ATTACHMENT #3

EASTERN REGION TECHNICAL ATTACHMENT
No. 85-9
June 17, 1985

## SEVERE WEATHER OUTBREAK OF 31 MAY 1985

A major severe weather episode occured during the late afternoon and evening hours of 31 May over northeastern Ohio, northwestern Pennsylvania and western New York. Numerous fatalities and extensive property damage occured on this day.

A moderate degree of instability preceded the severe weather outbreak with energy index EI1 generally in the 20's during the morning in advance of the approaching cold front and then increasing to about 70 as the severe weather developed in late afternoon. Strong synoptic scale forcing contributed to the severity of the weather this day. An intense surface low was located in Ontario with a cold front trailing southwestward and an upper level trough with strong positive vorticity advection moved over the region during the afternoon.

Severe weather began developing in Ohio soon after 2000GMT and was well predicted by the 2-6 hour severe weather probabilities, AFOS product Ø10 -- available about 1900GMT. The 2-6 hour probabilities for the time period 2000-0000GMT are shown in figure 1 with severe weather events* plotted for the same time period. The threshold probability for this time period was 20 percent, and is indicated by the heavy dashed line in figure 1. It is seen that nearly all the severe weather events fall within the threshold contour. The Ø10 chart for the period 2300-0300GMT also performed well, with nearly all the severe events for this period falling within the threshold probability of 18 percent shown in figure 2. Notice that the tornado 'T' and wind damage 'W' in Ohio, which were not predicted in figure 1, are located within the threshold contour for the following time period 2300-0300GMT in figure 2.

Figure 3 shows tornado tracks and "F" classifications which occured between 2000GMT and 0300GMT. The dashed line encloses the area where the 2-6 hour severe weather probability exceeds threshold values for either the time period of figure 1 or figure 2. The most intense tornadoes occured where

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* Events plotted are from the NSSFC Preliminary List (AFOS product STADTS), which may be missing a few events. Of course, Canadian events are not included and there were many.

probabilities were highest. All tornadoes originated within the threshold boundary of figure 3.

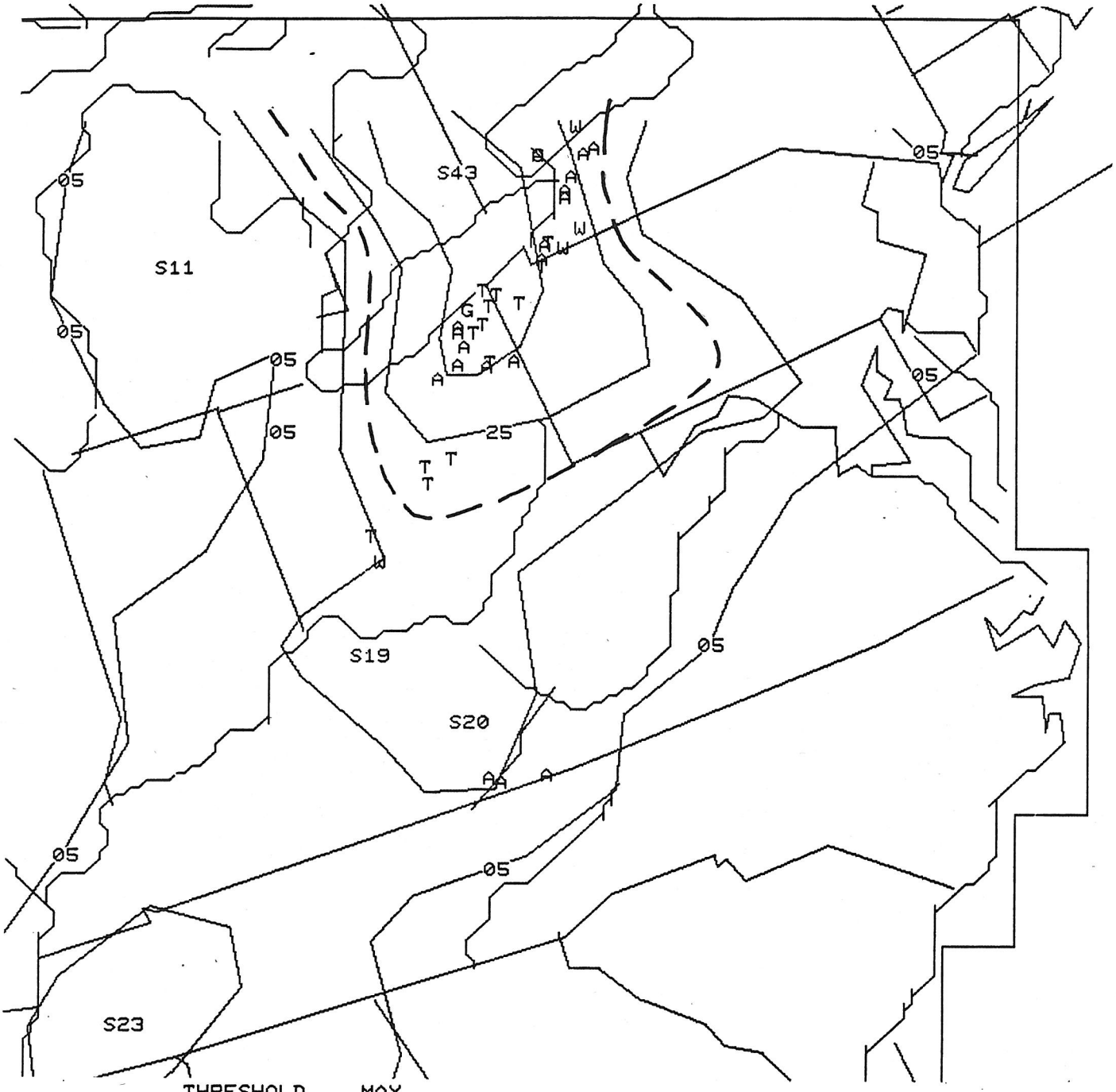
The evolution of radar echoes between 1835GMT and 2035GMT is shown in figures 4 through 6. A rapid increase in convective activity is shown over southern Ontario at 1935GMT, figure 5, and another rapid increase in northeastern Ohio the following hour, 2035GMT, figure 6, with tops to 51 thousand feet. The first tornadoes were reported a half hour later at 2105GMT.

A cooperative experiment involving SSD and six WSFO's is currently underway, in which VIP values in an area having probabilities exceeding threshold values of the Ø1O chart, the threat area, are related to severe weather occurences during the following hour. It is expected that a VIP maximum inside the threat area will indicate a high probability of severe weather during the following hour in the MDR box having the maximum VIP or an adjacent MDR box. We have not yet received the results for this severe episode, but good results are expected.

Experience with 2-6 hour severe weather probabilities (AFOS product Ø1O) during the last two years has shown that it is a very good tool for delineating areas of impending severe weather. It has good reliability and we strongly recommend that it be used.

SCIENTIFIC SERVICES DIVISION, ERH
June 17, 1985

Attachments (Figures 1 through 3)

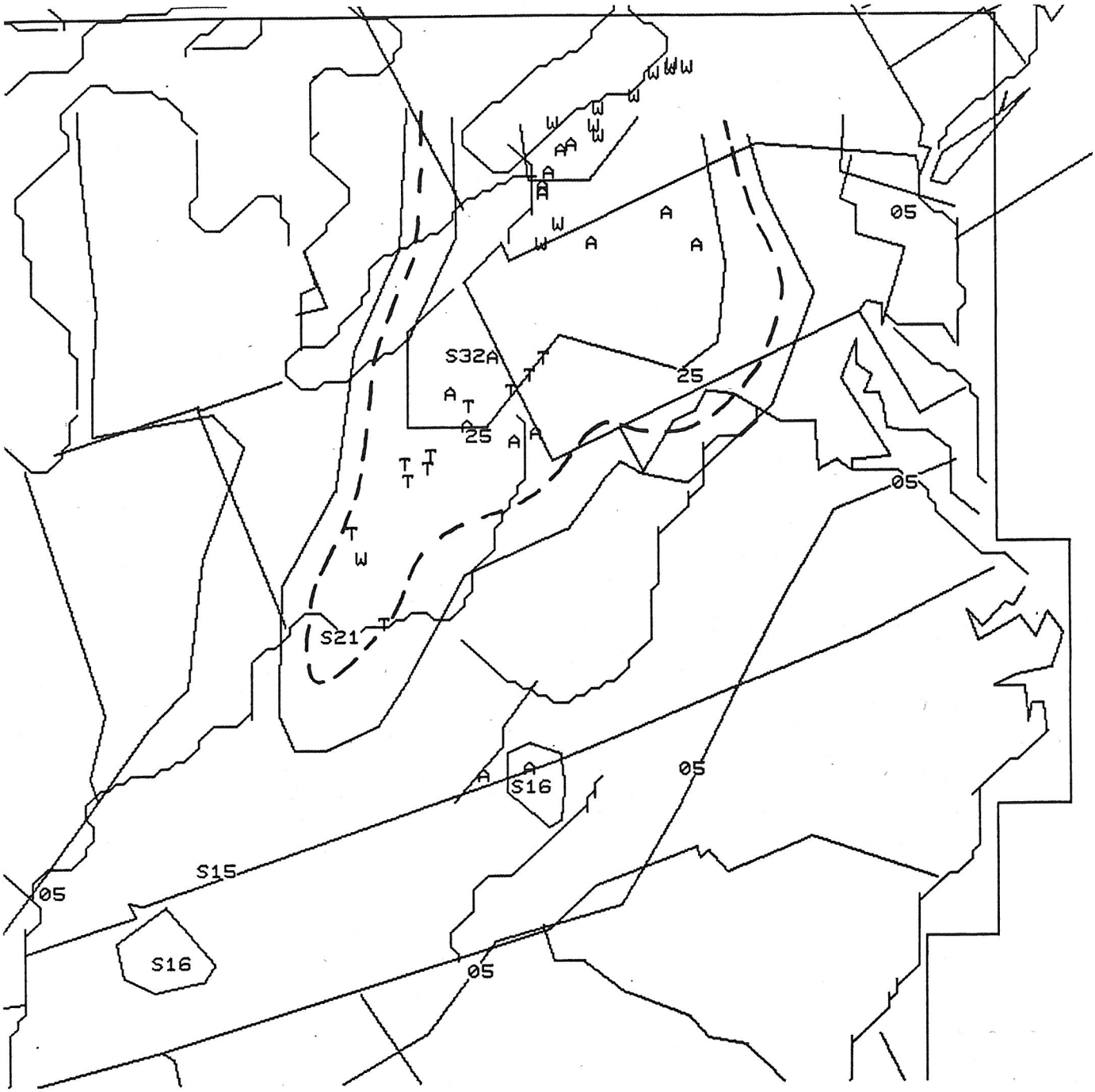



| AREA | THRESHOLD PROB(PCT) | MAX PROB(PCT) |
|---|---|---|
| GREAT PLAINS | 19 | 100 |
| NORTHEAST | 20 | 100 |
| GULF COAST | 16 | 60 |

2-6 HR SVR STORMS PROB(PCT)

VALID FRI 31 MAY 1985 20- 0Z

Figure 1. 2-6 hour severe weather probabilities, AFOS product Ø1O, with severe weather events for the same time period 2000-0000GMT. The heavy dashed line encloses the area where probabilities exceed threshold values.




| AREA | THRESHOLD PROB(PCT) | MAX PROB(PCT) |
|---|---|---|
| GREAT PLAINS | 19 | 80 |
| NORTHEAST | 18 | 80 |
| GULF COAST | 16 | 70 |

2-6 HR SVR STORMS PROB(PCT)

VALID FRI 31 MAY 1985 23- 3Z

Figure 2. 2-6 hour severe weather probabilities, AFOS product Ø1O, with severe weather events for the same time period 2300-0300GMT. The heavy dashed line encloses the area where probabilities exceed threshold values.

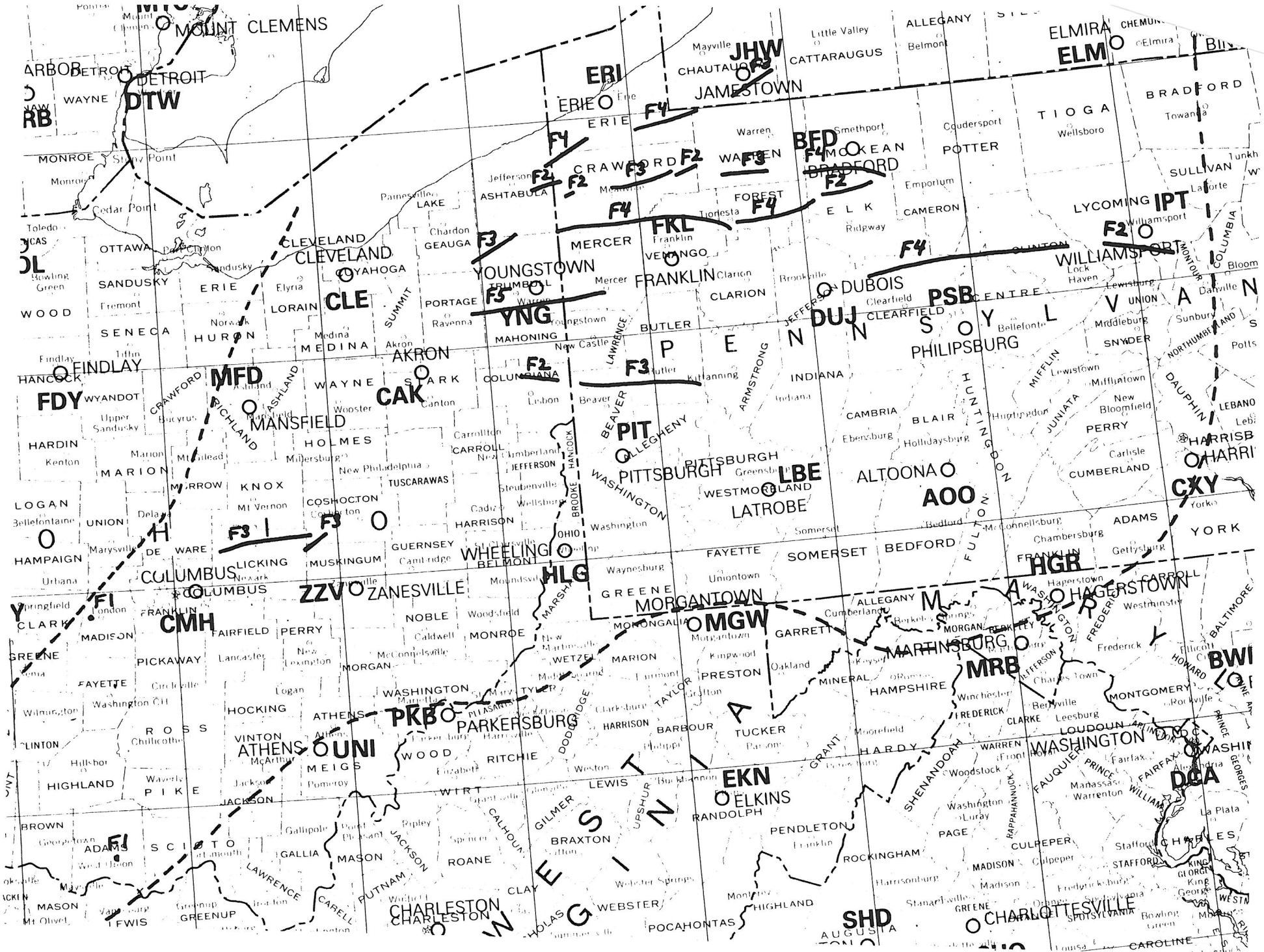



Figure 3. Tornado tracks with "F" classifications during the period 2000-0300GMT. The dashed line indicates area where probabilities exceed threshold values for either time periods shown in Figures 1 or 2.

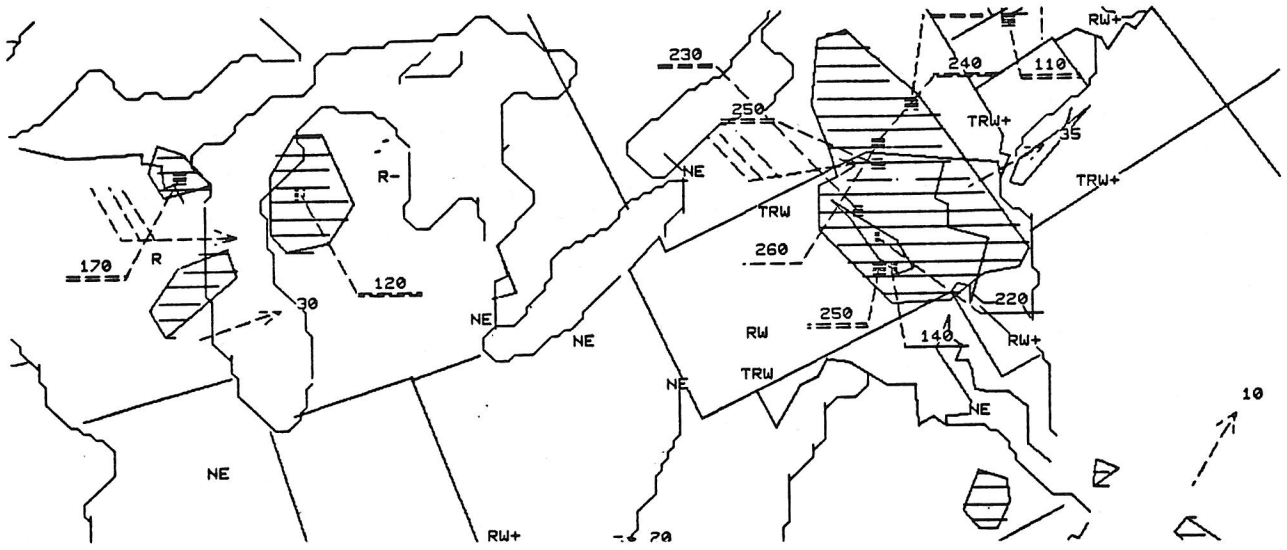



Fig. 4. Radar 1835GMT

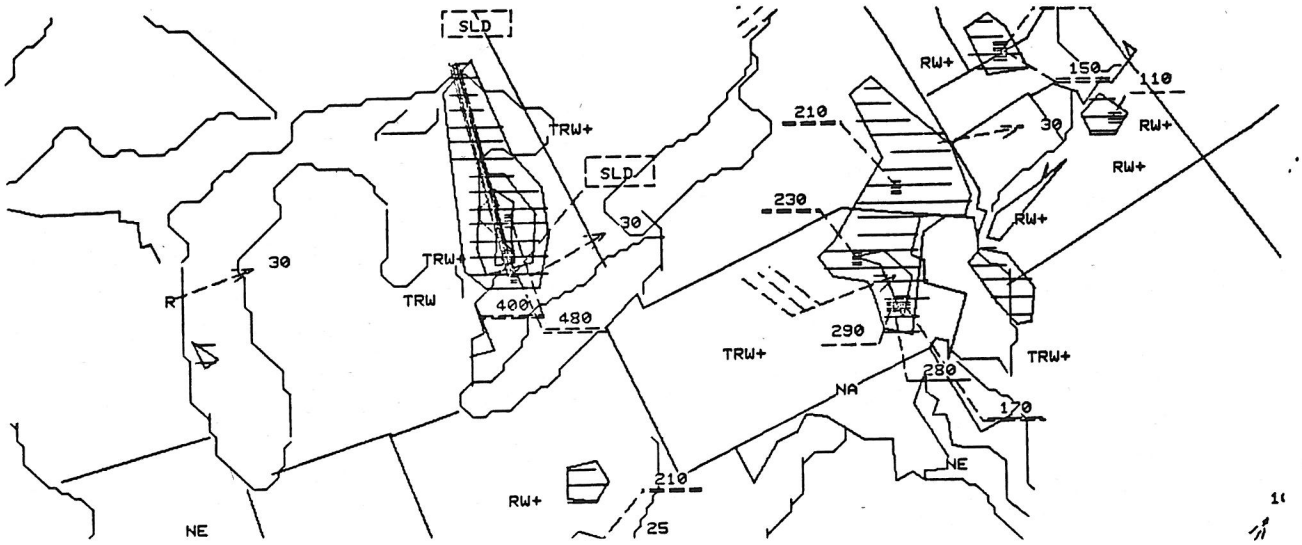



Fig. 5. Radar 1935GMT

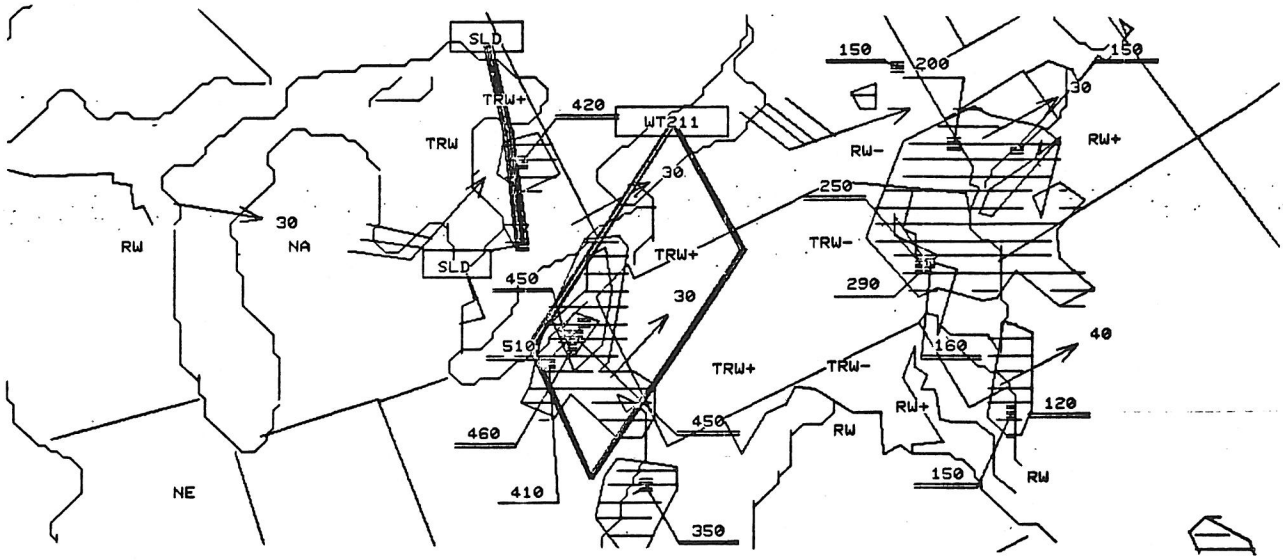



Fig. 6. Radar 2035Z