Nothing Compares
NORTH CAROLINA

Quality Assurance Methods for Nonpoint Source Industrial and Commercial/Institutional Fuel Combustion

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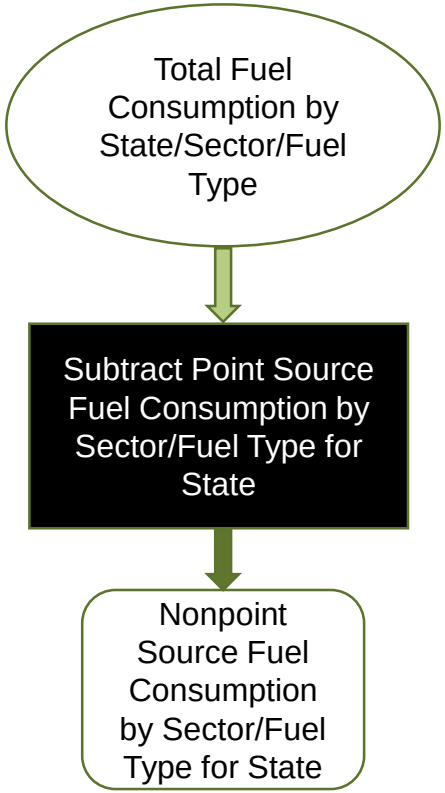
Department of Environmental Quality

Quality Assurance Methods for Nonpoint Source Industrial and Commercial/Institutional (ICI) Fuel Combustion

- ICI Fuel Combustion is a Major Nonpoint Source Category
  - ➡ 2014 NEIv1 - Nearly 40% of All Nonpoint SO2 and 10% of All Nonpoint Source NOx



Quality Assurance Methods for Nonpoint Source ICI Fuel Combustion

- Environmental Protection Agency (EPA) Default Emissions Estimation Tool
  - Top-down Estimation Approach
  - State-Level Energy Consumption from Energy Information Administration (EIA)
    - Transportation (onroad and nonroad mobile source inventories)
    - Residential (separate EPA nonpoint source emissions estimation tool)
    - Electric power (represented in point source inventory)
    - **Industrial**
    - **Commercial**
  - ICI Point Source Reconciliation Equation

$$\textit{Nonpoint Fuel Consumption}_{x,y} = \textit{Total Fuel Consumption}_{x,y} - \textit{Point Source Fuel Consumption}_{x,y}$$

where x = *sector*

y = *fuel type*

EIA – EPA Fuel Sector Reconciliation

- ICI Emissions Estimation Tool Nonpoint-to-Point Source Crosswalk
  - ➡ Source Classification Codes (SCCs) Key to Subtraction Procedure

Point SCCs Associated with Nonpoint Source Industrial Wood Combustion (2102008000)

SCC	Description1	Description2	Description3	Description4
10200901	External Combustion Boilers	Industrial	Wood/Bark Waste	Bark-fired Boiler
10200902	External Combustion Boilers	Industrial	Wood/Bark Waste	Wood/Bark-fired Boiler
10200903	External Combustion Boilers	Industrial	Wood/Bark Waste	Wood-fired Boiler - Wet Wood (>=20% moisture)
10200904	External Combustion Boilers	Industrial	Wood/Bark Waste	Bark-fired Boiler (< 50,000 Lb Steam) **
10200905	External Combustion Boilers	Industrial	Wood/Bark Waste	Wood/Bark-fired Boiler (< 50,000 Lb Steam) **
10200906	External Combustion Boilers	Industrial	Wood/Bark Waste	Wood-fired Boiler (< 50,000 Lb Steam) **
10200907	External Combustion Boilers	Industrial	Wood/Bark Waste	Wood Cogeneration
10200908	External Combustion Boilers	Industrial	Wood/Bark Waste	Wood-fired Boiler - Dry Wood (<20% moisture)
10200910	External Combustion Boilers	Industrial	Wood/Bark Waste	Fuel cell/Dutch oven boilers **
10200911	External Combustion Boilers	Industrial	Wood/Bark Waste	Stoker boilers **
10200912	External Combustion Boilers	Industrial	Wood/Bark Waste	Fluidized bed combustion boiler
39000989	Industrial Processes	In-process Fuel Use	Wood	General
39000999	Industrial Processes	In-process Fuel Use	Wood	General: Wood

Quality Assurance Methods for Nonpoint Source ICI Fuel Combustion

Key Quality Assurance (QA) Issues in ICI Tool Point Source Subtraction

1. Reconciliation of EIA Fuel Consumption Sectors with EPA Fuel Combustion Sectors (defined by Source Classification Codes [SCCs])

2. QA Review/Validation of Point Source Inventory Throughput Data

EIA – EPA Fuel Sector Reconciliation

- EIA
  - Sector Reflects the Primary **Economic** Activity of the **Facility**
  - Industrial: Facility Classified Under One of Following Economic Sectors
    - Manufacturing - North American Industrial Classification System [NAICS] codes 31-33
    - Agriculture, Forestry, Fishing, and Hunting - NAICS code 11
    - Mining, including Oil and Gas Extraction - NAICS code 21, or
    - Construction - NAICS code 23.
  - Commercial: Service-providing Facilities; that is, Facilities that EIA Does not Classify in:
    - Electric Power
    - Industrial
    - Transportation, or
    - Residential.
- EPA
  - Sector based on **Equipment** rather than facility
  - If Equipment
    - Connects to a turbine-generation set ➡ Electric Generation SCC
    - Provides industrial process steam ➡ Industrial SCC
    - Provides heating/cooling/space conditioning ➡ Commercial/Institutional SCC

EIA – EPA Fuel Sector Reconciliation

- Example: Boiler Producing Heat for Offices at an Industrial Facility
  Acme Furniture Facility - NAICS 3371 (Household/Institutional Furniture Manufacturing)

  - EPA – Commercial/Institutional Sector because “Process Provides Heating”
  - EIA – Industrial Sector because the Facility is Categorized in this Sector

- **Conclusion**: Unless State’s Point Source Inventory Always Assigns SCCs Based on the Economic Sector of Facility, Use of ICI Tool Results in Inaccurate Point Source Subtraction/Nonpoint Source Emissions Estimates

EIA – EPA Fuel Sector Reconciliation

- Electric Power Sector – EIA-923 Survey of Facilities Consuming Fuel
  - EIA Form-923 Identifies Facility Sector: Electric Utility, Industrial, or Commercial
  - Point Source Subtraction in ICI Tool Should Reflect EIA Sector Designations
  - Review 2014 EIA Data to Assign Point Source Records to the EIA Sector:
    - Electric Utility (records ultimately removed from subtraction procedure)
    - Industrial/Commercial sector assignments may differ from point inventory SCCs

Sample EIA-923 Data Records for North Carolina

Plant Id	Plant Name	Operator Name	Operator Id	Plant State	NAICS Code	EIA Sector Number	Sector Name	AER Fuel Type Code
6377	Ocracoke	North Carolina El Member Corp	13683	NC	22	1	Electric Utility	DFO
50188	Weyerhaeuser New Bern NC	Weyerhaeuser Co NR, New Bern CF	20511	NC	322	7	Industrial NAICS Cogen	DFO
50188	Weyerhaeuser New Bern NC	Weyerhaeuser Co NR, New Bern CF	20511	NC	322	7	Industrial NAICS Cogen	NG
50188	Weyerhaeuser New Bern NC	Weyerhaeuser Co NR, New Bern CF	20511	NC	322	7	Industrial NAICS Cogen	RFO
54276	Univ of NC Chapel Hill Cogen Facility	University of North Carolina	19541	NC	611	5	Commercial NAICS Cogen	DFO
54276	Univ of NC Chapel Hill Cogen Facility	University of North Carolina	19541	NC	611	5	Commercial NAICS Cogen	COL
54276	Univ of NC Chapel Hill Cogen Facility	University of North Carolina	19541	NC	611	5	Commercial NAICS Cogen	NG
56553	Catawba River Pollution Control	City of Morganton - (NC)	12944	NC	22132	4	Commercial NAICS Non-Cogen	DFO
58046	Works 53	PPG Ind Fiber Glass Prdcts Inc	57422	NC	327	6	Industrial NAICS Non-Cogen	DFO

EIA – EPA Fuel Sector Reconciliation

- NC DAQ 2014 Point Source Inventory Sector Reconciliation
  - Linked ~400 Point Source EGU, Industrial, and Commercial SCCs to EIA-923
  - About 1/4 of Linked Point SCCs Categorized in a Different Sector by EIA
    - 203 EGU point SCCs
      - 21 classified in Commercial sector by EIA
      - 7 classified in Industrial sector by EIA
    - 129 Industrial point SCCs
      - 44 classified in Electric Power sector by EIA
      - 13 classified in Commercial sector by EIA
    - 67 Commercial point SCCs
      - 16 classified in Electric Power sector by EIA
      - 1 classified in Industrial sector by EIA

EIA – EPA Fuel Sector Reconciliation

- Point Source Records not Linked to EIA-923 Data
  - Review NAICS Codes/Facility Info to Assign Each Remaining Record to EIA Sector
    - Reflect primary economic activity of facility
    - Can differ from SCC sector
    - Performed on ICI and EGU point SCC records
  - Revised Sector Assignments
    - EGU point SCC records assigned to Industrial or Commercial sector
    - Industrial point SCC records assigned to EGU or Commercial sector
    - Commercial point SCC records assigned to EGU or Industrial sector

QA Review of Point Source Inventory Throughput Data

- Throughput Reported in Units Other than Those Required by ICI Tool
  - Types
    - Invalid throughput unit entries (natural gas reported in tons)
    - Production reported rather than fuel consumption (e.g., tons of asphalt produced rather than volume of diesel fuel consumed)
  - Calculate Two Alternative Sets of Throughput Estimates
    1. From reported carbon monoxide (CO) emissions and EPA/State emission factors
    2. From fuel combustion unit capacity, operating hours (and 100% load factor)
  - Calculate Ratio of Two Throughput Values to Identify Records for More Detailed Review
  - CO Emissions-based Approach Considered Default Method because Data Always Available (while capacity or operating hours not always reported) and because Actual Load Factor Value is Unknown

QA Review of Point Source Inventory Throughput Data

- Throughput Reported in Units Other than Those Required by ICI Tool
  - Identify Potential Outlier Values for Further Review/Refinement
    - Calculate implied CO emission factor (EF) from reported emissions & throughput
    - Compare implied CO EF with relevant EPA/State EF for SCC
    - Flag records for detailed review based on threshold EF ratio (>2 times or <0.5 times EPA/State EF)
- Sum Total Sector/Fuel Type Throughput from post-QA Throughput Estimates

➡ Enter Throughput Totals into Tool via One Representative SCC for Sector/Fuel Type

Nonpoint Source Industrial Wood Combustion (2102008000)

SCC	Description1	Description2	Description3	Description4	Throughput (E6Btu)
10200901	External Combustion Boilers	Industrial	Wood/Bark Waste	Bark-fired Boiler	27,059,372

QA Review of Point Source Inventory Throughput Data

- Original/Post-QA 2014 Year Point Source Throughput Estimates

		2014 Pt Throughput		
Sector and Fuel Type	**Units**	**Original**	**Revised**	**% Change**
Industrial Coal	E3TONS	1,910	547	-71%
Industrial Distillate Oil	E3GAL	93,198	40,466	-57%
Industrial Kerosene	E3GAL		5	
Industrial Liquified Petroleum Gas (LPG)	E3GAL	4,536	5,088	12%
Industrial Natural Gas	E6FT3	114,324,884	68,821	-100%
Industrial Residual Oil	E3GAL	4,788	4,141	-14%
Industrial Wood	E6BTU	29,655,000	27,059,372	-9%
Commercial/Institutional Coal	E3TONS	51	147	188%
Commercial/Institutional Distillate Oil	E3GAL	19,530	7,897	-60%
Commercial/Institutional Kerosene	E3GAL		86	
Commercial/Institutional LPG	E3GAL	3,444	446	-87%
Commercial/Institutional Natural Gas	E6FT3	17,122,991	12,773	-100%
Commercial/Institutional Residual Oil	E3GAL	1,302	182	-86%
Commercial/Institutional Wood	E6BTU	2,965,000	966,876	-67%

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