

Monitoring Related to Oil and Gas Development

Gordon Pierce
Colorado Department of Public Health and
Environment

May 17, 2012

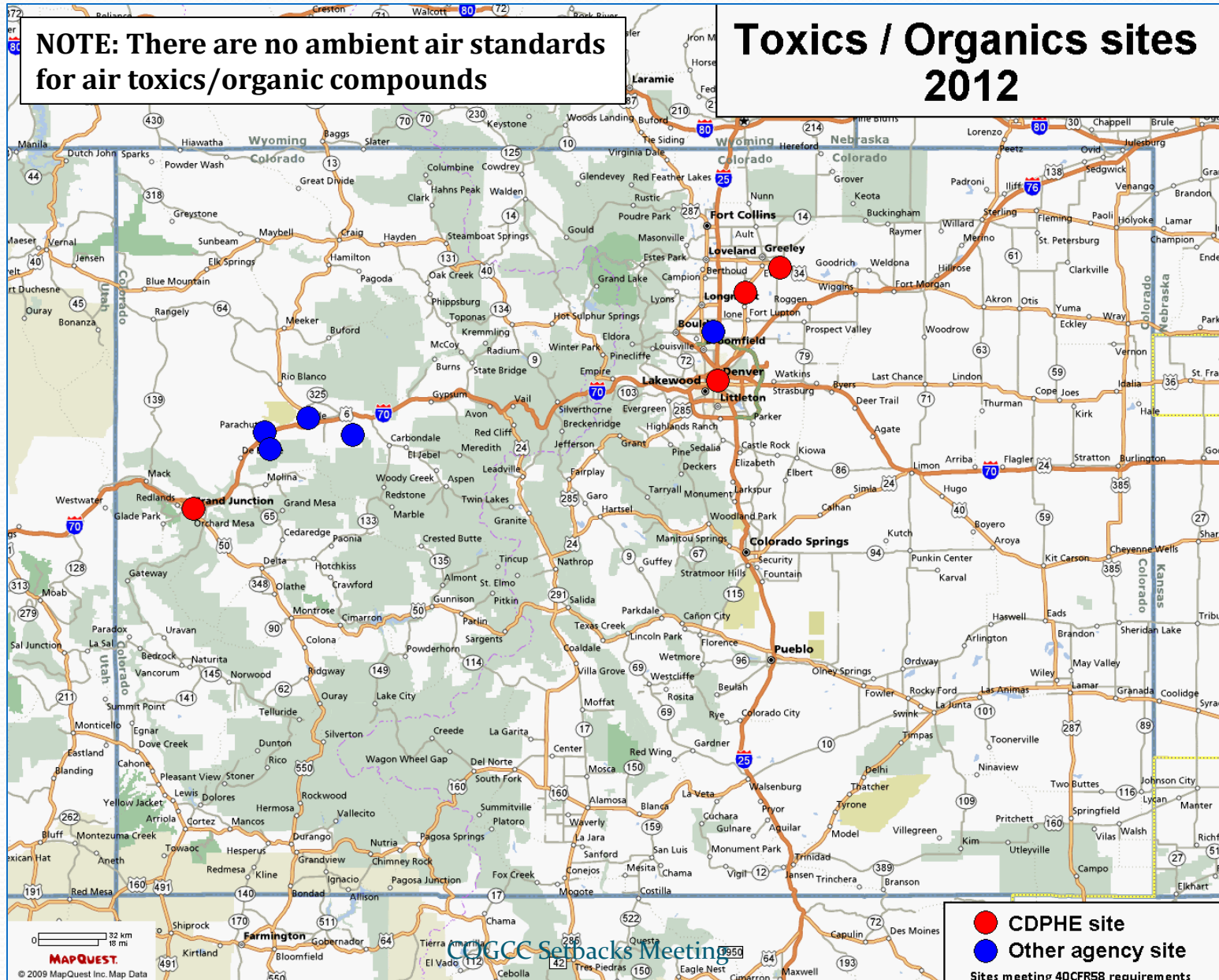
Air Monitoring Overview

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

Air Quality Monitoring Sites

NOTE: There are no ambient air standards for air toxics/organic compounds

Toxics / Organics sites 2012





Front Range Area / Wattenberg Field Monitoring and Results

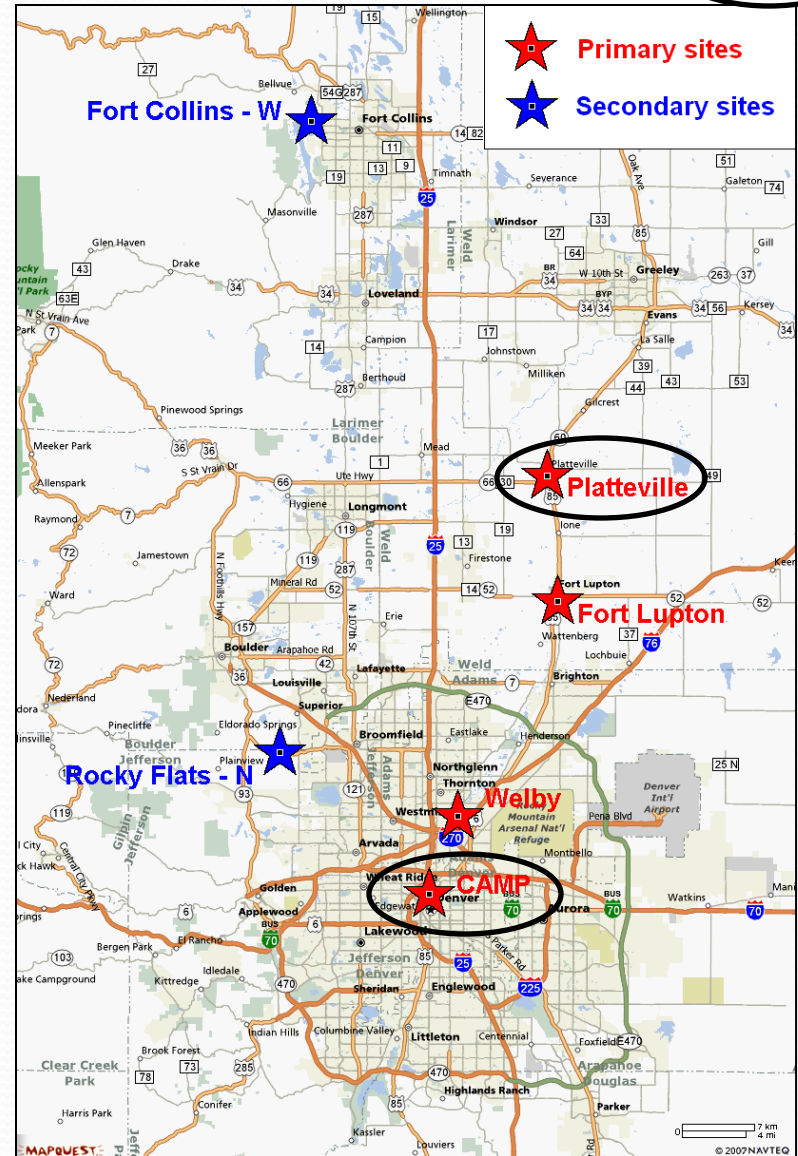
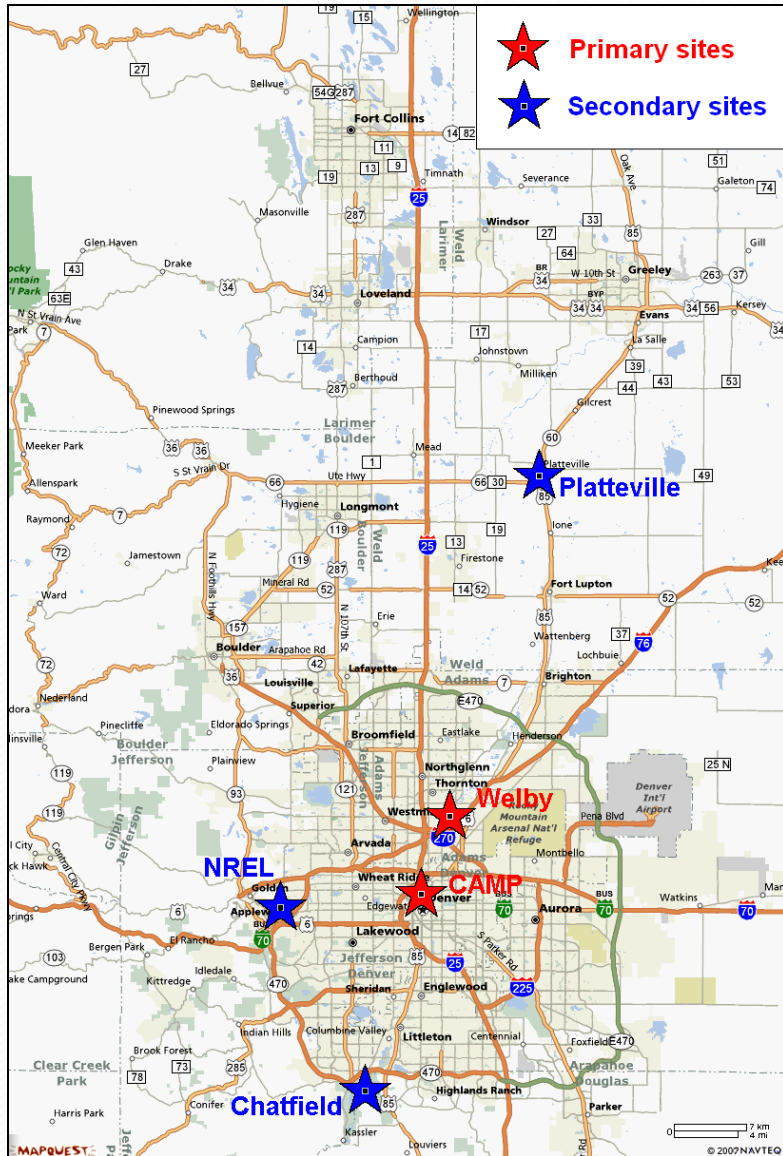
Organic Compounds Monitoring History

- 2003 Ozone Precursor Study (July – Sept.)
 - SNMOC's and carbonyls
 - 2 primary sites, 3 secondary sites
 - 3-hour a.m. and 3-hour p.m. samples
- 2006 Ozone Precursor Study (June – July)
 - SNMOC's and carbonyls
 - 4 primary sites (3-hour a.m.)
 - 2 secondary sites (3-hour p.m.)
- 2012 Ozone Precursor Study (Dec. 2011 – current)
 - SNMOC's and carbonyls
 - 3 primary sites (2 currently installed)
 - Additional secondary sampling being planned
 - 3-hour a.m. samples

2003

Ozone Precursor Studies

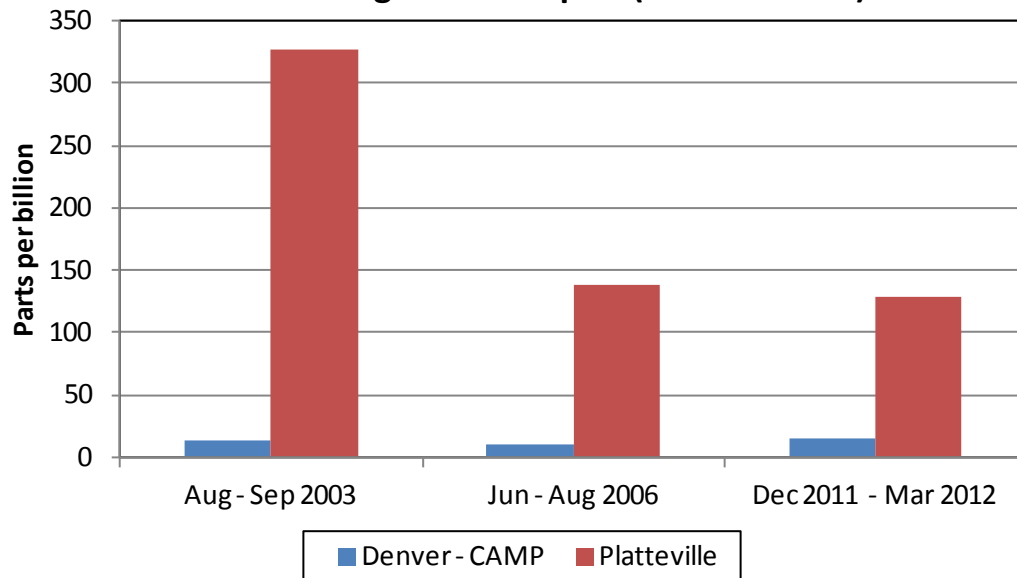
2006/2012



6/14/2012

Ethane

Average 3-hr. samples (6 a.m. - 9 a.m.)



Select organics that are typically O&G-related

NOTE:

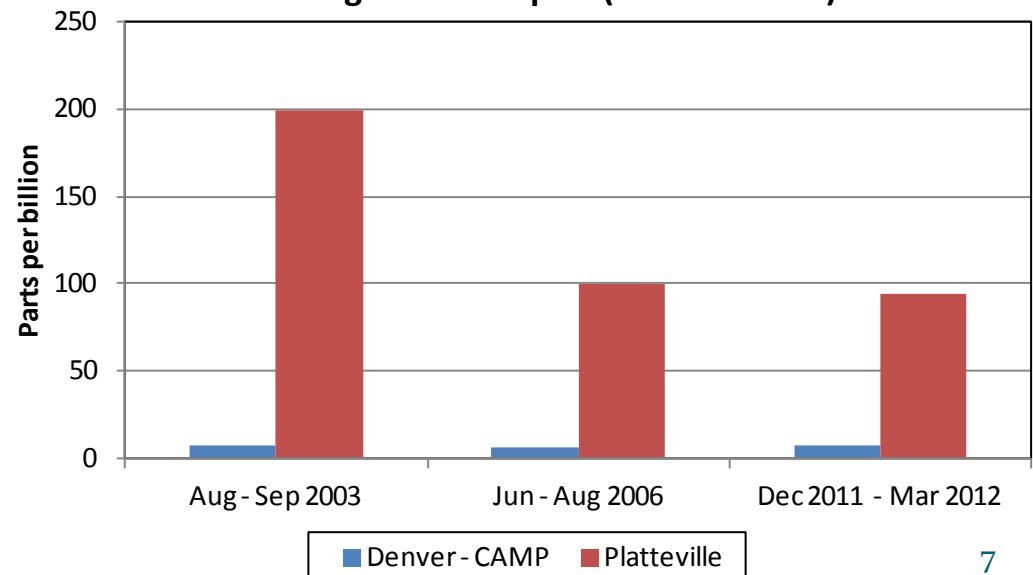
Average methane levels for March 2012:

CAMP = 1780 ppb

Platteville = 2535 ppb

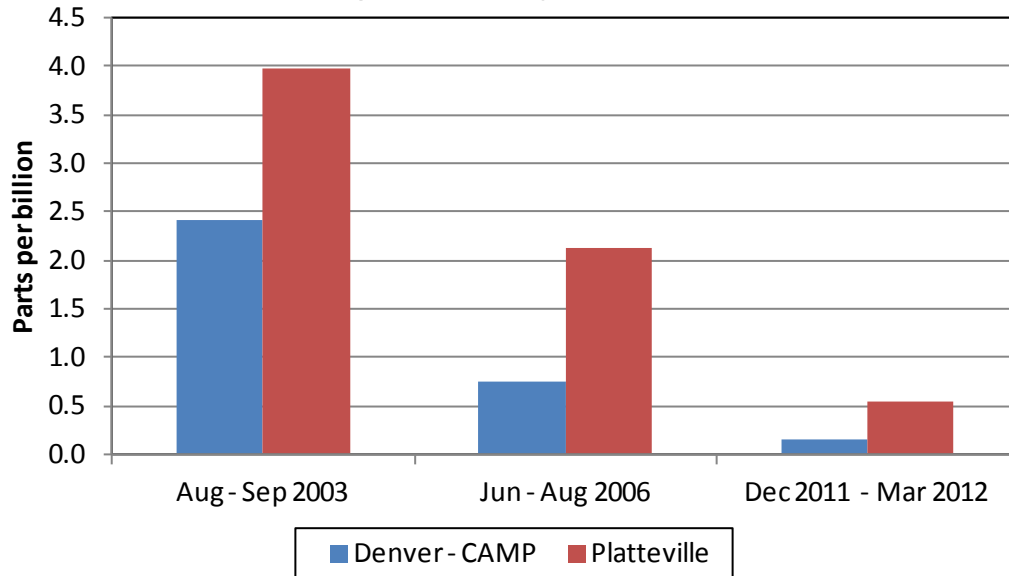
Propane

Average 3-hr. samples (6 a.m. - 9 a.m.)



Benzene

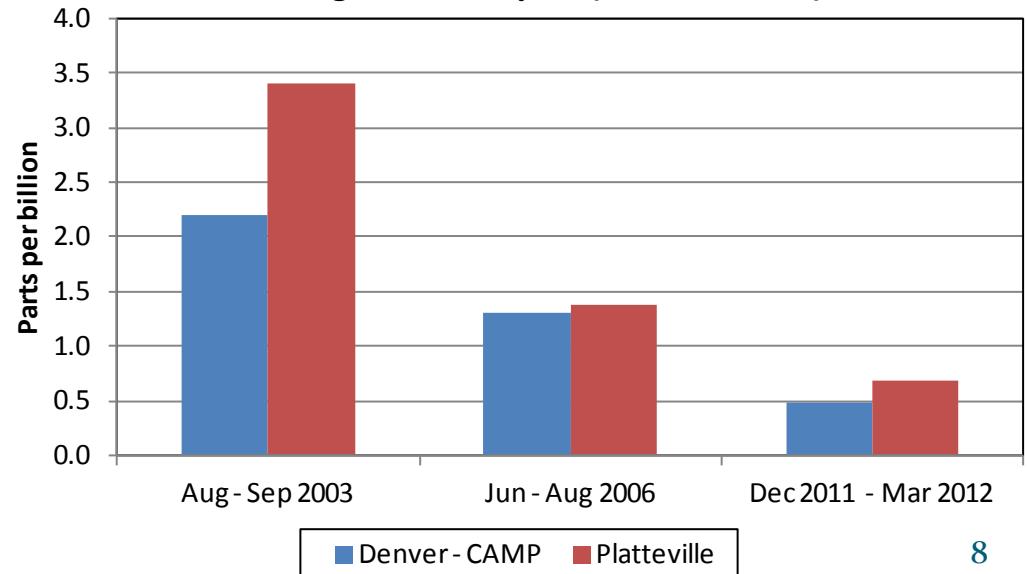
Average 3-hr. samples (6 a.m. - 9 a.m.)



Select organics that are urban and O&G-related

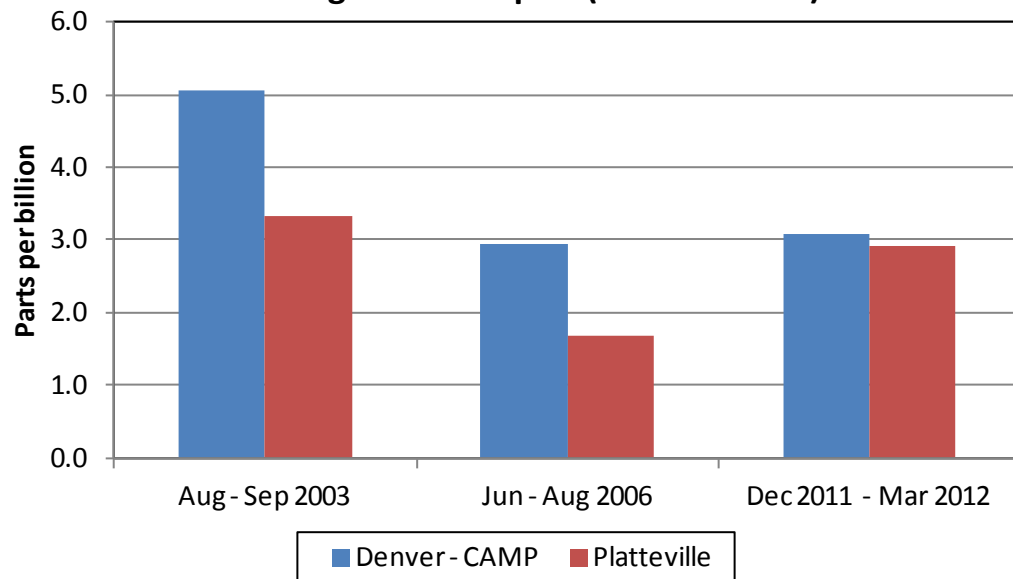
Toluene

Average 3-hr. samples (6 a.m. - 9 a.m.)



Ethylene

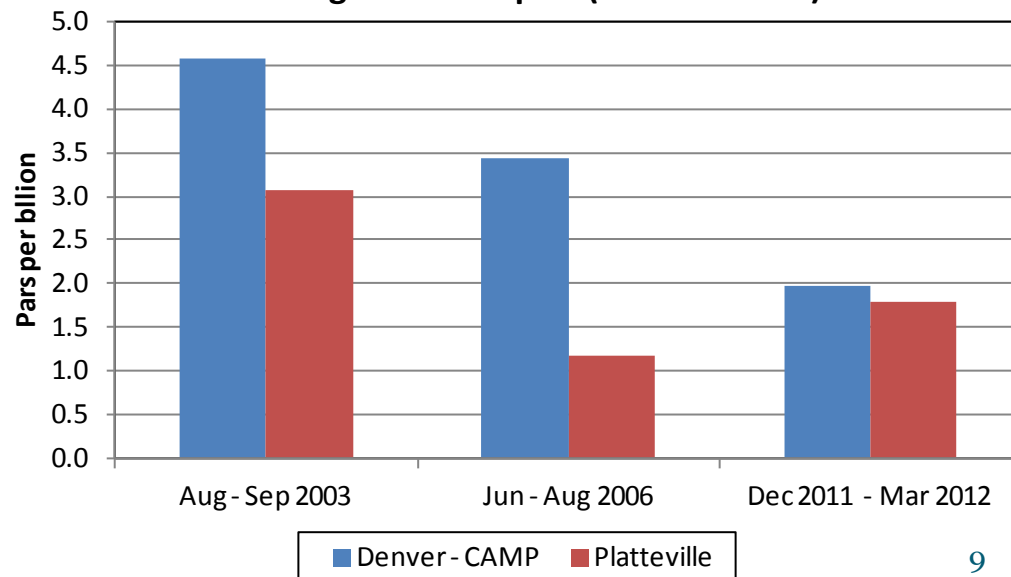
Average 3-hr. samples (6 a.m. - 9 a.m.)



Select organics that are typically urban-related

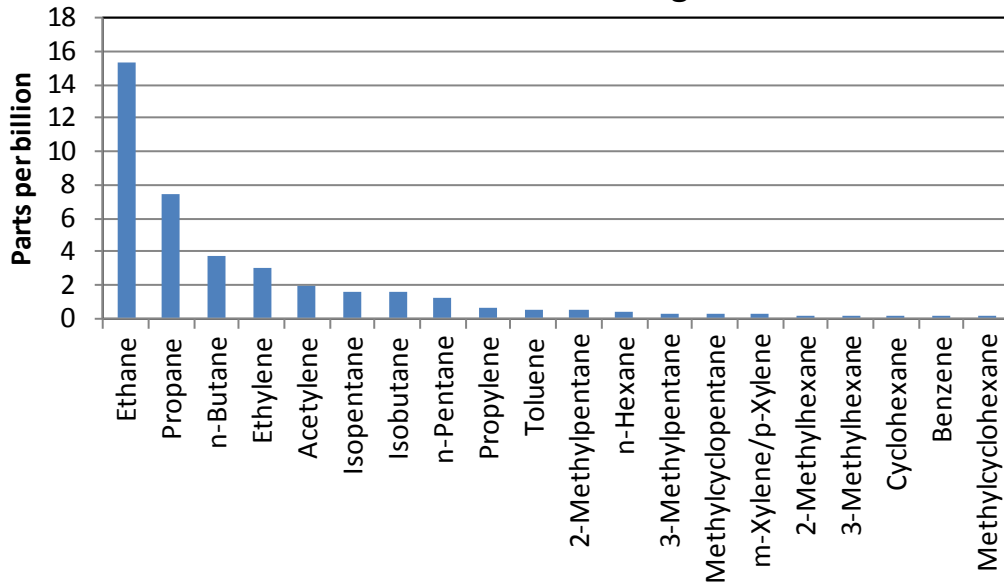
Acetylene

Average 3-hr. samples (6 a.m. - 9 a.m.)



Top 20 NMOC - Denver CAMP Dec. 2011 - Mar. 2012 Averages

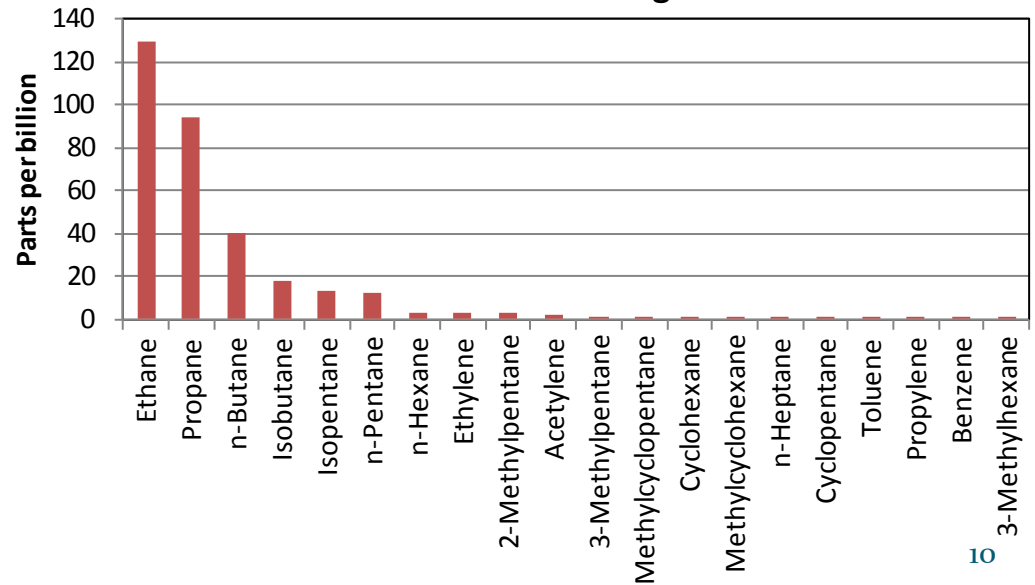
6 a.m. - 9 a.m.
samples




Top 20 NMOC's

Top 20 NMOC - Platteville Dec. 2011 - Mar. 2012 Averages

6 a.m. - 9 a.m.
samples

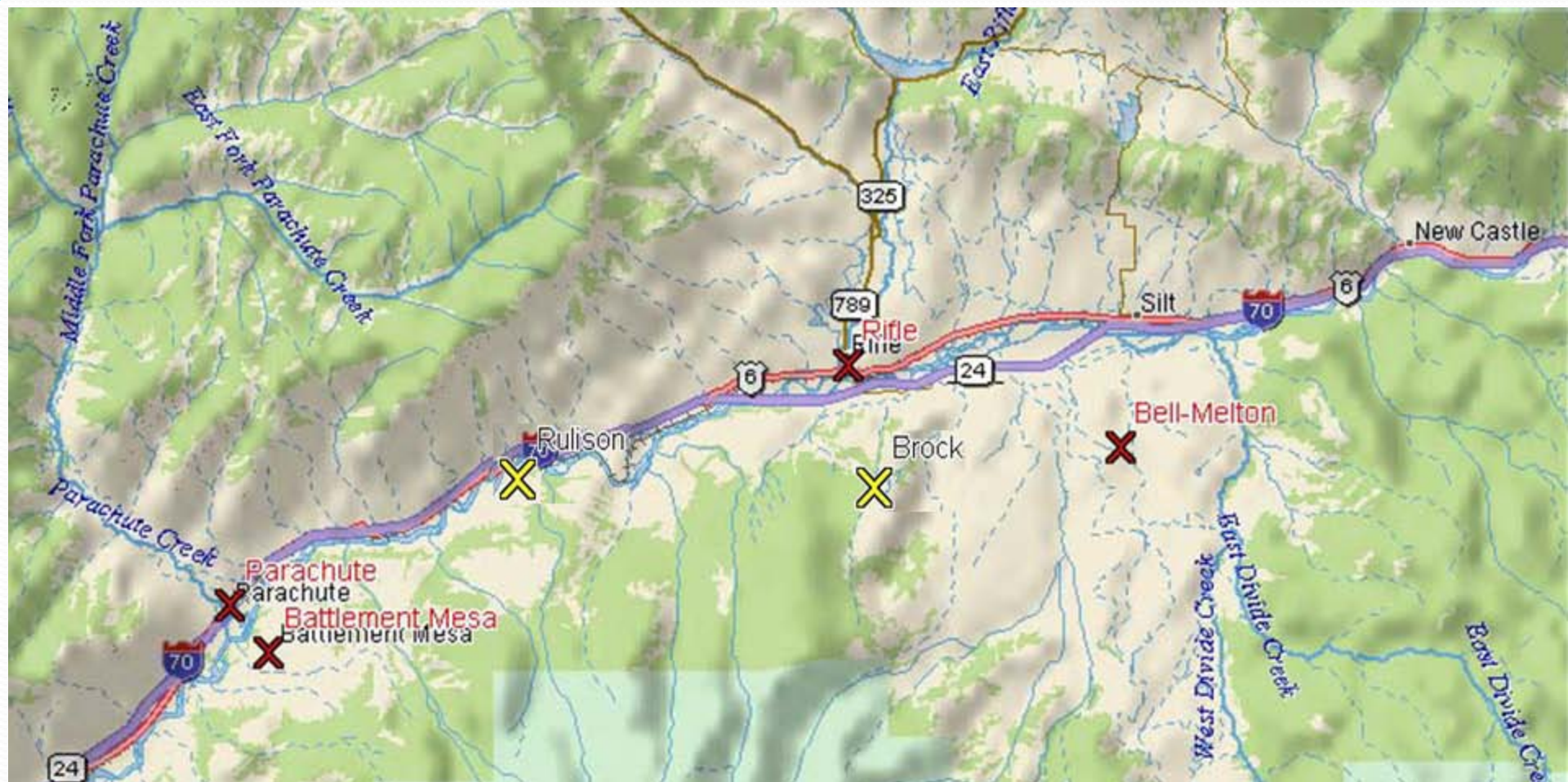




Garfield County / Piceance Basin Monitoring and Results

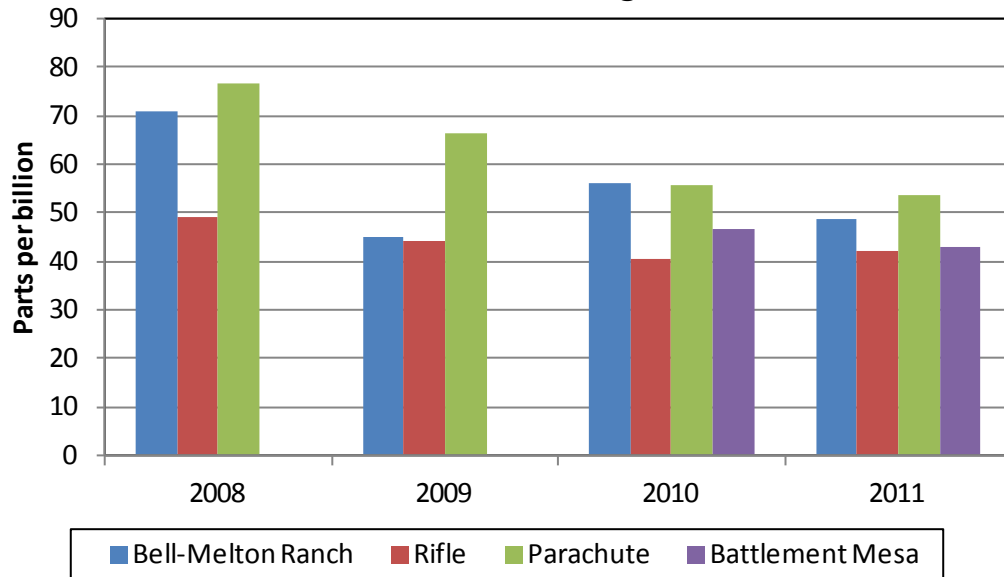
Organic Compounds Monitoring History

- 2005-2007
 - VOC's at 14 sites, 24-hour
 - VOC grab samples
- 2008-current
 - SNMOC's and carbonyls, 24-hour
 - 4-5 sites each year
- 2002 Well Study
 - VOC's at uncontrolled well and controlled well
- 2008 Targeted Well Study
 - SNMOC's and carbonyls, 24-hour
 - 8 wells (4 drilling activities, 4 completion activities)



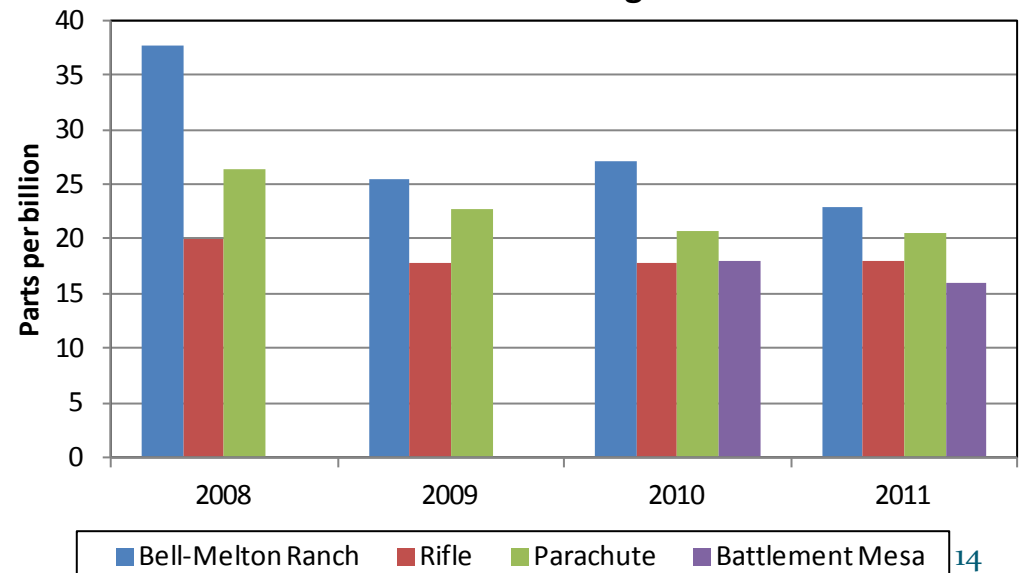
2008 - 2011 Air Quality Monitoring Sites

Ethane Annual Averages

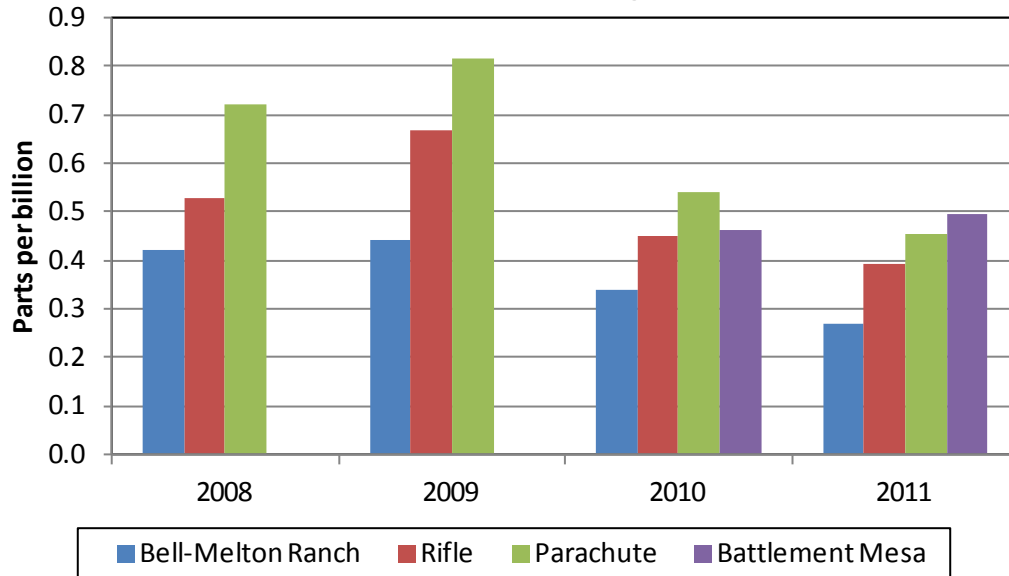


Select
organics that
are typically
O&G-related

Propane Annual Averages

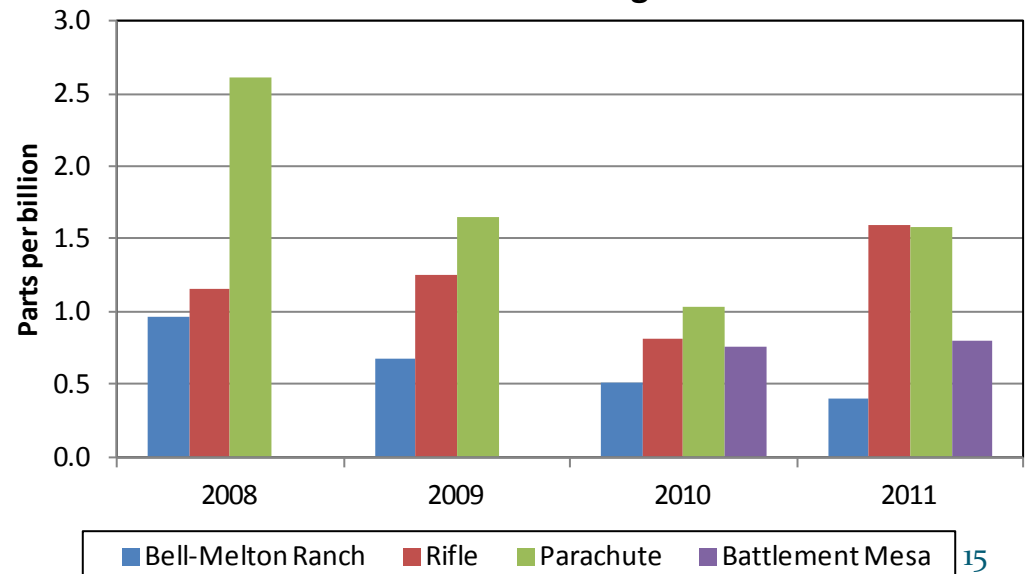


Benzene Annual Averages

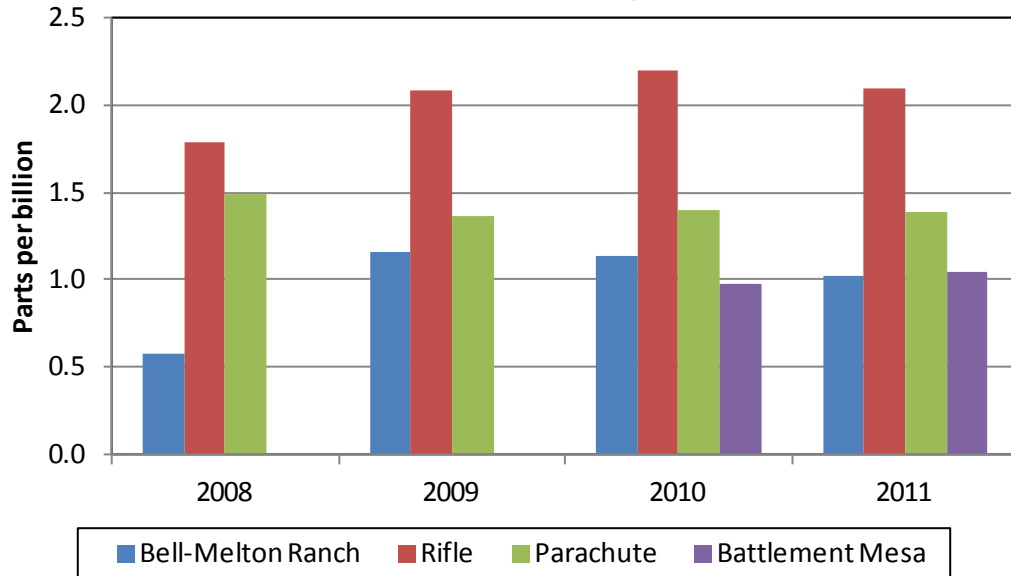


Select
organics that
are urban and
O&G-related

Toluene Annual Averages

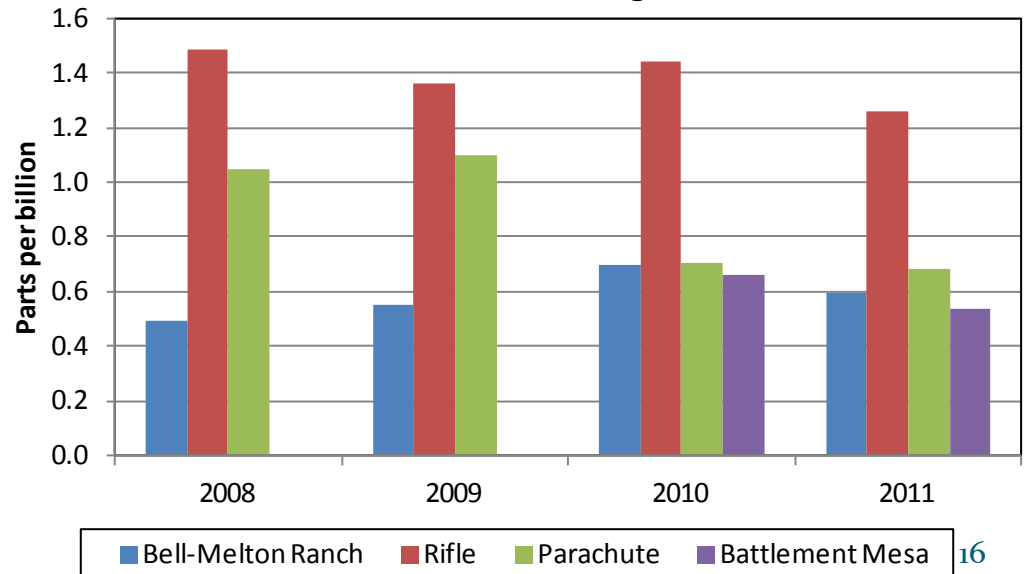


Ethylene Annual Averages



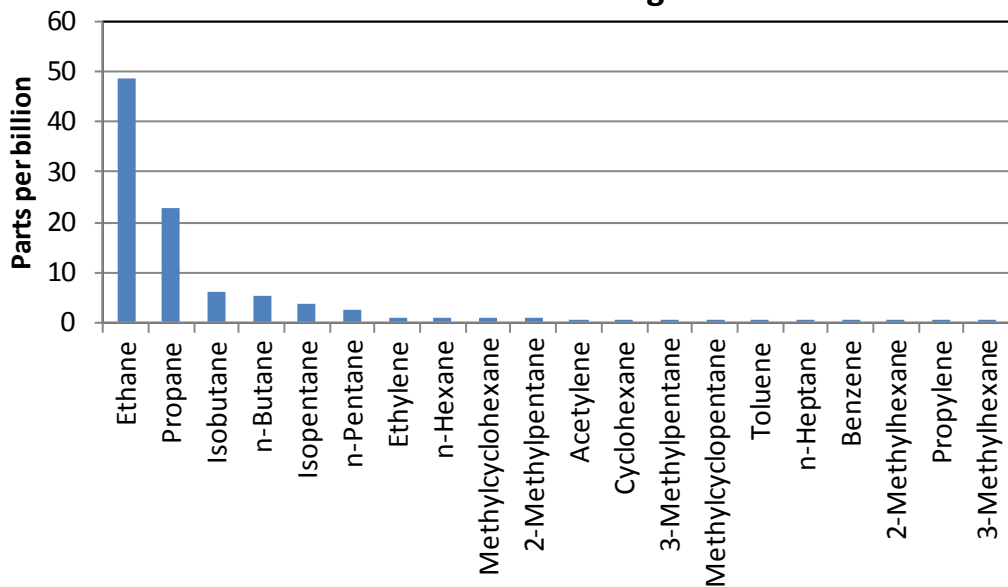
Select
organics that
are typically
urban-related

Acetylene Annual Averages



Top 20 NMOC - Bell-Melton Jan. 2011 - Dec. 2011 Averages

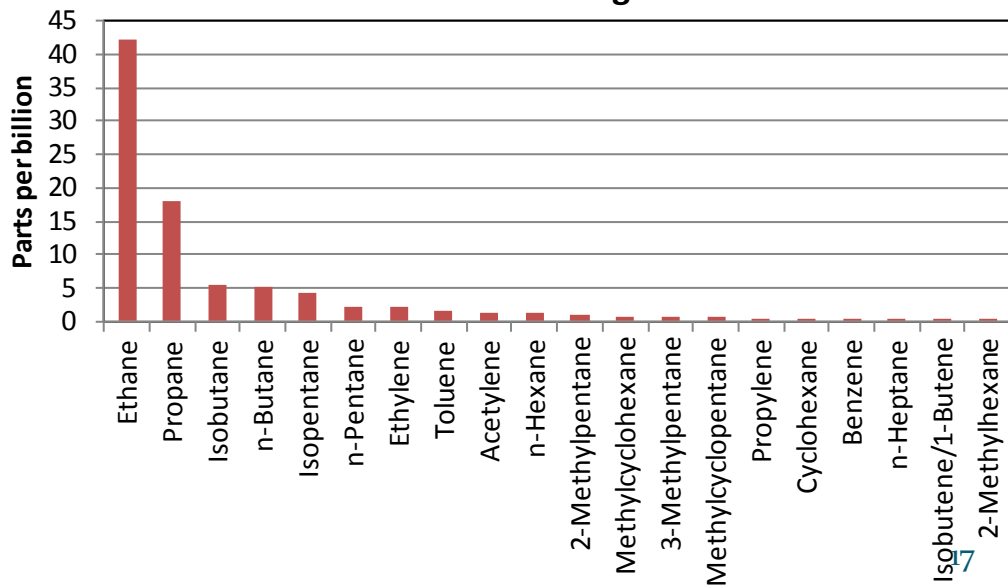
24-hour
samples



Top 20 NMOC's

Top 20 NMOC - Rifle Jan. 2011 - Dec. 2011 Averages

24-hour
samples



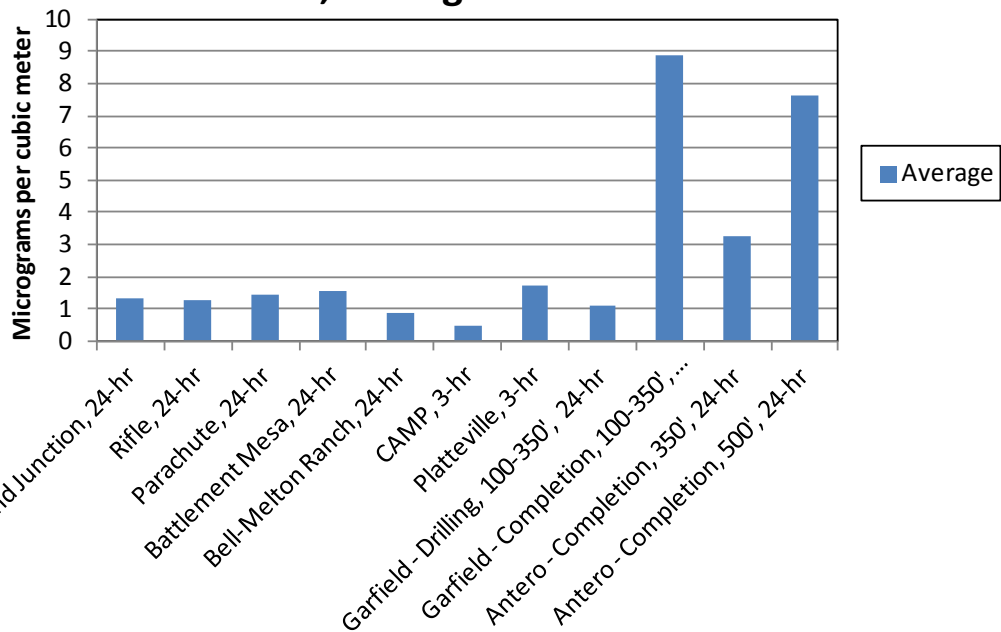


Focus on Benzene

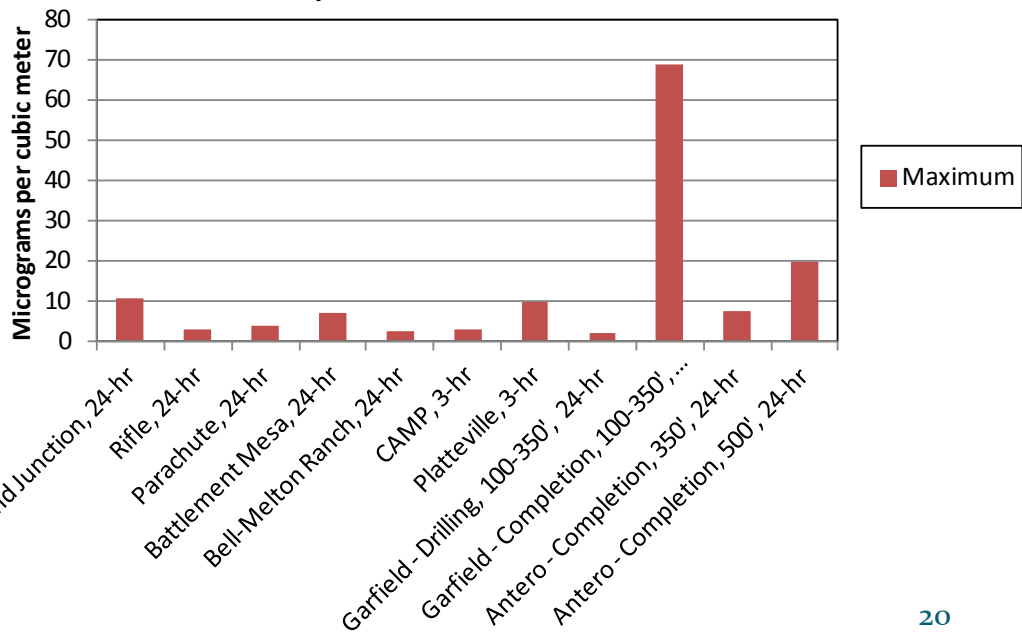
Recent benzene data

Site	Date period	Sample time length	Number of samples	Average ug/m3	Maximum ug/m3
Grand Junction	2011	24-hour	60	1.333	10.543
Rifle	2011	24-hour	51	1.260	2.780
Parachute	2011	24-hour	50	1.450	3.690
Battlement Mesa	2011	24-hour	50	1.580	6.870
Bell-Melton Ranch	2011	24-hour	54	0.860	2.640
CAMP	Dec. 2011-Mar 2012	3-hour	28	0.489	2.987
Platteville	Dec. 2011-Mar 2012	3-hour	35	1.732	9.691
Garfield - Drilling, 100-350' to well head	2008	24-hour	20	1.117	1.816
Garfield - Completion, 100-350' to well head	2008	24-hour	20	8.866	68.686
Antero - Completion, 350' to well head	2010	24-hour	4	3.259	7.667
Antero - Completion, 500' to well head	2010	24-hour	4	7.646	19.914

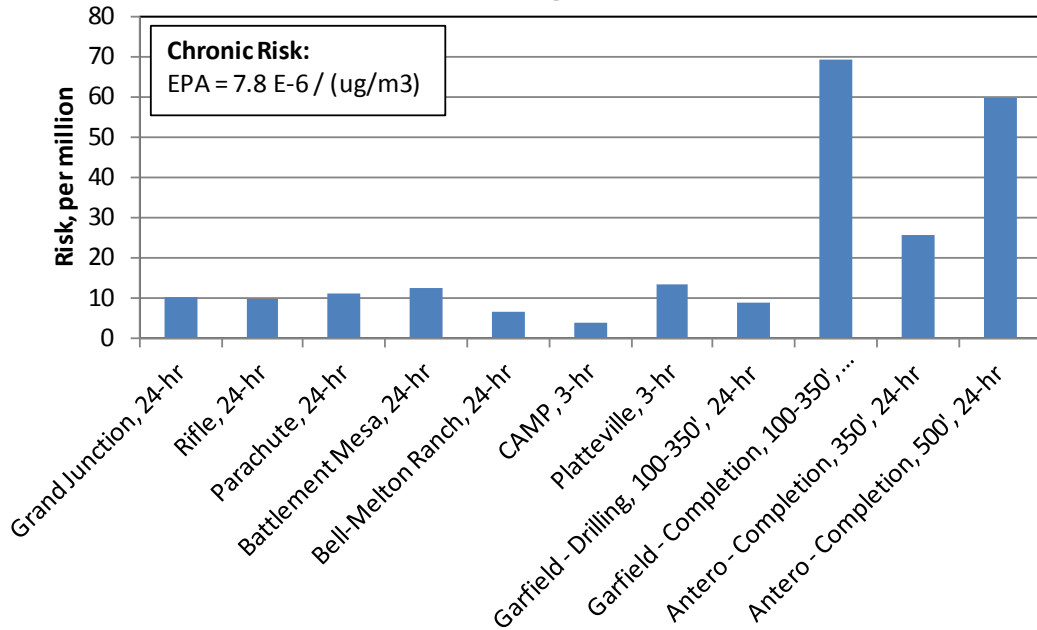
Benzene, Average concentration



Benzene, Maximum concentration



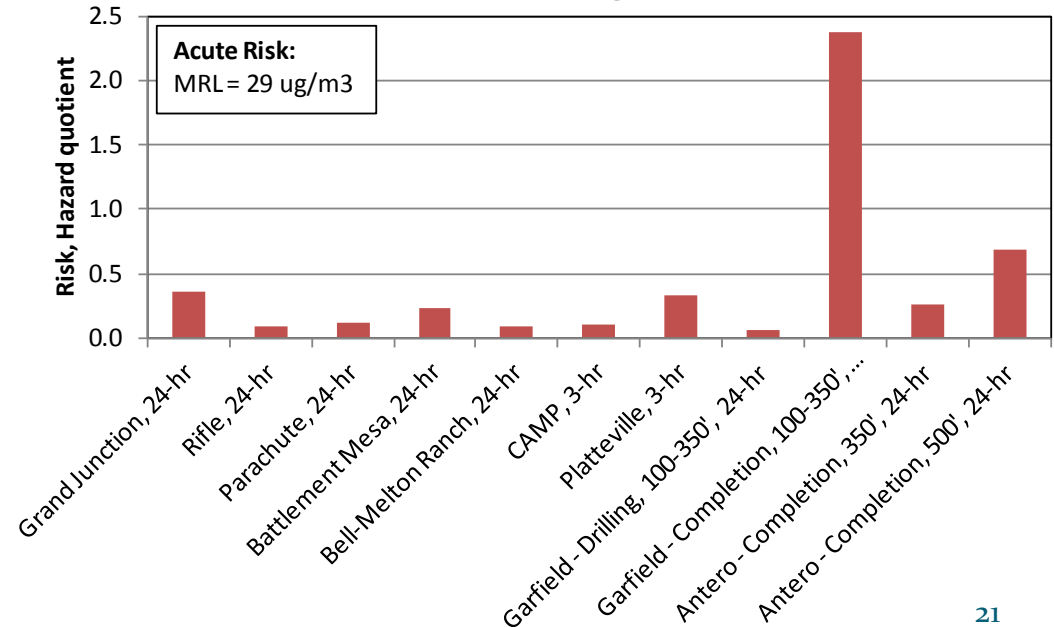
Benzene, screening chronic cancer risk



(Chronic risk based on average of data)

(Acute risk based on maximum value of data)

Benzene, screening acute risk



Questions?

Gordon Pierce
gordon.pierce@state.co.us
303-692-3238