

# Highlights of QA/QC Procedures applied in U.S. GHG Inventory System



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# QA/QC U.S. GHG Inventory

- System designed and operated to ensure inventory quality through planning, preparation and management of inventory activities
  - Checks and procedures at every step of inventory development process
  - Multiple review processes
  - Provide for communication and feedback across the participants in the inventory
- QA/QC procedures designed to enhance and continually improve inventory quality over time



# Annual U.S. GHG Inventory Development Schedule/ Process

- **April-Sept** - Gather data and prepare initial estimates
- **July** - Formal kick-off of annual process, review of priorities
- **Oct-Nov** – Prepare estimates draft report for expert and public review
- **Dec-Jan** - Expert and interagency review
- **January** – Respond to interagency comments
- **Mid-February**– Release for public comment
- **Mid-March** - Incorporate public comments
- **April 15** - Submit Inventory to UN
- **May** - Initial UNFCCC Review
- **September** – UNFCCC Expert Review



# Roles and Responsibilities

- U.S. EPA U.S. GHG Inventory Coordinator
  - Responsible for general QA/QC
- Source Category Leads
  - Implement source specific QA/QC (completes checklist)
  - Responsible for taking corrective actions
  - Responsible for responding to expert and public review comments
- QA/QC Coordinator
  - Directs overall QA/QC development and implementation of QA/QC procedures, oversees expert review
  - Collects QC checklists/forms
- Outside Experts
  - Expert review (QA)
    - University experts, industry groups, and other relevant agencies
- Consultants working on inventory
  - Day to day QC as required, follow QA/QC procedures of inventory team



## References

- Guidelines from UNFCCC and IPCC
  - U.S. EPA closely adheres to and was involved in development of QA/QC guidance
- *Quality Assurance/Quality Control and Uncertainty Management Plan for the U.S. Greenhouse Gas Inventory Procedures Manual for Quality Assurance / Quality Control and Uncertainty Analysis*



# Required QC for Source Leads

- **Required:** Tier 1 QA/QC analysis on all sources. At a minimum, everyone completes the QC form entitled "Individual Source Category Checklist"
- **Suggested:** Tier 2 QA/QC for at least one key sources and sources with significant methodological change. Source leads may implement a multi-year plan to conduct a Tier 2 analysis on key sources.
- Relevant QA/QC forms for each source completed and archived



# Forms & Checklists for Source-specific QC

- Tier 1: Individual Source Category Checklist
- Tier 2: Source Category Checklist
  - A: Data Gathering and Selection
  - B: Secondary Data and Direct Emission Measurement
- Sample Data/Reference Tracking Sheet
- Contact Report
  - Can be used to record personal communications
- Supplemental Report
  - Additional documentation



# Forms & Checklists for Cross-cutting QC

- Tier 1: Overall Inventory and Cross-source category checklist
- Inventory document checklist
  - Formatting,
  - Looking for transcription errors, consistency between tables and text, etc.
- Common Reporting Format Checklist
- Contact Report
- Supplemental Report



# QC – Procedures or Best practices for Data Gathering, Input and Handling

A number of common sense procedures govern the collection, maintenance, and use of electronic and transcribed data for all activity data, emission factors, and other primary data elements. Appropriate procedures can minimize the extent to which errors in data collection occur; various checks on the data and files can further reduce the errors that occur.

Procedures for the inventory analyst to follow include:

- Electronic data should be used where possible to minimize transcription errors.
- Spreadsheet features should be used to minimize user error or entry error.
  - ✓ avoid hardwiring factors into formulas (see §2.1.3)<sup>3</sup>
  - ✓ create automatic look-up tables or pull down menus that limit permissible entries or, in some cases, automatically enter data
  - ✓ use cell protection so that fixed data cannot accidentally be changed
- If identical data are used by different source categories, the same electronic data file (whether obtained electronically or transcribed) should be used by both source categories.
- Build in computerized checks to highlight possible problems.<sup>4</sup>
  - ✓ set up automatic data screens to detect outliers (range checks based on high and low values or on median or mean value), negative values, or missing data
  - ✓ use spreadsheet features to conduct other checks, such as ensuring that values are appropriate to the variable type
  - ✓ check consistency, e.g., if a certain field has data, then check that other required fields also have data, or calculate ratios between variables to check for expected values
  - ✓ employ quality control features of different Excel add-on software packages
  - ✓ generate “quality check” reports displaying the results of computerized and automated quality checks



# Quality Assurance: Expert Review

- Review list maintained by inventory coordinator
  - Potential reviewers are added as they are identified
  - Inventory Coordinator emails all on inventory team with list of expert reviewers, asks for additional reviewers
- Inventory Coordinator emails to all identified reviewers draft inventory and annex (December to January)
- Reviewers send comments to Inventory Coordinator
- Coordinator sends comments to relevant inventory team members
  - Response drafted and archived
  - Outreach with commenter
- Improvements addressed in Inventory for Public Review, Final, or next year's Inventory depending on complexity
- *Related, but occurs post submission: UNFCCC Review*



# Quality Assurance: Public Review

- Draft GHG Inventory available on EPA web site
- Federal Register Notice
- Email GHG-Inv Listserv
- Reviewers send comments to Inventory Coordinator
- Inventory Coordinator sends comments to relevant inventory team members
  - Source leads, with coordinator, manage response and additional outreach with commenter
  - Response drafted and archived
- Comments posted on EPA's web site:
  - <http://www.epa.gov/climatechange/emissions/usinventoryreport.html>
- Improvements implemented as needed to Inventory for Final Report or added to next year's Inventory improvement plan



# Thanks!

- For additional information
  - U.S. Annual Inventory of GHG Emissions and Sinks 1990-2009 (Introduction)
    - <http://www.epa.gov/climatechange/emissions/usinventoryreport.html>
  - 2006 IPCC Guidelines (Volume 1, Chapter 6)
    - <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol1.html>
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