

The February 7 to 12, 2007, Front Range Fine Particulate Air Pollution Episode

March 1, 2007

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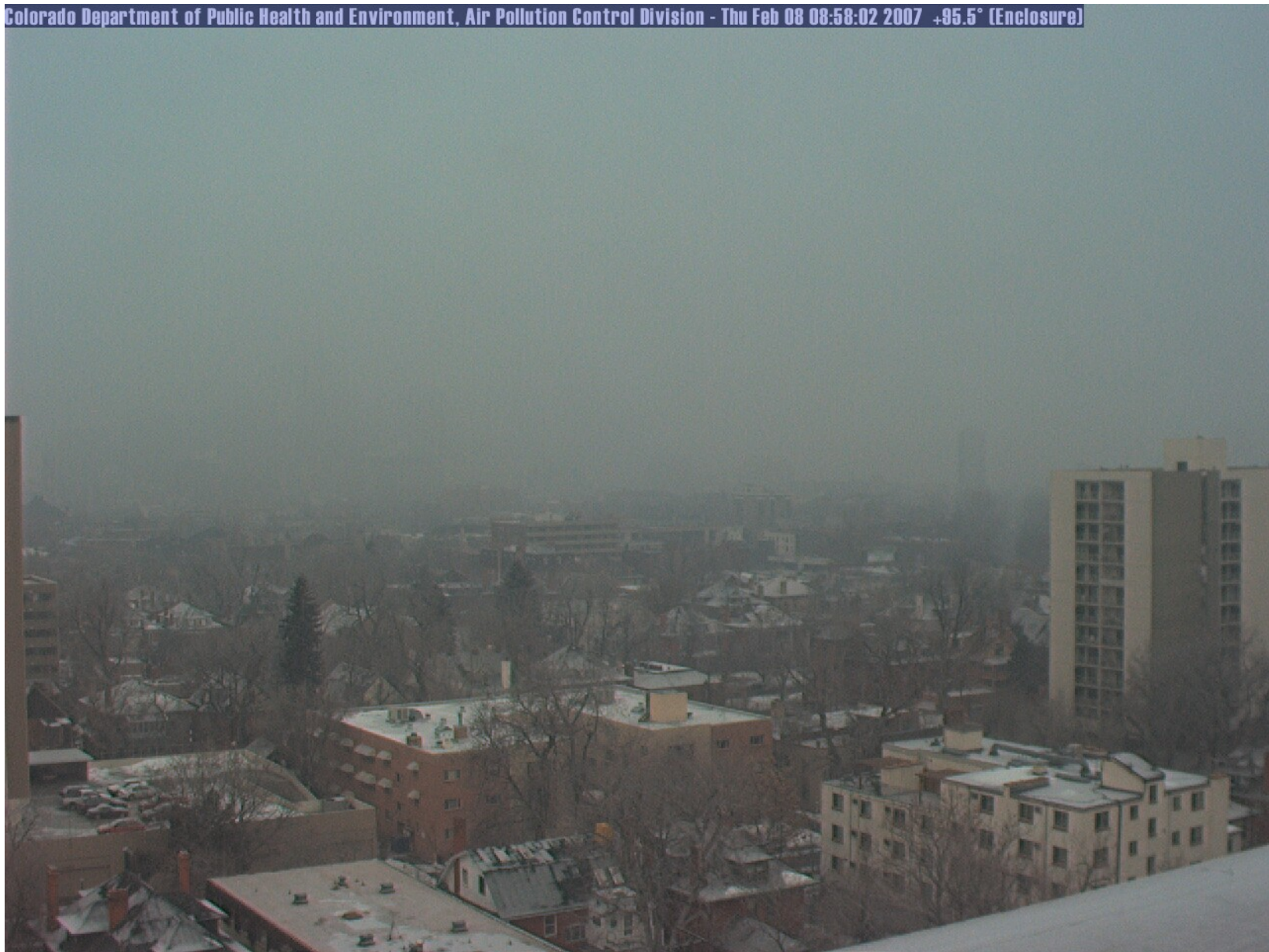
Air Pollution Control Division

Colorado Department of Public Health and Environment

Key Factors Contributing to This Episode

- A “blocking pattern” in the jet stream kept eastern Colorado under the thin western edge of an Arctic air mass for several days.
- This is the same pattern that gave Upstate New York nearly 10 feet of snow.
- Persistent snow cover here enhanced nighttime inversions and limited daytime dissipation of these inversions.
- Snow cover also enhanced the pooling of cold air along the Platte Valley. Local circulations moved a shallow layer of cold air southward across the metro area.
- Fog associated with upslope on the eastern plains enhanced the formation of secondary particulates – a classic case of smog.
- A buildup of particulates on road surfaces may have contributed.

Images for February 8 show the cycle of morning fog leading to secondary particulate formation and afternoon smog.



9 AM Thursday February 8, 2007

Colorado Department of Public Health and Environment, Air Pollution Control Division - Thu Feb 08 14:00:31 2007 +96.5° [Enclosure]

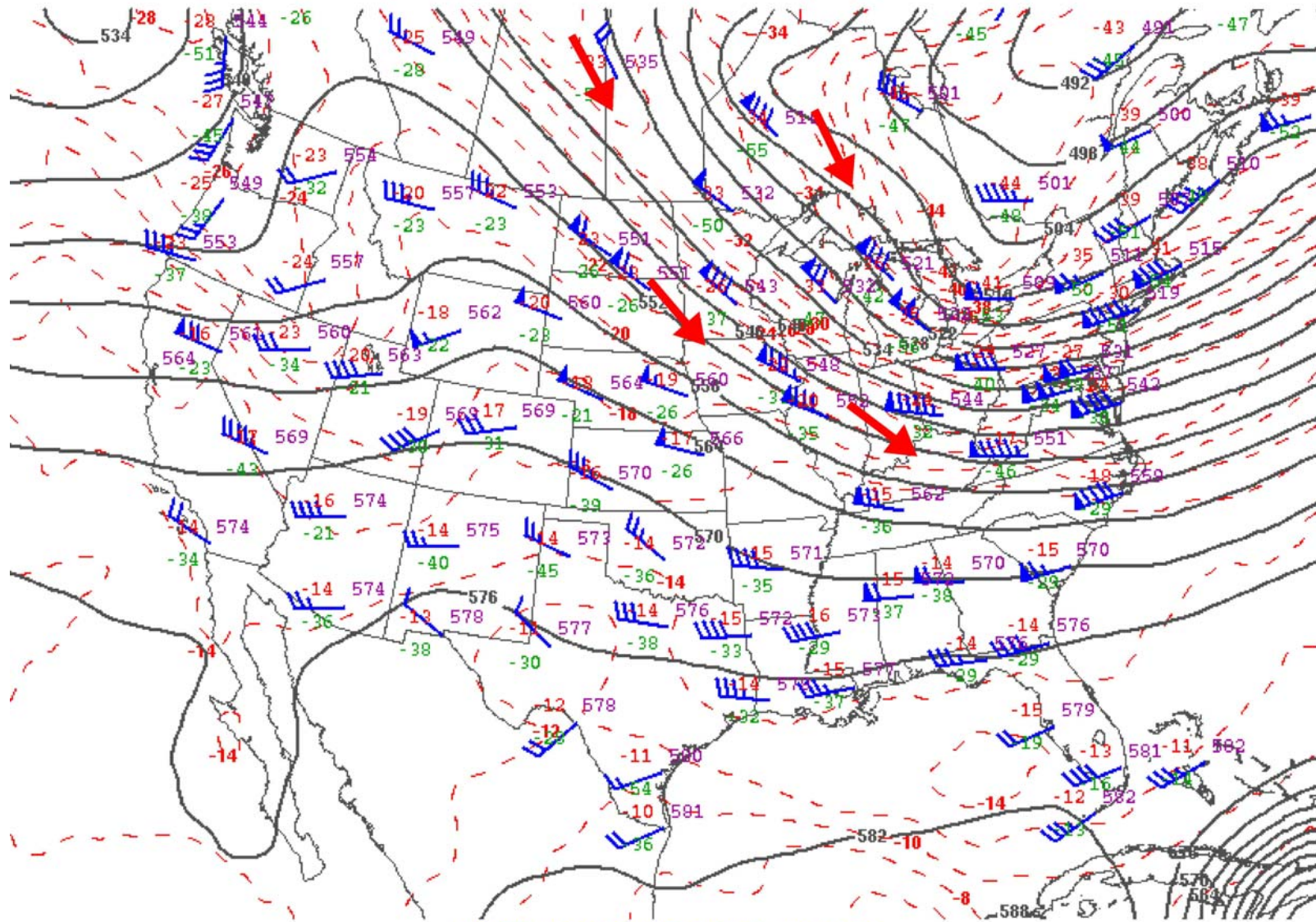


2 PM Thursday February 8, 2007

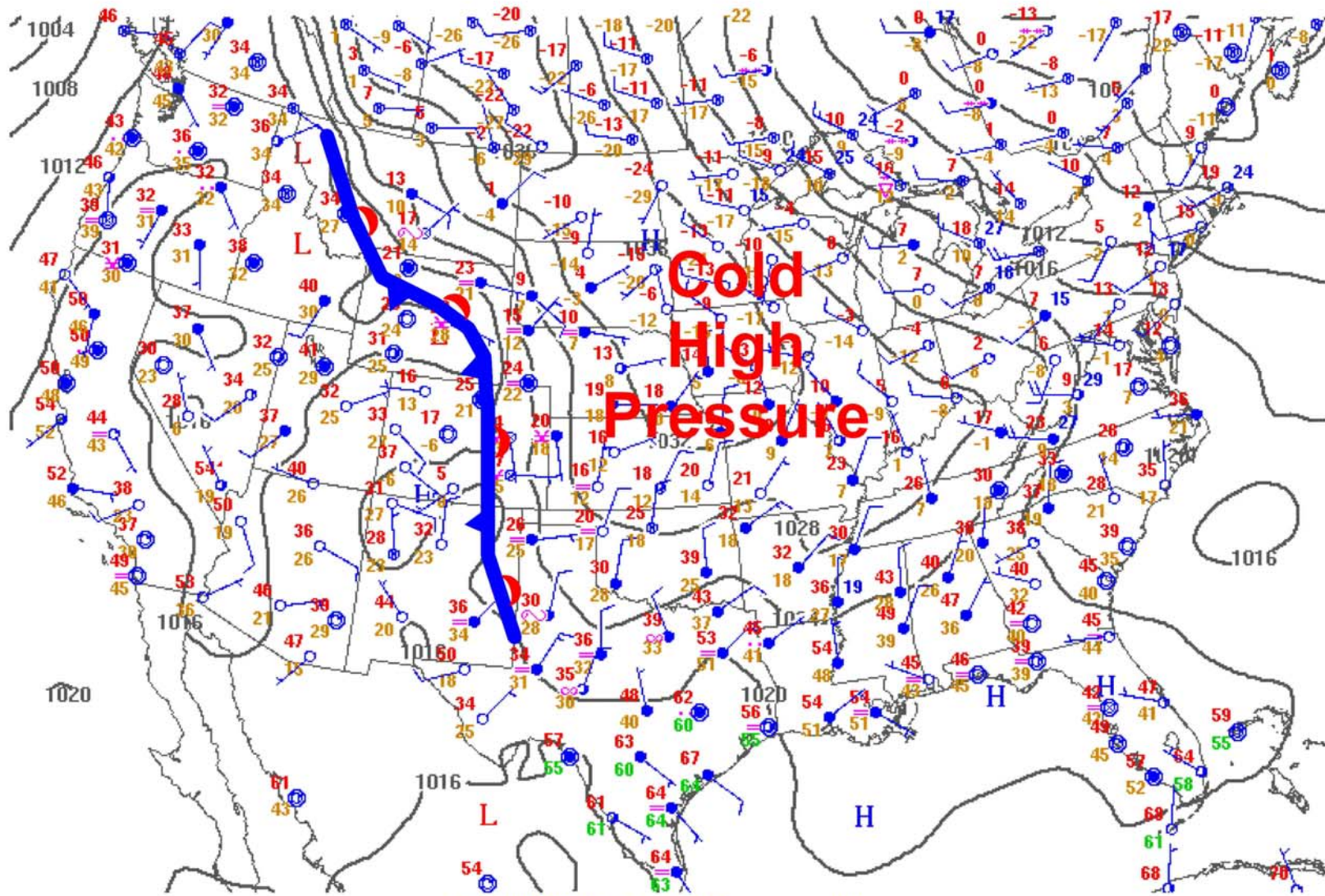


4 PM Thursday February 8, 2007

Upper air and surface weather maps for February 8 show the typical meteorological pattern for the air pollution episode.

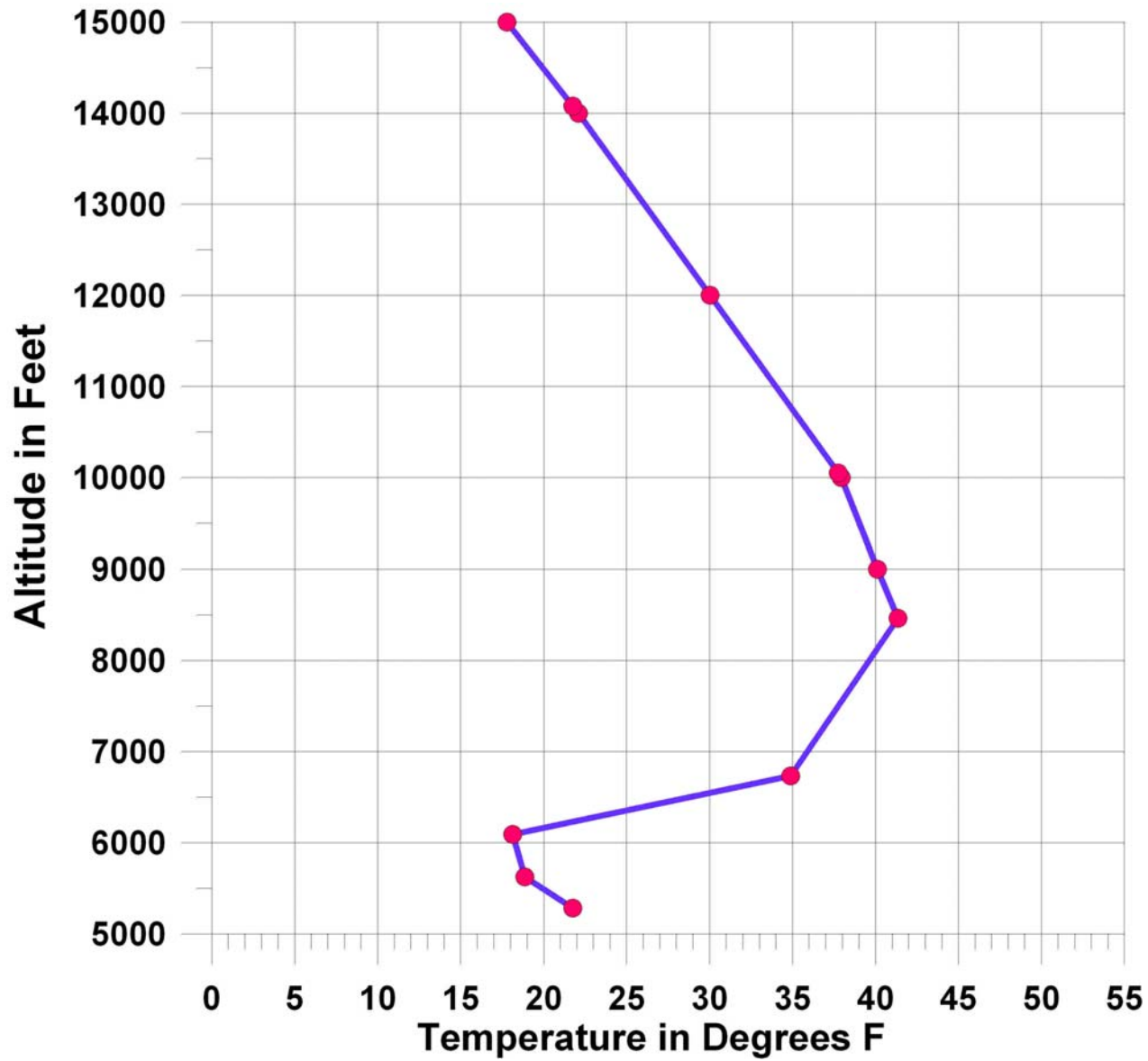


070208/1200 500 MB UA OBS, HGHTS, and TEMPS

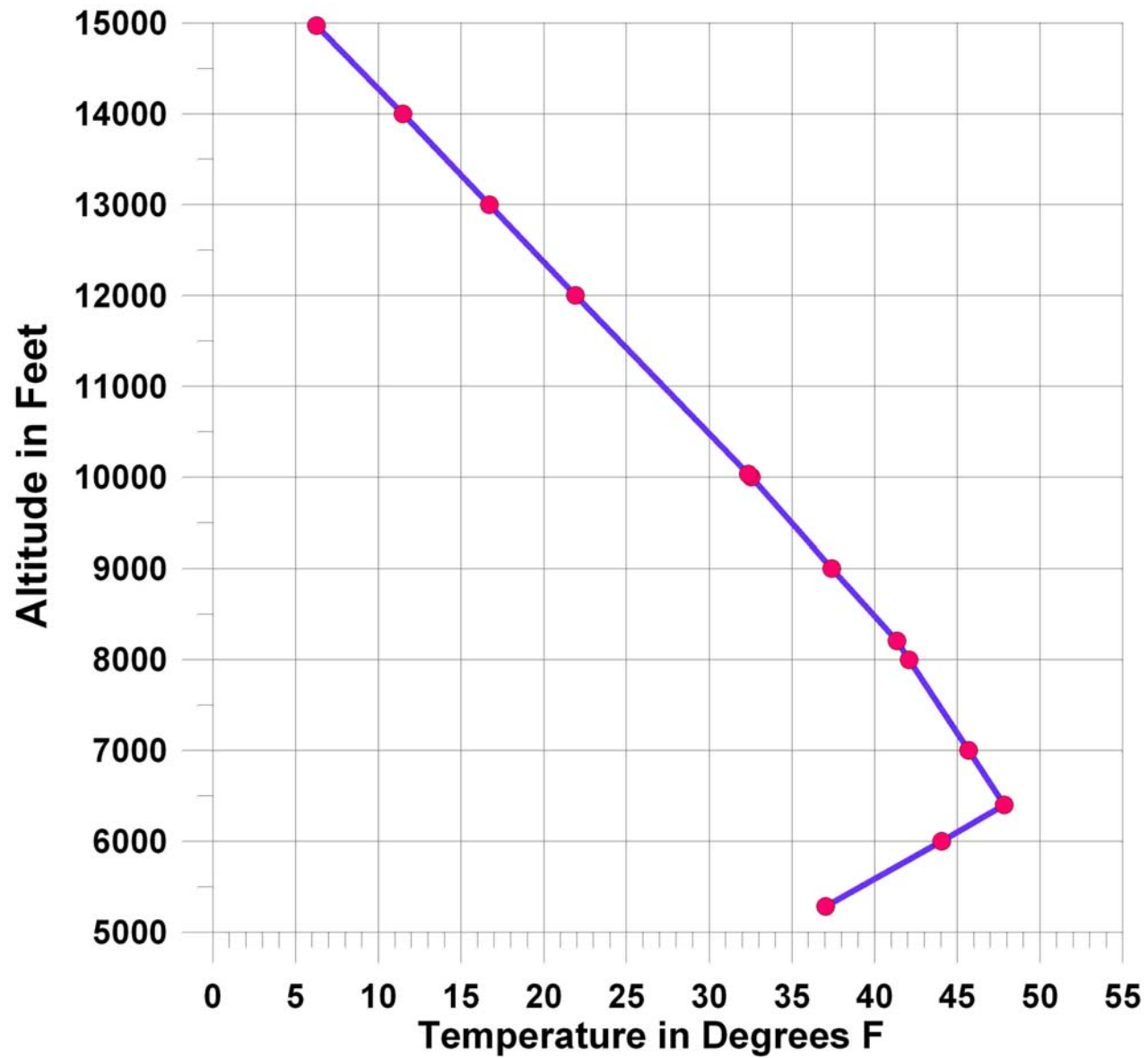


070208/1200 Surface OA Pressure and Obs
 Weather, Temp, Dvpt, Gusts

Morning and evening soundings for February 8 show the presence of a shallow surface inversion.

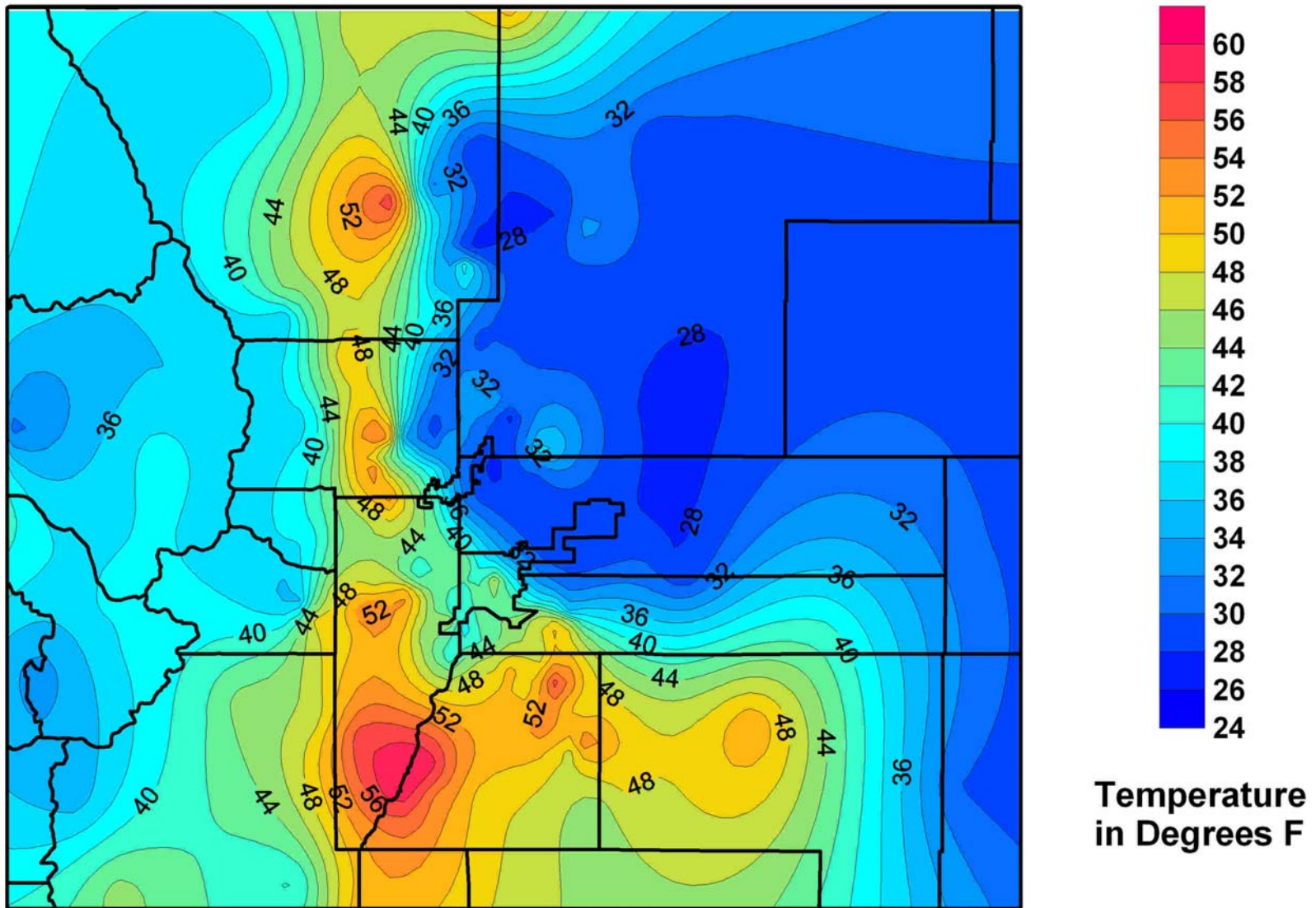


Denver sounding for 5 AM MST on February 8, 2007

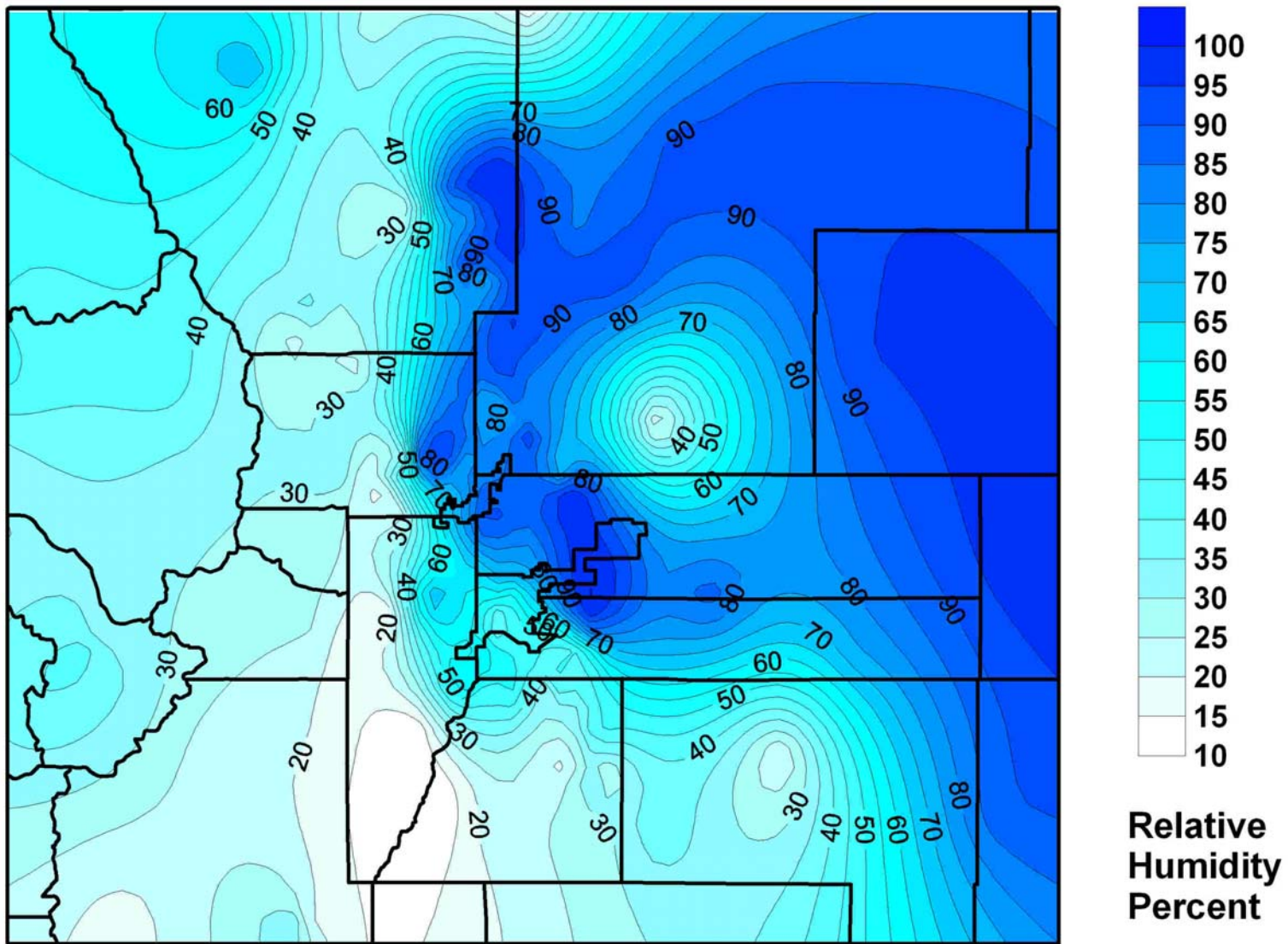


Denver sounding for 5 PM MST on February 8, 2007

Plots of Front Range surface temperatures and relative humidity reveal plains and Platte Valley cold pooling and high humidity.

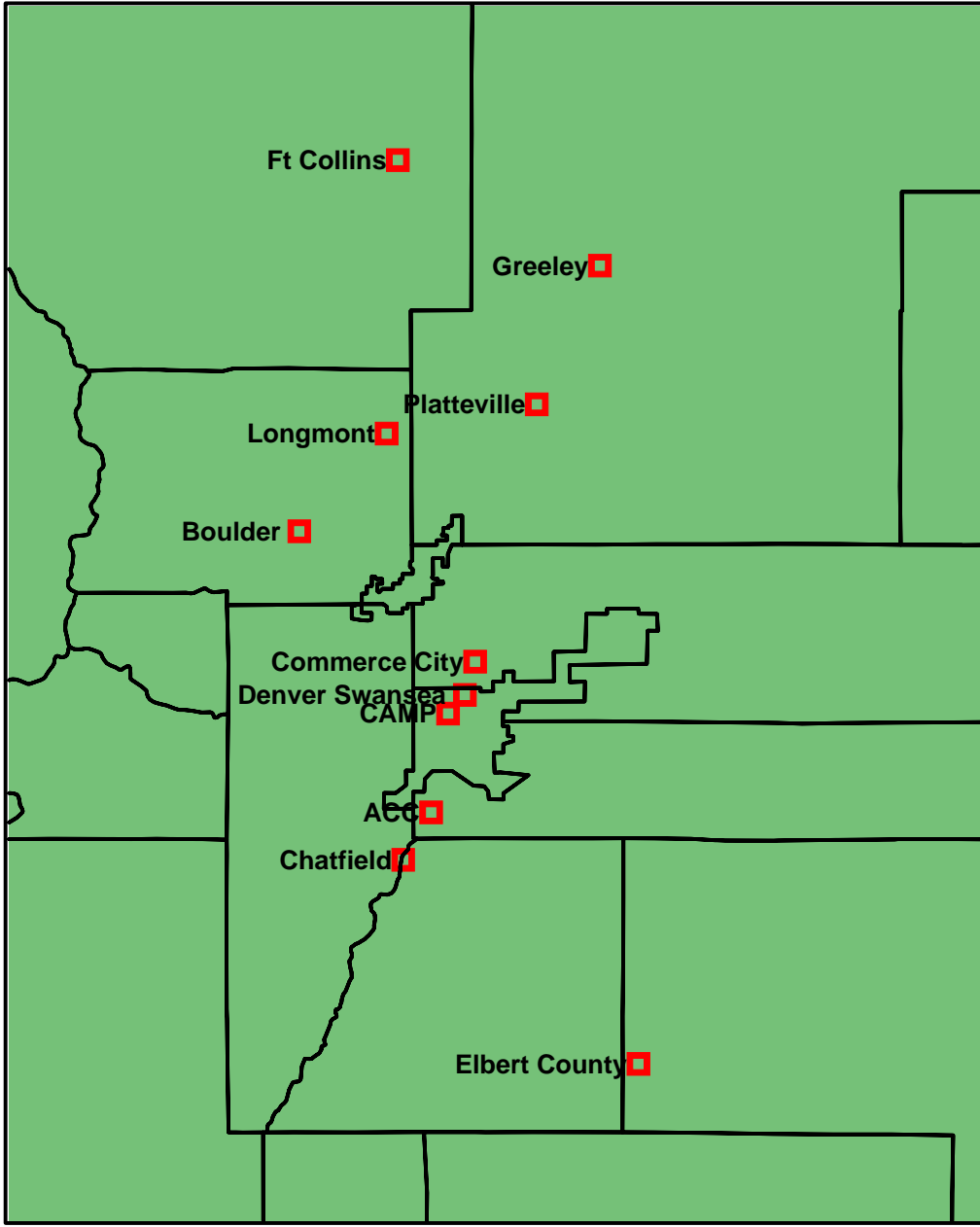


Surface temperature contours at 1:45 PM February 8 2007



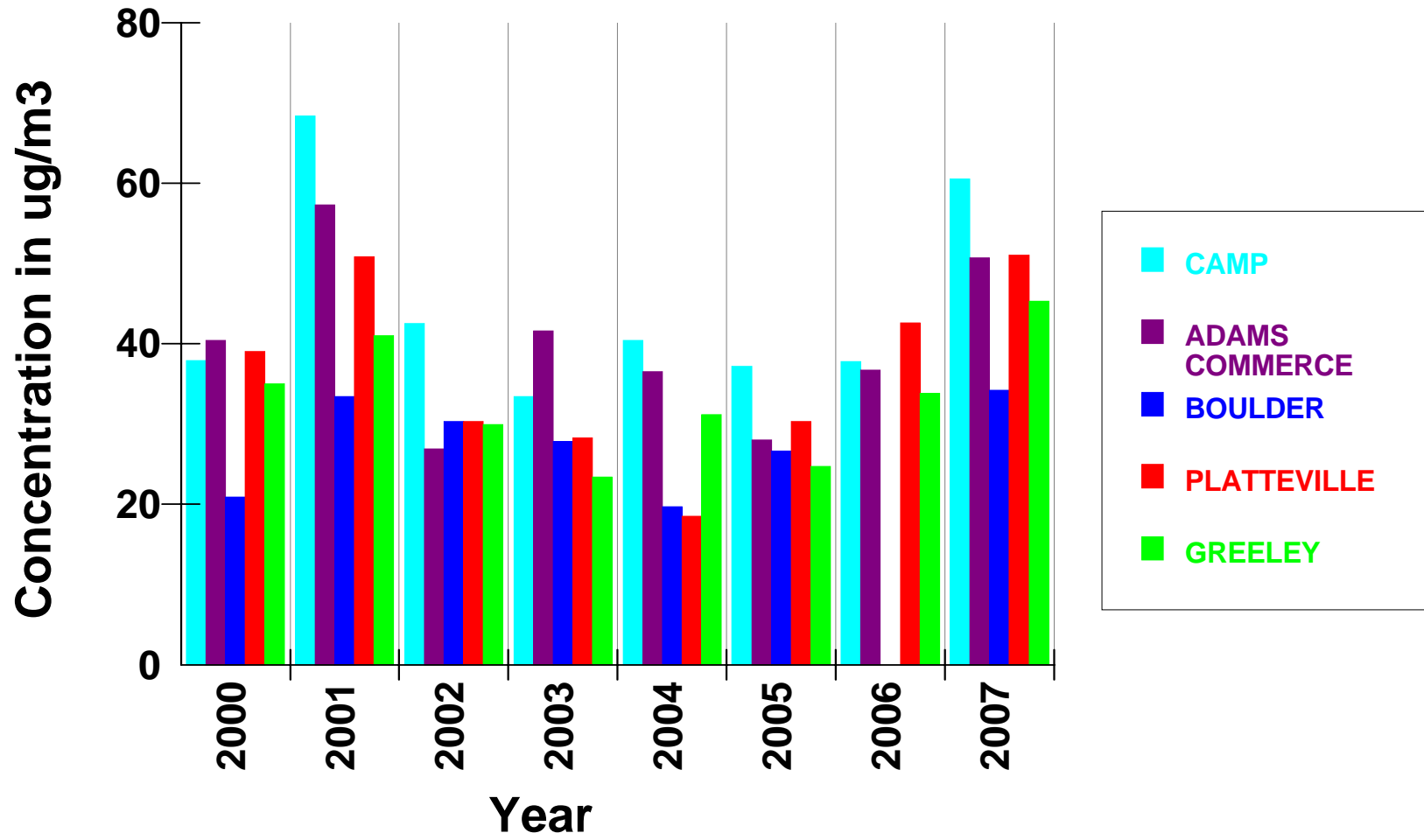
Surface relative humidity contours at 1:45 PM February 8 2007

- The Air Division uses a variety of monitor types to measure PM_{2.5}. Only Federal Reference Monitor (FRM) concentrations are officially counted against the standard.
- The FRM monitors do not capture secondaries as well as the real-time FDMS TEOM monitors. Data from these monitors is reported on our real-time AQI web pages.
- The following chart shows annual max PM_{2.5} data from FRM monitors for the last several years. Although the recent episode had high values, our highest FRM concentrations to date occurred in February of 2001.
- Although the higher real-time FDMS TEOM values do not count against the standard, they are used by both the Air Division and the EPA for advisories and health alerts.



Front Range
PM2.5 Monitor
Locations

Annual Max 24-hour PM2.5



February, 2007, PM2.5 Event

Preliminary 24-hr. Average PM2.5 Concentrations (ug/m³) Federal Reference Method Monitors

(Midnight to midnight, many 24-hr. running averages were higher. Exceedances in red.)

Date	Camp	Swansea	Commerce City	Greeley	Platteville	Boulder	Arapahoe	Chatfield
2/7	38.8	41.9						
2/8	60.5	55.2	50.7	30.2	30.0	26.3	60.1	46.8
2/9	29.6	25.2						
2/10	53.6	50.2						
2/11	36.9	41.9	48.7	45.3	51.0	25.0	17.8	5.9
2/12	29.1	32.0						

Federal Reference Method (FRM) monitor data is used by the EPA to determine attainment.

**Preliminary 24-hr. Average PM2.5 Exceedance Concentrations (ug/m³)
Real-time TEOM monitors
(Midnight to midnight, many 24-hr. running averages were higher.)**

Date	Camp	Commerce City	National Jewish Hospital	Chatfield	Boulder	Greeley
2/7	45.0	19.6	32.8	33.2	26.1	4.0
2/8	75.6	32.7	65.2	58.3	24.8	8.6
2/9	38.4	5.7	29.8	35.6	17.1	3.1
2/10	64.5	24.6	46.4	35.7	39.3	19.8
2/11	53.7	25.7	29.5	13.1	30.8	28.5
2/12	43	10.9	32.7	28.5	34.1	16.8

CAMP, Boulder, Chatfield, and National Jewish TEOM monitors are able to capture secondary particulates and will generally read higher than co-located FRM monitors.

The following table shows the highest 24-hour concentrations allowable at each site in 2007. Values higher than this would trigger a violation of the new standard.

Site	2004-2006 PM2.5 24-hr 3-Year Average (98th Percentile Value)	Highest Allowable 2007 PM2.5 24-hr (98th Percentile Value)
Arapahoe	21	65
Boulder	18	71
CAMP	26	53
Chatfield	-	-
Commerce City	24	59
Greeley	23	61
Longmont	20	68
National Jewish	not available	-
Platteville	19	66
Swansea	not available	57