

Meteorology Surrounding the Aerosol Event of August 8-14, 2002

General: A slow-moving high pressure system centered over the Great Lakes set up northerly flow over the MANE-VU region on 8/8. The High drifted southeast-ward and became extended over several days bringing high temperatures to the region. Calm conditions east of MANE-VU on August 10 were pivotal in the formation of fine aerosol concentrations, which began building in the Ohio river valley. Over the next four days concentrations in the MANE-VU region climbed into the 60-90 $\mu\text{g}/\text{m}^3$ range over a wide area before being swept out to sea by a series of frontal passages beginning on 8/15.

8/8 – A high pressure system over the Great Lakes produces NW-N prevailing surface winds (~4-8 mph) throughout the region. Maximum daily temperatures approach or exceed 80 $^{\circ}\text{F}$.

8/9 – Wind speeds fall off but direction remains NW-N as the High moves into the central portion of MANE-VU. Temperatures rise as cloud cover declines.

8/10 – The High reaches the east coast and stalls. Temperatures (except in northern-most areas) reach 90 $^{\circ}\text{F}$ while surface-level winds turn to more southerly directions. Calm conditions through the morning hours in the lower Ohio river valley promote creation of haze noted in surface observations.

8/11 – Circulation around the High (now near Cape Hatteras) becomes well established. Peak temperatures are in the low to mid-90's. Morning winds are low-to-calm in the area east of the Mississippi – the area of haze now reaches from Michigan to northern Texas and eastward to West Virginia and eastern Tennessee. A surface-level trough descends from north of the Great Lakes during the day, passes eastward through the Ohio valley and stalls over the Alleghenies and southward.

8/12 – Temperatures exceed 90 $^{\circ}\text{F}$ throughout MANE-VU except in coastal ME. The area of concentrated haze has pushed eastward and now extends from central ME to central PA. Haze builds throughout the day MANE-VU as circulation forces it to channel NE between the stalled trough and a cold front approaching from the mid-west.

8/13 – Calm conditions prevail as the trough reaches coastal NJ by 8 AM. Generally clear skies allow temperatures to reach the mid-90's everywhere except in coastal ME. Dew points, which had been rising since 8/8, reach the upper 60's. Peak hourly fine aerosol concentrations are greater than 40 $\mu\text{g}/\text{m}^3$ everywhere in MANE-VU and exceed 90 $\mu\text{g}/\text{m}^3$ in some locations. By 8 PM, showers associated with the approaching cold front have reached into Ohio.

8/14 – By 8 AM the trough has dissipated and the High is moving offshore. Dew points remain in the upper 60's and peak temperatures reach into the 90's everywhere and top 100 in several locations. Increased ventilation causes aerosol concentrations to drop throughout the day everywhere except ME where some locations peak above 60 $\mu\text{g}/\text{m}^3$ after midnight.

8/15 – The approaching cold front and associated showers fall apart during the morning hours. By 8 PM a new batch of moderate rain has intruded deeply into the region from the SW and has virtually pushed the haze out of MANE-VU.