

Air Monitoring in Garfield County



15 April 2008

“Smart Citizen Series” Presentation



Reasons for Air Monitoring

- EPA requirements
- NAAQS compliance
- Permit related
- Local concerns and requests
- Community assistance



Monitoring Overview

- Designed to protect public health
- EPA has 6 “Criteria” pollutants for National Ambient Air Quality Standards (NAAQS)
 - CO, O₃, NO₂, SO₂, PM (PM₁₀ & PM_{2.5}), Pb
- Performed across State of Colorado
 - approximately 60 sites
 - Sites added or removed based on needs and concentrations recorded
- Mainly in population centers
- Different types
 - “Continuous” provides hourly values
 - CO, O₃, NO_x, SO₂, PM₁₀, PM_{2.5}, meteorology
 - “Daily” provides 24-hour values
 - PM₁₀, PM_{2.5}, air toxics

National Ambient Air Quality Standards

POLLUTANT	AVERAGING TIME	STANDARD
Carbon Monoxide (CO)		
Primary Standard	1 Hour	35 ppm
Primary Standard	8 Hour	9 ppm
Ozone (O ₃)		
Primary and Secondary Standards (up to 1997)	1 Hour	0.12 ppm
Primary and Secondary Standards (as of July 1997)	8 Hour	0.08 ppm
Primary and Secondary Standards (as of May 2008)	8 Hour	0.075 ppm
Nitrogen Dioxide (NO ₂)		
Primary and Secondary Standards	Annual Arithmetic Mean	0.053 ppm
Sulfur Dioxide (SO ₂)		
Primary Standard	Annual Arithmetic Mean	0.030 ppm
Primary Standard	24 Hour	0.14 ppm
Secondary Standard	3 Hour	0.5 ppm
Particulates (PM ₁₀)		
Primary and Secondary Standards	24 Hour	150 µg/m ³
Fine Particulates (PM _{2.5})		
Primary and Secondary Standards	Annual Arithmetic Mean	15.0 µg/m ³
Primary and Secondary Standards	24 Hour	35 µg/m ³
Lead (Pb)		
Primary and Secondary Standards	Calendar Quarter Average	1.5 µg/m ³



Garfield County Population Estimates

- 2006 Garfield County = 53,020
- 2010 Garfield County = 64,097
- 2020 = Garfield County = 98,992

- 2006 Glenwood Springs = 8,743
- 2006 Rifle = 8,706
- 2006 Carbondale = 6,088
- 2006 New Castle = 3,443
- 2006 Silt = 2,416
- 2006 Parachute = 1,486



EPA Requirements under 40 CFR Part 58

■ Carbon Monoxide

- No minimum number requirements based on MSA population

■ Ozone

- If MSA population $> 50,000$ and $< 350,000$ then need:
 - 0 sites if 3-year design value $< 85\%$ of NAAQS
 - 1 site if 3-year design value $> 85\%$ of NAAQS

■ Nitrogen Dioxide

- No minimum number requirements based on MSA population

■ Sulfur Dioxide

- No minimum number requirements based on MSA population



EPA Requirements under 40 CFR Part 58 (cont.)

■ PM_{10}

- If population $> 100,000$ and $< 250,000$ then need:
 - 0 sites if low concentration area ($< 80\%$ of NAAQS)
 - 0-1 site if medium concentration area ($> 80\%$ of NAAQS)
 - 1-2 sites if high concentration area ($> 120\%$ of NAAQS)

■ $PM_{2.5}$

- If population $> 50,000$ and $< 500,000$ then need:
 - 0 sites if 3-year design value $< 85\%$ of NAAQS
 - 1 site if 3-year design value $> 85\%$ of NAAQS

■ Lead

- Need 2 in an area if exceedances have been recorded



EPA Requirements under 40 CFR Part 58 (cont.)

■ NCore

- 1 required for each state
- Must have at least:
 - Carbon monoxide (trace level)
 - Sulfur dioxide (trace level)
 - Reactive oxides of nitrogen
 - Ozone
 - PM₁₀ (continuous and filter-based)
 - PM_{2.5} (continuous and filter-based)
 - Speciated PM_{2.5}
 - Meteorology (WS, WD, Temp, Rel. Humidity)



Is monitoring required in Garfield County?

Based on current population estimates and expected concentrations, no Federally required monitoring is currently necessary.

This does not mean that there are no local issues or concerns that may warrant monitoring!



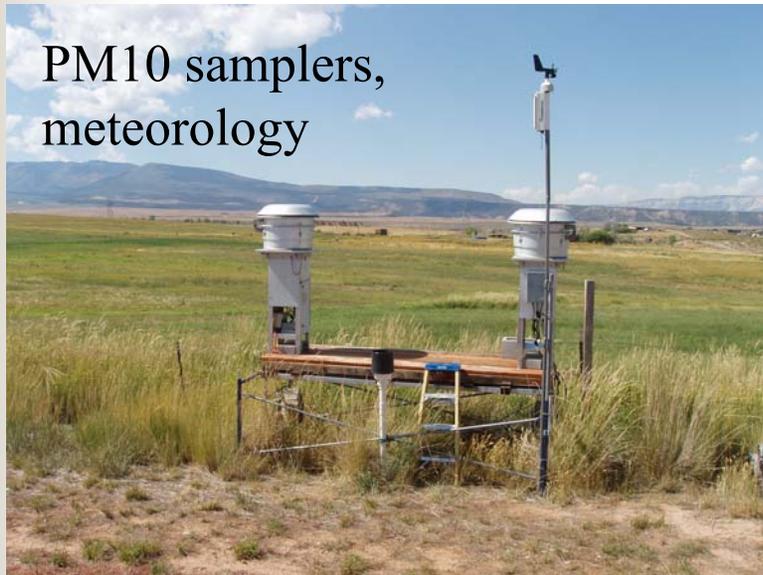
So what air monitoring
has been performed in
Garfield County?



Who has done monitoring?

- Colorado Dept. of Public Health & Envir.
 - TSP, PM₁₀ and lead
- Garfield County
 - PM₁₀, volatile organic compounds and meteorology
- U.S. Forest Service
 - Ozone
- Private companies
 - Ozone, NO_x, SO₂, PM₁₀, meteorology

Air monitoring equipment





Monitoring in Garfield County

Total Suspended Particulates

- 109 8th St., Glenwood Spgs. (Court.) 1967 - 1984
- 111 E. 3rd Ave., Rifle 1968 - 1981
- 337 East Ave., Rifle (City Hall) 1969 - 1970, 1985 - 1986
- Parachute (Grand Valley School) 1973 - 1978
- 520 CR 265, Rifle (High School) 1982 - 1985
- 100 E. 2nd St., Parachute 1982 - 1984
- 806 Cooper Ave., Glenwood Spgs. (Fire) 1983 - 1987
- Carbondale 1985 - 1986



Monitoring in Garfield County

PM10

- 337 East Ave., Rifle (City Hall) 1985 - 1986
- 806 Cooper Ave., Glenwood Spgs. (Fire) 1986 - 2001
- 200 W. 3rd St., Rifle (Mtn. Bell) 1987 - 2001
- 100 E. 2nd St., Parachute 2000 - current
- 114 E. 3rd Ave., Rifle (Henry Bldg.) 2005 - current
- 402 W. Main St., New Castle (Library) 2005 - 2007
- 512 Owens Dr., Silt (Bell Ranch) 2005 - 2007
- 884 CR 327, Silt (Daley Ranch) 2005 - 2007
- 5933 CR 233, Silt (Cox Ranch) 2005 - 2007
- 109 8th St., Glenwood Spgs. (Court.) 2005 - 2007



Monitoring in Garfield County

PM2.5

- 114 E. 3rd Ave., Rifle (Henry Bldg.) being installed

Lead (TSP)

- 111 E. 3rd Ave., Rifle 1968 - 1981



Monitoring in Garfield County

Ozone

- US Forest Service at multiple locations 2006 - current
- 195 W. 14th Ave., Rifle (Public Health) being installed

Volatile organic compounds

- Garfield Co., multiple locations 2005 - current

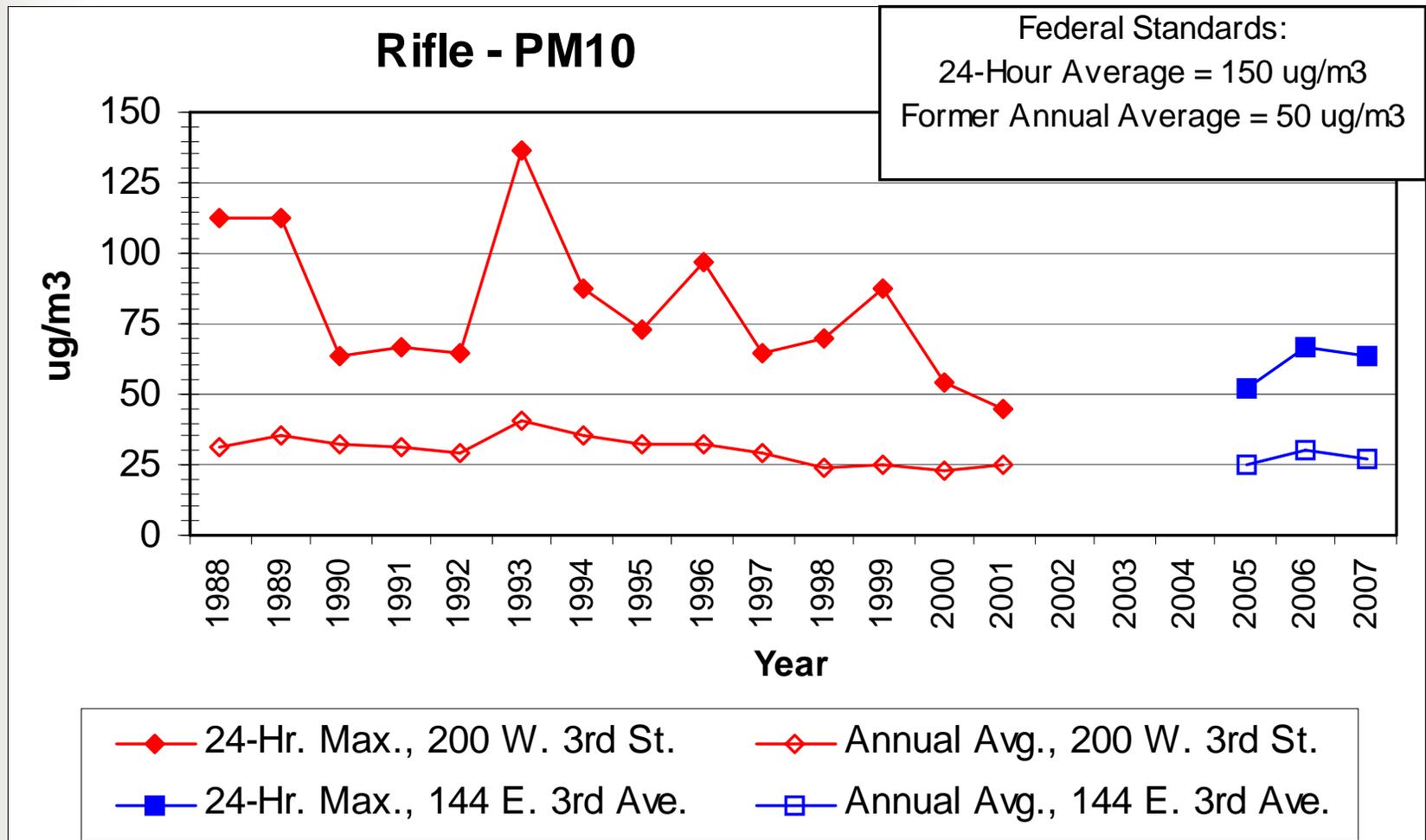
Visibility camera

- 114 E. 3rd Ave., Rifle (Henry Bldg.) being installed

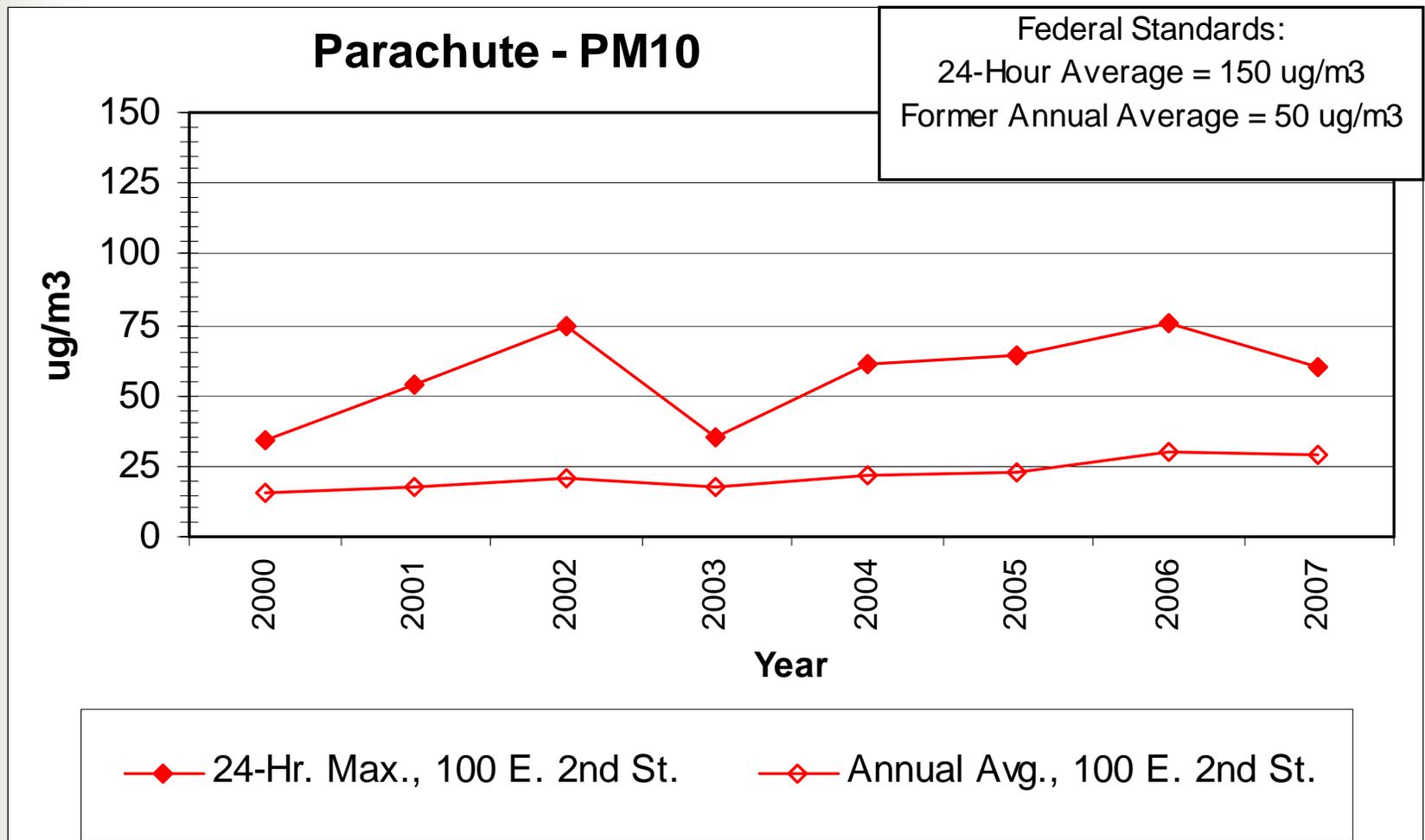


What are the air pollution trends in Garfield County?

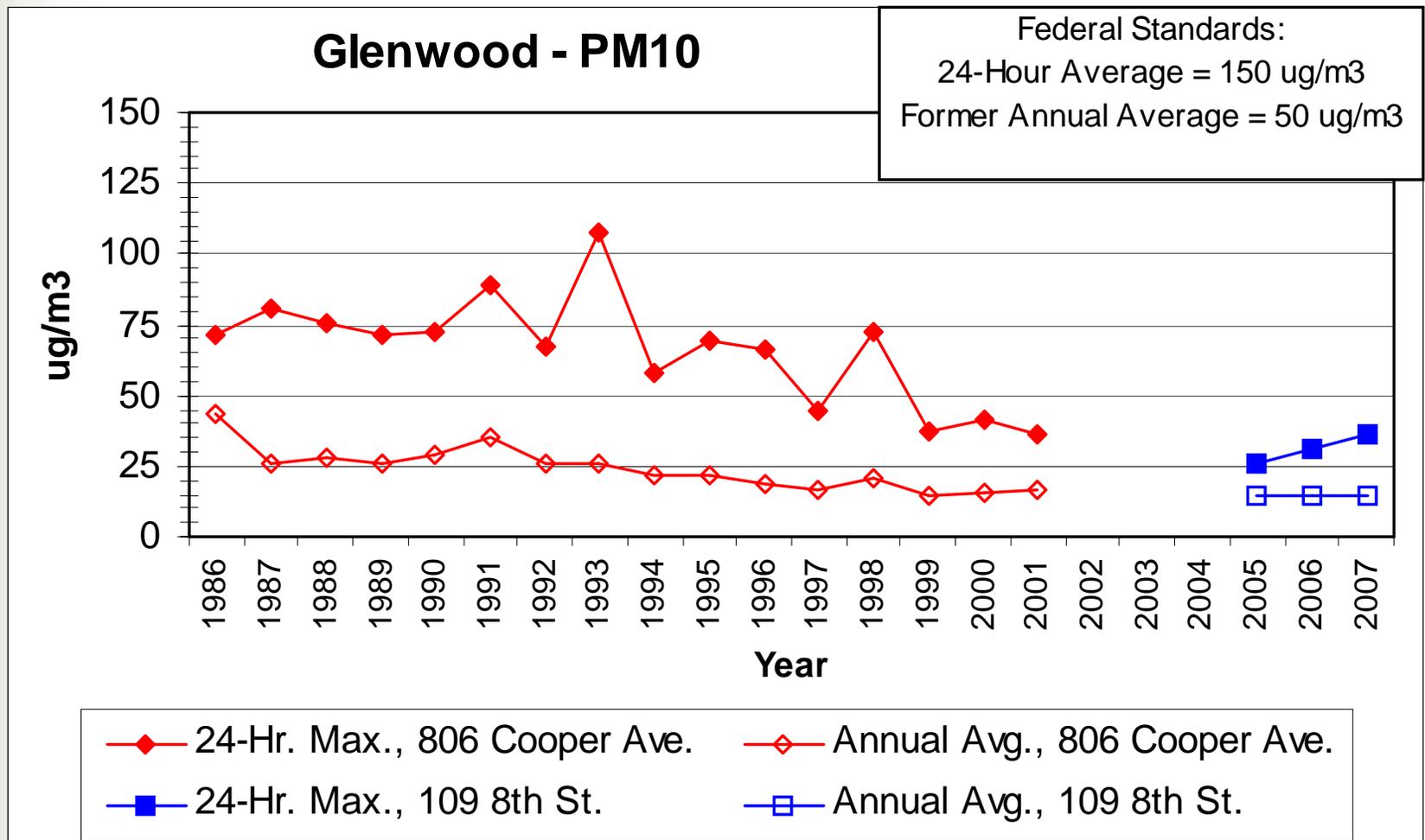
Rifle – PM10



Parachute – PM10



Glenwood Springs – PM10





Garfield County Well Study 2002

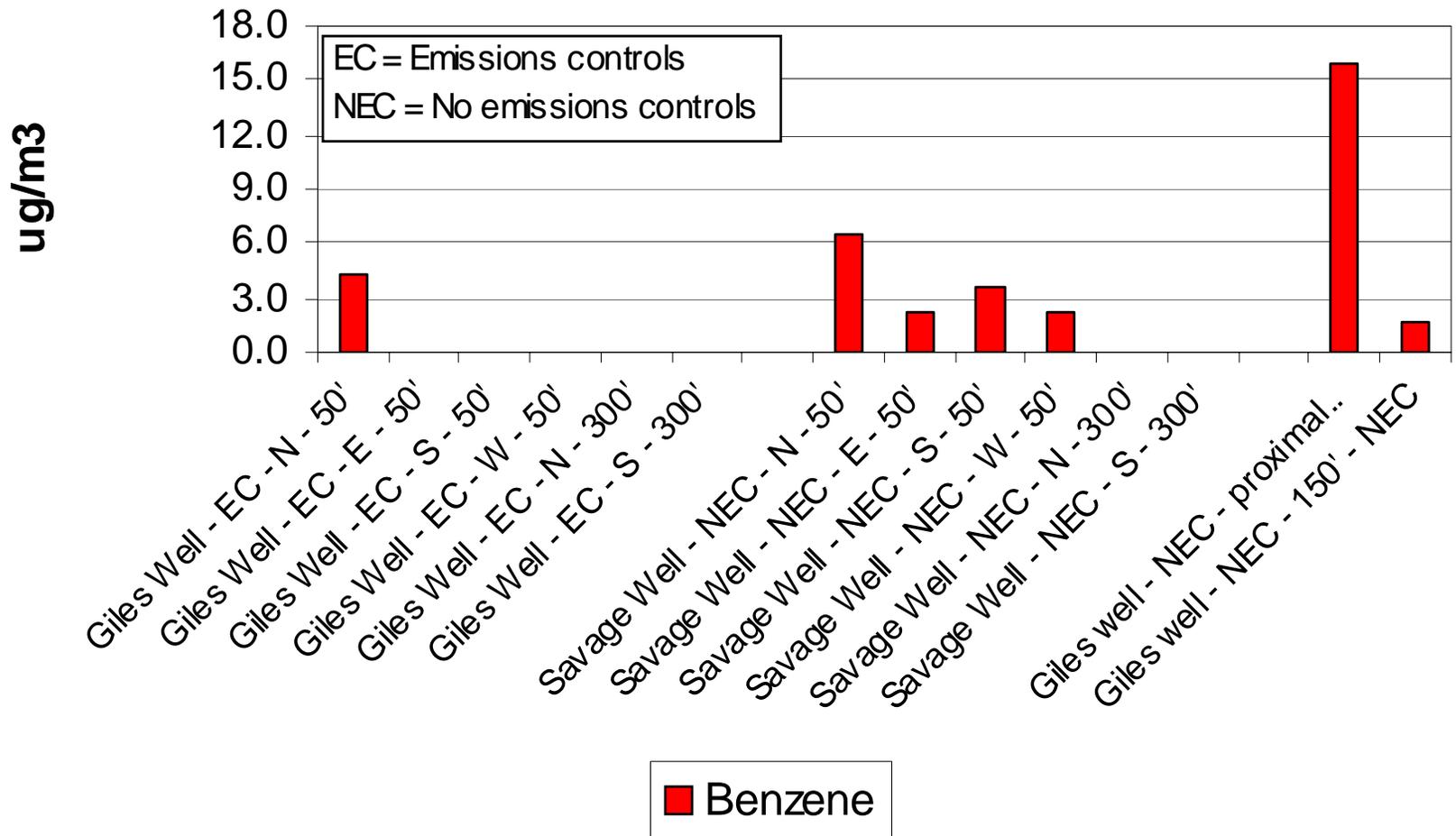


Purpose of the 2002 Well Study

- To identify whether any threats to human health or the environment exist due to the potential impact of gaseous chemicals emitting from natural gas wells.
- To evaluate the difference in emissions from a combustor-controlled well versus a well with no emissions controls.
- To evaluate the emissions from well completion flaring operations.
- To obtain baseline data for future air monitoring efforts.

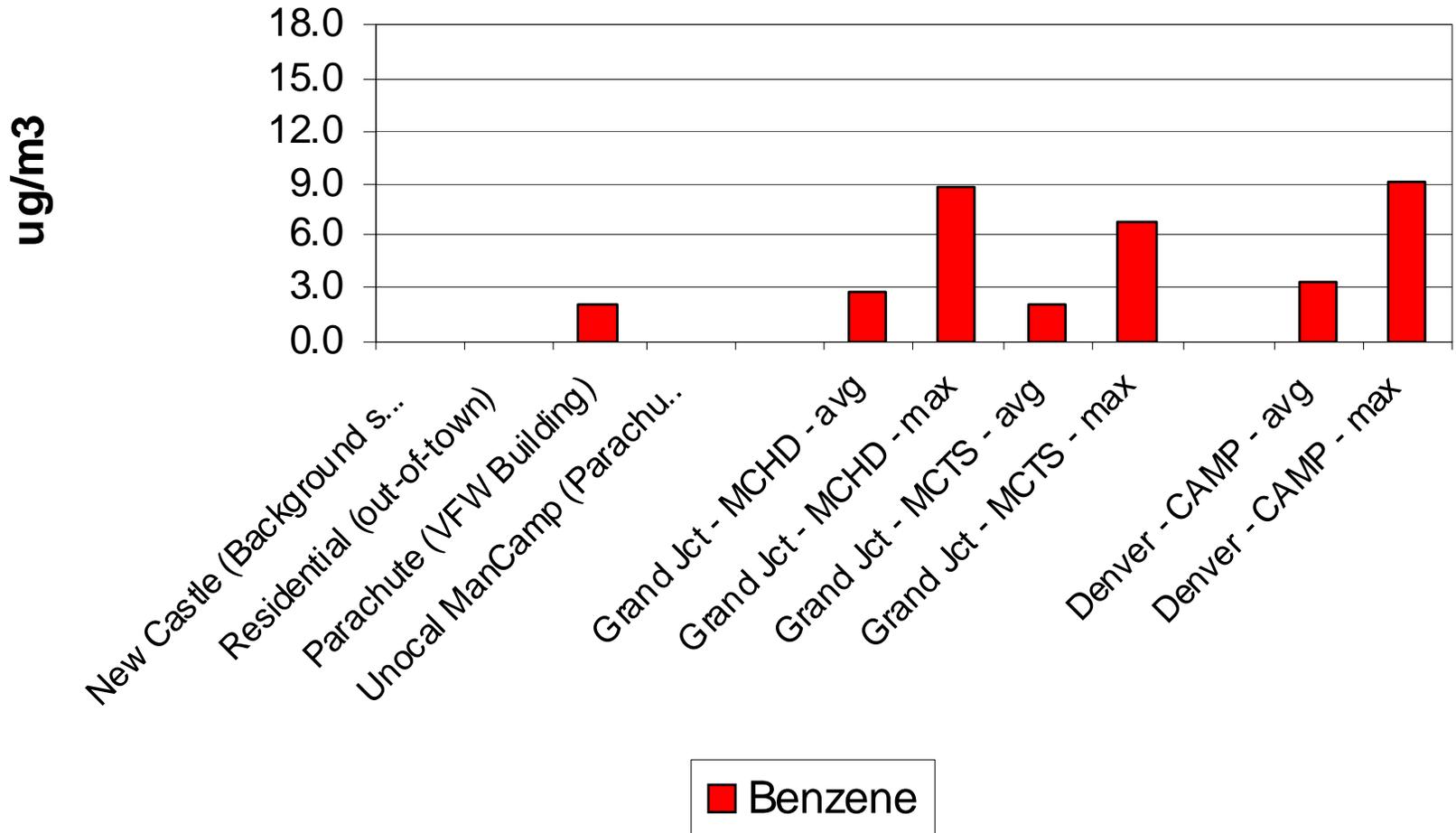
2002 Well Study Results

Garfield County - Gas Well Sampling



2002 Well Study Results

Garfield County - Comparison of Towns / Non-Well





Results of the 2002 Well Study

- Only 6 of 43 VOCs analyzed were detected.
- VOCs are lower around well with combustor unit.
- VOCs decrease with distance from wells.
- VOCs are generally low in Garfield County compared to urban areas.
- VOCs detected are also produced by other sources.
 - Motor vehicles, refueling operations, solvents, tobacco smoke, natural (biogenic), photochemical.
- SO₂, NO and NO₂ around flaring operation were very low.
- Minimum detection levels may be an issue.



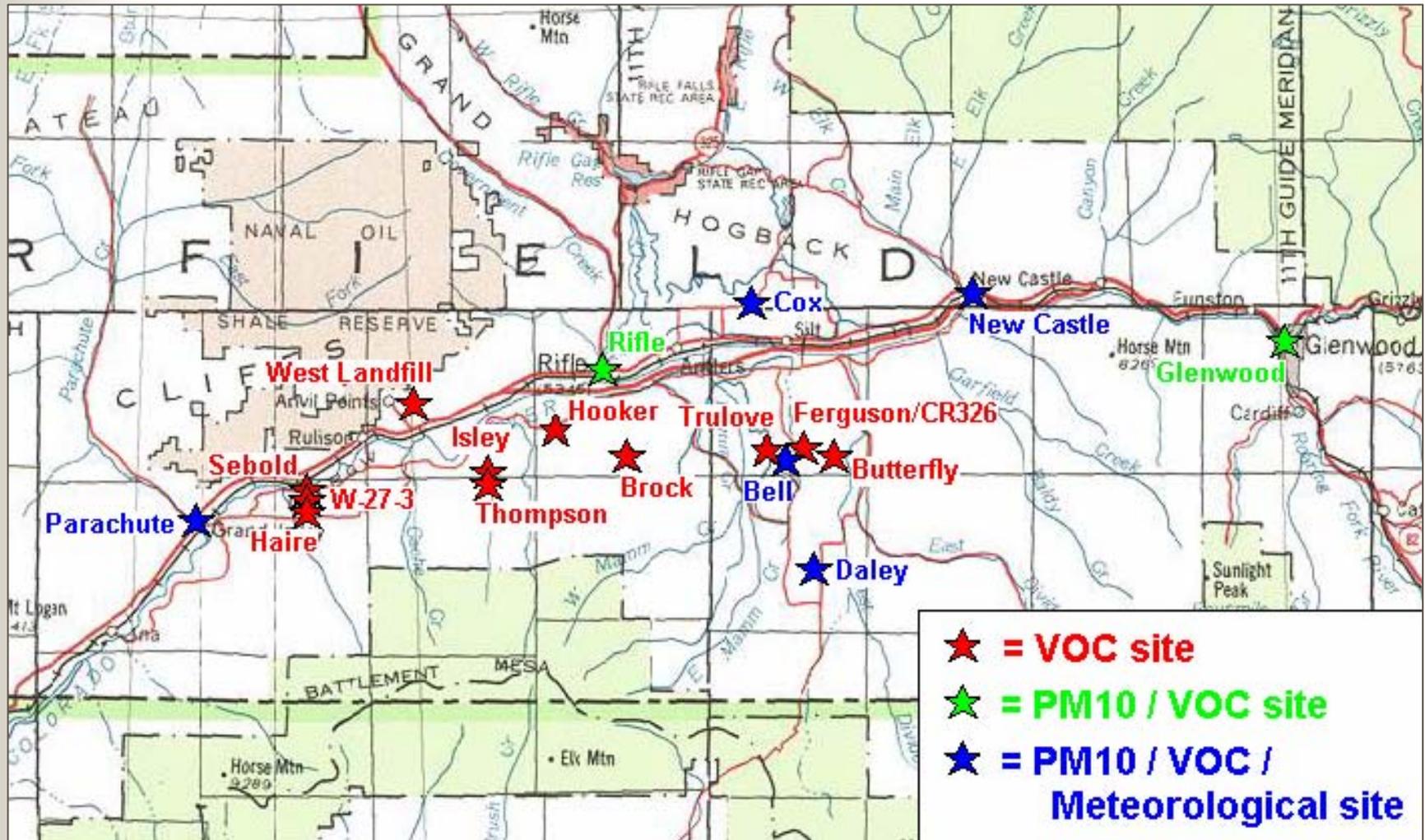
Garfield County Ambient Air
Quality Monitoring Study
2005 - 2007



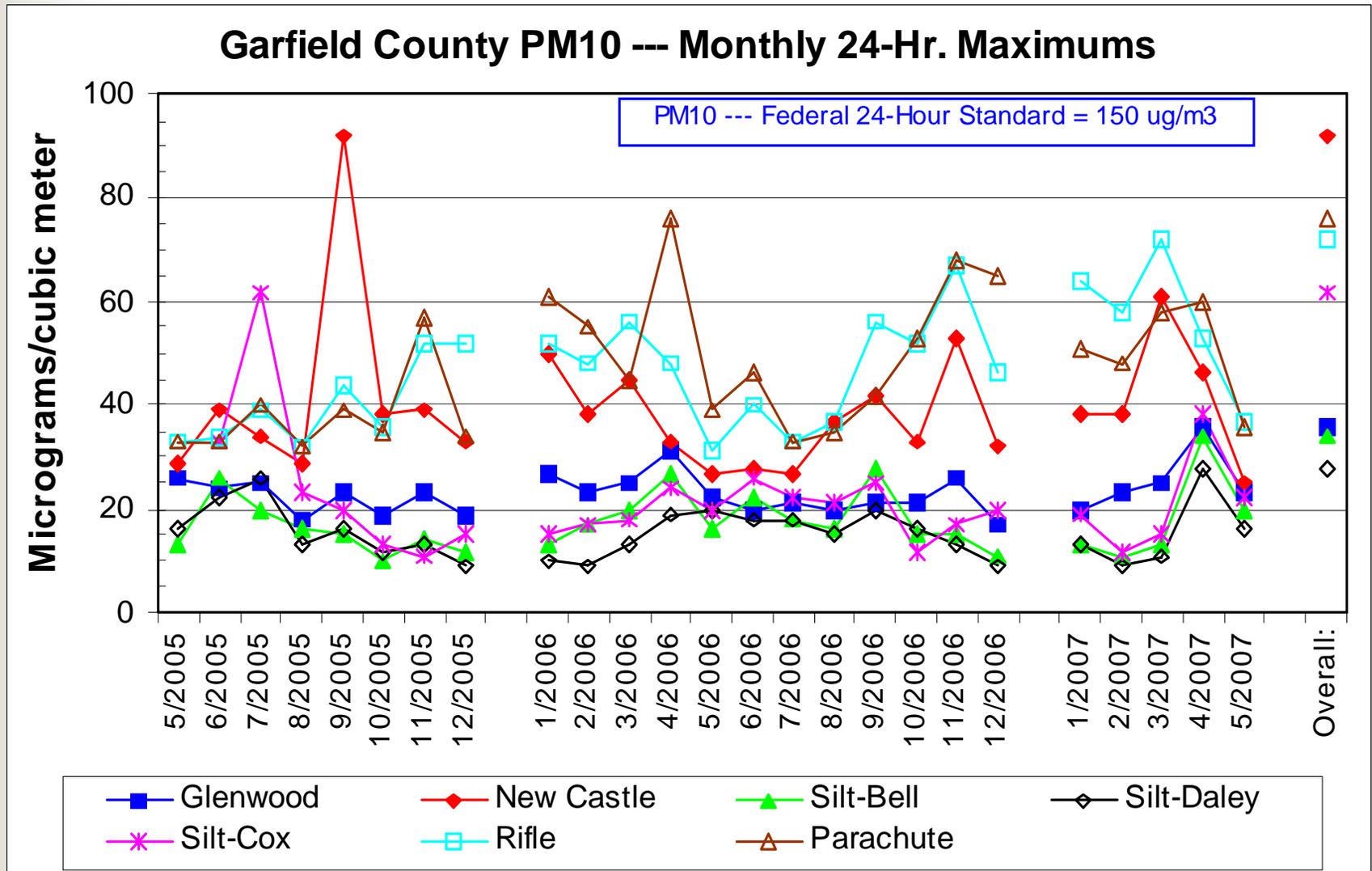
Purpose of the 2005-2007 Ambient Air Quality Monitoring Study

- To evaluate air quality characteristics within Garfield County with particular attention to particulate matter of ten microns or less (PM_{10}) and volatile organic compounds (VOC's).
- To attempt to address concerns from local citizens about air pollution in the area and potential health effects, primarily due to the dramatic increase in oil and gas development activities.
- To obtain baseline data for future air monitoring efforts.

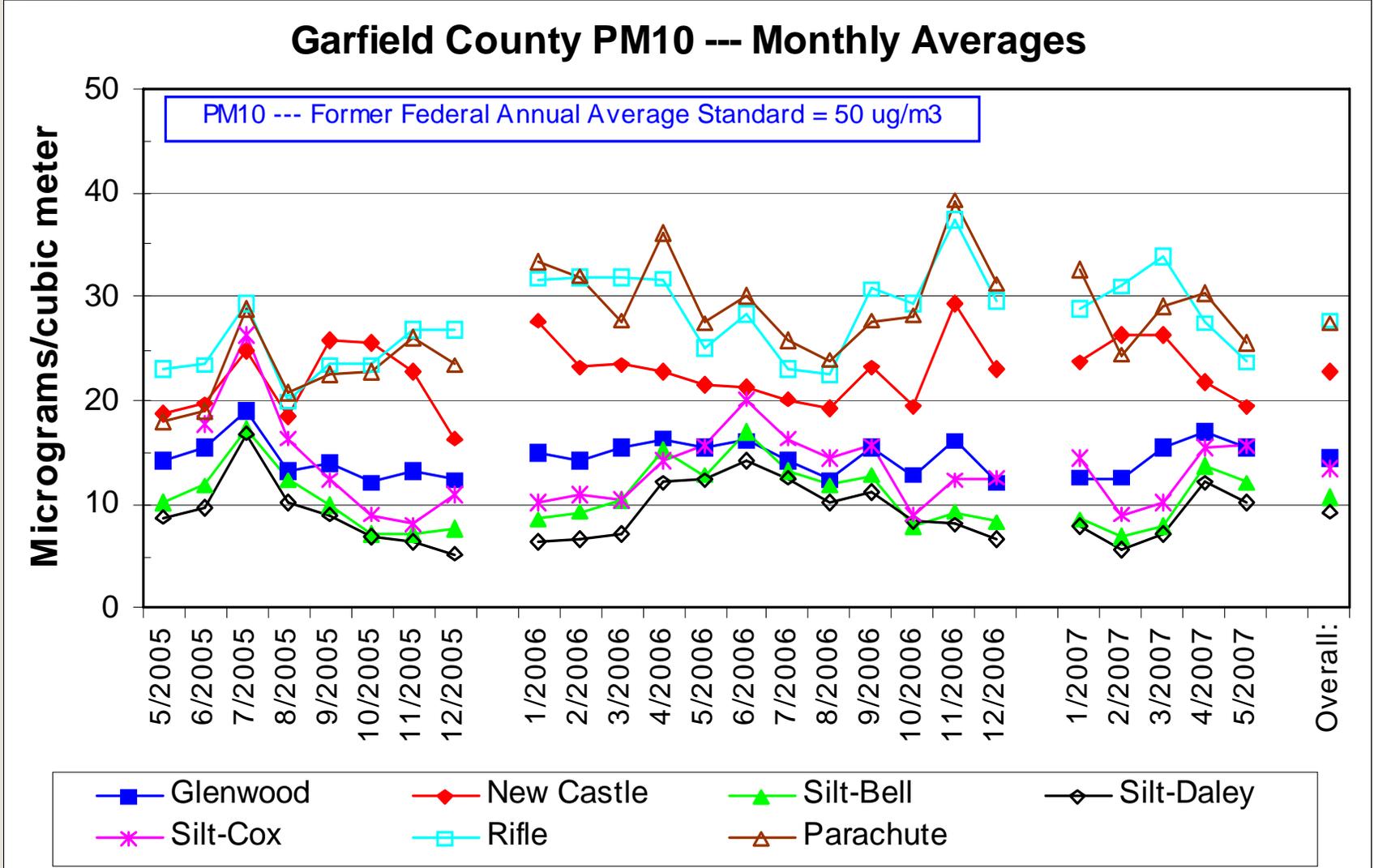
Garfield Air Quality Study Monitoring Locations



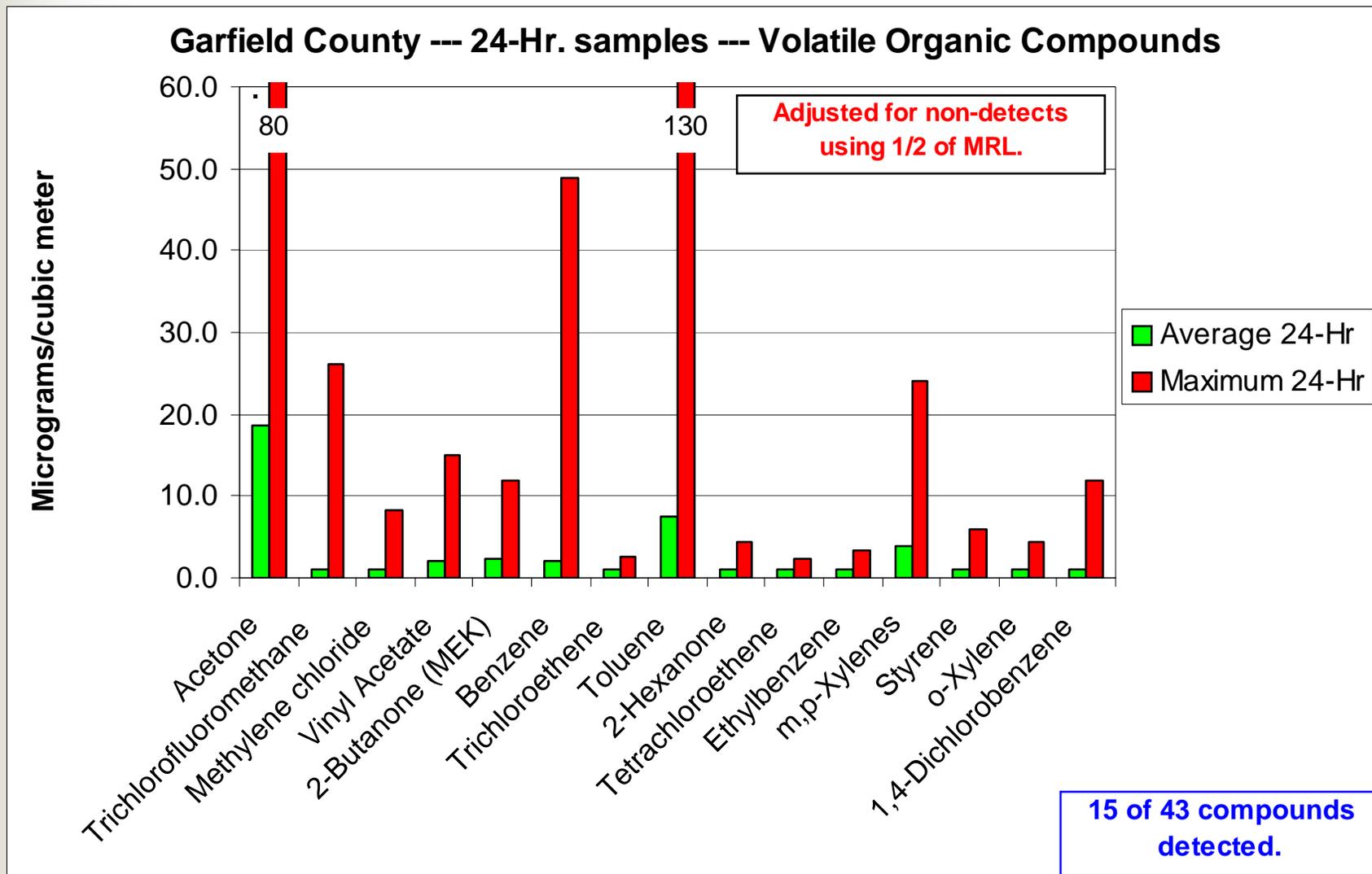
Garfield Air Quality Study – PM10 results (Max)



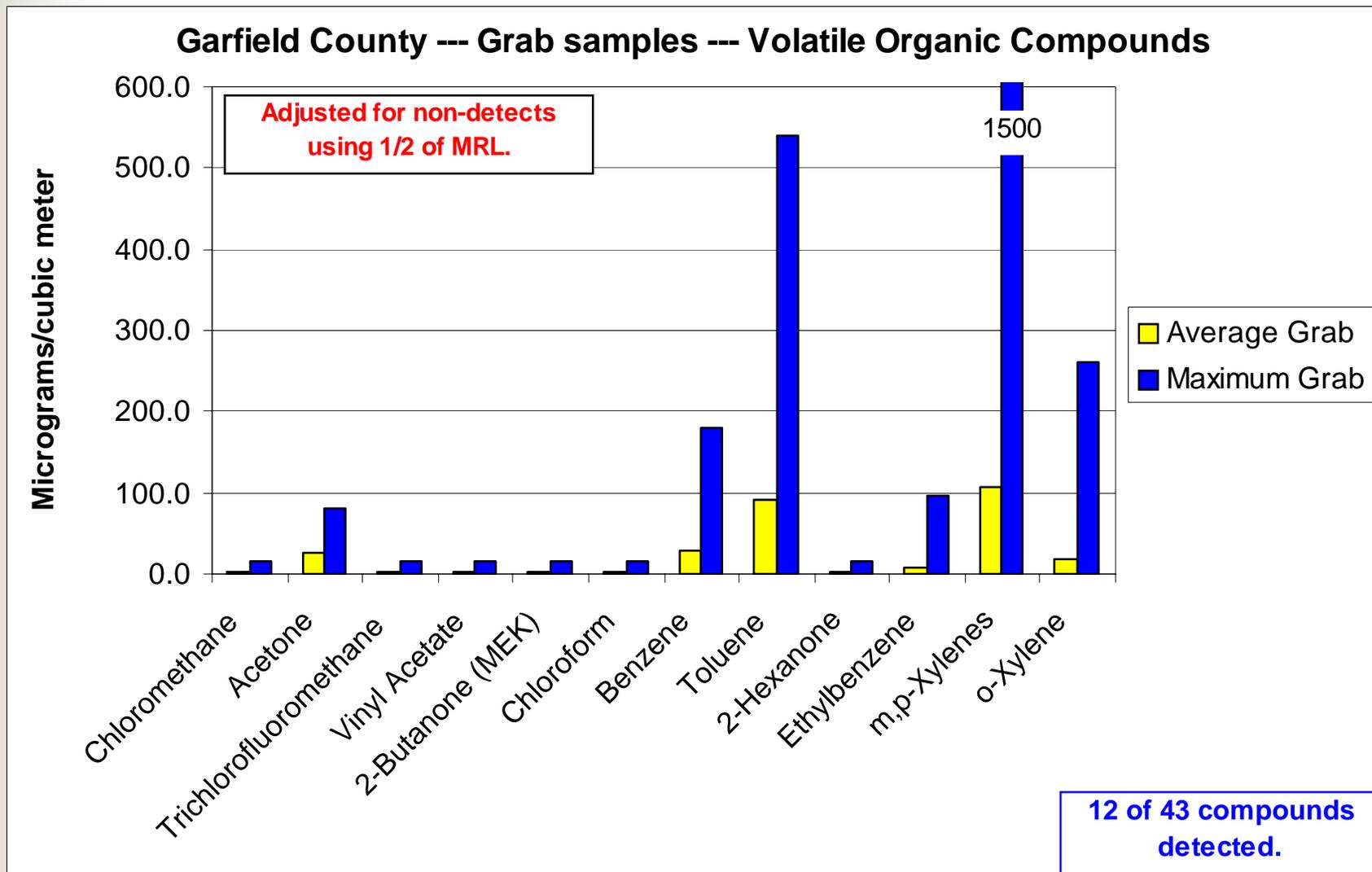
Garfield Air Quality Study – PM10 results (Avg)



Garfield Air Quality Study – VOC results (24hr)



Garfield Air Quality Study – VOC results (grab)





Results of the 2005-2007 Ambient Air Quality Monitoring Study

■ PM₁₀ monitoring:

- No exceedances of federal National Ambient Air Quality Standards were recorded.
- Concentrations in urban areas were generally higher than in rural areas.
- Particulate mass is primarily from geologic material.
- Particulate carbon in the samples is likely due to lighter weight fossil fuel combustion.

■ VOC monitoring:

- Concentrations of detected compounds were higher in rural oil and gas development areas than in the urban areas.
- Local sources do have impacts on air pollution levels.
- Compounds that were detected in the highest concentrations were acetone and the BTEX group.



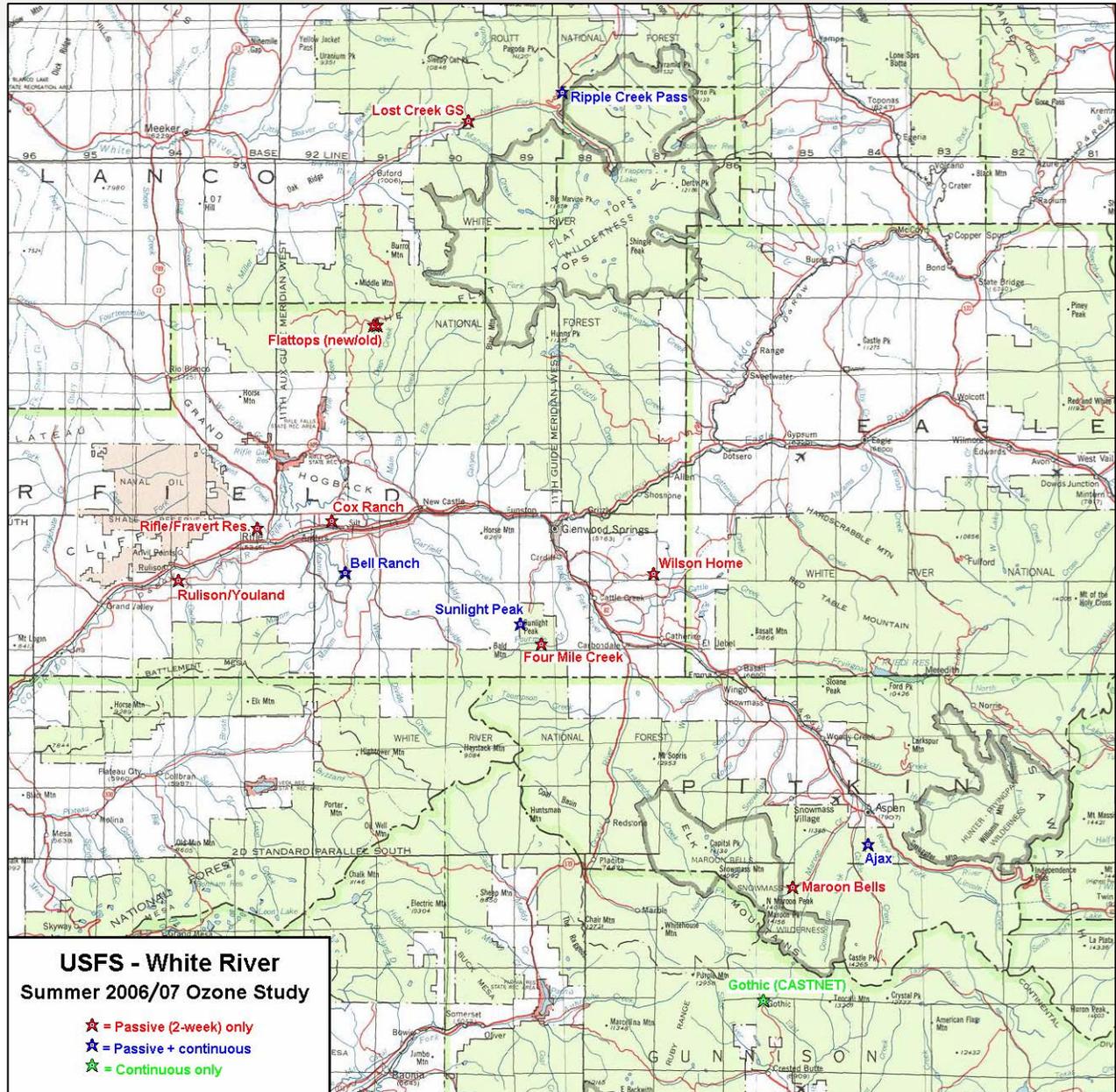
U.S. Forest Service
Ozone Monitoring
2006 - current



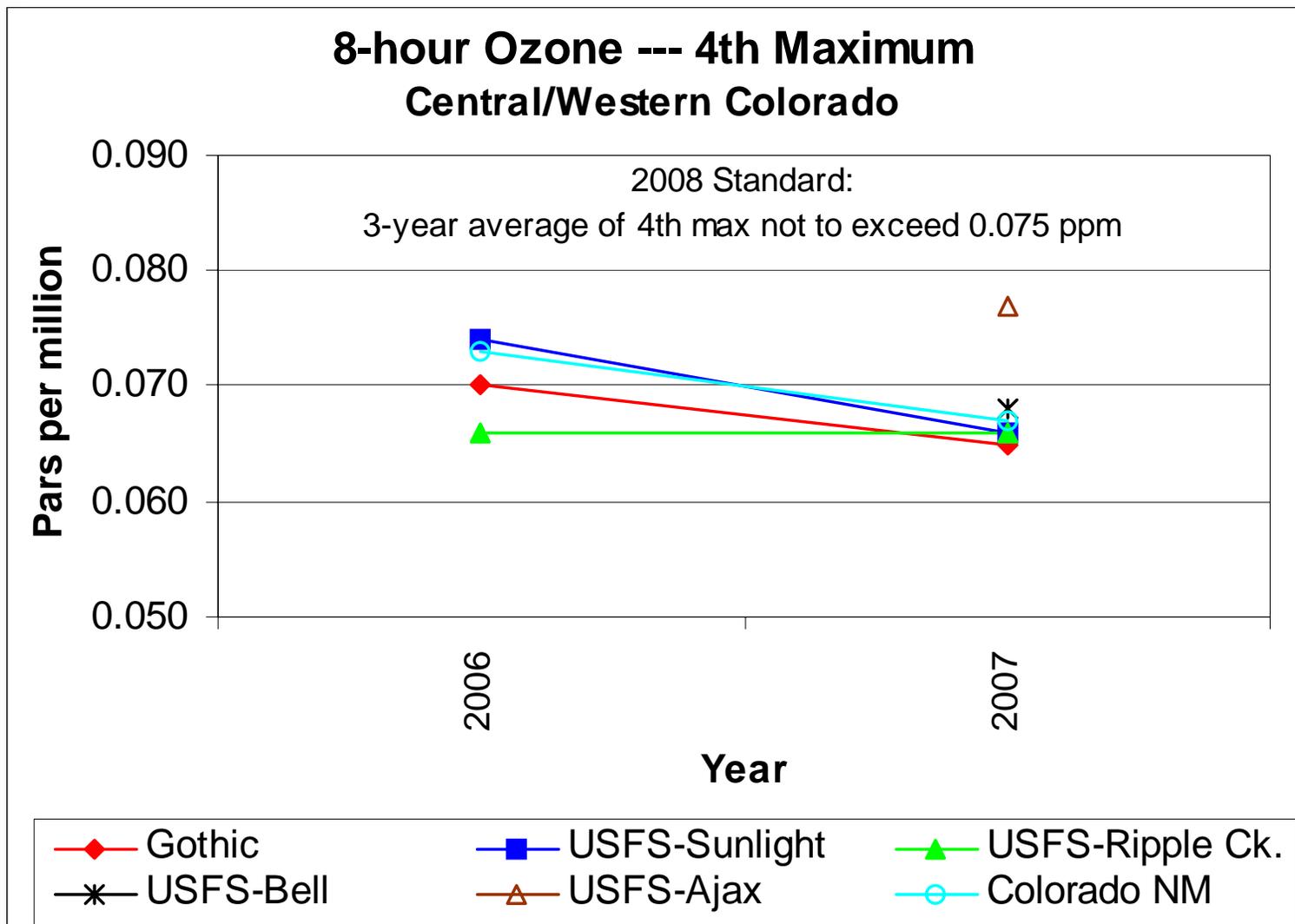
Purpose of the U.S. Forest Service Ozone Monitoring

- To evaluate and protect air quality characteristics near and within the White River National Forest.
- To protect air quality related values in Class I areas.
- To obtain baseline data for future air monitoring efforts.
- To determine representative location(s) for long term continuous ozone monitoring.

U.S. Forest Service Monitoring Locations



U.S. Forest Service Ozone Monitoring Results



Results of the U.S. Forest Service Ozone Monitoring

- 2 continuous sites in 2006, 4 in 2007
- Passive sites = 2-week samples
- In general, higher elevation = higher concentration
- Not enough data yet to determine compliance with NAAQS





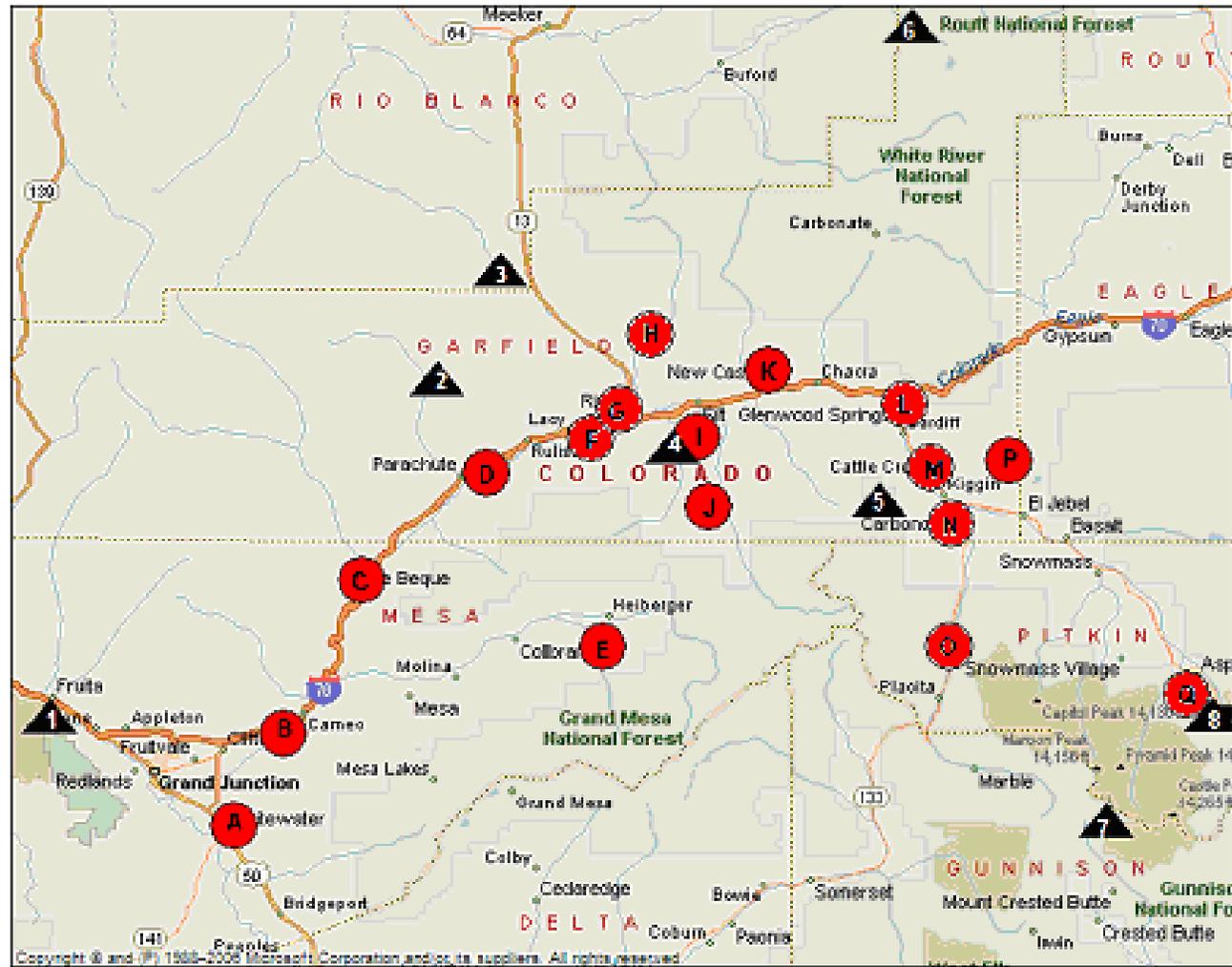
2007 Passive Ozone Study



Purpose of the Passive Ozone Study

- To evaluate ozone concentrations across Colorado.
- To determine possible high concentration areas for additional monitoring.
- Concerns due to oil and gas development.
- Concerns due to many unmonitored locations.
- Concerns due to lowering of ozone standard.

2007 Passive Ozone Study Site Locations

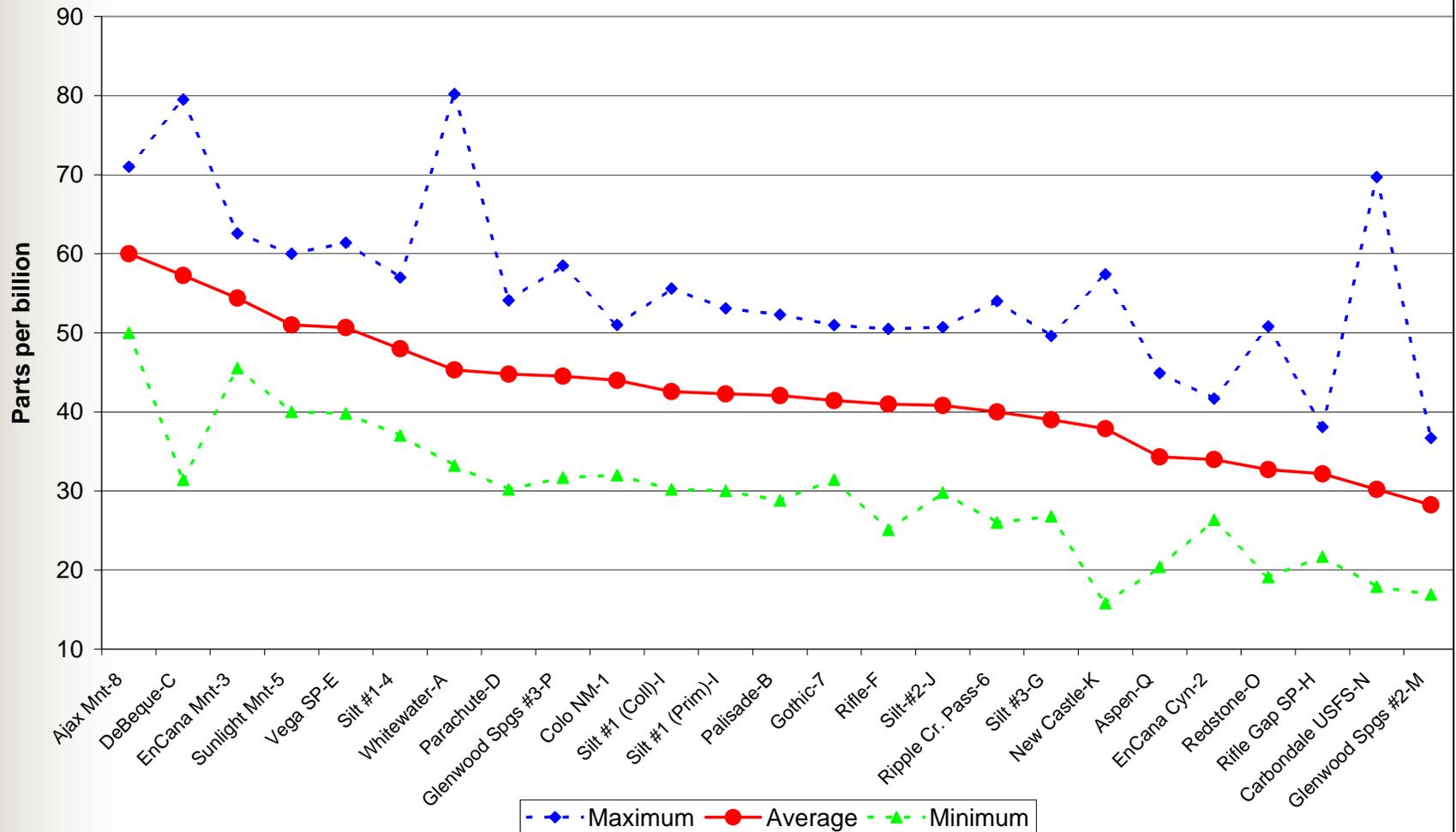


● Passive monitoring site

▲ Continuous monitoring site

2007 Passive Ozone Study Site Results

2007 Passive Ozone Study - Western Colorado
 (48-hour passive samples and continuous averages)





Results of the 2007 Passive Ozone Study

- Due to the passive samples being 48-hours long, no comparisons can be made to the NAAQS.
- In general, the western portion of the study area had higher average ozone concentrations than the eastern area (with a few exceptions).
- Urban areas are likely lower due to nighttime scrubbing from oxides of nitrogen.

A decorative header at the top of the slide features a collage of nature-themed images. From left to right, it includes a green and yellow abstract pattern, a brown and green abstract pattern, a blue and white abstract pattern, and a yellow and green abstract pattern.

What comes next for air
monitoring in Garfield
County?



U.S. Environmental
Protection Agency Regional
Grant Initiative



Purpose of Monitoring under the U.S. EPA Regional Grant Initiative

- To further develop the basis for decisions on how Garfield County can best manage impacts of air pollution caused by energy development.
- Short-term targeted air quality monitoring to characterize the exposure of citizens to air toxics and PM_{2.5} emissions from oil and gas operations.



Monitoring under the U.S. EPA Regional Grant Initiative

- Non-methane organic compound (NMOC) and PM_{2.5} monitoring.
- Around a number of different oil and gas source types, including drilling rigs, completion equipment, production wells and condensate tanks.
- At least three 24-hour samples will be taken in each of the four cardinal directions around a source.
- Some grab samples in known plumes.
- To be performed in spring/summer 2008.



2008 Garfield County Air
Monitoring Proposal
+
Additional State Funding



Purpose of Monitoring under the 2008 Garfield Air Monitoring Proposal

- Continue characterizing concentrations of local scale air toxics and particulate matter to develop a baseline reference for long-term measuring.
- Build upon our previous study that has identified data gaps for local source emissions.
- Implement a more targeted approach with the goal of answering specific questions about the potential relationship between the air quality in Garfield County and human health risk.
- Further develop the basis for decisions on how Garfield County can best manage impacts of air pollution caused by overall development.
- Create a comprehensive community-based air quality management plan and implementation strategy based on the best available scientific data and practices.
- Additional State funding provided by the legislature.



Monitoring under the 2008 Garfield Air Monitoring Proposal

- Commenced January 2008.
- PM_{10}
 - Rifle, Parachute
- $PM_{2.5}$ and visibility camera
 - Planned in Rifle (start before July 2008)
- Ozone
 - Planned in Rifle (start before July 2008)
- Non-methane organic compounds, carbonyls and meteorology
 - Rifle, Parachute, Bell Ranch, Grass Mesa



Questions?

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