



Oil and Gas Operations and Air Monitoring in Texas

Keith Sheedy, P.E.

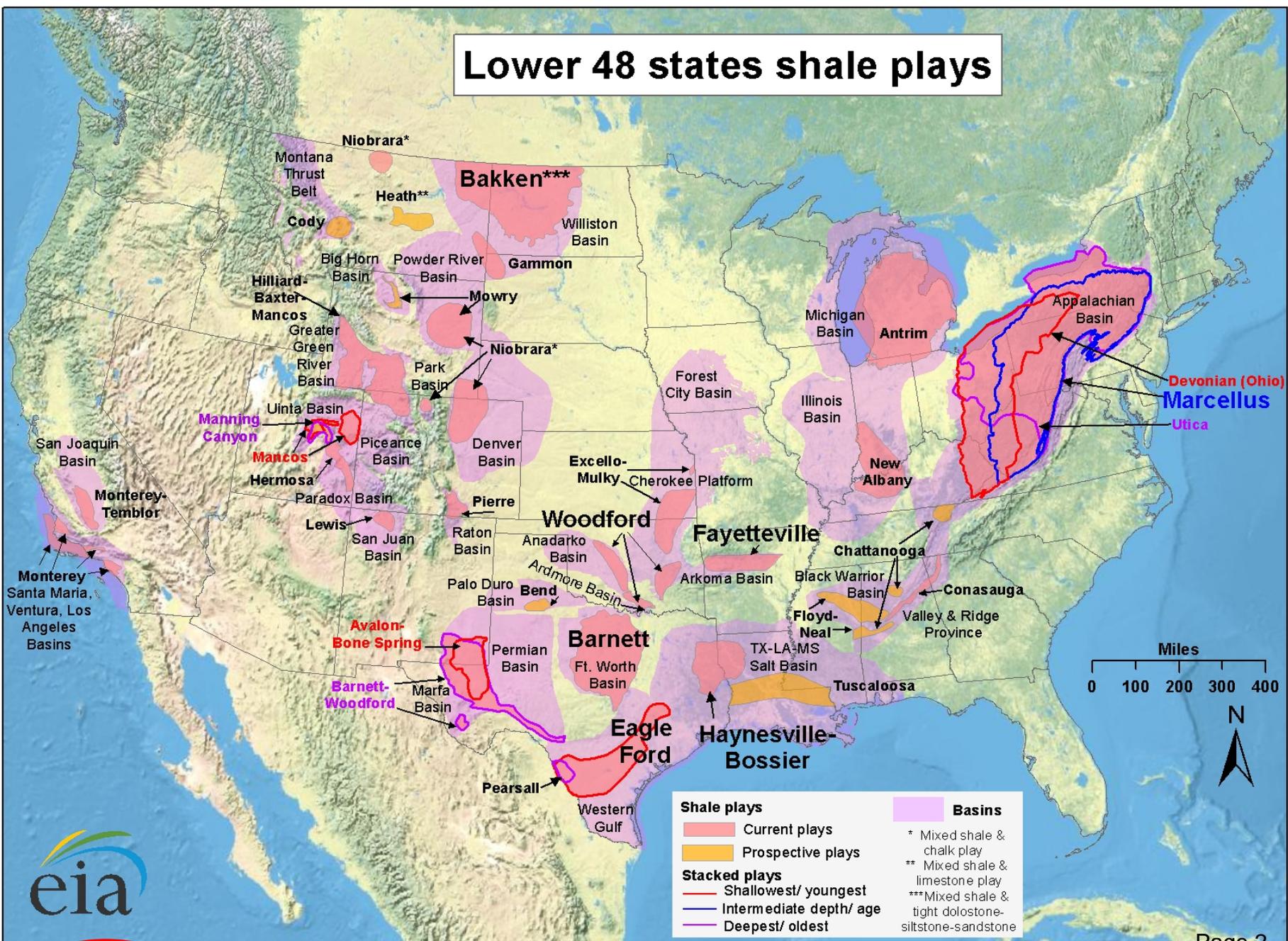
Technical Advisor

Chief Engineer's Office

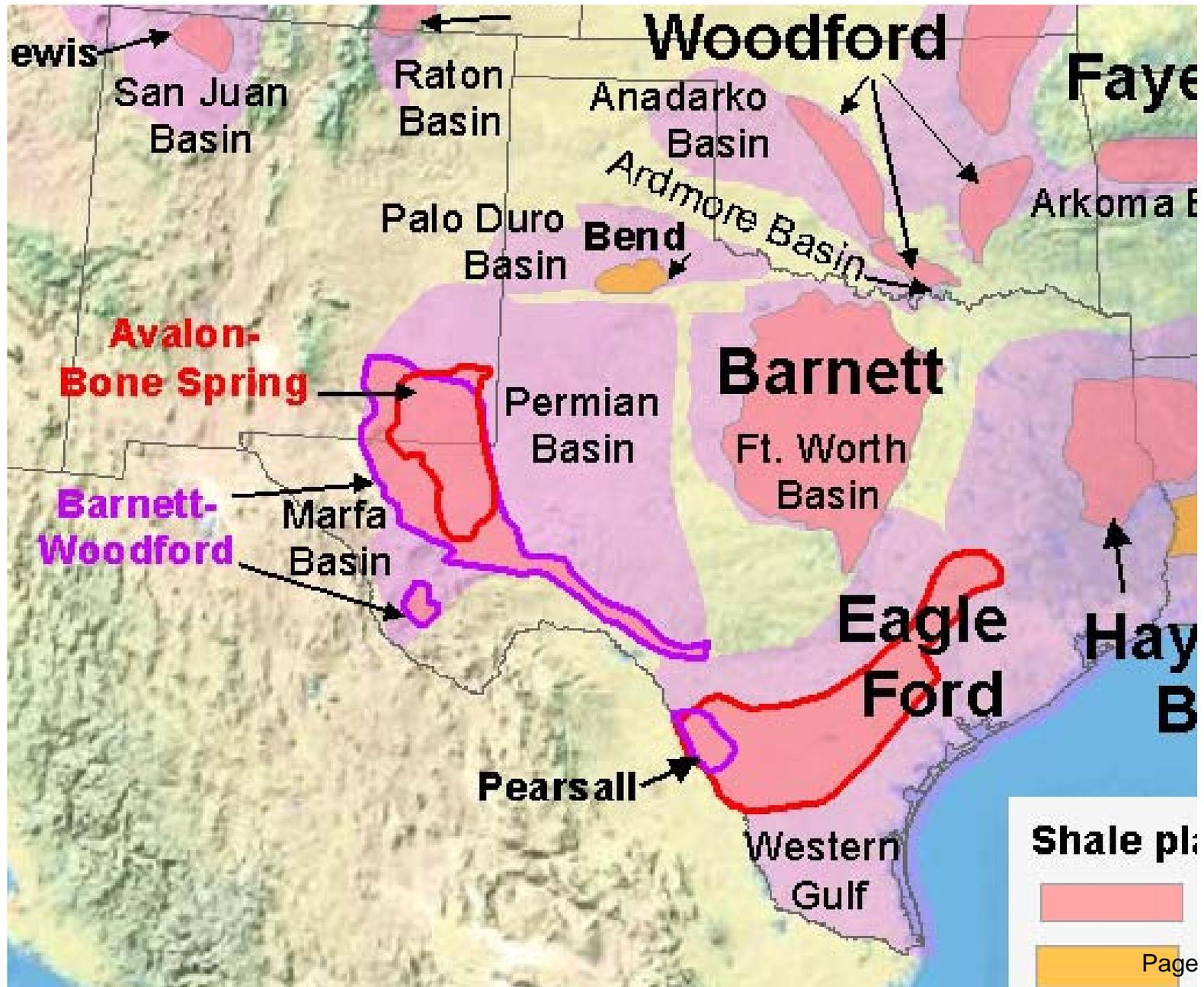
Texas Commission on Environmental Quality

Marcellus Summit 2011 – November 17, 2011

Lower 48 states shale plays



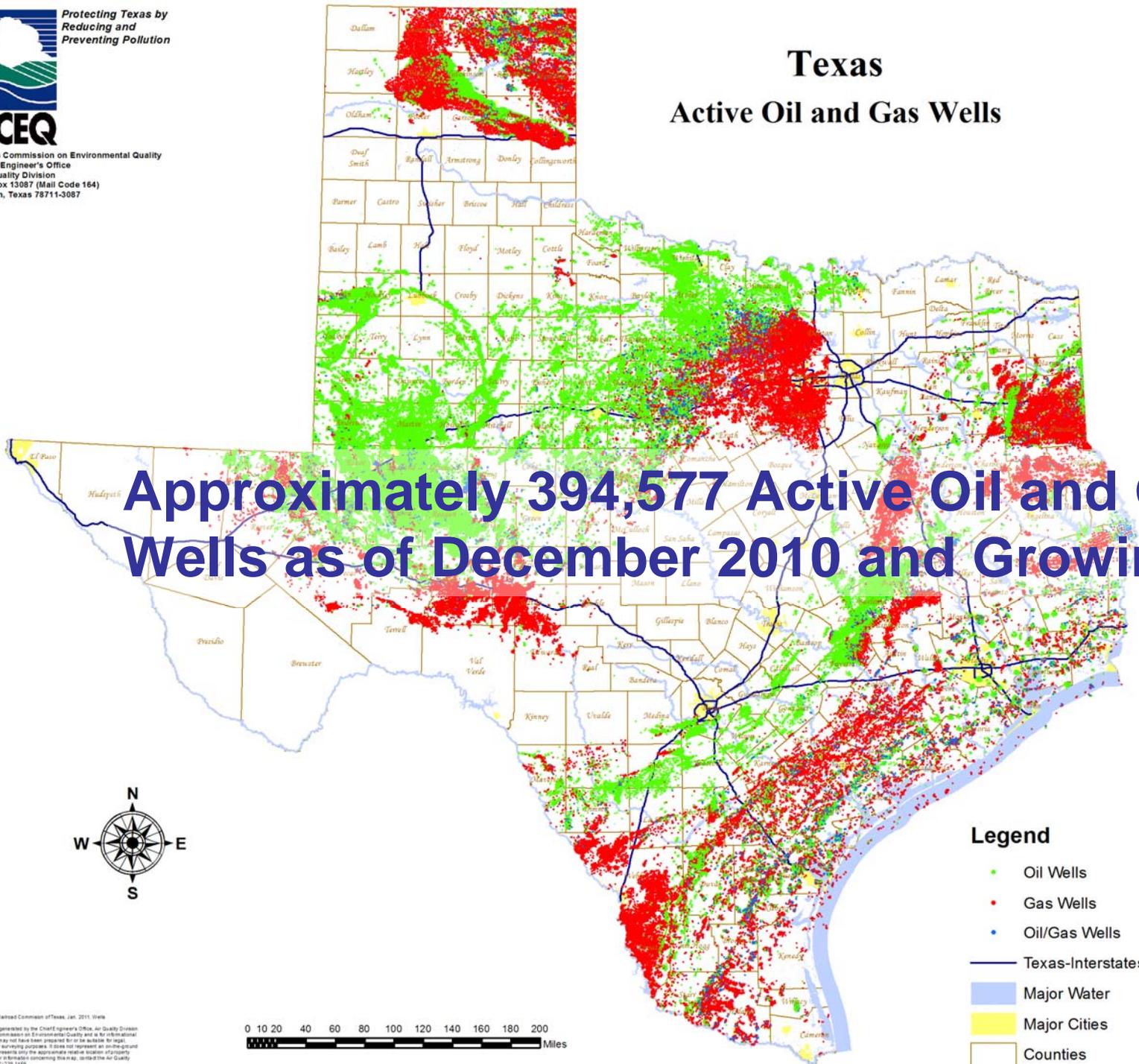
Source: Energy Information Administration based on data from various published studies.
 Updated: May 9, 2011



Texas

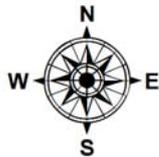
Active Oil and Gas Wells

Approximately 394,577 Active Oil and Gas Wells as of December 2010 and Growing



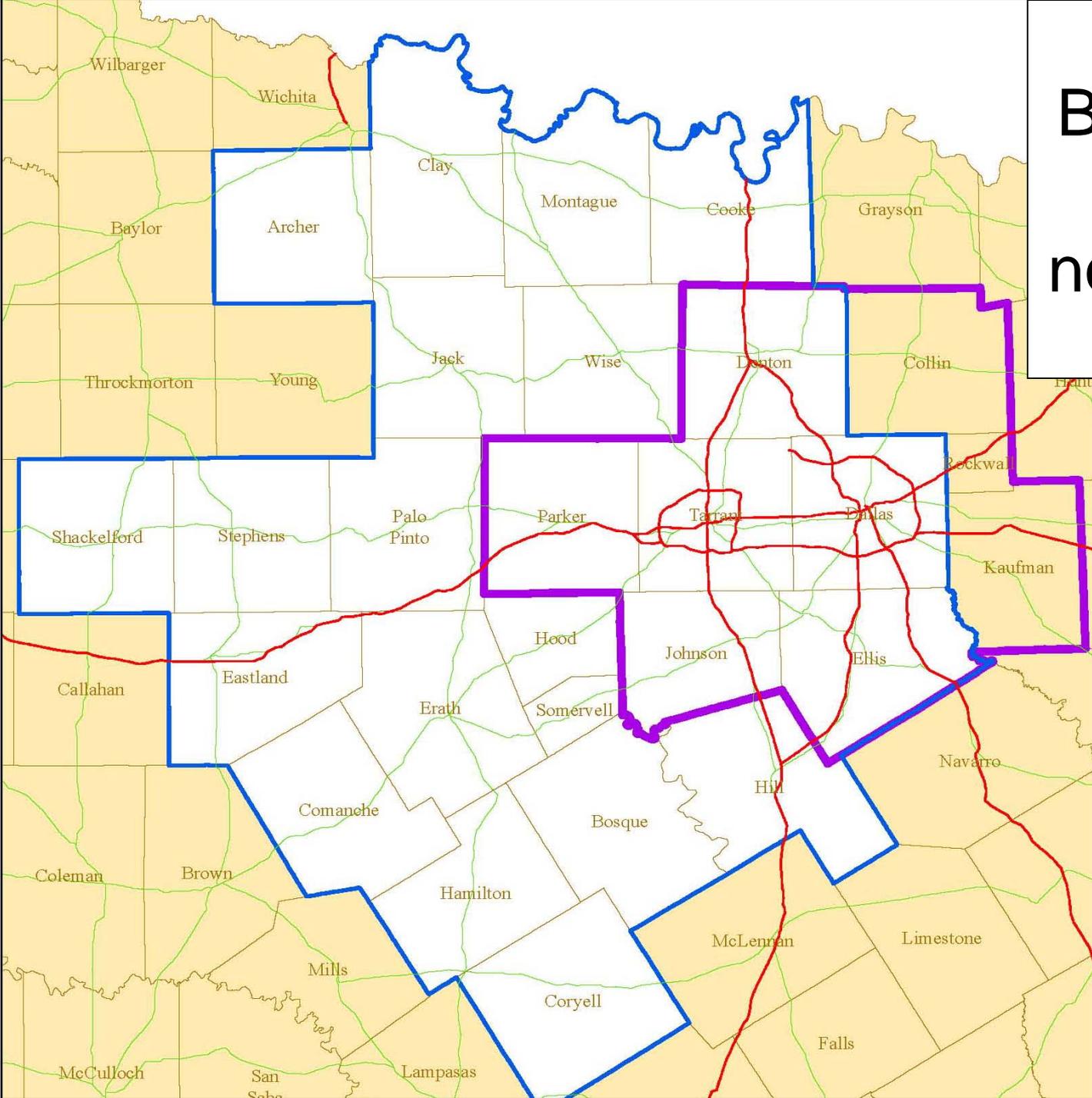
Legend

- Oil Wells
- Gas Wells
- Oil/Gas Wells
- Texas-Interstates
- Major Water
- Major Cities
- Counties

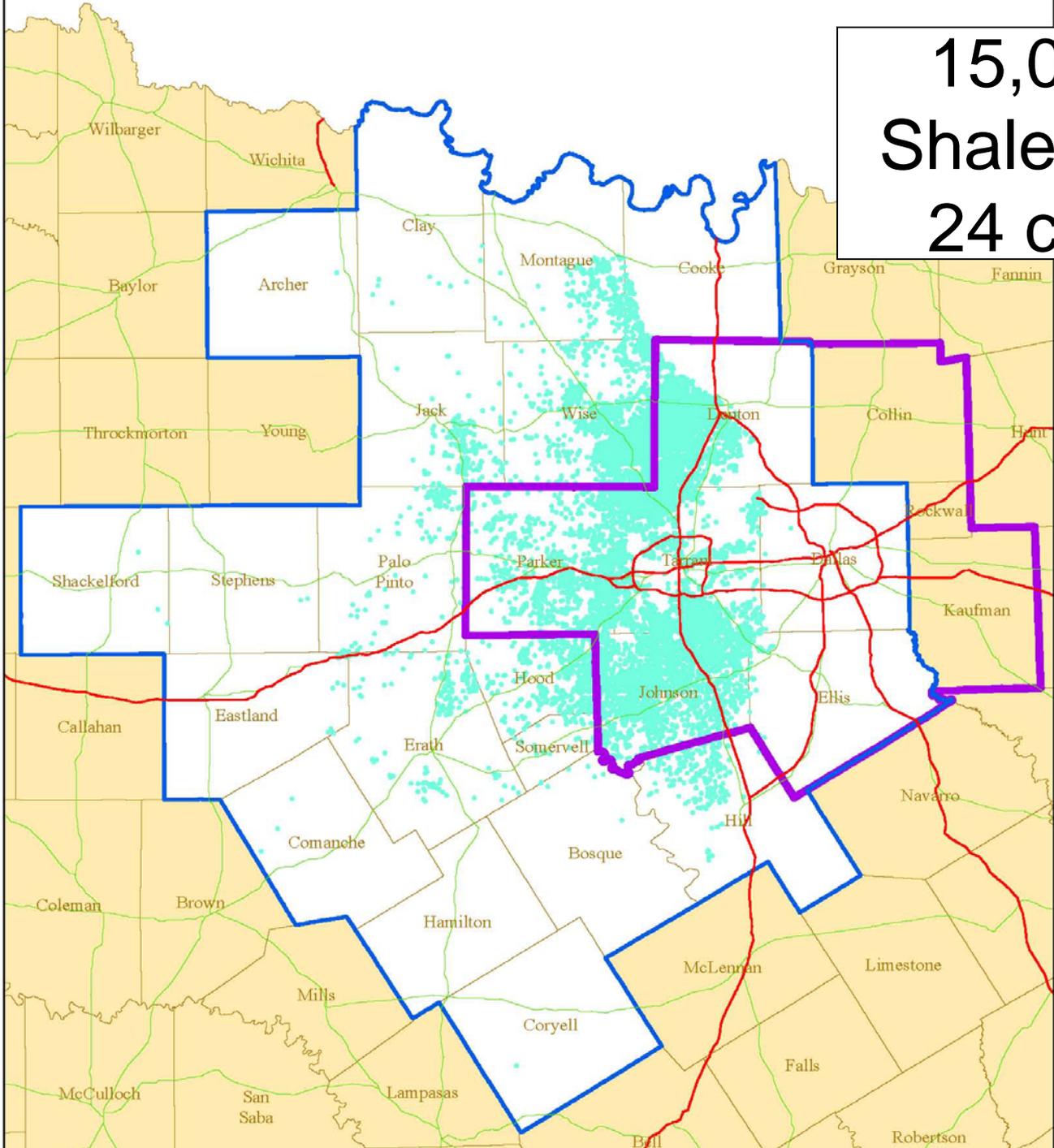


0 10 20 40 60 80 100 120 140 160 180 200 Miles

24 county Barnett Shale and ozone nonattainment area

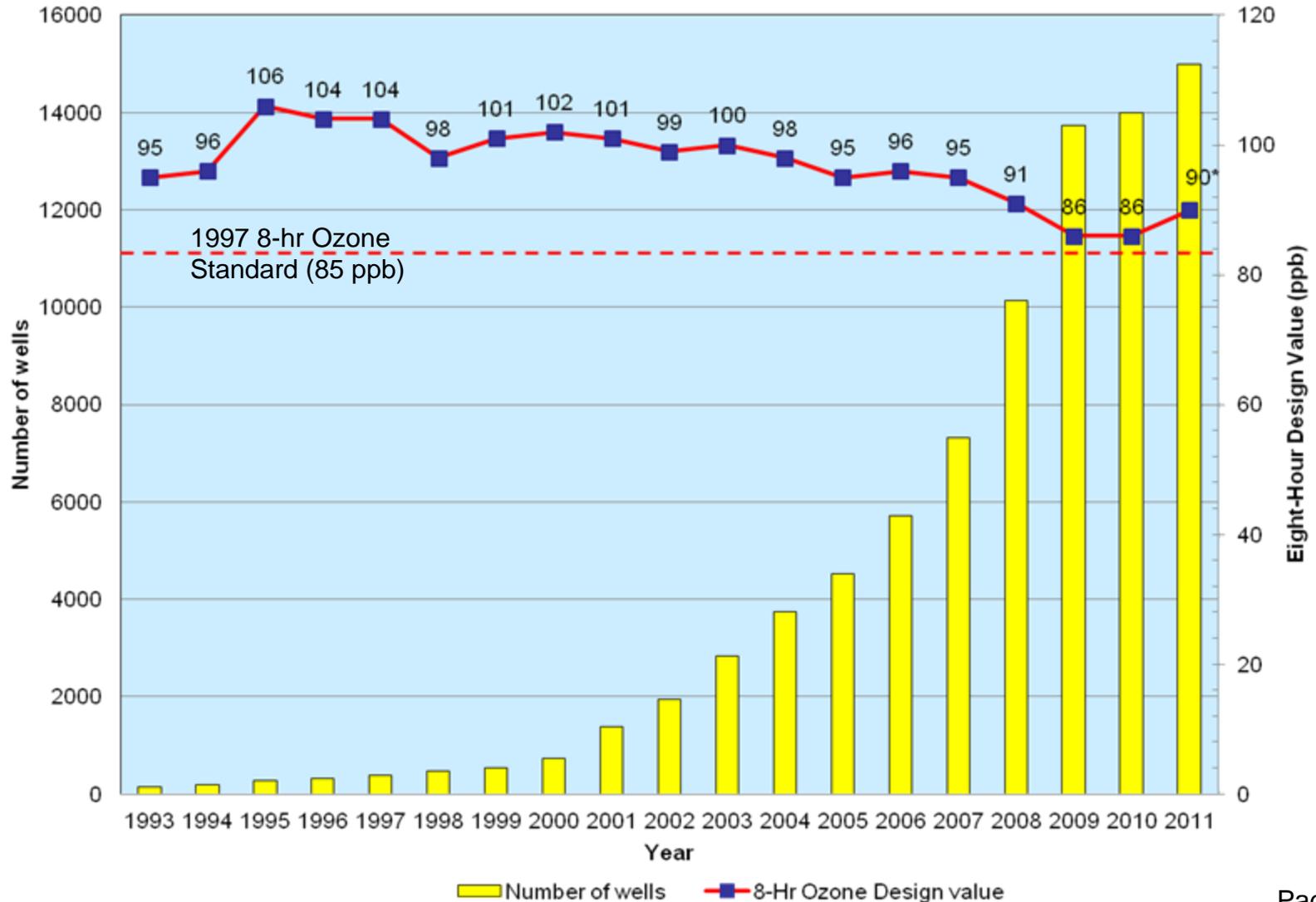


15,000 Barnett Shale Wells in the 24 county area





DFW Ozone Design Values and Barnett Shale Production





Storage Tank Emissions and VOC Detecting Infrared Cameras

- Flyovers were conducted in 2007 and 2010
- The 2010 flyover, resulted in images of over 5,000 individual storage tanks and identified 88 sources of significant hydrocarbon emissions.
- The TCEQ has followed up via ground investigations to ensure that facilities are compliant with our rules.





Main questions from the flyovers: How many sources are there and what is in the air?

We quickly figured out that while we knew how many wells there were in the Barnett Shale formation, we didn't know how many sources (storage tanks, compressors, etc...) were associated with each of those wells and what their actual emissions were.





2009 Oil and Gas Equipment and Emission Inventory

- Phase I – the first phase of the inventory request asked for basic information from producers and pipeline companies in the 24-county area:
 - Location, number, and type of emissions sources
- Phase II required that the companies provide detailed information for each piece of equipment reported in Phase I, including:
 - Equipment and production information
 - Air emissions authorizations
 - Exact location of the sources located within one-quarter mile of the nearest receptor, and
 - Annual 2009 emissions for nitrogen oxides, volatile organic compounds, and hazardous air pollutants.
- A county level emissions summary is available at:
<http://www.tceq.texas.gov/airquality/point-source-ei/psei.html>



Oil and Gas Emissions Inventory Improvement Activities

- Flash emissions model evaluation
- Drilling rig emissions project
- DFW compressor engine project
- Oil and gas model evaluation
- Emissions inventory guidance improvements
- Engine fleet DFW nonattainment area survey, etc...

Copies of these studies and more are available on the Agency's emissions inventory website:

http://www.tceq.texas.gov/airquality/airmod/project/pj_report_ei.html



Air Monitoring in Texas

- Ambient air monitoring networks (long-term monitoring)
- Mobile monitoring (short-term monitoring)
 - Over 369 monitoring projects since mid-1980's
 - Two Primary Job Functions
 - Emergency Response
 - Mobile Monitoring





What is in the ambient air?

Short-term monitoring

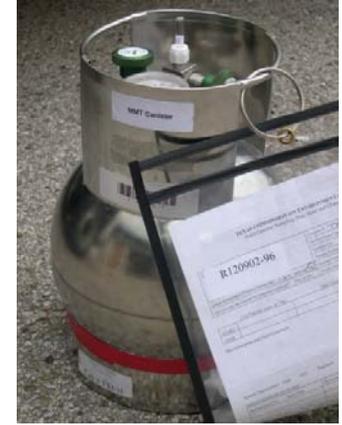
We conducted several (9), multiple day mobile monitoring trips throughout the area, evaluating the ambient air along the ‘fence-line’ of the facilities (short-term 30 minute sampling)

- Provides short-term data – the equivalent of a snapshot of air quality for a specific time and place
- Short-term data allows the TCEQ to make assumptions about the potential for health effects after a short-term exposure to the monitored concentrations
- Short-term data also helps the TCEQ determine where to focus resources
- Since 2005, the TCEQ has purchased 11 GasFind IR cameras (4 in DFW Region) and numerous other handheld, state-of-the-art, air monitoring instruments





What is in the Ambient Air? Short-term Monitoring (cont.)



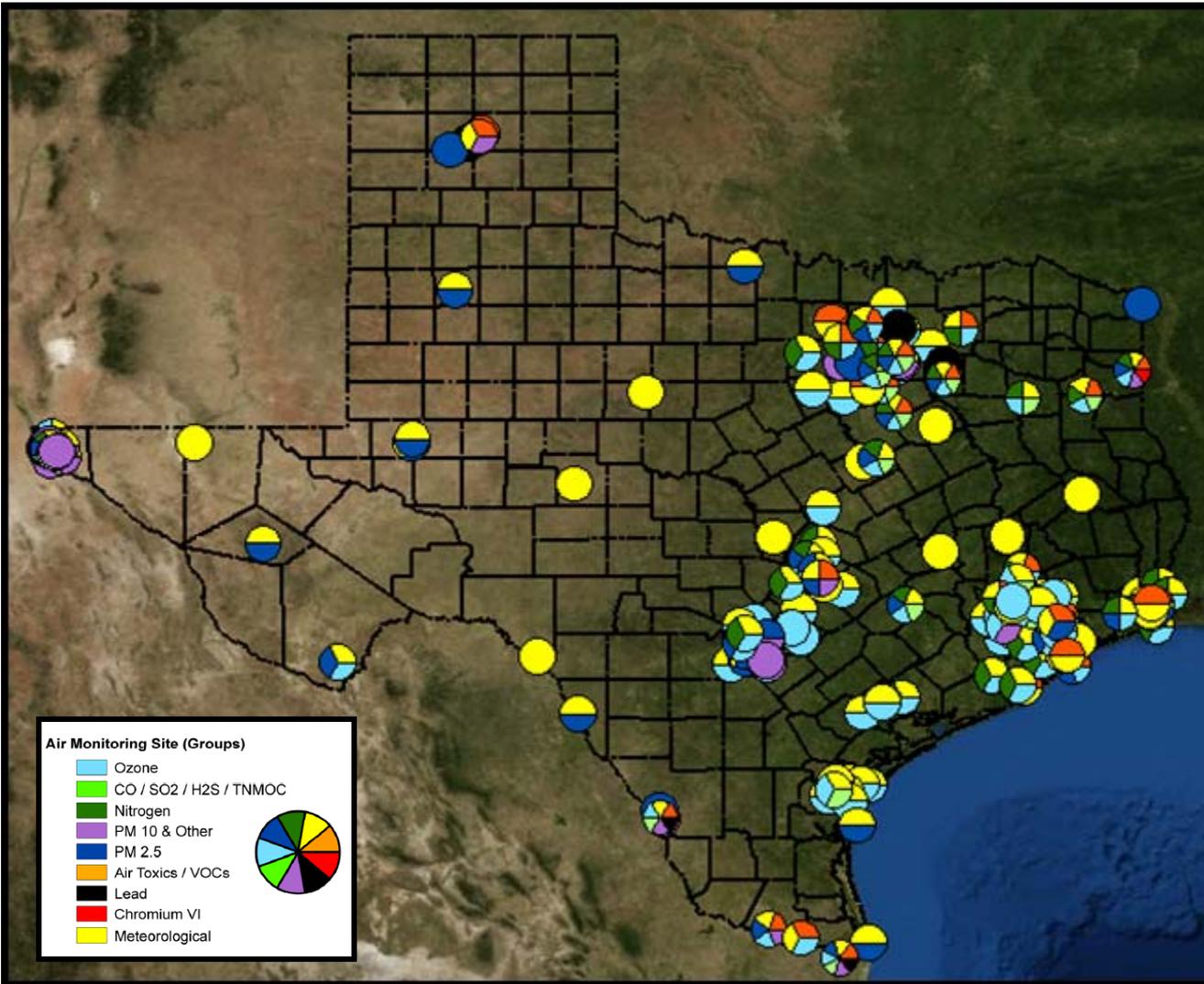
- Since August 1, 2009, the TCEQ has surveyed 1,816 sites using the GasFind IR camera and at 1,773 of these sites, a hand-held volatile organic compound sampler was also used. Based on observations with these instruments, 1,055 canister samples have been collected, including 1,026 samples and 29 field quality control samples (i.e., duplicate samples and field blanks).
- Barnett Shale Air Sampling Map Viewer:
<http://www.tceq.texas.gov/airquality/barnettshale/bshale-viewer>





Ambient Air Monitoring Network

- One of the largest monitoring networks in the nation
- Monitor for:
 - CO/NO_x/O₃
 - SO₂/H₂S/
 - VOCs and Semi-volatiles
 - Chromium VI
 - Particulate Matter
 - Lead



Noncertified 2011 Ozone Design Values as of October 31, 2011

 = New ozone rules could require monitors in these areas

71

69

90

77

72

70

75

89

79

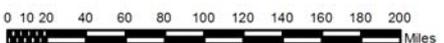
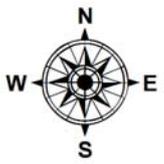
75

70

72

62

64



Legend

-  Oil Wells
-  Gas Wells
-  Oil/Gas Wells
-  Texas-Interstates
-  Major Water
-  Major Cities
-  Counties

Source Data: Railroad Commission of Texas, Jan. 2011, 10/9/11
This map was generated by the Chief Engineer's Office, Air Quality Division of the Texas Commission on Environmental Quality and is for informational purposes only and may not have been produced for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For all information concerning this map, contact the Air Quality Division at 800-TCEQ-5439.

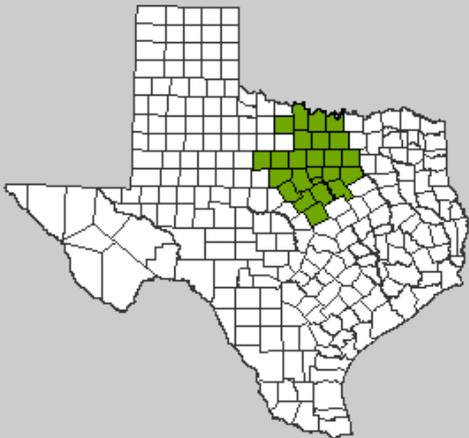


Network Snapshot

- Over 230 sites
 - 118 TCEQ-owned
 - TCEQ hosts data for other entities
- 1445 monitors



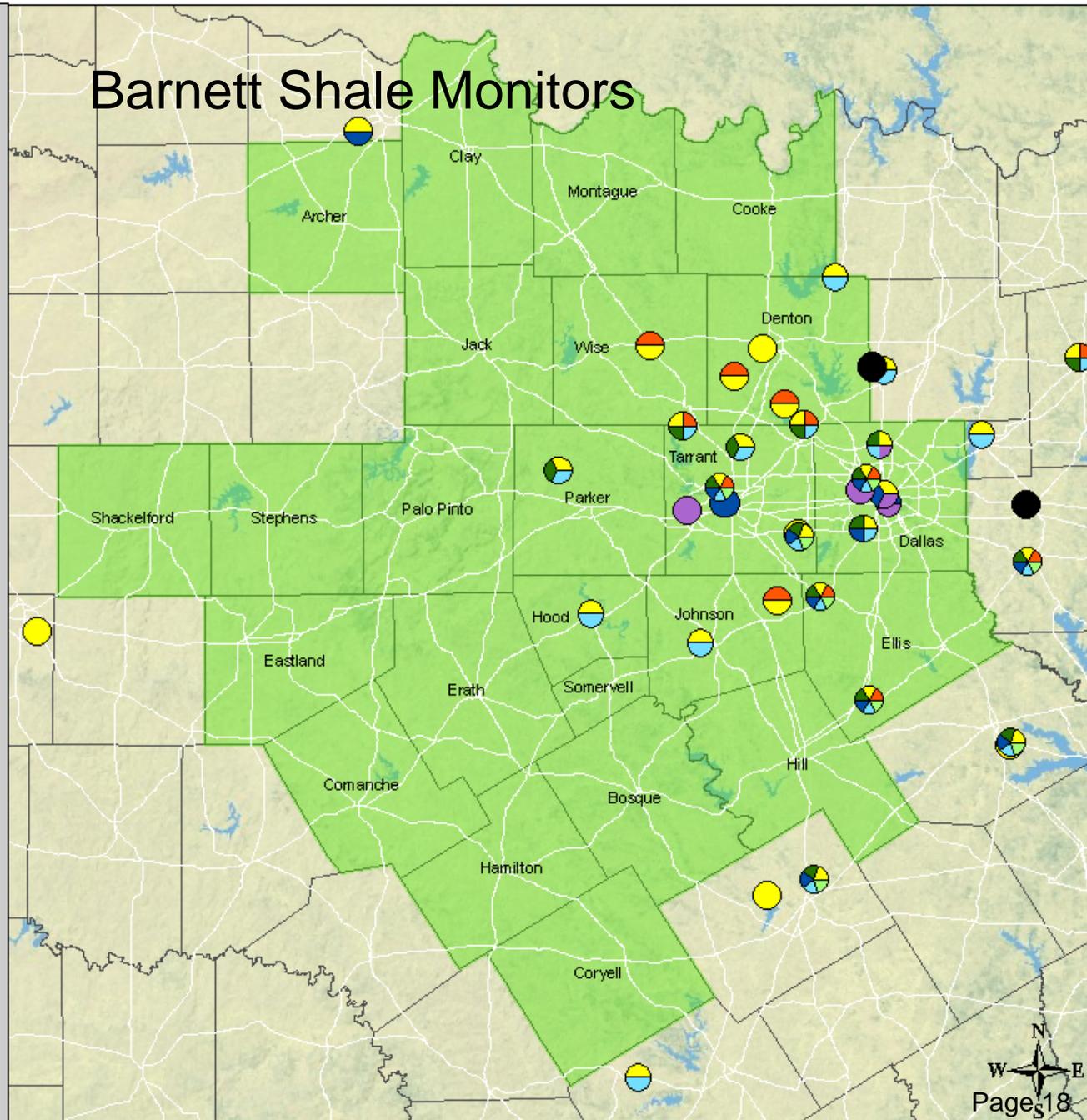
Barnett Shale Monitors

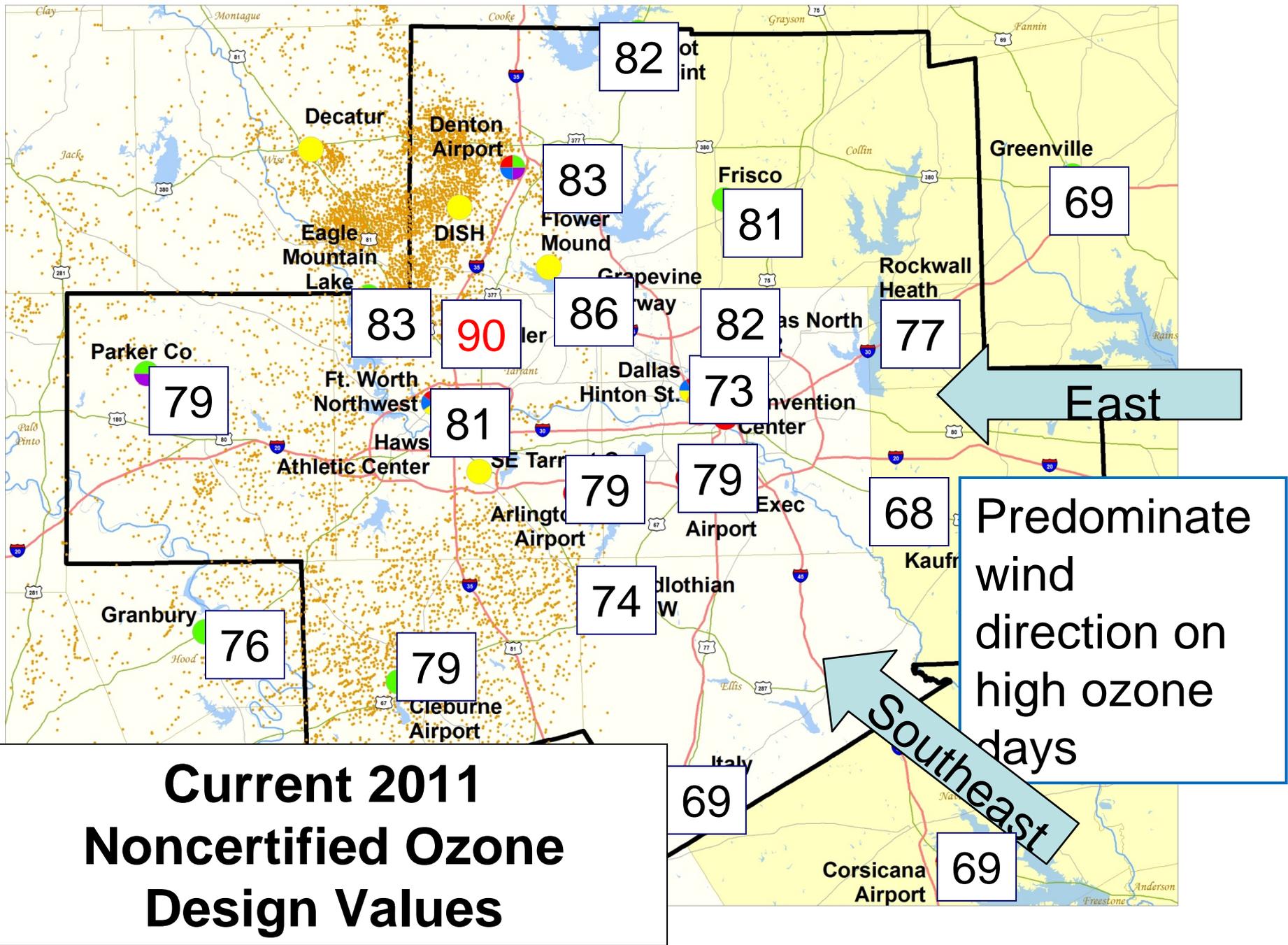


- CO / SO2 / H2S / TNMOC
- Nitrogen Oxides
- Ozone
- PM 2.5
- PM 10 & Other
- Air Toxics / VOCs
- Lead
- Meteorological
- Barnett Shale County



Texas Commission on Environmental Quality
www.tceq.texas.gov





**Current 2011
Noncertified Ozone
Design Values**

Predominate
wind
direction on
high ozone
days

Southeast

East



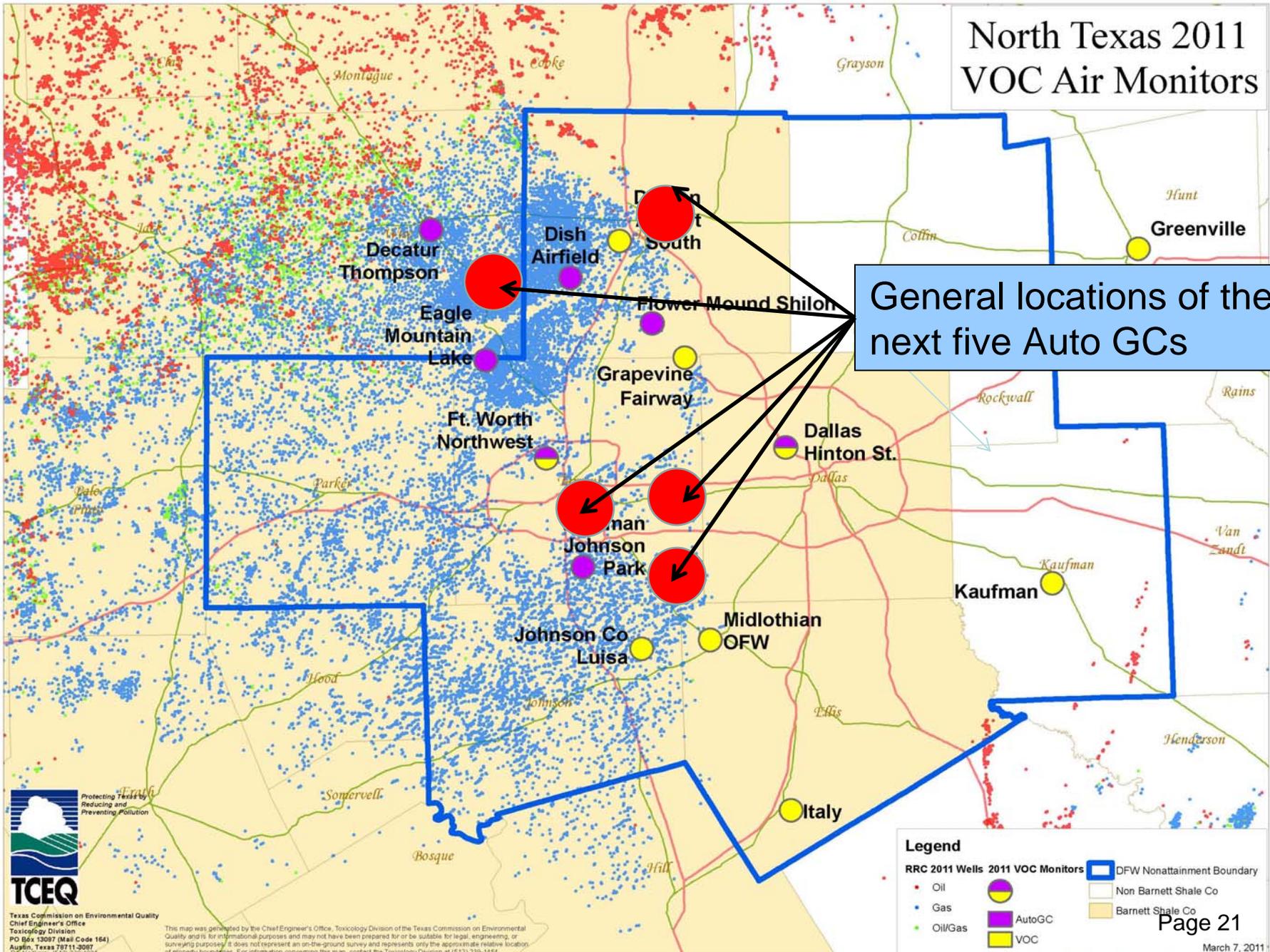
What is in the Ambient Air?

Long-term Monitoring

Re-evaluation of the agency's long-term, stationary, ambient monitoring network

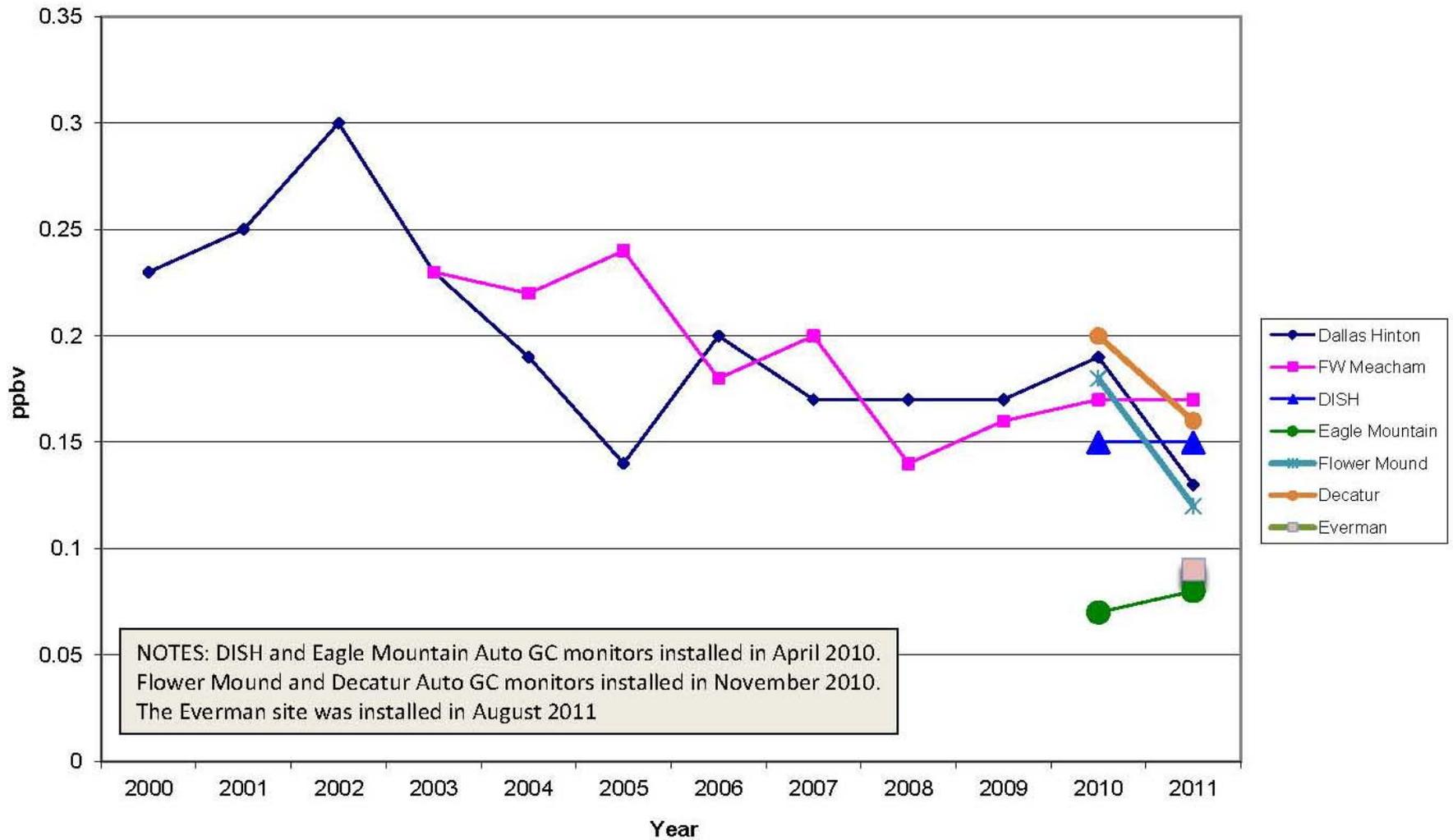
- Prior to 2009, there were only two stationary monitors that included auto GC's in the DFW area
- Five additional GC's have been added: near Eagle Mountain Lake, in the Town of DISH, the Town of Flower Mound, the City of Decatur and the City of Everman.
- TCEQ has contracted with the University of Texas at Arlington to install four Auto GC's that are slated for placement in the Barnett Shale in the next year.
- Additionally, the TCEQ will be working with a non-profit organization in the Dallas/Fort Worth area to establish a regional monitoring network (Senate Bill 527).
- Real-time data from all of the Auto GC's is available on the TCEQ web page

North Texas 2011 VOC Air Monitors



General locations of the next five Auto GCs

Auto GC Benzene Annual Averages part per billion - by volume (ppbv)





Investigative Presence and Complaint Response

- Implemented a 12-hour response time for all complaints received concerning oil and gas facilities in the 24-county Barnett Shale area
- Added additional investigators to the DFW Region Office and created a Barnett Shale team
- Allocated four handheld infrared cameras and additional VOC monitoring equipment to the DFW Region Office
- Conduct periodic reconnaissance investigations in selected areas, along with scheduled compliance investigations at natural gas sites
- Conduct monitoring at the request of the public and other interested parties.



2011 Eagle Ford Shale Area Flyover

- A six county area was flown – Dewitt, Dimmit, Karnes, Live Oak, McMullen, and Webb counties
- 194 sites with ‘visible’ emissions
- Requesting the same information that we have been requesting in the DFW area





Communication - Getting Out Front

- Met with County Judges
- Met with local government agencies in the area
- Member of the Texas Railroad Commission's Eagle Ford Task Force
- Development of guidance documents



Guidance Documents Available on TexasEnviroHelp

Small Business and Local Government Assistance
<http://www.tceq.state.tx.us/assistance>

- Oil and Gas Facilities: Compliance Resources –
Compliance tools for
oil and gas facilities
in Texas
- RV Parks:
Am I Regulated?





Guidance Documents to be Completed Soon

- Ground water conservation districts – clarifying authority related to oil and gas activities
- Section 210 authorizations and reclaimed water use
- Waste and waste water hauler requirements
- Local government authority and enforcement of On-Site Sewage Facilities (OSSF) and illegal dumping



What We Are Finding

- Nearly all of the issues documented arose from human or mechanical failures.
- These items were quickly remedied and could have been avoided through increased diligence on the part of the operator.
- Corrective actions amounted to little more than replacing worn gaskets, closing open hatches, and repairing stuck valves.





Moving Forward

The TCEQ will continue to:

- **Ensure transparency of our efforts through abundant and timely communication with all interested parties;**
- Evaluate the existing ambient air quality monitoring network and expand, as needed, through the use of established agency protocol for determining the placement of long-term, stationary monitors;
- Apply the use of state-of-the-art handheld air monitoring equipment to assess short-term, near-source air quality;
- Maintain a frequent, routine investigative presence while also providing timely complaint response;
- Base our rules and permits on sound science and common sense; and
- Apply our enforcement tools in a fair and consistent manner.



Additional Information

- Barnett Shale website:
 - www.tceq.state.tx.us/implementation/barnettshale/bshale-main
- Air Quality Research and Contract Reports:
 - www.tceq.texas.gov/airquality/airmod/project/pj_report_ei.html
- Railroad Commission Eagle Ford Shale website:
 - <http://www.rrc.state.tx.us/eagleford/index.php>



Questions?

Keith Sheedy, P.E.
Engineer/Technical Advisor
Chief Engineer's Office
Texas Commission on Environmental Quality
512.239.1556
Keith.Sheedy@tceq.texas.gov