Quality Assurance of Emission Inventories Using Visual and Geographical Techniques

Roy Huntley, USEPA
David Misenheimer, USEPA
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Purpose:

- Demonstrate visual techniques for QA of emission inventories, including:
  - Initial assessment of data
  - Evaluating inconsistencies
  - Comparing with related data sets
  - Comparing with data for previous years
  - Eliminating outliers
  - Evaluating locational information
Important Points

• Visual QA techniques can help quickly identify potential errors in EI’s
• Prior to QA, You should assume there are errors in the EI when you begin your review
• You can use off-the-shelf software to aid in this type of review
• Look at the data different ways (e.g., mapping quintiles & natural breaks, bar charts comparing time series) to highlight anomalies
General Assessment of Data

• Can use visual techniques to get an initial sense of the starting data for an inventory, including:
  – Format of reported pollutants
  – Categorization of data
  – Data completeness

• See example in Figure 1
Figure 1. Reporting of PM from Residential Wood Combustion
Data Inconsistencies & Trends

• Visual techniques can help identify patterns that are inconsistent with expectations, including:
  – Location of emissions
  – Expected trends in emission levels
  – Relationship to related data sets
  – Comparison to data for previous years

• See examples in Figures 2-11.
Figure 2. Offshore Emissions
Figure 3. PM2.5 from Wildfires
Figure 4. Fraction Forested for Each County
Figure 5. VOC Emissions Differences between 2002 & 1999 NEI
Figure 6. PM2.5 Primary Emissions from Paved Roads
Figure 8. VOC Emissions from Asphalt Paving, minus Texas
Figure 9. VOC Emissions from Asphalt Paving, minus Texas, Idaho & Indiana
Figure 10. PM2.5 Emissions from Residential Wood Combustion
Figure 11. PM2.5 Emissions from Residential Wood Combustion
Locational Errors

• Mapping is an obvious tool for quickly evaluating errors in locational information
• This technique can be used to identify anomalies on a regional or local level
• Like other visual techniques, it is best to use this approach in conjunction with automated QA procedures
Figure 12. 2002 NEI Draft – EGU Locations

SO2 (tons/yr)
- 0 - 3
- 4 - 53
- 54 - 1,900
- 1,901 - 10,586
- 10,587 - 164,884

MAGIC VALLEY GENERATING STATION (Texas - Oris Plant ID 55123)
PASADENA POWER PLANT (Texas - Oris Plant ID 55047)

Note: 67 Facilities have no lat/lon
Figure 14. NOx Point Sources in North Carolina

Note: Data are from draft 1999 NEI v3 (8/27/03)
Conclusion

• Visual QA techniques offer a powerful tool, in conjunction with automated QA procedures, for identifying and correcting emission inventory data errors.