box") is issued by the National Severe Storms Forecast Center (NSSFC), each affected State Relay Center must issue a Redefining Statement (Areal Outline) describing the part of the state included in the Watch area. It is released to the public and is usually expressed in terms of whole counties, cities, or well-known geographical landmarks (see Weather Service Operations Manual, Chapter C-40).

Forecasters previously plotted the watch area on a map, then determined the affected counties visually; this was followed by manually sorting the counties by area, alphabetizing, and finally typing the Redefining Statement itself. This procedure is relatively time-consuming, usually is done under some pressure at unscheduled times, and is subject to various errors.

The Scientific Services Division of the Southern Region developed a FORTRAN program (REDEFINE) to produce the Redefining Statement automatically on AFOS, given only the size and orientation of the SELS watch "box" and the issue time. This memo describes the program and its use, as well as changes to the program made since the original issuance in 1979.

II PROGRAM LOGIC

The approximate outline of each county in a given state is defined in advance by up to 16 latitude/longitude points. These points may be up to 40 miles apart in the far Western U.S., but are usually much more closely spaced. A county is determined to be in a watch area only if a given number of that county's defining points (usually one) are inside the watch box.

The watch area itself is either a rectangle or a parallelogram defined by two endpoints and a given distance (half width) either side of, north-south of, or east-west of the line between the endpoints. The endpoints are given as a distance (statute miles) and direction (16 point compass) from pre-selected cities, as shown in Fig. 1.

The program logic consists mainly of comparing the geographic boundaries of the watch area with the coordinates of the county defining points. The rest is simply the formatting of the message itself. The county defining points and other constant data are determined in advance and stored on disk (either mass storage or diskette). Files contain only data pertaining to one state, so each State Relay Center requires a minimum of storage, as well as computation time, for this program.

As Table 1 shows, there are ten input fields; most are identical to those given in the SELS watch message as well as in the Preliminary Notification (WIBIS) message. A few additional points are emphasized below:

- 1) Data in each field must be right justified.
- 2) Each anchor point is specified by a distance and direction from a given city; if an anchor point is a city, use zero for the distance and the direction entry may be ignored.
- 3) Field number (10) indicates the shape and orientation of the box; two blanks indicate the box is a rectangle with ends oriented perpendicular to the line connecting the anchor points. The half-width is given in input field (9). NS(EW) specifies a parallelogram-shaped box with the ends oriented north-south (east-west) of the anchor points.

The issue time must be the same as given in the SELS message; format is not important, but text is limited to 40 characters. The completed message should appear as in Fig. 2b.

A MACRO file "REDEFINE.MC" is usually used to execute the program from the ADM; it is recommended that the macro contain the following command line:

```
REDEFINE.SV XX/S AAA/F II/B
```

where

```
XX is your two letter state abbreviation,  
AAA is your three letter WSFO ID, and,  
II is the two digit number representing the regional  
map background on which the "box" will be plotted.  
(Backgrounds B02 [North America] and B03 [United  
States] may also be used, as of Revision 3.00 and  
later versions of the program.)
```

Example:

```
REDEFINE.SV TX/S FTW/F 25/B
```

The program would then be run at an ADM with the command:

```
RUN:REDEFINE
```

Much "constant" data is also needed for REDEFINE to function; these data are prepared in advance (a one-time effort), and stored in RDOS data files. Detailed instructions on preparation of these files have been issued to all Southern Region State Relay Centers, and are included in the Appendix.

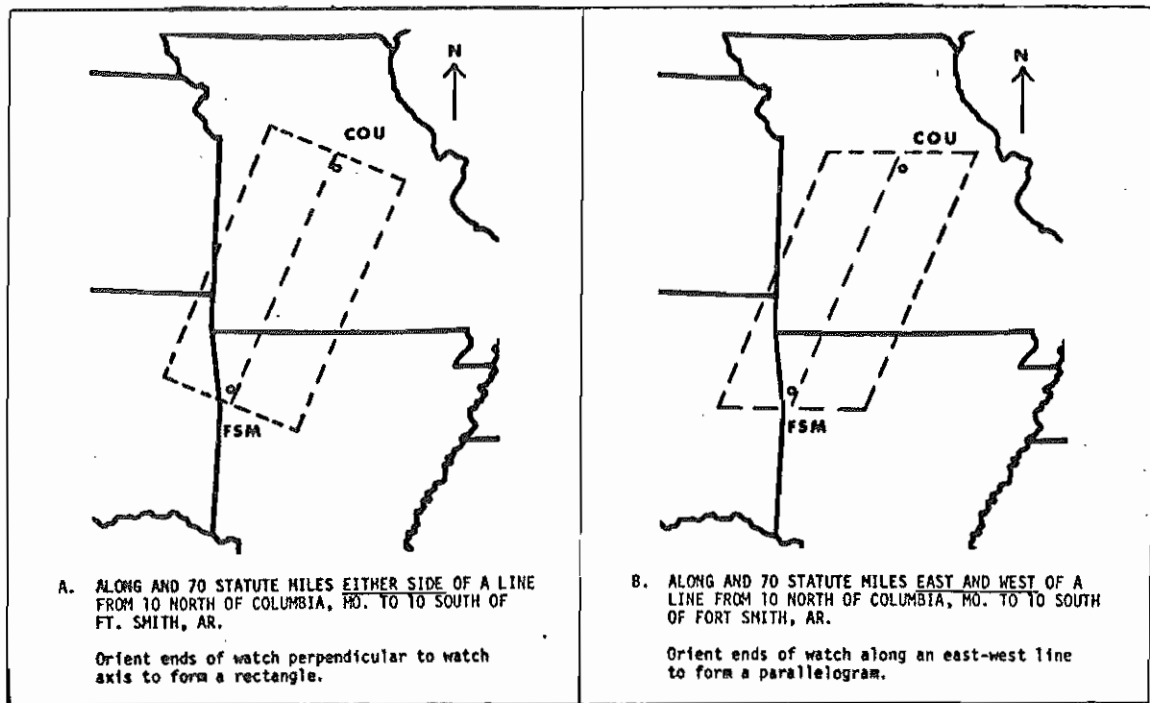


Figure 1. Two ways in which SELS may define severe weather watch areas.

III INPUT

REDEFINE has been designed to be run entirely from an AFOS console (ADM). Data are input by means of a PREFORMAT (Fig. 2a) and data are entered according to the instructions in Table 1 and the example above the input brackets.

Table 1

<p>WJUS00 KSRH 261923 TO INPUT WATCH MESSAGE</p> <p>1. FILL IN MESSAGE HEADER BLOCKS AS FOLLOWS:</p> <p>[ARE] [DEF] [INE] [000]</p> <p>2. STRIKE ENTER AND FILL IN THE PREFORMAT AS FOLLOWS:</p> <p>FIELD (1) IS EITHER T (FOR TORNADO) OR S (SEVERE THUNDERSTORM) WATCH FIELD (2) IS THE WATCH NUMBER FROM SELS (THREE DIGIT INTEGER) FIELD (3) IS STATUTE MILES FROM ANCHOR POINT #1 (THREE DIGIT INTEGER) FIELD (4) IS DIRECTION FROM ANCHOR POINT #1 (16 POINT COMPASS) FIELD (5) IS THE THREE-LETTER ID OF ANCHOR POINT #1 FIELD (6) IS STATUTE MILES FROM ANCHOR POINT #2 (THREE DIGIT INTEGER) FIELD (7) IS DIRECTION FROM ANCHOR POINT #2 (16 POINT COMPASS) FIELD (8) IS THE THREE-LETTER ID OF ANCHOR POINT #2 FIELD (9) IS THE HALF WIDTH OF THE WATCH BOX (3 DIGITS, STATUTE MILES) FIELD (10) IS SHAPE OF THE BOX (NS FOR NORTH/SOUTH OF A LINE, EW FOR EASE/WEST OF A LINE; EITHER SIDE OF A LINE IS DEFAULT.)</p> <p>NOTE: ALL FIELDS ARE RIGHT JUSTIFIED. FOR FIELDS 3 AND 6, USE 000 IF ANCHOR POINT IS AT THE STATION. AN EXAMPLE IS GIVEN AS PART OF THE PREFORMAT THAT FOLLOWS.</p>

```

SRHMCPRD
TTAA00 KSRH 161739
ENTER WATCH INFORMATION AS IN THE FOLLOWING EXAMPLE:

  T 123 020 SSW OKC 050   N END 070 EW
  [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] ]

ENTER ISSUE TIME BELOW(SAME AS IN SELS WATCH)
[ ]

NOW "TAB" TO THE BOTTOM BRACKETS AND STRIKE ENTER...

```

```

FTWJRKRED
TTAA00 KSRH 191314
ENTER WATCH INFORMATION AS IN THE FOLLOWING EXAMPLE:

  T 123 020 SSW OKC 050   N END 070 EW
  T 111 040 SW  ABI 050 NNE FTW 070

ENTER ISSUE TIME BELOW(SAME AS IN SELS WATCH)
015 AM CDT MONDAY AUGUST 19, 1985

NOW "TAB" TO THE BOTTOM BRACKETS AND STRIKE ENTER...

```

Figure 2. a) AFOS input PREFORMAT for REDEFINE. Data are entered in brackets. b) Example of completed input. See also Table 1.

IV PROGRAM OUTPUT

A. Alphanumeric Output

The output is divided into two parts - the redefine statement itself, and a zone/county breakdown that may be used in updating the appropriate zone forecasts.

The redefine statement (Fig. 3) is automatically stored into the AFOS database under the local node, category SLS, and the appropriate state abbreviation. You will be notified by the AFOS alert (the flashing red light on the ADM console) when the product is stored; clearing the alert (pressing the red button), produces the following message:

JOB REDEFINE COMPLETED: PRODUCT CCCSLSXX STORED

on the ADM. The CCCSLSXX gives the name of the product, where CCC is your node, and XX is the appropriate state abbreviation. The product may then be called up

in the usual manner by typing this identifier. It may be edited (if necessary) and then transmitted.

The zone/county breakdown (Fig. 4) is typed on the Dasher for information, since it is not transmitted and there is no need for it to be stored in the database. It gives information to determine which zone forecasts need to be updated with appropriate watch headings.

```

FTWSLSTX
TTAA00 KFTW 191316
AREAL OUTLINE FOR TORNADO WATCH NUMBER 111
NATIONAL WEATHER SERVICE FORT WORTH TX
015 AM CDT MONDAY AUGUST 19, 1985

IN TEXAS
THIS WATCH INCLUDES THE FOLLOWING COUNTIES...

IN NORTHWESTERN TEXAS          5 COUNTIES...
FISHER          KENT          NOLAN          SCURRY
STONEWALL

IN SOUTHWESTERN TEXAS         2 COUNTIES...
COKE            TOM GREEN

IN NORTH CENTRAL TEXAS      43 COUNTIES...
ARCHER          BAYLOR          BOSQUE          BROWN
CALLAHAN        CLAY            COLEMAN         COLLIN
COMANCHE        CONCHO         COOKE           DALLAS
DENTON          EASTLAND       ELLIS           ERATH
GRAYSON         HAMILTON       HASKELL         HILL
HOOD            JACK           JOHNSON         JONES
KAUFMAN         KNOX           MCCULLOCH       MILLS
MONTAGUE        PALO PINTO     PARKER          ROCKWALL
RUNNELS         SAN SABA       SHACKELFORD     SOMERVELL
STEPHENS        TARRANT       TAYLOR          THROCKMORTON
WICHITA         WISE           YOUNG
  
```

Figure 3. Completed county redefining statement (principal REDEFINE output). Note the standard TTAA00 header and that the product identifier now is the state abbreviation, rather than 0 - 9.

B. GRAPHIC OUTPUT

The program automatically produces a graphic product stored in the AFOS database as NMCGPHRED (Figure 5). The plotted watch "box" will be associated with the map background (II), as specified by the /B switch in the run command line.

Upon program completion, an alert is activated at the ADM; when the alert is cleared, the following message is displayed:

"JOB REDEFINE COMPLETED: PRODUCT NMCGPHRED STORED"

The graphic plot of the watch box may then be displayed by selecting a graphic display screen and simply entering the command "RED".

V PROGRAM FEATURES

This section gives details of the output and the relationship between input data and the resulting output. Let's first examine input fields one through ten (Table 1).

- 1) S(T) in field (1) indicates that the product is a severe thunder-storm (tornado) watch.
- 2) Field (2) is the watch number for the Redefining Statement.
- 3) Fields (3) through (10) identify the anchor points of the watch box, the half-width and the shape, as given in the SELS watch message; note that since most boxes are specified to be rectangular in shape (N miles either side of a line) this has been made the default value, that is, no entry is required in field (10) for rectangular boxes.
- 4) Finally, the issue time entered into the PREFORMAT is inserted into the heading unmodified.

Let's now examine the details of the message. The county list is normally introduced by the statement "Includes the following counties...". However, if the state is Louisiana, the word "counties" will be replaced by "parishes". The body of the redefine message lists all counties in the watch box alphabetically by geographic area of the state. Two features of this basic output require additional explanation - "pairing" and "coastal waters".

Pairing will add a county to the output list whenever a given nearby county is in the watch area. This feature is used primarily in metropolitan areas that are located within more than one county; for instance, the Dallas/Fort Worth Metroplex is contained in Dallas and Tarrant counties and the Fort Worth WSFO includes both counties when either is in a watch box. Counties which require pairing must be specified in advance when the data files are prepared (see Appendix). The coastal waters specification is used to list separately the counties with adjoining coastal waters. Like the "pairing" feature discussed above, this designation must be determined in the "constant" data file referred to previously. The effect of this feature is that for each area in which counties are designated to have coastal waters and are in the watch box, the phrase

--AND ADJOINING COASTAL WATERS OF THE FOLLOWING COUNTIES--

...list of counties...

is added to the message.

Space is allocated for up to 20 paired counties and 20 coastal counties in each area. If more are to be listed, a warning message is typed on the Dasher.


```

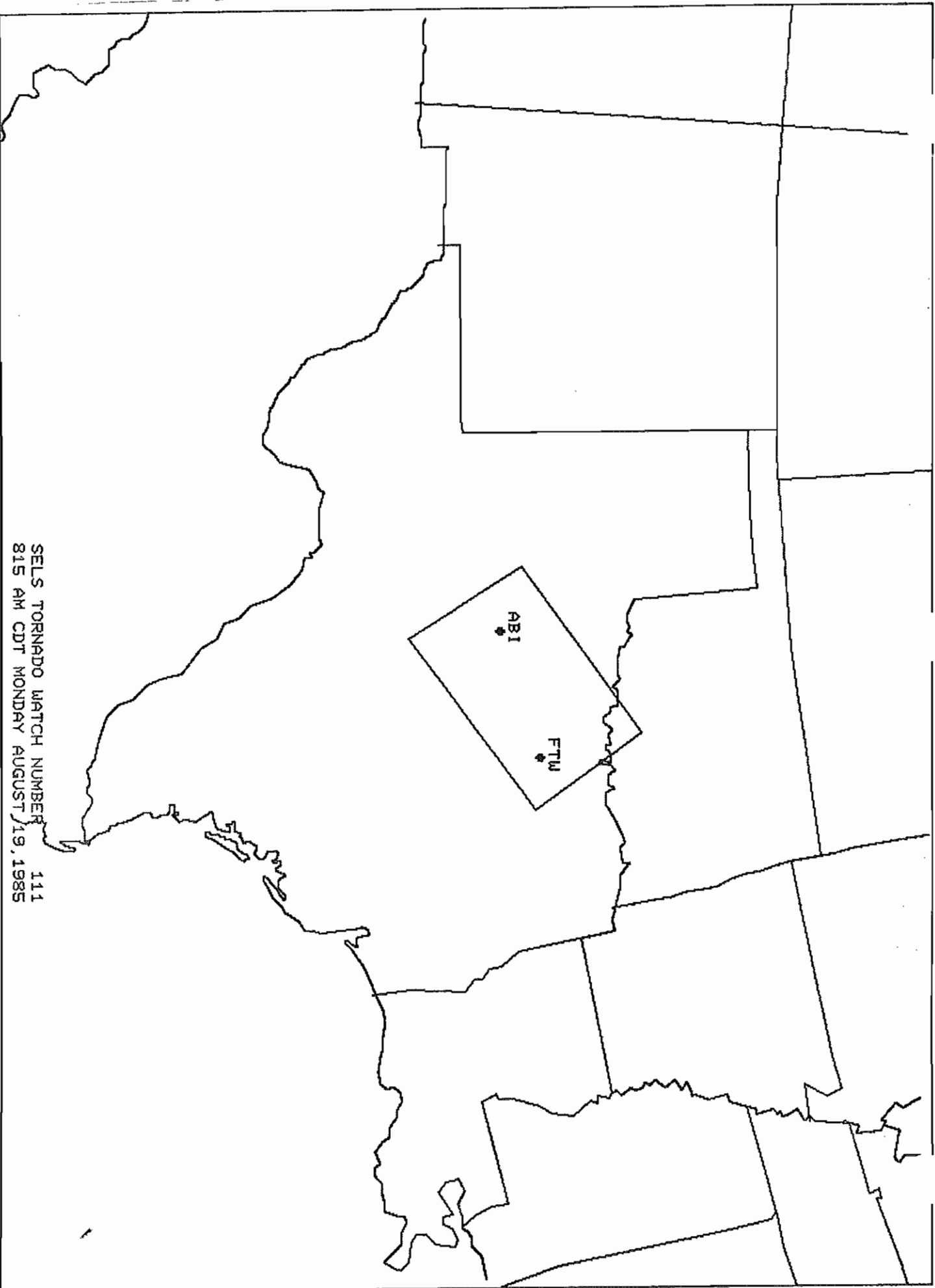
ZONES (OR PARISHES) AFFECTED IN TEXAS
ZONE (PARISHES)/COUNTIES
12 2 OF 5
   KENT STONEWALL
15 3 OF 4
   FISHER NOLAN SCURRY
17 2 OF 4
   COKE TOM GREEN
19 4 OF 7
   BAYLOR HASKELL KNOX THROCKMORTON
20 6 OF 6
   ARCHER CLAY JACK MONTAGUE
   WICHITA YOUNG
21 5 OF 5
   COLLIN COOKE DENTON GRAYSON
   WISE
24 4 OF 4
   CALLAHAN JONES SHACKELFORD TAYLOR
25 5 OF 5
   COMANCHE EASTLAND ERATH PALO PINTO
   STEPHENS
26 7 OF 7
   DALLAS ELLIS HOOD JOHNSON
   PARKER SOMERVELL TARRANT
27 2 OF 7
   KAUFMAN ROCKWALL
29 4 OF 4
   COLEMAN CONCHO MCCULLOCH RUNNELS
30 3 OF 4
   BROWN MILLS SAN SABA
31 3 OF 9
   BOSQUE HAMILTON HILL
NNNN
END OF REDEFINING STATEMENT

```

Figure 4. Example of zone/county "breakdown" generated by REDEFINE. This message is output on the printer/plotter and serves to alert the forecaster to the need for zone forecast updates.

VI SUMMARY

REDEFINE was designed to save time and effort in the preparation of the Watch Areal Outline. It should also be more accurate than hand plotting. The editing feature of AFOS gives the forecaster flexibility to make any changes in the program output which are deemed appropriate. Like any new program, some practice with the use of the program and associated procedure is needed; we recommend that all station personnel involved in watch or warning issuance become familiar with this program before it is needed. Remember, a watch situation is no time to be learning a new technique!



SELS TORNADO WATCH NUMBER 111
815 AM CDT MONDAY AUGUST 19, 1985

Figure 5. Example of plotted watch box - product NMC6PHRED.

APPENDIX

Instructions for Preparing Data Files for the REDEFINE Program

I INTRODUCTION

The Scientific Services Division of the Southern Region has developed a FORTRAN computer program to produce the Redefining Statement (Areal Outline) required when NSSFC issues a Severe Thunderstorm (or Tornado) Watch. The program runs in the background partition of AFOS, and the resulting output is stored in the AFOS database and may be displayed at a console upon completion of the program; the message may then be edited and/or transmitted. At the time it is used, all that needs to be entered are the endpoints, the half width, and the shape (e.g., either side, North-South or East-West of a line) of the watch box, and the issue time.

Although there is a minimum of input information at actual run time, much constant data must be prepared in advance and stored on disk. This appendix describes how to set up the required data files for your station.

II GENERAL DESCRIPTION

The REDEFINE program uses three data files as input. They contain constants defining the names and locations of cities from which the endpoints of the watch area are determined; data defining the names and locations of counties in your state; and the 16 points (maximum) outlining each county. Finally, there is additional information unique to a particular state, such as the number and names of the various areas (Central Oklahoma, for example), the number of counties in each area, and so forth. The program computes the latitude and longitude of the box endpoints using the distance and direction from key cities (named in the NSSFC message). Then using the given width and "shape", it computes the four corner points of the watch box; from there, it's a matter of trigonometry to compare the latitude/longitude of the county defining points with the location of the watch box to determine if any part of a county is in the box. We define a county to be in a watch area if a given number of county defining points are in the box. This number is a variable determined by you when you set up the data files (we've been using one). Finally, once the counties in the box have been determined, the rest is just a matter of formatting the counties into the appropriate message.

III USE OF THE EDITOR TO CREATE DATA FILES

You are requested to create, for your station's use, two data files that give information about your particular state (see below). To do this, we recommend that you use the EDIT feature of RDOS (see Chapter 5 of "Learning to Use Your RDOS/DOS System", and the June 25, 1979 copy of the "AFOS User Tips").

Examples 1 and 3 of the latter reference illustrate how to create as well as edit a file; although the examples are of creating a FORTRAN program, the procedure is used for data files as well. However, the name of the file should

have the extension .DT (instead of .FR), indicating these are data files. More details will be given below.

IV DIRECTORY OF U. S. CITIES

The REDEFINE program has been modified to access the master station directory (STDIR.MS) for the coordinates of the cities used to define the anchor points of the watch box. This file should be available on all AFOS systems, since it is already used in a number of background applications programs. Since there are a number of versions of this file, the user would be well-advised to check the contents against the list of key cities used by the National Severe Storms Forecast Center (available from SRH).

V THE COUNTY CENTERS FILE

This file is so named because it originally contained only the names and center points of each county in a state; however, to make the program more general, we've taken some data constants out of the body of the program and added them to this file, so each station could "tailor" the data to its area, and we could use the same program for everyone. The file we will discuss below is actually a sequentially organized file you will create with the Editor; later we'll show you how to create a randomly organized file from this one (See Sec. VII).

The first line of this file contains five data constants, each requiring three spaces; the positioning of this information is important, so be sure the data are right-justified in each of the three-character fields.

Figure 1 illustrates part of the data file for Oklahoma; let's discuss the first line. The constants shown are, in order.

- 1) The number of counties in the State (77)
- 2) The number of geographic areas (6)
- 3) The number of zones in the State (21)
- 4) The distance (in degrees and tenths) that approximates the radius of the largest county. (0.7 in the example; 9.9 maximum allowed)
- 5) The number of county defining points required to be in a watch box for a county to be included in the Redefine Statement (Use 1, unless notified otherwise)

The next one-to eight lines (variable) contain the number of counties in each zone. Use two spaces (right justified) for each number and put only 14 numbers on each line. (Also, be sure to put 14 on all except the last line; the last line can have 14 or less).

Again looking at Fig. 1, we see that, since Oklahoma has 21 zones (see above), we must use two lines for this particular data (21 zones/14 per line = 2

lines). Then zone 1 has 6 counties, zone 2 has 3 counties, and finally, zone 21 has 2 counties. Note that position is very important, since the N-th number must refer to the N-th zone.

The next line simply contains the name of your state (maximum of 28 characters allowed); please start in the first column, though. This entry is used for headings, so any space you leave will be included in the text.

The line after the state is the name of your WSFO (28 characters maximum) including the city and the state's abbreviation.

The next entries name the various geographic areas in the state, one line for each area. Hence, there will be as many lines as given by the second entry on line one. Put the entire name, including your state name (if used) on each line. This gives you more flexibility, since your text is not restricted to a given format; however, you must limit each of these lines to 28 characters.

The remainder of this file consists of data pertaining to individual counties - with all data for a particular county on one line.

Since our program does not sort the counties alphabetically, it will be necessary to order the counties by area and alphabetically within each area (see Fig. 1). This enables the program to list the counties alphabetically without sorting every time (since you've already done it). It also provides some organization, which makes checking your work easier.

These data have the following format:

COUNTY NAME	XXxxYYyy	ZO	AR	NP
← 16 Char →	← 8 Char →	← 2 Char →	← 2 Char →	← 3 Char →

NAME - The name of the county; maximum of 16 characters
 XX - Latitude of center of the county (degrees)
 xx - Latitude of center of the county (minutes)
 YY - Longitude of center of the county (degrees*)
 yy - Longitude of center of the county (minutes)
 ZO - Zone in which the county is located
 AR - Area in which the county is located**
 NP - Indicator for pairing counties together and for specifying coastal waters

The variable NP, as mentioned above, serves a dual purpose. First for pairing counties. That is, if you want a given county added when a nearby county is in a watch area. This is used primarily in metropolitan areas that

* If longitude is greater than 99 degrees, enter tens and units digits only (e.g., 105 degrees coded as 05).

** The number for an area corresponds to its order in the file. In Fig. 1, the Oklahoma Panhandle is area number three, for example.

are located within more than one county; for instance, the Dallas/Ft. Worth Metroplex is contained in Dallas and Tarrant counties, and it is a local rule at the Fort Worth WSFO to include both counties when either is in a watch box. To "pair" these two counties, simply set NP equal to the number of the other county; do this for both counties. If, for example, Dallas County were number 13 and Tarrant County number 19, then NP for Dallas County would be 19 and NP for Tarrant County would be 13. The county numbers are determined by the order in this file; also, it is important to make sure the counties in the file described in Section VI are in this exact same order. If the county is not paired, enter zero.

The other function of NP is for specifying counties having coastal waters. Add 500 to the value determined for the pairing feature if the county does have coastal waters. The effect of this will be to add, in the redefining statement, the statement:

AND ADJOINING COASTAL WATERS OF THE FOLLOWING COUNTY(IES):

(list of county names in the watch box)

if any of the coastal counties are in the watch box.

Finally, enter a line of blanks as the last line of this file.

This file must be named CENTER.DT. To do this, use the procedure illustrated in Example 1 of the referenced User's Tips; for this file line D of that example would become:

*GWCENTER.DT\$\$

Where \$ indicates striking the [esc] key.

VI THE COUNTIES FILE (COUNTIES.DT)

The counties file contains up to 16 points per county used to define the outline of that county; all data pertaining to a county are on one line (each line is defined by striking a carriage return). The counties must be in the same order as those in the CENTER.DT file (see Section V).

For each county defining point, eight characters are required as follows:

XXxxYYyy

Where XX is the latitude (degrees)
xx is the latitude (minutes)
YY* is the longitude (degrees)
yy is the longitude (minutes)

* Use same convention as in Section V

Hence, each line will consist of 128 characters (16 points x 8 characters/point). For counties with less than 16 defining points, enter 9999999 for each unused point.

Example:

Fig. 2 is a portion of the counties file for Oklahoma. Note that there are 128 characters per line (county), and that not all counties are defined by using 16 points, but have groups of nines to complete the 128 characters. Decoding the data for the first county (Canadian) we find that the first point is at latitude 35° 44' and longitude 98° 18'. There are eight points outlining this county, the last of which is at latitude 35° 33' and longitude 98° 18'. Note also that there are no spaces allowed in this data file.

You should use enough data points to outline a county so that if a watch area intrudes into that county, a point will likely fall in the box. Keep in mind as a guideline that in very large counties (mostly in the Western U.S.) that even if 16 points are used, the points will average around 40 miles apart. In contrast, states with small counties might find eight points adequate. Even distribution of the points is more desirable than defining the exact shape of the county. An actual defining point must be in the box for the county to be selected as being in the watch area. The program logic does not outline the county by "connecting the dots"! The important thing here is to use your judgment now when you create the data file; only your office will suffer inadequacies. And finally, a tornado watch situation is no time to wonder if the data are right or if enough points were used. We strongly urge you to make numerous test runs for practice as well as for checking accuracy, even after you've carefully checked your data files.

Create the file for your station using EDIT, and be sure you name it COUNTIES.DT; otherwise the REDEFINE program will not recognize it. To do this, see Example 1 of the referenced User's Tips; on line D of that example we would type *GWCOUNTIES.DT\$\$

where \$ indicates striking the [esc] key.

VII CREATION OF RANDOM COCENTER.DT FILE

When you have completed the file CENTER.DT (see Section V), you will be ready to convert the sequential file CENTER.DT to a randomly organized file called COCENTER.DT. A program called SEQTORA has been written to do this for you; hence, all that is required of you is to type the following on the Dasher:

GRAND COCENTER.DT

SEQTORA

These two commands will create the County Centers file to be used by the REDEFINE program.

VIII ERROR CHECKS

After you have carefully constructed your data files, you should still re-check numbers, spelling, station order, etc. To aid you in this, we've written a program (CKREDATA) to list your data in an orderly and more readable fashion; in addition, this program does a number of checks for reasonableness (e.g. are the Lat/Lon coordinates in the U.S.?) and for consistency (number of counties found equal to number specified, for instance).

The listed data are described by the headings printed; visual checks of your data can be more easily made from these lists than from the raw data files. In addition, some quality checks are made for you to help detect errors. A list of these follows:

- 1) Sum of the number of counties in each zone must equal the total number of counties given.
- 2) Counts counties found in each area; the sum of the number of counties in each area must equal the total number of counties given.
- 3) Minutes portion of Lat/Lon must be less than 60
- 4) Latitude: $24^{\circ} \leq \text{Lat} \leq 50^{\circ}$
- 5) Longitude: $125^{\circ} \geq \text{Lon} \geq 66^{\circ}$
- 6) Only 20 coastal counties, and 20 paired counties allowed in an area
- 7) The number of counties found in each zone must equal the number specified in the beginning of your file (see Section V).
- 8) All county defining points must be within the approximate county radius that is given as item four in the first line of the county centers file. If they are not, the program lists the county name, the defining point, and the county center point.

IX SUMMARY

The preceding should be adequate instructions on how to create data files necessary to run the REDEFINE program on AFOS. The operation of the program is very much dependent upon the accuracy of the files you created; once you have completed this work, we think you can use this program with confidence, and that, in the long run, it will save you much time and effort.

List of Figures

- Fig. 1 County Centers, etc.
- Fig. 2 County Defining Points

X REFERENCES

- 1) "AFOS User Tips", June 25, 1979. National Weather Service, Southern Region.
- 2) Southern Region Program Note No. 5, Rev. No. 3, "Areal Redefine Program". August, 1985.
- 3) Southern Region Program Note No. 18, "Master Station Directory File Maintenance Programs".

77 6 210.7 1
 6 3 4 4 3 2 3 5 4 3 5 6 3 4
 3 2 5 4 3 3 2

OKLAHOMA
 OKLAHOMA CITY OK
 CENTRAL OKLAHOMA
 NORTHEAST OKLAHOMA
 THE OKLAHOMA PANHANDLE
 SOUTHEAST OKLAHOMA
 NORTHWEST OKLAHOMA
 SOUTHWEST OKLAHOMA
 CANADIAN 3533980011 1 0
 CLEVELAND 3511971711 1 0
 GRADY 3502975311 1 0
 KINGFISHER 3557975616 1 0
 LINCOLN 3542965310 1 0
 LOGAN 3557972410 1 0
 MCCLAIN 3500972611 1 0
 OKLAHOMA 3533972411 1 0
 PAYNE 3606970010 1 0
 POTTAWATOMIE 35129658 9 1 0
 SEMINOLE 35119636 9 1 0
 ADAIR 35579439 1 2 0
 CHEROKEE 35539500 1 2 0
 CRAIG 36469513 1 2 0
 CREEK 35549622 3 2 0
 DELAWARE 36269448 1 2 0
 KAY 3647970817 2 0
 MAYES 36179513 1 2 0
 MCINTOSH 35239536 4 2 0
 MUSKOGEE 35389525 4 2 0
 NOBLE 3623971317 2 0
 NOWATA 36479537 2 2 0
 OKFUSKEE 35309623 4 2 0
 OKMULGEE 35429557 4 2 0
 OSAGE 36369626 2 2 0
 OTTAWA 36509448 1 2 0
 PAWNEE 3619964317 2 0
 ROGERS 36229536 3 2 0
 SEQUOYAH 35309443 6 2 0
 TULSA 36079555 3 2 0
 WAGONER 35579531 3 2 0
 WASHINGTON 36429554 2 2 0
 BEAVER 3645002820 3 0
 CIMARRON 3645023121 3 0
 TEXAS 3645013021 3 0
 ATOKA 34229602 8 4 0
 BRYAN 33589617 8 4 0
 CARTER 3415971512 4 0
 CHOCTAW 34029534 7 4 0
 COAL 34369618 8 4 0
 GARVIN 3441971812 4 0
 HASKELL 35149508 5 4 0
 HUGHES 35039614 9 4 0
 JOHNSTON (listing terminated...)

Figure 1. Example of file
 CENTER.DT for Oklahoma.
 Only part of the file is
 listed. See text for
 explanation of data on
 each line. When converted
 from a sequential file to
 a random file (by using
 the program SEQTORA), this
 file will become COCENTER.DT.