

Greenhouse Gas Reporting Program

XML Reporting Instructions for Subpart AA – Pulp and Paper Manufacturing

United States Environmental Protection Agency
Climate Change Division
Washington, DC

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These instructions explain how to report the required data for the applicable regulations. Owners and operators of units should refer to the applicable regulations for information about what data are required to be reported.

EPA has finalized a rule that defers the deadline for reporting data elements used as inputs to emission equations for direct emitters. (See <http://www.epa.gov/climatechange/emissions/notices.html> for a pre-publication version of the rule). In accordance with the rule, e-GGRT is not currently collecting data used as inputs to emission equations.

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Introduction

The U.S. Environmental Protection Agency's (EPA's) electronic greenhouse gas reporting tool (e-GGRT) extensible markup language (XML) Reporting Schema contains all of the data elements needed to comply with the greenhouse gas reporting program (GHGRP) beginning with the 2010 data collection year. The schema defines expected data elements and attributes, allowable data types for each element and the hierarchy and order in which elements must appear. Similar to an architectural blueprint that describes the structural design of a house, an XML schema describes the structural design of an XML file. In some cases, it also defines which elements are optional, which are required and the maximum number of occurrences allowed for each element.

The e-GGRT XML schema is made up of a root element, complex elements and simple elements. A simple element is a single piece of data. A complex element is a group of simple elements which are logically grouped together. The root element is the base of the XML schema.

The elements are related to each other in parent-child relationships. The root element is the parent element of the entire schema. Complex elements are children of the root element, and complex elements can also be children of other complex elements. If a complex element is dependent on a parent complex element, the child complex element cannot be included in the XML file unless the appropriate parent complex element is also included.

The XML upload method may be used only for submitting the annual GHG report. User and facility or supplier registration and the Certificate of Representation must be entered on-line using e-GGRT.

All XML files submitted to e-GGRT must be well formed and will be accepted only if they conform to the correct and current version of the e-GGRT XML schema.

An XML submission can only contain GHG data for a single facility or supplier. All data for a facility or supplier must be submitted in a single file as a complete report and must include all of the relevant subparts. It is not possible to submit a subset of any portion of a facility's data to add, delete, correct or update. The entire report must be resubmitted to make any modification at all. Each subsequent submission for the same facility replaces all of the previously submitted data.

The e-GGRT XML schema contains enumerated lists of the units of measures for some data elements and allowable values for some data elements. For rules regarding the unit of measure or allowable values for a specific data element, please refer to the appropriate Data Elements table.

The e-GGRT XML Reporting Schema is available for download at the GHGRP web site here: http://www.epa.gov/climatechange/emissions/e-ggrr_xml.html. The zip file contains:

- **GHG_Final.xsd and Included Files**
- **SchemaChanges.xlsx**

This document provides a step-by-step description of how to report data for Subpart AA Pulp and Paper Manufacturing and overall total Subpart AA emissions for a facility using the XML schema. Please note the following:

- **Not all data elements included in the schema must be reported.** Required or relevant data components and data elements are boxed in red in the schema diagrams and listed in the tables. If a data element is not listed, it does not need to be reported (e.g., deferred data elements, the data element "IsConfidentialBusinessInformationIndicator"). Some data elements are conditional and only need to be reported if they are relevant to the reporting facility.

- **Enumerations are case sensitive.** Values must be entered exactly as they are displayed in order to be accepted by schema validation.
- **Data elements must be reported in a specific order.** The figures and tables in this document depict the specific order in which data elements must be reported in order to produce a well-formed XML report.
- **Data elements for calculated and measured values are not displayed in the schema diagrams.** The parent elements for calculated and measured values are displayed in the schema diagrams in this document, but the specific data elements to be reported are not displayed. The descriptions in the XML data elements tables include the specific data elements to report, which are commonly the calculated or measured value and the unit of measure. For some values, the number of times substitute data procedures were used may also be required. See Figure 1 for the expanded view of a sample data element which is a calculated value and Figure 2 for the expanded view of a sample data element which is a measured value.

Figure 1
Sample Calculated Value Schema Diagram

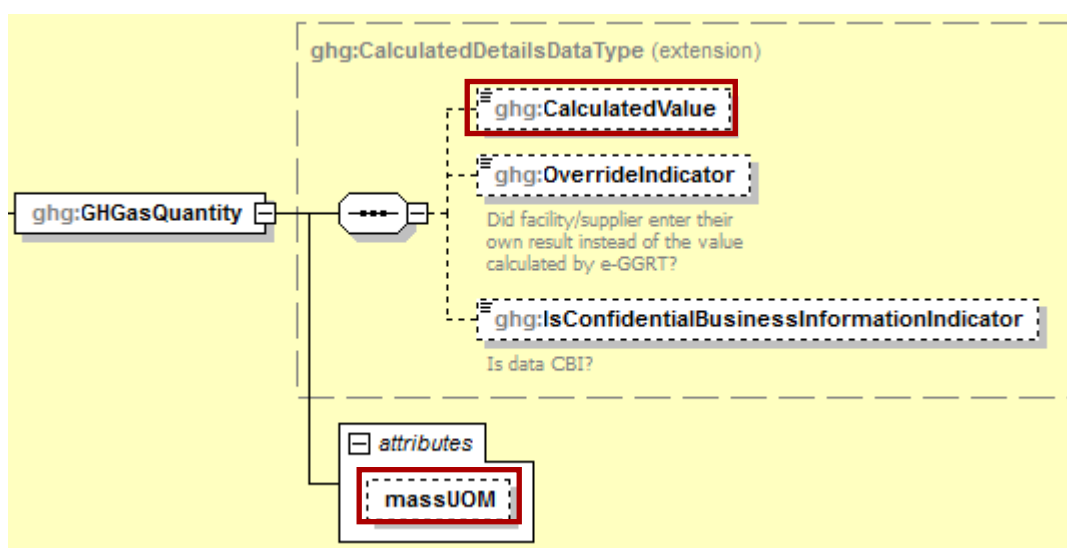


Figure 2
Sample Measured Value Schema Diagram

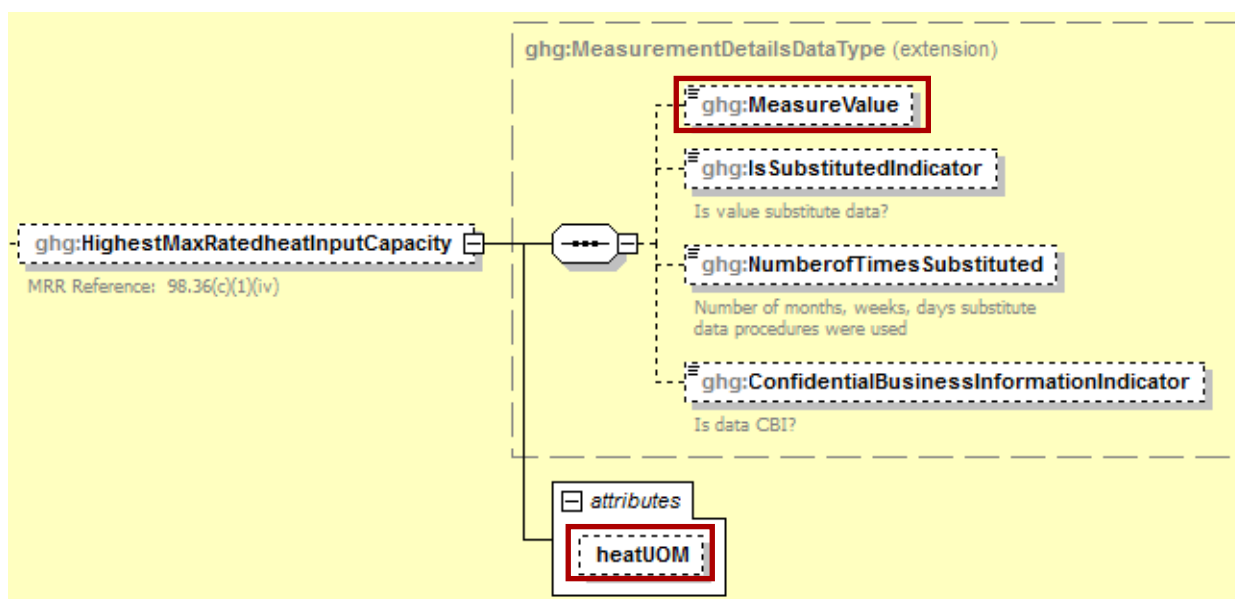
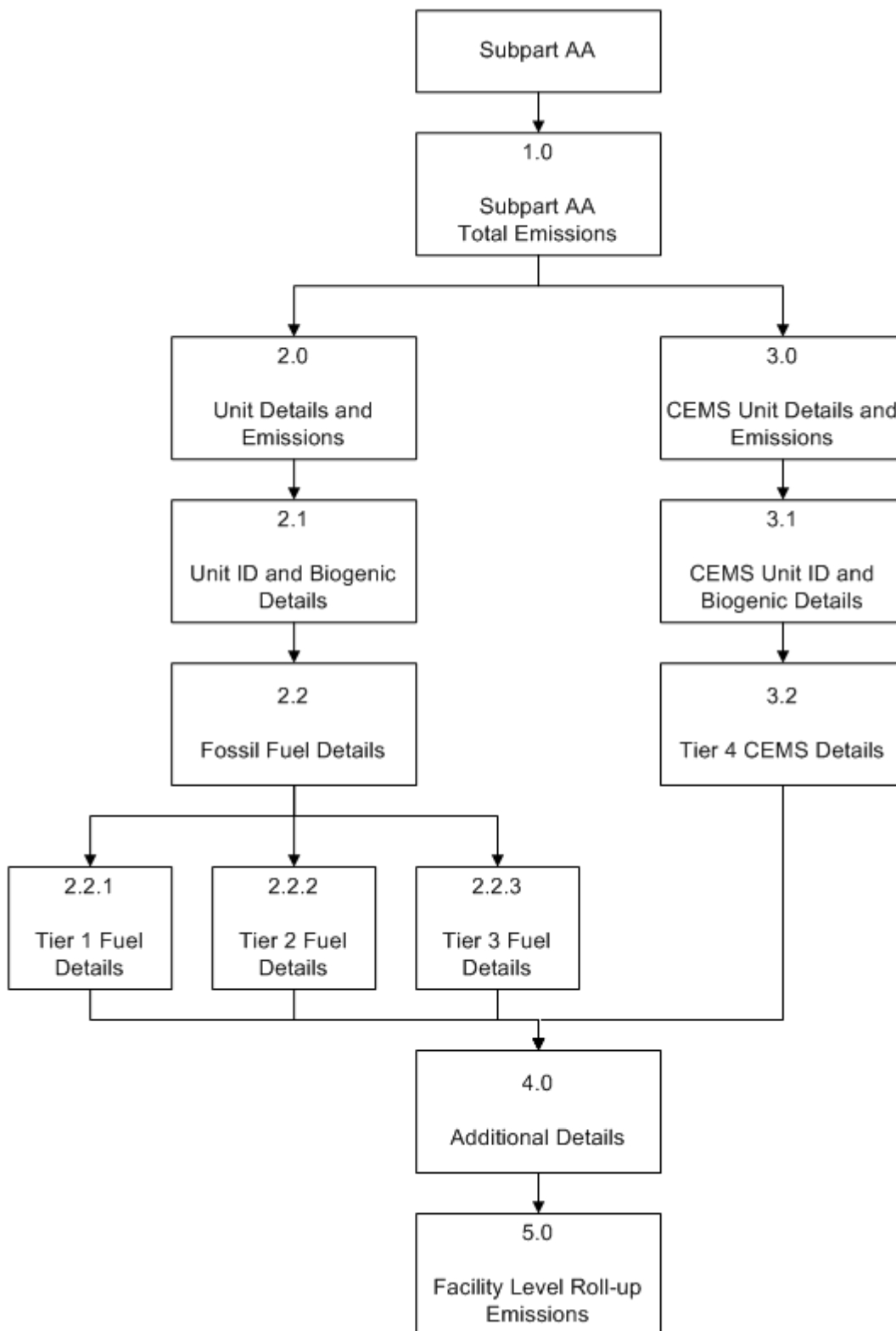


Figure 3
Subpart AA Reporting Diagram



The XML schema includes the following areas for reporting for Subpart AA as shown in Figure 1:

- 1.0 Subpart AA Total Emissions: includes the total emissions for greenhouse gases required to be reported.
- 2.0 Unit Details and Emissions: includes information on each unit which was not monitored using a continuous emission monitoring system (CEMS).
 - 2.1 Unit ID and Biogenic Details: includes information on biogenic emissions and emissions from biomass for each unit.
 - 2.2 Fossil Fuel Details: includes information on each fuel type used for each unit and the calculation methodology used.
 - 2.2.1 Tier 1 Fuel Details: includes emissions details to report if the Tier 1 calculation methodology was used.
 - 2.2.2 Tier 2 Fuel Details: includes emissions details to report if the Tier 2 calculation methodology was used.
 - 2.2.3 Tier 3 Fuel Details: includes emissions details to report if the Tier 3 calculation methodology was used.
- 3.0 CEMS Unit Details and Emissions: includes information on each unit which was monitored using a CEMS.
 - 3.1 CEMS Unit ID and Biogenic Details: includes information on biogenic emissions and emissions from biomass for each unit.
 - 3.2 Tier 4 CEMS Details: includes information on each CEMS monitoring location (CML).
- 4.0 Additional Details: includes information on emissions from makeup chemical use, steam purchased and paper and pulp products produced.
- 5.0 Facility Level Roll-up Emissions: includes information on how to report total emissions for CO₂e (excluding biogenic CO₂) and total biogenic CO₂.

The following terminology is used throughout this document:

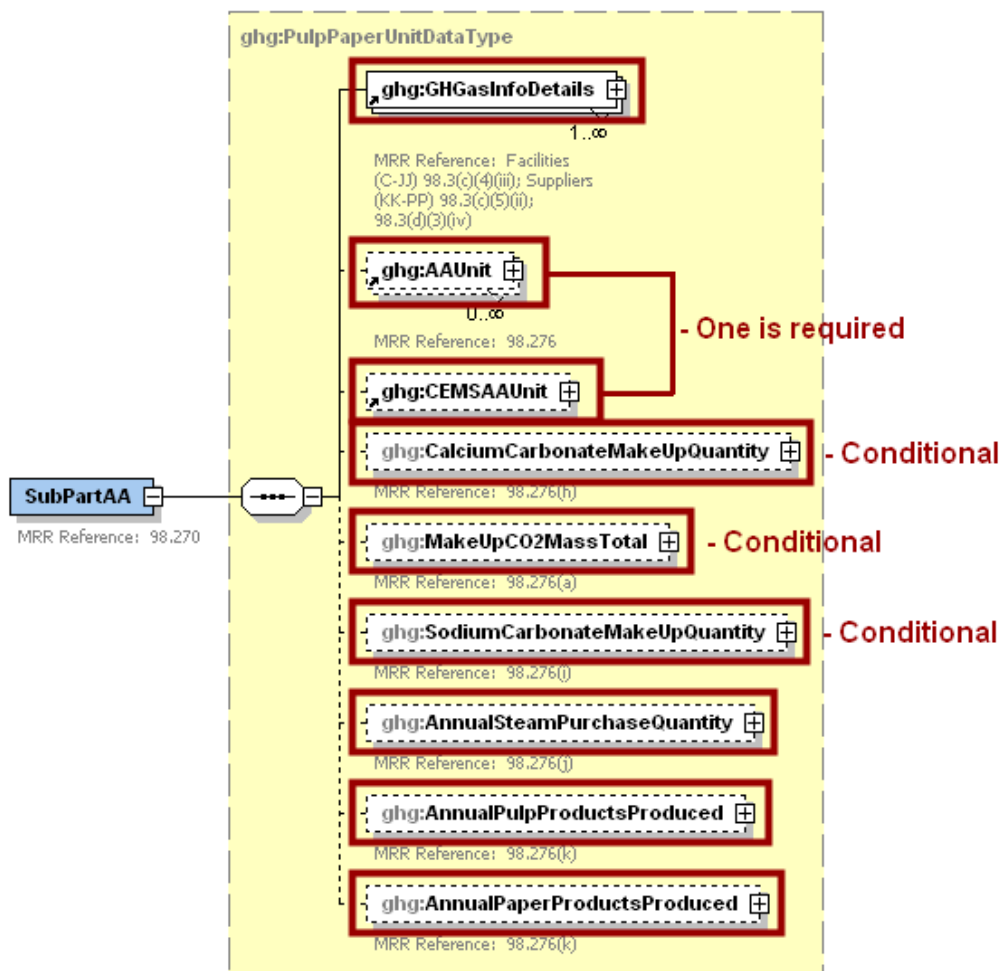
- **Namespace:** A namespace uniquely identifies a set of names such that there is no ambiguity when objects having different origins but the same names are mixed together.
- **Markup Language:** A way to combine text and extra information to show the structure and layout of a document. This information is expressed using markup, which is typically intermingled with the primary text. A commonly known markup language is HTML.
- **XML:** A markup language for documents containing structured information. The XML specification defines a standard way to add markup to documents. Its primary purpose is to facilitate the sharing of structured data across different information systems, particularly via the internet.
- **XML Schema:** An XML schema describes the structure of an XML document. An XML schema defines the set of rules to which the XML document must conform in order to be considered "valid" according to its schema. An instance of an XML schema is an XML schema document and is a file with the extension .xsd.
- **XML Document:** An XML document is a file containing data organized into a structured document using XML markup. An XML document is considered to be "well-formed" if it conforms to all XML syntax rules. An XML document is considered to be "valid" if it conforms to all the semantic rules defined by an associated XML schema. An XML document cannot be processed if it is not well-formed or valid. XML documents have the file extension .xml.
- **XML Element:** An XML element is a unit of the XML document that is expressed as tags in the form "<tagName>." XML elements must have either a start and end tag as in `<ghg:GHGasInfoDetails> </ghg:GHGasInfoDetails>` or a single empty tag name as in `<ghg:GHGasInfoDetails/>`. XML elements may be nested within one another in a structured hierarchy and sequence specified in an XML schema.
- **XML Attribute:** An XML attribute contains additional information about an XML element placed at the start tag of the XML element. XML attributes have the form `attributeName = "attributeValue,"` as in `<ghg:GHGasQuantity massUOM="Metric Tons">`. XML attributes are

used to report identifying information or to help e-GGRT process the data being reported within the data elements.

Rounded results from calculated values should be reported in the XML schema. Please use the following rounding rules:

- 1) CO₂e and CO₂ emissions data expressed in metric tons should be rounded to one decimal place. This should be done regardless of the level of data collection (e.g., unit-level, facility-level). Quantities less than 0.05 metric tons would round to 0.0 and be reported as such. Quantities greater than or equal to 0.05 metric tons would round up to 0.1 and be reported as such.
- 2) CH₄ emissions data expressed in metric tons should be rounded to two decimal places.
- 3) N₂O emissions data expressed in metric tons should be rounded to three decimal places.
- 4) Emissions data for all GHGs other than CO₂, N₂O, and CH₄ expressed in metric tons should be rounded to the fourth digit to the right of the decimal (one tenth of a kilogram, or 1 ten thousandth of a metric ton). This rounding should be applied regardless of the level of data collection (unit, facility, etc.).
- 5) Other (non-emissions) quantitative data reported by the user (e.g., a monthly HHV sample result, an annual production quantity) will not need to be rounded.
- 6) In the case of aggregation/roll-ups, those calculations should be performed on the rounded values.

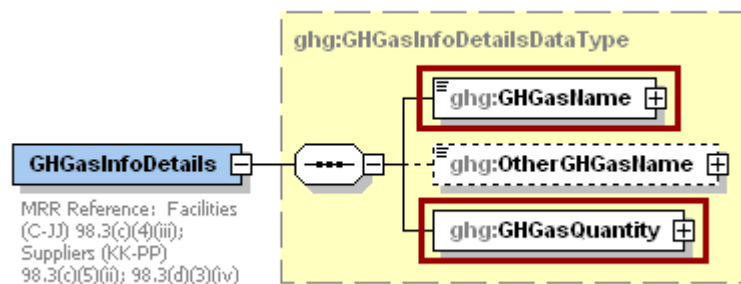
**Figure 4
Subpart AA Schema Diagram**



1.0 Subpart AA Total Emissions

Greenhouse gas information details comprise a collection of data elements to report the total annual emissions of each greenhouse gas (GHG) listed in Table A-1 of the Mandatory Reporting of GHG, part 98, reported under Subpart AA, expressed in metric tons.

Figure 5
GHGasInfoDetails Details Schema Diagram



For Subpart AA, report total emissions for carbon dioxide (excluding biogenic CO₂), biogenic carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). For greenhouse gas quantity, report the calculated value and mass unit of measure (metric tons) only according to the following guidelines:

- Total annual quantity of carbon dioxide:
 - Add the CO₂ mass emissions from makeup chemical use (using Equation AA-3) in metric tons rounded to one decimal place.
 - Add the CO₂ emissions from each fossil fuel from non-CEMS Chemical Recovery Furnaces (using calculation methodology Tier 1, 2 or 3) in metric tons rounded to one decimal place for each non-CEMS Chemical Recovery Furnace.
 - Add the CO₂ emissions from each fossil fuel from non-CEMS Chemical Recovery Combustion Units (using calculation methodology Tier 1, 2 or 3) in metric tons rounded to one decimal place for each non-CEMS Chemical Recovery Combustion Unit.
 - Add the CO₂ emissions from each fossil fuel from non-CEMS pulp mill lime kilns (using calculation methodology Tier 1, 2 or 3) in metric tons rounded to one decimal place for each non-CEMS pulp mill lime kiln.
 - Add the total annual CO₂ mass emissions measured by the CEMS in metric tons rounded to one decimal place for each CML.
 - Subtract the biogenic CO₂ emissions from Chemical Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons rounded to one decimal place for all process units associated with the CML for each CML.
 - Subtract the biogenic CO₂ emissions from Chemical Recovery Combustion Units (from spent liquor solids using Equation AA-2) in metric tons rounded to one decimal place for all process units associated with the CML for each CML.
- Total annual quantity of biogenic carbon dioxide:
 - Add the biogenic CO₂ emissions from non-CEMS Chemical Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons rounded to one decimal place for each non-CEMS Chemical Recovery Furnace.
 - Add the biogenic CO₂ emissions from non-CEMS Chemical Recovery Combustion Units (from spent liquor solids using Equation AA-2) in metric tons rounded to one decimal place for each non-CEMS Chemical Recovery Combustion Unit.

- Add the biogenic CO₂ emissions from CEMS Chemical Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons rounded to one decimal place for each CEMS Chemical Recovery Furnace.
- Add the biogenic CO₂ emissions from CEMS Chemical Recovery Combustion Units (from spent liquor solids using Equation AA-2) in metric tons rounded to one decimal place for each CEMS Chemical Recovery Combustion Unit.
- Total annual quantity of methane:
 - Add the CH₄ emissions from biomass from Chemical Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons rounded to two decimal places for each non-CEMS Chemical Recovery Furnace.
 - Add the CH₄ emissions from each fossil fuel from Chemical Recovery Furnaces in metric tons rounded to two decimal places for each non-CEMS Chemical Recovery Furnace.
 - Add the CH₄ emissions from biomass from Chemical Recovery Combustion Units (from spent liquor solids using Equation AA-1) in metric tons rounded to two decimal places for each non-CEMS Chemical Recovery Combustion Unit.
 - Add the CH₄ emissions from each fossil fuel from Chemical Recovery Combustion Units in metric tons rounded to two decimal places for each non-CEMS Chemical Recovery Combustion Unit.
 - Add the CH₄ emissions from each fossil fuel from pulp mill lime kilns in metric tons rounded to two decimal places for each non-CEMS pulp mill lime kiln
 - Add the CH₄ emissions from biomass from Chemical Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons rounded to two decimal places for each CEMS Chemical Recovery Furnace.
 - Add the CH₄ emissions from biomass from Chemical Recovery Combustion Units (from spent liquor solids using Equation AA-1) in metric tons rounded to two decimal places for each CEMS Chemical Recovery Combustion Unit.
 - Add the total CH₄ emissions from each fossil fuel in metric tons rounded to two decimal places for each CML.
- Total annual quantity of nitrous oxide:
 - Add the N₂O emissions from biomass from Combustion Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons rounded to three decimal places for each non-CEMS Combustion Recovery Furnace.
 - Add the N₂O emissions from each fossil fuel from Combustion Recovery Furnaces in metric tons rounded to three decimal places for each non-CEMS Combustion Recovery Furnace.
 - Add the N₂O emissions from biomass from Chemical Recovery Combustion Furnaces (from spent liquor solids using Equation AA-1) in metric tons rounded to three decimal places for each non-CEMS Chemical Recovery Combustion Furnace.
 - Add the N₂O emissions from each fossil fuel from Chemical Recovery Combustion Units in metric tons rounded to three decimal places for each non-CEMS Chemical Recovery Combustion Furnace.
 - Add the N₂O emissions from each fossil fuel from pulp mill lime kilns in metric tons rounded to three decimal places for each non-CEMS pulp mill lime kiln.
 - Add the N₂O emissions from biomass from Combustion Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons rounded to three decimal places for each CEMS Combustion Recovery Furnace.
 - Add the N₂O emissions from biomass from Chemical Recovery Combustion Units (from spent liquor solids using Equation AA-1) in metric tons rounded to three decimal places for each CEMS Chemical Recovery Combustion Unit.
 - Add the total N₂O emissions from each fossil fuel in metric tons rounded to three decimal places for each CML.

Table 1
GHGasInfoDetails XML Data Elements

Data Element Name	Description
GHGasInfoDetails	A collection of data elements containing the total annual emissions of each greenhouse gas (GHG) listed in Table A-1 of the Mandatory Reporting of GHGs, Part 98 reported under this subpart, expressed in metric tons.
GHGasName	Specify the name of the greenhouse gas. See list of allowable values: Carbon Dioxide Biogenic Carbon dioxide Methane Nitrous Oxide
GHGasQuantity	A collection of data elements that quantify the annual emissions from this source category. Report the calculated value only according to the guidelines above..
GHGasQuantity.massUOM	Metric Tons

Figure 6
Sample XML Excerpt for GHGasInfoDetails

```

<ghg:SubPartAA>
  <ghg:GHGasInfoDetails>
    <ghg:GHGasName>Biogenic Carbon dioxide</ghg:GHGasName>
    <ghg:GHGasQuantity massUOM="Metric Tons">
      <ghg:CalculatedValue>2443</ghg:CalculatedValue>
    </ghg:GHGasQuantity>
  </ghg:GHGasInfoDetails>
  <ghg:GHGasInfoDetails>
    <ghg:GHGasName>Methane</ghg:GHGasName>
    <ghg:GHGasQuantity massUOM="Metric Tons">
      <ghg:CalculatedValue>397</ghg:CalculatedValue>
    </ghg:GHGasQuantity>
  </ghg:GHGasInfoDetails>
  <ghg:GHGasInfoDetails>
    <ghg:GHGasName>Nitrous Oxide</ghg:GHGasName>
    <ghg:GHGasQuantity massUOM="Metric Tons">
      <ghg:CalculatedValue>39</ghg:CalculatedValue>
    </ghg:GHGasQuantity>
  </ghg:GHGasInfoDetails>
  <ghg:GHGasInfoDetails>
    <ghg:GHGasName>Carbon Dioxide</ghg:GHGasName>
    <ghg:GHGasQuantity massUOM="Metric Tons">
      <ghg:CalculatedValue>14997</ghg:CalculatedValue>
    </ghg:GHGasQuantity>
  </ghg:GHGasInfoDetails>

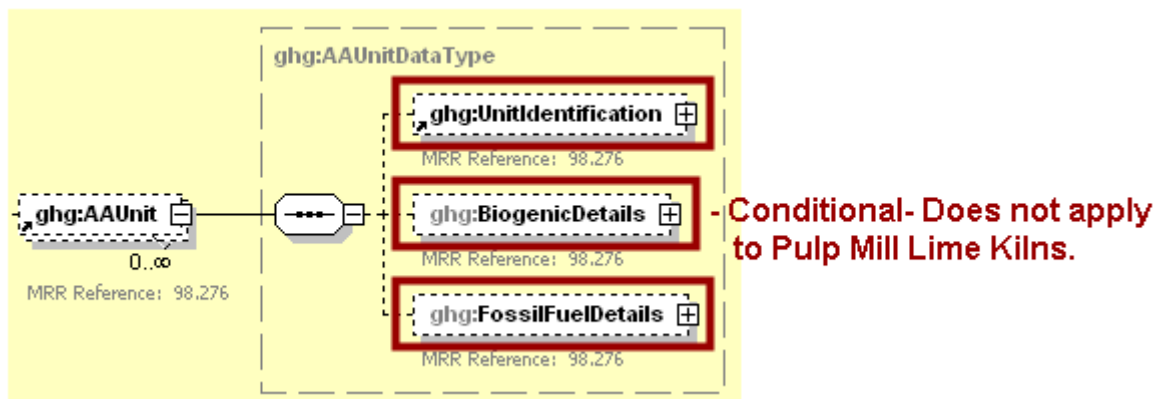
```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

2.0 Unit Details and Emissions

This section provides a description of how to report Subpart AA information for units which were not monitored using a continuous emission monitoring system (CEMS).

Figure 7
Unit Details and Emissions Schema Diagram



2.1 Unit ID and Biogenic Details

This section includes information on unit identification, biogenic CO₂ emissions and CH₄ and N₂O emissions from biomass for each unit.

For each unit or furnace within your facility, Subpart AA requires you to report the following data:

- A unique name or identifier, plus optional description for the unit.
- The type of unit:
 - Kraft or soda mill chemical recovery furnace (“chemical recovery furnace”) (use Tier 1, 2 or 3 for fossil fuels, plus Equation AA-1 for biomass).
 - Sulfite or semichemical mill chemical recovery combustion unit (“chemical recovery combustion unit”) (use Tier 1, 2 or 3 for fossil fuels, plus Equations AA-1 (CH₄/N₂O) and AA-2 (CO₂) for biomass).
 - Pulp mill lime kiln (use Tier 1, 2 or 3 for fossil fuels).

For each Chemical Recovery Furnace and Chemical Recovery Combustion Unit within your facility, Subpart AA requires you to report the following data:

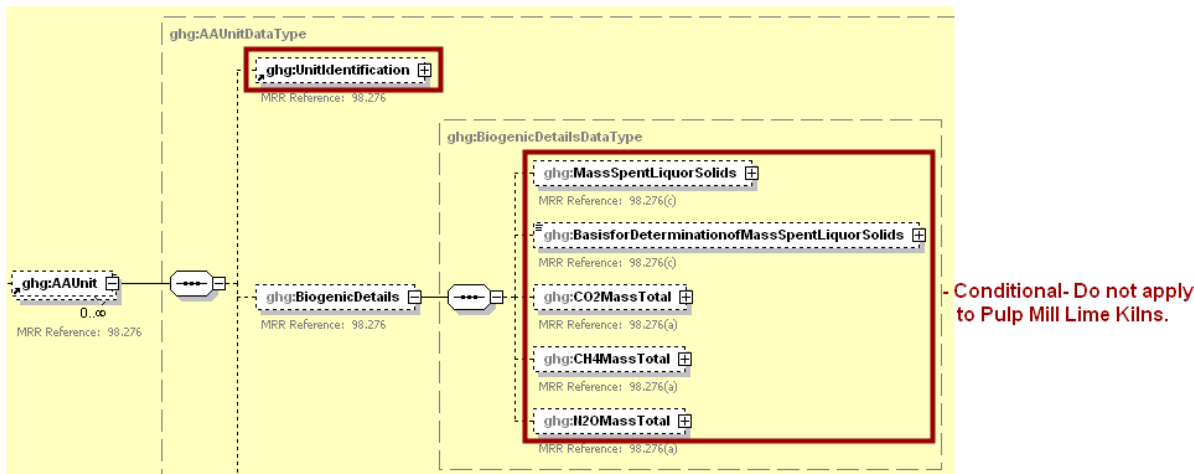
- An indication if the annual mass of spent liquor solids combusted in the unit during the year is a substitute data value calculated per the procedures described in §98.275(b) [98.3(c)(8)].
- The basis for determining the annual mass of spent liquor solids combusted in the unit during the year [98.276(c)]. Select from the following:
 - TAPPI method
 - On-line metering/measuring system

Emissions information required for Subpart AA depends upon the type of unit:

- If reporting for a Chemical Recovery Furnace, report biogenic CO₂ emissions and CH₄ and N₂O emissions from biomass using Equation AA-1.

- If reporting for a Chemical Recovery Combustion Unit, report biogenic CO₂ emissions using Equation AA-2 and CH₄ and N₂O emissions from biomass using Equation AA-1.
- If reporting for a Pulp Mill Lime Kiln, no biomass emissions are required to be reported.

**Figure 8
Unit ID and Biogenic Details Schema Diagram**



**Table 2
Unit ID and Biogenic Details XML Data Elements**

Data Element Name	Description
AAUnit	A collection of data elements containing information for each chemical recovery furnace, chemical recovery combustion unit or pulp mill lime kiln not monitored by CEMS.
UnitIdentification	A collection of data elements containing the identity of each chemical recovery furnace, chemical recovery combustion unit or pulp mill lime kiln not monitored by CEMS. It includes the unit ID, an optional description and the type of unit. See list of allowable values for type of unit: Chemical Recovery Furnace Chemical Recovery Combustion Unit Pulp Mill Lime Kiln
BiogenicDetails	A collection of data elements containing information on emissions from spent liquor solids combustion for the specified unit. This section does not apply to pulp mill lime kilns.
MassSpentLiquorSolids	A collection of data elements containing information on the mass of spent liquor solids. Indicate (Y/N) if a substitute value was used for the annual mass of spent liquor solids only.
BasisforDeterminationofMassSpentLiquorSolids	The basis for determining the annual mass of spent liquor solids combusted in the unit during the year. See list of allowable values: TAPPI method on-line metering/measuring system

Data Element Name	Description
CO2MassTotal	A collection of data elements containing information on biogenic CO ₂ emissions from spent liquor solids combustion. Report the calculated value and mass unit of measure only.
CO2MassTotal.massUOM	Metric Tons
CH4MassTotal	A collection of data elements containing information on biogenic CH ₄ emissions from spent liquor solids combustion. Report the calculated value and mass unit of measure only.
CH4MassTotal.massUOM	Metric Tons
N2OMassTotal	A collection of data elements containing information on biogenic N ₂ O emissions from spent liquor solids combustion. Report the calculated value and mass unit of measure only.
N2OMassTotal.massUOM	Metric Tons

Figure 9
Sample XML Excerpt for Unit ID and Biogenic Details

```

<ghg:AAUnit>
  <ghg:UnitIdentification>
    <ghg:UnitName>002- CRF</ghg:UnitName>
    <ghg:UnitDescription>Chemical Recovery Furnace unit 002</ghg:UnitDescription>
    <ghg:UnitType>Chemical Recovery Furnace</ghg:UnitType>
  </ghg:UnitIdentification>
  <ghg:BiogenicDetails>
    <ghg:MassSpentLiquorSolids>
      <ghg:IsSubstitutedIndicator>Y</ghg:IsSubstitutedIndicator>
    </ghg:MassSpentLiquorSolids>
    <ghg:BasisforDeterminationofMassSpentLiquorSolids>on-line metering/measuring
system</ghg:BasisforDeterminationofMassSpentLiquorSolids>
    <ghg:CO2MassTotal massUOM="Metric Tons">
      <ghg:CalculatedValue>1111</ghg:CalculatedValue>
    </ghg:CO2MassTotal>
    <ghg:CH4MassTotal massUOM="Metric Tons">
      <ghg:CalculatedValue>111</ghg:CalculatedValue>
    </ghg:CH4MassTotal>
    <ghg:N2OMassTotal massUOM="Metric Tons">
      <ghg:CalculatedValue>11</ghg:CalculatedValue>
    </ghg:N2OMassTotal>
  </ghg:BiogenicDetails>

```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

2.2 Fossil Fuel Details

This section includes information to report on each fuel type used for each unit and the calculation methodology used.

- For each chemical recovery furnace, chemical recovery combustion unit and pulp mill lime kiln, the facility must report each type of fossil fuel combusted in the unit during the reporting year [98.276(a)(6) and 98.276(b)(8)].
- For each fuel, the facility must report Tier1, Tier 2 or Tier 3 details based on which methodology was used to calculate emissions.

Note: The parent element FossilFuelDetails does not apply for spent pulping liquor (the primary fuel for chemical recovery combustion units and recovery furnaces) or other biogenic fuel types. Do not report for FossilFuelDetails for a unit if spent pulping liquor and/or other biogenic fuels are the only fuels combusted by the unit.

**Figure 10
Fossil Fuel Details Schema Diagram**

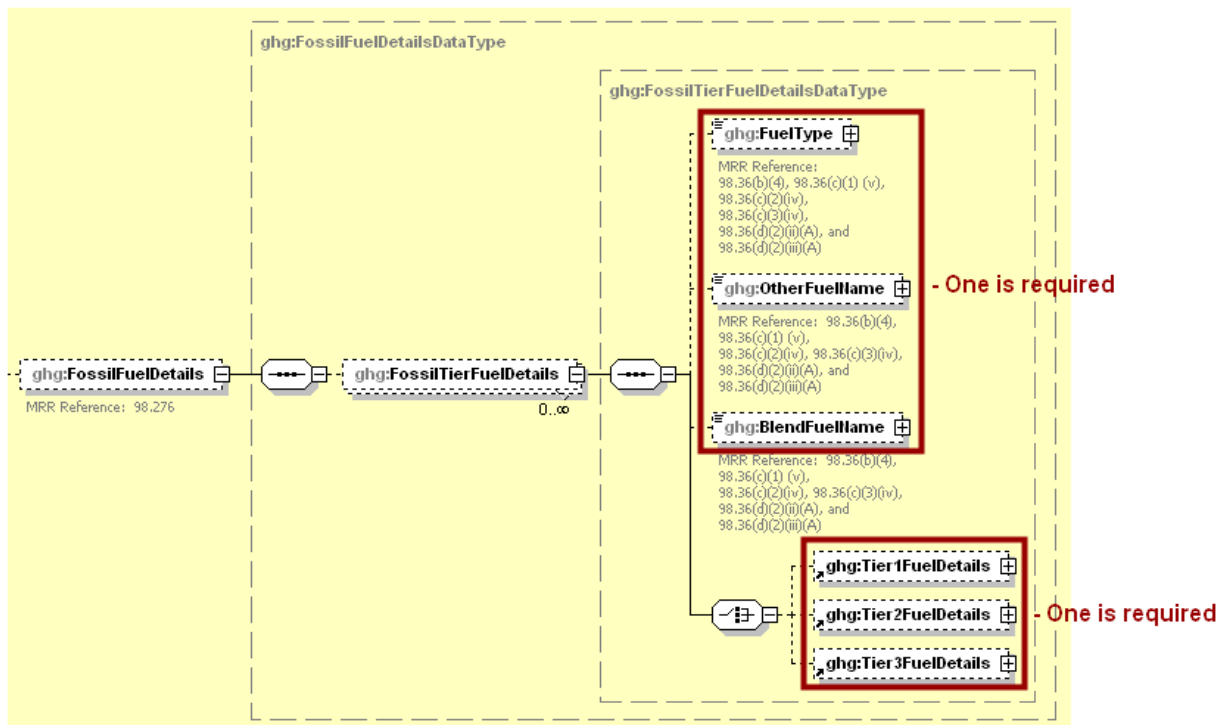


Table 3
Fossil Fuel Details XML Data Elements

Data Element Name	Description
FossilFuelDetails	A collection of data elements containing information on the fuels combusted by the specified unit.
FossilTierFuelDetails	A collection of data elements containing information on each fuel combusted by the specified unit.
FuelType	<p>Specify separately each type of fuel combusted in the unit during the report year. See list of allowable fuel types. If the fuel type does not appear in the list, then specify its name using one of the following data elements, "OtherFuelName" or "BlendFuelName" as appropriate.</p> <ul style="list-style-type: none"> Anthracite Bituminous Subbituminous Lignite Coke Mixed (Commercial sector) Mixed (Industrial coking) Mixed (Industrial sector) Mixed (Electric Power sector) Mixed (Electric Power sector) Plastics Petroleum Coke Municipal Solid Waste Tires Wood and Wood Residuals Agricultural Byproducts Peat Distillate Fuel Oil No. 1 Distillate Fuel Oil No. 2 Distillate Fuel Oil No. 4 Residual Fuel Oil No. 5 Residual Fuel Oil No. 6 Used Oil Kerosene Liquefied petroleum gases (LPG) Propylene Ethane Ethanol (100%) Ethylene Isobutane Isobutylene Butane Butylene Naphtha (<401 deg F) Natural Gasoline Other Oil (>401 deg F) Pentanes Plus Petrochemical Feedstocks Petroleum Coke Special Naphtha Unfinished Oils Heavy Gas Oils Lubricants Motor Gasoline Aviation Gasoline Kerosene-Type Jet Fuel Asphalt and Road Oil Crude Oil Propane Ethanol Biodiesel

Data Element Name	Description
	Rendered Animal Fat Vegetable Oil Natural Gas (Weighted U.S. Average) Blast Furnace Gas Coke Oven Gas Propane Gas Fuel Gas Biogas (Captured methane) Solid Byproducts
OtherFuelName	Name of the specific fuel if not found in the list of allowable values.
BlendFuelName	Name of the specific fuel blend if not found in the list of allowable values.

Figure 11
Sample XML Excerpt for Fossil Fuel Details

```

<ghg:FossilFuelDetails>
  <ghg:FossilTierFuelDetails>
    <ghg:FuelType>Lignite</ghg:FuelType>
  </ghg:FossilTierFuelDetails>
</ghg:FossilFuelDetails>

```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

2.2.1 Tier 1 Fuel Details

This section includes emissions details to report if the Tier 1 calculation methodology was used.

For each unit and each fuel type for which a Tier 1 calculation methodology was used, the following information is required:

- Calculation methodology used for the emissions calculation period specified [98.36(b)(8)(i), 98.36(c)(1)(vi), or 98.36(c)(3)(vii)]:
 - Tier 1/Equation C-1 - Annual fuel combusted
 - Tier 1/Equation C-1a - Annual natural gas usage from billing records (therms)
 - Tier 1/Equation C-1b - Annual natural gas usage from billing records (mmBtu)
- Calculation methodology start date [98.36(b)(6), 98.36(c)(1)(viii), 98.36(c)(3)(viii)].
- Calculation methodology end date [98.36(b)(7), 98.36(c)(1)(ix), 98.36(c)(3)(ix)].
- The total annual CO₂ mass emissions derived from Equation C-1, Equation C-1a, or Equation C-1b, in metric tons CO₂ [98.36(b)(8)(i), 98.36(c)(1)(vi), 98.36(c)(3)(vii)].
- The total annual CH₄ mass emissions derived from Equation C-8, Equation C-8a, or Equation C-8b in metric tons CH₄ and in metric tons CO₂e (for Table C-2 fuels only or Table AA-2 fuels, if deriving CH₄ emissions for a pulp lime kiln) [98.36(b)(8)(i), 98.36(c)(1)(vi), 98.36(c)(3)(vii), 98.273(c)].
- The total annual N₂O mass emissions derived from Equation C-8, Equation C-8a, or Equation C-8b in metric tons N₂O and in metric tons CO₂e (for Table C-2 fuels only or Table AA-2 fuels, if deriving N₂O emissions for a pulp lime kiln) [98.36(b)(8)(i), 98.36(c)(1)(vi), 98.36(c)(3)(vii), 98.273(c)].

Figure 12
Tier 1 Fuel Details Schema Diagram

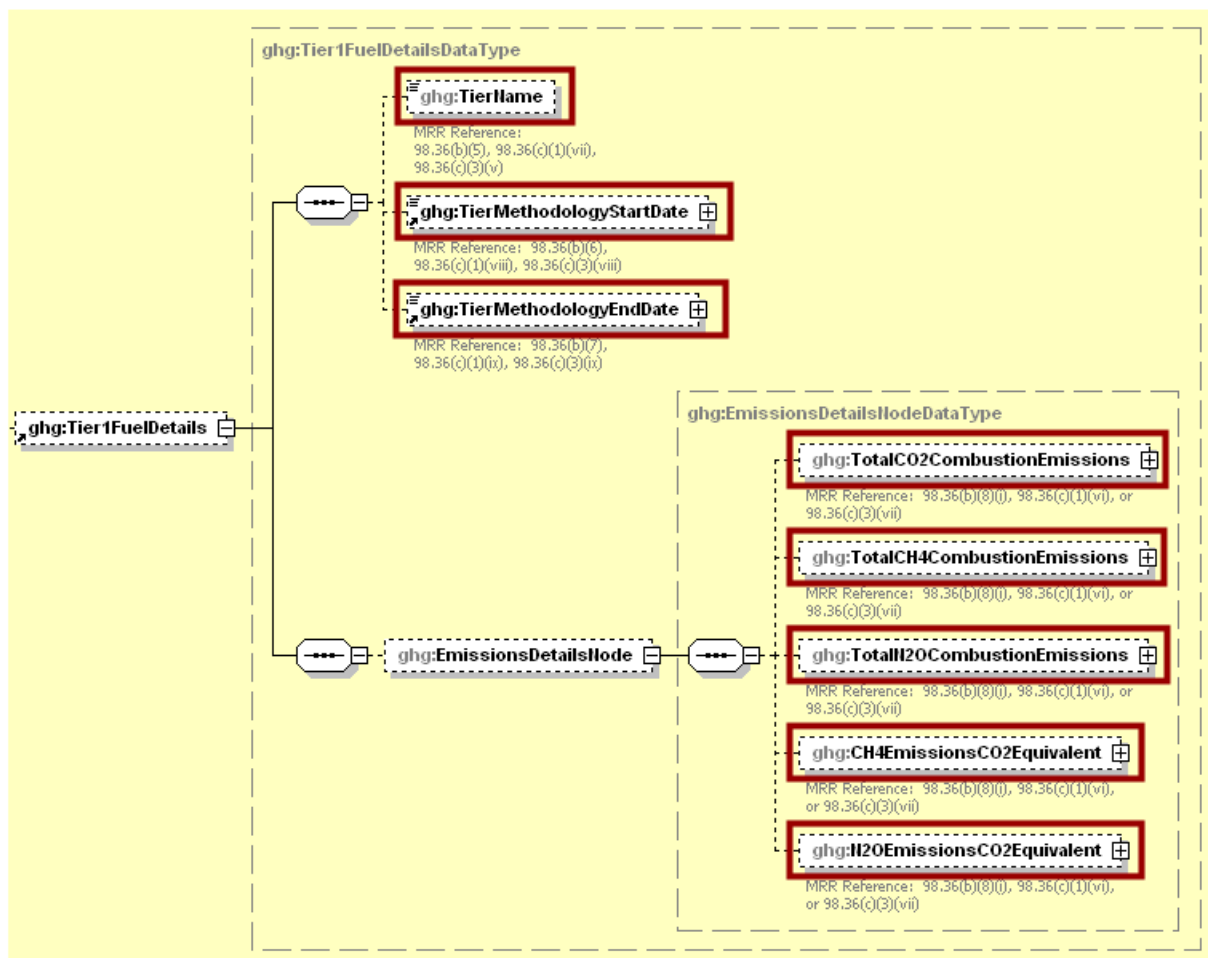


Table 4
Tier 1 Fuel Details XML Data Elements

Data Element Name	Description
Tier1FuelDetails	A collection of data elements to report if using a Tier 1 calculation methodology for the specified fuel type.
TierName	The Tier 1 calculation methodology used. See list of allowable values: Tier 1 (Equation C-1) Tier 1 (Equation C-1a, natural gas billing in therms) Tier 1 (Equation C-1b, natural gas billing in mmBtu)
TierMethodologyStartDate	The methodology start date for the specified fuel type.
TierMethodologyEndDate	The methodology end date for the specified fuel type.
EmissionsDetailsNode	A collection of data elements containing combustion emissions information for the specified fuel type.

Data Element Name	Description
TotalCO2CombustionEmissions	A collection of data elements containing information on the annual CO ₂ emissions from combustion of the specified fuel calculated using Equation C-1, C-1a or C-1b. Report the calculated value and mass unit of measure only.
TotalCO2CombustionEmissions.massUOM	Metric Tons
TotalCH4CombustionEmissions	A collection of data elements containing information on the annual CH ₄ emissions from combustion of the specified fuel calculated using Equation C-8, C-8a or C-8b. Report the calculated value and mass unit of measure only.
TotalCH4CombustionEmissions.massUOM	Metric Tons
TotalN2OCombustionEmissions	A collection of data elements containing information on the annual N ₂ O emissions from combustion of the specified fuel calculated using Equation C-8, C-8a or C-8b. Report the calculated value and mass unit of measure only.
TotalN2OCombustionEmissions.massUOM	Metric Tons
CH4EmissionsCO2Equivalent	A collection of data elements containing information on the CO ₂ equivalent value for the annual CH ₄ emissions. Multiply the calculated value for CH ₄ emissions by the Global Warming Potential of 21 to arrive at the CO ₂ e of the CH ₄ emissions. Report the calculated value and mass unit of measure only.
CH4EmissionsCO2Equivalent.massUOM	Metric Tons
N2OEmissionsCO2Equivalent	A collection of data elements containing information on the CO ₂ equivalent value for the annual N ₂ O emissions. Multiply the calculated value for N ₂ O emissions by the Global Warming Potential of 310 to arrive at the CO ₂ e of the N ₂ O emissions. Report the calculated value and mass unit of measure only.
N2OEmissionsCO2Equivalent.massUOM	Metric Tons

Figure 13
Sample XML Excerpt for Tier 1 Fuel Details

```

<ghg:Tier1FuelDetails>
  <ghg:TierName>Tier 1 (Equation C-1)</ghg:TierName>
  <ghg:TierMethodologyStartDate>2010-01-01-
00:05</ghg:TierMethodologyStartDate>
  <ghg:TierMethodologyEndDate>2010-12-31-
00:05</ghg:TierMethodologyEndDate>
  <ghg:EmissionsDetailsNode>
    <ghg:TotalCO2CombustionEmissions massUOM="Metric
Tons">
      <ghg:CalculatedValue>11111</ghg:Calculated
Value>
    </ghg:TotalCO2CombustionEmissions>
    <ghg:TotalCH4CombustionEmissions massUOM="Metric
Tons">
      <ghg:CalculatedValue>11</ghg:CalculatedVal
ue>
    </ghg:TotalCH4CombustionEmissions>
    <ghg:TotalN2OCombustionEmissions massUOM="Metric
Tons">
      <ghg:CalculatedValue>11</ghg:CalculatedValu
e>
    </ghg:TotalN2OCombustionEmissions>
    <ghg:CH4EmissionsCO2Equivalent massUOM="Metric
Tons">
      <ghg:CalculatedValue>2331</ghg:CalculatedV
alue>
    </ghg:CH4EmissionsCO2Equivalent>
    <ghg:N2OEmissionsCO2Equivalent massUOM="Metric
Tons">
      <ghg:CalculatedValue>3410</ghg:CalculatedV
alue>
    </ghg:N2OEmissionsCO2Equivalent>
  </ghg:EmissionsDetailsNode>
</ghg:Tier1FuelDetails>

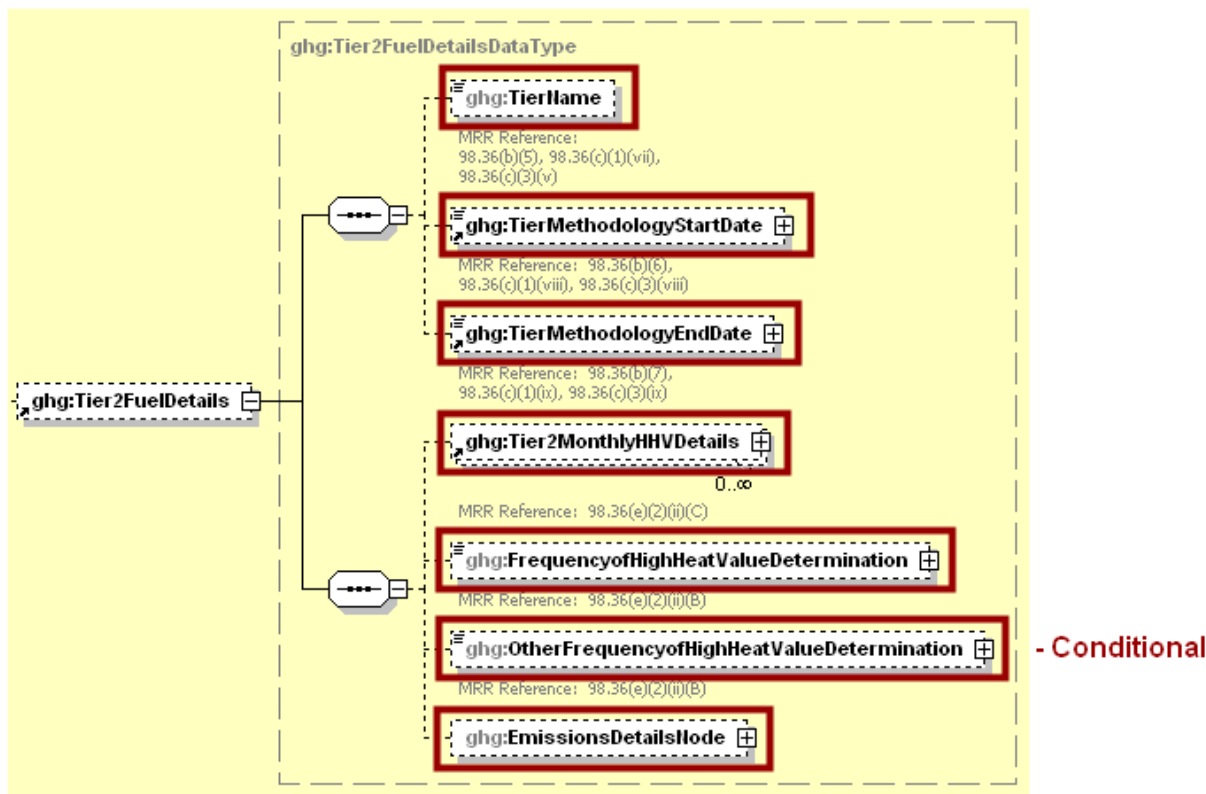
```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

2.2.2 Tier 2 Fuel Details

This section includes emissions details to report if the Tier 2 calculation methodology was used.

Figure 14
Tier 2 Fuel Details Schema Diagram



For each unit and each fuel type for which a Tier 2 calculation methodology was used, the following information is required:

- Calculation methodology used for the emissions calculation period specified [98.36(b)(5), 98.36(c)(1)(vii), 98.36(c)(3)(v)]:
 - Tier 2/Equation C-2a
 - Tier 2/Equation C-2c – Steam generation
- Calculation methodology start date [98.36(b)(6), 98.36(c)(1)(viii), 98.36(c)(3)(viii)].
- Calculation methodology end date [98.36(b)(7), 98.36(c)(1)(ix), 98.36(c)(3)(ix)].
- Identification of each month for which high heat values (HHVs) were calculated using one or more substitute data values [98.36(e)(2)(i)(C)].
- The frequency of the HHV determinations [98.36(e)(2)(i)(B)]:
 - Hourly
 - Daily
 - Weekly
 - Monthly
 - Semiannually
 - Quarterly
 - Once per fuel lot
 - Upon addition of oil to the storage tank
 - Other (specify)

Figure 15
Tier 2 Dates and HHV Details Schema Diagram

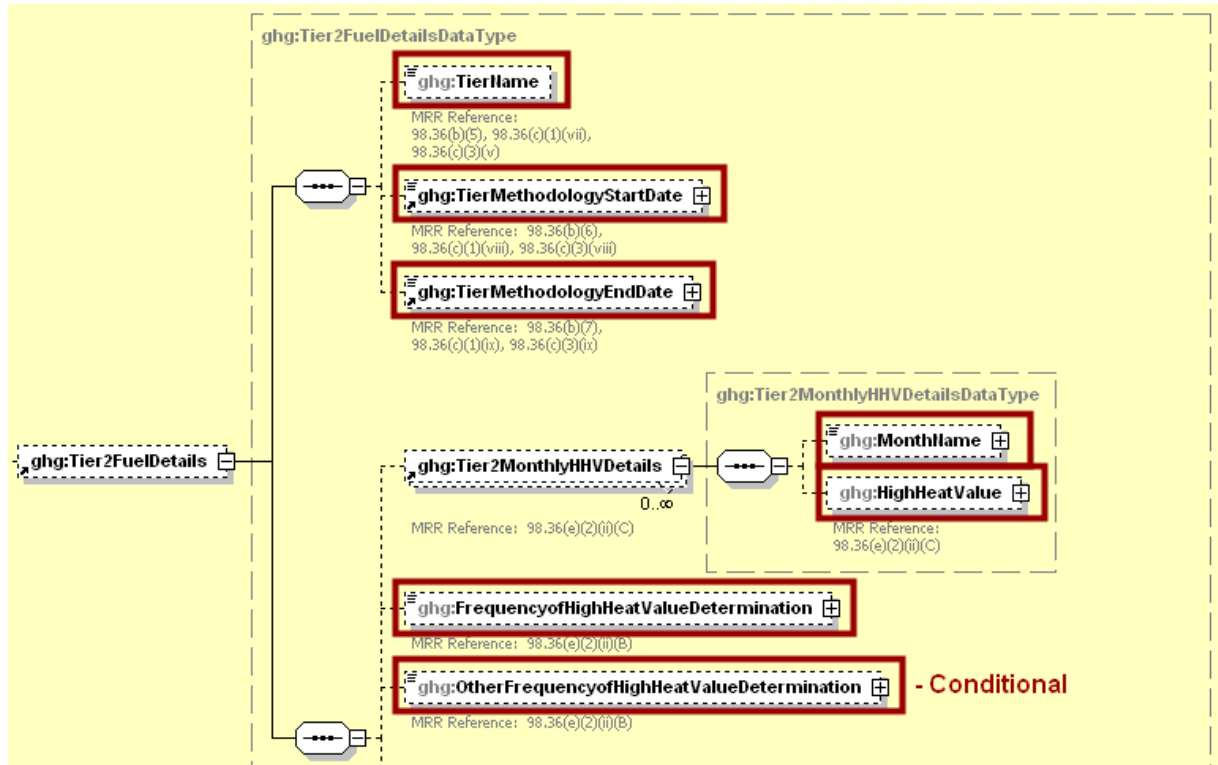


Table 5
Tier 2 Dates and HHV Details XML Data Elements

Data Element Name	Description
Tier2FuelDetails	A collection of data elements to report if using a Tier 2 calculation methodology for the specified fuel type.
TierName	The Tier 2 calculation methodology used. See list of allowable values: Tier 2 (Equation C-2a) Tier 2 (Equation C-2c, steam generation)
TierMethodologyStartDate	The methodology start date for the specified fuel type.
TierMethodologyEndDate	The methodology end date for the specified fuel type.
Tier2MonthlyHHVDetails	A collection of data elements containing information on monthly HHVs.

Data Element Name	Description
MonthName	<p>Month name. See list of allowable values:</p> <p>January February March April May June July August September October November December</p>
HighHeatValue	<p>A collection of data elements containing information on the HHV for the month specified. Indicate (Y/N) if the monthly HHV value for the month specified was calculated using one or more substitute data values only.</p>
FrequencyofHighHeatValueDetermination	<p>The frequency of the HHV determinations. See list of allowable values. If the frequency you are reporting does not appear in the list, then report "Other (specify)" and then specify the frequency in the OtherFrequencyofHighHeatValueDetermination data element.</p> <p>Hourly Daily Weekly Monthly Semiannually Quarterly Once per fuel lot Upon addition of oil to the storage tank Other (specify)</p>
OtherFrequencyofHighHeatValueDetermination	<p>The frequency of the HHV determinations if "Other (specify)" is reported.</p>

Figure 16
Sample XML Excerpt for Tier 2 Dates and HHV Details

```

<ghg:Tier2FuelDetails>
  <ghg:TierName>Tier 2 (Equation C-2a)</ghg:TierName>
  <ghg:TierMethodologyStartDate>2010-01-01-
00:05</ghg:TierMethodologyStartDate>
  <ghg:TierMethodologyEndDate>2010-12-31-
00:05</ghg:TierMethodologyEndDate>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>January</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>Y</ghg:IsSubstit
utedIndicator>
    </ghg:HighHeatValue>
  </ghg:Tier2MonthlyHHVDetails>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>February</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>N</ghg:IsSubstit
utedIndicator>
    </ghg:HighHeatValue>
  </ghg:Tier2MonthlyHHVDetails>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>March</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>N</ghg:IsSubstit
utedIndicator>
    </ghg:HighHeatValue>
  </ghg:Tier2MonthlyHHVDetails>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>April</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>N</ghg:IsSubstit
utedIndicator>
    </ghg:HighHeatValue>
  </ghg:Tier2MonthlyHHVDetails>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>May</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>N</ghg:IsSubstit
utedIndicator>
    </ghg:HighHeatValue>
  </ghg:Tier2MonthlyHHVDetails>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>June</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>N</ghg:IsSubstit
utedIndicator>
    </ghg:HighHeatValue>
  </ghg:Tier2MonthlyHHVDetails>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>July</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>N</ghg:IsSubstit
utedIndicator>
    </ghg:HighHeatValue>
  </ghg:Tier2MonthlyHHVDetails>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>August</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>N</ghg:IsSubstit
utedIndicator>
    </ghg:HighHeatValue>
  </ghg:Tier2MonthlyHHVDetails>
  <ghg:FrequencyofHighHeatValueDetermination>Upon addition of oil
to the storage
tank</ghg:FrequencyofHighHeatValueDetermination>

```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

For each unit and each fuel type for which a Tier 2 calculation methodology was used, the following information is required:

- The total annual CO₂ mass emissions derived from Equation C-2a or C-2c, in metric tons CO₂ [98.36(b)(8)(i), 98.36(c)(1)(vi), 98.36(c)(3)(vii)].
- The total annual CH₄ mass emissions derived from Equation C-9a or C-9b, in metric tons CH₄ and in metric tons CO₂e (for Table C-2 fuels only or Table AA-2 fuels, if deriving CH₄ emissions for a pulp lime kiln) [98.36(b)(8)(i), 98.36(c)(1)(vi), 98.36(c)(3)(vii), 98.273(c)].
- The total annual N₂O mass emissions derived from Equation C-9a or C-9b, in metric tons N₂O and in metric tons CO₂e (for Table C-2 fuels only or Table AA-2 fuels, if deriving N₂O emissions for a pulp lime kiln) [98.36(b)(8)(i), 98.36(c)(1)(vi), 98.36(c)(3)(vii), 98.273(c)].

Figure 17
Tier 2 Emissions Details Schema Diagram

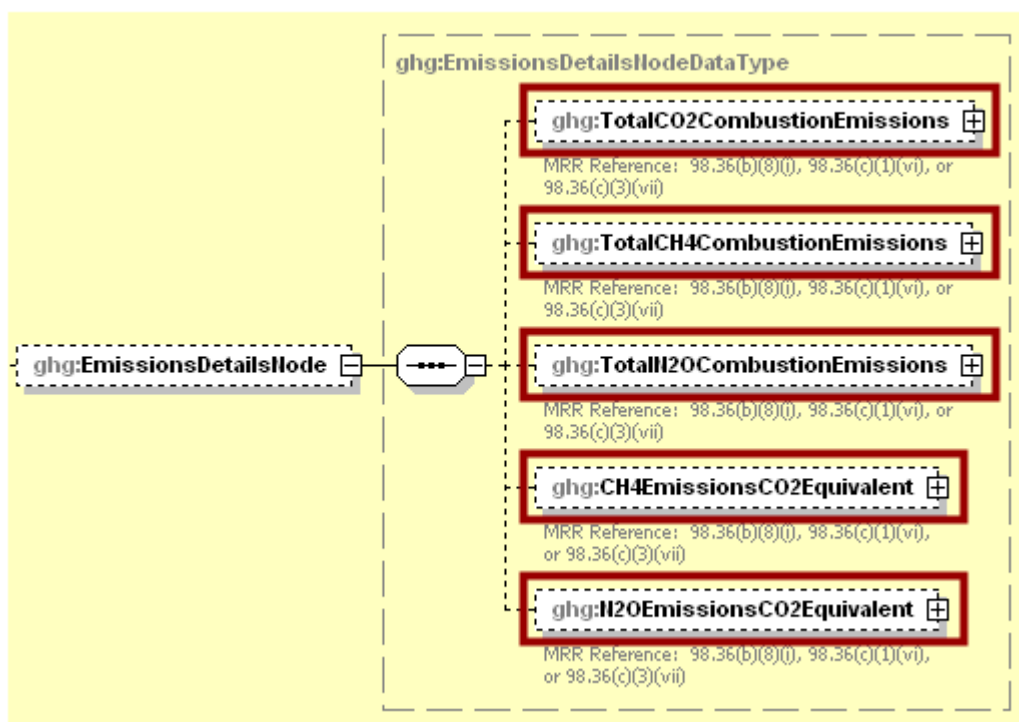


Table 6
Tier 2 Fuel Details XML Data Elements

Data Element Name	Description
EmissionsDetailsNode	A collection of data elements containing combustion emissions information for the specified fuel type.
TotalCO2CombustionEmissions	A collection of data elements containing information on the annual CO ₂ emissions from combustion of the specified fuel calculated using Equation C-2a or C-2c. Report the calculated value and mass unit of measure only.

Data Element Name	Description
TotalCO2CombustionEmissions.massUOM	Metric Tons
TotalCH4CombustionEmissions	A collection of data elements containing information on the annual CH ₄ emissions from combustion of the specified fuel calculated using Equation C-9a or C-9b. Report the calculated value and mass unit of measure only.
TotalCH4CombustionEmissions.massUOM	Metric Tons
TotalN2OCombustionEmissions	A collection of data elements containing information on the annual N ₂ O emissions from combustion of the specified fuel calculated using Equation C-9a or C-9b. Report the calculated value and mass unit of measure only.
TotalN2OCombustionEmissions.massUOM	Metric Tons
CH4EmissionsCO2Equivalent	A collection of data elements containing information on the CO ₂ equivalent value for the annual CH ₄ emissions. Multiply the calculated value for CH ₄ emissions by the Global Warming Potential of 21 to arrive at the CO ₂ e of the CH ₄ emissions. Report the calculated value and mass unit of measure only.
CH4EmissionsCO2Equivalent.massUOM	Metric Tons
N2OEmissionsCO2Equivalent	A collection of data elements containing information on the CO ₂ equivalent value for the annual N ₂ O emissions. Multiply the calculated value for N ₂ O emissions by the Global Warming Potential of 310 to arrive at the CO ₂ e of the N ₂ O emissions. Report the calculated value and mass unit of measure only.
N2OEmissionsCO2Equivalent.massUOM	Metric Tons

Figure 18
Sample XML Excerpt for Tier 2 Fuel Details

```

    <ghg:EmissionsDetailsNode>
      <ghg:TotalCO2CombustionEmissions massUOM="Metric
        Tons">
        <ghg:CalculatedValue>444</ghg:CalculatedValue>
      </ghg:TotalCO2CombustionEmissions>
      <ghg:TotalCH4CombustionEmissions massUOM="Metric
        Tons">
        <ghg:CalculatedValue>44</ghg:CalculatedValue>
      </ghg:TotalCH4CombustionEmissions>
      <ghg:TotalN2OCombustionEmissions massUOM="Metric
        Tons">
        <ghg:CalculatedValue>4</ghg:CalculatedValue>
      </ghg:TotalN2OCombustionEmissions>
      <ghg:CH4EmissionsCO2Equivalent massUOM="Metric
        Tons">
        <ghg:CalculatedValue>44</ghg:CalculatedValue>
      </ghg:CH4EmissionsCO2Equivalent>
      <ghg:N2OEmissionsCO2Equivalent massUOM="Metric
        Tons">
        <ghg:CalculatedValue>4</ghg:CalculatedValue>
      </ghg:N2OEmissionsCO2Equivalent>
    </ghg:EmissionsDetailsNode>
  </ghg:Tier2FuelDetails>
</ghg:FossilTierFuelDetails>
</ghg:FossilFuelDetails>
</ghg:AAUnit>

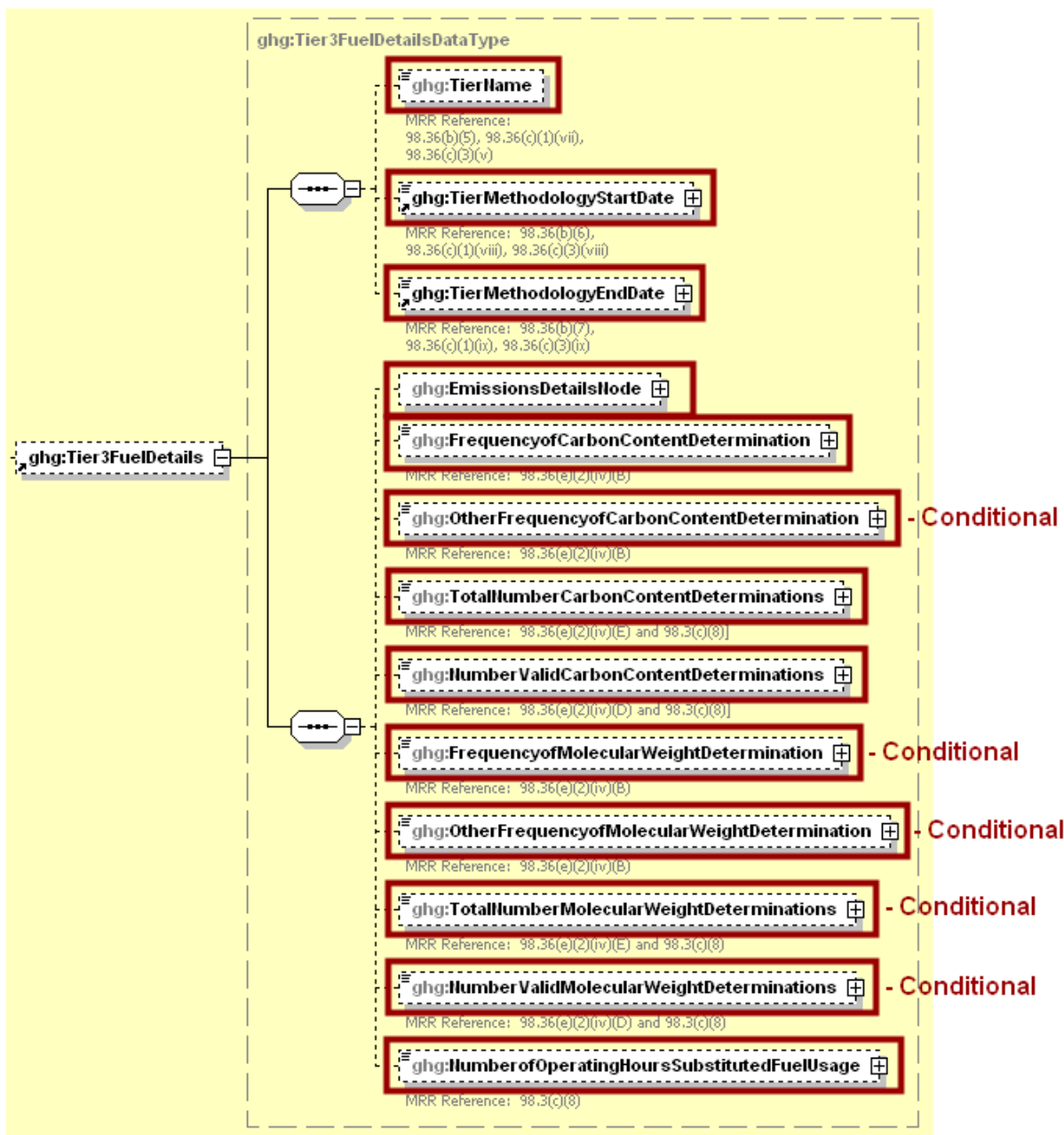
```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

2.2.3 Tier 3 Fuel Details

This section includes emissions details to report if the Tier 3 calculation methodology was used.

Figure 19
Tier 3 Fuel Details Schema Diagram



For each unit and each fuel type for which a Tier 3 calculation methodology was used, the following information is required:

- Calculation methodology used for the emissions calculation period specified [98.36(b)(5), 98.36(c)(1)(vii), 98.36(c)(3)(v)]:
 - Tier 3 (Equation C-3, solid fuel)
 - Tier 3 (Equation C-4, liquid fuel)
 - Tier 3 (Equation C-5, gaseous fuel)

- Calculation methodology start date [98.36(b)(6), 98.36(c)(1)(viii), 98.36(c)(3)(viii)].
- Calculation methodology end date [98.36(b)(7), 98.36(c)(1)(ix), 98.36(c)(3)(ix)].
- The total annual CO₂ mass emissions derived from Equation C-3 for solid fuels, Equation C-4 for liquid fuels, or Equation C-5 for gaseous fuels, in metric tons CO₂ [98.36(b)(8)(i), 98.36(c)(1)(vi), 98.36(c)(3)(vii)].
- The total annual CH₄ mass emissions derived from Equation C-8, in metric tons CH₄ and in metric tons CO₂e (for Table C-2 fuels only) [98.36(b)(8)(i), 98.36(c)(1)(vi), 98.36(c)(3)(vii)].
- The total annual N₂O mass emissions derived from Equation C-8, in metric tons N₂O and in metric tons CO₂e (for Table C-2 fuels only) [98.36(b)(8)(i), 98.36(c)(1)(vi), 98.36(c)(3)(vii)].

Figure 20
Tier 3 Methodology Dates and Emission Details Schema Diagram

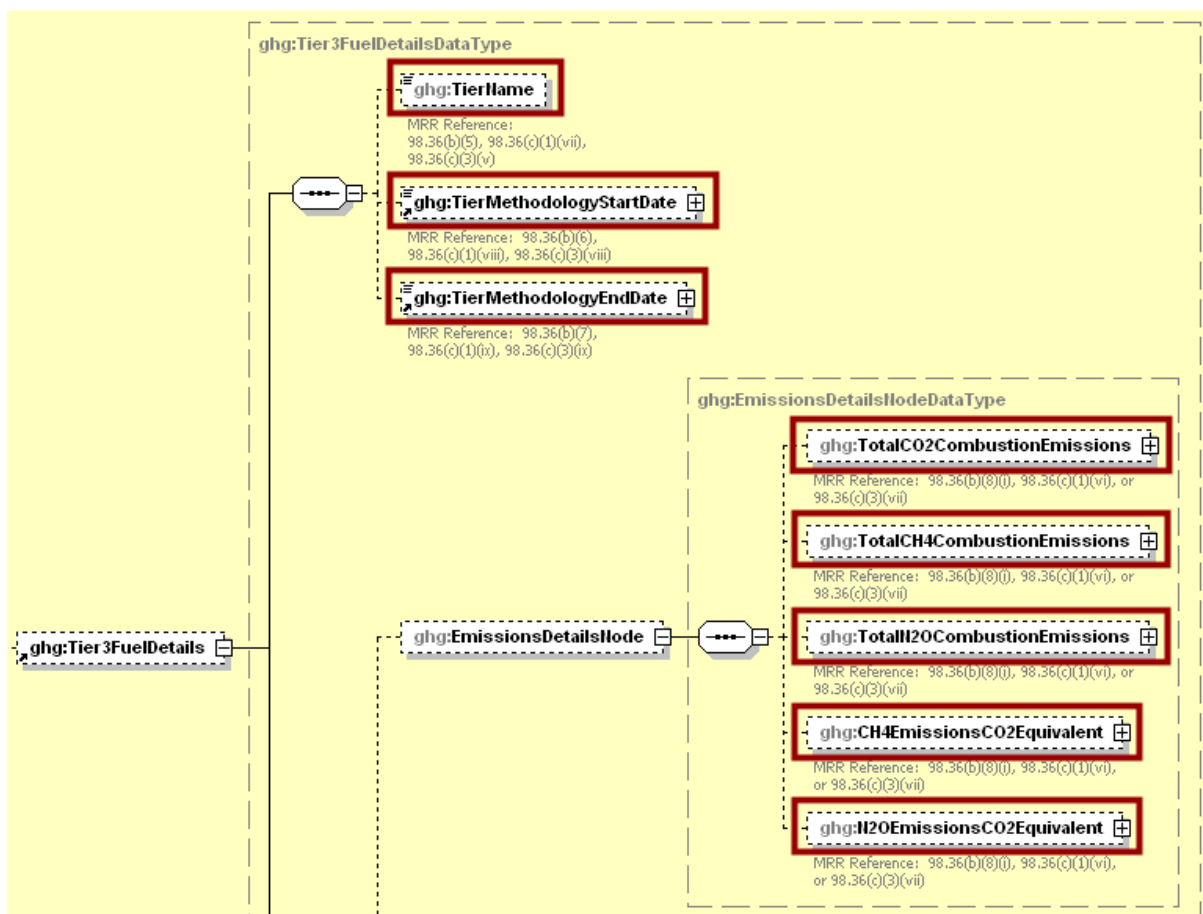


Table 7
Tier 3 Methodology Dates and Emission Details XML Data Elements

Data Element Name	Description
Tier3FuelDetails	A collection of data elements to report if using a Tier 3 calculation methodology for the specified fuel type.
TierName	The Tier 3 calculation methodology used. See list of allowable values: Tier 3 (Equation C-3, solid fuel) Tier 3 (Equation C-4, liquid fuel) Tier 3 (Equation C-5, gaseous fuel)
TierMethodologyStartDate	The methodology start date for the specified fuel type.
TierMethodologyEndDate	The methodology end date for the specified fuel type.
EmissionsDetailsNode	A collection of data elements containing combustion emissions information for the specified fuel type.
TotalCO2CombustionEmissions	A collection of data elements containing information on the annual CO ₂ emissions from combustion of the specified fuel calculated using Equation C-3, C-4 or C-5. Report the calculated value and mass unit of measure only.
TotalCO2CombustionEmissions.massUOM	Metric Tons
TotalCH4CombustionEmissions	A collection of data elements containing information on the annual CH ₄ emissions from combustion of the specified fuel calculated using Equation C-8. Report the calculated value and mass unit of measure only.
TotalCH4CombustionEmissions.massUOM	Metric Tons
TotalN2OCombustionEmissions	A collection of data elements containing information on the annual N ₂ O emissions from combustion of the specified fuel calculated using Equation C-8. Report the calculated value and mass unit of measure only.
TotalN2OCombustionEmissions.massUOM	Metric Tons
CH4EmissionsCO2Equivalent	A collection of data elements containing information on the CO ₂ equivalent value for the annual CH ₄ emissions. Multiply the calculated value for CH ₄ emissions by the Global Warming Potential of 21 to arrive at the CO ₂ e of the CH ₄ emissions. Report the calculated value and mass unit of measure only.
CH4EmissionsCO2Equivalent.massUOM	Metric Tons

Data Element Name	Description
N2OEmissionsCO2Equivalent	A collection of data elements containing information on the CO ₂ equivalent value for the annual N ₂ O emissions. Multiply the calculated value for N ₂ O emissions by the Global Warming Potential of 310 to arrive at the CO ₂ e of the N ₂ O emissions. Report the calculated value and mass unit of measure only.
N2OEmissionsCO2Equivalent.massUOM	Metric Tons

Figure 21
Sample XML Excerpt for Tier 3 Methodology Dates and Emission Details

```

<ghg:Tier3FuelDetails>
  <ghg:TierName>Tier 3 (Equation C-3, solid fuel)</ghg:TierName>
  <ghg:TierMethodologyStartDate>2010-01-01-
00:05</ghg:TierMethodologyStartDate>
  <ghg:TierMethodologyEndDate>2010-12-31-
00:05</ghg:TierMethodologyEndDate>
  <ghg:EmissionsDetailsNode>
    <ghg:TotalCO2CombustionEmissions massUOM="Metric
Tons">
      <ghg:CalculatedValue>888</ghg:CalculatedVal
ue>
    </ghg:TotalCO2CombustionEmissions>
    <ghg:TotalCH4CombustionEmissions massUOM="Metric
Tons">
      <ghg:CalculatedValue>99</ghg:CalculatedValu
e>
    </ghg:TotalCH4CombustionEmissions>
    <ghg:TotalN2OCombustionEmissions massUOM="Metric
Tons">
      <ghg:CalculatedValue>10</ghg:CalculatedValu
e>
    </ghg:TotalN2OCombustionEmissions>
    <ghg:CH4EmissionsCO2Equivalent massUOM="Metric
Tons">
      <ghg:CalculatedValue>2079</ghg:CalculatedV
alue>
    </ghg:CH4EmissionsCO2Equivalent>
    <ghg:N2OEmissionsCO2Equivalent massUOM="Metric
Tons">
      <ghg:CalculatedValue>3100</ghg:CalculatedV
alue>
    </ghg:N2OEmissionsCO2Equivalent>
  </ghg:EmissionsDetailsNode>

```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

For each unit and each fuel type for which a Tier 3 calculation methodology was used, the following information is required:

- The frequency of carbon content determinations [98.36(e)(2)(iv)(B)]:
 - Hourly
 - Daily
 - Weekly
 - Monthly
 - Semiannually
 - Quarterly
 - Once per fuel lot
 - Upon addition of oil to the storage tank
 - Other (specify)

- The total number of carbon content substitute data values [98.36(e)(2)(iv)(E)].
- The total number of valid carbon content determinations [98.36(e)(2)(iv)(D)].
- The total number of operating hours in the reporting year for which missing data substitution was used for fuel usage [98.3(c)(8)].

For each gaseous fuel only, report the following additional information:

- Frequency of molecular weight determinations [98.36(e)(2)(iv)(B)]:
 - Hourly
 - Daily
 - Weekly
 - Monthly
 - Semiannually
 - Quarterly
 - Other (specify)
- Total number of molecular weight substitute data values [98.36(e)(2)(iv)(E)].
- Total number of valid molecular weight determinations [98.36(e)(2)(iv)(D)].

Figure 22
Tier 3 Carbon Content and Molecular Weight Details Schema Diagram



Table 8
Tier 3 Carbon Content and Molecular Weight Details XML Data Elements

Data Element Name	Description
FrequencyofCarbonContentDetermination	<p>The frequency of carbon content determinations for the specified fuel for the reporting year. If the frequency you are reporting does not appear in the list, then report "Other (specify)" and then specify the frequency in the "OtherFrequencyofCarbonContentDetermination" data element. See list of allowable values.</p> <p>Hourly Daily Weekly Monthly Semiannually Quarterly Once per fuel lot Upon addition of oil to the storage tank Other (specify)</p>
OtherFrequencyofCarbonContentDetermination	The frequency of the carbon content determinations if "Other (specify)" is reported.
TotalNumberCarbonContentDeterminations	Total number of carbon content substitute data values used during the reporting year for the specified fuel type.
NumberValidCarbonContentDeterminations	The total number of valid carbon content determinations made during the reporting year for the specified fuel type.
FrequencyofMolecularWeightDetermination	<p>For gaseous fuels only, the frequency of molecular weight determinations for the specified fuel during the reporting year. If the frequency you are reporting does not appear in the list, then report "Other (specify)" and then specify the frequency in the "OtherFrequencyofMolecularWeightDetermination" data element. See list of allowable values.</p> <p>Hourly Daily Weekly Monthly Semiannually Quarterly Once per fuel lot Upon addition of oil to the storage tank Other (specify)</p>
OtherFrequencyofMolecularWeightDetermination	For gaseous fuels only, the frequency of the molecular weight determinations if "Other (specify)" is reported.
TotalNumberMolecularWeightDeterminations	For gaseous fuels only, the total number of molecular weight substitute data values used during the reporting year for the specified fuel type.

Data Element Name	Description
NumberValidMolecularWeightDeterminations	For gaseous fuels only, the total number of valid molecular weight determinations made during the reporting year for the specified fuel type.
NumberofOperatingHoursSubstitutedFuelUsage	The total number of operating hours in the year for which missing data substitution was used for fuel usage.
NumberofOperatingHoursSubstitutedFuelUsage.time UOM	Hours

Figure 23
Sample XML Excerpt for Tier 3 Carbon Content and Molecular Weight

```

    <ghg:FrequencyofCarbonContentDetermination>Monthly</ghg:FrequencyofCarbonContentDetermination>
    <ghg:TotalNumberCarbonContentDeterminations>12</ghg:TotalNumberCarbonContentDeterminations>
    <ghg:NumberValidCarbonContentDeterminations>11</ghg:NumberValidCarbonContentDeterminations>
    <ghg:FrequencyofMolecularWeightDetermination>Monthly</ghg:FrequencyofMolecularWeightDetermination>
    <ghg:TotalNumberMolecularWeightDeterminations>12</ghg:TotalNumberMolecularWeightDeterminations>
    <ghg:NumberValidMolecularWeightDeterminations>10</ghg:NumberValidMolecularWeightDeterminations>
    <ghg:NumberofOperatingHoursSubstitutedFuelUsage timeUOM="Hours">13</ghg:NumberofOperatingHoursSubstitutedFuelUsage>
    </ghg:Tier3FuelDetails>
  </ghg:FossilTierFuelDetails>
</ghg:AAUnit>

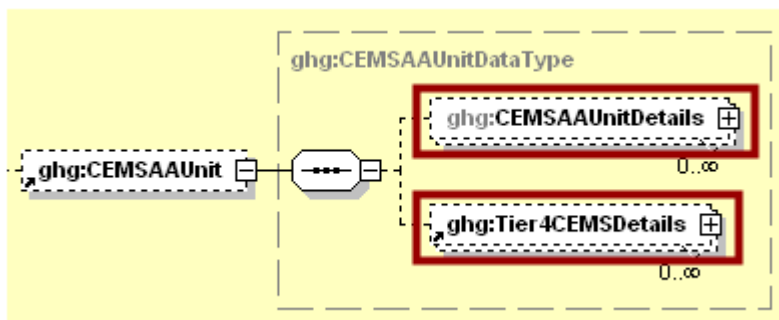
```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

3.0 CEMS Unit Details and Emissions

This section describes unit information that must be reported for units if a continuous emissions monitoring system (CEMS) was in use during the reporting year.

Figure 24
CEMS Unit Details Schema Diagram



3.1 CEMS Unit ID and Biogenic Details

This section includes information on biogenic CO₂ emissions and CH₄ and N₂O emissions from biomass for each unit monitored by a CEMS.

For each unit or furnace within your facility, Subpart AA requires you to report the following data:

- A unique name or identifier, plus optional description for the unit.
- The type of unit:
 - Kraft or soda mill chemical recovery furnace (“chemical recovery furnace”) (use Equation AA-1 for biomass).
 - Sulfito or semichemical mill chemical recovery combustion unit (“chemical recovery combustion unit”) (use Equations AA-1 (CH₄/N₂O) and AA-2 (CO₂) for biomass).
 - Pulp mill lime kiln.

For each Chemical Recovery Furnace and Chemical Recovery Combustion Unit within your facility, Subpart AA requires you to report the following data:

- An indication if the annual mass of spent liquor solids combusted in the unit during the year is a substitute data value calculated per the procedures described in §98.275(b) [98.3(c)(8)].
- The basis for determining the annual mass of spent liquor solids combusted in the unit during the year [98.276(c)]. Select from the following:
 - TAPPI method
 - On-line metering/measuring system

Emissions information required for Subpart AA depends upon the type of unit:

- If reporting for a Chemical Recovery Furnace, report biogenic CO₂ emissions and CH₄ and N₂O emissions from biomass using Equation AA-1.
- If reporting for a Chemical Recovery Combustion Unit, report biogenic CO₂ emissions using Equation AA-2 and CH₄ and N₂O emissions from biomass using Equation AA-1.
- If reporting for a Pulp Mill Lime Kiln, no biomass emissions are required to be reported.

Note: Do not include CH₄ or N₂O emissions from biomass reported for a Chemical Recovery Furnace or a Chemical Recovery Combustion Unit in the CEMS Monitoring Location (CML) emissions data.

Figure 25
CEMS Unit ID and Biogenic Details Schema Diagram

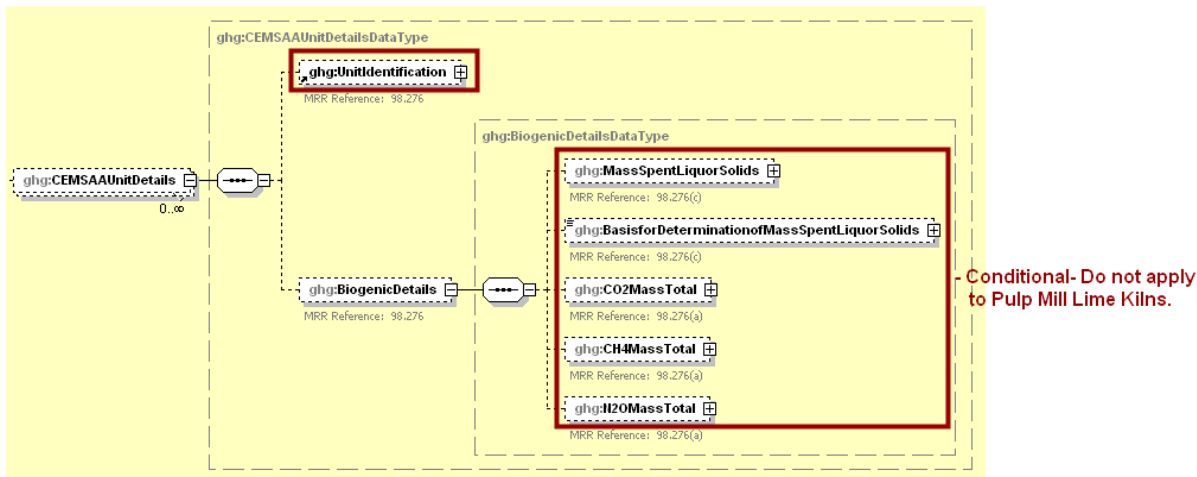


Table 9
CEMS Unit ID and Biogenic Details XML Data Elements

Data Element Name	Description
CEMSAAUnit	A collection of data elements containing information for each chemical recovery furnace, chemical recovery combustion unit or pulp mill lime kiln monitored by CEMS.
CEMSAAUnitDetails	A collection of data elements containing unit identification information and biogenic details.
UnitIdentification	A collection of data elements containing the identity of each chemical recovery furnace, chemical recovery combustion unit or pulp mill lime kiln monitored by CEMS. It includes the unit ID, an optional description and the type of unit. See list of allowable values for unit type: Chemical Recovery Furnace Chemical Recovery Combustion Unit Pulp Mill Lime Kiln
BiogenicDetails	A collection of data elements containing information on emissions from spent liquor solids combustion for the specified unit. This section does not apply to pulp mill lime kilns.
MassSpentLiquorSolids	A collection of data elements containing information on the mass of spent liquor solids. Indication (Y/N) if a substitute value was used for the annual mass of spent liquor solids only.

Data Element Name	Description
BasisforDeterminationofMassSpentLiquorSolids	The basis for determining the annual mass of spent liquor solids combusted in the unit during the year. See list of allowable values: TAPPI method on-line metering/measuring system
CO2MassTotal	A collection of data elements containing information on biogenic CO ₂ emissions from spent liquor solids combustion. Report the calculated value and mass unit of measure only.
CO2MassTotal.massUOM	Metric Tons
CH4MassTotal	A collection of data elements containing information on CH ₄ emissions from spent liquor solids combustion. Report the calculated value and mass unit of measure only. Note: Do not include CH ₄ emissions reported here in the CEMS Monitoring Location (CML) emissions data.
CH4MassTotal.massUOM	Metric Tons
N2OMassTotal	A collection of data elements containing information on N ₂ O emissions from spent liquor solids combustion. Report the calculated value and mass unit of measure only. Note: Do not include N ₂ O emissions reported here in the CEMS Monitoring Location (CML) emissions data.
N2OMassTotal.massUOM	Metric Tons

Figure 26
Sample XML Excerpt for CEMS Unit ID and Biogenic Details

```

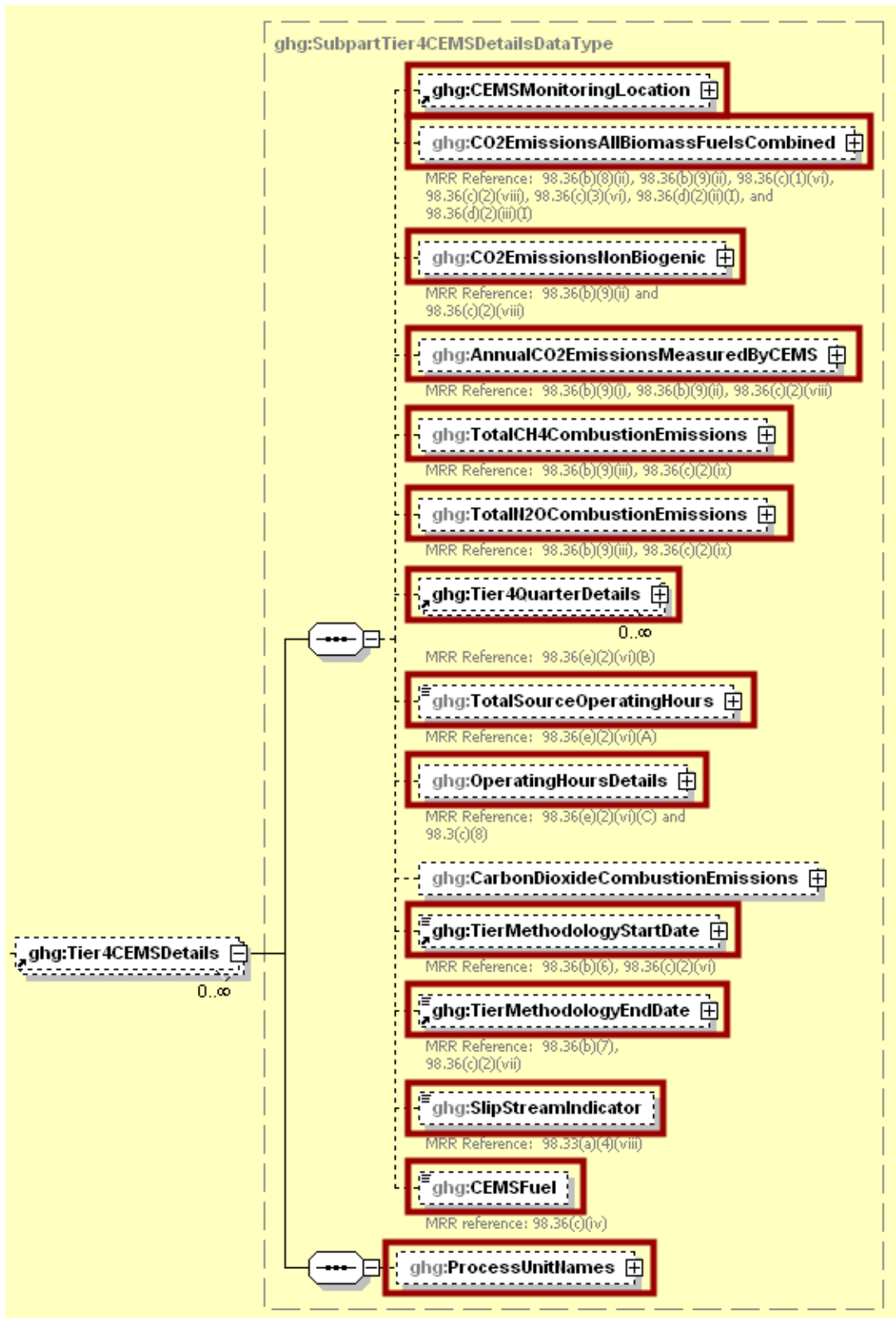
    <ghg:CEMSAAUnit>
      <ghg:CEMSAAUnitDetails>
        <ghg:UnitIdentification>
          <ghg:UnitName>005- CEMS</ghg:UnitName>
          <ghg:UnitDescription>Chemical Recovery Furnace CEMS unit
          005</ghg:UnitDescription>
          <ghg:UnitType>Chemical Recovery Furnace</ghg:UnitType>
        </ghg:UnitIdentification>
        <ghg:BiogenicDetails>
          <ghg:MassSpentLiquorSolids>
            <ghg:IsSubstitutedIndicator>Y</ghg:IsSubstitutedIndicator>
          </ghg:MassSpentLiquorSolids>
          <ghg:BasisforDeterminationofMassSpentLiquorSolids>on-line metering/measuring
          system</ghg:BasisforDeterminationofMassSpentLiquorSolids>
          <ghg:CO2MassTotal massUOM="Metric Tons">
            <ghg:CalculatedValue>7777</ghg:CalculatedValue>
          </ghg:CO2MassTotal>
          <ghg:CH4MassTotal massUOM="Metric Tons">
            <ghg:CalculatedValue>777</ghg:CalculatedValue>
          </ghg:CH4MassTotal>
          <ghg:N2OMassTotal massUOM="Metric Tons">
            <ghg:CalculatedValue>77</ghg:CalculatedValue>
          </ghg:N2OMassTotal>
        </ghg:BiogenicDetails>
      </ghg:CEMSAAUnitDetails>
    </ghg:CEMSAAUnit>
  
```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

3.2 Tier 4 CEMS Details

This section includes information to be reported for each CEMS monitoring location (CML).

Figure 27
Tier 4 CEMS Details Schema Diagram



For Subpart AA, information on each CEMS monitoring location (CML) is required including the name, an optional description and the configuration type. For each CML identified by the facility, the facility must specify the configuration type from the following list [98.176(e)]:

- Single industrial process or process unit that exhausts to a dedicated stack.
- Multiple industrial processes or process units share a common stack.
- Industrial process or process unit shares a common stack with a Tier 4 stationary fuel combustion unit.

For each CEMS monitoring location identified, the following emissions data must be reported:

- The total annual biogenic CO₂ mass emissions from combustion of all biomass fuels combined [98.36(b)(8)(ii)].
- The total annual non-biogenic CO₂ mass emissions (i.e., CO₂ mass emissions from fossil fuels, sorbent use, and process emissions) [98.36(b)(9)(ii)].
- The total annual CO₂ mass emissions measured by the CEMS [98.36(b)(9)(i)-(ii)].
- The total annual CH₄ mass emissions derived from Equation C-10, in metric tons CH₄ [98.36(b)(9)(iii), 98.36(c)(2)(ix)].
- The total annual N₂O mass emissions derived from Equation C-10, in metric tons N₂O [98.36(b)(9)(iii), 98.36(c)(2)(ix)].

Note: Do not use Equation C-10 for spent pulping liquor (the primary fuel for chemical recovery combustion units and recovery furnaces) or other biogenic fuel types.

Figure 28
Tier 4 CEMS Location and Emission Details Schema Diagram



Table 10
Tier 4 CEMS Location and Emission Details XML Data Elements

Data Element Name	Description
Tier4CEMSDetails	A collection of data elements containing information on emissions from combustion sources monitored with Tier 4 CEMS methodology.
CEMSMonitoringLocation	<p>A collection of data elements containing information on each CEMS monitoring location (CML). It includes the name, an optional description and the configuration type. See the list of allowable configuration types:</p> <p>Single process/process unit exhausts to dedicated stack Multiple processes/process units share common stack Process/stationary combustion units share common stack</p>
CO2EmissionsAllBiomassFuelsCombined	A collection of data elements containing information on the total annual biogenic CO ₂ mass emissions for the specified CML. Report the calculated value and mass unit of measure only.
CO2EmissionsAllBiomassFuelsCombined.massUOM	Metric Tons
CO2EmissionsNonBiogenic	A collection of data elements containing information on the total annual non-biogenic CO ₂ mass emissions (includes fossil fuel, sorbent, and process CO ₂ emissions) for the specified CML. Report the calculated value and mass unit of measure only.
CO2EmissionsNonBiogenic.massUOM	Metric Tons
AnnualCO2EmissionsMeasuredByCEMS	A collection of data elements containing information on the total annual CO ₂ mass emissions measured by the CEMS at the specified monitoring location. Report the calculated value and mass unit of measure only.
AnnualCO2EmissionsMeasuredByCEMS.massUOM	Metric Tons
TotalCH4CombustionEmissions	A collection of data elements containing information on the annual CH ₄ mass emissions from combustion in the CML configuration during the reporting year calculated using Equation C-10 expressed in mass of CH ₄ . Report the calculated value and mass unit of measure only.
TotalCH4CombustionEmissions.massUOM	Metric Tons
TotalN2OCombustionEmissions	A collection of data elements containing information on the annual N ₂ O mass emissions from combustion in the CML configuration during the reporting year calculated using Equation C-10 expressed in mass of N ₂ O. Report the calculated value and mass unit of measure only.
TotalN2OCombustionEmissions.massUOM	Metric Tons

Figure 29
Sample XML Excerpt for Tier 4 CEMS Location and Emission Details

```

<ghg:Tier4CEMSDetails>
  <ghg:CEMSMonitoringLocation>
    <ghg:Name>006- CML</ghg:Name>
    <ghg:Description>CML 006</ghg:Description>
    <ghg:Type>Process/stationary combustion units share common
    stack</ghg:Type>
  </ghg:CEMSMonitoringLocation>
  <ghg:CO2EmissionsAllBiomassFuelsCombined massUOM="Metric Tons">
    <ghg:CalculatedValue>150</ghg:CalculatedValue>
  </ghg:CO2EmissionsAllBiomassFuelsCombined>
  <ghg:CO2EmissionsNonBiogenic massUOM="Metric Tons">
    <ghg:CalculatedValue>20</ghg:CalculatedValue>
  </ghg:CO2EmissionsNonBiogenic>
  <ghg:AnnualCO2EmissionsMeasuredByCEMS massUOM="Metric Tons">
    <ghg:CalculatedValue>1110</ghg:CalculatedValue>
  </ghg:AnnualCO2EmissionsMeasuredByCEMS>
  <ghg:TotalCH4CombustionEmissions massUOM="Metric Tons">
    <ghg:CalculatedValue>111</ghg:CalculatedValue>
  </ghg:TotalCH4CombustionEmissions>
  <ghg:TotalN2OCombustionEmissions massUOM="Metric Tons">
    <ghg:CalculatedValue>20</ghg:CalculatedValue>
  </ghg:TotalN2OCombustionEmissions>

```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

For each quarter of the reporting year, the facility must provide the cumulative CO₂ mass emissions for each CML [98.36(e)(2)(vi)(B)].

The facility must provide the following additional information for each CML:

- The total number of source operating hours in the reporting year [98.36(e)(2)(vi)(A)].
- The total operating hours in which a substitute data value was used in the emissions calculations for the CO₂ concentration parameter [98.36(e)(2)(vi)(C) and 98.3(c)(8)].
- The total operating hours in which a substitute data value was used in the emissions calculations for the stack gas flow rate parameter [98.36(e)(2)(vi)(C) and 98.3(c)(8)].
- If moisture correction is required and a continuous moisture monitor is used, the total operating hours in which a substitute data value was used in the emissions calculations for the stack gas moisture content parameter [98.36(e)(2)(vi)(C) and 98.3(c)(8)].
- The Tier 4 methodology start date [98.36(b)(6), 98.36(c)(2)(vi)].
- The Tier 4 methodology end date [98.36(b)(7), 98.36(c)(2)(vii)].
- Specify if emissions reported for the CEMS include emissions calculated according to 98.33(a)(4)(viii) for a slipstream that bypassed the CEMS [98.33(a)(4)(viii)]
- Each type of fuel combusted in the group of units during the reporting year [98.36(c)(1)(v)]
- The name of each process unit sharing the stack.

Figure 30
Tier 4 CEMS Quarter and Additional Details Schema Diagram

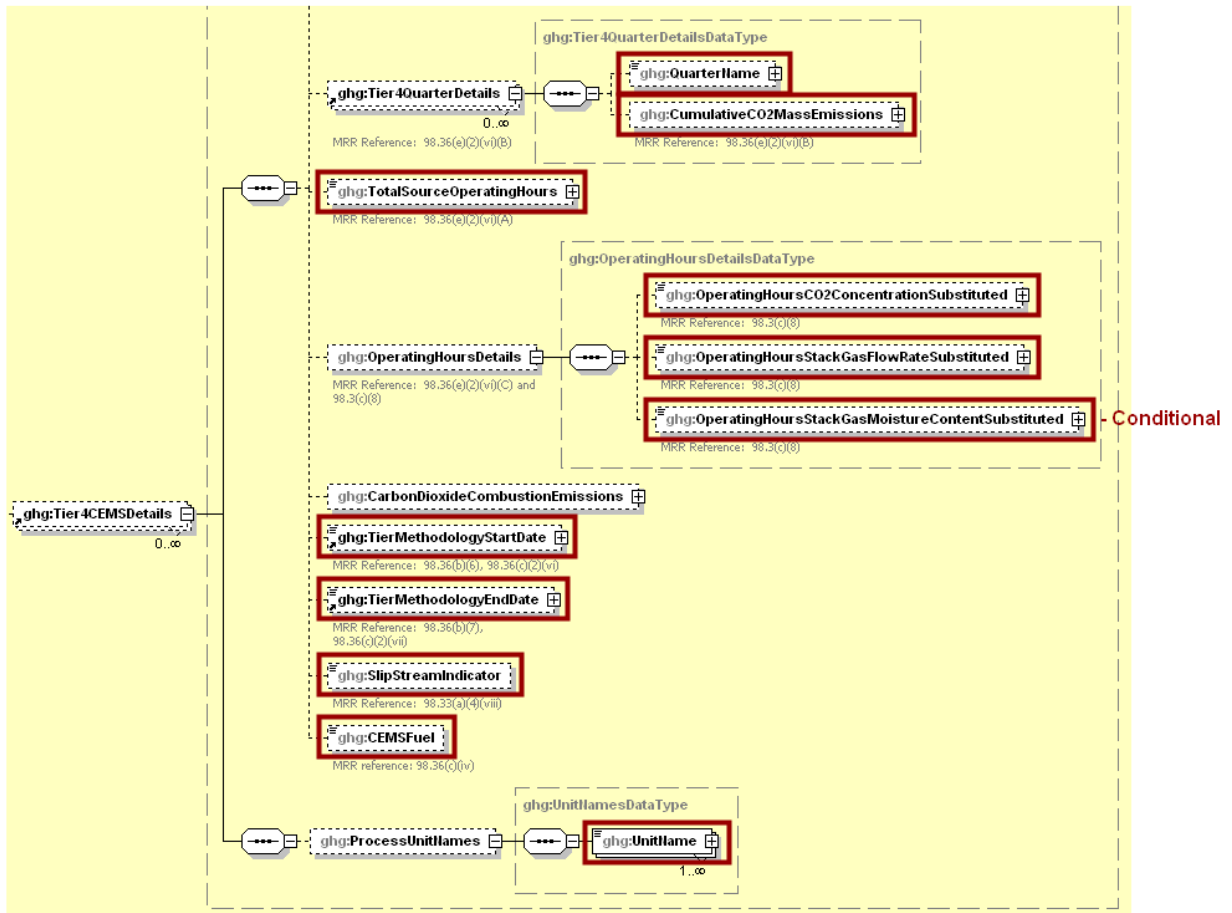


Table 11
Tier 4 CEMS Quarter and Additional Details XML Data Elements

Data Element Name	Description
Tier4QuarterDetails	A collection of data elements containing Tier 4 quarterly information.
QuarterName	The name of the quarter. See list of allowable values: First Quarter Second Quarter Third Quarter Fourth Quarter
CumulativeCO2MassEmissions	A collection of data elements containing information on the cumulative CO ₂ mass emissions for the specified quarter of the reporting year. Report the calculated value and mass unit of measure only.
CumulativeCO2MassEmissions.massUOM	Metric Tons
TotalSourceOperatingHours	The total number of source operating hours in the reporting year.
OperatingHoursDetails	A collection of data elements containing information on the number of operating hours in which substitute data values were used.
OperatingHoursCO2ConcentrationSubstituted	The total operating hours in which a substitute data value was used in the emissions calculations for the CO ₂ concentration parameter.
OperatingHoursStackGasFlowRateSubstituted	The total operating hours in which a substitute data value was used in the emissions calculations for the stack gas flow rate parameter.
OperatingHoursStackGasMoistureContentSubstituted	If moisture correction is required and a continuous moisture monitor is used, the total operating hours in which a substitute data value was used in the emissions calculations for the stack gas moisture content parameter.
TierMethodologyStartDate	The tier methodology start date for the specified CEMS monitoring location.
TierMethodologyEndDate	The tier methodology end date for the specified CEMS monitoring location.
SlipStreamIndicator	An indication (Y/N) that the emissions reported for the CEMS include emissions calculated according to 98.33(a)(4)(viii) for a slipstream that bypassed the CEMS.
CEMSFuel	Each type of fuel combusted in the group of units during the reporting year.
ProcessUnitNames	A collection of data elements identifying each unit or furnace which was monitored at the specified CEMS monitoring location.
UnitName	The unit ID for each unit or furnace which was monitored at the specified CEMS monitoring location.

Figure 31
Sample XML Excerpt for Tier 4 CEMS Quarter and Additional Details

```

<ghg:Tier4QuarterDetails>
  <ghg:QuarterName>First Quarter</ghg:QuarterName>
  <ghg:CumulativeCO2MassEmissions massUOM="Metric Tons">
    <ghg:CalculatedValue>111</ghg:CalculatedValue>
  </ghg:CumulativeCO2MassEmissions>
</ghg:Tier4QuarterDetails>
<ghg:Tier4QuarterDetails>
  <ghg:QuarterName>Second Quarter</ghg:QuarterName>
  <ghg:CumulativeCO2MassEmissions massUOM="Metric Tons">
    <ghg:CalculatedValue>222</ghg:CalculatedValue>
  </ghg:CumulativeCO2MassEmissions>
</ghg:Tier4QuarterDetails>
<ghg:Tier4QuarterDetails>
  <ghg:QuarterName>Third Quarter</ghg:QuarterName>
  <ghg:CumulativeCO2MassEmissions massUOM="Metric Tons">
    <ghg:CalculatedValue>333</ghg:CalculatedValue>
  </ghg:CumulativeCO2MassEmissions>
</ghg:Tier4QuarterDetails>
<ghg:Tier4QuarterDetails>
  <ghg:QuarterName>Fourth Quarter</ghg:QuarterName>
  <ghg:CumulativeCO2MassEmissions massUOM="Metric Tons">
    <ghg:CalculatedValue>444</ghg:CalculatedValue>
  </ghg:CumulativeCO2MassEmissions>
</ghg:Tier4QuarterDetails>
<ghg>TotalSourceOperatingHours>300</ghg>TotalSourceOperatingHours>
<ghg:OperatingHoursDetails>
  <ghg:OperatingHoursCO2ConcentrationSubstituted>4</ghg:OperatingHoursCO2
  ConcentrationSubstituted>
  <ghg:OperatingHoursStackGasFlowRateSubstituted>5</ghg:OperatingHoursStac
  kGasFlowRateSubstituted>
  <ghg:OperatingHoursStackGasMoistureContentSubstituted>6</ghg:OperatingHo
  ursStackGasMoistureContentSubstituted>
</ghg:OperatingHoursDetails>
<ghg:TierMethodologyStartDate>2010-01-01-00:05</ghg:TierMethodologyStartDate>
<ghg:TierMethodologyEndDate>2010-12-31-00:05</ghg:TierMethodologyEndDate>
<ghg:SlipStreamIndicator>Y</ghg:SlipStreamIndicator>
<ghg:CEMSFuel>coal, coke, natural gas</ghg:CEMSFuel>
<ghg:ProcessUnitNames>
  <ghg:UnitName>005- CEMS</ghg:UnitName>
</ghg:ProcessUnitNames>
</ghg:Tier4CEMSDetails>
</ghg:CEMSAAUnit>

```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

4.0 Additional Details

This section includes information on emissions from makeup chemical use, steam purchased and paper and pulp products produced.

If the facility has makeup chemical use, the following information is required:

- An indication if the quantity of CaCO_3 (calcium carbonate) used during the reporting year is a substitute data value calculated per the procedures described in §98.275(c) [98.3(c)(8)].
- The annual CO_2 mass emissions from makeup chemical use calculated using Equation AA-3 [98.276(a)].
- An indication if the quantity of Na_2CO_3 (sodium carbonate) used during the reporting year is a substitute data value calculated per the procedures described in §98.275(c) [98.3(c)(8)].

Subpart AA requires you to report the following data about your facility:

- The total annual steam purchases (pounds) [98.276(j)].
- The annual production of pulp products (metric tons) [98.276(k)].
- The annual production of paper products (metric tons) [98.276(k)].

Figure 32
Additional Details Schema Diagram

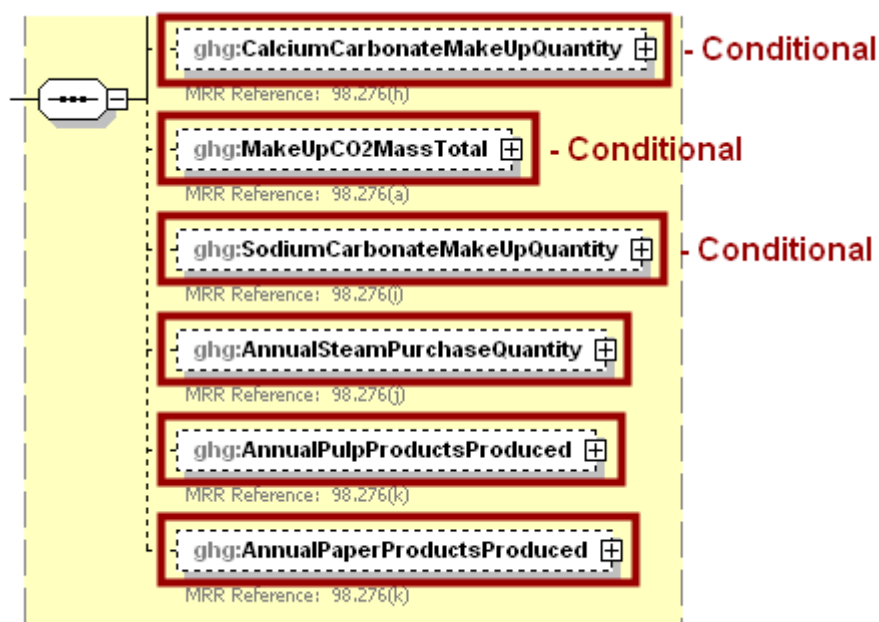


Table 12
Additional Details XML Data Elements

Data Element Name	Description
CalciumCarbonateMakeUpQuantity	A collection of data elements containing information on the calcium carbonate makeup quantity, if applicable. Only indicate (Y/N) whether a substitute value was used for the calcium carbonate makeup quantity.
MakeUpCO2MassTotal	A collection of data elements containing information on CO ₂ mass emissions from makeup chemical use calculated using Equation AA-3, if applicable. Report the measured value and mass unit of measure only.
MakeUpCO2MassTotal.massUOM	Metric Tons
SodiumCarbonateMakeUpQuantity	A collection of data elements containing information on the sodium carbonate makeup quantity, if applicable. Only indicate (Y/N) whether a substitute value was used for the sodium carbonate makeup quantity.
AnnualSteamPurchaseQuantity	A collection of data elements containing information on annual steam purchases. Report the measured value and mass unit of measure only.
AnnualSteamPurchaseQuantity.massUOM	Pounds
AnnualPulpProductsProduced	A collection of data elements containing information on the annual production of pulp products. Report the measured value and mass unit of measure only.
AnnualPulpProductsProduced.massUOM	Metric Tons
AnnualPaperProductsProduced	A collection of data elements containing information on Annual production of paper products. Report the measured value and mass unit of measure only.
AnnualPaperProductsProduced.massUOM	Metric Tons

Figure 33
Sample XML Excerpt for Additional Details

```

    <ghg:CalciumCarbonateMakeUpQuantity>
      <ghg:IsSubstitutedIndicator>Y</ghg:IsSubstitutedIndicator>
    </ghg:CalciumCarbonateMakeUpQuantity>
    <ghg:MakeUpCO2MassTotal massUOM="Metric Tons">
      <ghg:MeasureValue>1111</ghg:MeasureValue>
    </ghg:MakeUpCO2MassTotal>
    <ghg:SodiumCarbonateMakeUpQuantity>
      <ghg:IsSubstitutedIndicator>Y</ghg:IsSubstitutedIndicator>
    </ghg:SodiumCarbonateMakeUpQuantity>
    <ghg:AnnualSteamPurchaseQuantity massUOM="Pounds">
      <ghg:MeasureValue>11111</ghg:MeasureValue>
    </ghg:AnnualSteamPurchaseQuantity>
    <ghg:AnnualPulpProductsProduced massUOM="Metric Tons">
      <ghg:MeasureValue>22222</ghg:MeasureValue>
    </ghg:AnnualPulpProductsProduced>
    <ghg:AnnualPaperProductsProduced massUOM="Metric Tons">
      <ghg:MeasureValue>33333</ghg:MeasureValue>
    </ghg:AnnualPaperProductsProduced>
  </ghg:SubPartAA>

```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

5.0 Facility-Level Roll-up Emissions

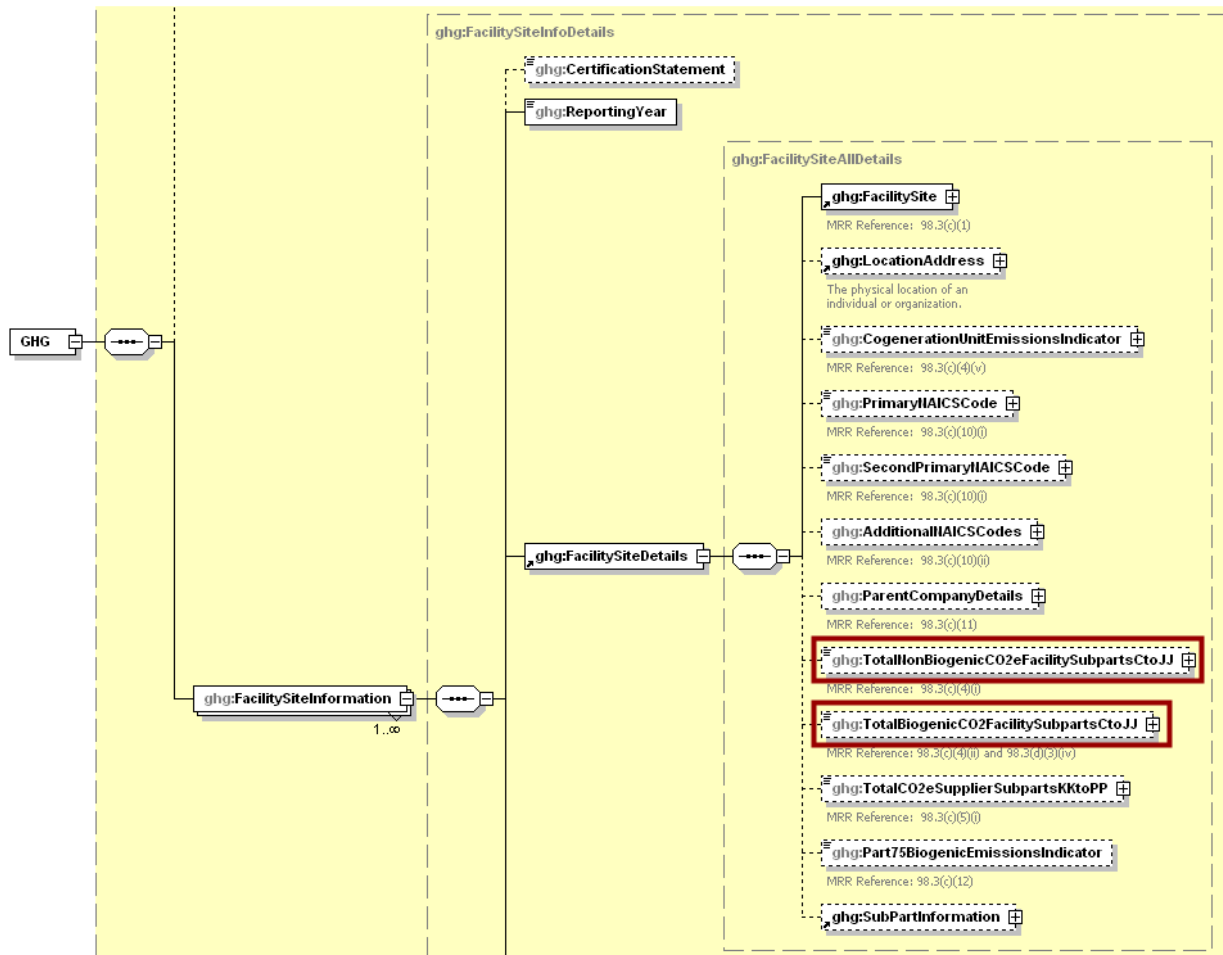
Each facility must report the following facility-level emission totals:

- Total CO₂ equivalent (CO₂e) emissions (excluding biogenic CO₂) aggregated across all direct emitter source categories (subparts C-HH) associated with the facility.
- Total biogenic CO₂ emissions aggregated across all direct emitter source categories (subparts C-HH) associated with the facility.

Each supplier must report the following supplier totals:

- Total CO₂e associated with products supplied aggregated across subparts NN, OO and PP (as applicable). Do not include subpart LL and MM totals in this data element as these values are not being collected in e-GGRT.

**Figure 34
Facility-Level Roll-up Emissions Schema Diagram**



Add the total CO₂e value for Subpart AA in metric tons to the CO₂e emissions aggregated across all source category subparts associated with the facility according to the following guidelines:

- Total non-biogenic CO₂e:
 - Add the CO₂ mass emissions from makeup chemical use (using Equation AA-3) in metric tons rounded to one decimal place.
 - Multiply the CH₄ emissions from biomass from non-CEMS Chemical Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons rounded to two decimal places for each non-CEMS Chemical Recovery Furnace by the Global Warming Potential for CH₄ (21) and add the resulting value.
 - Multiply the N₂O emissions from biomass from non-CEMS Chemical Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons rounded to three decimal places for each non-CEMS Chemical Recovery Furnace by the Global Warming Potential for N₂O (310) and add the resulting value.
 - Add the CO₂ emissions from each fossil fuel from non-CEMS Chemical Recovery Furnaces (using calculation methodology Tier 1, 2 or 3) in metric tons rounded to one decimal place for each non-CEMS Chemical Recovery Furnace.
 - Multiply the CH₄ emissions from each fossil fuel from non-CEMS Chemical Recovery Furnaces in metric tons rounded to two decimal places for each non-CEMS Chemical Recovery Furnace by the Global Warming Potential for CH₄ (21) and add the resulting value.
 - Multiply the N₂O emissions from each fossil fuel from non-CEMS Chemical Recovery Furnaces in metric tons rounded to three decimal places for each non-CEMS Chemical Recovery Furnace by the Global Warming Potential for N₂O (310) and add the resulting value.
 - Multiply the CH₄ emissions from biomass from non-CEMS Chemical Recovery Combustion Units (from spent liquor solids using Equation AA-1) in metric tons rounded to two decimal places for each non-CEMS Chemical Recovery Combustion Unit by the Global Warming Potential for CH₄ (21) and add the resulting value.
 - Multiply the N₂O emissions from biomass from non-CEMS Chemical Recovery Combustion Units (from spent liquor solids using Equation AA-1) in metric tons rounded to three decimal places for each non-CEMS Chemical Recovery Combustion Unit by the Global Warming Potential for N₂O (310) and add the resulting value.
 - Add the CO₂ emissions from each fossil fuel from non-CEMS Chemical Recovery Combustion Units (using calculation methodology Tier 1, 2 or 3) in metric tons rounded to one decimal place for each non-CEMS Chemical Recovery Combustion Unit.
 - Multiply the CH₄ emissions from each fossil fuel from non-CEMS Chemical Recovery Combustion Units in metric tons rounded to two decimal places for each non-CEMS Chemical Recovery Combustion Unit by the Global Warming Potential for CH₄ (21) and add the resulting value.
 - Multiply the N₂O emissions from each fossil fuel from non-CEMS Chemical Recovery Combustion Units in metric tons rounded to three decimal places for each non-CEMS Chemical Recovery Combustion Unit by the Global Warming Potential for N₂O (310) and add the resulting value.
 - Add the CO₂ emissions from each fossil fuel from non-CEMS pulp mill lime kilns (using calculation methodology Tier 1, 2 or 3) in metric tons rounded to one decimal place for each pulp mill lime kiln.
 - Multiply the CH₄ emissions from each fossil fuel from non-CEMS pulp mill lime kilns in metric tons rounded to two decimal places for each pulp mill lime kiln by the Global Warming Potential for CH₄ (21) and add the resulting value.
 - Multiply the N₂O emissions from each fossil fuel from non-CEMS pulp mill lime kilns in metric tons rounded to three decimal places for each non-CEMS pulp mill lime kiln by the Global Warming Potential for N₂O (310) and add the resulting value.
 - Multiply the CH₄ emissions from biomass from CEMS Chemical Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons rounded to two decimal places for

- each CEMS Chemical Recovery Furnace by the Global Warming Potential for CH₄ (21) and add the resulting value.
 - Multiply the N₂O emissions from biomass from CEMS Chemical Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons rounded to three decimal places for each CEMS Chemical Recovery Furnace by the Global Warming Potential for N₂O (310) and add the resulting value.
 - Multiply the CH₄ emissions from biomass from CEMS Chemical Recovery Combustion Units (from spent liquor solids using Equation AA-1) in metric tons rounded to two decimal places for each CEMS Chemical Recovery Combustion Unit by the Global Warming Potential for CH₄ (21) and add the resulting value.
 - Multiply the N₂O emissions from biomass from CEMS Chemical Recovery Combustion Units (from spent liquor solids using Equation AA-1) in metric tons rounded to three decimal places for each CEMS Chemical Recovery Combustion Unit by the Global Warming Potential for N₂O (310) and add the resulting value.
 - Multiply the total CH₄ emissions in metric tons rounded to two decimal places for each CML by the Global Warming Potential for CH₄ (21) and add the resulting value.
 - Multiply the total N₂O emissions in metric tons rounded to three decimal places for each CML by the Global Warming Potential for N₂O (310) and add the resulting value.
 - Add the total annual CO₂ mass emissions measured by the CEMS in metric tons rounded to one decimal place for each CML.
 - Subtract the biogenic CO₂ emissions from Chemical Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons rounded to one decimal place for all process units associated with the CML for each CML.
 - Subtract the biogenic CO₂ emissions from Chemical Recovery Combustion Units (from spent liquor solids using Equation AA-2) in metric tons rounded to one decimal place for all process units associated with the CML for each CML
- Total biogenic CO₂:
 - Add the biogenic CO₂ emissions from Chemical Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons rounded to one decimal place for each Chemical Recovery Furnace.
 - Add the biogenic CO₂ emissions from Chemical Recovery Combustion Unit (from spent liquor solids using Equation AA-2) in metric tons rounded to one decimal place for each Chemical Recovery Combustion Unit.

Table 13
Facility Level Roll-up Emissions XML Data Elements

Data Element Name	Description
TotalNonBiogenicCO2eFacilitySubpartsCtoJJ	Add the total CO ₂ e value for Subpart AA in metric tons to the total CO ₂ e emissions (excluding biogenic CO ₂) aggregated across all source category subparts associated with the facility according to the guidelines above.
TotalNonBiogenicCO2eFacilitySubpartsCtoJJ.massUOM	Metric Tons
TotalBiogenicCO2FacilitySubpartsCtoJJ	Add the total annual biogenic CO ₂ value for Subpart AA in metric tons to the total biogenic CO ₂ emissions aggregated across all source category subparts associated with the facility according to the guidelines above.
TotalBiogenicCO2FacilitySubpartsCtoJJ.massUOM	Metric Tons

Figure 35
Sample XML Excerpt for Facility Level Roll-up Emissions

```
<ghg:TotalNonBiogenicCO2eFacilitySubpartsCtoJJ massUOM="Metric  
Tons">60713</ghg:TotalNonBiogenicCO2eFacilitySubpartsCtoJJ>  
<ghg:TotalBiogenicCO2eFacilitySubpartsCtoJJ massUOM="Metric Tons">9443</ghg:TotalBiogenicCO2eFacilitySubpartsCtoJJ>  
<ghg:TotalCO2eSupplierSubpartsKKtoPP massUOM="Metric Tons">0</ghg:TotalCO2eSupplierSubpartsKKtoPP>
```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

Appendix A

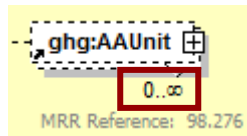
Legend for Tables

Blue = parent element

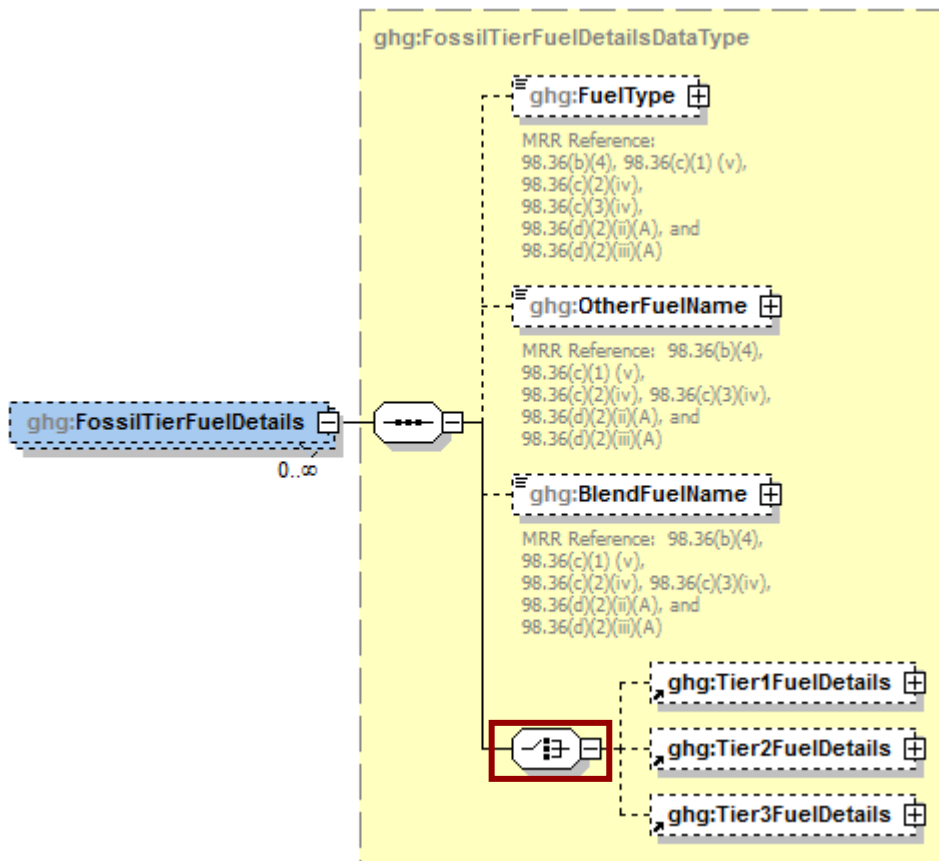
Legend for XML Schema Diagrams

Red box = relevant for reporting

The following XML symbol “0..∞” means that multiple occurrences for the parent element can be reported:



The following XML symbol for “or” means that only one of the data elements following the sign can be reported for the current instance of the parent element:



Appendix B

Sample XML Document for Subpart AA

(Note: Data values do not reflect an actual facility's emissions.)

```
<ghg:GHG xsi:schemaLocation="http://www.exchangenetwork.net/schema/ghg/1
file:///L:/XML_Schema/GHG_schema_06162011/GHG_Final_v1.15.xsd"
xmlns:ghg="http://www.exchangenetwork.net/schema/ghg/1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <ghg:FacilitySiteInformation>
    <ghg:ReportingYear>2010</ghg:ReportingYear>
    <ghg:FacilitySiteDetails>
      <ghg:FacilitySite>
        <ghg:FacilitySiteIdentifier>523997</ghg:FacilitySiteIdentifier>
        <ghg:FacilitySiteName>Test Facility G</ghg:FacilitySiteName>
      </ghg:FacilitySite>
      <ghg:LocationAddress>
        <ghg:LocationAddressText>1 Main St.</ghg:LocationAddressText>
        <ghg:LocalityName>Charlottesville</ghg:LocalityName>
        <ghg:StateIdentity>
          <ghg:StateCode>VA</ghg:StateCode>
        </ghg:StateIdentity>
        <ghg:AddressPostalCode>22911</ghg:AddressPostalCode>
      </ghg:LocationAddress>
      <ghg:CogenerationUnitEmissionsIndicator>N</ghg:CogenerationUnitEmissionsIndicator>
      <ghg:PrimaryNAICSCode>325311</ghg:PrimaryNAICSCode>
      <ghg>TotalNonBiogenicCO2eFacilitySubpartsCtoJJ massUOM="Metric
Tons">60713</ghg>TotalNonBiogenicCO2eFacilitySubpartsCtoJJ>
      <ghg>TotalBiogenicCO2eFacilitySubpartsCtoJJ massUOM="Metric
Tons">9443</ghg>TotalBiogenicCO2eFacilitySubpartsCtoJJ>
      <ghg>TotalCO2eSupplierSubpartsKKtoPP massUOM="Metric Tons">0</ghg>TotalCO2eSupplierSubpartsKKtoPP>
      <ghg:SubPartInformation>
        <ghg:SubPartAA>
          <ghg:GHGasInfoDetails>
            <ghg:GHGasName>Biogenic Carbon dioxide</ghg:GHGasName>
            <ghg:GHGasQuantity massUOM="Metric Tons">
              <ghg:CalculatedValue>9443</ghg:CalculatedValue>
            </ghg:GHGasQuantity>
          </ghg:GHGasInfoDetails>
          <ghg:GHGasInfoDetails>
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            </ghg:GHGasQuantity>
          </ghg:GHGasInfoDetails>
          <ghg:GHGasInfoDetails>
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            </ghg:GHGasQuantity>
          </ghg:GHGasInfoDetails>
          <ghg:GHGasInfoDetails>
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            </ghg:GHGasQuantity>
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          <ghg:AAUnit>
            <ghg:UnitIdentification>
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              <ghg:UnitDescription>Chemical Recovery Furnace unit 002</ghg:UnitDescription>
              <ghg:UnitType>Chemical Recovery Furnace</ghg:UnitType>
            </ghg:UnitIdentification>
            <ghg:BiogenicDetails>
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              </ghg:MassSpentLiquorSolids>
              <ghg:BasisforDeterminationofMassSpentLiquorSolids>on-line metering/measuring
system</ghg:BasisforDeterminationofMassSpentLiquorSolids>
              <ghg:CO2MassTotal massUOM="Metric Tons">
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              </ghg:CO2MassTotal>
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                <ghg:CalculatedValue>111</ghg:CalculatedValue>
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              <ghg:N2OMassTotal massUOM="Metric Tons">
```

```
<ghg:CalculatedValue>11</ghg:CalculatedValue>
</ghg:N2OMassTotal>
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  <ghg:FossilTierFuelDetails>
    <ghg:FuelType>Lignite</ghg:FuelType>
    <ghg:Tier2FuelDetails>
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      <ghg:TierMethodologyStartDate>2010-01-01-
00:05</ghg:TierMethodologyStartDate>
      <ghg:TierMethodologyEndDate>2010-12-31-
00:05</ghg:TierMethodologyEndDate>
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edIndicator>
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edIndicator>
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edIndicator>
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edIndicator>
        </ghg:HighHeatValue>
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      <ghg:Tier2MonthlyHHVDetails>
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edIndicator>
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      <ghg:Tier2MonthlyHHVDetails>
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edIndicator>
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edIndicator>
        </ghg:HighHeatValue>
      </ghg:Tier2MonthlyHHVDetails>
      <ghg:Tier2MonthlyHHVDetails>
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        <ghg:HighHeatValue>
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edIndicator>
        </ghg:HighHeatValue>
      </ghg:Tier2MonthlyHHVDetails>
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          <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitut
edIndicator>
        </ghg:HighHeatValue>
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        <ghg:MonthName>October</ghg:MonthName>
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edIndicator>
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  </ghg:Tier2FuelDetails>
</ghg:FossilTierFuelDetails>
</ghg:FossilFuelDetails>
</ghg:BiogenicDetails>
</ghg:CalculatedValue>
```



```

    <ghg:Tier2MonthlyHHVDetails>
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edIndicator>
      </ghg:HighHeatValue>
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    <ghg:Tier2MonthlyHHVDetails>
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edIndicator>
      </ghg:HighHeatValue>
    </ghg:Tier2MonthlyHHVDetails>
    <ghg:FrequencyofHighHeatValueDetermination>Upon addition of oil
to the storage tank</ghg:FrequencyofHighHeatValueDetermination>
    <ghg:EmissionsDetailsNode>
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Tons">
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e>
      </ghg:TotalCO2CombustionEmissions>
      <ghg:TotalCH4CombustionEmissions massUOM="Metric
Tons">
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>
      </ghg:TotalCH4CombustionEmissions>
      <ghg:TotalN2OCombustionEmissions massUOM="Metric
Tons">
        <ghg:CalculatedValue>4</ghg:CalculatedValue>
      </ghg:TotalN2OCombustionEmissions>
      <ghg:CH4EmissionsCO2Equivalent massUOM="Metric
Tons">
        <ghg:CalculatedValue>44</ghg:CalculatedValue
>
      </ghg:CH4EmissionsCO2Equivalent>
      <ghg:N2OEmissionsCO2Equivalent massUOM="Metric
Tons">
        <ghg:CalculatedValue>4</ghg:CalculatedValue>
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</ghg:FossilTierFuelDetails>
</ghg:FossilFuelDetails>
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<ghg:AAUnit>
  <ghg:UnitIdentification>
    <ghg:UnitName>003- CRCU</ghg:UnitName>
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    <ghg:UnitType>Chemical Recovery Combustion Unit</ghg:UnitType>
  </ghg:UnitIdentification>
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system</ghg:BasisforDeterminationofMassSpentLiquorSolids>
    <ghg:CO2MassTotal massUOM="Metric Tons">
      <ghg:CalculatedValue>555</ghg:CalculatedValue>
    </ghg:CO2MassTotal>
    <ghg:CH4MassTotal massUOM="Metric Tons">
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    </ghg:CH4MassTotal>
    <ghg:N2OMassTotal massUOM="Metric Tons">
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    </ghg:N2OMassTotal>
  </ghg:BiogenicDetails>
  <ghg:FossilFuelDetails>
    <ghg:FossilTierFuelDetails>
      <ghg:FuelType>Natural Gasoline</ghg:FuelType>
      <ghg:Tier3FuelDetails>
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        <ghg:TierMethodologyStartDate>2010-01-01-
00:05</ghg:TierMethodologyStartDate>
        <ghg:TierMethodologyEndDate>2010-12-31-
00:05</ghg:TierMethodologyEndDate>
        <ghg:EmissionsDetailsNode>
          <ghg:TotalCO2CombustionEmissions massUOM="Metric
Tons">
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e>
          </ghg:TotalCO2CombustionEmissions>

```

```

    <ghg:TotalCH4CombustionEmissions massUOM="Metric
    Tons">
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    Tons">
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      >
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    Tons">
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      ue>
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    Tons">
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      ue>
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  </ghg:EmissionsDetailsNode>
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  encyofCarbonContentDetermination>
  <ghg:TotalNumberCarbonContentDeterminations>12</ghg:TotalNum
  berCarbonContentDeterminations>
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  alidCarbonContentDeterminations>
  <ghg:FrequencyofMolecularWeightDetermination>Monthly</ghg:Freq
  uencyofMolecularWeightDetermination>
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  mberMolecularWeightDeterminations>
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  ValidMolecularWeightDeterminations>
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  Usage>
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</ghg:FossilFuelDetails>
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<ghg:AAUnit>
  <ghg:UnitIdentification>
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    <ghg:UnitDescription>Pulp Mill Lime Kiln unit 004</ghg:UnitDescription>
    <ghg:UnitType>Pulp Mill Lime Kiln</ghg:UnitType>
  </ghg:UnitIdentification>
  <ghg:FossilFuelDetails>
    <ghg:FossilTierFuelDetails>
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      <ghg:Tier2FuelDetails>
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        generation)</ghg:TierName>
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        00:05</ghg:TierMethodologyStartDate>
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```

```

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edIndicator>
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edIndicator>
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edIndicator>
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edIndicator>
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edIndicator>
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edIndicator>
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Tons">
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e>
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Tons">
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Tons">
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Tons">
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e>
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Tons">
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ue>

```

```

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    <ghg:UnitType>Pulp Mill Lime Kiln</ghg:UnitType>
  </ghg:UnitIdentification>
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              e>
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  </ghg:FossilFuelDetails>
</ghg:AAUnit>
<ghg:CEMSAAUnit>
  <ghg:CEMSAAUnitDetails>
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      <ghg:UnitDescription>Chemical Recovery Furnace CEMS unit
        005</ghg:UnitDescription>
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    </ghg:UnitIdentification>
    <ghg:BiogenicDetails>
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        <ghg:IsSubstitutedIndicator>Y</ghg:IsSubstitutedIndicator>
      </ghg:MassSpentLiquorSolids>
      <ghg:BasisforDeterminationofMassSpentLiquorSolids>on-line
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        system</ghg:BasisforDeterminationofMassSpentLiquorSolids>
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      <ghg:Description>CML 006</ghg:Description>
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  </ghg:Tier4CEMSDetails>
</ghg:CEMSAAUnit>

```

```

        <ghg:Type>Process/stationary combustion units share common
        stack</ghg:Type>
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