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Emission monitoring, reporting, and verification (MRV) for U.S. cap and trade programs

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Principles of MRV for cap and trade programs

- Cap & trade requires a ***complete record of total emissions*** from each affected source
  - Environmental integrity: Achievement of the environmental goal is based on total emissions from all affected sources
  - Equity: Each source must pay, through the surrender of allowances, for each ton of reported emissions
  - Comprehensiveness: Substitute data procedures are used to account for missing or invalid data

Principles of MRV for cap and trade programs

- Cap and trade requires ***frequent and timely emission reporting*** to instill confidence in the market and to facilitate compliance assessment
  - Market stability: Lack of timely emission and compliance information can increase uncertainty and market volatility
  - Data accuracy: Frequent reporting allows for reporting errors to be found and corrected early before they affect compliance

Principles of MRV for cap and trade programs

- Measurement methods should create ***incentives for greater accuracy***, but provide flexibility (e.g., allowing simplified measurement approaches for low emitters) when appropriate
  - Uncertainty is addressed through the use of conservative estimation methods to ensure that emissions are not underreported
  - Substitute data procedures become more conservative (i.e., overestimate emissions) as the period(s) of missing or invalid data increases
- Reporting requirements should be ***standardized to facilitate consistency, comparability, and automation***

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Emission monitoring for U.S. cap and trade programs

Monitoring process

- EPA specifies measurement methodologies and QA/QC requirements
- Sources develop and submit a monitoring plan consistent with selected measurement methodology
- Sources install, certify, & maintain measurement equipment
- Sources perform QA/QC testing for measurement equipment at prescribed intervals
- Sources report emission and activity data to EPA
- EPA audits and verifies all emission data

Reporting requirements

- Hourly data
  - SO_2, NO_X, CO_2 emissions
  - Heat input
  - Operating load (MWh or 1,000 pounds steam)
  - Oil and gas fuel flow
  - Moisture data
- Quality assurance test data
- Monitoring system re-certification and maintenance event data
- Unit fuel type data
- Control equipment data
- Facility information (industry codes, boiler types)
- Monitoring plans

Data standardization

- Data reported electronically to EPA in standard format
  - Emissions
  - Operations
  - Quality assurance / testing
- Plant operators and EPA quality assure data with standardized data checking software

Quality assurance and evaluation

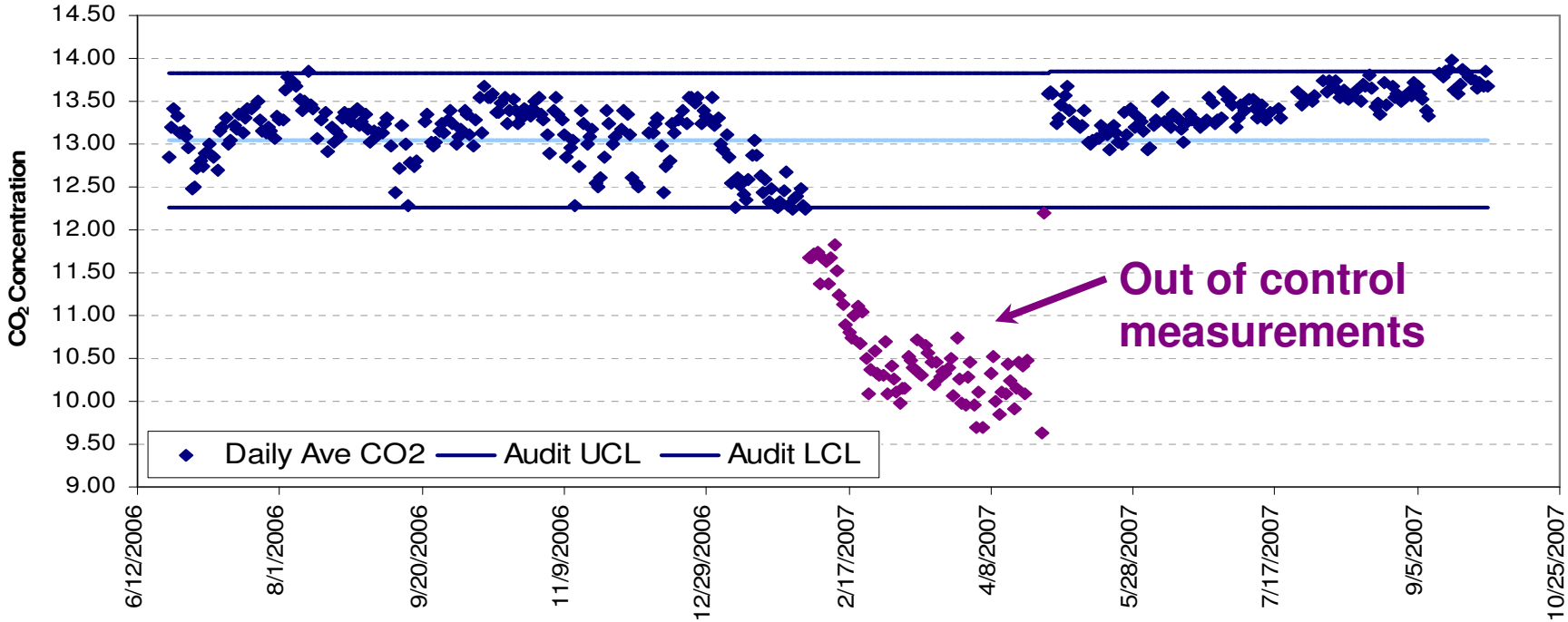
- Monitoring certification and recertification
- Regular quality assurance checks and tests
  - Daily calibration error test
  - Quarterly linearity check
  - Bi-annual relative accuracy test audit (RATA)
  - Bias test (uses RATA data)
- On-site audits of monitors and equipment tests

Evaluation program

- A systematic, thorough, and uniformly applied approach to ensure high-quality, accurate, timely, transparent, and complete data
  - Equipment performance standards
  - Quality assurance tests
  - Documented procedures and methodologies
  - Comprehensive electronic auditing
  - Independent field audits (random and targeted)
  - Mechanism to solve unique monitoring and reporting issues

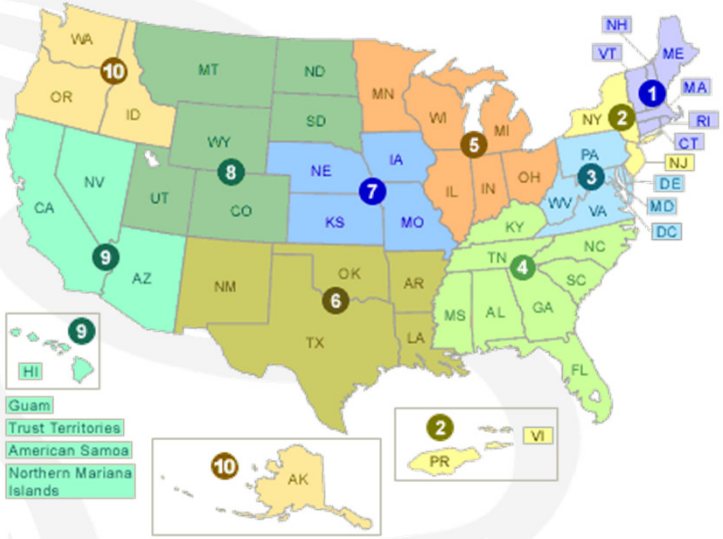
Electronic audit and analysis of emission reports

- Compare monitoring plans, QA test history, and emissions data to rule requirements
- Look for mathematical and methodological errors
- Look for statistical anomalies



Compliance assistance

An EPA analyst is responsible for each Region



- Calls and emails from sources, States personnel, EPA regional staff, and the public
- Answer questions, provide guidance, and supply information
- Point of contact

Compliance assistance: services and tools

- Petitions: EPA can approve alternatives for situations where a facility can't follow the regulations
- Regulatory guidance
- Quality assurance and reporting software
- Informational materials published on EPA's web site
  - Applicable regulations
  - "Plain English Guide"
  - Policy manual
  - Field audit manual and checklists

Audits and problem prevention

- Electronic Audits
  - Emissions data
  - Facility information
  - Ad hoc or “spot check”
- Field Audits
  - Identify “suspect” facilities
  - Invite local, State, or EPA regional personnel for audit participation
  - Opportunity for sources to gain knowledge and ask questions
- Compliance Check
  - Before “true-up”, we run a hypothetical compliance check and notify sources if there are any problems

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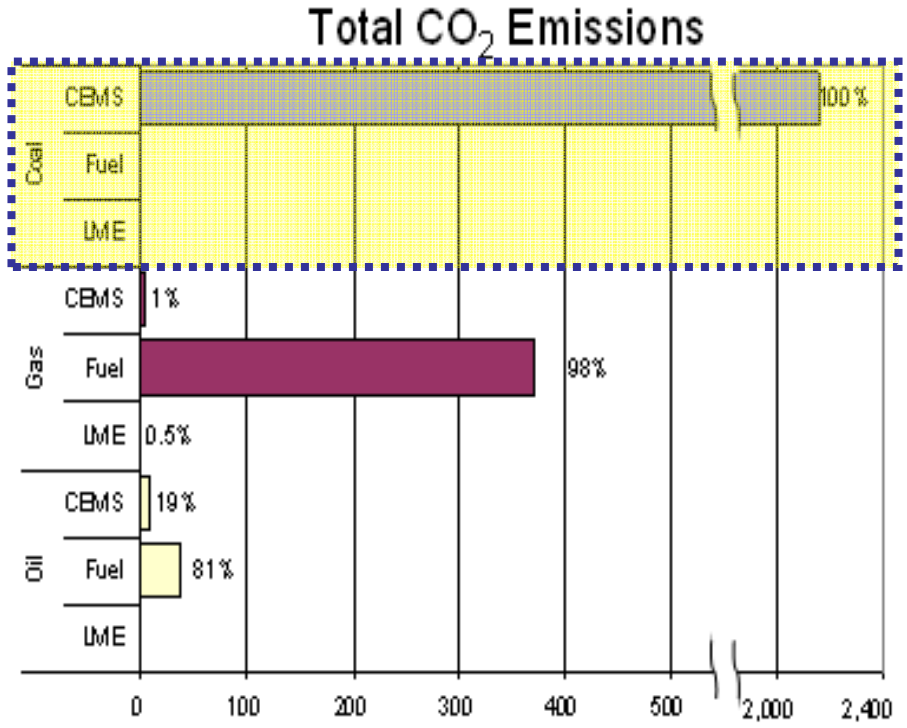
Lessons learned from U.S. emission MRV programs

Lesson: Measurement flexibility can reduce costs, but it is not appropriate for all sources or sectors

Use direct emission measurement when the sector or source is responsible for a large share of emissions and:

- Fuel sulfur or carbon content is variable
- Fuel use is difficult to measure accurately
- Pollution controls are used to capture emissions
- Process emissions are emitted through a stack or other easily monitored point
- Oxidation rates vary from source to source



Lesson: Properly designed incentives can improve emission data accuracy

- Incomplete or inaccurate data has consequences
  - More frequent quality assurance tests
  - Progressively stringent substitute data requirements
- Missing data substitution procedures reward high monitor data availability
- Automatic statutory penalties that are greater than cost of allowances

Sources have a financial incentive, in the form of allowances, to "get it right"

Other lessons

- Frequent reporting (e.g., quarterly) provides opportunities for government and industry to correct problems before the problems affect compliance
- Clear, consistent, and prescriptive rules for addressing missing or invalid data reduce underreporting
- Measurement programs must adapt to new information, instrumentation, and science
- Measurement programs must have mechanisms to deal with unusual or unique situations
- Electronic reporting reduces burden on industry and government, increases timeliness of data, and facilitates electronic QA/QC and auditing

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For More Information

Visit the clean air markets web site to view

- Emission data and allowance information
- Cap and trade program information
- Program rules and guidelines
- Studies and reports
- International cooperation activities

http://www.epa.gov/airmarkets/