

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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I. 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 XML schema defines expected data elements and attributes, allowable data formats for each data element, and the hierarchical structure and sequence in which data elements must appear in the XML file. 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 and which are required and the maximum number of occurrences allowed for each element.

The e-GGRT XML schema is made up of a root data element (GHG) and complex and simple data 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 data element is the base of the XML schema.

The schema's structure can be thought of as a family tree. 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.

The XML upload method may be used for reporting a facility or supplier's annual greenhouse gas (GHG) data; however, the following actions can only be performed using the e-GGRT web forms:

- User, facility and supplier registration
- Certificate of Representation and Notice of Delegation signing
- Facility representative and agent changes
- Facility and supplier address changes
- Notice of intent to not submit an annual GHG report

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

An XML submission must 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 Element Definitions table.

The e-GGRT XML Reporting Schema is available for download at the e-GGRT help website: <http://www.ccdsupport.com/confluence/display/help/XML+Reporting+Instructions>. The zip file contains:

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

Table 1
Reporting Numbers

Number Format	Description
Rounding	<ul style="list-style-type: none"> • 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. • CH₄ emissions data expressed in metric tons should be rounded to two decimal places. • N₂O emissions data expressed in metric tons should be rounded to three decimal places. • 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.). • 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. • In the case of aggregation/roll-ups, those calculations should be performed on the rounded values.
Percentages	If a value must be reported as a percentage, then the number should be within the range of 0 to 100 (percent), e.g. 85.5% should be reported as 85.5.
Fractions	If a value must be reported as a decimal fraction, then the number should be within the range of 0 and 1, e.g., 1/4 should be reported as 0.25. Leading zeroes are optional.

Key XML Terms

- 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. The schema also defines the set of rules to which the XML document must conform in order to be considered "valid".
- XML file: A file containing data organized into a structured document using XML markup.
- Data Element: An XML data element is used for storing and classifying data in an XML file. Opening and closing tags represent the start and end of a data element. An opening tag looks like <elementName>, while a closing tag has a slash that is placed before the element's name </elementName>. The following example shows how to report the facility's identification

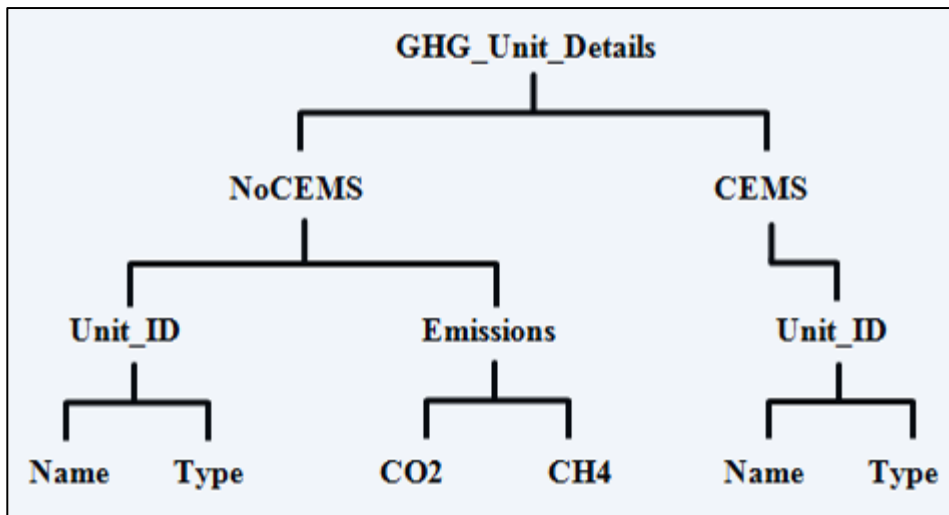
number: <FacilitySiteIdentifier>23222</FacilitySiteIdentifier>. The information shaded in blue represents the data element’s value.

If a data element does not contain a value, then a single empty tag name may be used. An empty tag has a slash placed after the element’s name <FacilitySiteIdentifier/>. **Note:** If you do not intend to report a value for a particular data element, then it is recommended that you do not include the data element in the XML file.

- **Attribute:** An XML attribute contains additional information about a specific data element. An attribute for a data element is placed within the opening tag. The syntax for including an attribute in an element is <elementName attributeName="value">. For example, <TotalCH4CombustionEmissionsmassUOM="Metric Tons">.
- **Root/Parent/Child Element:** The schema’s structure can be thought of as a family tree. At the top of the tree is some early ancestor and at the bottom of the tree are the latest children. With a tree structure you can see which children belong to which parents and many other relationships.

XML data elements are sometimes referenced in terms of how they relate to each other, e.g., parent-child relationships, within the schema’s tree structure, also known as hierarchy. The top of the XML tree is considered the root – it is the parent to all data elements within the schema. In the example below, “GHG_Unit_Details” is the root, and just like in many other family trees, there is more than one item with the same name (e.g., “Unit_ID”). The easiest way to distinguish these items is by referencing them in terms of their parent-child relationships, e.g., NoCEMS/Unit_ID vs. CEMS/Unit_ID.

Figure 1
Example of an XML Tree



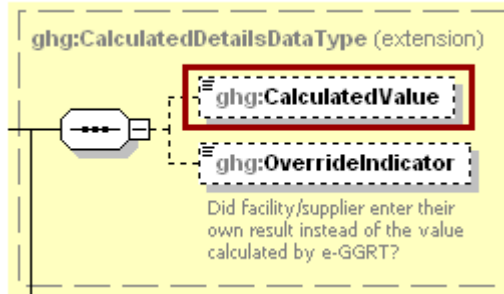
This document provides a step-by-step description of how to report emissions data using the XML schema. Please note the following:

- **Non-applicable data elements should not be included in the facility's XML file.** The schema contains many data elements, some of which may not be applicable to XML reporters in general or to a particular situation. If a data element is not referenced in the instructions (definition tables), then **do not** report or include it in the facility's XML file.
- **Data elements must be reported in a specific order.** The figures and tables in this document depict the specific sequence in which data elements must be arranged in the facility's XML file in order to produce a well-formed XML report.
- **Enumerations are case sensitive.** Many data elements have a defined set of allowable values, also known as enumerations. Values for enumerations must be entered exactly as they are defined within the schema (including punctuation marks) in order to be accepted by schema validation. See the definition tables for a complete list of enumerations.
- **Schema diagrams depict the hierarchy (or tree structure).** The primary purpose of the schema diagrams is to indicate the sequence in which data elements must appear within the facility's XML file and to identify the data elements that are required (must be reported) and conditionally required (see last bullet). Required data elements are boxed in red and conditionally required data elements are noted.
- **Definition tables provide details for required and conditionally required data elements.** The tables are designed to provide unique instructions for reporting a given data element, including the list of enumerations and required units of measure, if defined. As noted above, there are some data elements in the schema that are not applicable to XML reporters or to a particular situation. For example, the "OverrideIndicator" data element is used solely by e-GGRT to indicate that the web form reporter chose to override the system's calculated value with their own. These non-applicable data elements **are not** included in the definition tables. If a data element is not referenced in a definition table, then **do not** report or include it in the facility's XML file.
- **Commonly used data types are not depicted in the schema diagrams nor listed separately in the definition tables.** The schema diagrams display almost every data element in the schema except those that are associated with the three most commonly occurring data types:
 - Calculated Details
 - Measurement Details
 - Unit Identification Details

Once defined, these data types (static collection of data elements) are then associated as children to every data element in the schema containing a measured or calculated value or unit details. These child data elements do not appear in the diagrams and are not listed on separate rows in the definition tables in order to reduce their redundancy. They are however, referenced in the tables in the description of their parent data element. See Figures 2-4 and Tables 2-4.

- **Some data elements are conditionally required.** Data elements which are conditionally required are noted in the schema diagrams and the data element definitions tables. If your facility meets the condition specified for the data element, then the data element is required and you must report it in the facility's XML file. If your facility does not meet the condition specified for the data element, then **do not** include the data element in the facility's XML file. If a parent element is not required, then **do not** include any of its child data elements in the facility's XML file.

Figure 2
Calculated Details Data Type Schema Diagram

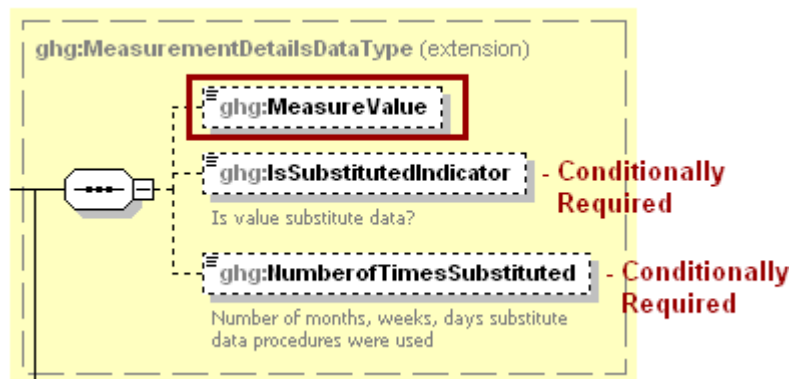


Note: Data elements boxed in red are required.

Table 2
Calculated Details Data Element Definitions

Data Element Name	Description
CalculatedDetailsDataType	
CalculatedValue	Calculated value (decimal).
OverrideIndicator	Note: Do not include this data element in the facility’s XML file because it only applies to web form reporters. It is a flag set by e-GGRT to indicate that the system-calculated value was overridden with the web form reporter’s value.

Figure 3
Measurement Details Data Type Schema Diagram

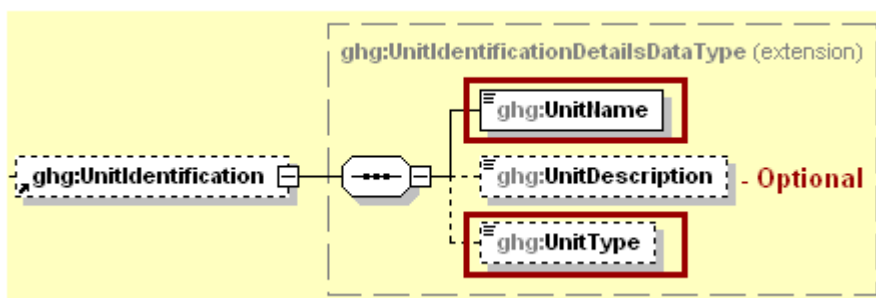


Note: Data elements boxed in red are required. Please see page 4 of this document for more information on conditionally required elements.

**Table 3
Measurement Details Data Element Definitions**

Data Element Name	Description
MeasurementDetailsDataType	
MeasureValue	Measured value (decimal).
IsSubstitutedIndicator	An indication (Y/N) that the measure value contains substituted data. Note: Do not include this data element in your XML file unless noted in the instructions for the particular measured value.
NumberOfTimesSubstituted	The number (integer) of days, months, weeks or hours in the reporting year that missing data procedures were followed. Note: Do not include this data element in your XML file unless noted in the instructions for the particular measured value.

**Figure 4
Unit Identification Details Data Type Schema Diagram**



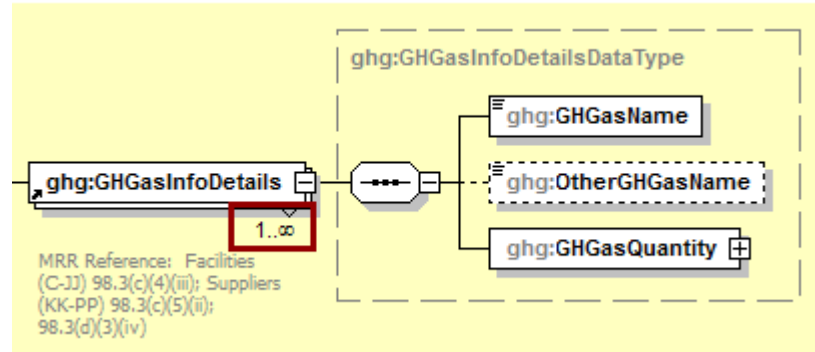
Note: Data elements boxed in red are required.

**Table 4
Unit Identification Details Data Element Definitions**

Data Element Name	Description
UnitIdentificationDetails	
UnitName	A unique name (ID) for each unit so that the data for different units can be recorded, maintained and retrieved clearly.
UnitDescription	Optional brief description of the unit.
UnitType	The type of unit. The list of allowable values varies. For more information, see the instructions for the specific unit process to be reported. For example, if reporting Flare Gas details, the unit type would be “Flare”.

The XML symbol “1..∞” shown in Figure 5 means that the parent element is “unbounded” so that multiple instances of the parent element can be reported. XML Excerpt 1 shows an example of reporting multiple instances of a parent element.

Figure 1
“Unbounded” Symbol in Schema Diagram



XML Excerpt 1
Example for “Unbounded” Parent Element

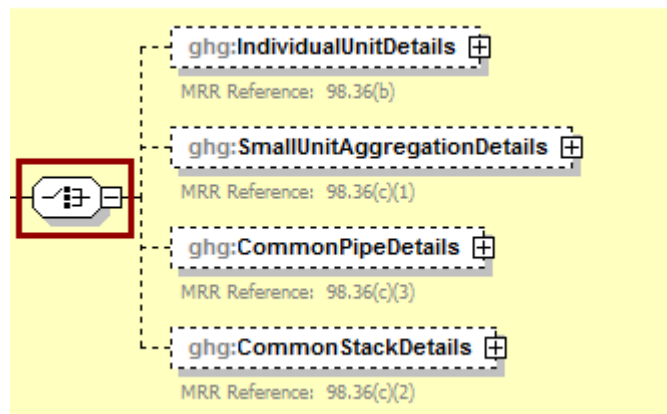
```

<ghg:GHGasInfoDetails>
  <ghg:GHGasName>Carbon Dioxide </ghg:GHGasName>
  <ghg:GHGasQuantity massUOM="Metric Tons">
    <ghg:CalculatedValue>384781.2 </ghg:CalculatedValue>
  </ghg:GHGasQuantity></ghg:GHGasInfoDetails>
<ghg:GHGasInfoDetails>
<ghg:GHGasInfoDetails>
  <ghg:GHGasName>Methane</ghg:GHGasName>
  <ghg:GHGasQuantity massUOM="Metric Tons">
    <ghg:CalculatedValue>4004.12</ghg:CalculatedValue>
  </ghg:GHGasQuantity></ghg:GHGasInfoDetails>
<ghg:GHGasInfoDetails>

```

The XML symbol for a logical “Or” shown in Figure 6 means that **only one** of the data elements following the symbol can be reported for the current instance of the parent element.

Figure 2
Logical “Or” Symbol in Schema Diagram



II. Summary of Changes

The following modifications were applied to the previous version of the GHG XML schema in relation to Subpart AA (GHG_SubPartAA_v2.0.xsd) for reporting year 2011.

Table 5
Summary of Changes to the Schema for Subpart AA

No.	Change Description
1	Removed the unit of measure attribute " massUOM " from data element " MassSpentLiquorSolids " for non-CEMS unit. (Xpath = AAUnit/BiogenicDetails/MassSpentLiquorSolids)
2	Removed the unit of measure attribute " massUOM " from data element " MassSpentLiquorSolids " for CEMS unit. (Xpath = CEMSAAUnit/CEMSAAUnitDetails/BiogenicDetails/MassSpentLiquorSolids)
3	Removed the unit of measure attribute " massUOM " from data element " CalciumCarbonateMakeUpQuantity ". (Xpath = CalciumCarbonateMakeUpQuantity)

Document Changes:

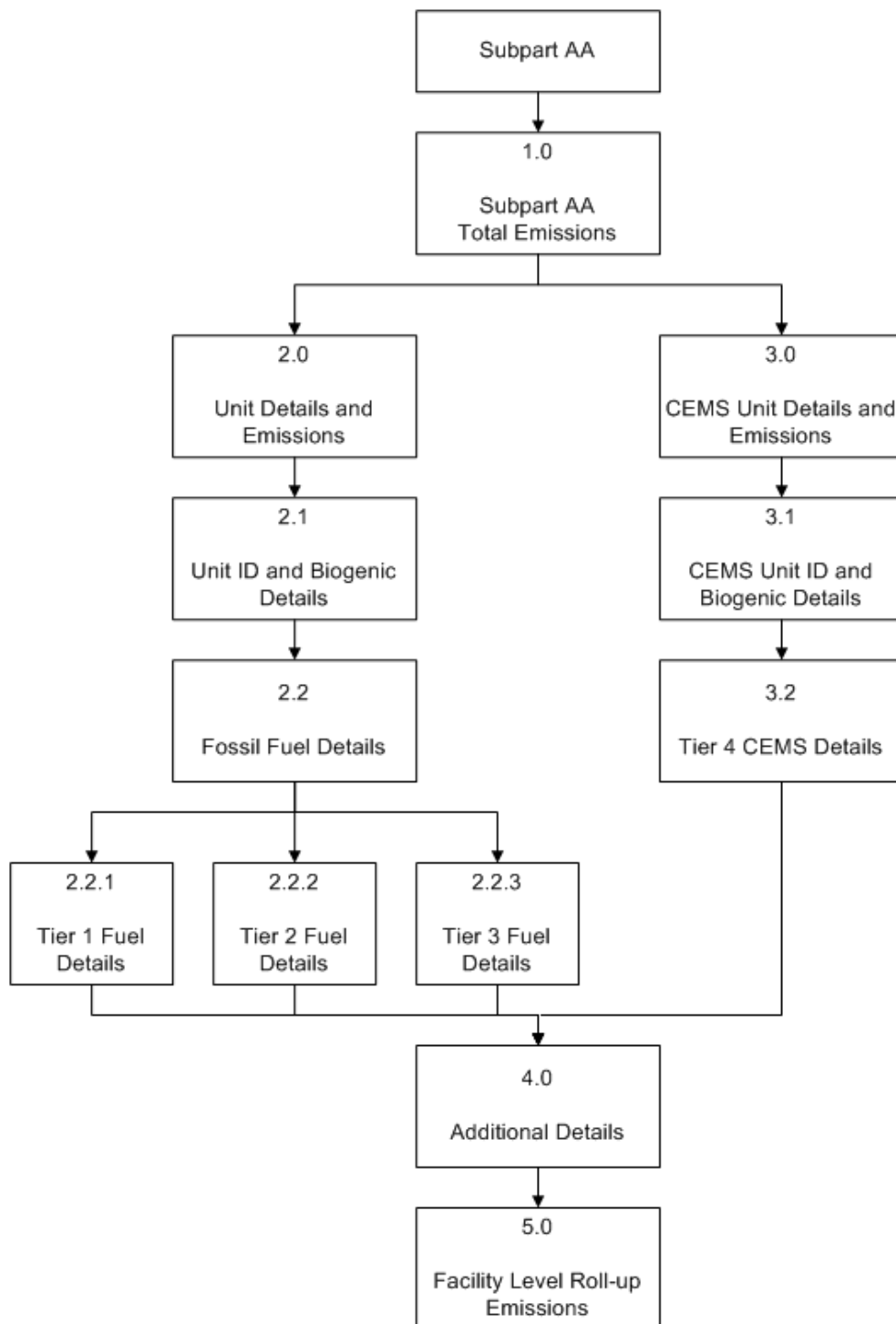
3-9-2012 – Modified some of the emissions values within the XML excerpts to emphasize the rounding rules, see [Table 1](#).

3-21-2012 - Updated data element name for "TotalBiogenicCO2FacilitySubpartsCtoJJ" in excerpt and sample XML document. Added "ParentCompanyDetails" to sample XML document.

III. Subpart AA Overview

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

Figure 5
Subpart AA Reporting Diagram



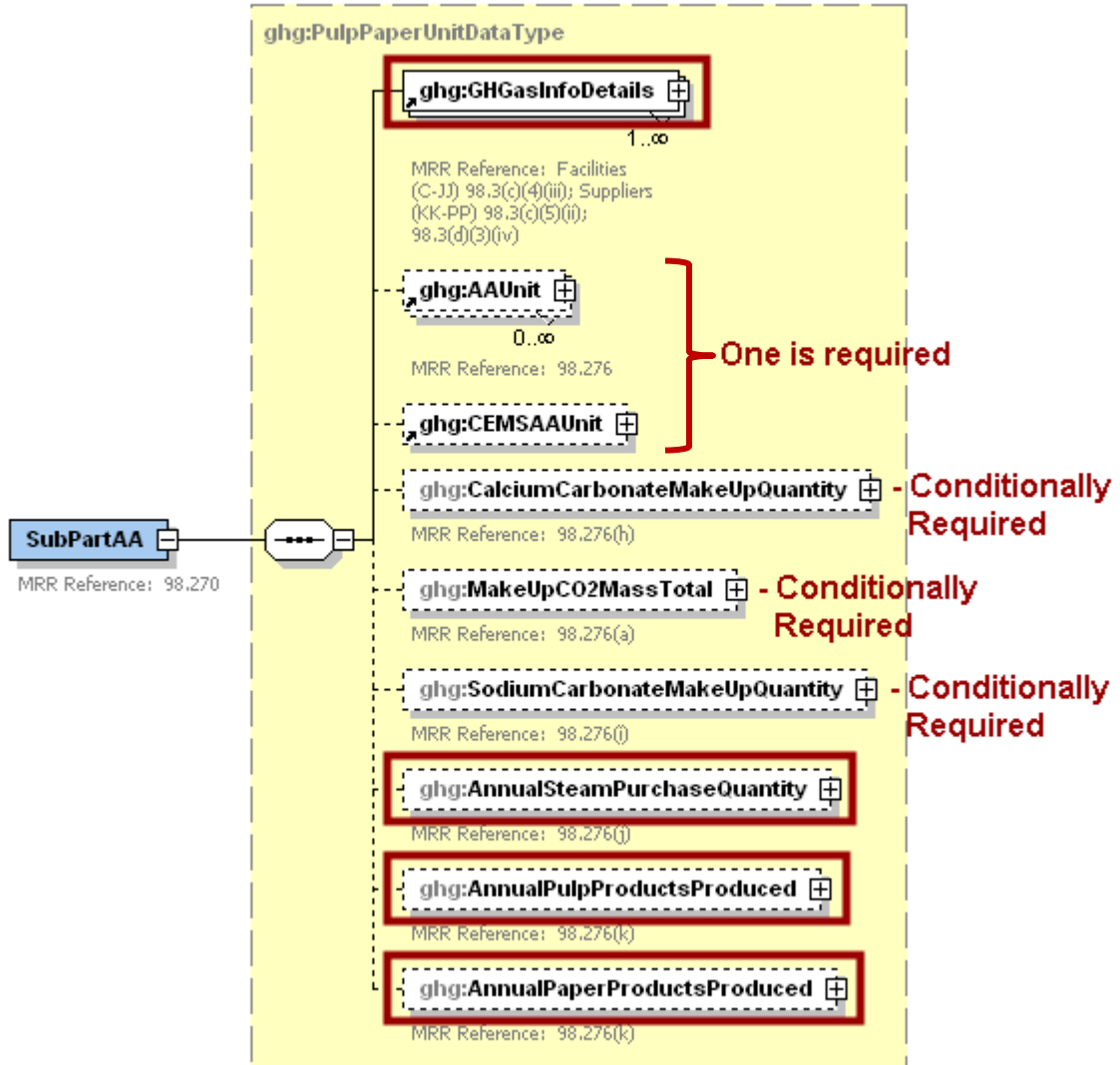
The XML schema includes the following areas for reporting for Subpart AA as shown in the reporting diagram:

- 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.

NOTE: If your facility is subject to reporting under Subpart AA (Pulp and Paper Manufacturing), EPA recommends that you also consider Subpart C (General Stationary Fuel Combustion) in your facility applicability determination.

This source category is only provided as a suggestion - additional Subparts may be relevant for a given facility/supplier and the listed Subpart may not be relevant for all facilities/suppliers.

Figure 6
Subpart AA Schema Diagram

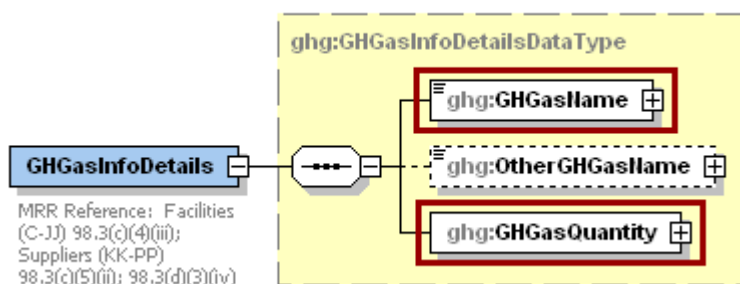


Note: Data elements boxed in red are required. Please see page 4 of this document for more information on conditionally required elements.

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 40 CFR 98 Mandatory Reporting of Greenhouse Gases, reported under Subpart AA, expressed in metric tons.

Figure 7
GHGasInfoDetails Details Schema Diagram



Note: Data elements boxed in red are required.

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.
 - 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 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 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 for each non-CEMS pulp mill lime kiln.
 - Add the total annual CO₂ mass emissions measured by the CEMS in metric tons for each CML.
 - Subtract the biogenic CO₂ emissions from Chemical Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons 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 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 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 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 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 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 for each non-CEMS Chemical Recovery Furnace.
 - Add the CH₄ emissions from each fossil fuel from Chemical Recovery Furnaces in metric tons 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 for each non-CEMS Chemical Recovery Combustion Unit.
 - Add the CH₄ emissions from each fossil fuel from Chemical Recovery Combustion Units in metric tons for each non-CEMS Chemical Recovery Combustion Unit.
 - Add the CH₄ emissions from each fossil fuel from pulp mill lime kilns in metric tons 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 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 for each CEMS Chemical Recovery Combustion Unit.
 - Add the total CH₄ emissions from each fossil fuel in metric tons 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 for each non-CEMS Combustion Recovery Furnace.
 - Add the N₂O emissions from each fossil fuel from Combustion Recovery Furnaces in metric tons 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 for each non-CEMS Chemical Recovery Combustion Furnace.
 - Add the N₂O emissions from each fossil fuel from Chemical Recovery Combustion Units in metric tons for each non-CEMS Chemical Recovery Combustion Furnace.
 - Add the N₂O emissions from each fossil fuel from pulp mill lime kilns in metric tons 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 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 for each CEMS Chemical Recovery Combustion Unit.
 - Add the total N₂O emissions from each fossil fuel in metric tons for each CML.

Note: You must follow the rounding rules found in [Table 1](#).

**Table 6
GHGasInfoDetails Data Element Definitions**

Data Element Name	Description
GHGasInfoDetails	Parent Element: A collection of data elements containing the total annual emissions of each greenhouse gas (GHG) listed in Table A-1 of 40 CFR 98 Mandatory Reporting of Greenhouse Gases 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 greenhouse gas emissions from this source category. Report the value in the child data element CalculatedValue according to the guidelines above. Set the units of measure to “Metric Tons” in the attribute massUOM .

**XML Excerpt 1
Example for Greenhouse Gas Information Details**

```

<ghg:SubPartAA>
  <ghg:GHGasInfoDetails>
    <ghg:GHGasName>Biogenic Carbon dioxide</ghg:GHGasName>
    <ghg:GHGasQuantity massUOM="Metric Tons">
      <ghg:CalculatedValue>2443.1</ghg:CalculatedValue>
    </ghg:GHGasQuantity>
  </ghg:GHGasInfoDetails>
  <ghg:GHGasInfoDetails>
    <ghg:GHGasName>Methane</ghg:GHGasName>
    <ghg:GHGasQuantity massUOM="Metric Tons">
      <ghg:CalculatedValue>397.23</ghg:CalculatedValue>
    </ghg:GHGasQuantity>
  </ghg:GHGasInfoDetails>
  <ghg:GHGasInfoDetails>
    <ghg:GHGasName>Nitrous Oxide</ghg:GHGasName>
    <ghg:GHGasQuantity massUOM="Metric Tons">
      <ghg:CalculatedValue>39.456</ghg:CalculatedValue>
    </ghg:GHGasQuantity>
  </ghg:GHGasInfoDetails>
  <ghg:GHGasInfoDetails>
    <ghg:GHGasName>Carbon Dioxide</ghg:GHGasName>
    <ghg:GHGasQuantity massUOM="Metric Tons">
      <ghg:CalculatedValue>14997.7</ghg:CalculatedValue>
    </ghg:GHGasQuantity>
  </ghg:GHGasInfoDetails>

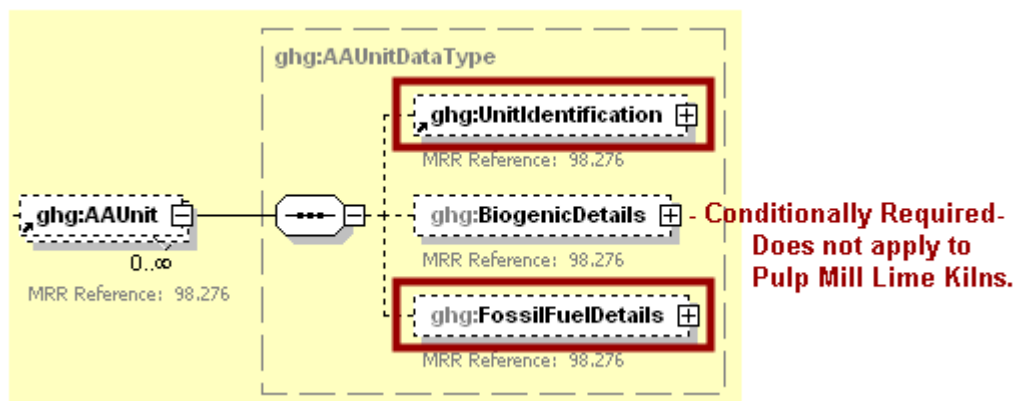
```

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 8
Unit Details and Emissions Schema Diagram



Note: Data elements boxed in red are required. Please see page 4 of this document for more information on conditionally required elements.

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:

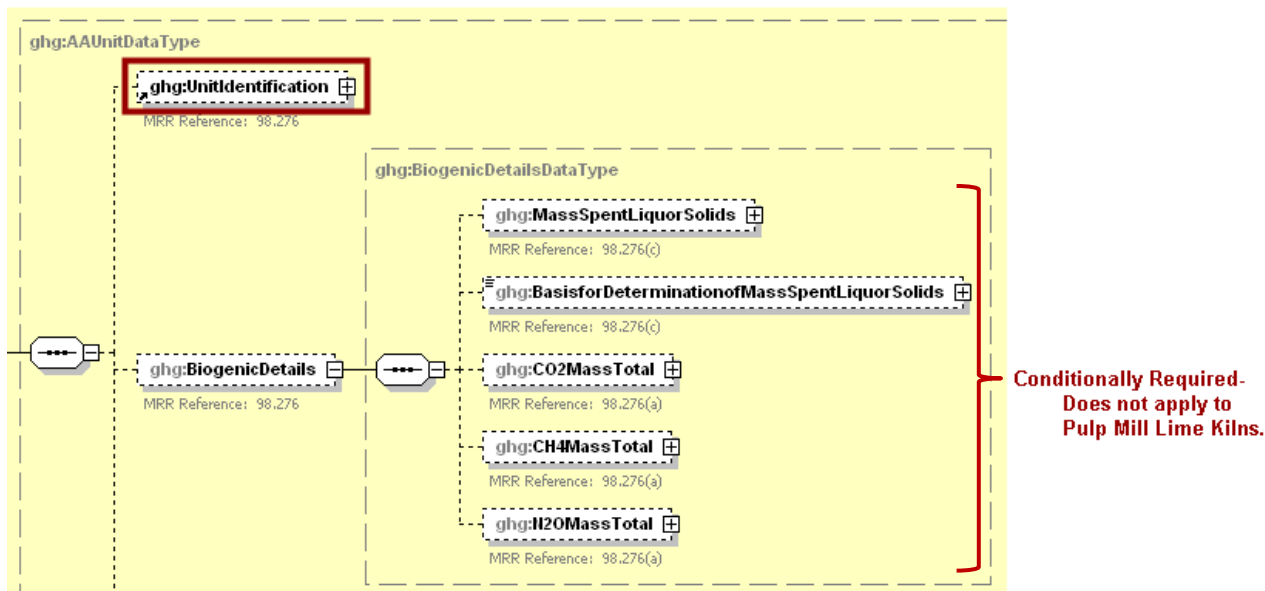
- An indication if the annual mass of spent liquor solids combusted in the unit during the year is a substitute data value calculated per the procedures described in §98.275(b) [98.3(c)(8)].
- The basis for determining the annual mass of spent liquor solids combusted in the unit during the year [98.276(c)]. 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 9
Unit ID and Biogenic Details Schema Diagram



Note: Data elements boxed in red are required. Please see page 4 of this document for more information on conditionally required elements.

Table 7
Unit ID and Biogenic Details Data Element Definitions

Data Element Name	Description
AAUnit	Parent Element: 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. Report a unique unit name (ID) in the child data element UnitName , an optional brief description in the child data element UnitDescription and the type of unit in the child data element UnitType . See list of allowable values for type of unit: Chemical Recovery Furnace Chemical Recovery Combustion Unit Pulp Mill Lime Kiln
BiogenicDetails	Parent Element (Conditionally Required): 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. If reporting for a pulp mill lime kiln, then do not include this section in the facility's XML file.

Data Element Name	Description
MassSpentLiquorSolids	Indicate (Y/N) if a substitute value was used for the annual mass of spent liquor solids in the child data element IsSubstitutedIndicator .
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 value in the child data element CalculatedValue . Set the units of measure to "Metric Tons" in the attribute massUOM .
CH4MassTotal	A collection of data elements containing information on biogenic CH ₄ emissions from spent liquor solids combustion. Report the value in the child data element CalculatedValue . Set the units of measure to "Metric Tons" in the attribute massUOM .
N2OMassTotal	A collection of data elements containing information on biogenic N ₂ O emissions from spent liquor solids combustion. Report the value in the child data element CalculatedValue . Set the units of measure to "Metric Tons" in the attribute massUOM .

XML Excerpt 2 Example 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>1121.1</ghg:CalculatedValue>
    </ghg:CO2MassTotal>
    <ghg:CH4MassTotal massUOM="Metric Tons">
      <ghg:CalculatedValue>113.11</ghg:CalculatedValue>
    </ghg:CH4MassTotal>
    <ghg:N2OMassTotal massUOM="Metric Tons">
      <ghg:CalculatedValue>18.111</ghg:CalculatedValue>
    </ghg:N2OMassTotal>
  </ghg:BiogenicDetails>
</ghg:AAUnit>

```

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

2.2 Fossil Fuel Details

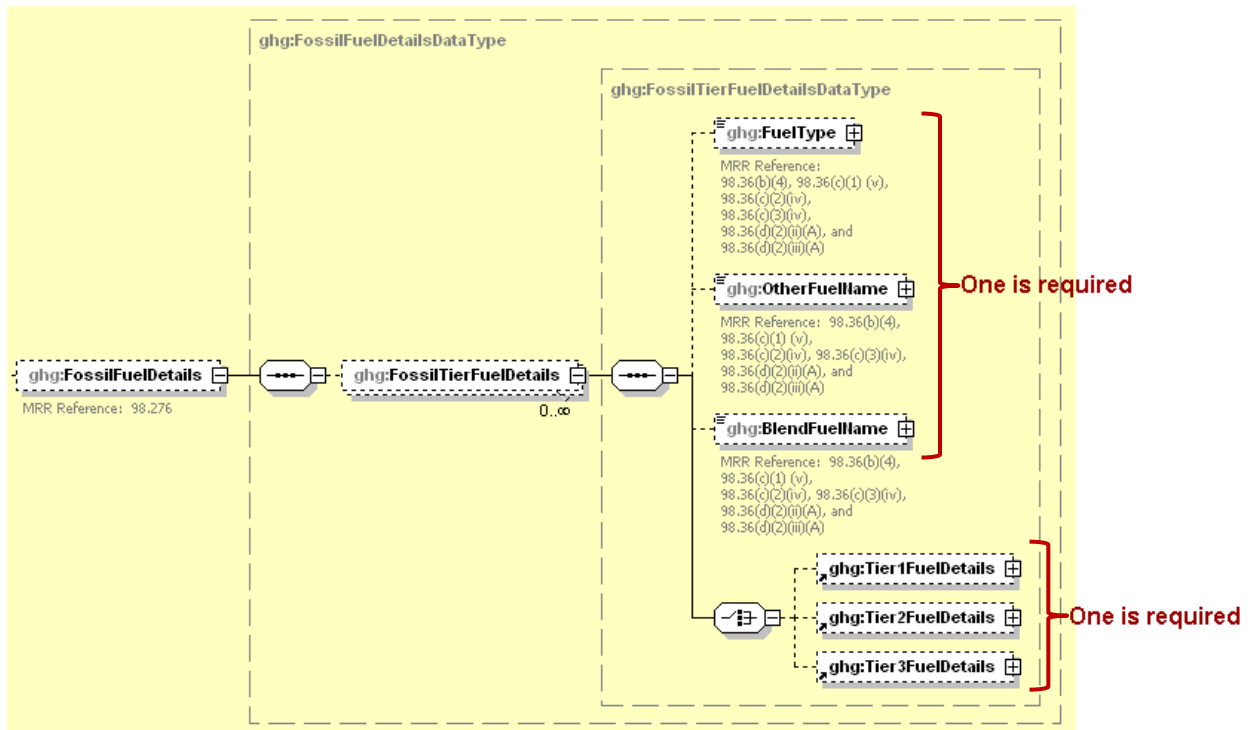
This section includes information to report on each fuel type used for each unit and the calculation methodology used.

- 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)]. Report only one fuel per instance of “FossilTierFuelDetails”.
- For each fuel reported, the facility must report the Tier1, Tier 2 or Tier 3 details based on which methodology was used to calculate emissions.

? *Were spent pulping liquor (the primary fuel for chemical recovery combustion units and recovery furnaces) and/or other biogenic fuel types used?*

➔ *If spent pulping liquor and/or other biogenic fuel types were the only fuels combusted by the unit during the reporting year, then do not report or include the “FossilFuelDetails” section in the facility’s XML file. Proceed to [Section 3.0](#) for instructions on how to report CEMS Unit Details, if applicable, or [Section 4.0](#) for instructions on how to report additional details.*

Figure 10
Fossil Fuel Details Schema Diagram



Note: Data elements boxed in red are required. Please see page 4 of this document for more information on conditionally required elements.

Table 8
Fossil Fuel Details Data Element Definitions

Data Element Name	Description
FossilFuelDetails	Parent Element (Conditionally Required): A collection of data elements containing information on the fuels combusted by the specified unit. Do not report this section in the facility's XML file if spent pulp liquor and/or other biogenic fuel types were the only fuels combusted in the unit during the reporting year.
FossilTierFuelDetails	Parent Element: A collection of data elements containing information about the fuel combusted by the specified unit. Report a separate instance of this section for each fuel type combusted in the unit.
FuelType	<p>Conditionally Required: Specify the type of fuel combusted in the unit during the reporting 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. Report only one fuel per instance of "FossilTierFuelDetails".</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 Naptha Unfinished Oils Heavy Gas Oils Lubricants Motor Gasoline

Data Element Name	Description
	Aviation Gasoline Kerosene-Type Jet Fuel Asphalt and Road Oil Crude Oil Propane Ethanol Biodiesel 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	Conditionally Required: Name of the specific fuel if not found in the list of allowable values. Otherwise, do not report this data element.
BlendFuelName	Conditionally Required: Name of the specific fuel blend if not found in the list of allowable values. Otherwise, do not report this data element.

XML Excerpt 3 Example for Fossil Fuel Details

```

<ghg:FossilFuelDetails>
  <ghg:FossilTierFuelDetails>
    <ghg:FuelType>Lignite</ghg:FuelType>
    <ghg:Tier1FuelDetails>
      <ghg:TierName>Tier 1 (Equation C-1)</ghg:TierName>
      <ghg:TierMethodologyStartDate>2011-01-01</ghg:TierMethodologyStartDate>
      <ghg:TierMethodologyEndDate>2011-12-31</ghg:TierMethodologyEndDate>
      <ghg:EmissionsDetailsNode>
        <ghg:TotalCO2CombustionEmissions massUOM="Metric Tons">
          <ghg:CalculatedValue>11121.1</ghg:CalculatedValue>
        </ghg:TotalCO2CombustionEmissions>
        <ghg:TotalCH4CombustionEmissions massUOM="Metric Tons">
          <ghg:CalculatedValue>143.11</ghg:CalculatedValue>
        </ghg:TotalCH4CombustionEmissions>
        <ghg:TotalN2OCombustionEmissions massUOM="Metric Tons">
          <ghg:CalculatedValue>18.111</ghg:CalculatedValue>
        </ghg:TotalN2OCombustionEmissions>
        <ghg:CH4EmissionsCO2Equivalent massUOM="Metric Tons">
          <ghg:CalculatedValue>2331.2</ghg:CalculatedValue>
        </ghg:CH4EmissionsCO2Equivalent>
        <ghg:N2OEmissionsCO2Equivalent massUOM="Metric Tons">
          <ghg:CalculatedValue>3410.5</ghg:CalculatedValue>
        </ghg:N2OEmissionsCO2Equivalent>
      </ghg:EmissionsDetailsNode>
    </ghg:Tier1FuelDetails>
  </ghg:FossilTierFuelDetails>
</ghg:FossilFuelDetails>
    
```

See the next section for instructions on reporting specific Tier fuel details.

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

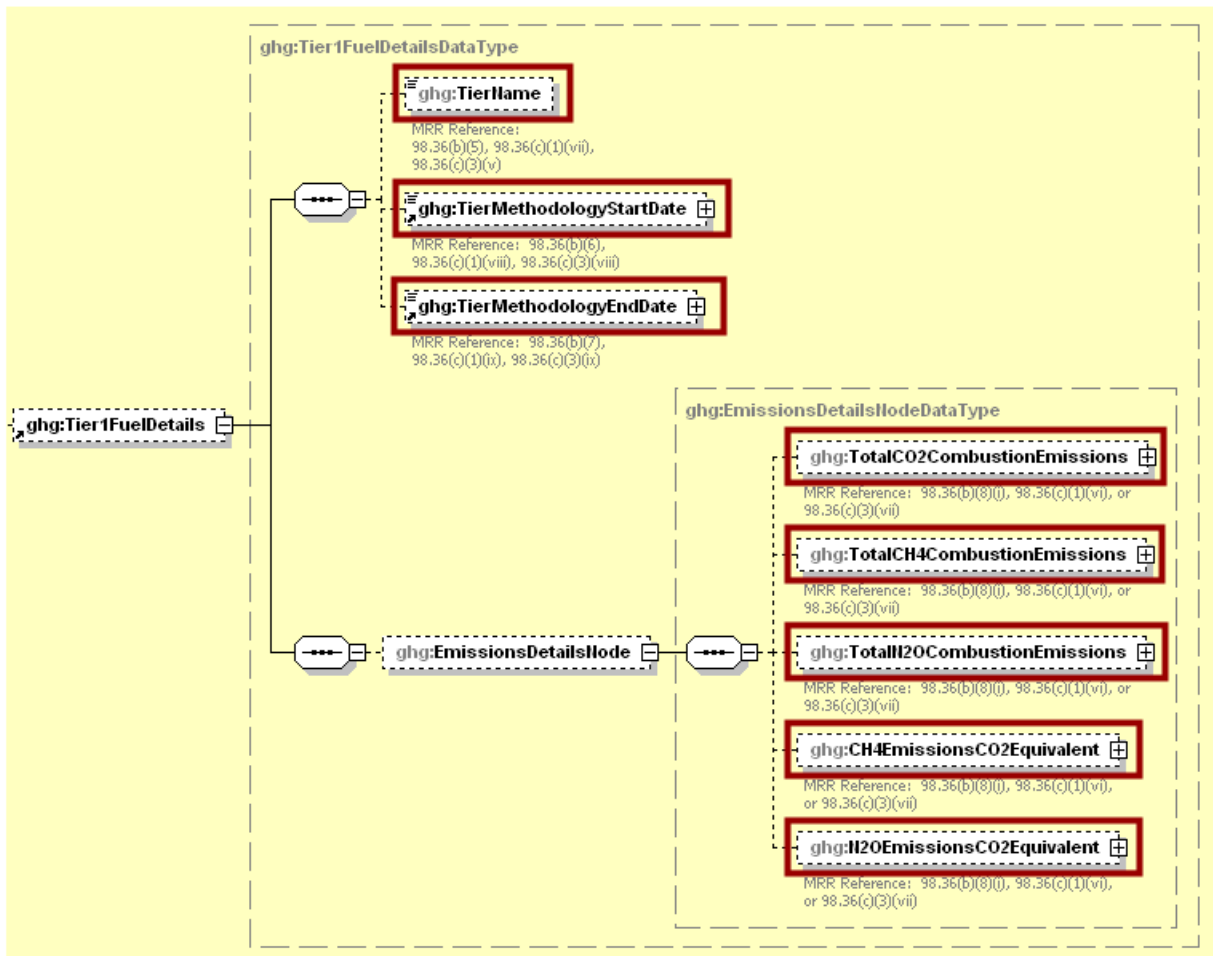
2.2.1 Tier 1 Fuel Details

Conditionally Required: 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 11
Tier 1 Fuel Details Schema Diagram**



Note: Data elements boxed in red are required.

**Table 9
Tier 1 Fuel Details Data Element Definitions**

Data Element Name	Description
Tier1FuelDetails	Parent Element (Conditionally Required): A collection of data elements to report if using a Tier 1 calculation methodology for the specified fuel type. Otherwise, do not report this parent element.
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 (YYYY-MM-DD).
TierMethodologyEndDate	The methodology end date for the specified fuel type (YYYY-MM-DD).
EmissionsDetailsNode	Parent Element: 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-1, C-1a or C-1b. Report the value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .

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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .

XML Excerpt 4 Example for Tier 1 Fuel Details

```

<ghg:FossilFuelDetails>
  <ghg:FossilTierFuelDetails>
    <ghg:FuelType>Lignite</ghg:FuelType>
    <ghg:Tier1FuelDetails>
      <ghg:TierName>Tier 1 (Equation C-1)</ghg:TierName>
      <ghg:TierMethodologyStartDate>2011-01-01</ghg:TierMethodologyStartDate>
      <ghg:TierMethodologyEndDate>2011-12-31</ghg:TierMethodologyEndDate>
      <ghg:EmissionsDetailsNode>
        <ghg:TotalCO2CombustionEmissions massUOM="Metric Tons">
          <ghg:CalculatedValue>11111.1</ghg:CalculatedValue>
        </ghg:TotalCO2CombustionEmissions>
        <ghg:TotalCH4CombustionEmissions massUOM="Metric Tons">
          <ghg:CalculatedValue>143.11</ghg:CalculatedValue>
        </ghg:TotalCH4CombustionEmissions>
        <ghg:TotalN2OCombustionEmissions massUOM="Metric Tons">
          <ghg:CalculatedValue>18.111</ghg:CalculatedValue>
        </ghg:TotalN2OCombustionEmissions>
        <ghg:CH4EmissionsCO2Equivalent massUOM="Metric Tons">
          <ghg:CalculatedValue>2331.2</ghg:CalculatedValue>
        </ghg:CH4EmissionsCO2Equivalent>
        <ghg:N2OEmissionsCO2Equivalent massUOM="Metric Tons">
          <ghg:CalculatedValue>3410.9</ghg:CalculatedValue>
        </ghg:N2OEmissionsCO2Equivalent>
      </ghg:EmissionsDetailsNode>
    </ghg:Tier1FuelDetails>
  </ghg:FossilTierFuelDetails>
  <ghg:FossilTierFuelDetails>
    <ghg:BlendFuelName>Blend A</ghg:BlendFuelName>
    <ghg:Tier1FuelDetails>
      <ghg:TierName>Tier 1 (Equation C-1)</ghg:TierName>
      <ghg:TierMethodologyStartDate>2011-01-01</ghg:TierMethodologyStartDate>
      <ghg:TierMethodologyEndDate>2011-12-31</ghg:TierMethodologyEndDate>
      <ghg:EmissionsDetailsNode>
        <ghg:TotalCO2CombustionEmissions massUOM="Metric Tons">
          <ghg:CalculatedValue>12345.3</ghg:CalculatedValue>
        </ghg:TotalCO2CombustionEmissions>
        <ghg:TotalCH4CombustionEmissions massUOM="Metric Tons">
          <ghg:CalculatedValue>222.73</ghg:CalculatedValue>
        </ghg:TotalCH4CombustionEmissions>
        <ghg:TotalN2OCombustionEmissions massUOM="Metric Tons">
          <ghg:CalculatedValue>33.486</ghg:CalculatedValue>
        </ghg:TotalN2OCombustionEmissions>
        <ghg:CH4EmissionsCO2Equivalent massUOM="Metric Tons">
          <ghg:CalculatedValue>4675.1</ghg:CalculatedValue>
        </ghg:CH4EmissionsCO2Equivalent>
        <ghg:N2OEmissionsCO2Equivalent massUOM="Metric Tons">
          <ghg:CalculatedValue>5410.6</ghg:CalculatedValue>
        </ghg:N2OEmissionsCO2Equivalent>
      </ghg:EmissionsDetailsNode>
    </ghg:Tier1FuelDetails>
  </ghg:FossilTierFuelDetails>

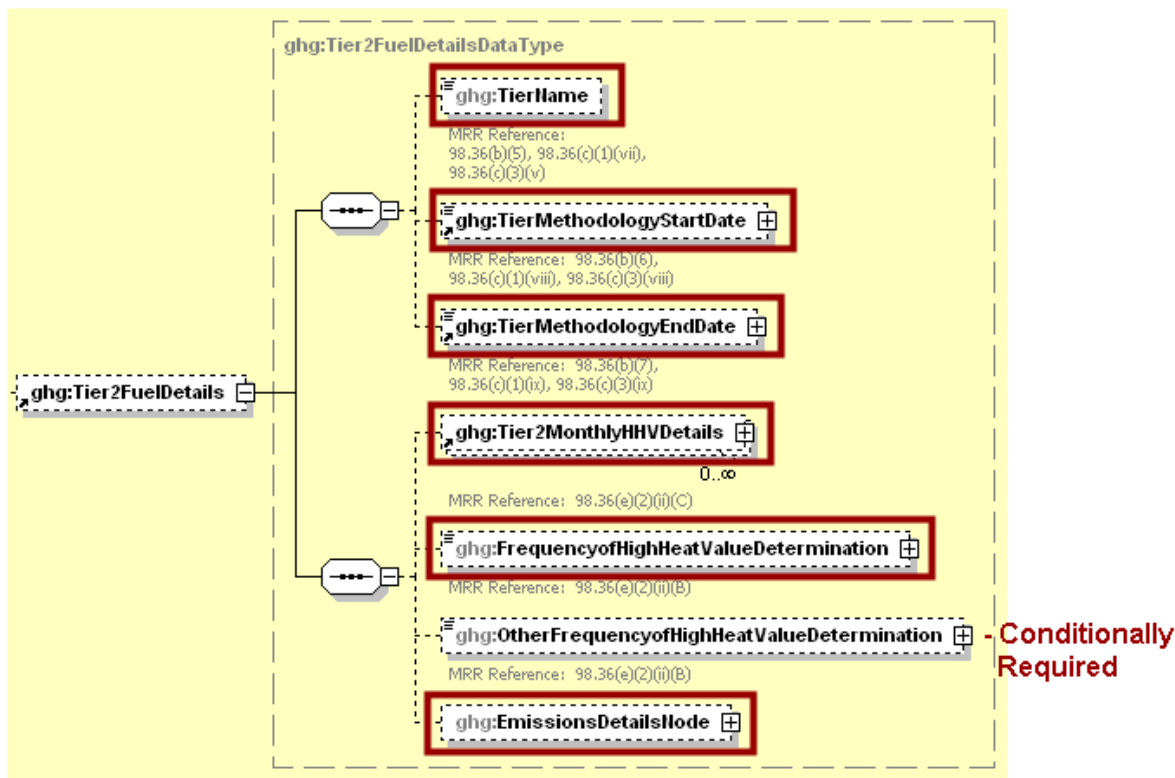
```

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

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

**Figure 12
Tier 2 Fuel Details Schema Diagram**

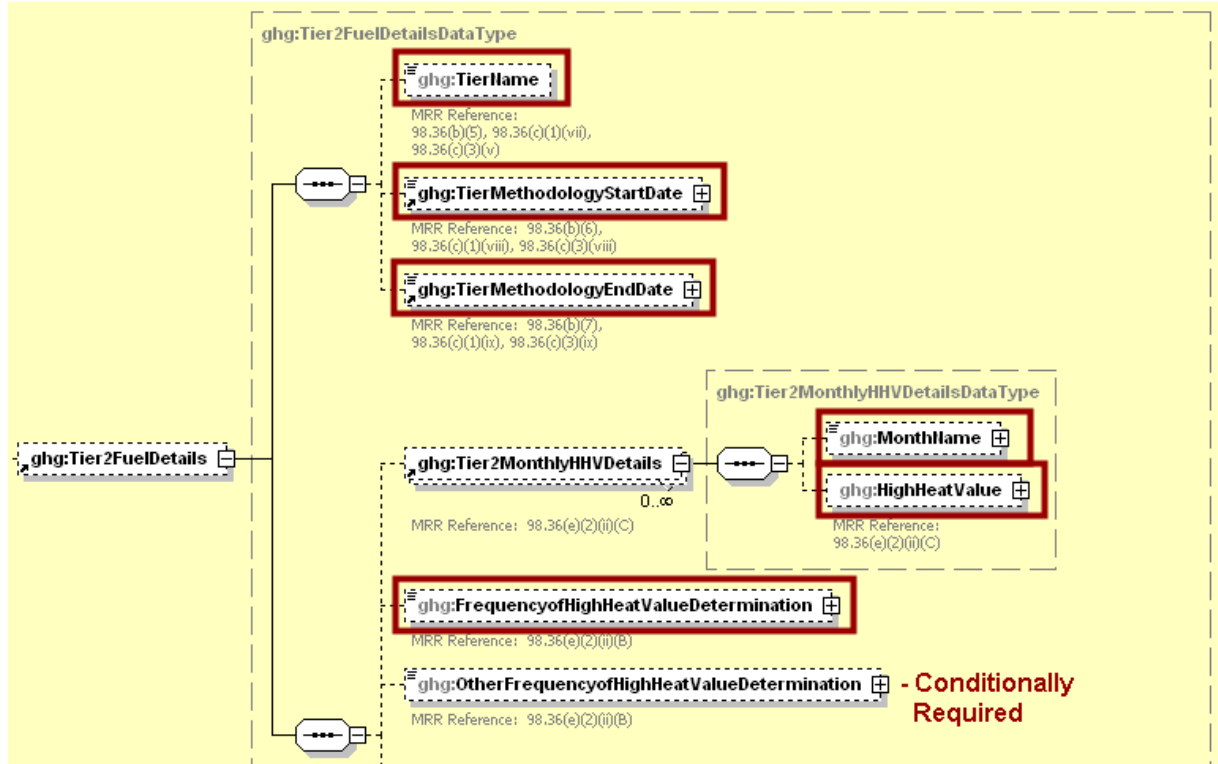


Note: Data elements boxed in red are required. Please see page 4 of this document for more information on conditionally required elements.

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

Figure 13
Tier 2 Dates and HHV Details Schema Diagram



Note: Data elements boxed in red are required. Please see page 4 of this document for more information on conditionally required elements.

Table 10
Tier 2 Dates and HHV Details Data Element Definitions

Data Element Name	Description
Tier2FuelDetails	Parent Element: 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 (YYYY-MM-DD).
TierMethodologyEndDate	The methodology end date for the specified fuel type (YYYY-MM-DD).
Tier2MonthlyHHVDetails	Parent Element: A collection of data elements containing information on monthly HHVs.

Data Element Name	Description
MonthName	<p>Month name. See list of allowable values:</p> <ul style="list-style-type: none"> January February March April May June July August September October November December
HighHeatValue	<p>Indicate (Y/N) if the monthly HHV value for the month specified was calculated using one or more substitute data values in the child data element IsSubstitutedIndicator.</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> <ul style="list-style-type: none"> Hourly Daily Weekly Monthly Semiannually Quarterly Once per fuel lot Upon addition of oil to the storage tank Other (specify)
OtherFrequencyofHighHeatValueDetermination	<p>Conditionally Required: The frequency of the HHV determinations if "Other (specify)" is reported. Otherwise, do not report this data element.</p>

XML Excerpt 5 Example for Tier 2 Dates and HHV Details

```

<ghg:Tier2FuelDetails>
  <ghg:TierName>Tier 2 (Equation C-2a)</ghg:TierName>
  <ghg:TierMethodologyStartDate>2011-01-01</ghg:TierMethodologyStartDate>
  <ghg:TierMethodologyEndDate>2011-12-31</ghg:TierMethodologyEndDate>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>January</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>Y</ghg:IsSubstitutedIndicator>
    </ghg:HighHeatValue>
  </ghg:Tier2MonthlyHHVDetails>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>February</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>
    </ghg:HighHeatValue>
  </ghg:Tier2MonthlyHHVDetails>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>March</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>
    </ghg:HighHeatValue>
  </ghg:Tier2MonthlyHHVDetails>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>April</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>
    </ghg:HighHeatValue>
  </ghg:Tier2MonthlyHHVDetails>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>May</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>
    </ghg:HighHeatValue>
  </ghg:Tier2MonthlyHHVDetails>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>June</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>
    </ghg:HighHeatValue>
  </ghg:Tier2MonthlyHHVDetails>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>July</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>
    </ghg:HighHeatValue>
  </ghg:Tier2MonthlyHHVDetails>
  <ghg:Tier2MonthlyHHVDetails>
    <ghg:MonthName>August</ghg:MonthName>
    <ghg:HighHeatValue>
      <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>
    </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 14
Tier 2 Emissions Details Schema Diagram



Note: Data elements boxed in red are required.

Table 11
Tier 2 Fuel Details Data Element Definitions

Data Element Name	Description
EmissionsDetailsNode	Parent Element: 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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .

XML Excerpt 6 Example for Tier 2 Fuel Details

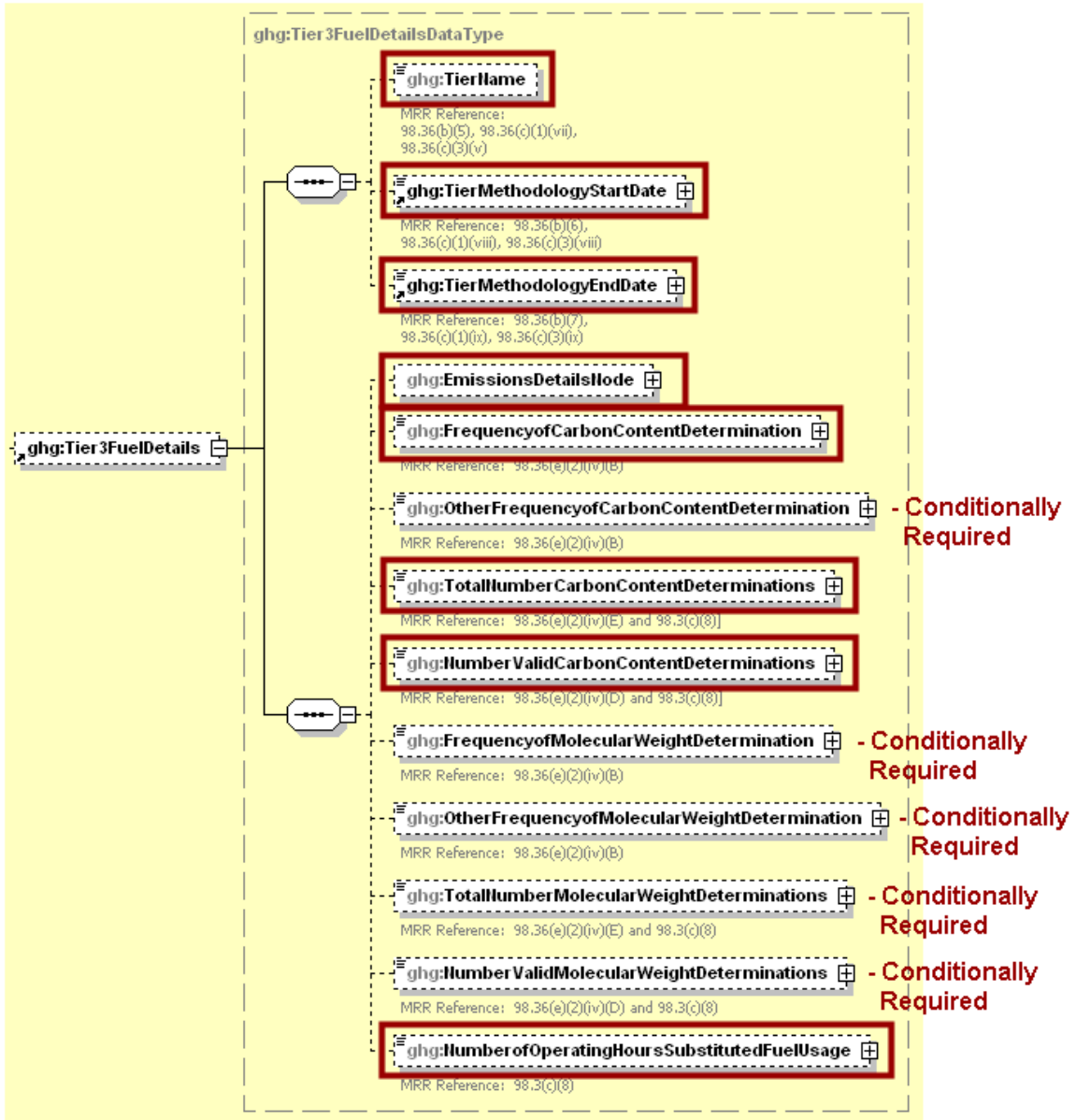
```
<ghg:EmissionsDetailsNode >
  <ghg:TotalCO2CombustionEmissions massUOM="Metric Tons">
    <ghg:CalculatedValue>444.1</ghg:CalculatedValue>
  </ghg:TotalCO2CombustionEmissions >
  <ghg:TotalCH4CombustionEmissions massUOM="Metric Tons">
    <ghg:CalculatedValue>44.23</ghg:CalculatedValue>
  </ghg:TotalCH4CombustionEmissions >
  <ghg:TotalN2OCombustionEmissions massUOM="Metric Tons">
    <ghg:CalculatedValue>4.654</ghg:CalculatedValue>
  </ghg:TotalN2OCombustionEmissions >
  <ghg:CH4EmissionsCO2Equivalent massUOM="Metric Tons">
    <ghg:CalculatedValue>44.2</ghg:CalculatedValue>
  </ghg:CH4EmissionsCO2Equivalent >
  <ghg:N2OEmissionsCO2Equivalent massUOM="Metric Tons">
    <ghg:CalculatedValue>4.9</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

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

Figure 15
Tier 3 Fuel Details Schema Diagram



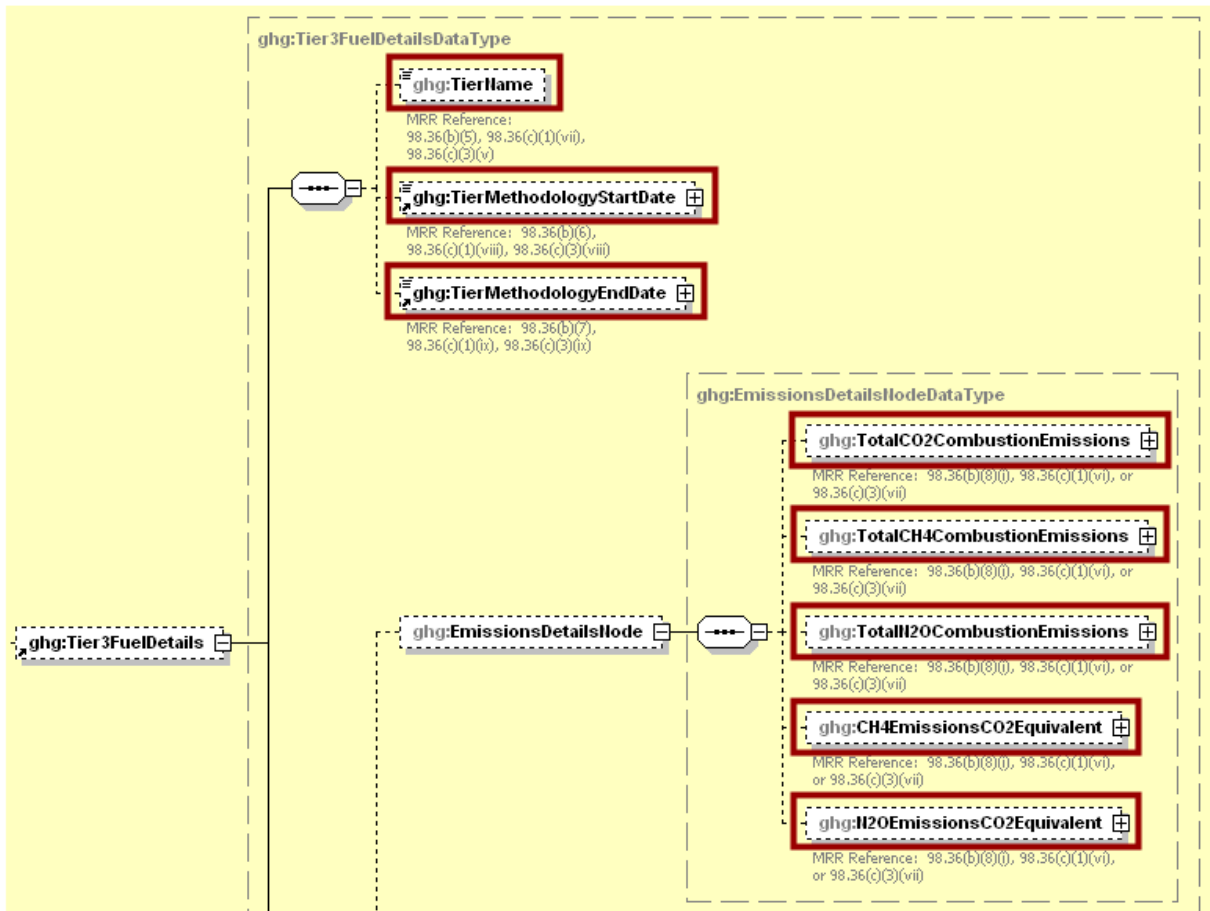
Note: Data elements boxed in red are required. Please see page 4 of this document for more information on conditionally required elements.

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 16
Tier 3 Methodology Dates and Emission Details Schema Diagram



Note: Data elements boxed in red are required.

Table 12
Tier 3 Methodology Dates and Emission Details Data Element Definitions

Data Element Name	Description
Tier3FuelDetails	Parent Element (Conditionally Required): A collection of data elements to report if using a Tier 3 calculation methodology for the specified fuel type. Otherwise, do not report this parent element.
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 (YYYY-MM-DD).
TierMethodologyEndDate	The methodology end date for the specified fuel type (YYYY-MM-DD).
EmissionsDetailsNode	Parent Element: 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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .

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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .

XML Excerpt 7 Example for Tier 3 Methodology Dates and Emission Details

```

<ghg:Tier3FuelDetails>
  <ghg:TierName>Tier 3 (Equation C-3, solid fuel)</ghg:TierName>
  <ghg:TierMethodologyStartDate>2011-01-01</ghg:TierMethodologyStartDate>
  <ghg:TierMethodologyEndDate>2011-12-31</ghg:TierMethodologyEndDate>
  <ghg:EmissionsDetailsNode>
    <ghg:TotalCO2CombustionEmissions massUOM="Metric Tons">
      <ghg:CalculatedValue>888.1</ghg:CalculatedValue>
    </ghg:TotalCO2CombustionEmissions>
    <ghg:TotalCH4CombustionEmissions massUOM="Metric Tons">
      <ghg:CalculatedValue>99.24</ghg:CalculatedValue>
    </ghg:TotalCH4CombustionEmissions>
    <ghg:TotalN2OCombustionEmissions massUOM="Metric Tons">
      <ghg:CalculatedValue>10.123</ghg:CalculatedValue>
    </ghg:TotalN2OCombustionEmissions>
    <ghg:CH4EmissionsCO2Equivalent massUOM="Metric Tons">
      <ghg:CalculatedValue>2079.9</ghg:CalculatedValue>
    </ghg:CH4EmissionsCO2Equivalent>
    <ghg:N2OEmissionsCO2Equivalent massUOM="Metric Tons">
      <ghg:CalculatedValue>3100.8</ghg:CalculatedValue>
    </ghg:N2OEmissionsCO2Equivalent>
  </ghg:EmissionsDetailsNode>
</ghg:Tier3FuelDetails>
  
```

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 17
Tier 3 Carbon Content and Molecular Weight Details Schema Diagram



Note: Data elements boxed in red are required. Please see page 4 of this document for more information on conditionally required elements.

Table 13
Tier 3 Carbon Content and Molecular Weight Details Data Element Definitions

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	<p>Conditionally Required: The frequency of the carbon content determinations if "Other (specify)" is reported. Otherwise, do not report this data element.</p>
TotalNumberCarbonContentDeterminations	<p>Total number of carbon content substitute data values used during the reporting year for the specified fuel type.</p>
NumberValidCarbonContentDeterminations	<p>The total number of valid carbon content determinations made during the reporting year for the specified fuel type.</p>
FrequencyofMolecularWeightDetermination	<p>Conditionally Required: For gaseous fuels only, the frequency of molecular weight determinations for the specified fuel during the reporting year. Otherwise, do not report this data element. 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	<p>Conditionally Required: For gaseous fuels only, the frequency of the molecular weight determinations if "Other (specify)" is reported. Otherwise, do not report this data element.</p>

Data Element Name	Description
TotalNumberMolecularWeightDeterminations	Conditionally Required: For gaseous fuels only, the total number of molecular weight substitute data values used during the reporting year for the specified fuel type. Otherwise, do not report this data element.
NumberValidMolecularWeightDeterminations	Conditionally Required: For gaseous fuels only, the total number of valid molecular weight determinations made during the reporting year for the specified fuel type. Otherwise, do not report this data element.
NumberofOperatingHoursSubstitutedFuelUsage	The total number of operating hours in the year for which missing data substitution was used for fuel usage. Set the units of measure to "Hours" in the attribute timeUOM .

XML Excerpt 8 Example 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:NumberofOperatingHours
SubstitutedFuelUsage >
</ghg:Tier3FuelDetails >
</ghg:FossilTierFuelDetails >
</ghg:FossilFuelDetails >
</ghg:AAUnit >

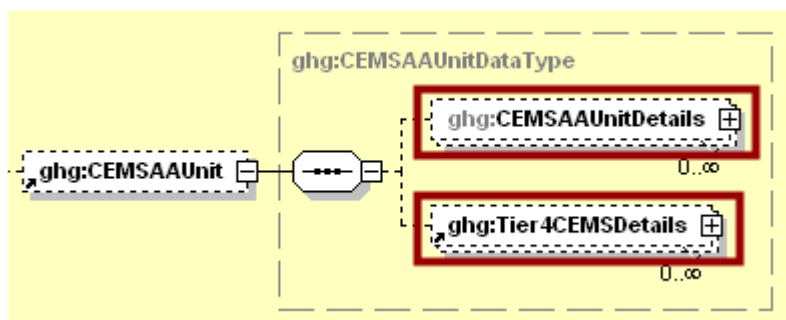
```

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

Conditionally Required: 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 18
CEMS Unit Details Schema Diagram



Note: Data elements boxed in red are required.

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).
 - Sulfite 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:

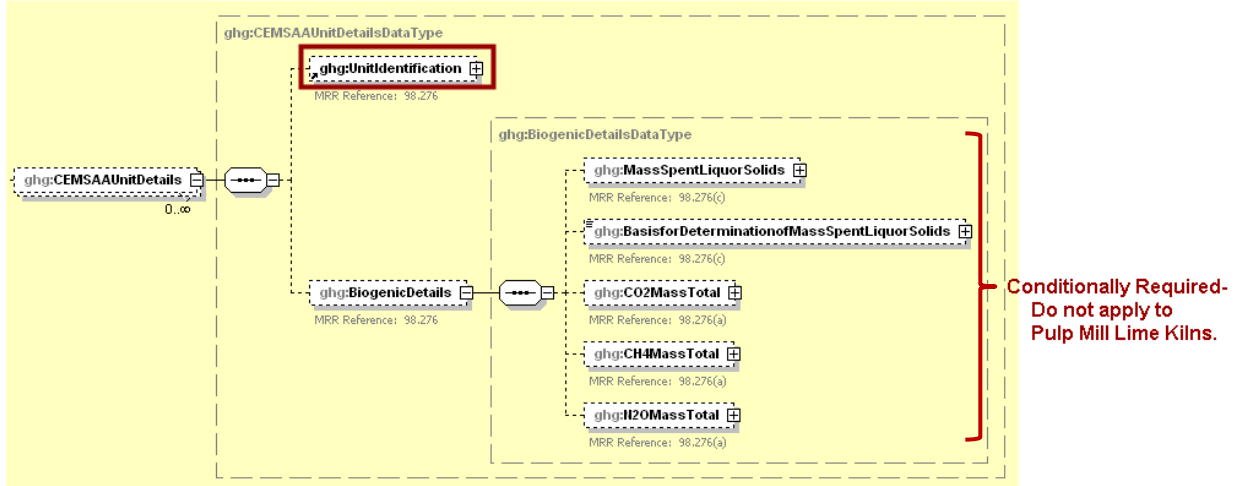
- An indication if the annual mass of spent liquor solids combusted in the unit during the year is a substitute data value calculated per the procedures described in §98.275(b) [98.3(c)(8)].
- The basis for determining the annual mass of spent liquor solids combusted in the unit during the year [98.276(c)]. 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 19
CEMS Unit ID and Biogenic Details Schema Diagram



Note: Data elements boxed in red are required. Please see page 4 of this document for more information on conditionally required elements.

Table 14
CEMS Unit ID and Biogenic Details Data Element Definitions

Data Element Name	Description
CEMSAAUnit	Parent Element (Conditionally Required): A collection of data elements containing information for each chemical recovery furnace, chemical recovery combustion unit or pulp mill lime kiln monitored by CEMS. Otherwise, do not report this parent element.
CEMSAAUnitDetails	Parent Element: 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. Report a unique unit name (ID) in the child data element UnitName , an optional brief description in the child data element UnitDescription and the type of unit in the child data element UnitType . See list of allowable values for unit type: Chemical Recovery Furnace Chemical Recovery Combustion Unit Pulp Mill Lime Kiln

Data Element Name	Description
BiogenicDetails	Parent Element (Conditionally Required): 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. Do not include this set of data elements in your XML file if your unit is a Pulp Mill Lime Kiln.
MassSpentLiquorSolids	Indicate (Y/N) if a substitute value was used for the annual mass of spent liquor solids in the child data element IsSubstitutedIndicator .
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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
CH4MassTotal	A collection of data elements containing information on CH ₄ emissions from spent liquor solids combustion. Report the value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM . Note: Do not include CH ₄ emissions reported here in the CEMS Monitoring Location (CML) emissions data.
N2OMassTotal	A collection of data elements containing information on N ₂ O emissions from spent liquor solids combustion. Report the value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM . Note: Do not include N ₂ O emissions reported here in the CEMS Monitoring Location (CML) emissions data.

XML Excerpt 9 Example for CEMS Unit ID and Biogenic Details

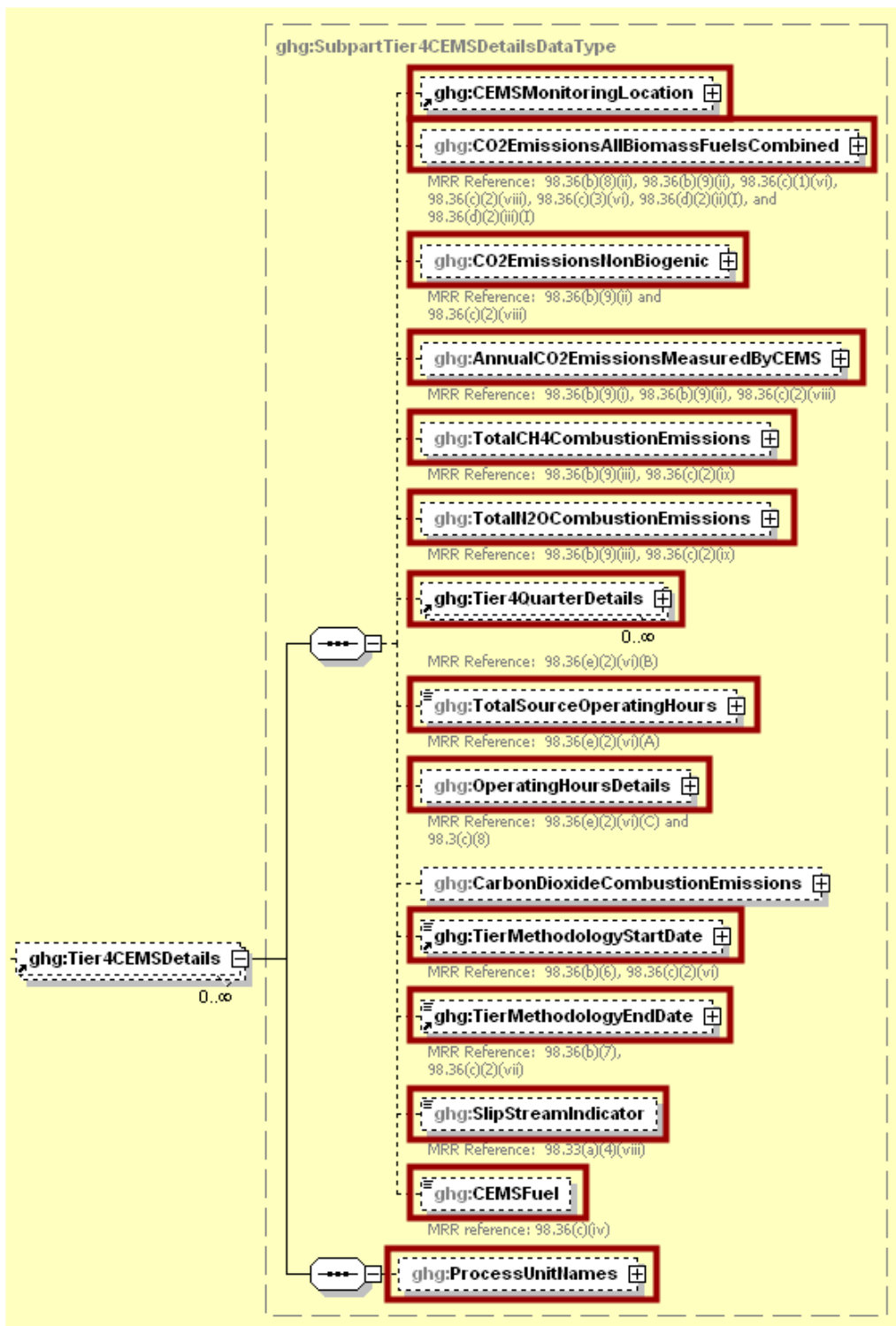
```
<ghg:CEMSAAUnit>
  <ghg:CEMSAAUnitDetails>
    <ghg:UnitIdentification>
      <ghg:UnitName>005- CEMS</ghg:UnitName>
      <ghg:UnitDescription>Chemical Recovery Furnace CEMS unit 005</ghg:UnitDescription>
      <ghg:UnitType>Chemical Recovery Furnace</ghg:UnitType>
    </ghg:UnitIdentification>
    <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>7777.1</ghg:CalculatedValue>
      </ghg:CO2MassTotal>
      <ghg:CH4MassTotal massUOM="Metric Tons">
        <ghg:CalculatedValue>777.67</ghg:CalculatedValue>
      </ghg:CH4MassTotal>
      <ghg:N2OMassTotal massUOM="Metric Tons">
        <ghg:CalculatedValue>77.978</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 20
Tier 4 CEMS Details Schema Diagram



Note: Data elements boxed in red are required.

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:

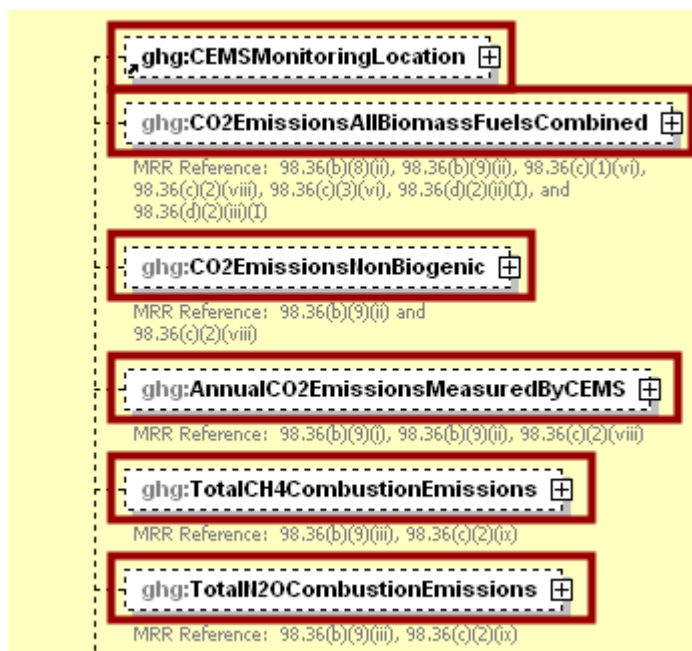
- Single industrial process or process unit that exhausts to a dedicated stack.
- Multiple industrial processes or process units share a common stack.
- Industrial process or process unit shares a common stack with a Tier 4 stationary fuel combustion unit.

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)(9)(ii), 98.36(c)(2)(viii)].
- 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), 98.36(c)(2)(viii)].
- The total annual CO₂ mass emissions measured by the CEMS [98.36(b)(9)(i)-(ii), 98.36(c)(2)(viii)].
- 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 21
Tier 4 CEMS Location and Emission Details Schema Diagram



Note: Data elements boxed in red are required.

Table 15
Tier 4 CEMS Location and Emission Details Data Element Definitions

Data Element Name	Description
Tier4CEMSDetails	Parent Element: A collection of data elements containing information on emissions from combustion sources monitored with Tier 4 CEMS methodology.
CEMSMonitoringLocation	A collection of data elements containing information on each CEMS monitoring location (CML). Report a unique unit name (ID) in the child data element Name , an optional brief description in the child data element Description and the configuration type in the child data element Type . See the list of allowable configuration types: Single process/process unit exhausts to dedicated stack Multiple processes/process units share common stack Process/stationary combustion units share common stack
CO2EmissionsAllBiomassFuelsCombined	A collection of data elements containing information on the total annual biogenic CO ₂ mass emissions for the specified CML. Report the value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
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 value in the child data element CalculatedValue . Set the units of measure to “Metric Tons” in the attribute massUOM .

XML Excerpt 10

Example 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>150.1</ghg:CalculatedValue>
  </ghg:CO2EmissionsAllBiomassFuelsCombined>
  <ghg:CO2EmissionsNonBiogenic massUOM="Metric Tons">
    <ghg:CalculatedValue>20.6</ghg:CalculatedValue>
  </ghg:CO2EmissionsNonBiogenic>
  <ghg:AnnualCO2EmissionsMeasuredByCEMS massUOM="Metric Tons">
    <ghg:CalculatedValue>1110.7</ghg:CalculatedValue>
  </ghg:AnnualCO2EmissionsMeasuredByCEMS>
  <ghg:TotalCH4CombustionEmissions massUOM="Metric Tons">
    <ghg:CalculatedValue>111.45</ghg:CalculatedValue>
  </ghg:TotalCH4CombustionEmissions>
  <ghg:TotalN2OCombustionEmissions massUOM="Metric Tons">
    <ghg:CalculatedValue>20.234</ghg:CalculatedValue>
  </ghg:TotalN2OCombustionEmissions>

```

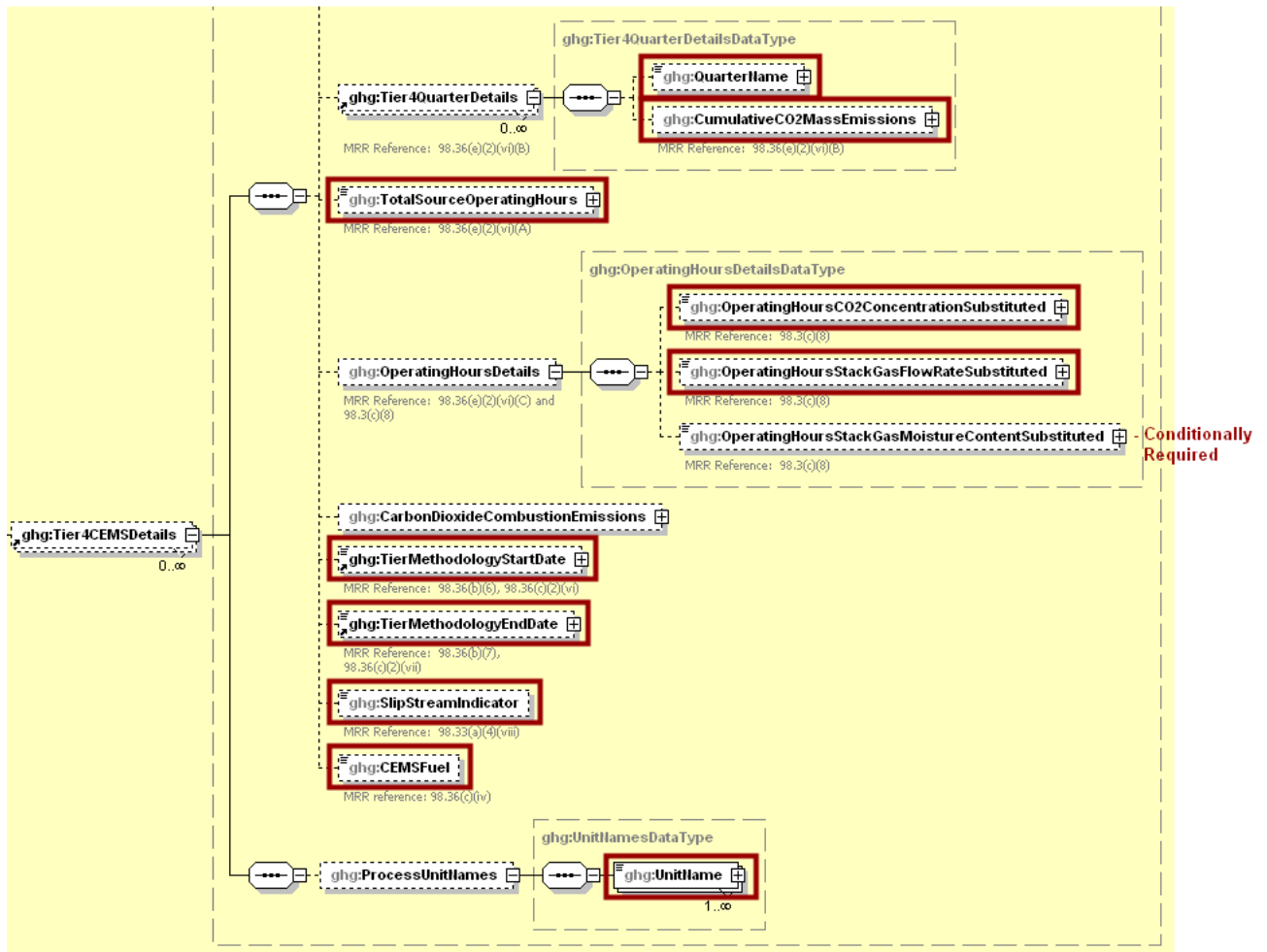
Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

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), 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), 98.3(c)(8)].
- **Conditionally Required:** 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), 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(b)(4), 98.36(c)(2)(iv)].
- The name of each process unit sharing the stack. **Note:** Use the same identification for the unit as was used for the parent element "CEMSAAUnitDetails".

Figure 22
Tier 4 CEMS Quarter and Additional Details Schema Diagram



Note: Data elements boxed in red are required. Please see page 4 of this document for more information on conditionally required elements.

Table 16
Tier 4 CEMS Quarter and Additional Details Data Element Definitions

Data Element Name	Description
Tier4QuarterDetails	Parent Element: 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 value in the child data element CalculatedValue . Set the units of measure to "Metric Tons" in the attribute massUOM .
TotalSourceOperatingHours	The total number of source operating hours in the reporting year.
OperatingHoursDetails	Parent Element: 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	Conditionally Required: Report the total operating hours in which a substitute data value was used in the emissions calculations for the stack gas moisture content parameter. Note: Report this information only if moisture correction is required and a continuous moisture monitor is used; otherwise, do not include this data element in the XML file.
TierMethodologyStartDate	The tier methodology start date for the specified CEMS monitoring location (YYYY-MM-DD).
TierMethodologyEndDate	The tier methodology end date for the specified CEMS monitoring location (YYYY-MM-DD).
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.

Data Element Name	Description
ProcessUnitNames	Parent Element: 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. Note: Use the same identification for the unit as was used for the parent element "CEMSAAUnitDetails".

XML Excerpt 11 Example for Tier 4 CEMS Quarter and Additional Details

```

<ghg:Tier4QuarterDetails>
  <ghg:QuarterName>First Quarter</ghg:QuarterName>
  <ghg:CumulativeCO2MassEmissions massUOM="Metric Tons">
    <ghg:CalculatedValue>111.2</ghg:CalculatedValue>
  </ghg:CumulativeCO2MassEmissions>
</ghg:Tier4QuarterDetails>
<ghg:Tier4QuarterDetails>
  <ghg:QuarterName>Second Quarter</ghg:QuarterName>
  <ghg:CumulativeCO2MassEmissions massUOM="Metric Tons">
    <ghg:CalculatedValue>222.4</ghg:CalculatedValue>
  </ghg:CumulativeCO2MassEmissions>
</ghg:Tier4QuarterDetails>
<ghg:Tier4QuarterDetails>
  <ghg:QuarterName>Third Quarter</ghg:QuarterName>
  <ghg:CumulativeCO2MassEmissions massUOM="Metric Tons">
    <ghg:CalculatedValue>333.7</ghg:CalculatedValue>
  </ghg:CumulativeCO2MassEmissions>
</ghg:Tier4QuarterDetails>
<ghg:Tier4QuarterDetails>
  <ghg:QuarterName>Fourth Quarter</ghg:QuarterName>
  <ghg:CumulativeCO2MassEmissions massUOM="Metric Tons">
    <ghg:CalculatedValue>444.9</ghg:CalculatedValue>
  </ghg:CumulativeCO2MassEmissions>
</ghg:Tier4QuarterDetails>
<ghg:TotalSourceOperatingHours>300</ghg:TotalSourceOperatingHours>
<ghg:OperatingHoursDetails>
  <ghg:OperatingHoursCO2ConcentrationSubstituted>4</ghg:OperatingHoursCO2ConcentrationSubstituted>
  <ghg:OperatingHoursStackGasFlowRateSubstituted>5</ghg:OperatingHoursStackGasFlowRateSubstituted>
  <ghg:OperatingHoursStackGasMoistureContentSubstituted>6</ghg:OperatingHoursStackGasMoistureContentSubstituted>
</ghg:OperatingHoursDetails>
<ghg:TierMethodologyStartDate>2011-01-01</ghg:TierMethodologyStartDate>
<ghg:TierMethodologyEndDate>2011-12-31</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.

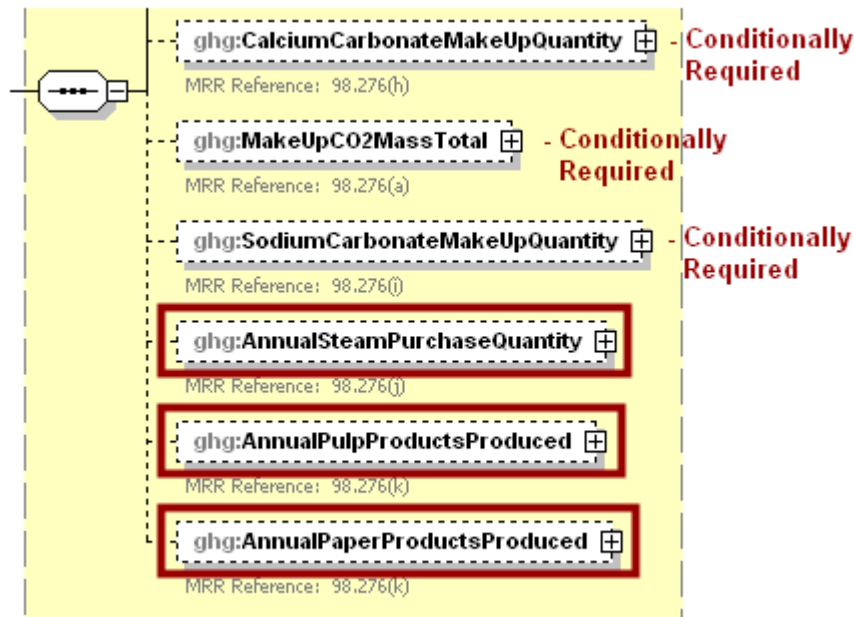
Conditionally Required: If the facility has makeup chemical use, the following information is required:

- An indication if the quantity of CaCO₃ (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 CO₂ mass emissions from makeup chemical use calculated using Equation AA-3 [98.276(a)].
- An indication if the quantity of Na₂CO₃ (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 23
Additional Details Schema Diagram**



Note: Data elements boxed in red are required. Please see page 4 of this document for more information on conditionally required elements.

Table 17
Additional Details Data Element Definitions

Data Element Name	Description
CalciumCarbonateMakeUpQuantity	Conditionally Required: If the facility has makeup chemical use, indicate (Y/N) whether a substitute value was used for the calcium carbonate makeup quantity in the child data element IsSubstitutedIndicator. Otherwise, do not report this data element.
MakeUpCO2MassTotal	Conditionally Required: A collection of data elements containing information on CO ₂ mass emissions from makeup chemical use, calculated using Equation AA-3. Report if the facility has makeup chemical use. Otherwise, do not report this data element. Report the value in the child data element MeasureValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
SodiumCarbonateMakeUpQuantity	Conditionally Required: If the facility has makeup chemical use, indicate (Y/N) whether a substitute value was used for the sodium carbonate makeup quantity in the child data element IsSubstitutedIndicator. Otherwise, do not report this data element.
AnnualSteamPurchaseQuantity	A collection of data elements containing information on annual steam purchases. Report the value in the child data element MeasureValue . Set the units of measure to “Pounds” in the attribute massUOM .
AnnualPulpProductsProduced	A collection of data elements containing information on the annual production of pulp products. Report the value in the child data element MeasureValue . Set the units of measure to “Metric Tons” in the attribute massUOM .
AnnualPaperProductsProduced	A collection of data elements containing information on Annual production of paper products. Report the value in the child data element MeasureValue . Set the units of measure to “Metric Tons” in the attribute massUOM .

XML Excerpt 12
Example for Additional Details

```

<ghg:CalciumCarbonateMakeUpQuantity>
  <ghg:IsSubstitutedIndicator>Y</ghg:IsSubstitutedIndicator>
</ghg:CalciumCarbonateMakeUpQuantity>
<ghg:MakeUpCO2MassTotal massUOM="Metric Tons">
  <ghg:MeasureValue>1111.2</ghg:MeasureValue>
</ghg:MakeUpCO2MassTotal>
<ghg:SodiumCarbonateMakeUpQuantity>
  <ghg:IsSubstitutedIndicator>Y</ghg:IsSubstitutedIndicator>
</ghg:SodiumCarbonateMakeUpQuantity>
<ghg:AnnualSteamPurchaseQuantity massUOM="Pounds">
  <ghg:MeasureValue>11111.24246</ghg:MeasureValue>
</ghg:AnnualSteamPurchaseQuantity>
<ghg:AnnualPulpProductsProduced massUOM="Metric Tons">
  <ghg:MeasureValue>22222.1222351</ghg:MeasureValue>
</ghg:AnnualPulpProductsProduced>
<ghg:AnnualPaperProductsProduced massUOM="Metric Tons">
  <ghg:MeasureValue>33333.233</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

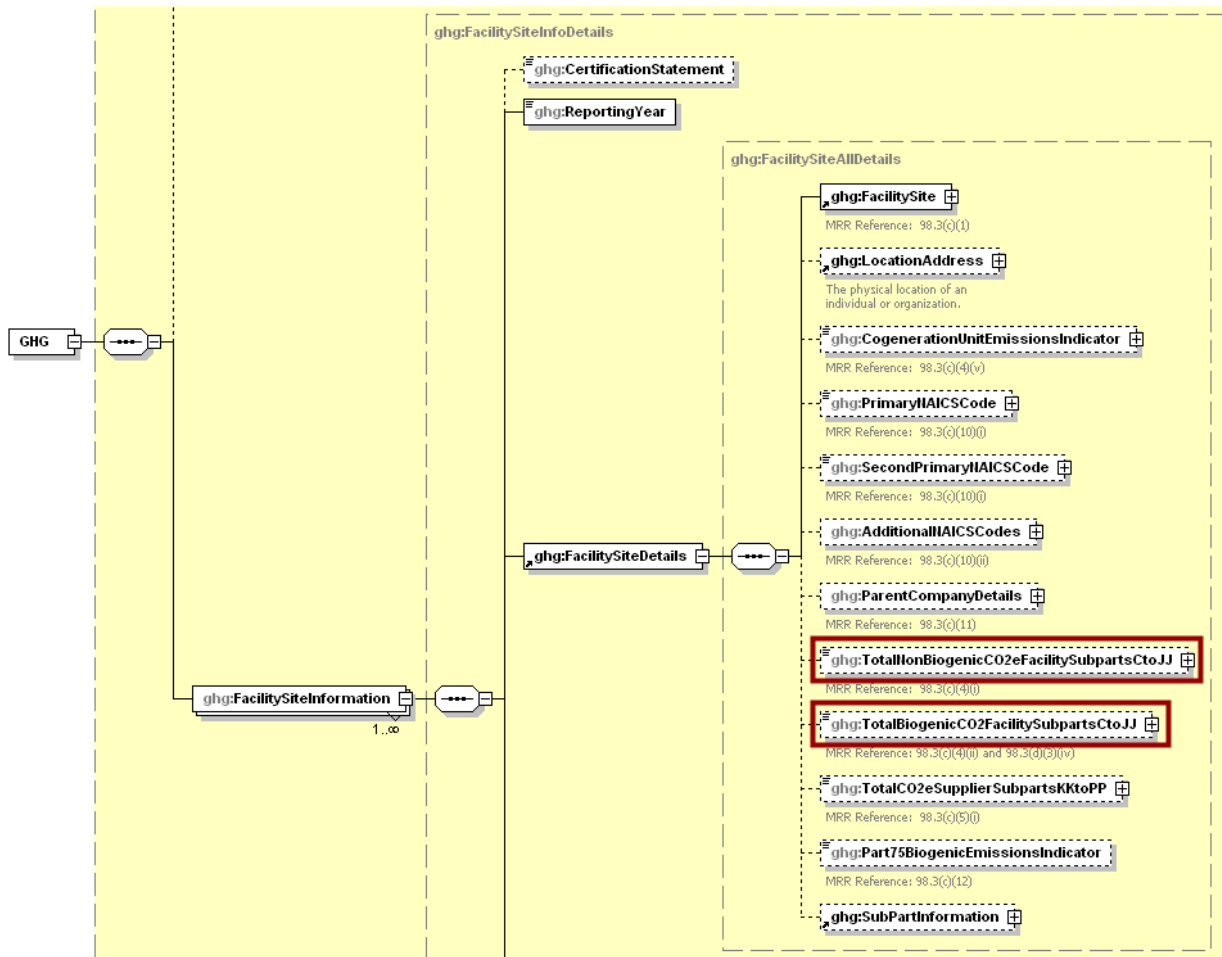
Each facility must report the following facility-level emission totals:

- 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). **Note:** Do not include Subpart LL and MM totals in this data element as these values are not being collected in e-GGRT.

Figure 24
Facility-Level Roll-up Emissions Schema Diagram



Note: Data elements boxed in red are required.

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.
 - Multiply the CH₄ emissions from biomass from non-CEMS Chemical Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons 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 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 for each non-CEMS Chemical Recovery Furnace.
 - Multiply the CH₄ emissions from each fossil fuel from non-CEMS Chemical Recovery Furnaces in metric tons 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 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 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 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 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 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 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 for each pulp mill lime kiln.
 - Multiply the CH₄ emissions from each fossil fuel from non-CEMS pulp mill lime kilns in metric tons 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 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 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 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 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 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 for each CML by the Global Warming Potential for CH₄ (21) and add the resulting value.
- Multiply the total N₂O emissions in metric tons 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 for each CML.
- Subtract the biogenic CO₂ emissions from Chemical Recovery Furnaces (from spent liquor solids using Equation AA-1) in metric tons 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 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 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 for each Chemical Recovery Combustion Unit.

Note: You must follow the rounding rules found in [Table 1](#).

Table 18
Facility Level Roll-up Emissions Data Element Definitions

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. Set the units of measure to “Metric Tons” in the attribute massUOM .
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. Set the units of measure to “Metric Tons” in the attribute massUOM .

XML Excerpt 13
Example for Facility Level Roll-up Emissions

```
<ghg:TotalNonBiogenicCO2eFacilitySubpartsCtoJJ massUOM="Metric Tons">60713.1 </ghg:TotalNonBiogenicCO2eFacilitySubpartsCtoJJ>
<ghg:TotalBiogenicCO2FacilitySubpartsCtoJJ massUOM="Metric Tons">9443.6 </ghg:TotalBiogenicCO2FacilitySubpartsCtoJJ>
```

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

IV. Appendix A – Sample XML Document for Subpart AA

(Note: Data values do not reflect an actual facility's emissions. Additional sample XML files for Subpart AA are posted on the e-GGRT help site. <http://www.ccdsupport.com/confluence/display/help/Additional+XML+Examples>)

```
<?xml version="1.0" encoding="UTF-8"? >
<ghg:GHG xsi:schemaLocation="http://www.exchangenetwork.net/schema/ghg/1 file:///L:/XML_Schema/ GHG_schema_01-27-2012/GHG_Final_v2.0.xsd"
xmlns:ghg="http://www.exchangenetwork.net/schema/ghg/1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <ghg:FacilitySiteInformation>
    <ghg:ReportingYear>2011 </ghg:ReportingYear>
    <ghg:FacilitySiteDetails>
      <ghg:FacilitySite>
        <ghg:FacilitySiteIdentifier>523997 </ghg:FacilitySiteIdentifier>
        <ghg:FacilitySiteName>Test Facility AA </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:ParentCompanyDetails>
        <ghg:ParentCompany>
          <ghg:ParentCompanyLegalName>Soda Ash Corporation </ghg:ParentCompanyLegalName>
          <ghg:StreetAddress>108 Hillcrest Street </ghg:StreetAddress>
          <ghg:City>Sandpoint </ghg:City>
          <ghg:StateID </ghg:State>
          <ghg:Zip>83864 </ghg:Zip>
          <ghg:PercentOwnershipInterest>100.0 </ghg:PercentOwnershipInterest>
        </ghg:ParentCompany>
      </ghg:ParentCompanyDetails>
      <ghg>TotalNonBiogenicCO2eFacilitySubpartsCtoJJ massUOM="Metric Tons">60999.6 </ghg>TotalNonBiogenicCO2eFacilitySubpartsCtoJJ>
      <ghg>TotalBiogenicCO2FacilitySubpartsCtoJJ massUOM="Metric Tons">9443.1 </ghg>TotalBiogenicCO2FacilitySubpartsCtoJJ>
      <ghg>TotalCO2eSupplierSubpartsKtoPP massUOM="Metric Tons">0 </ghg>TotalCO2eSupplierSubpartsKtoPP>
    </ghg:SubPartInformation>
    <ghg:SubPartAA>
      <ghg:GHGasInfoDetails>
        <ghg:GHGasName>Biogenic Carbon dioxide </ghg:GHGasName>
        <ghg:GHGasQuantity massUOM="Metric Tons">
          <ghg:CalculatedValue>9443.1 </ghg:CalculatedValue>
        </ghg:GHGasQuantity>
      </ghg:GHGasInfoDetails>
      <ghg:GHGasInfoDetails>
        <ghg:GHGasName>Methane </ghg:GHGasName>
        <ghg:GHGasQuantity massUOM="Metric Tons">
          <ghg:CalculatedValue>1097.22 </ghg:CalculatedValue>
        </ghg:GHGasQuantity>
      </ghg:GHGasInfoDetails>
    </ghg:SubPartAA>
  </ghg:FacilitySiteInformation>
</ghg:GHG>
```

```

    </ghg:GHGasQuantity >
  </ghg:GHGasInfoDetails >
<ghg:GHGasInfoDetails >
  <ghg:GHGasName>Nitrous Oxide</ghg:GHGasName >
  <ghg:GHGasQuantity massUOM="Metric Tons" >
    <ghg:CalculatedValue>109.909</ghg:CalculatedValue >
  </ghg:GHGasQuantity >
</ghg:GHGasInfoDetails >
<ghg:GHGasInfoDetails >
  <ghg:GHGasName>Carbon Dioxide</ghg:GHGasName >
  <ghg:GHGasQuantity massUOM="Metric Tons" >
    <ghg:CalculatedValue>3886.2</ghg:CalculatedValue >
  </ghg:GHGasQuantity >
</ghg:GHGasInfoDetails >
<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>1111.2</ghg:CalculatedValue >
    </ghg:CO2MassTotal >
    <ghg:CH4MassTotal massUOM="Metric Tons" >
      <ghg:CalculatedValue>111.34</ghg:CalculatedValue >
    </ghg:CH4MassTotal >
    <ghg:N2OMassTotal massUOM="Metric Tons" >
      <ghg:CalculatedValue>11.235</ghg:CalculatedValue >
    </ghg:N2OMassTotal >
  </ghg:BiogenicDetails >
  <ghg:FossilFuelDetails >
    <ghg:FossilTierFuelDetails >
      <ghg:FuelType >Lignite</ghg:FuelType >
      <ghg:Tier2FuelDetails >
        <ghg:TierName >Tier 2 (Equation C-2a)</ghg:TierName >
        <ghg:TierMethodologyStartDate >2011-01-01</ghg:TierMethodologyStartDate >
        <ghg:TierMethodologyEndDate >2011-12-31</ghg:TierMethodologyEndDate >
        <ghg:Tier2MonthlyHHVDetails >
          <ghg:MonthName >January</ghg:MonthName >
          <ghg:HighHeatValue >
            <ghg:IsSubstitutedIndicator >Y</ghg:IsSubstitutedIndicator >
          </ghg:HighHeatValue >
        </ghg:Tier2MonthlyHHVDetails >
        <ghg:Tier2MonthlyHHVDetails >
          <ghg:MonthName >February</ghg:MonthName >
          <ghg:HighHeatValue >
            <ghg:IsSubstitutedIndicator >N</ghg:IsSubstitutedIndicator >
          </ghg:HighHeatValue >
        </ghg:Tier2MonthlyHHVDetails >
      </ghg:Tier2FuelDetails >
    </ghg:FossilTierFuelDetails >
  </ghg:FossilFuelDetails >
</ghg:AAUnit >

```

```
<ghg:Tier2MonthlyHHVDetails>  
<ghg:MonthName>March</ghg:MonthName>  
  <ghg:HighHeatValue>  
    <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>  
  </ghg:HighHeatValue>  
</ghg:Tier2MonthlyHHVDetails>  
<ghg:Tier2MonthlyHHVDetails>  
  <ghg:MonthName>April</ghg:MonthName>  
  <ghg:HighHeatValue>  
    <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>  
  </ghg:HighHeatValue>  
</ghg:Tier2MonthlyHHVDetails>  
<ghg:Tier2MonthlyHHVDetails>  
  <ghg:MonthName>May</ghg:MonthName>  
  <ghg:HighHeatValue>  
    <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>  
  </ghg:HighHeatValue>  
</ghg:Tier2MonthlyHHVDetails>  
<ghg:Tier2MonthlyHHVDetails>  
  <ghg:MonthName>June</ghg:MonthName>  
  <ghg:HighHeatValue>  
    <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>  
  </ghg:HighHeatValue>  
</ghg:Tier2MonthlyHHVDetails>  
<ghg:Tier2MonthlyHHVDetails>  
  <ghg:MonthName>July</ghg:MonthName>  
  <ghg:HighHeatValue>  
    <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>  
  </ghg:HighHeatValue>  
</ghg:Tier2MonthlyHHVDetails>  
<ghg:Tier2MonthlyHHVDetails>  
  <ghg:MonthName>August</ghg:MonthName>  
  <ghg:HighHeatValue>  
    <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>  
  </ghg:HighHeatValue>  
</ghg:Tier2MonthlyHHVDetails>  
<ghg:Tier2MonthlyHHVDetails>  
  <ghg:MonthName>September</ghg:MonthName>  
  <ghg:HighHeatValue>  
    <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>  
  </ghg:HighHeatValue>  
</ghg:Tier2MonthlyHHVDetails>  
<ghg:Tier2MonthlyHHVDetails>  
  <ghg:MonthName>October</ghg:MonthName>  
  <ghg:HighHeatValue>  
    <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>  
  </ghg:HighHeatValue>  
</ghg:Tier2MonthlyHHVDetails>  
<ghg:Tier2MonthlyHHVDetails>  
  <ghg:MonthName>November</ghg:MonthName>  
  <ghg:HighHeatValue>  
    <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>  
  </ghg:HighHeatValue>  
</ghg:Tier2MonthlyHHVDetails>
```

```

    <ghg:Tier2MonthlyHHVDetails>
      <ghg:MonthName>December</ghg:MonthName>
      <ghg:HighHeatValue>
        <ghg:IsSubstitutedIndicator>N</ghg:IsSubstitutedIndicator>
      </ghg:HighHeatValue>
    </ghg:Tier2MonthlyHHVDetails>
    <ghg:FrequencyofHighHeatValueDetermination>Upon addition of oil to the storage
    tank</ghg:FrequencyofHighHeatValueDetermination>
    <ghg:EmissionsDetailsNode>
      <ghg:TotalCO2CombustionEmissions massUOM="Metric Tons">
        <ghg:CalculatedValue>444.1</ghg:CalculatedValue>
      </ghg:TotalCO2CombustionEmissions>
      <ghg:TotalCH4CombustionEmissions massUOM="Metric Tons">
        <ghg:CalculatedValue>44.34</ghg:CalculatedValue>
      </ghg:TotalCH4CombustionEmissions>
      <ghg:TotalN2OCombustionEmissions massUOM="Metric Tons">
        <ghg:CalculatedValue>4.909</ghg:CalculatedValue>
      </ghg:TotalN2OCombustionEmissions>
      <ghg:CH4EmissionsCO2Equivalent massUOM="Metric Tons">
        <ghg:CalculatedValue>44.2</ghg:CalculatedValue>
      </ghg:CH4EmissionsCO2Equivalent>
      <ghg:N2OEmissionsCO2Equivalent massUOM="Metric Tons">
        <ghg:CalculatedValue>4.7</ghg:CalculatedValue>
      </ghg:N2OEmissionsCO2Equivalent>
    </ghg:EmissionsDetailsNode>
  </ghg:Tier2FuelDetails>
</ghg:FossilTierFuelDetails>
</ghg:FossilFuelDetails>
</ghg:AAUnit>
<ghg:AAUnit>
  <ghg:UnitIdentification>
    <ghg:UnitName>003- CRU</ghg:UnitName>
    <ghg:UnitDescription>Chemical Recovery Combustion Unit 003</ghg:UnitDescription>
    <ghg:UnitType>Chemical Recovery Combustion Unit</ghg:UnitType>
  </ghg:UnitIdentification>
  <ghg:BiogenicDetails>
    <ghg:MassSpentLiquorSolids>
      <ghg:IsSubstitutedIndicator>Y</ghg:IsSubstitutedIndicator>
    </ghg:MassSpentLiquorSolids>
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