

# CAP/HAP National Emission Inventory Development

## 2014 NEI Plans for the Oil & Gas Sector



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# National Emissions Inventory (NEI)

- The full NEI is on a 3-yr cycle (e.g. 2008, 2011, 2014)
  - Point sources (facility-process for ~100,000 facilities)
  - Nonpoint and mobile sources (county-process)
  - Fires (daily/point)
  - Biogenic soil and vegetation (county)
- States, locals, and tribes are required to submit CO, SO<sub>x</sub>, NO<sub>x</sub>, VOC, PM<sub>10</sub>, PM<sub>2.5</sub>, NH<sub>3</sub>, and Lead.
  - Basis is National Ambient Air Quality Standards (NAAQS) parts of the Clean Air Act
  - Use CAA-based emissions thresholds for “point.” States can go lower.
- Hazardous Air Pollutants (HAPs) and GHGs can also be voluntarily submitted
  - EPA augments the data to make HAPs more complete

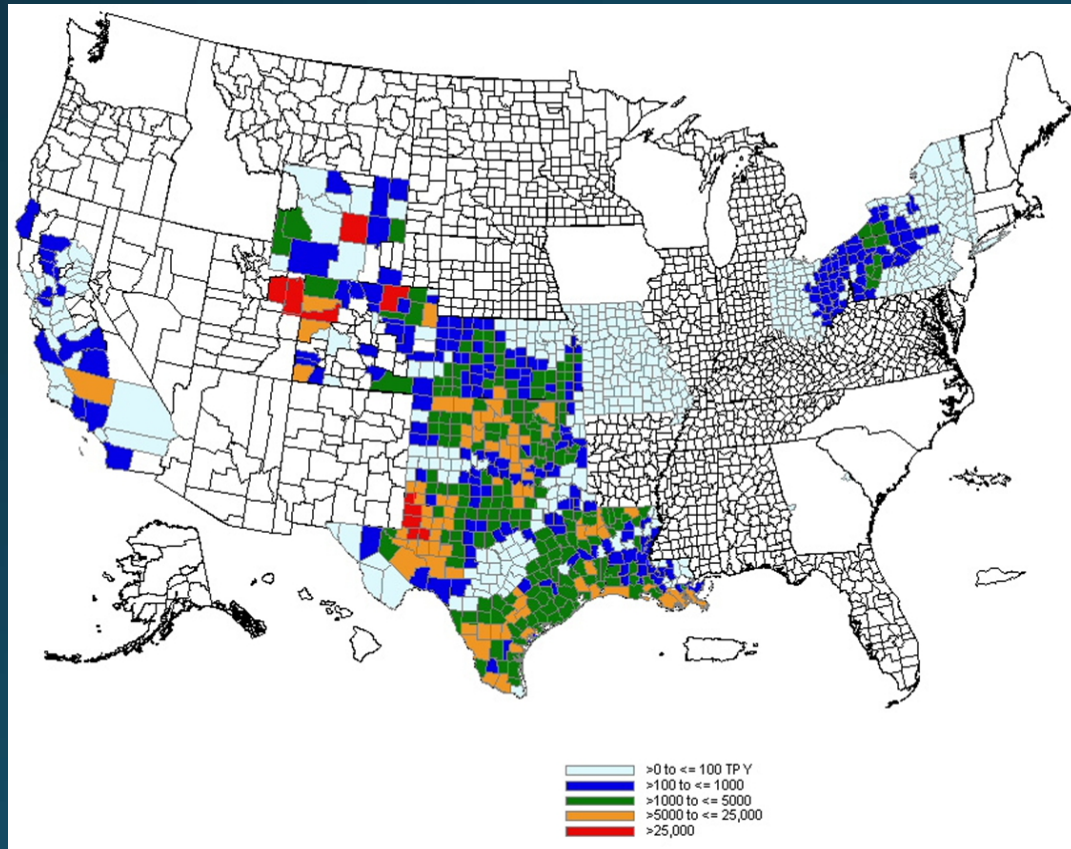
# Role of states versus EPA

- The presumption of the NEI program is that states are responsible for the emissions estimates
  - EPA methods are assumptions about activity and emissions rates that can be improved with local understanding
- While EPA creates and promotes emissions factors & methods, states choose which methods to apply
- We allow states to meet their obligations under the Air Emissions Reporting Rule (AERR) by accepting EPA estimates where we have them
- While we ask for some “method” information to be included as additional information (for QA purposes) when states report as required under the AERR, we do not always get it (e.g., activity and emission factors)

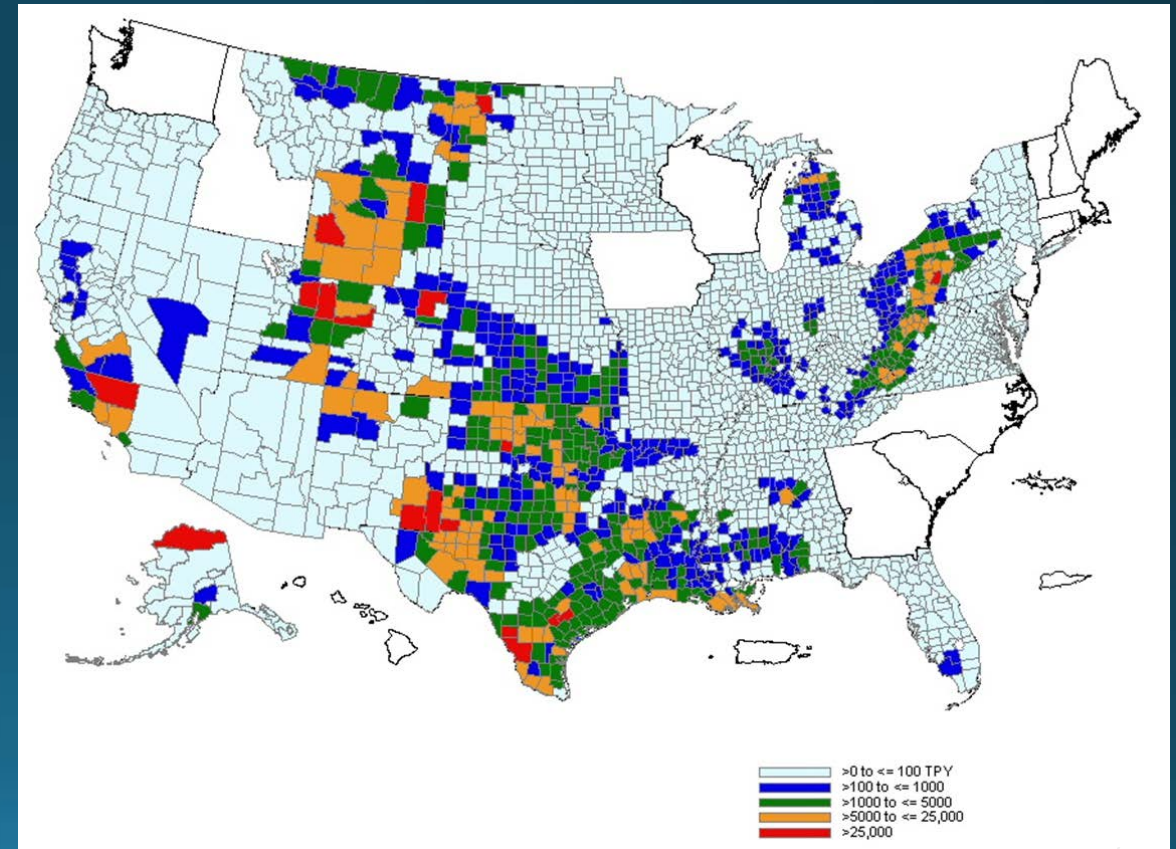


# The NEI is a composite

2011 v1 NEI State VOC Submissions  
for Nonpoint Oil and Gas Sector



VOC Emissions  
2011 v1 Oil and Gas Tool

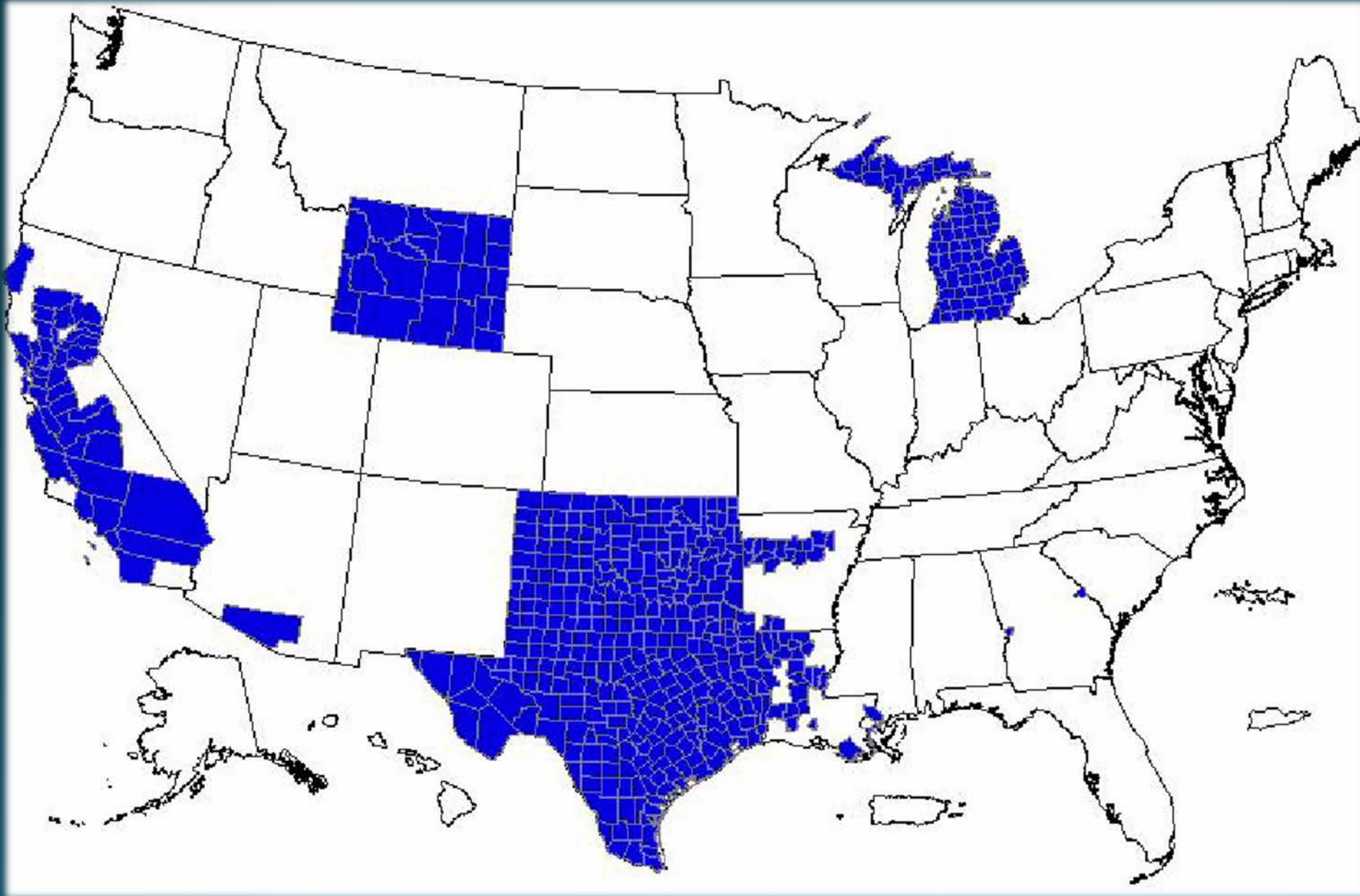


# NEI Uses

- A critical input for many EPA analyses
  - Inputs for detailed air quality and risk modeling at national, regional, and local levels
  - EPA NAAQS-related rules and Regulatory Impact Analyses (RIAs)
  - Planning ambient monitoring network locations
  - Factor in designations of nonattainment areas
  - Large scale summaries and trends assessments
- A resource to many outside EPA
  - Upholding international reporting treaties
  - Research

# 2008 NEI Nonpoint Oil and Gas

Note the lack of coverage, limited to a few states



# Oil & Gas Emissions Estimation Tool

- In the 2008 NEI, many states did not submit emissions for upstream oil and gas categories
  - Oil and gas production had increased sharply
  - Needed a way to help state/local/tribes estimate emissions
- EPA Inspector General Report (February, 2013)
  - *“EPA Needs to Improve Air Emissions Data for the Oil and Natural Gas Production Sector”*
  - Concluded that “...the NEI likely underestimates oil and gas emissions”
- Access<sup>®</sup>-based emissions estimation calculator
  - County-level activity data & process characterization data
  - Emission factors down to the county/basin level
  - Generates county-level emission estimates by SCC
- State/Local/Tribal (SLT) uses
  - States, local agencies and tribes can input local parameters
  - For NEI or State Implementation Plan work



# How Does the Tool Work?

- “Bottom up” inventory
- Based on estimation methodologies developed by CenSARA
- Engineering equations, ideal gas law, mass balances, emission factors
- Estimates on a county or basin level using activity factors (e.g., well counts, oil production, gas production) from DrillingInfo (HPDI)
- Refer to “[\*2011 Nonpoint Oil and Gas Emission Estimation Tool\*](#)” (November, 2014) for details
  - [ftp://ftp.epa.gov/EmisInventory/2011nei/doc/Tool\\_and\\_Report112614.zip](ftp://ftp.epa.gov/EmisInventory/2011nei/doc/Tool_and_Report112614.zip)



# Example Calculation

(4 stroke rich burn engine)

$$E_{engine,type} = \frac{EF_i \times HP \times LF \times t_{annual}}{907,185} \times (1 - F_{controlled} \times CF_i)$$

where:

$E_{engine}$  are emissions from a particular type (rich vs. lean) of compressor engine  
[ton/year/engine]

$EF_i$  is the emissions factor of pollutant  $i$  [g/hp-hr]

$HP$  is the horsepower of the engine [hp]

$LF$  is the load factor of the engine

$t_{annual}$  is the annual number of hours the engine is used [hr/yr]

$F_{controlled}$  is the fraction of compressors of a particular type (rich vs. lean) that are controlled

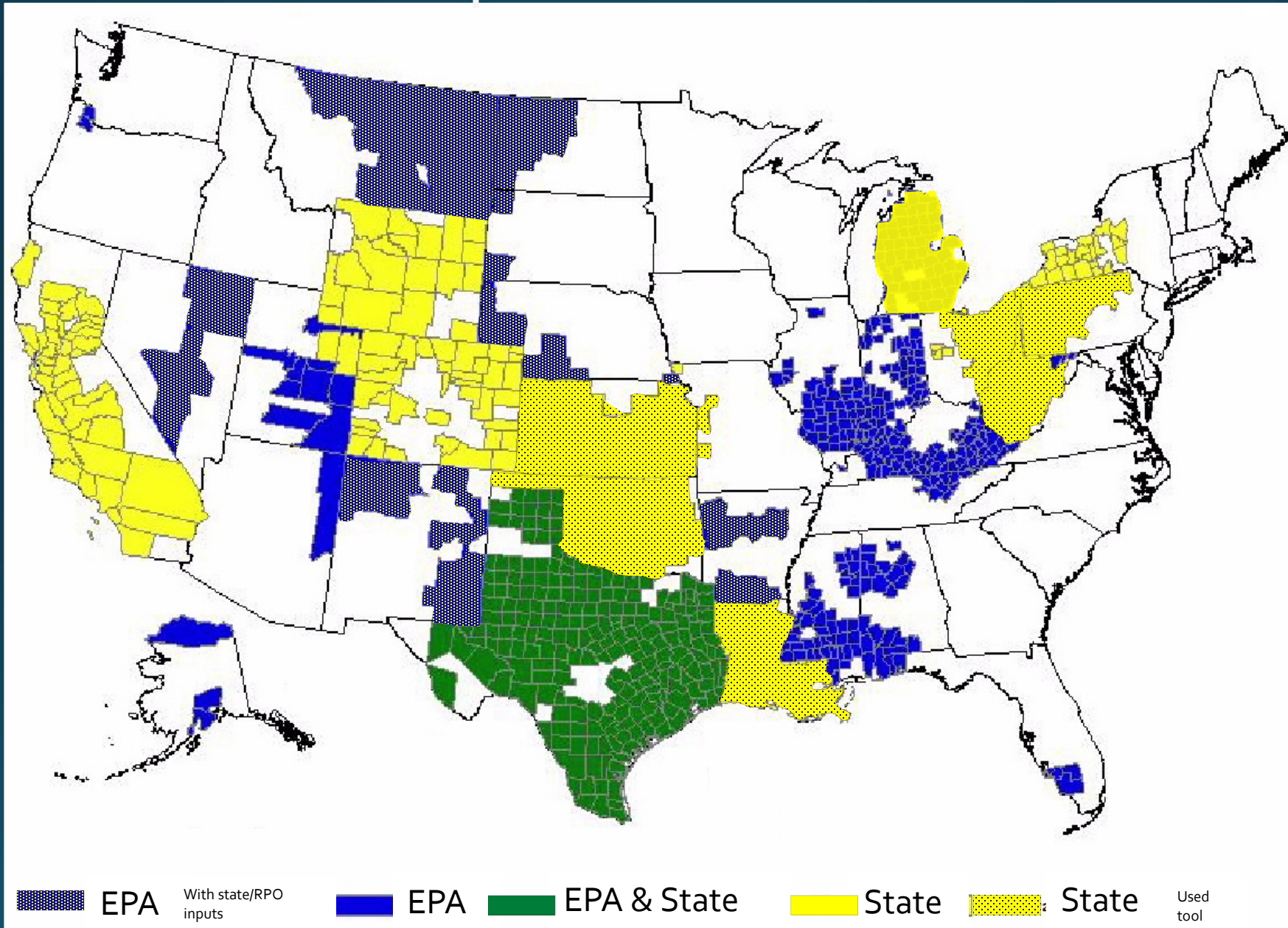
$CF_i$  is the control factor for controlled engines for pollutant  $i$

907,185 is the unit conversion factor g/ton

# Does the Tool Take into Account Different Geological Formations?

- Can specify input parameters at a county/basin level
- Because of the different geologies of each basin, the gas or oil characteristics can look very different
  - Example: New Mexico has a lot of coal bed methane, NE Pennsylvania has dry gas, SW Pennsylvania has very wet gas
- Equipment differences (conventional, fractured, CBM)
- Production amounts vary from basin to basin
- While some states and multijurisdictional organizations (MJOs) have supplied specific information, we could use more

# 2011 NEI Nonpoint Oil and Gas



# Collaborative Efforts

- National Oil and Gas Emissions Committee (meets monthly)
- Internal agencywide EPA Oil and Gas Team that includes regional experts, reg writers, EF developers, modelers
- Reviewing data from new studies from EDF, NOAA, UT and others
- Incorporate GHG EI and RP data and methods (whole gas/venting) into the 2014 Oil and Gas Tool, as appropriate



Questions?