

# Ozone in the Four-Corners Area 1990 – 2007

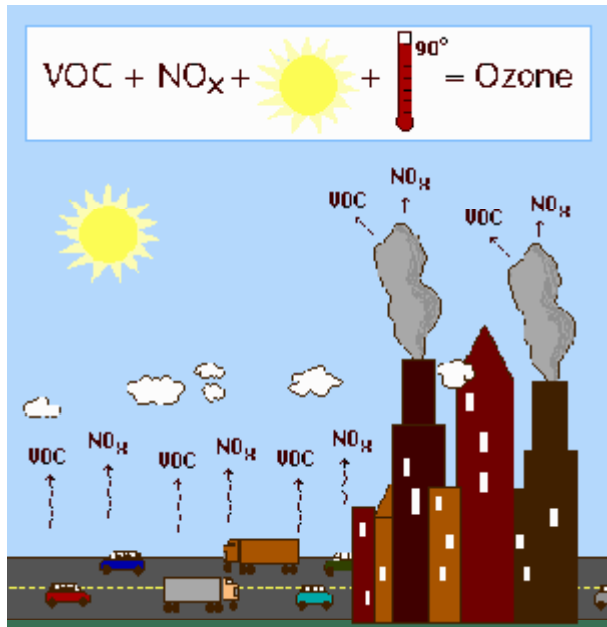


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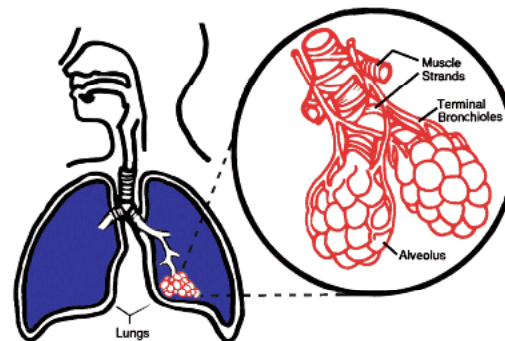
# Ground-Level Ozone



<http://www.state.nj.us/dep/airmon/images/o3form.gif>

- Not the same as the Hole in the Ozone Layer!
- Formed from NOx + VOC's + sunlight
- NOx – mainly fossil fuel combustion
- VOC's – Many sources: Fossil fuels, Natural Gas Leaks, Solvents, Ruminants (cows, etc.), Trees...

- Increases lung problems in people & animals (asthma, etc.).
- Damages trees and other plants (including crops).



# Current Ozone Levels and Trends

# 8-Hour Ozone Tables

## 4th Maximum 8-hr. (ppm)

Year	Ute-Ignacio 08-067-7001	Ute-Red Mesa 08-067-7002	Ute-Hwy. 550 08-067-7003	MVNP 08-083-0101	USFS-Sham. 08-067-9000	Bloomfield 35-045-0009	Shiprock Sub 35-045-1005	Navajo Lake 35-045-0018	CanyonlandNP 49-037-0101
1990	0.060								
1991	0.058								
1992	0.064	0.067							
1993	0.065	0.064							0.063
1994	0.066	0.069		0.063					0.068
1995	0.062			0.063					0.067
1996	0.071			0.072					0.074
1997	0.065			0.063			0.067		0.067
1998	0.068		0.068	0.068			0.071		0.071
1999	0.071		0.065	0.069			0.065		0.073
2000	0.063		0.061	0.073		0.079	0.080		0.076
2001	0.052		0.051	0.065		0.074	0.074		0.067
2002	0.060		0.055	0.070		0.076	0.075		0.072
2003	0.062		0.060	0.067		0.073	0.075		0.074
2004	0.063		0.060	0.069	0.067	0.068	0.069		0.072
2005	0.060		0.066	0.076	0.075	0.075	0.072		0.071
2006	0.048		0.063	0.074	0.074	0.063	0.071	0.079	0.070
2007	0.058		0.071	0.070	0.069	0.069	0.073	0.079	0.072

## 3-yr. Average of the 4th Max. 8-hr. (ppm)

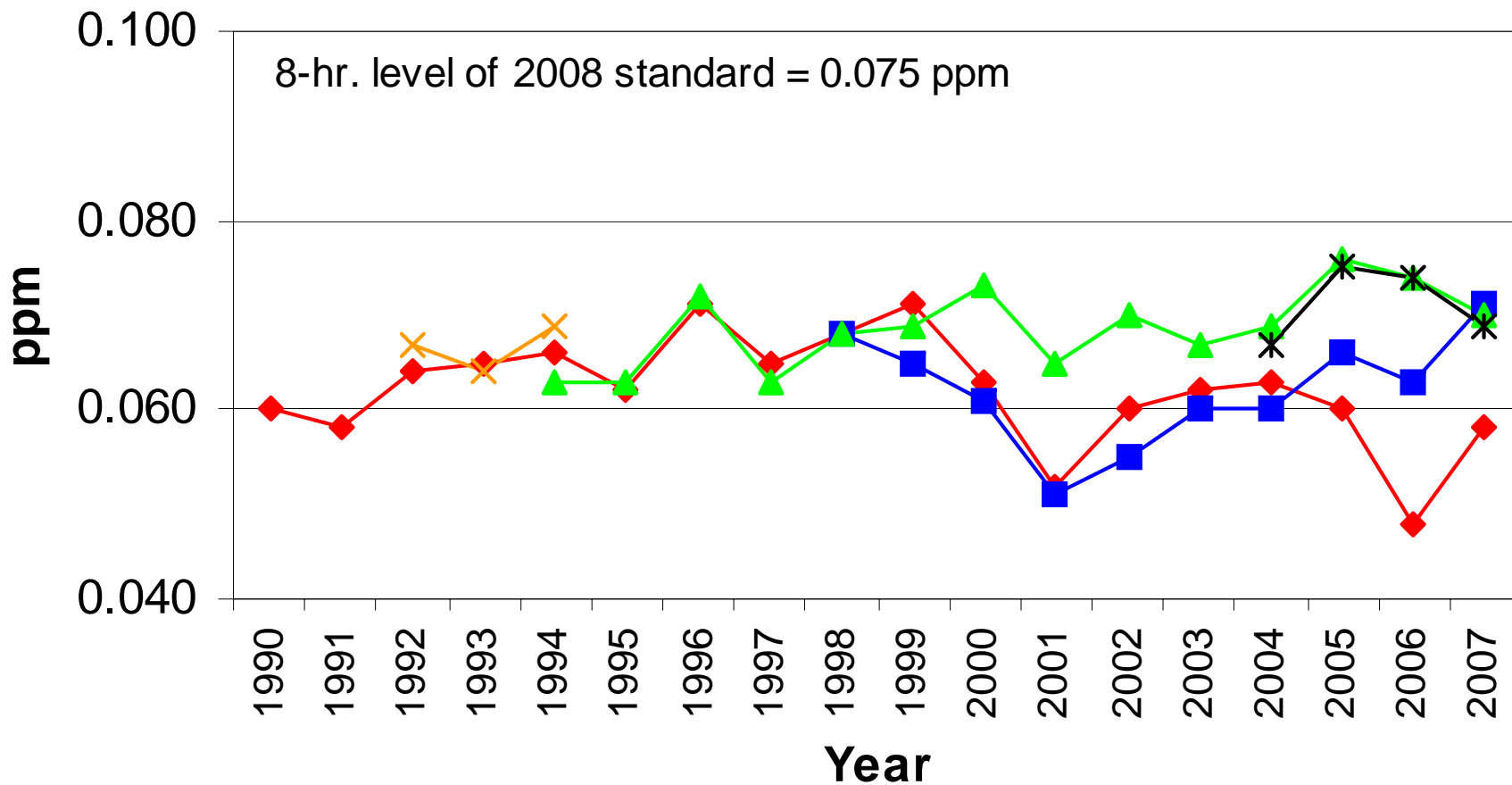
Year	Ute-Ignacio 08-067-7001	Ute-Hwy. 550 08-067-7003	Ute-Hwy. 550 08-067-7003	MVNP 08-083-0101	USFS-Sham. 08-067-9000	Bloomfield 35-45-0009	Shiprock Sub 35-045-1005	Navajo Lake 35-045-0018	CanyonlandNP 49-037-0101
1992	0.060								
1993	0.062								
1994	0.065	0.066							
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1996	0.066			0.066					0.069
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1998	0.068			0.067					0.070
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2000	0.067		0.064	0.070			0.072		0.073
2001	0.062		0.059	0.069			0.073		0.072
2002	0.058		0.055	0.069		0.076	0.076		0.071
2003	0.058		0.055	0.067		0.074	0.074		0.071
2004	0.061		0.058	0.068		0.072	0.073		0.072
2005	0.061		0.062	0.070		0.072	0.072		0.072
2006	0.057		0.063	0.073	0.072	0.068	0.070		0.071
2007	0.055		0.066	0.073	0.072	0.069	0.072		0.071

New ozone standard: 3-year avg. of 4<sup>th</sup> max. 8-hour values not to exceed 0.075 ppm

# Ozone Graphs

4<sup>th</sup> Maximum 8-Hour Values

# 8-hour Ozone --- 4th Maximum Southwestern Colorado



◆ Ute-Ignacio

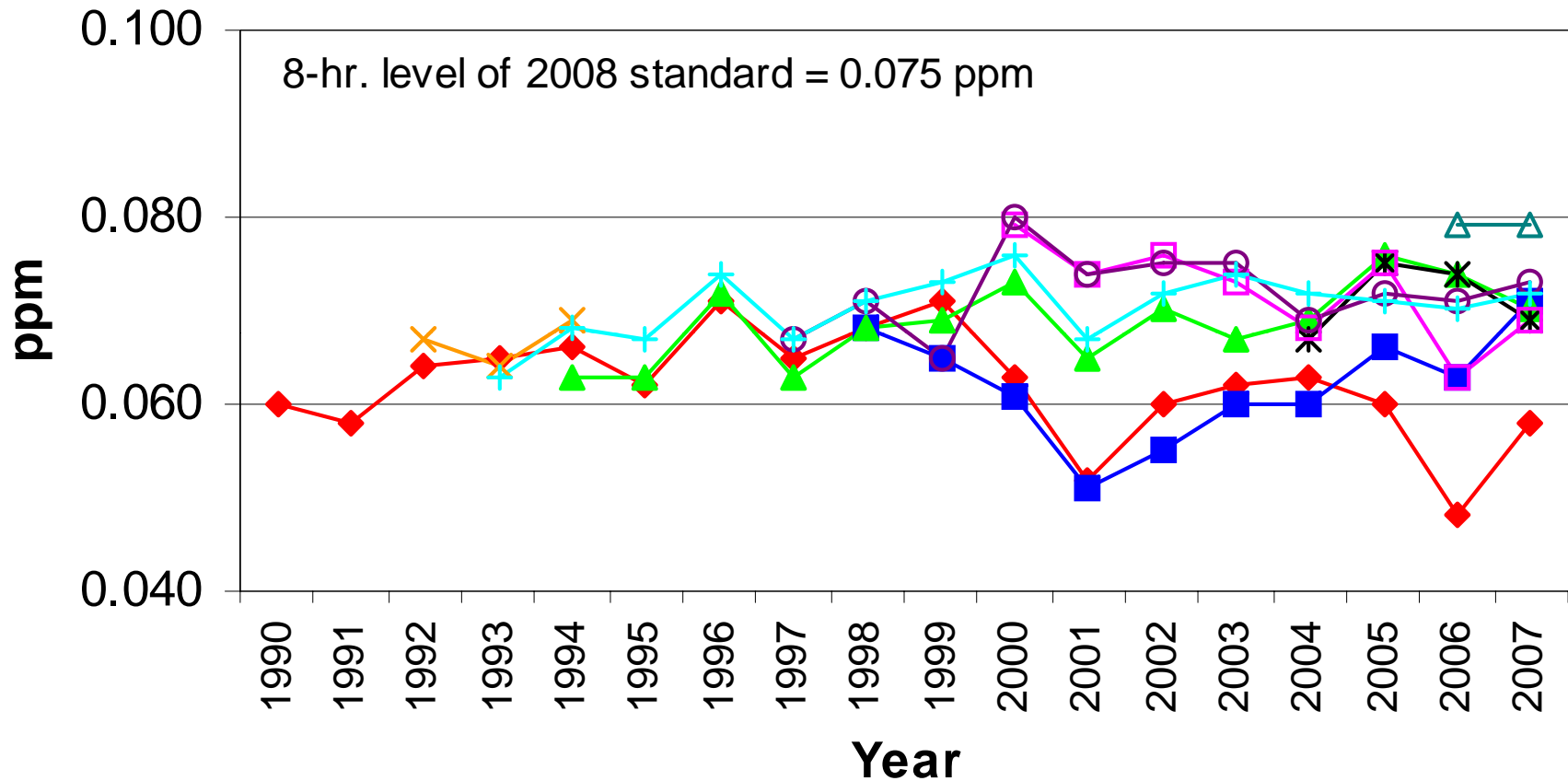
✕ Ute-Red Mesa

■ Ute-Hwy. 550

▲ MVNP

\* USFS-Shamrock

## 8-hour Ozone --- 4th Maximum Four Corners Area

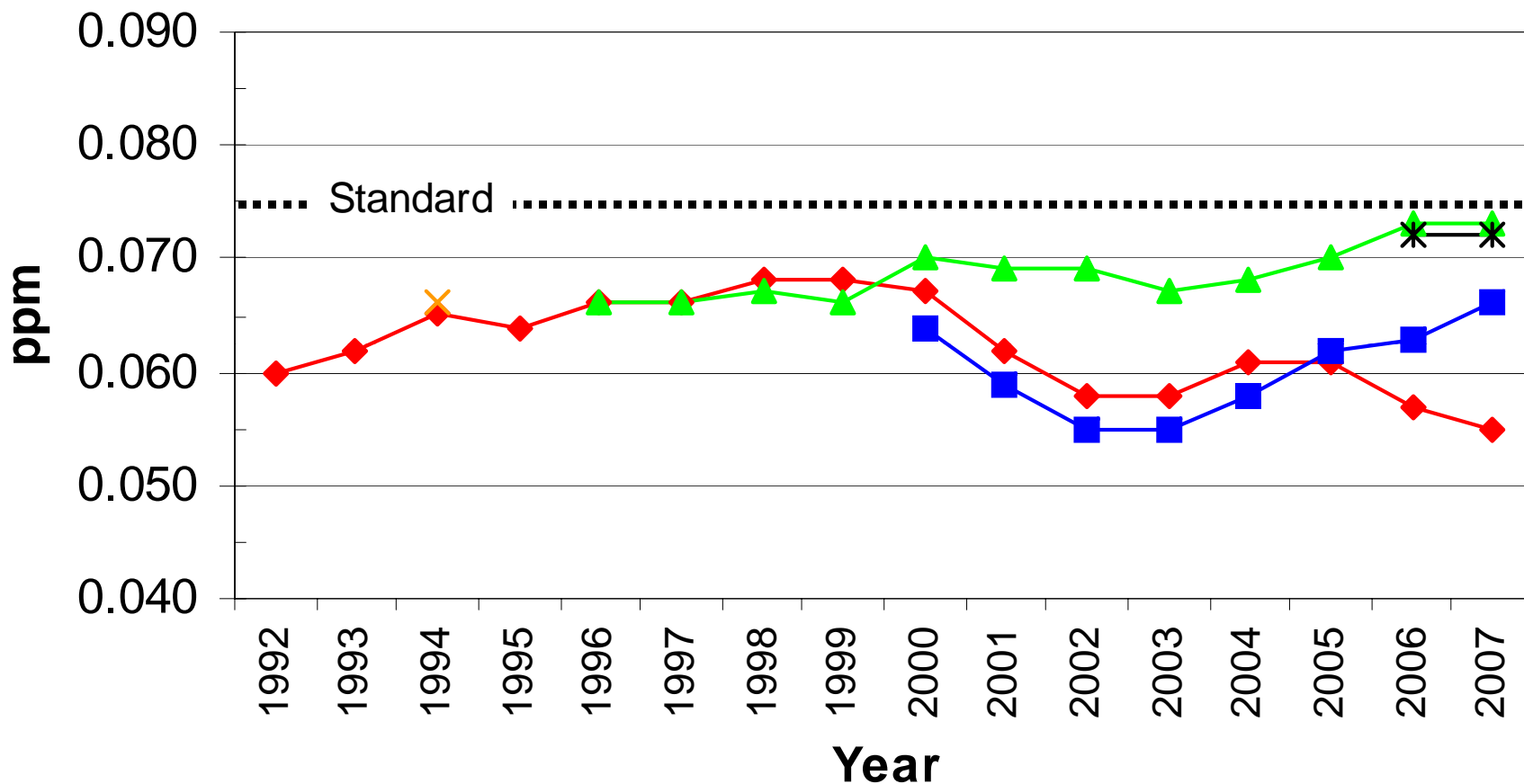


- |                    |                    |                     |
|--------------------|--------------------|---------------------|
| ◆ Ute-Ignacio, CO  | × Ute-Red Mesa, CO | ■ Ute-Hw y. 550, CO |
| ▲ Mesa Verde NP    | * USFS-Shamrock    | □ Bloomfield, NM    |
| ○ Shiprock Sub, NM | △ Navajo Lake, NM  | + Canyonlands NP    |

# Ozone Graphs

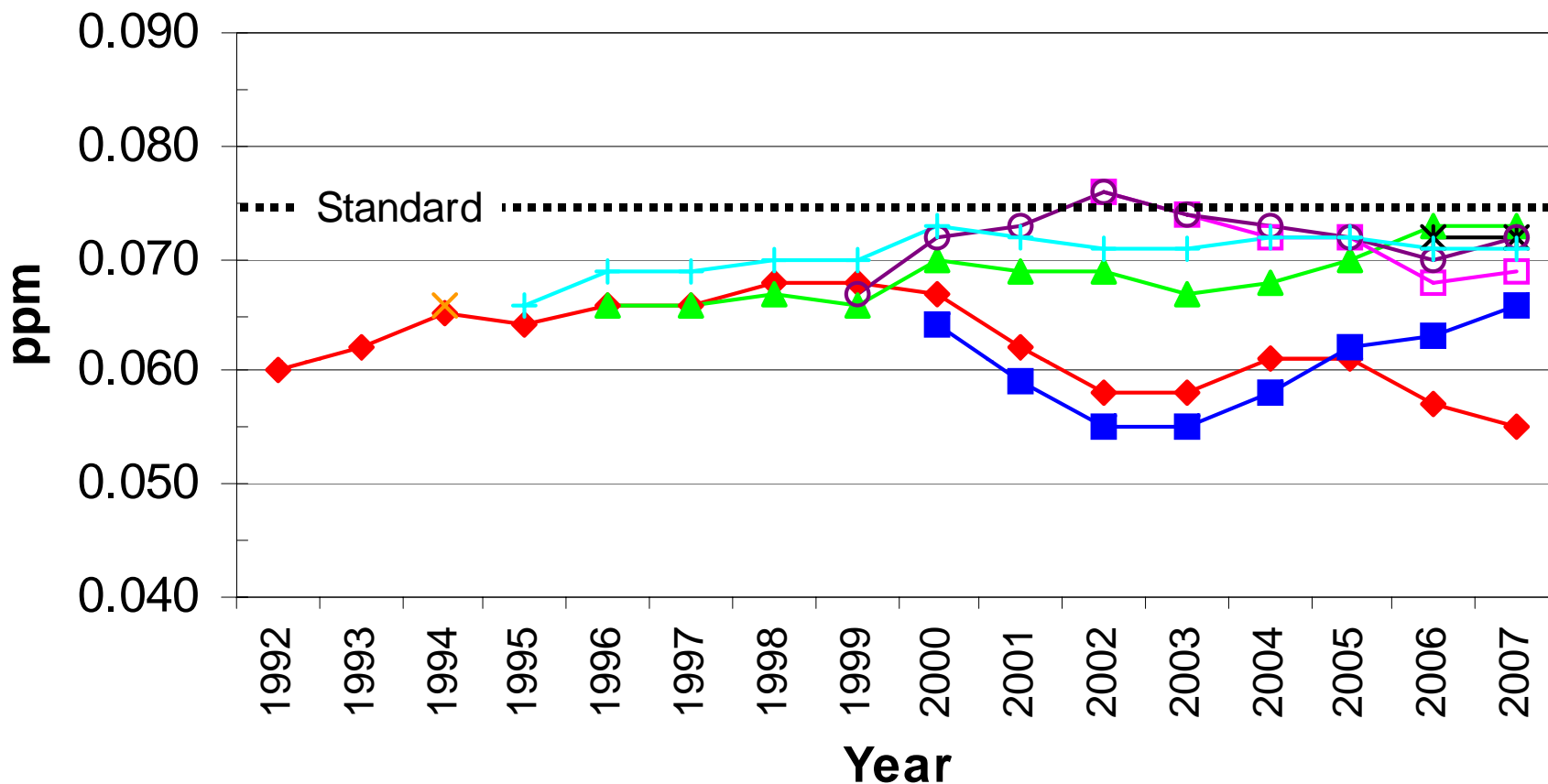
3-Year Average of the  
4<sup>th</sup> Maximum 8-Hour Values

## 8-hour Ozone --- 3-year Avg. of 4th Max. Southwestern Colorado



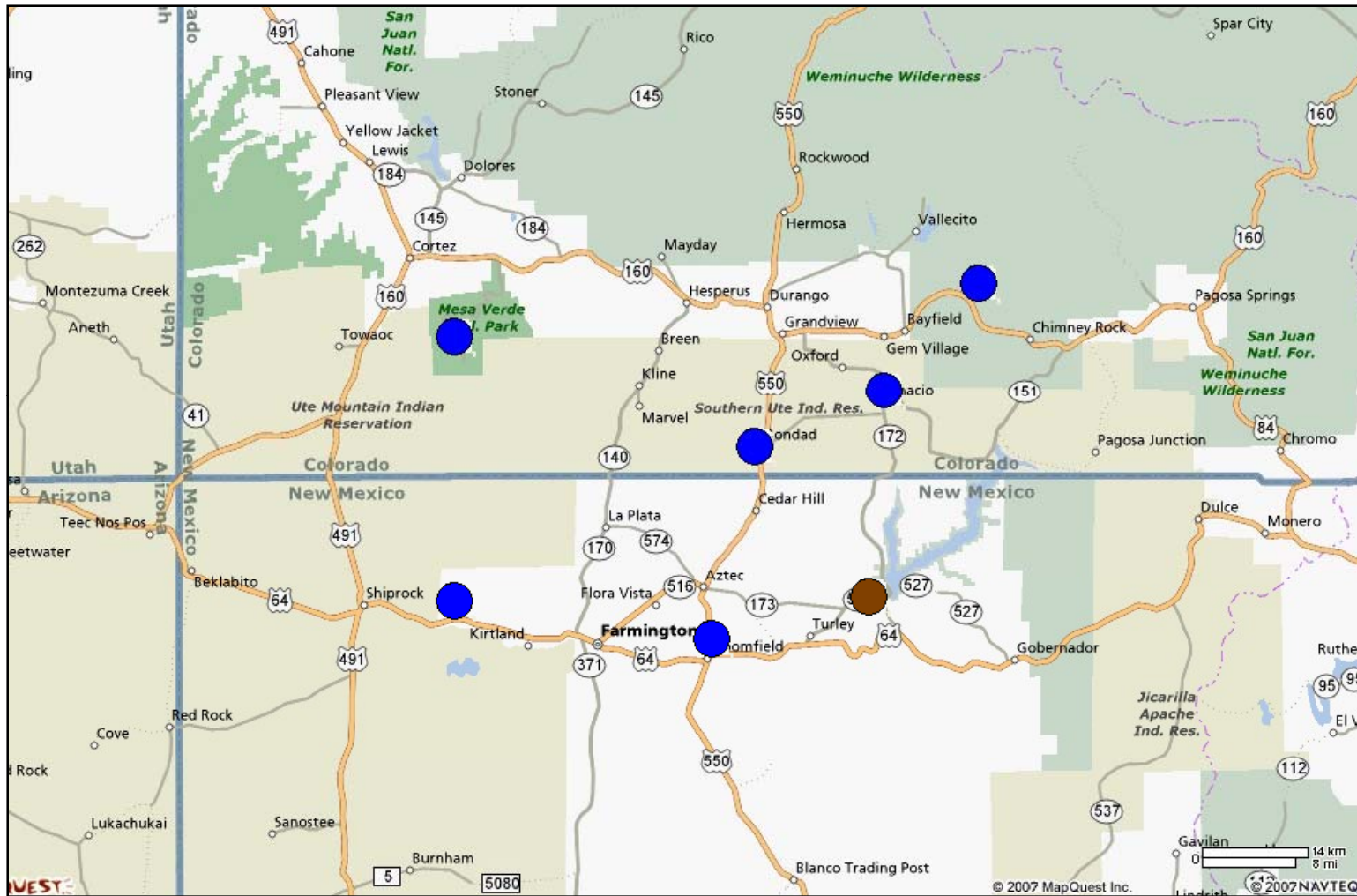
New ozone standard: 3-year avg. of 4<sup>th</sup> max. 8-hour values not to exceed 0.075 ppm

## 8-hour Ozone --- 3-year Avg. of 4th Max. Four Corners Area



New ozone standard: 3-year avg. of 4<sup>th</sup> max. 8-hour values not to exceed 0.075 ppm

# New ozone standard: $\leq 0.075$ ppm



- Below level of new standard  
(Site in operation 3+ years)  
(Based on 3-yr. avg. of 4th max. for 2004-2006)
- Above level of new standard  
(Site in operation 3+ years)  
(Based on 3-yr. avg. of 4th max. for 2004-2006)

- Below level of new standard  
(Site in operation <3 years)  
(Based on avg. of 4th max. for years of operation)
- Above level of new standard  
(Site in operation < 3 years)  
(Based on avg. of 4th max. for years of operation)

# Current Ozone Monitoring

## --- Conclusions ---

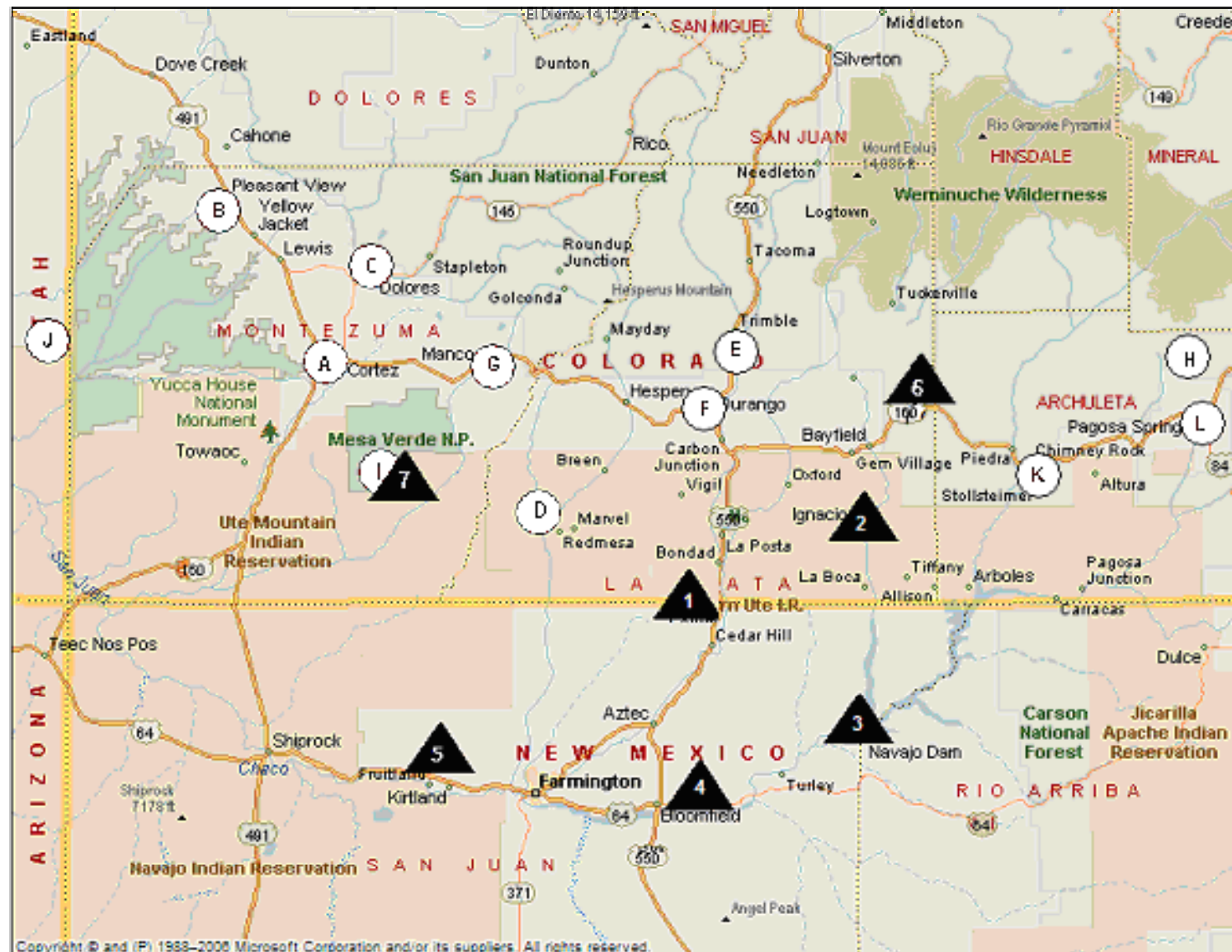
- Ozone levels in southwest Colorado are currently below the level of the new NAAQS.
- However, they are not far below at the NPS Mesa Verde and USFS Shamrock sites.
- New Mexico's Navajo Lake site will probably be in violation of the new NAAQS this summer.
- This will mean non-attainment designation for part or all of San Juan County in New Mexico and maybe into Colorado.

# 2007 Southwest Colorado Passive Ozone Study

# 2007 SW Colorado Passive Ozone Study

- 30 July 2007 – 08 Sept. 2007
- 12 passive sites (incl. collocated site)
- 7 continuous sites for comparison
  - 4 in Colorado (Mesa Verde = collocated site)
  - 3 in New Mexico
- 48-hour samples
- Approx. 7:00 a.m. change-outs
- Sampling done by volunteers

# 2007 SW Colorado Passive Ozone Study Sites

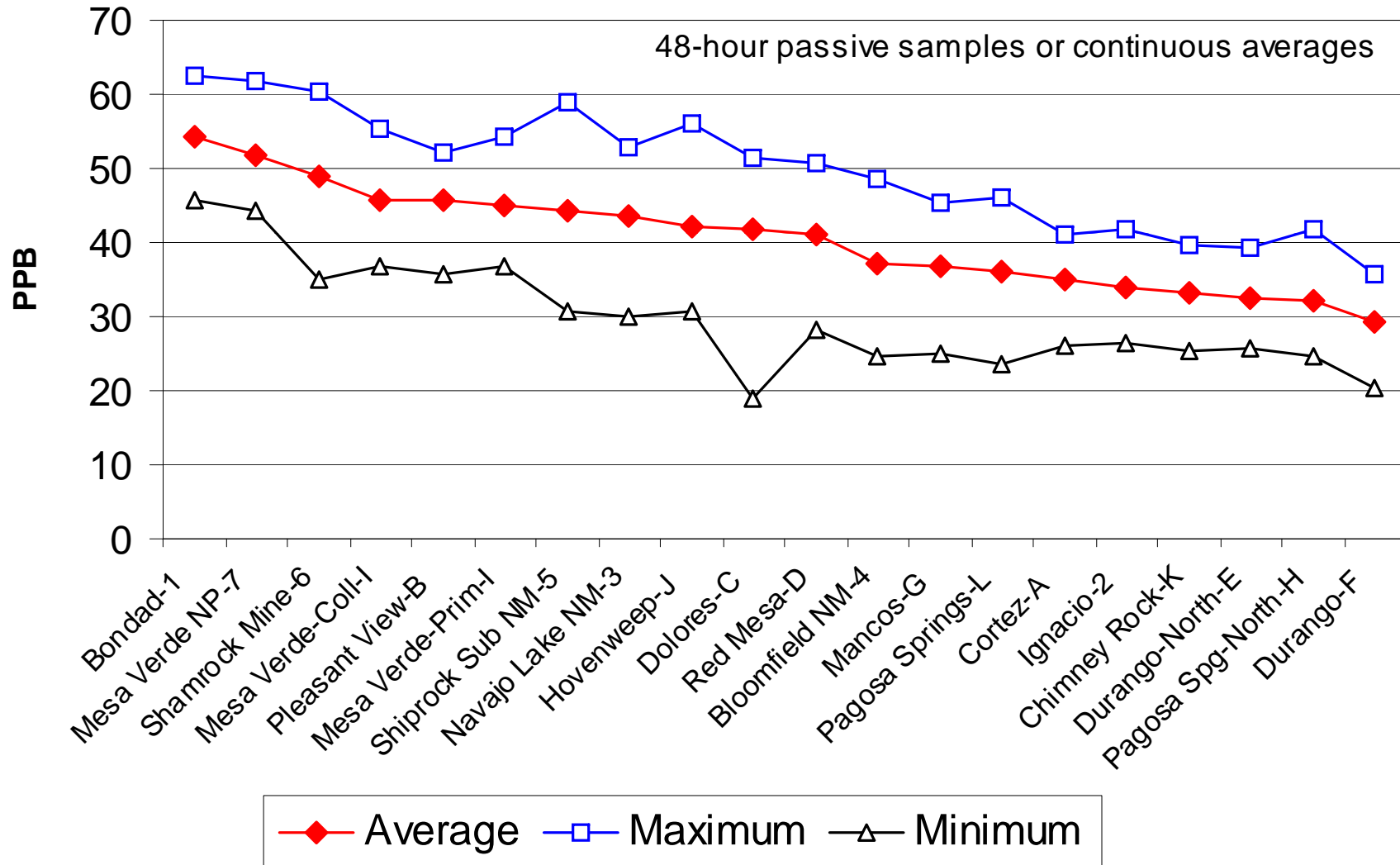


○ Passive monitoring site

▲ Continuous monitoring site

# 2007 SW Colorado Passive Ozone Study Results

**Ozone --- Four Corners Area - Passive Study 2007**  
**7/30/2007 - 9/8/2007**



# 2007 SW Colorado Passive Ozone Study

## --- Conclusions ---

- Overall passive sample recovery was good.
- Precision between collocated passive samplers was good.
- Precision between passive samplers and continuous analyzer was acceptable.
- Passive samples provide a relative indication of what areas might have elevated ozone concentrations, but cannot be directly compared to the 8-hour standard.
- In general, ozone levels appear to be higher in the western portion of the study area and lower in the eastern portion.
- NO<sub>x</sub> titration may be reducing ozone in urban areas at night, resulting in lower 48-hour passive averages.

# What is next in southwest Colorado for ozone?

- Installation of an ozone analyzer in Cortez by 30 June 2008 for population protection.
- Additional passive studies in future?
- Possible ozone precursor studies in future?