Greenhouse Gas Reporting Program

XML Reporting Instructions for Subpart W - Petroleum and Natural Gas Systems

United States Environmental Protection Agency
Climate Change Division
Washington, DC

August 6, 2012

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 more information). 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	• CO_2e and CO_2 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. • CH_4 emissions data expressed in metric tons should be rounded to two decimal places. • N_2O emissions data expressed in metric tons should be rounded to three decimal places. • Emissions data for all GHGs other than CO_2, N_2O and CH_4 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

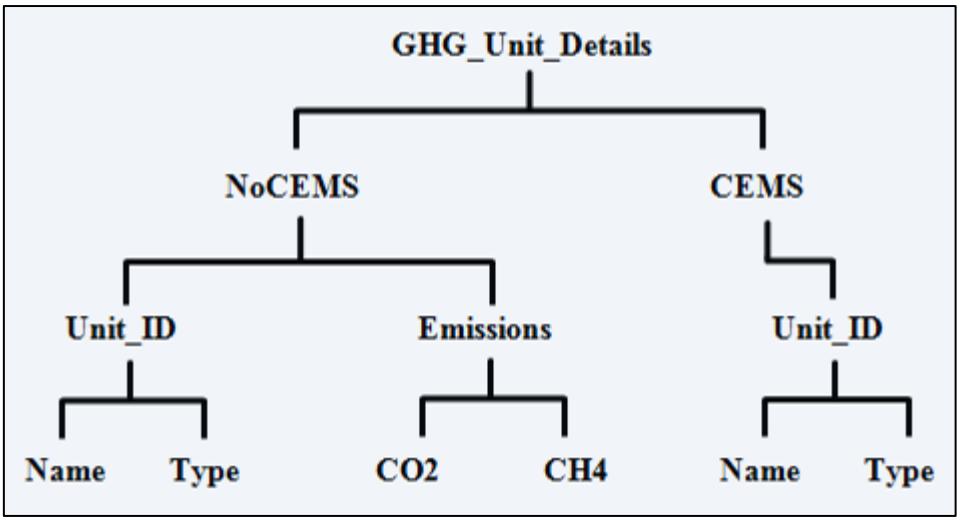
number: <FacilitySiteIdentifier>23222</FacilitySiteIdentifier>. The information shaded in blue represents the data element's value.

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.

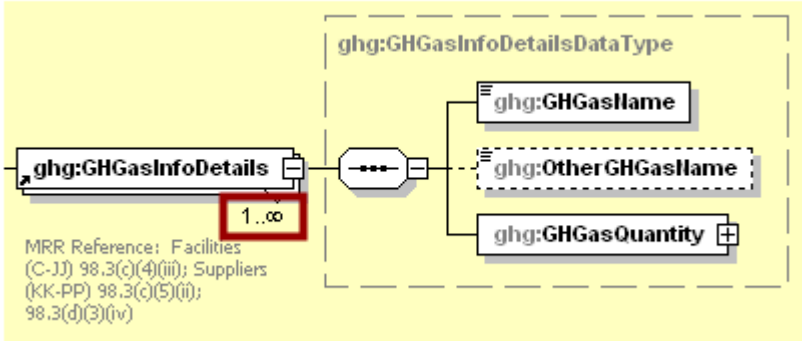
- **Schema diagrams depict the hierarchy (or tree structure).** The primary purpose of the schema diagrams is to indicate the sequence in which data elements must appear within the facility's XML file and to identify the data elements that are required (must be reported) and conditionally required (see 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.

- **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.

The XML symbol "1..∞" shown in the figure below means that the parent element is "unbounded" so that multiple instances of the parent element can be reported. The XML excerpt below shows an example of reporting multiple instances of a parent element.

Figure 2
"Unbounded" Symbol in Schema Diagram



XML Excerpt 1
Example for "Unbounded" Parent Element

```
<ghg:GHGasInfoDetails>
        <ghg:GHGasName>Biogenic Carbon dioxide</ghg:GHGasName>
        <ghg:GHGasQuantity massUOM="Metric Tons">
                <ghg:CalculatedValue>600.1</ghg:CalculatedValue>
        </ghg:GHGasQuantity>
</ghg:GHGasInfoDetails>
<ghg:GHGasInfoDetails>
        <ghg:GHGasName>Methane</ghg:GHGasName>
        <ghg:GHGasQuantity massUOM="Metric Tons">
                <ghg:CalculatedValue>280.23</ghg:CalculatedValue>
        </ghg:GHGasQuantity>
</ghg:GHGasInfoDetails>
<ghg:GHGasInfoDetails>
        <ghg:GHGasName>Nitrous Oxide</ghg:GHGasName>
        <ghg:GHGasQuantity massUOM="Metric Tons">
                <ghg:CalculatedValue>19.456</ghg:CalculatedValue>
        </ghg:GHGasQuantity>
</ghg:GHGasInfoDetails>
<ghg:GHGasInfoDetails>
        <ghg:GHGasName>Carbon Dioxide</ghg:GHGasName>
        <ghg:GHGasQuantity massUOM="Metric Tons">
                <ghg:CalculatedValue>10800.7</ghg:CalculatedValue>
        </ghg:GHGasQuantity>
</ghg:GHGasInfoDetails>
```

Note: In the above XML excerpt, there are four instances of the data element GHGGasInfoDetails.

II. Subpart W Overview

This document provides a step-by-step description of how to report data for Subpart W - Petroleum and Natural Gas Systems and overall total Subpart W greenhouse gas data for a facility using the XML schema.

This source category consists of the following industry segments [98.230(a)]:

- Offshore petroleum and natural gas production
- Onshore petroleum and natural gas production
- Onshore natural gas processing
- Onshore natural gas transmission compression
- Underground natural gas storage
- Liquefied natural gas (LNG) storage
- LNG import and export equipment
- Natural gas distribution

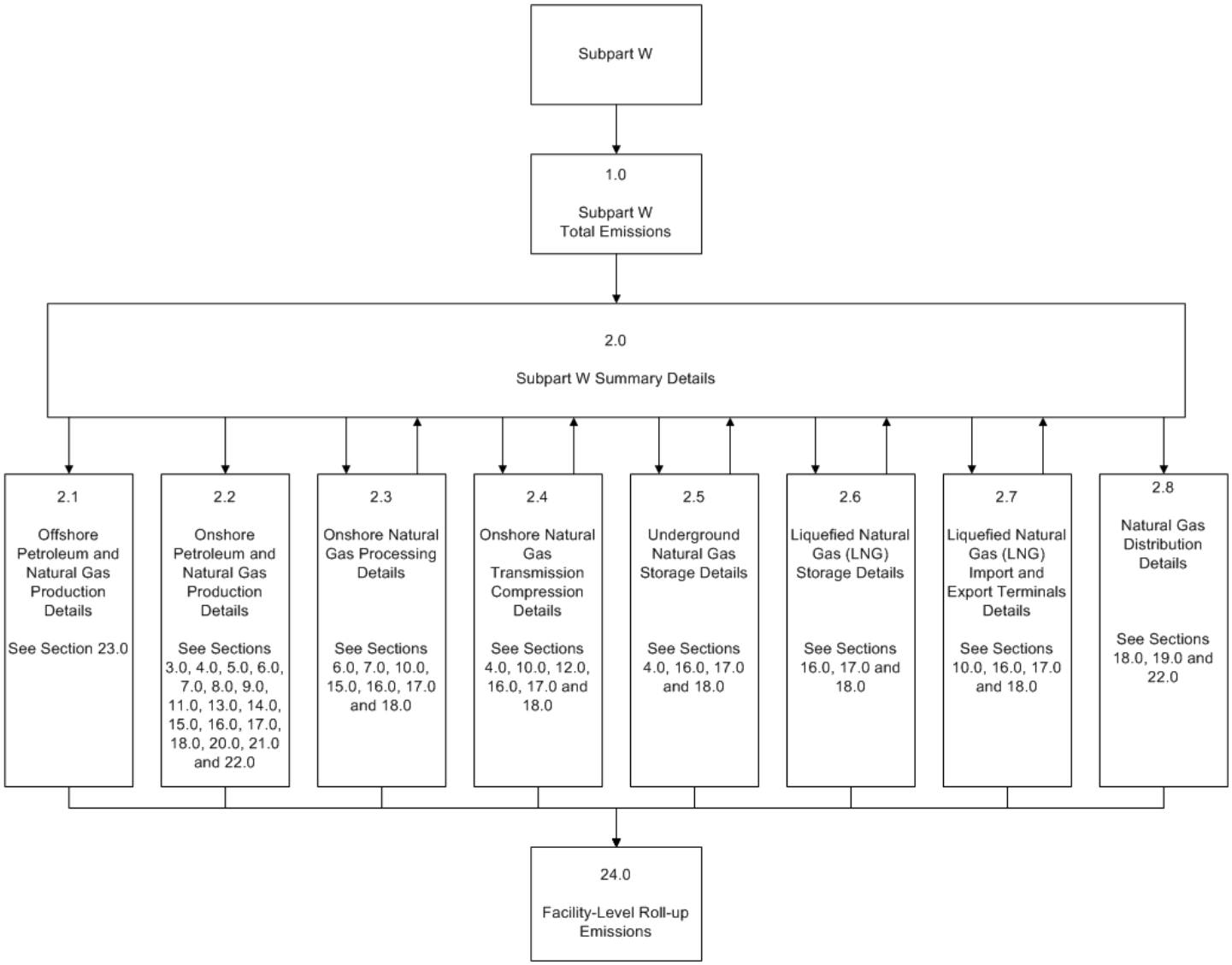
Data is to be reported by source type within each industry segment. If a facility operates under more than one industry segment, each piece of equipment should be reported under the unit's respective majority use industry segment. [98.236(c)]

The following industry segments are treated as separate facilities and cannot be reported with other industry segments.

- Offshore petroleum and natural gas production
- Onshore petroleum and natural gas production
- Natural gas distribution

The other industry segments can be reported in the same annual GHG report.

Figure 3
Subpart W Reporting Diagram



The XML schema includes the following areas for reporting for Subpart W, as displayed in the reporting diagram:

1.0 Subpart W Total Emissions: includes the total greenhouse gas emissions required to be reported for Subpart W.

2.0 Subpart W Summary Details: includes information on each applicable industry segment, including annual throughput and emissions totals by industry segment and source category.

2.1 Offshore petroleum and natural gas production: Offshore petroleum and natural gas production is any platform structure, affixed temporarily or permanently to offshore submerged lands, that houses equipment to extract hydrocarbons from the ocean or lake floor and that processes and/or transfers such hydrocarbons to storage, transport vessels, or onshore. In addition, offshore production includes secondary platform structures connected to the platform structure via walkways, storage tanks associated with the platform structure and floating production and storage offloading equipment (FPSO). This source category does not include reporting of emissions from offshore drilling and exploration that is not conducted on production platforms.

Note: If your facility reports under this industry segment, you should only report for Subparts A and C in addition to this industry segment within Subpart W.

2.2 Onshore petroleum and natural gas production: Onshore petroleum and natural gas production means all equipment on a single well-pad or associated with a single well-pad (including but not limited to compressors, generators, dehydrators, storage vessels and portable non-self-propelled equipment which includes well drilling and completion equipment, workover equipment, gravity separation equipment, auxiliary non-transportation-related equipment and leased, rented or contracted equipment) used in the production, extraction, recovery, lifting, stabilization, separation or treating of petroleum and/or natural gas (including condensate). This equipment also includes associated storage or measurement vessels and all enhanced oil recovery (EOR) operations using CO_2 or natural gas injection and all petroleum and natural gas production equipment located on islands, artificial islands, or structures connected by a causeway to land, an island, or an artificial island.

Note 1: Onshore petroleum and natural gas production is treated as an independent facility by 40 CFR 98. Therefore, if you own or operate onshore petroleum and natural gas production equipment that is co-located with any GHG-emitting equipment used under a different industry segment, you must conduct an assessment to determine applicability for the onshore petroleum and natural gas production facility, as defined below. The other GHG-emitting equipment would be assessed as a separate facility.

Facility with respect to onshore petroleum and natural gas production for purposes of reporting under this subpart and for the corresponding subpart A requirements means all petroleum or natural gas equipment on a single well-pad or associated with a single well-pad and CO_2 EOR operations that are under common ownership or common control including leased, rented, or contracted activities by an onshore petroleum and natural gas production owner or operator and that are located in a single hydrocarbon basin as defined in 98.238. Where a person or entity owns or operates more than one well in a basin, then all onshore petroleum and natural gas production equipment associated with all wells that the person or entity owns or operates in the basin would be considered one facility.

Note 2: If your facility reports under this industry segment, you may only report for Subpart A in addition to this industry segment within Subpart W.

2.3 Onshore natural gas processing: Natural gas processing means the separation of natural gas liquids (NGLs) or non-methane gases from produced natural gas, or the separation of NGLs into one or more component mixtures. Separation includes one or more of the following: forced extraction of natural gas liquids, sulfur and carbon dioxide removal, fractionation of NGLs, or the capture of CO_2 separated from natural gas streams. This segment also includes all residue gas compression equipment owned or operated by the natural gas processing plant. This industry segment includes processing plants that fractionate gas liquids and processing plants that do not fractionate gas liquids but have an annual average throughput of 25 MMscf per day or greater.

2.4 Onshore natural gas transmission compression: Onshore natural gas transmission compression means any stationary combination of compressors that move natural gas from production fields, natural gas processing plants, or other transmission compressors through transmission pipelines to natural gas distribution pipelines, LNG storage facilities, or into underground storage. In addition, a transmission compressor station includes equipment for liquids separation and tanks for the storage of water and hydrocarbon liquids. Residue (sales) gas compression that is part of onshore natural gas processing plants are included in the onshore natural gas processing segment and are excluded from this segment.

2.5 Underground natural gas storage: Underground natural gas storage means subsurface storage, including depleted gas or oil reservoirs and salt dome caverns that store natural gas that has been transferred from its original location for the primary purpose of load balancing (the process of equalizing the receipt and delivery of natural gas); natural gas underground storage processes and operations (including compression, dehydration and flow measurement and excluding transmission pipelines); and all the wellheads connected to the compression units located at the facility that inject and recover natural gas into and from the underground reservoirs.

2.6 Liquefied natural gas (LNG) storage: LNG storage means onshore LNG storage vessels located above ground, equipment for liquefying natural gas, compressors to capture and re-liquefy boil-off-gas, re-condensers and vaporization units for re-gasification of the liquefied natural gas.

2.7 LNG import and export equipment: LNG import equipment means all onshore or offshore equipment that receives imported LNG via ocean transport, stores LNG, re-gasifies LNG and delivers re-gasified natural gas to a natural gas transmission or distribution system. LNG export equipment means all onshore or offshore equipment that receives natural gas, liquefies natural gas, stores LNG and transfers the LNG via ocean transportation to any location, including locations in the United States.

2.8 Natural gas distribution: Natural gas distribution means the collection of all distribution pipelines and metering and regulating equipment at metering-regulating stations that are operated by a Local Distribution Company (LDC) within a single state that is regulated as a separate operating company by a public utility commission or that is operated as an independent municipally-owned distribution system. This segment also excludes customer meters and regulators, infrastructure and pipelines (both interstate and intrastate) delivering natural gas directly to major industrial users and farm taps upstream of the local distribution company inlet.

Note 1: Natural gas distribution is treated as an independent facility by 40 CFR 98. Therefore, if you own or operate a natural gas distribution system and other GHG-emitting equipment used under a different industry segment, you must conduct an assessment to determine applicability for the natural gas distribution facility as defined below. The other GHG-emitting equipment would be assessed as a separate facility as defined above.

Facility with respect to natural gas distribution for purposes of reporting under this subpart and for the corresponding subpart A requirements means the collection of all distribution pipelines

and metering-regulating stations that are operated by a Local Distribution Company (LDC) within a single state that is regulated as a separate operating company by a public utility commission or that are operated as an independent municipally-owned distribution system.

Note 2: If your LDC reports under this industry segment, you may only report for Subparts A and NN in addition to this industry segment within Subpart W. Because Subpart NN is a supplier category, it may be submitted either under the same facility registration as Subpart W or as a separate facility. Reporting determinations for Subparts NN and W are considered independently.

3.0 Sub-basin Selection / Onshore Requirements Under 98.236(e)

4.0 Natural Gas Pneumatic Devices [98.236(c)(1)]

5.0 Natural Gas Driven Pneumatic Pumps [98.236(c)(2)]

6.0 Acid Gas Removal Units [98.236(c)(3)]

7.0 Dehydrators [98.236(c)(4)]

8.0 Well Venting for Liquids Unloading [98.236(c)(5)]

9.0 Gas Well Completions and Workovers [98.236(c)(6)]

10.0 Blowdown Vent Stacks [98.236(c)(7)]

11.0 Gas from Produced Oil Sent to Atmospheric Tanks [98.236(c)(8)]

12.0 Transmission Tanks [98.236(c)(9)]

13.0 Well Testing Venting and Flaring [98.236(c)(10)]

14.0 Associated Gas Venting and Flaring [98.236(c)(11)]

15.0 Flare Stacks [98.236(c)(12)]

16.0 Centrifugal Compressors [98.236(c)(13)]

17.0 Reciprocating Compressors [98.236(c)(14)]

18.0 Other Emissions from Equipment Leaks Estimated Using Emission Factors [98.236(c)(15)]

19.0 Local Distribution Companies [98.236(c)(16)]

20.0 Enhanced Oil Recovery Injection Pump Blowdown [98.236(c)(17)]

21.0 Enhanced Oil Recovery Hydrocarbon Liquids Dissolved CO_2 [98.236(c)(18)]

22.0 Onshore Petroleum and Natural Gas Production and Natural Gas Distribution Combustion Emissions [98.236(c)(19)]

23.0 Offshore Sources [98.236(b)]

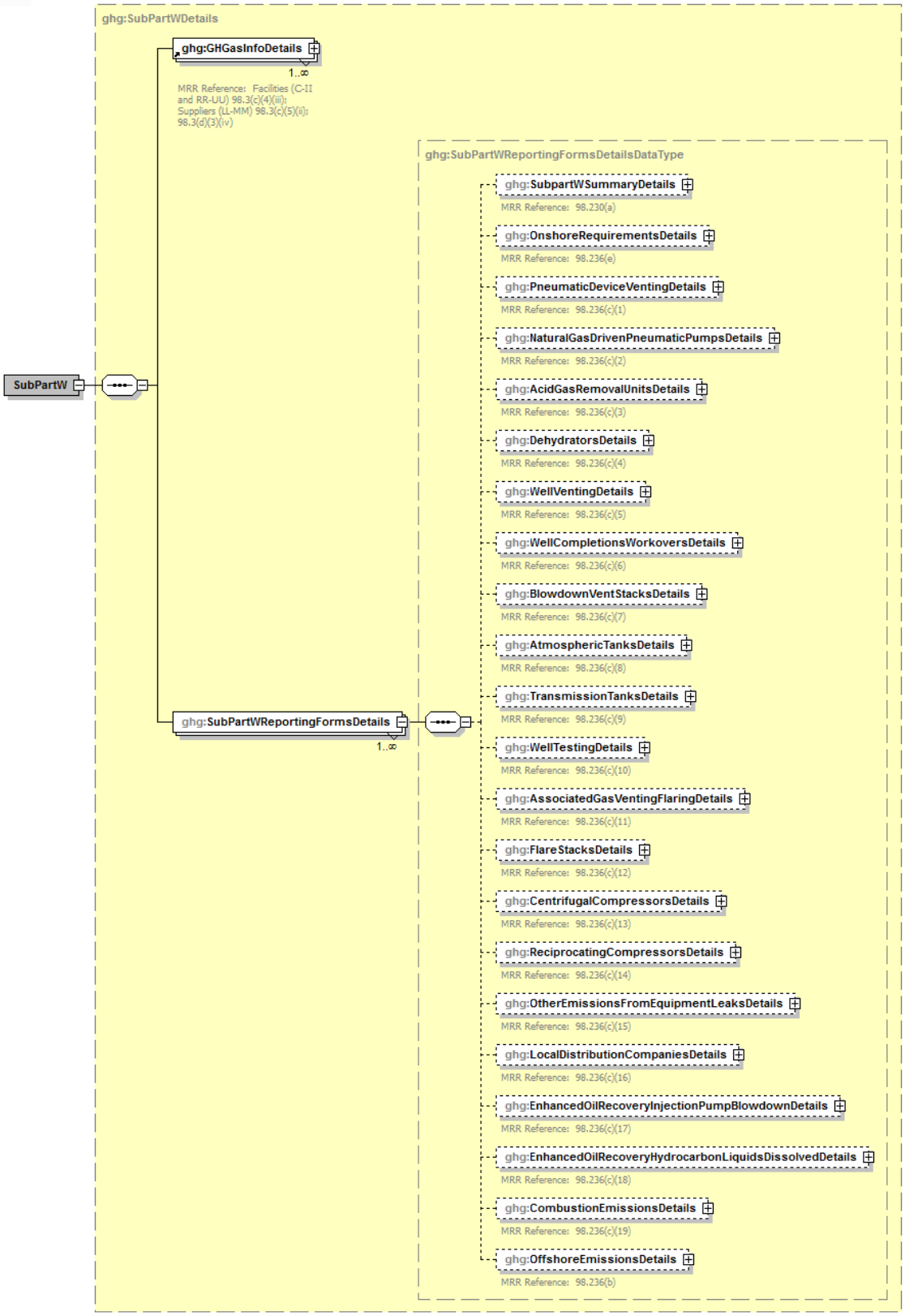
24.0 Facility-Level Roll-up Emissions: includes information on how to report total emissions for CO_2e (excluding biogenic CO_2) from Subpart W at the facility level.

Note: If your facility is subject to reporting under Subpart W (Petroleum and Natural Gas Systems), EPA recommends that you also consider the following source categories in your facility applicability determination:

- Subpart C (General Stationary Fuel Combustion)
- Subpart D (Electricity Generation)
- Subpart G (Ammonia Manufacturing)
- Subpart P (Hydrogen Production)
- Subpart FF (Underground Coal Mines)
- Subpart MM (Suppliers of Petroleum Products)
- Subpart NN (Suppliers of Natural Gas and Natural Gas Liquids)
- Subpart PP (Suppliers of Carbon Dioxide)
- Subpart RR (Geologic Sequestration of Carbon Dioxide)
- Subpart UU (Injection of Carbon Dioxide).

These source categories are only provided as suggestions - additional Subparts may be relevant for a given facility/supplier and not all listed Subparts are relevant for all facilities/suppliers.

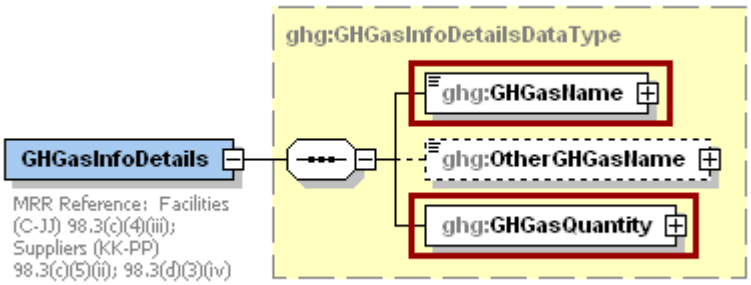
Figure 4
Subpart W Schema Diagram



1.0 Subpart W 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 W, expressed in metric tons.

Figure 5
Greenhouse Gas Information Details Schema Diagram



Note: Data elements boxed in red are required.

For Subpart W, report total emissions for carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) from all applicable industry segments and flares at the Subpart level as specified using the following guidelines [98.232].

- For offshore petroleum and natural gas production, report CO_2, CH_4 and N_2O emissions from equipment leaks, vented emission and flare emission source types as identified in the data collection and emissions estimation study conducted by BOEMRE in compliance with 30 CFR 250.302 through 304. Offshore platforms do not need to report portable emissions. [98.232(b)]

- For an onshore petroleum and natural gas production facility, report CO_2, CH_4 and N_2O emissions from only the following source types on a single well-pad or associated with a single well-pad [98.232(c)]:

  - Natural gas pneumatic device venting
  - Natural gas driven pneumatic pump venting
  - Well venting for liquids unloading
  - Gas well venting during well completions and workovers without hydraulic fracturing
  - Gas well venting during well completions and workovers with hydraulic fracturing.
  - Flare stack emissions
  - Storage tanks vented emissions from produced hydrocarbons
  - Reciprocating compressor rod packing venting
  - Well testing venting and flaring
  - Associated gas venting and flaring from produced hydrocarbons
  - Dehydrator vents
  - EOR injection pump blowdown
  - Acid gas removal vents
  - EOR hydrocarbon liquids dissolved CO_2
  - Centrifugal compressor venting

  - Equipment leaks from valves, connectors, open ended lines, pressure relief valves, pumps, flanges and other equipment leak sources (such as instruments, loading arms, stuffing boxes, compressor seals, dump lever arms and breather caps)
  - You must use the methods in 98.233(z) and report under this subpart the emissions of CO_2, CH_4 and N_2O from stationary or portable fuel combustion equipment that cannot move on roadways under its own power and drive train and that is located at an onshore petroleum and natural gas production facility as defined in 98.238. Stationary or portable equipment are the following equipment, which are integral to the extraction, processing, or movement of oil or natural gas: well drilling and completion equipment, workover equipment, natural gas dehydrators, natural gas compressors, electrical generators, steam boilers and process heaters.

- For onshore natural gas processing, report CO_2, CH_4 and N_2O emissions from the following sources [98.232(d)]:

  - Reciprocating compressor rod packing venting
  - Centrifugal compressor venting
  - Blowdown vent stacks
  - Dehydrator vents
  - Acid gas removal vents
  - Flare stack emissions
  - Equipment leaks from valves, connectors, open ended lines, pressure relief valves and meters

- For onshore natural gas transmission compression, report CO_2, CH_4 and N_2O emissions from the following sources [98.232(e)]:

  - Reciprocating compressor rod packing venting
  - Centrifugal compressor venting
  - Transmission storage tanks
  - Blowdown vent stacks
  - Natural gas pneumatic device venting
  - Equipment leaks from valves, connectors, open ended lines, pressure relief valves and meters

- For underground natural gas storage, report CO_2, CH_4 and N_2O emissions from the following sources [98.232(f)]:

  - Reciprocating compressor rod packing venting
  - Centrifugal compressor venting
  - Natural gas pneumatic device venting
  - Equipment leaks from valves, connectors, open ended lines, pressure relief valves and meters

- For LNG storage, report CO_2, CH_4 and N_2O emissions from the following sources [98.232(g)]:

  - Reciprocating compressor rod packing venting
  - Centrifugal compressor venting
  - Equipment leaks from valves; pump seals; connectors; vapor recovery compressors and other equipment leak sources

- LNG import and export equipment, report CO_2, CH_4 and N_2O emissions from the following sources [98.232(h)]:

  - Reciprocating compressor rod packing venting
  - Centrifugal compressor venting
  - Blowdown vent stacks
  - Equipment leaks from valves, pump seals, connectors, vapor recovery compressors and other equipment leak sources

- For natural gas distribution, report CO_2, CH_4 and N_2O emissions from the following sources [98.232(i)]:

  - Meters, regulators and associated equipment at above grade transmission-distribution transfer stations, including equipment leaks from connectors, block valves, control valves, pressure relief valves, orifice meters, regulators and open ended lines
  - Equipment leaks from vaults at below grade transmission-distribution transfer stations
  - Meters, regulators and associated equipment at above grade metering-regulating station
  - Equipment leaks from vaults at below grade metering-regulating stations
  - Pipeline main equipment leaks
  - Service line equipment leaks
  - The emissions of CO_2, CH_4 and N_2O emissions from stationary fuel combustion sources following the methods in 98.233(z)

Note: You must follow the rounding rules found in Table 1.

Report under Subpart C (General Stationary Fuel Combustion Sources) the emissions of CO_2, CH_4 and N_2O from each stationary fuel combustion unit by following the requirements of Subpart C except for facilities under onshore petroleum and natural gas production and natural gas distribution. (Onshore petroleum and natural gas production facilities and natural gas distribution facilities must report stationary and portable combustion emissions as specified above.) [98.232(k)]

For offshore petroleum and natural gas production, combustion emissions other than flaring must be reported under Subpart C.

Report under Subpart PP (Suppliers of Carbon Dioxide) CO_2 emissions captured and transferred off-site by following the requirements of Subpart PP. [98.232(l)]

The values to report for "GHGasQuantity" are equivalent to the following:

- For Carbon Dioxide, the value reported for the data element "TotalReportedCarbonDioxideEmissions" in Subpart W Summary Details.
- For Methane, the value reported for the data element "TotalReportedMethaneCarbonDioxideEquivalent" in Subpart W Summary Details divided by the Global Warming Potential, 21, to convert to metric tons CH_4.
- For Nitrous Oxide, the value reported for the data element "TotalReportedNitrousCarbonDioxideEquivalent" in Subpart W Summary Details divided by the Global Warming Potential, 310, to convert to metric tons N_2O.

Table 2
Greenhouse Gas Information Details 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 GHG. See list of allowable values: Carbon Dioxide Methane Nitrous Oxide
GHGasQuantity	A collection of data elements that quantify the annual emissions required to report under Subpart W. Report the value in the child data element **CalculatedValue** using the guidelines above. Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 2
Example for Greenhouse Gas Information Details

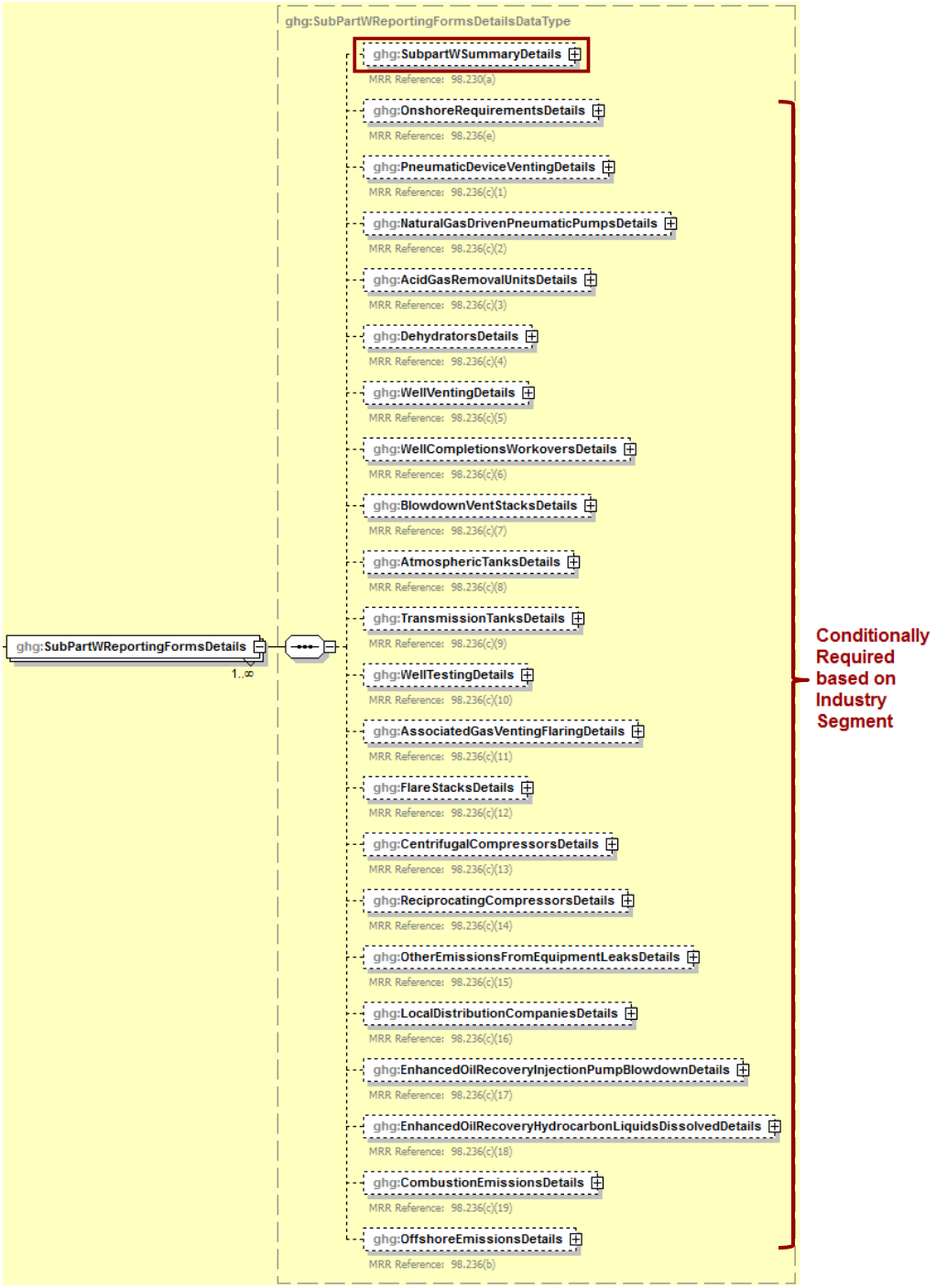
```
<ghg:SubPartWDetails>
    <ghg:GHGasInfoDetails>
        <ghg:GHGasName>Methane</ghg:GHGasName>
        <ghg:GHGasQuantity massUOM="Metric Tons">
            <ghg:CalculatedValue>785196.60</ghg:CalculatedValue>
        </ghg:GHGasQuantity>
    </ghg:GHGasInfoDetails>
    <ghg:GHGasInfoDetails>
        <ghg:GHGasName>Nitrous Oxide</ghg:GHGasName>
        <ghg:GHGasQuantity massUOM="Metric Tons">
            <ghg:CalculatedValue>2.209</ghg:CalculatedValue>
        </ghg:GHGasQuantity>
    </ghg:GHGasInfoDetails>
    <ghg:GHGasInfoDetails>
        <ghg:GHGasName>Carbon Dioxide</ghg:GHGasName>
        <ghg:GHGasQuantity massUOM="Metric Tons">
            <ghg:CalculatedValue>2733773.7</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 Subpart W Summary Details

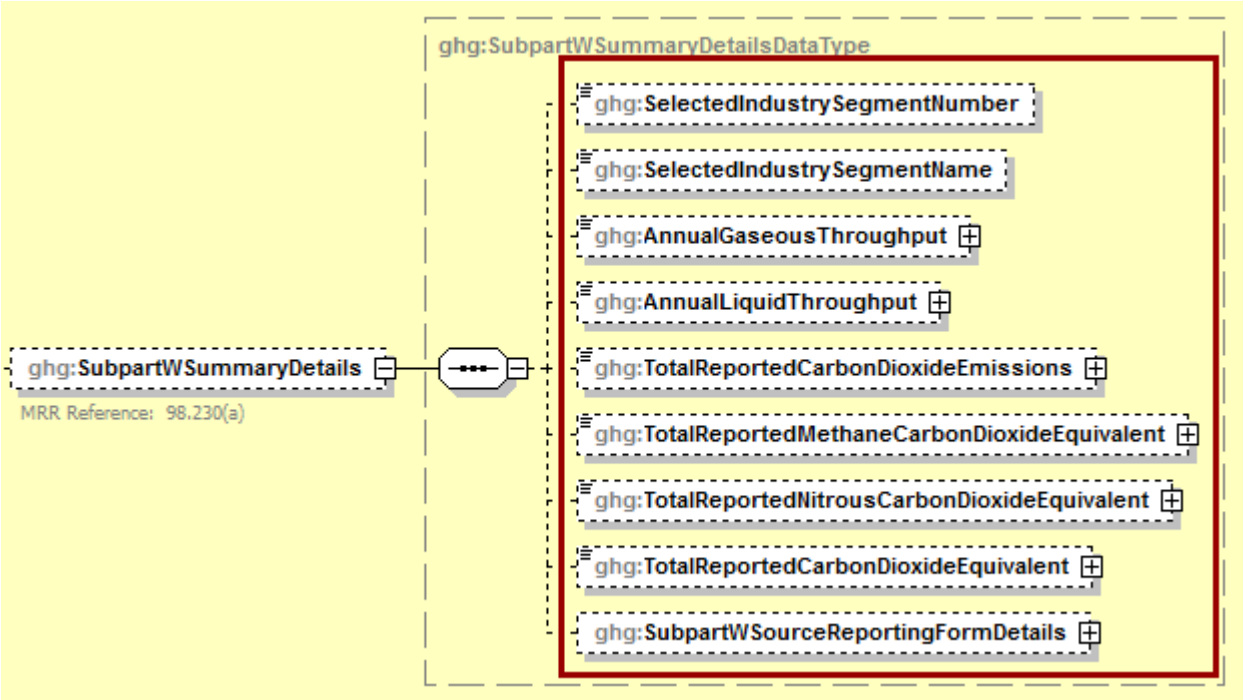
Summary data must be reported separately for each applicable industry segment.

Figure 6
Subpart W Reporting 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.

Figure 7
Subpart W Summary Details Schema Diagram



Note: Data elements boxed in red are required.

The following summary data must be reported for each applicable industry segment:

- The number and name of the industry segment.

  1 Offshore petroleum and natural gas production [98.230(a)(1)]
  2 Onshore petroleum and natural gas production [98.230(a)(2)]
  3 Onshore natural gas processing [98.230(a)(3)]
  4 Onshore natural gas transmission compression [98.230(a)(4)]
  5 Underground natural gas storage [98.230(a)(5)]
  6 Liquefied natural gas (LNG) storage [98.230(a)(6)]
  7 LNG import and export equipment [98.230(a)(7)]
  8 Natural gas distribution [98.230(a)(8)]

- The annual gaseous and liquid throughput as determined by engineering estimate based on best available data for the industry segment. For gaseous throughput, report in MMscf. For liquid throughput, report in thousand barrels. [98.236(d)]
- The annual CO_2, CH_4 and N_2O emissions in metric tons of CO_2e for each GHG separately for the industry segment. [98.236(a)(2)].
  - The value to report for "TotalReportedCarbonDioxideEmissions" equals the sum of the values reported for "TotalReportedCarbonDioxideEmissions" for each applicable source category for the specified industry segment.

- The value to report for "TotalReportedMethaneCarbonDioxideEquivalent" equals the sum of the values reported for "TotalReportedMethaneCarbonDioxideEquivalent" for each applicable source category for the specified industry segment.
- The value to report for "TotalReportedNitrousCarbonDioxideEquivalent" equals the sum of the values reported for "TotalReportedNitrousCarbonDioxideEquivalent" for each applicable source category for the specified industry segment.

- The total annual CO_2, CH_4 and N_2O combined emissions in metric tons of CO_2e for the industry segment.
  - The value to report for "TotalReportedCarbonDioxideEquivalent" equals the sum of the values reported for "TotalReportedCarbonDioxideEquivalent" for each applicable source category for the specified industry segment.

  Please see Required Sources to Report by Industry Segment for source types applicable to and required for each industry segment.

For each instance of the parent element "SubPartWReportingFormsDetails", report data for one applicable industry segment and all of its applicable source types. Report a separate instance of the parent element "SubpartWSourceReportingFormRowDetails" for each applicable source category for the specified industry segment.

Table 3
Subpart W Summary Details Data Element Definitions

Data Element Name	Description
SubPartWReportingFormsDetails	**Parent Element:** A collection of data elements to report for each applicable industry segment in Subpart W. Report data for each applicable industry segment separately.
SubpartWSummaryDetails	**Parent Element:** A collection of data elements to report summary data for each applicable industry segment.
SelectedIndustrySegmentNumber	The number which corresponds to the applicable industry segment. See list of allowable values. 1 2 3 4 5 6 7 8

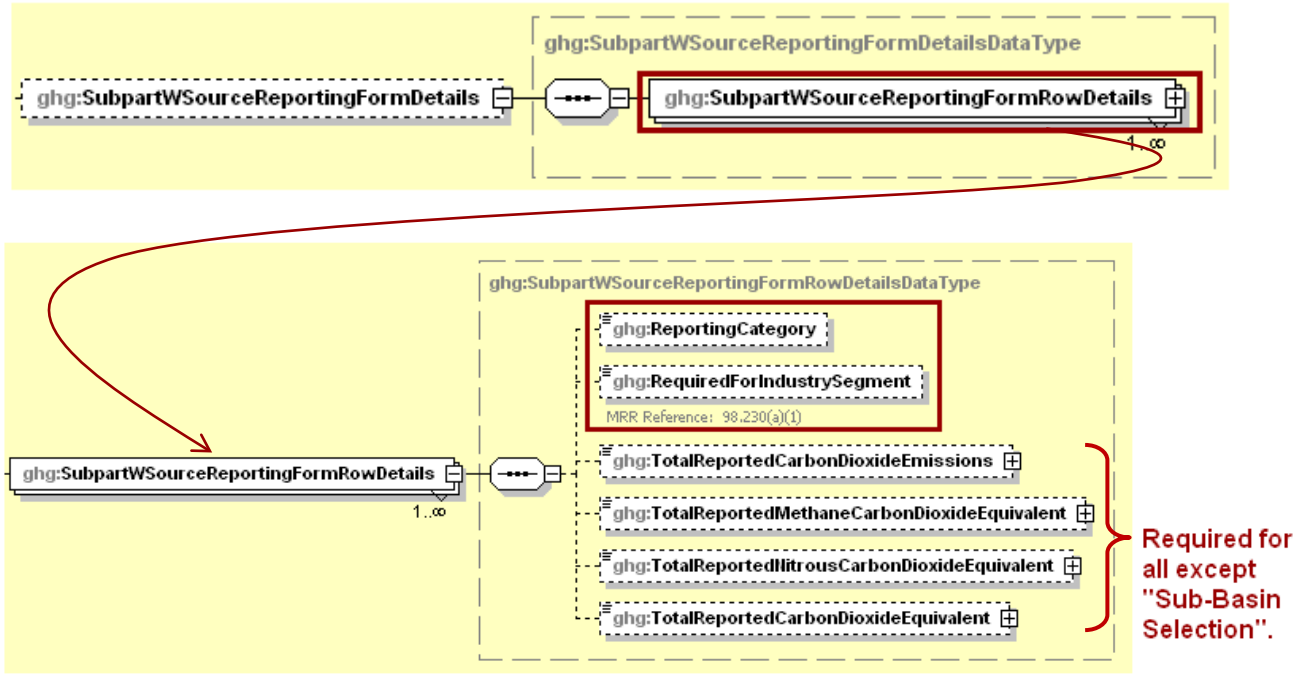
Data Element Name	Description
SelectedIndustrySegmentName	The name of the industry segment. See list of allowable values. Offshore petroleum and natural gas production [98.230(a)(1)] Onshore petroleum and natural gas production [98.230(a)(2)] Onshore natural gas processing [98.230(a)(3)] Onshore natural gas transmission compression [98.230(a)(4)] Underground natural gas storage [98.230(a)(5)] Liquefied natural gas (LNG) storage [98.230(a)(6)] LNG import and export equipment [98.230(a)(7)] Natural gas distribution [98.230(a)(8)]
AnnualGaseousThroughput	The annual gaseous throughput in MMscf for the specified industry segment. [98.236(d)] Set the units of measure to "MMscf" in the attribute **volUOM**. **Note:** Report "0" if the facility did not have any gaseous throughput during the reporting year.
AnnualLiquidThroughput	The annual liquid throughput in thousand barrels for the specified industry segment. [98.236(d)] Set the units of measure to "thousand barrels" in the attribute **volUOM**. **Note:** Report "0" if the facility did not have any liquid throughput during the reporting year.
TotalReportedCarbonDioxideEmissions	Total reported CO_2 emissions in metric tons for the specified industry segment. [98.236(a)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalReportedMethaneCarbonDioxideEquivalent	Total reported CH_4 emissions in metric tons CO_2e for the specified industry segment. [98.236(a)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalReportedNitrousCarbonDioxideEquivalent	Total reported N_2O emissions in metric tons CO_2e for the specified industry segment. [98.236(a)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalReportedCarbonDioxideEquivalent	Total reported CO_2, CH_4 and N_2O combined emissions in metric tons CO_2e for the specified industry segment. Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 3
Example for Subpart W Summary Details

```
<ghg:SubPartWReportingFormsDetails>
      <ghg:SubpartWSummaryDetails>
            <ghg:SelectedIndustrySegmentNumber>8</ghg:SelectedIndustrySegmentNumber>
            <ghg:SelectedIndustrySegmentName>Natural gas distribution
      [98.230(a)(8)]</ghg:SelectedIndustrySegmentName>
            <ghg:AnnualGaseousThroughput volUOM="MMscf">85821429</ghg:AnnualGaseousThroughput>
            <ghg:AnnualLiquidThroughput volUOM="thousand barrels">0</ghg:AnnualLiquidThroughput>
            <ghg:TotalReportedCarbonDioxideEmissions massUOM="Metric
Tons">808.8</ghg:TotalReportedCarbonDioxideEmissions>
            <ghg:TotalReportedMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">562162.3</ghg:TotalReportedMethaneCarbonDioxideEquivalent>
            <ghg:TotalReportedNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">11.3</ghg:TotalReportedNitrousCarbonDioxideEquivalent>
            <ghg:TotalReportedCarbonDioxideEquivalent massUOM="Metric Tons">
562982.4</ghg:TotalReportedCarbonDioxideEquivalent>
            <ghg:SubpartWSourceReportingFormDetails>
                  <See example for Subpart W Source Reporting Details>
            </ghg:SubpartWSourceReportingFormDetails>
      </ghg:SubpartWSummaryDetails>
```

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

Figure 8
Subpart W Source Reporting Details Schema Diagram



Note: Data elements boxed in red are required.

For each applicable source type required for the industry segment indicated in the data element "SelectedIndustrySegmentName", report the following:

- The name of the applicable source type. **Note:** Not all source types are applicable to every industry segment. Please see Required Sources to Report by Industry Segment for source types applicable to and required for each industry segment.
- An indication that the source type is required for the industry segment.
- The annual CO_2, CH_4 and N_2O emissions in metric tons of CO_2e for each GHG separately for the applicable source type. **Note 1:** Do not report for "Sub-Basin Selection". **Note 2:** There are some source types for which CH_4 and N_2O emissions do not apply. If reporting for one of these sources, include only the annual emissions for applicable GHG(s). Report "0" if the facility did not have any emissions for an applicable GHG.
  - The value to report for "TotalReportedCarbonDioxideEmissions" for each source type is equivalent to the value reported for the data element "TotalCarbonDioxideEmissions" for the source type.
  - The value to report for "TotalReportedMethaneCarbonDioxideEquivalent" for each source type is equivalent to the value reported for the data element "TotalMethaneCarbonDioxideEquivalent" for the source type.
  - The value to report for "TotalReportedNitrousCarbonDioxideEquivalent" for each source type is equivalent to the value reported for the data element "TotalNitrousCarbonDioxideEquivalent" for the source type.
- The total annual CO_2, CH_4 and N_2O combined emissions in metric tons of CO_2e for the applicable source type. Report "0" if the facility did not have any sources of the applicable type subject to reporting under 98.232 during the reporting year. **Note:** Do not report for "Sub-Basin Selection".
  - The value to report for "TotalReportedCarbonDioxideEquivalent" for each source type is the sum of the values reported for the data elements "TotalReportedCarbonDioxideEmissions", "TotalReportedMethaneCarbonDioxideEquivalent" and "TotalReportedNitrousCarbonDioxideEquivalent" for the source type.

Note: Emissions data is required for each applicable source type as defined in the rule for each industry segment for which the facility is required to report. Report "0" for emissions for an applicable source type if the facility did not have any sources of that type subject to reporting under 98.232 in the reporting year, or there were no emissions of a particular greenhouse gas, or a particular greenhouse gas is not applicable to the source type.

Table 4
Subpart W Source Reporting Details Data Element Definitions

Data Element Name	Description
SubpartWSourceReportingFormDetails	**Parent Element:** A collection of data elements to report for applicable source types for the specified industry segment.
SubpartWSourceReportingFormRowDetails	**Parent Element:** A collection of data elements to report for sub-basin identification (for onshore petroleum and natural gas production only) and each applicable source type for the specified industry segment. Report data for each applicable source type separately.
ReportingCategory	The applicable source type or sub-basin identification (for Onshore petroleum and natural gas production only) for the specified industry segment. Please see Required Sources to Report by Industry Segment for source types required for each industry segment. See list of allowable values. Sub-Basin Selection Natural Gas Pneumatic Devices [98.236(c)(1)] Natural Gas Driven Pneumatic Pumps [98.236(c)(2)] Acid Gas Removal Units [98.236(c)(3)] Dehydrators [98.236(c)(4)] Well Venting for Liquids Unloading [98.236(c)(5)] Gas Well Completions and Workovers [98.236(c)(6)] Blowdown Vent Stacks [98.236(c)(7)] Gas from Produced Oil Sent to Atmospheric Tanks [98.236(c)(8)] Transmission Tanks [98.236(c)(9)] Well Testing Venting and Flaring [98.236(c)(10)] Associated Gas Venting and Flaring [98.236(c)(11)] Flare Stacks [98.236(c)(12)] Centrifugal Compressors [98.236(c)(13)] Reciprocating Compressors [98.236(c)(14)] Other Emissions from Equipment Leaks Estimated Using Emission Factors [98.236(c)(15)] Local Distribution Companies [98.236(c)(16)] Enhanced Oil Recovery Injection Pump Blowdown [98.236(c)(17)] Enhanced Oil Recovery Hydrocarbon Liquids Dissolved CO2 [98.236(c)(18)] Onshore Petroleum and Natural Gas Production and Natural Gas Distribution Combustion Emissions [98.236(c)(19)] Offshore Sources [98.236(b)]
RequiredForIndustrySegment	An indication that the source type is required for the industry segment. Report “Yes”.

Data Element Name	Description
TotalReportedCarbonDioxideEmissions	Total reported CO_2 emissions in metric tons for the specified source type. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM. Note:** Report "0" if the facility did not have any sources of the specified type subject to reporting under 98.232 during the reporting year. Do not report for "Sub-Basin Selection".
TotalReportedMethaneCarbonDioxideEquivalent	Total reported CH_4 emissions in metric tons CO_2e for the specified source type. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any sources of the specified type subject to reporting under 98.232 during the reporting year or if methane is not required to be reported for the specified source type. Do not report for "Sub-Basin Selection".
TotalReportedNitrousCarbonDioxideEquivalent	Total reported N_2O emissions in metric tons CO_2e for the specified source type. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any sources of the specified type subject to reporting under 98.232 during the reporting year or if nitrous oxide is not required to be reported for the specified source type. Do not report for "Sub-Basin Selection".
TotalReportedCarbonDioxideEquivalent	Total reported CO_2, CH_4 and N_2O combined emissions in metric tons CO_2e for the specified source type. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any sources of the specified type subject to reporting under 98.232 during the reporting year. Do not report for "Sub-Basin Selection".

XML Excerpt 4
Example for Subpart W Source Reporting Details

```
      <ghg:SubpartWSourceReportingFormDetails>
            <ghg:SubpartWSourceReportingFormRowDetails>
                  <ghg:ReportingCategory>Other Emissions from Equipment Leaks Estimated Using Emission Factors
[98.236(c)(15)]</ghg:ReportingCategory>
                  <ghg:RequiredForIndustrySegment>Yes</ghg:RequiredForIndustrySegment>
                  <ghg:TotalReportedCarbonDioxideEmissions massUOM="Metric
            Tons">0.4</ghg:TotalReportedCarbonDioxideEmissions>
                  <ghg:TotalReportedMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">244.2</ghg:TotalReportedMethaneCarbonDioxideEquivalent>
                  <ghg:TotalReportedNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">0</ghg:TotalReportedNitrousCarbonDioxideEquivalent>
                  <ghg:TotalReportedCarbonDioxideEquivalent massUOM="Metric
Tons">244.6</ghg:TotalReportedCarbonDioxideEquivalent>
            </ghg:SubpartWSourceReportingFormRowDetails>
            <ghg:SubpartWSourceReportingFormRowDetails>
                  <ghg:ReportingCategory>Local Distribution Companies [98.236(c)(16)]</ghg:ReportingCategory>
                  <ghg:RequiredForIndustrySegment>Yes</ghg:RequiredForIndustrySegment>
                  <ghg:TotalReportedCarbonDioxideEmissions massUOM="Metric
Tons">806.0</ghg:TotalReportedCarbonDioxideEmissions>
                  <ghg:TotalReportedMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">561904.0</ghg:TotalReportedMethaneCarbonDioxideEquivalent>
                  <ghg:TotalReportedNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">0</ghg:TotalReportedNitrousCarbonDioxideEquivalent>
                  <ghg:TotalReportedCarbonDioxideEquivalent massUOM="Metric
Tons">562710</ghg:TotalReportedCarbonDioxideEquivalent>
            </ghg:SubpartWSourceReportingFormRowDetails>
            <ghg:SubpartWSourceReportingFormRowDetails>
                  <ghg:ReportingCategory>Onshore Petroleum and Natural Gas Production and Natural Gas Distribution
Combustion Emissions [98.236(c)(19)]</ghg:ReportingCategory>
                  <ghg:RequiredForIndustrySegment>Yes</ghg:RequiredForIndustrySegment>
                  <ghg:TotalReportedCarbonDioxideEmissions massUOM="Metric
Tons">2.4</ghg:TotalReportedCarbonDioxideEmissions>
                  <ghg:TotalReportedMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">14.1</ghg:TotalReportedMethaneCarbonDioxideEquivalent>
                  <ghg:TotalReportedNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">11.3</ghg:TotalReportedNitrousCarbonDioxideEquivalent>
                  <ghg:TotalReportedCarbonDioxideEquivalent massUOM="Metric
Tons">27.8</ghg:TotalReportedCarbonDioxideEquivalent>
            </ghg:SubpartWSourceReportingFormRowDetails>
      </ghg:SubpartWSourceReportingFormDetails>
</ghg:SubpartWSummaryDetails>
```

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

Table 5
Required Sources to Report by Industry Segment

		1 Offshore Petroleum and Natural Gas Production [98.230(a)(1)]	2 Onshore Petroleum and Natural Gas Production [98.230(a)(2)]	3 Onshore Natural Gas Processing [98.230(a)(3)]	4 Onshore Natural Gas Transmission Compression [98.230(a)(4)]	5 Underground Natural Gas Storage [98.230(a)(5)]	6 Liquefied Natural Gas (LNG) Storage [98.230(a)(6)]	7 LNG Import and Export Equipment [98.230(a)(7)]	8 Natural Gas Distribution [98.230(a)(8)]
3.0	Sub-basin Selection / Onshore Requirements Under 98.236(e)		X						
4.0	Natural Gas Pneumatic Devices [98.236(c)(1)]		X		X	X			
5.0	Natural Gas Driven Pneumatic Pumps [98.236(c)(2)]		X						
6.0	Acid Gas Removal Units [98.236(c)(3)]		X	X					
7.0	Dehydrators [98.236(c)(4)]		X	X					
8.0	Well Venting for Liquids Unloading [98.236(c)(5)]		X						
9.0	Well Completions and Workovers [98.236(c)(6)]		X						
10.0	Blowdown Vent Stacks [98.236(c)(7)]			X	X			X	
11.0	Gas from Produced Oil Sent to Atmospheric Tanks [98.236(c)(8)]		X						
12.0	Transmission Tanks [98.236(c)(9)]				X				
13.0	Well Testing Venting and Flaring [98.236(c)(10)]		X						
14.0	Associated Gas Venting and Flaring [98.236(c)(11)]		X						
15.0	Flare Stacks [98.236(c)(12)]		X	X					
16.0	Centrifugal Compressors [98.236(c)(13)]		X	X	X	X	X	X	
17.0	Reciprocating Compressors [98.236(c)(14)]		X	X	X	X	X	X	
18.0	Other Emissions from Equipment Leaks Estimated Using Emission Factors [98.236(c)(15)]		X	X	X	X	X	X	X
19.0	Local Distribution Companies [98.236(c)(16)]								X
20.0	Enhanced Oil Recovery (EOR) Injection Pump Blowdown [98.236(c)(17)]		X						
21.0	Enhanced Oil Recovery (EOR) Hydrocarbon Liquids Dissolved CO_2 [98.236(c)(18)]		X						
22.0	Onshore Petroleum and Natural Gas Production and Natural Gas Distribution Combustion Emissions [98.236(c)(19)]		X						X
23.0	Offshore Sources [98.236(b)]	X							

2.1 Offshore petroleum and natural gas production

Report CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for the applicable source type in metric tons of CO_2e.

The applicable source type is Offshore Sources [98.236(b)].

2.2 Onshore petroleum and natural gas production

Report CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for each applicable source type in metric tons of CO_2e. [98.236(c)] The applicable source types are:

- Sub-basin Selection / Onshore Requirements Under 98.236(e)
- Natural Gas Pneumatic Devices [98.236(c)(1)]
- Natural Gas Driven Pneumatic Pumps [98.236(c)(2)]
- Acid Gas Removal Units [98.236(c)(3)]
- Dehydrators [98.236(c)(4)]
- Well Venting for Liquids Unloading [98.236(c)(5)]
- Well Completions and Workovers [98.236(c)(6)]
- Gas from Produced Oil Sent to Atmospheric Tanks [98.236(c)(8)]
- Well Testing Venting and Flaring [98.236(c)(10)]
- Associated Gas Venting and Flaring [98.236(c)(11)]
- Flare Stacks [98.236(c)(12)]
- Centrifugal Compressors [98.236(c)(13)]
- Reciprocating Compressors [98.236(c)(14)]
- Other Emissions from Equipment Leaks Estimated Using Emission Factors [98.236(c)(15)]
- Enhanced Oil Recovery (EOR) Injection Pump Blowdown [98.236(c)(17)]
- Enhanced Oil Recovery (EOR) Hydrocarbon Liquids Dissolved CO_2 [98.236(c)(18)]
- Onshore Petroleum and Natural Gas Production and Natural Gas Distribution Combustion Emissions [98.236(c)(19)]

Note: When a covered source type routes gas to flare, separately report the emissions that were vented directly to the atmosphere without flaring and the emissions that resulted from flaring the gas. Both the vented and flared emissions will be reported under the respective source type and not under the flare source type. [98.236(c)]

2.3 Onshore natural gas processing

Report CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for each applicable source type in metric tons of CO_2e. [98.236(c)] The applicable source types are:

- Acid Gas Removal Units [98.236(c)(3)]
- Dehydrators [98.236(c)(4)]
- Blowdown Vent Stacks [98.236(c)(7)]
- Flare Stacks [98.236(c)(12)]
- Centrifugal Compressors [98.236(c)(13)]
- Reciprocating Compressors [98.236(c)(14)]
- Other Emissions from Equipment Leaks Estimated Using Emission Factors [98.236(c)(15)]

Note: If a facility operates under more than one industry segment, each piece of equipment should be reported under the unit's respective majority use segment. When a source type listed below routes gas to flare, separately report the emissions that were vented directly to the atmosphere without flaring and the emissions that resulted from flaring the gas. Both the vented and flared emissions will be reported under the respective source type and not under the flare source type. [98.236(c)]

2.4 Onshore natural gas transmission compression

Report CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for each applicable source type in metric tons of CO_2e. [98.236(c)] The applicable source types are:

- Natural Gas Pneumatic Devices [98.236(c)(1)]
- Blowdown Vent Stacks [98.236(c)(7)]
- Transmission Tanks [98.236(c)(9)]
- Centrifugal Compressors [98.236(c)(13)]
- Reciprocating Compressors [98.236(c)(14)]
- Other Emissions from Equipment Leaks Estimated Using Emission Factors [98.236(c)(15)]

Note: If a facility operates under more than one industry segment, each piece of equipment should be reported under the unit's respective majority use segment. When a source type listed below routes gas to flare, separately report the emissions that were vented directly to the atmosphere without flaring and the emissions that resulted from flaring the gas. Both the vented and flared emissions will be reported under the respective source type and not under the flare source type. [98.236(c)]

2.5 Underground natural gas storage

Report CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for each applicable source type in metric tons of CO_2e. [98.236(c)] The applicable source types are:

- Natural Gas Pneumatic Devices [98.236(c)(1)]
- Centrifugal Compressors [98.236(c)(13)]
- Reciprocating Compressors [98.236(c)(14)]
- Other Emissions from Equipment Leaks Estimated Using Emission Factors [98.236(c)(15)]

Note: If a facility operates under more than one industry segment, each piece of equipment should be reported under the unit's respective majority use segment. When a source type listed below routes gas to flare, separately report the emissions that were vented directly to the atmosphere without flaring and the emissions that resulted from flaring the gas. Both the vented and flared emissions will be reported under the respective source type and not under the flare source type. [98.236(c)]

2.6 Liquefied natural gas (LNG) storage

Report CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for each applicable source type in metric tons of CO_2e. [98.236(c)] The applicable source types are:

- Centrifugal Compressors [98.236(c)(13)]
- Reciprocating Compressors [98.236(c)(14)]
- Other Emissions from Equipment Leaks Estimated Using Emission Factors [98.236(c)(15)]

Note: If a facility operates under more than one industry segment, each piece of equipment should be reported under the unit's respective majority use segment. When a source type listed below routes gas to flare, separately report the emissions that were vented directly to the atmosphere without flaring and the emissions that resulted from flaring the gas. Both the vented and flared emissions will be reported under the respective source type and not under the flare source type. [98.236(c)]

2.7 LNG import and export equipment

Report CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for each applicable source type in metric tons of CO_2e. [98.236(c)] The applicable source types are:

- Blowdown Vent Stacks [98.236(c)(7)]
- Centrifugal Compressors [98.236(c)(13)]
- Reciprocating Compressors [98.236(c)(14)]
- Other Emissions from Equipment Leaks Estimated Using Emission Factors [98.236(c)(15)]

Note: If a facility operates under more than one industry segment, each piece of equipment should be reported under the unit's respective majority use segment. When a source type listed below routes gas to flare, separately report the emissions that were vented directly to the atmosphere without flaring and the

emissions that resulted from flaring the gas. Both the vented and flared emissions will be reported under the respective source type and not under the flare source type. [98.236(c)]

2.8 Natural gas distribution

Report CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for each applicable source type in metric tons of CO_2e. [98.236(c)] The applicable source types are:

- Other Emissions from Equipment Leaks Estimated Using Emission Factors [98.236(c)(15)]
- Local Distribution Companies [98.236(c)(16)]
- Onshore Petroleum and Natural Gas Production and Natural Gas Distribution Combustion Emissions [98.236(c)(19)]

3.0 Sub-Basin Selection / Onshore Requirements Under 98.236(e)

This topic provides a step-by-step description of how to report basin and applicable sub-basin identification for a facility and onshore requirements under 98.236(e) for each oil sub-basin category. This section is applicable to and required for the onshore petroleum and natural gas production industry segment only.

3.1 Basin Identification

"Basin" means geologic provinces as defined by the American Association of Petroleum Geologists (AAPG) Geologic Note: AAPG-CSD Geologic Provinces Code Map: AAPG Bulletin, Prepared by Richard F. Meyer, Laure G. Wallace and Fred J. Wagner, Jr., Volume 75, Number 10 (October 1991) (incorporated by reference, see 98.7) and the Alaska Geological Province Boundary Map, Compiled by the American Association of Petroleum Geologists Committee on Statistics of Drilling in Cooperation with the USGS, 1978 (incorporated by reference, see 98.7). Please use the following naming convention to identify the basin:

Three Digit Basin Number - Basin Name

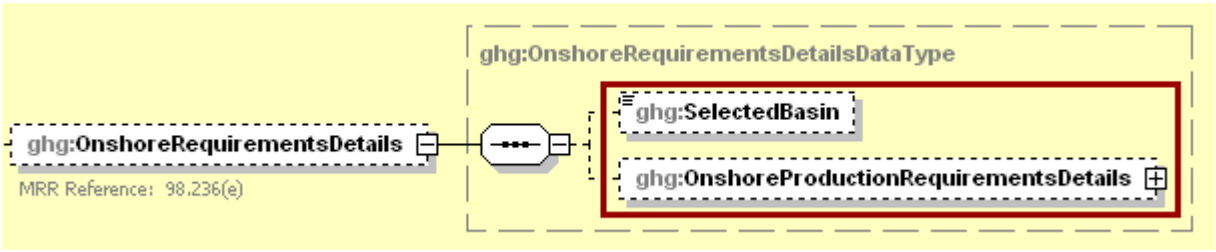
Example: 120 - Atlantic Coast Basin

See the following link for the list of basin numbers and names:

http://www.ccdsupport.com/confluence/display/help/Subpart+W+Basin+and+County+Combinations

EPA recognizes that onshore petroleum and natural gas producers, whose facility is a "basin", are also likely not to have a traditional facility address. Because of the large geographic size of the basins, identifying latitude/longitude coordinates might not always be practical. As a result, these reporters may use the address of the U.S. corporate headquarters, including its street address, city, state and zip code. To ensure that multiple facilities (basins) that share the same corporate address can be uniquely identified, we ask that you specify in your facility name, the code and name of the basin as identified by the American Association of Petroleum Geologists (e.g., MLH Production Inc. 470 Fort Worth Syncline). Please note that changes to the facility name and street address must be manually entered into e-GGRT on the Facility Management page, not via XML.

Figure 9
Basin Identification Schema Diagram



Note: Data elements boxed in red are required.

Table 6
Basin Identification Data Element Definitions

Data Element Name	Description
OnshoreRequirementsDetails	**Parent Element:** A collection of data elements to report for the basin.
SelectedBasin	The basin identifier. See Basin Identification for the required naming convention.

XML Excerpt 5
Example for Basin Identification

```
<ghg:OnshoreRequirementsDetails>
      <ghg:SelectedBasin>160 - Appalachian Basin</ghg:SelectedBasin>
      <ghg:OnshoreProductionRequirementsDetails>
            <See example for Sub-Basin Identification / Onshore Requirements Details>
      </ghg:OnshoreProductionRequirementsDetails>
</ghg:OnshoreRequirementsDetails>
```

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

3.2 Sub-Basin Identification

"Sub-basin category", for onshore natural gas production, means a subdivision of a basin into the unique combination of wells with the surface coordinates within the boundaries of an individual county and subsurface completion in one or more of each of the following five formation types: oil, high permeability gas, shale gas, coal seam or other tight reservoir rock. The distinction between high permeability gas and tight gas reservoirs shall be designated as follows: High permeability gas reservoirs with >0.1 millidarcy permeability and tight gas reservoirs with ≤0.1 millidarcy permeability. Permeability for a reservoir type shall be determined by engineering estimate. Wells that produce from high permeability gas, shale gas, coal seam, or other tight reservoir rock are considered gas wells; gas wells producing from more than one of these formation types shall be classified into only one type based on the formation with the most contribution to production as determined by engineering knowledge. All wells that produce hydrocarbon liquids and do not meet the definition of a gas well in this sub-basin category definition are considered to be in the oil formation. All emission sources that handle condensate from gas wells in high permeability gas, shale gas, or tight reservoir rock formations are considered to be in the formation that the gas well belongs to and not in the oil formation. [98.238]

Emissions information for several of the applicable source types must be reported by sub-basin category. Please use the following naming convention to identify each sub-basin:

Three Digit Basin Number - COUNTY, State abbreviation (County Number) - Formation Type

Example: 160 - ASHLAND, OH (5) - Oil

See the following link for the list of county names and numbers:

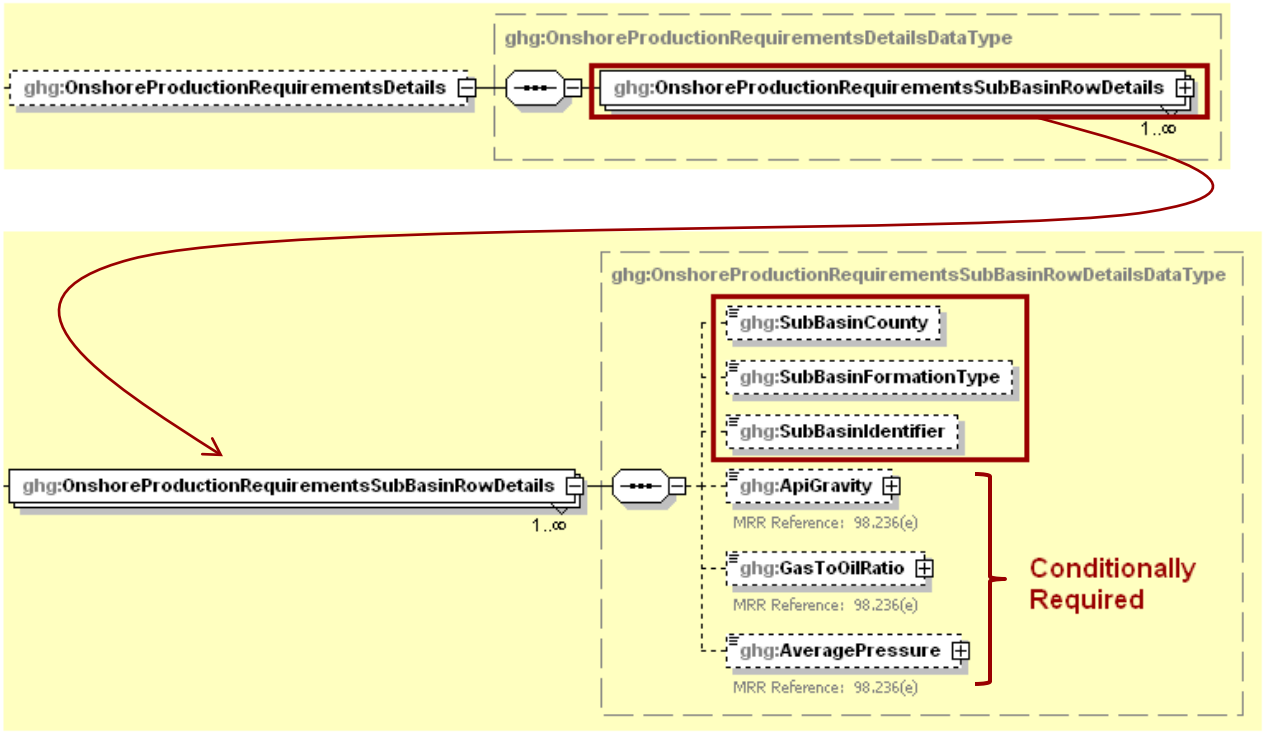
http://www.ccdsupport.com/confluence/display/help/Subpart+W+Basin+and+County+Combinations

The following are the formation types:

- Oil
- High permeability gas
- Shale gas
- Coal seam
- Other tight reservoir rock

Wells that produce from high permeability gas, shale gas, coal seam, or other tight reservoir rock are considered gas wells; gas wells producing from more than one of these formation types shall be classified into only one type based on the formation with the most contribution to production as determined by engineering knowledge. All wells that produce hydrocarbon liquids and do not meet the definition of a gas well in this sub-basin category definition are considered to be in the oil formation. All emission sources that handle condensate from gas wells in high permeability gas, shale gas, or tight reservoir rock formations are considered to be in the formation that the gas well belongs to and not in the oil formation. [98.238]

Figure 10
Sub-Basin Identification / Onshore Requirements 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 sub-basin category, report the following:

- County, state abbreviation and county number for the sub-basin location in the following format: ***COUNTY, State abbreviation (County Number)***
- Formation type for the sub-basin.
- Sub-basin identifier in the following format: ***Three Digit Basin Number - COUNTY, State abbreviation (County Number) - Formation Type***

For each oil sub-basin category only, report the following [98.236(e)]:

- The best available estimate of API gravity in degrees.
- The best available estimate of gas to oil ratio in cubic feet of gas per barrel of oil.
- The best available estimate of average low pressure separator pressure in psia.

Table 7
Sub-Basin Identification / Onshore Requirements Details Data Element Definitions

Data Element Name	Description
OnshoreProductionRequirementsDetails	**Parent Element:** A collection of data elements to report for applicable sub-basins in the basin.
OnshoreProductionRequirementsSubBasinRowDetails	**Parent Element:** A collection of data elements to report for each applicable sub-basin category in the basin.
SubBasinCounty	The county, state abbreviation and county number in which the applicable sub-basin is located. See Sub-Basin Identification for the required naming convention.
SubBasinFormationType	The formation type of the sub-basin. See list of allowable values. Oil High permeability gas Shale gas Coal seam Other tight reservoir rock
SubBasinIdentifier	Sub-basin ID. See Sub-Basin Identification for the required naming convention.
ApiGravity	**Conditionally Required:** For each oil sub-basin category only, report the best available estimate of API gravity in degrees for the specified sub-basin category. [98.236(e)] Set the units of measure to "degrees" in the attribute **densityUOM**.
GasToOilRatio	**Conditionally Required:** For each oil sub-basin category only, report the best available estimate of gas-to-oil ratio in cubic feet of gas per barrel of oil for the specified sub-basin category. [98.236(e)] Set the units of measure to "cubic feet of gas per barrel of oil" in the attribute **fractionUOM**.
AveragePressure	**Conditionally Required:** For each oil sub-basin category only, report the best available estimate of average low pressure separator pressure in psia for the specified sub-basin category. [98.236(e)] Set the units of measure to "psia" in the attribute **pressureUOM**.

XML Excerpt 6
Example for Sub-Basin Identification / Onshore Requirements Details

```
    <ghg:OnshoreProductionRequirementsDetails>
        <ghg:OnshoreProductionRequirementsSubBasinRowDetails>
            <ghg:SubBasinCounty>ASHLAND, OH (5)</ghg:SubBasinCounty>
            <ghg:SubBasinFormationType>Oil</ghg:SubBasinFormationType>
            <ghg:SubBasinIdentifier>160 – ASHLAND, OH (5) - Oil</ghg:SubBasinIdentifier>
            <ghg:ApiGravity densityUOM="degrees">17.257</ghg:ApiGravity>
            <ghg:GasToOilRatio fractionUOM="cubic feet of gas per barrel of oil">28.487</ghg:GasToOilRatio>
            <ghg:AveragePressure pressureUOM="psia">46.864</ghg:AveragePressure>
        </ghg:OnshoreProductionRequirementsSubBasinRowDetails>
    </ghg:OnshoreProductionRequirementsDetails>
</ghg:OnshoreRequirementsDetails>
```

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

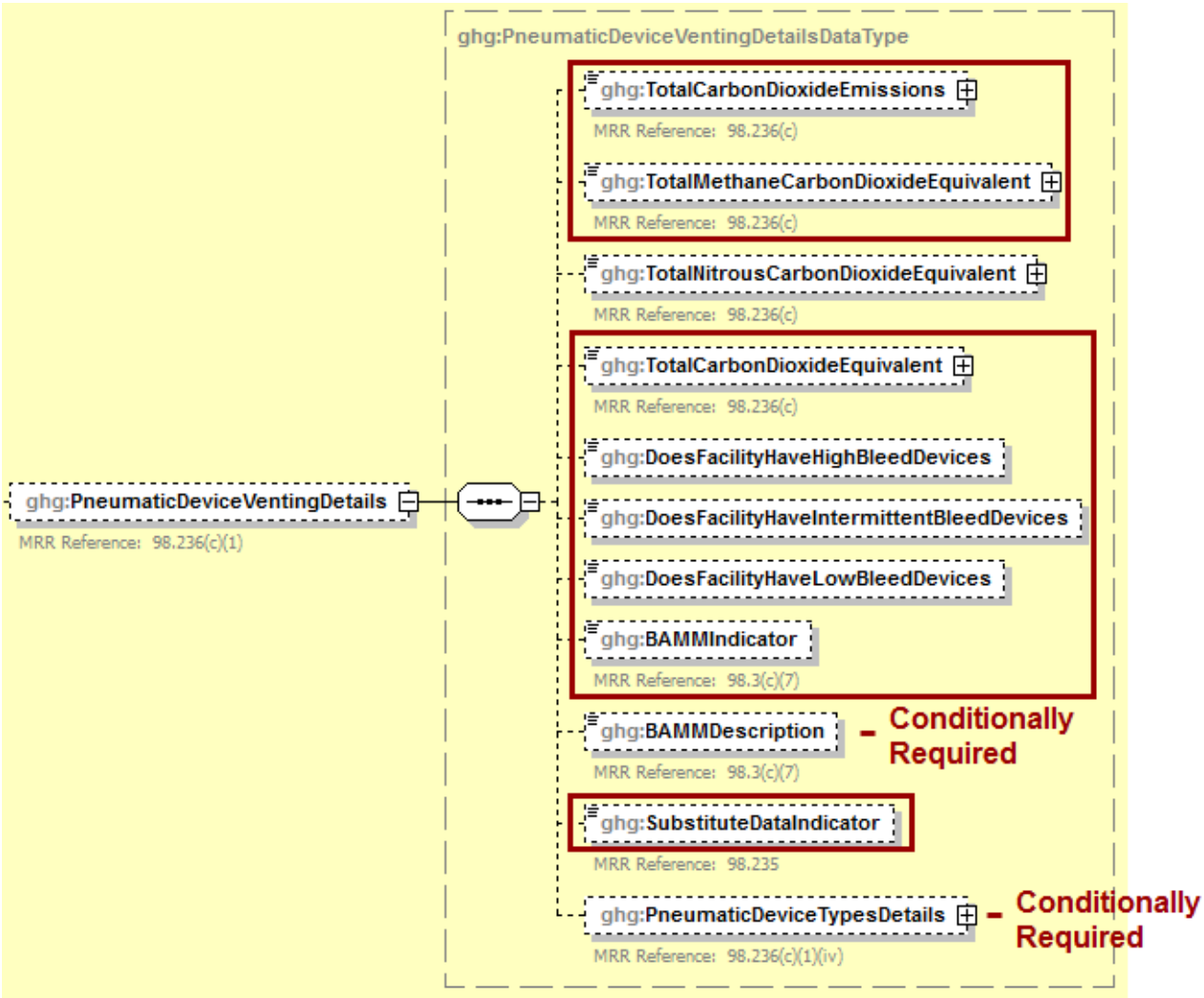
Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

4.0 Natural Gas Pneumatic Device Venting

This topic provides a step-by-step description of how to report pneumatic device information for a facility. This section is applicable to and required for the following industry segments only:

- Onshore petroleum and natural gas production
- Onshore natural gas transmission compression
- Underground natural gas storage

Figure 11
Pneumatic Device Venting 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 pneumatic devices, report the following:

- The CO_2 and CH_4 emissions totals and the total CO_2e emissions for all pneumatic devices combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any pneumatic devices subject to reporting under 98.232 during the reporting year.
    - The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the data element "TotalCarbonDioxideEmissions" for each pneumatic device type.
    - The value to report for "TotalMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the data element "TotalMethaneCarbonDioxideEquivalent" for each pneumatic device type.
    - The value to report for "TotalCarbonDioxideEquivalent" is the sum of the values reported for "TotalCarbonDioxideEmissions" and "TotalMethaneCarbonDioxideEquivalent".
- Whether the facility had any continuous high-bleed pneumatic devices subject to reporting under 98.232 in the reporting year.
- Whether the facility had any intermittent-bleed pneumatic devices subject to reporting under 98.232 in the reporting year.
- Whether the facility had any continuous low-bleed pneumatic devices subject to reporting under 98.232 in the reporting year.
- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

Table 8
Pneumatic Device Venting Details Data Element Definitions

Data Element Name	Description
PneumaticDeviceVentingDetails	**Parent Element:** A collection of data elements to report for natural gas pneumatic device venting. [98.236(c)(1)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions for all natural gas pneumatic device venting combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any pneumatic devices subject to reporting under 98.232 during the reporting year.

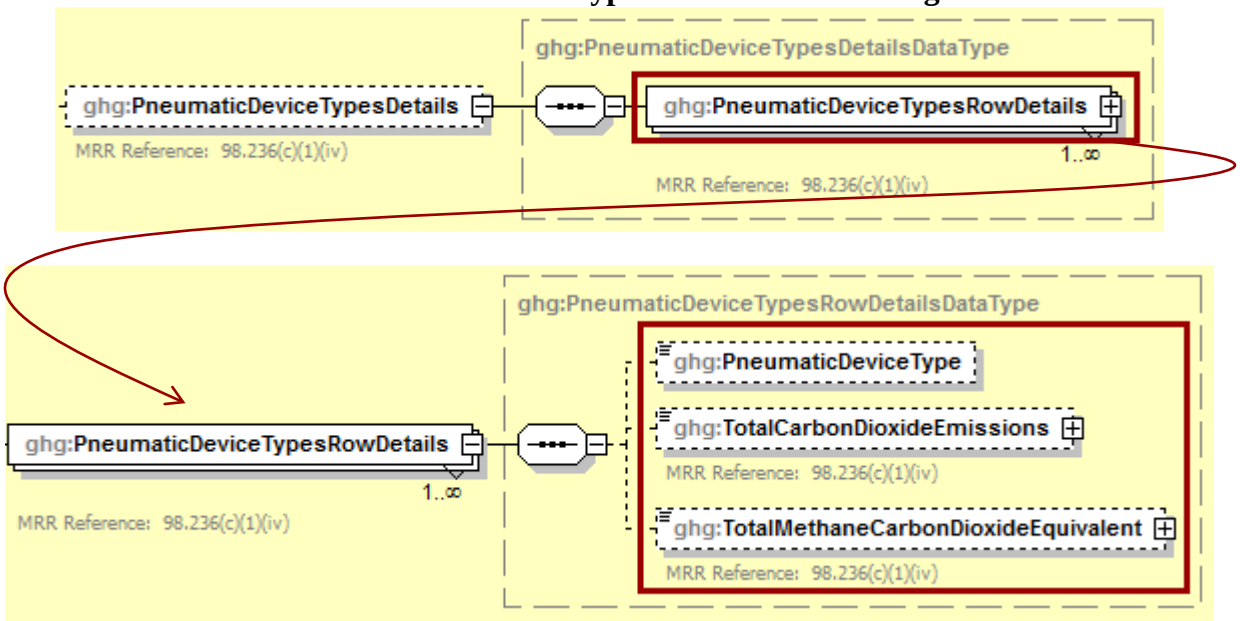
Data Element Name	Description
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions for all natural gas pneumatic device venting combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any pneumatic devices subject to reporting under 98.232 during the reporting year.
TotalCarbonDioxideEquivalent	Total reported CO_2 and CH_4 combined emissions in metric tons CO_2e for the specified source type. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any pneumatic devices subject to reporting under 98.232 during the reporting year.
DoesFacilityHaveHighBleedDevices	Indicate (Yes/No) if the facility had any continuous high-bleed pneumatic devices subject to reporting under 98.232 in the reporting year.
DoesFacilityHaveIntermittentBleedDevices	Indicate (Yes/No) if the facility had any intermittent bleed pneumatic devices subject to reporting under 98.232 in the reporting year.
DoesFacilityHaveLowBleedDevices	Indicate (Yes/No) if the facility had any continuous low-bleed pneumatic devices subject to reporting under 98.232 in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 7
Example for Pneumatic Device Venting Details

```
<ghg:PneumaticDeviceVentingDetails>
  <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">4768.2</ghg:TotalCarbonDioxideEmissions>
  <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric Tons">494299.7</ghg:TotalMethaneCarbonDioxideEquivalent>
  <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">499067.9</ghg:TotalCarbonDioxideEquivalent>
  <ghg:DoesFacilityHaveHighBleedDevices>Yes</ghg:DoesFacilityHaveHighBleedDevices>
  <ghg:DoesFacilityHaveIntermittentBleedDevices>Yes</ghg:DoesFacilityHaveIntermittentBleedDevices>
  <ghg:DoesFacilityHaveLowBleedDevices>Yes</ghg:DoesFacilityHaveLowBleedDevices>
  <ghg:BAMMIndicator>No</ghg:BAMMIndicator>
  <ghg:SubstituteDataIndicator>Yes</ghg:SubstituteDataIndicator>
  <ghg:PneumaticDeviceTypesDetails>
                        <See example for Pneumatic Device Types Details>
  </ghg:PneumaticDeviceTypesDetails>
</ghg:PneumaticDeviceVentingDetails>
```

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

Figure 12
Pneumatic Device Types Details Schema Diagram



Note: Data elements boxed in red are required.

For natural gas pneumatic devices subject to reporting under 98.232 in the reporting year (refer to Equation W-1 of 98.233), report the annual CO_2 and CH_4 emissions at the facility level, expressed in metric tons CO_2e for each gas, for each of the following pieces of equipment, as applicable [98.236(c)(1)(iv)]:

- continuous high-bleed pneumatic devices
- intermittent bleed pneumatic devices
- continuous low-bleed pneumatic devices

Table 9
Pneumatic Device Types Details Data Element Definitions

Data Element Name	Description
PneumaticDeviceTypesDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any pneumatic devices subject to reporting under 98.232 in the reporting year.
PneumaticDeviceTypesRowDetails	**Parent Element:** A collection of data elements to report for each type of pneumatic device subject to reporting under 98.232 in the reporting year.
PneumaticDeviceType	Type of pneumatic device subject to reporting under 98.232 in the reporting year. See list of allowable values. High-bleed Pneumatic Devices Intermittent Bleed Pneumatic Devices Low-Bleed Pneumatic Devices
TotalCarbonDioxideEmissions	Total CO_2 emissions in metric tons from all pneumatic devices of the specified type. [98.236(c)(1)(iv)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalMethaneCarbonDioxideEquivalent	Total CH_4 emissions in metric tons CO_2e from all pneumatic devices of the specified type. [98.236(c)(1)(iv)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 8
Example for Pneumatic Device Types Details

```
<ghg:PneumaticDeviceTypesDetails>
    <ghg:PneumaticDeviceTypesRowDetails>
        <ghg:PneumaticDeviceType>High-bleed Pneumatic Devices</ghg:PneumaticDeviceType>
        <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">3851.5</ghg:TotalCarbonDioxideEmissions>
        <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">399272.7</ghg:TotalMethaneCarbonDioxideEquivalent>
    </ghg:PneumaticDeviceTypesRowDetails>
    <ghg:PneumaticDeviceTypesRowDetails>
        <ghg:PneumaticDeviceType>Intermittent Bleed Pneumatic Devices</ghg:PneumaticDeviceType>
        <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">724.1</ghg:TotalCarbonDioxideEmissions>
        <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
 Tons">75063.3</ghg:TotalMethaneCarbonDioxideEquivalent>
    </ghg:PneumaticDeviceTypesRowDetails>
    <ghg:PneumaticDeviceTypesRowDetails>
        <ghg:PneumaticDeviceType>Low-Bleed Pneumatic Devices</ghg:PneumaticDeviceType>
        <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">192.6</ghg:TotalCarbonDioxideEmissions>
        <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">19963.7</ghg:TotalMethaneCarbonDioxideEquivalent>
    </ghg:PneumaticDeviceTypesRowDetails>
</ghg:PneumaticDeviceTypesDetails>
```

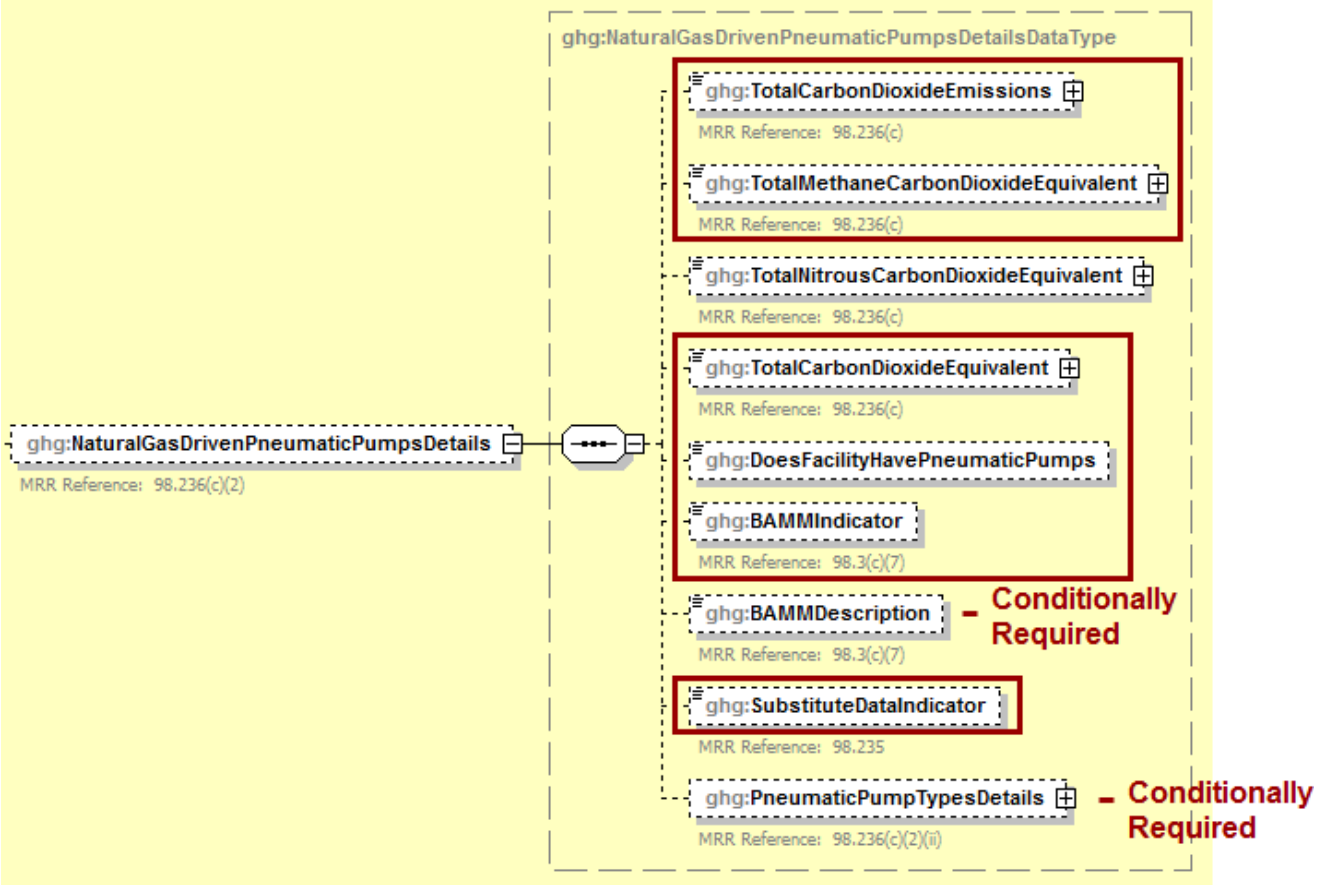
Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

5.0 Natural Gas Driven Pneumatic Pumps

This topic provides a step-by-step description of how to report natural gas driven pneumatic pumps information for a facility. This section is applicable to and required for the onshore petroleum and natural gas production industry segment only.

Figure 13
Natural Gas Driven Pneumatic Pumps 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 natural gas driven pneumatic pumps, report the following:

- The CO_2 and CH_4 emissions totals and the total CO_2e emissions for all natural gas driven pneumatic pumps combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any natural gas driven pneumatic pumps subject to reporting under 98.232 during the reporting year.
  - The value to report for "TotalCarbonDioxideEmissions" equals the value reported for the data element "TotalCarbonDioxideEmissions" for natural gas driven pneumatic pumps.

- The value to report for "TotalMethaneCarbonDioxideEquivalent" is the sum of the values reported for the data element "TotalMethaneCarbonDioxideEquivalent" for natural gas driven pneumatic pumps.
- The value to report for "TotalCarbonDioxideEquivalent" is the sum of the values reported for "TotalCarbonDioxideEmissions" and "TotalMethaneCarbonDioxideEquivalent".

- Whether the facility had any natural gas driven pneumatic pumps subject to reporting under 98.232 in the reporting year.
- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions.

Table 10
Natural Gas Driven Pneumatic Pumps Details Data Element Definitions

Data Element Name	Description
NaturalGasDrivenPneumaticPumpsDetails	**Parent Element:** A collection of data elements to report for natural gas driven pneumatic pumps. [98.236(c)(2)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions for all natural gas driven pneumatic pumps combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any pneumatic devices subject to reporting under 98.232 during the reporting year.
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions for all natural gas pneumatic pumps combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any pneumatic devices subject to reporting under 98.232 during the reporting year.
TotalCarbonDioxideEquivalent	Total reported CO_2 and CH_4 combined emissions in metric tons CO_2e for the specified source type. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any pneumatic devices subject to reporting under 98.232 during the reporting year.
DoesFacilityHavePneumaticPumps	Indicate (Yes/No) if the facility had any natural gas pneumatic pumps subject to reporting under 98.232 in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]

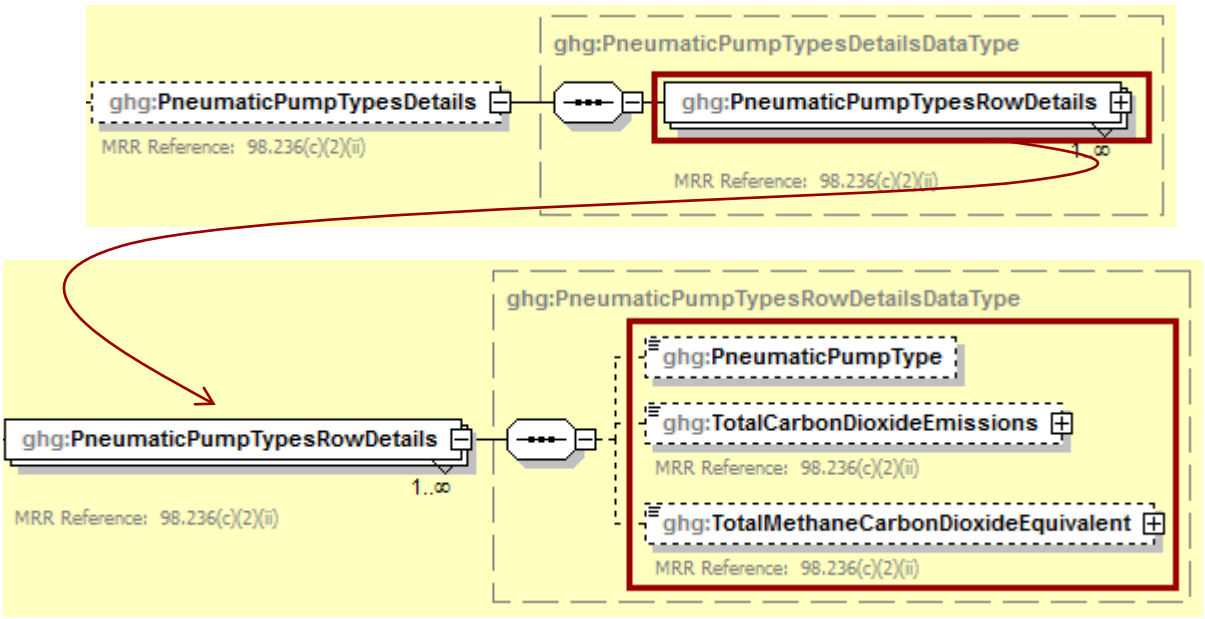
Data Element Name	Description
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 9
Example for Natural Gas Pneumatic Pumps Types Details

```
<ghg:NaturalGasDrivenPneumaticPumpsDetails>
  <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">281.6</ghg:TotalCarbonDioxideEmissions>
  <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric Tons">29188.6</ghg:TotalMethaneCarbonDioxideEquivalent>
  <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">29470.2</ghg:TotalCarbonDioxideEquivalent>
  <ghg:DoesFacilityHavePneumaticPumps>Yes</ghg:DoesFacilityHavePneumaticPumps>
  <ghg:BAMMIndicator>Yes</ghg:BAMMIndicator>
  <ghg:BAMMDescription>BAMM used 2/1/2011 – 6/3/2011. Applies to the count of pumps.</ghg:BAMMDescription>
  <ghg:SubstituteDataIndicator>Yes</ghg:SubstituteDataIndicator>
  <ghg:PneumaticPumpTypesDetails>
            <See example for Pneumatic Pumps Types Details>
  </ghg:PneumaticPumpTypesDetails>
</ghg:NaturalGasDrivenPneumaticPumpsDetails>
```

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

Figure 14
Pneumatic Device Types Details Schema Diagram



Note: Data elements boxed in red are required.

For natural gas driven pneumatic pumps subject to reporting under 98.232 in the reporting year (refer to Equation W-2 of 98.233), report annual CO_2 and CH_4 emissions at the facility level, expressed in metric tons CO_2e for each gas, for all natural gas driven pneumatic pumps combined. [98.236(c)(2)(ii)]

Table 11
Pneumatic Pump Types Details Data Element Definitions

Data Element Name	Description
PneumaticPumpTypesDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any natural gas driven pneumatic pumps subject to reporting under 98.232 in the reporting year.
PneumaticPumpTypesRowDetails	**Parent Element:** A collection of data elements to report for natural gas driven pneumatic pumps subject to reporting under 98.232 in the reporting year.
PneumaticDeviceType	The type of pneumatic pump: "Natural Gas Driven Pneumatic Pumps".
TotalCarbonDioxideEmissions	Total CO_2 emissions in metric tons from all natural gas driven pneumatic pumps. [98.236(c)(1)(iv)] Set the units of measure to “Metric Tons” in the attribute **massUOM**.

Data Element Name	Description
TotalMethaneCarbonDioxideEquivalent	Total CH_4 emissions in metric tons CO_2e from all pneumatic pumps of the specified type. [98.236(c)(1)(iv)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 10
Example for Pneumatic Pumps Types Details

```
<ghg:PneumaticPumpTypesDetails>
      <ghg:PneumaticPumpTypesRowDetails>
            <ghg:PneumaticPumpType>Natural Gas Driven Pneumatic Pumps</ghg:PneumaticPumpType>
            <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">281.6</ghg:TotalCarbonDioxideEmissions>
            <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">29188.6</ghg:TotalMethaneCarbonDioxideEquivalent>
      </ghg:PneumaticPumpTypesRowDetails>
</ghg:PneumaticPumpTypesDetails>
```

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

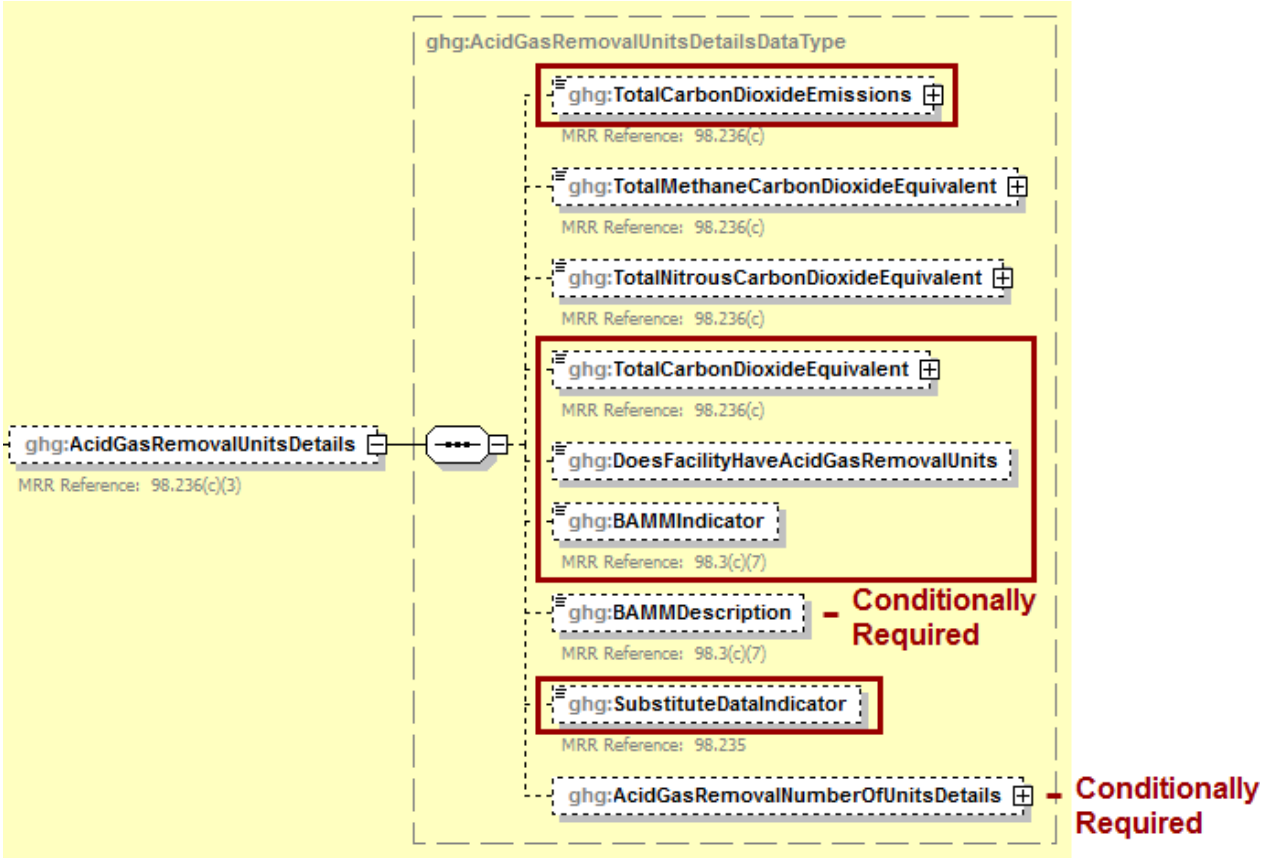
Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

6.0 Acid Gas Removal Units

This topic provides a step-by-step description of how to report acid gas removal unit information for a facility. This section is applicable to and required for the following industry segments only:

- Onshore petroleum and natural gas production
- Onshore natural gas processing

Figure 15
Acid Gas Removal Units 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 acid gas removal units, report the following:

- The CO_2 emissions total and the total CO_2e emissions for all acid gas removal units combined in metric tons of CO_2e (total CO_2 emissions and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any acid gas removal units subject to reporting under 98.232 during the reporting year.

- The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the data element "TotalCarbonDioxideEmissions" for each acid gas removal unit.
- The value to report for "TotalCarbonDioxideEquivalent" equals the value reported for "TotalCarbonDioxideEmissions".

- Whether the facility any acid gas removal units subject to reporting under 98.232 in the reporting year.
- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

Table 12
Acid Gas Removal Units Details Data Element Definitions

Data Element Name	Description
AcidGasRemovalUnitsDetails	**Parent Element:** A collection of data elements to report for acid gas removal units. [98.236(c)(3)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions for all acid gas removal units combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any acid gas removal units subject to reporting under 98.232 during the reporting year.
TotalCarbonDioxideEquivalent	Total reported CO_2 emissions for all acid gas removal units. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any acid gas removal units subject to reporting under 98.232 during the reporting year.
DoesFacilityHaveAcidGasRemovalUnits	Indicate (Yes/No) if the facility had any acid gas removal units subject to reporting under 98.232 in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]

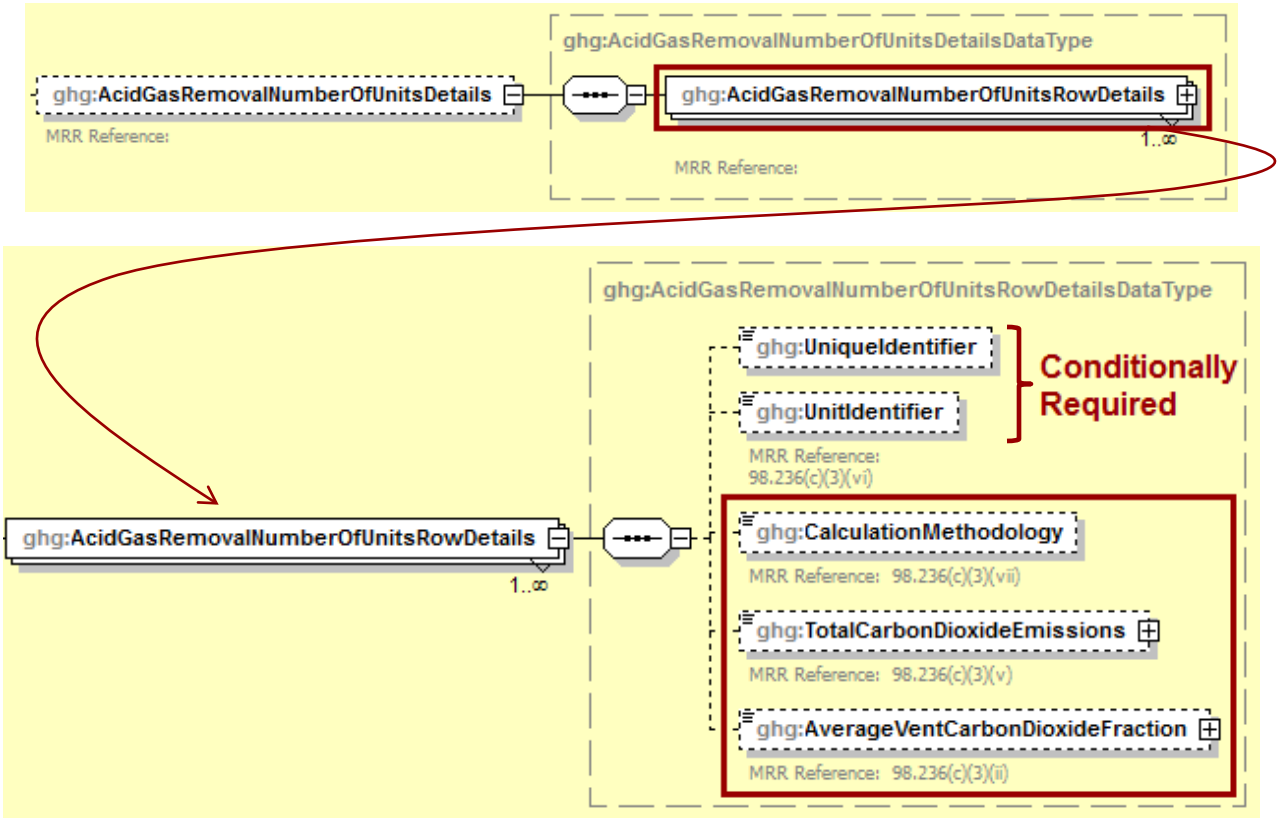
Data Element Name	Description
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 11
Example for Acid Gas Removal Units Details

```
<ghg:AcidGasRemovalUnitsDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM=" Metric Tons">1101876.6</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">1101876.6</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DoesFacilityHaveAcidGasRemovalUnits>Yes</ghg:DoesFacilityHaveAcidGasRemovalUnits>
      <ghg:BAMMIndicator>No</ghg:BAMMIndicator>
      <ghg:SubstituteDataIndicator>No</ghg:SubstituteDataIndicator>
      <ghg:AcidGasRemovalNumberOfUnitsDetails>
                  <See example for Acid Gas Removal Number of Units Details>
      </ghg:AcidGasRemovalNumberOfUnitsDetails>
</ghg:AcidGasRemovalUnitsDetails>
```

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

Figure 16
Acid Gas Removal Number of Units 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 acid gas removal (AGR) unit subject to reporting under 98.232 (refer to Equation W-3 and Equations W-4A and W-4B of 98.233), report the following:

- For the onshore petroleum and natural gas production industry segment only, a sequential identification number for the AGR unit. **Note:** This number is used for reference only in the event that there is a validation message associated with the AGR unit data.
- For the onshore natural gas processing industry segment only, a unique unit ID or name for the AGR unit. [98.236(c)(3)(vi)]
- An indication of which calculation methodology was used to calculate emissions for the AGR unit. [98.236(c)(3)(vii)]
  - Calculation Methodology 1 (98.233(d)(1))
  - Calculation Methodology 2 (98.233(d)(2))
  - Calculation Methodology 3 (98.233(d)(3))
  - Calculation Methodology 4 (98.233(d)(4))
- The annual CO_2 emissions for the AGR unit, expressed in metric tons. [98.236(c)(3)(v)]
- If Calculation Methodology 1 was used, report the annual average volumetric fraction of CO_2 content in the vent from the AGR unit. [98.236(c)(3)(ii)]

Table 13
Acid Gas Removal Number of Units Details Data Element Definitions

Data Element Name	Description
AcidGasRemovalNumberOfUnitsDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any acid gas removal units subject to reporting under 98.232 in the reporting year.
AcidGasRemovalNumberOfUnitsRowDetails	**Parent Element:** A collection of data elements to report for each acid gas removal unit subject to 98.232 in the reporting year.
UniqueIdentifier	**Conditionally Required:** For the onshore petroleum and natural gas production industry segment only, a unique ID for the acid gas removal unit. Please number units sequentially.
UnitIdentifier	**Conditionally Required:** For the onshore natural gas processing industry segment only, a unique unit ID or name for the acid gas removal unit. [98.236(c)(3)(vi)]

Data Element Name	Description
CalculationMethodology	The calculation methodology used to calculate CO_2 emissions for the specified acid gas removal unit. See list of allowable values. [98.236(c)(3)(vii)] Calculation Methodology 1 (98.233(d)(1)) Calculation Methodology 2 (98.233(d)(2)) Calculation Methodology 3 (98.233(d)(3)) Calculation Methodology 4 (98.233(d)(4))
TotalCarbonDioxideEmissions	Total CO_2 emissions in metric tons for the specified acid gas removal unit. [98.236(c)(3)(v)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
AverageVentCarbonDioxideFraction	**Conditionally Required:** If Calculation Methodology 1 is used, then report the annual average volumetric fraction of CO_2 content in the vent from the acid gas removal unit. [98.236(c)(3)(ii)] Set the units of measure to "decimal fraction" in the attribute **fractionUOM**. The value must fall between 0 and 1.

XML Excerpt 12
Example for Acid Gas Removal Number of Units Details

```
<ghg:AcidGasRemovalNumberOfUnitsDetails>
 <ghg:AcidGasRemovalNumberOfUnitsRowDetails>
       <ghg:UniqueIdentifier>1</ghg:UniqueIdentifier>
       <ghg:CalculationMethodology>Calculation Methodology 2 (98.233(d)(2))</ghg:CalculationMethodology>
       <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">367292.2</ghg:TotalCarbonDioxideEmissions>
 </ghg:AcidGasRemovalNumberOfUnitsRowDetails>
<ghg:AcidGasRemovalNumberOfUnitsRowDetails>
       <ghg:UniqueIdentifier>2</ghg:UniqueIdentifier>
       <ghg:CalculationMethodology>Calculation Methodology 1 (98.233(d)(1))</ghg:CalculationMethodology>
       <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">734584.4</ghg:TotalCarbonDioxideEmissions>
       <ghg:AverageVentCarbonDioxideFraction fractionUOM="decimal
 fraction">0.33</ghg:AverageVentCarbonDioxideFraction>
 </ghg:AcidGasRemovalNumberOfUnitsRowDetails>
</ghg:AcidGasRemovalNumberOfUnitsDetails>
```

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

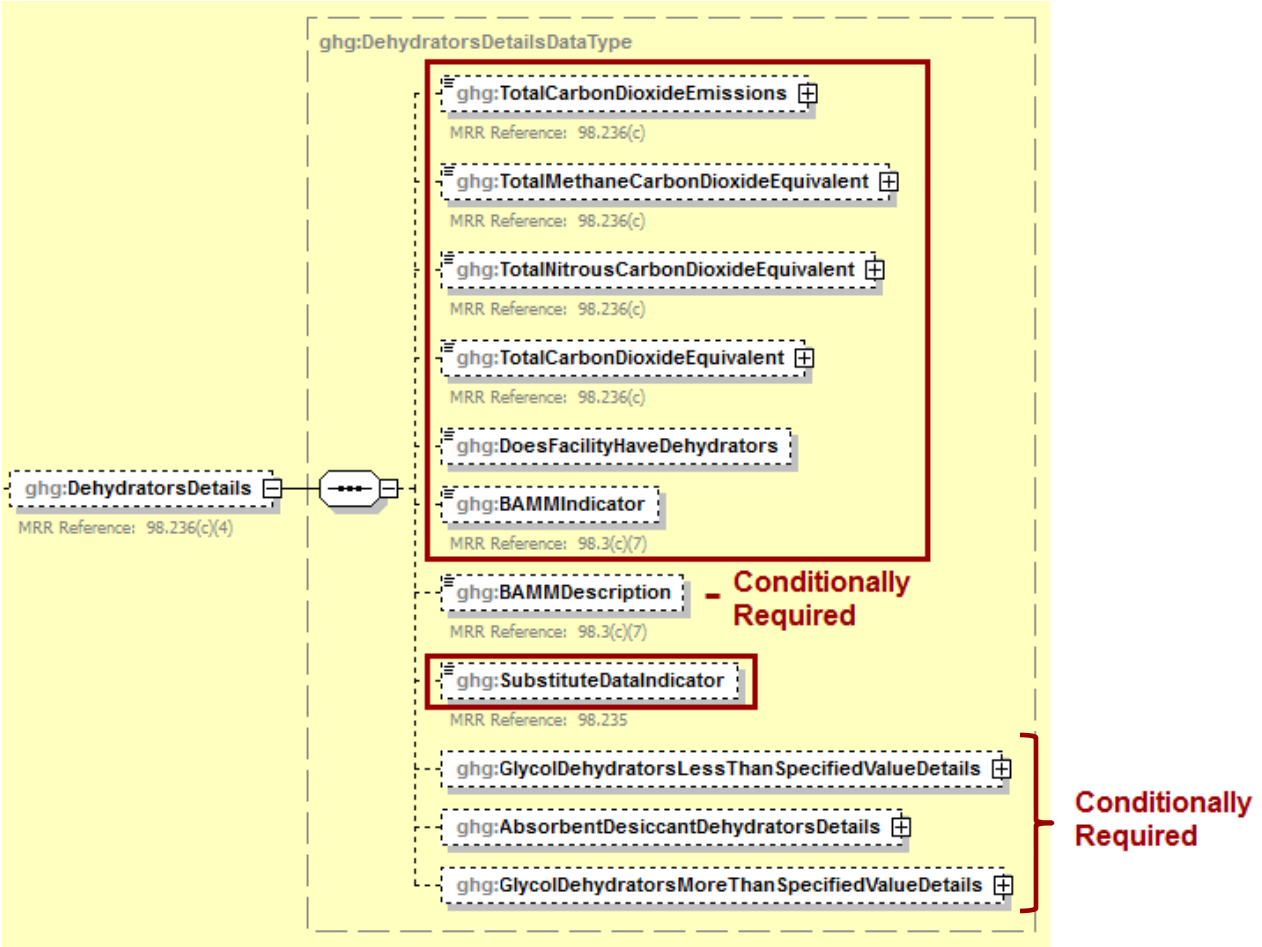
Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

7.0 Dehydrators

This topic provides a step-by-step description of how to report dehydrator information for a facility. This section is applicable to and required for the following industry segments only:

- Onshore petroleum and natural gas production
- Onshore natural gas processing

Figure 17
Dehydrators 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 dehydrators, report the following:

- The CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for all dehydrators combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e, total N_2O emissions in CO_2e and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any glycol or absorbent desiccant dehydrators subject to reporting under 98.232 during the reporting year.
  - The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the following data elements:
    - "VentingCarbonDioxideEmissions" for all glycol dehydrators with a throughput less than 0.4 MMscfd.
    - "FlaringCarbonDioxideEmissions" for all glycol dehydrators with a throughput less than 0.4 MMscfd.
    - "TotalCarbonDioxideEmissions" for all absorbent desiccant dehydrators.
    - "VentingCarbonDioxideEmissions" for each glycol dehydrators with a throughput greater than or equal to 0.4 MMscfd.
    - "FlaringCarbonDioxideEmissions" for each glycol dehydrators with a throughput greater than or equal to 0.4 MMscfd.
  - The value to report for "TotalMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:
    - "VentingMethaneCarbonDioxideEquivalent" for all glycol dehydrators with a throughput less than 0.4 MMscfd.
    - "FlaringMethaneCarbonDioxideEquivalent" for all glycol dehydrators with a throughput less than 0.4 MMscfd.
    - "TotalMethaneCarbonDioxideEquivalent" for all absorbent desiccant dehydrators.
    - "VentingMethaneCarbonDioxideEquivalent" for each glycol dehydrators with a throughput greater than or equal to 0.4 MMscfd.
    - "FlaringMethaneCarbonDioxideEquivalent" for each glycol dehydrators with a throughput greater than or equal to 0.4 MMscfd.
  - The value to report for "TotalNitrousCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:
    - "FlaringNitrousCarbonDioxideEquivalent" for all glycol dehydrators with a throughput less than 0.4 MMscfd.
    - "FlaringNitrousCarbonDioxideEquivalent" for each glycol dehydrators with a throughput greater than or equal to 0.4 MMscfd.
  - The value to report for "TotalCarbonDioxideEquivalent" is the sum of the values reported for "TotalCarbonDioxideEmissions", "TotalMethaneCarbonDioxideEquivalent" and "TotalNitrousCarbonDioxideEquivalent".

- Whether the facility had any glycol or absorbent desiccant dehydrators subject to reporting under 98.232 during the reporting year.
- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

Table 14
Dehydrators Details Data Element Definitions

Data Element Name	Description
DehydratorsDetails	**Parent Element:** A collection of data elements to report for dehydrators. [98.236(c)(4)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions for all dehydrators combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any glycol or absorbent desiccant dehydrators subject to reporting under 98.232 during the reporting year.
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions for all dehydrators combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any glycol or absorbent desiccant dehydrators subject to reporting under 98.232 during the reporting year.
TotalNitrousCarbonDioxideEquivalent	Annual N_2O emissions for all dehydrators combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any glycol or absorbent desiccant dehydrators subject to reporting under 98.232 during the reporting year.
TotalCarbonDioxideEquivalent	Total combined CO_2, CH_4 and N_2O emissions for all dehydrators combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any glycol or absorbent desiccant dehydrators subject to reporting under 98.232 during the reporting year.
DoesFacilityHaveDehydrators	Indicate (Yes/No) if the facility had any dehydrators subject to reporting under 98.232 in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]

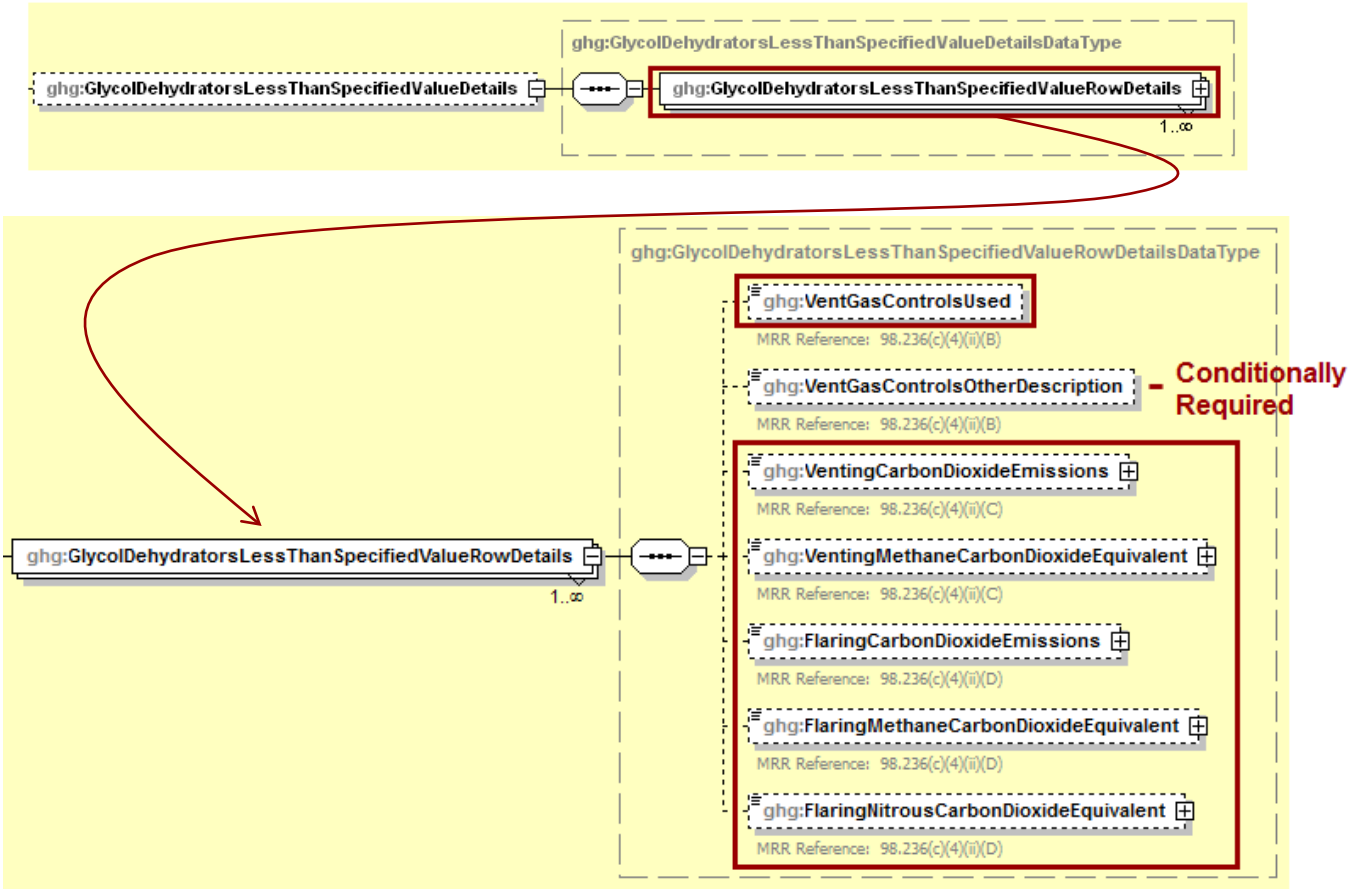
Data Element Name	Description
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 13
Example for Dehydrators Details

```
<ghg:DehydratorsDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">3571.9</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">68314.2</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalNitrousCarbonDioxideEquivalent massUOM="Metric Tons">6.1</ghg:TotalNitrousCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">71892.2</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DoesFacilityHaveDehydrators>Yes</ghg:DoesFacilityHaveDehydrators>
      <ghg:BAMMIndicator>Yes</ghg:BAMMIndicator>
      <ghg:BAMMDescription>BAMM Description</ghg:BAMMDescription>
      <ghg:SubstituteDataIndicator>No</ghg:SubstituteDataIndicator>
      <ghg:GlycolDehydratorsLessThanSpecifiedValueDetails>
            <See example for Glycol Dehydrator Throughput Less Than 0.4 MMscfd Details>
      </ghg:GlycolDehydratorsLessThanSpecifiedValueDetails>
      <ghg:AbsorbentDesiccantDehydratorsDetails>
            <See example for Absorbent Desiccant Dehydrators Details>
      </ghg:AbsorbentDesiccantDehydratorsDetails>
      <ghg:GlycolDehydratorsMoreThanSpecifiedValueDetails>
            <See example for Glycol Dehydrator Throughput More Than 0.4 MMscfd Details Data >
      </ghg:GlycolDehydratorsMoreThanSpecifiedValueDetails>
</ghg:DehydratorsDetails>
```

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

Figure 18
Glycol Dehydrator Throughput Less Than 0.4 MMscfd 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.

If the facility had any glycol dehydrators with a throughput less than 0.4 MMscfd (refer to 98.233, Equation W-5 of 98.233), report the following for all combined:

- Which vent gas controls are used (refer to 98.233(e)(3) and (e)(4)). [98.236(c)(4)(ii)(B)]
- Annual CO_2 and CH_4 emissions at the facility level that resulted from venting gas directly to the atmosphere, expressed in metric tons CO_2e for each gas, combined for all glycol dehydrators with annual average daily throughput of less than 0.4 MMscfd. [98.236(c)(4)(ii)(C)]
- Annual CO_2, CH_4 and N_2O emissions at the facility level that resulted from the flaring of process gas, expressed in metric tons CO_2e for each gas, combined for all glycol dehydrators with annual average daily throughput of less than 0.4 MMscfd. [98.236(c)(4)(ii)(D)] **Note:** Emissions associated with regenerator fire-box/fire-tubes should be included here.

Table 15
Glycol Dehydrator Throughput Less Than 0.4 MMscfd Details Data Element Definitions

Data Element Name	Description
GlycolDehydratorsLessThanSpecifiedValueDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any glycol dehydrators with a throughput <0.4 MMscfd subject to reporting under 98.232 in the reporting year.
GlycolDehydratorsLessThanSpecifiedValueRowDetails	**Parent Element:** A collection of data elements to report for glycol dehydrators with a throughput <0.4 MMscfd.
VentGasControlsUsed	The vent gas control used for all glycol dehydrators with a throughput <0.4 MMscfd. See list of allowable values. [98.236(c)(4)(ii)(B)] If the vent gas control used is not on the list or if more than one control was used, report "Other / Multiple Vent Gas Controls" and describe all vent gas controls used in the following data element. Vapor Recovery Dehydrator Vents to Flares Regenerator fire-box/fire tubes Other / Multiple Vent Gas Controls No Vent Controls
VentGasControlsOtherDescription	**Conditionally Required:** If "Other / Multiple Vent Gas Controls" was reported above, describe the gas vent control(s) used. [98.236(c)(4)(ii)(B)]
VentingCarbonDioxideEmissions	Total CO_2 emissions from venting gas directly to the atmosphere in metric tons for all glycol dehydrators with a throughput <0.4 MMscfd which used the specified vent gas controls. [98.236(c)(4)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
VentingMethaneCarbonDioxideEquivalent	Total CH_4 emissions from venting gas directly to the atmosphere in metric tons CO_2e for all glycol dehydrators with a throughput <0.4 MMscfd which used the specified vent gas controls. [98.236(c)(4)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

Data Element Name	Description
FlaringCarbonDioxideEmissions	Total CO_2 emissions from flaring of process gas in metric tons for all glycol dehydrators with a throughput <0.4 MMscfd which used the specified vent gas controls. **Note:** Emissions associated with regenerator fire-box/fire-tubes should be included here. [98.236(c)(4)(ii)(D)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringMethaneCarbonDioxideEquivalent	Total CH_4 emissions from flaring of process gas in metric tons CO_2e for all glycol dehydrators with a throughput <0.4 MMscfd which used the specified vent gas controls. **Note:** Emissions associated with regenerator fire-box/fire-tubes should be included here. [98.236(c)(4)(ii)(D)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringNitrousCarbonDioxideEquivalent	Total N_2O emissions from flaring of process gas in metric tons CO_2e for all glycol dehydrators with a throughput <0.4 MMscfd which used the specified vent gas controls. **Note:** Emissions associated with regenerator fire-box/fire-tubes should be included here. [98.236(c)(4)(ii)(D)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 14
Example for Glycol Dehydrator Throughput Less Than 0.4 MMscfd Details

```
<ghg:GlycolDehydratorsLessThanSpecifiedValueDetails>
      <ghg:GlycolDehydratorsLessThanSpecifiedValueRowDetails>
            <ghg:DeviceType>Glycol Dehydrator with &lt;0.4 MMscfd</ghg:DeviceType>
            <ghg:VentGasControlsUsed>Vapor Recovery</ghg:VentGasControlsUsed>
            <ghg:VentingCarbonDioxideEmissions massUOM="Metric Tons">32.2</ghg:VentingCarbonDioxideEmissions>
            <ghg:VentingMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">5803.0</ghg:VentingMethaneCarbonDioxideEquivalent>
            <ghg:FlaringCarbonDioxideEmissions massUOM="Metric Tons">303.1</ghg:FlaringCarbonDioxideEmissions>
            <ghg:FlaringMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">116.1</ghg:FlaringMethaneCarbonDioxideEquivalent>
            <ghg:FlaringNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">0.6</ghg:FlaringNitrousCarbonDioxideEquivalent>
      </ghg:GlycolDehydratorsLessThanSpecifiedValueRowDetails>
</ghg:GlycolDehydratorsLessThanSpecifiedValueDetails>
```

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

Figure 19
Absorbent Desiccant Dehydrators 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.

If the facility has any absorbent desiccant dehydrators (refer to Equation W-6 of 98.233), report the following for all combined:

- Total count of desiccant dehydrators. [98.236(c)(4)(iii)(A)]
- Annual CO_2 and CH_4 emissions at the facility level, expressed in metric tons CO_2e for each gas, for all absorbent desiccant dehydrators combined. [98.236(c)(4)(iii)(B)]

Table 16
Absorbent Desiccant Dehydrators Details Data Element Definitions

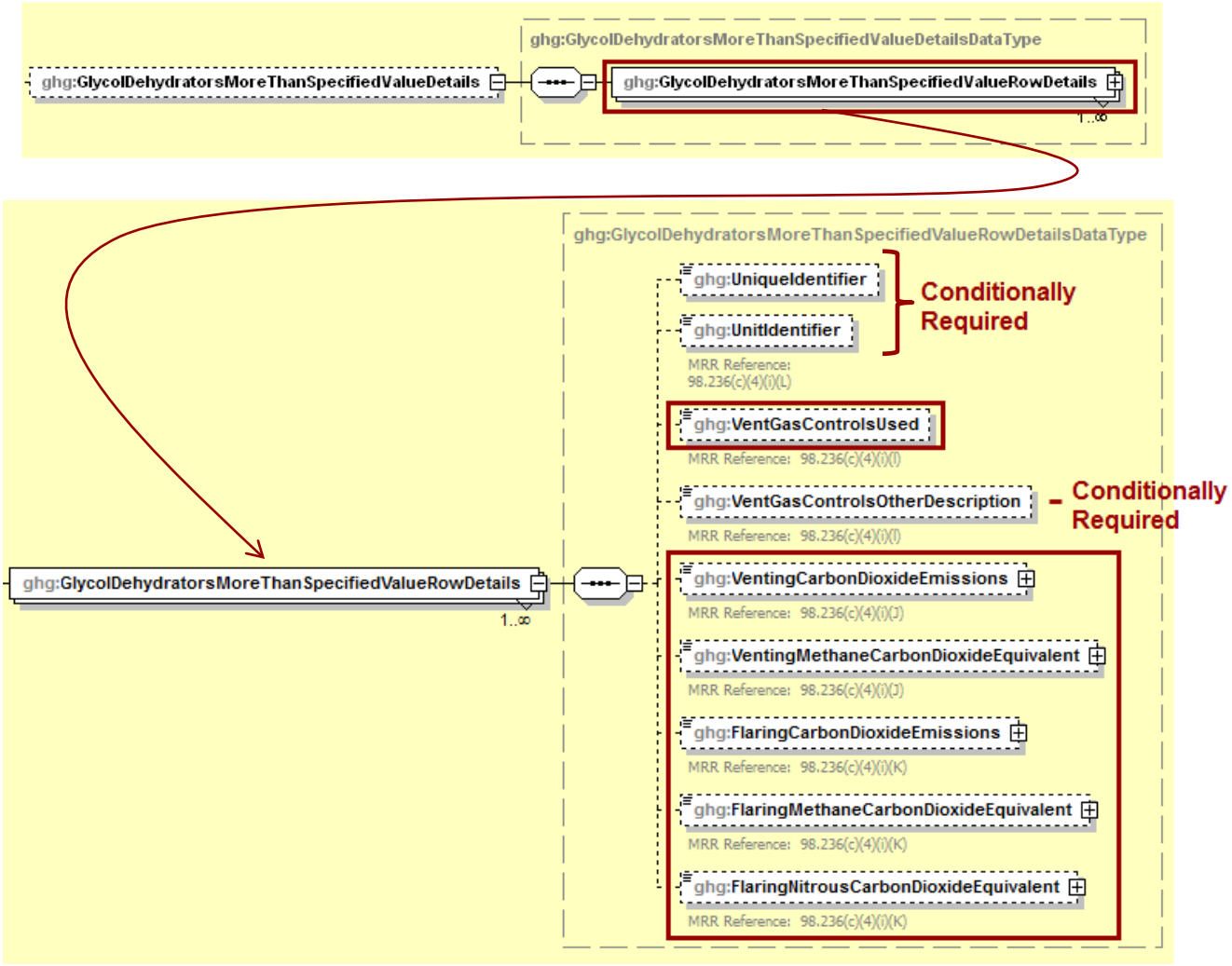
Data Element Name	Description
AbsorbentDesiccantDehydratorsDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any absorbent desiccant dehydrators subject to reporting under 98.232 in the reporting year.
AbsorbentDesiccantDehydratorsRowDetails	**Parent Element:** A collection of data elements to report for absorbent desiccant dehydrators.
DeviceType	The type of device [98.236(c)(4)(iii)]: "Absorbent Desiccant dehydrators"
AbsorbentDesiccantDehydrators	Total count of absorbent desiccant dehydrators. [98.236(c)(4)(iii)(A)]
TotalCarbonDioxideEmissions	Total CO_2 emissions in metric tons for all absorbent desiccant dehydrators. [98.236(c)(4)(iii)(B)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalMethaneCarbonDioxideEquivalent	Total CH_4 emissions in metric tons CO_2e for all absorbent desiccant dehydrators. [98.236(c)(4)(iii)(B)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 15
Example for Absorbent Desiccant Dehydrators Details

```
<ghg:AbsorbentDesiccantDehydratorsDetails>
      <ghg:AbsorbentDesiccantDehydratorsRowDetails>
            <ghg:DeviceType>Absorbent Desiccant dehydrators</ghg:DeviceType>
            <ghg:AbsorbentDesiccantDehydrators>55</ghg:AbsorbentDesiccantDehydrators>
            <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">32.2</ghg:TotalCarbonDioxideEmissions>
            <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">5803.0</ghg:TotalMethaneCarbonDioxideEquivalent>
      </ghg:AbsorbentDesiccantDehydratorsRowDetails>
</ghg:AbsorbentDesiccantDehydratorsDetails>
```

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

Figure 20
Glycol Dehydrator Throughput More Than 0.4 MMscfd 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.

If the facility had any glycol dehydrators with a throughput greater than or equal to 0.4 MMscfd (refer to 98.233(e)(1)), report the following for each:

- For the onshore petroleum and natural gas production industry segment only, report a sequential identification number for the dehydrator. **Note:** This number is used for reference only in the event that there is a validation message associated with the dehydrator data.
- For the onshore natural gas processing industry segment only, report a unique unit ID or name for the glycol dehydrator. [98.236(c)(4)(L)]
- Which vent gas controls are used (refer to 98.233(e)(3) and (e)(4)). [98.236(c)(4)(i)(I)]

- Annual CO_2 and CH_4 emissions that resulted from venting gas directly to the atmosphere, expressed in metric tons CO_2e for each gas. [98.236(c)(4)(i)(J)]
- Annual CO_2, CH_4 and N_2O emissions that resulted from flaring process gas from the dehydrator, expressed in metric tons CO_2e for each gas. [98.236(c)(4)(i)(K)] **Note:** Emissions associated with regenerator fire-box/fire-tubes should be included here.

Table 17
Glycol Dehydrator Throughput More Than 0.4 MMscfd Details Data Element Definitions

Data Element Name	Description
GlycolDehydratorsMoreThanSpecifiedValue Details	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any glycol dehydrators with a throughput >0.4 MMscfd subject to reporting under 98.232 in the reporting year.
GlycolDehydratorsMoreThanSpecifiedValue RowDetails	**Parent Element:** A collection of data elements to report for each glycol dehydrator with a throughput >0.4 MMscfd.
UniqueIdentifier	**Conditionally Required:** For the onshore petroleum and natural gas production industry segment only, a unique ID for the glycol dehydrator with a throughput >0.4 MMscfd. Please number dehydrators sequentially.
UnitIdentifier	**Conditionally Required:** For the onshore natural gas processing industry segment only, a unique unit ID or name for the glycol dehydrator with a throughput >0.4 MMscfd. [98.236(c)(4)(i)(L)]
VentGasControlsUsed	The vent gas control used for the specified dehydrator. See list of allowable values. [98.236(c)(4)(i)(I)] If the vent gas control used is not on the list or if more than one control was used, report "Other / Multiple Vent Gas Controls" and describe all vent gas controls used in the following data element. Vapor Recovery Dehydrator Vents to Flares Regenerator fire-box/fire tubes Other / Multiple Vent Gas Controls No Vent Controls
VentGasControlsOtherDescription	**Conditionally Required:** If "Other / Multiple Vent Gas Controls" was reported above, describe the gas vent control(s) used. [98.236(c)(4)(i)(I)]

Data Element Name	Description
VentingCarbonDioxideEmissions	CO_2 emissions from venting gas directly to the atmosphere in metric tons for the specified dehydrator. [98.236(c)(4)(i)(J)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
VentingMethaneCarbonDioxideEquivalent	CH_4 emissions from venting gas directly to the atmosphere in metric tons CO_2e for the specified dehydrator. [98.236(c)(4)(i)(J)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringCarbonDioxideEmissions	CO_2 emissions from flaring and other combustion in metric tons for the specified dehydrator. Emissions associated with regenerator fire-box/fire-tubes should be included here. [98.236(c)(4)(i)(K)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringMethaneCarbonDioxideEquivalent	CH_4 emissions from flaring and other combustion in metric tons CO_2e for the specified dehydrator. Emissions associated with regenerator fire-box/fire-tubes should be included here. [98.236(c)(4)(i)(K)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringNitrousCarbonDioxideEquivalent	N_2O emissions from flaring and other combustion in metric tons CO_2e for the specified dehydrator. Emissions associated with regenerator fire-box/fire-tubes should be included here. [98.236(c)(4)(i)(K)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 16
Example for Glycol Dehydrator Throughput More Than 0.4 MMscfd Details Data

```
      <ghg:GlycolDehydratorsMoreThanSpecifiedValueDetails>
            <ghg:GlycolDehydratorsMoreThanSpecifiedValueRowDetails>
                  <ghg:UnitIdentifier>001</ghg:UnitIdentifier>
                  <ghg:VentGasControlsUsed>Other</ghg:VentGasControlsUsed>
                  <ghg:VentGasControlsOtherDescription>Vapor Recovery, Regenerator fire-box/fire
tubes</ghg:VentGasControlsOtherDescription>
                  <ghg:VentingCarbonDioxideEmissions massUOM="Metric
Tons">123.0</ghg:VentingCarbonDioxideEmissions>
                  <ghg:VentingMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">22192.9</ghg:VentingMethaneCarbonDioxideEquivalent>
                  <ghg:FlaringCarbonDioxideEmissions massUOM="Metric
Tons">1158.7</ghg:FlaringCarbonDioxideEmissions>
                  <ghg:FlaringMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">443.8</ghg:FlaringMethaneCarbonDioxideEquivalent>
                  <ghg:FlaringNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">2.1</ghg:FlaringNitrousCarbonDioxideEquivalent>
            </ghg:GlycolDehydratorsMoreThanSpecifiedValueRowDetails>
            <ghg:GlycolDehydratorsMoreThanSpecifiedValueRowDetails>
                  <ghg:UnitIdentifier>002</ghg:UnitIdentifier>
                  <ghg:VentGasControlsUsed>Vapor Recovery</ghg:VentGasControlsUsed>
                  <ghg:VentingCarbonDioxideEmissions massUOM="Metric
Tons">184.6</ghg:VentingCarbonDioxideEmissions>
                  <ghg:VentingMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">33289.5</ghg:VentingMethaneCarbonDioxideEquivalent>
                  <ghg:FlaringCarbonDioxideEmissions massUOM="Metric
Tons">1738.1</ghg:FlaringCarbonDioxideEmissions>
                  <ghg:FlaringMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">665.9</ghg:FlaringMethaneCarbonDioxideEquivalent>
                  <ghg:FlaringNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">3.4</ghg:FlaringNitrousCarbonDioxideEquivalent>
            </ghg:GlycolDehydratorsMoreThanSpecifiedValueRowDetails>
      </ghg:GlycolDehydratorsMoreThanSpecifiedValueDetails>
</ghg:DehydratorsDetails>
```

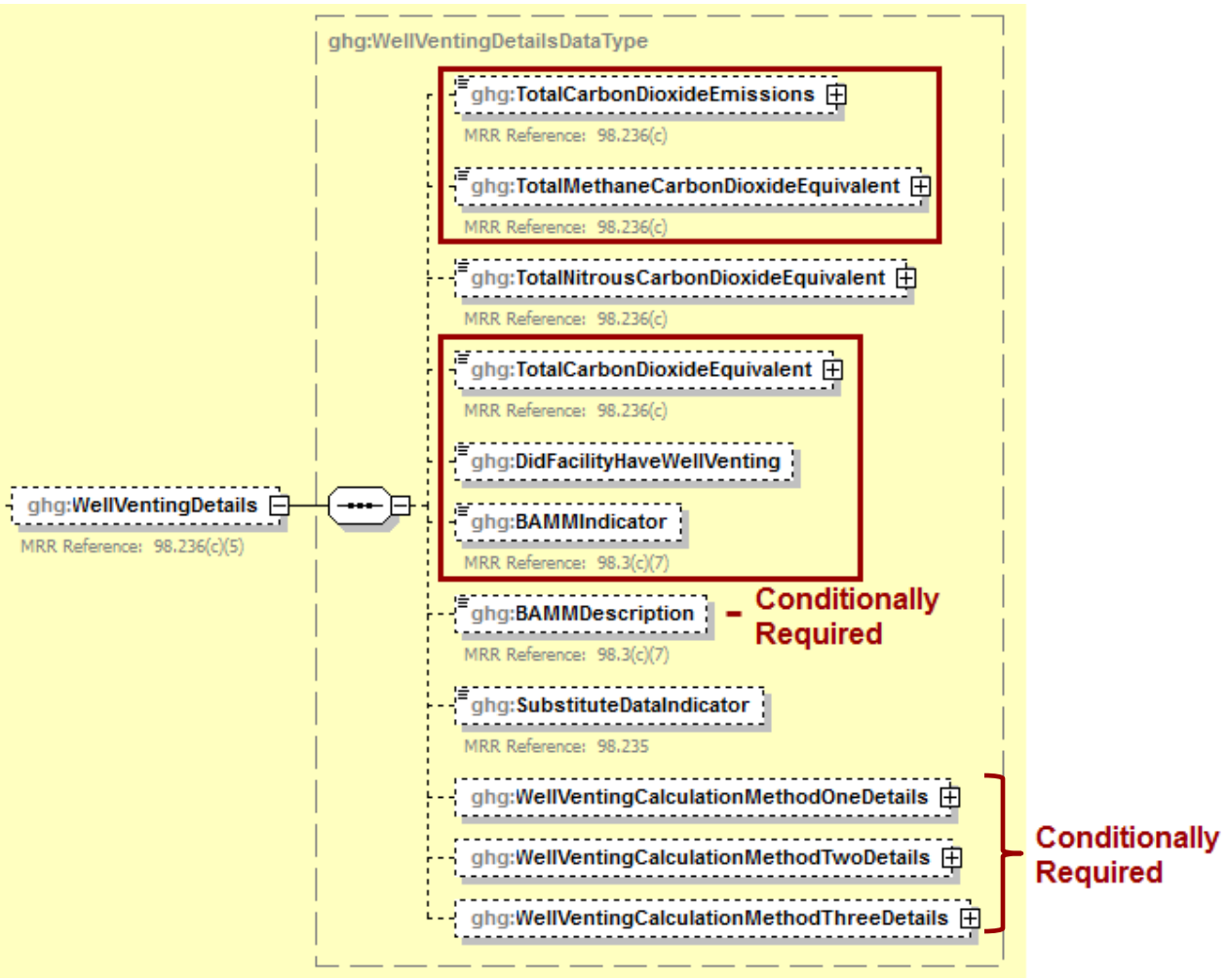
Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

8.0 Well Venting for Liquids Unloading

This topic provides a step-by-step description of how to report well venting for liquids unloading information for a facility. This section is applicable to and required for the onshore petroleum and natural gas production industry segment only.

Figure 21
Well Venting 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 well venting for liquids unloading, report the following:

- The CO_2 and CH_4 emissions totals and the total CO_2e emissions for all well ventings for liquids unloading combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any well venting for liquids unloading subject to reporting under 98.232 during the reporting year.
  - The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the following data elements:
    - "TotalCarbonDioxideEmissions" using Calculation Methodology 1.
    - "TotalCarbonDioxideEmissions" using Calculation Methodology 2.
    - "TotalCarbonDioxideEmissions" using Calculation Methodology 3.
  - The value to report for "TotalMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:
    - "TotalMethaneCarbonDioxideEquivalent" using Calculation Methodology 1.
    - "TotalMethaneCarbonDioxideEquivalent" using Calculation Methodology 2.
    - "TotalMethaneCarbonDioxideEquivalent" using Calculation Methodology 3.
  - The value to report for "TotalCarbonDioxideEquivalent" equals the sum of the values reported for "TotalCarbonDioxideEmissions" and "TotalMethaneCarbonDioxideEquivalent".
- Whether the facility had any well venting for liquids unloading subject to reporting under 98.232 in the reporting year.
- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

Table 18
Well Venting Details Data Element Definitions

Data Element Name	Description
WellVentingDetails	**Parent Element:** A collection of data elements to report for well venting for liquids unloading. [98.236(c)(5)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions for all well venting for liquids unloading combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any well venting for liquids unloading subject to reporting under 98.232 during the reporting year.

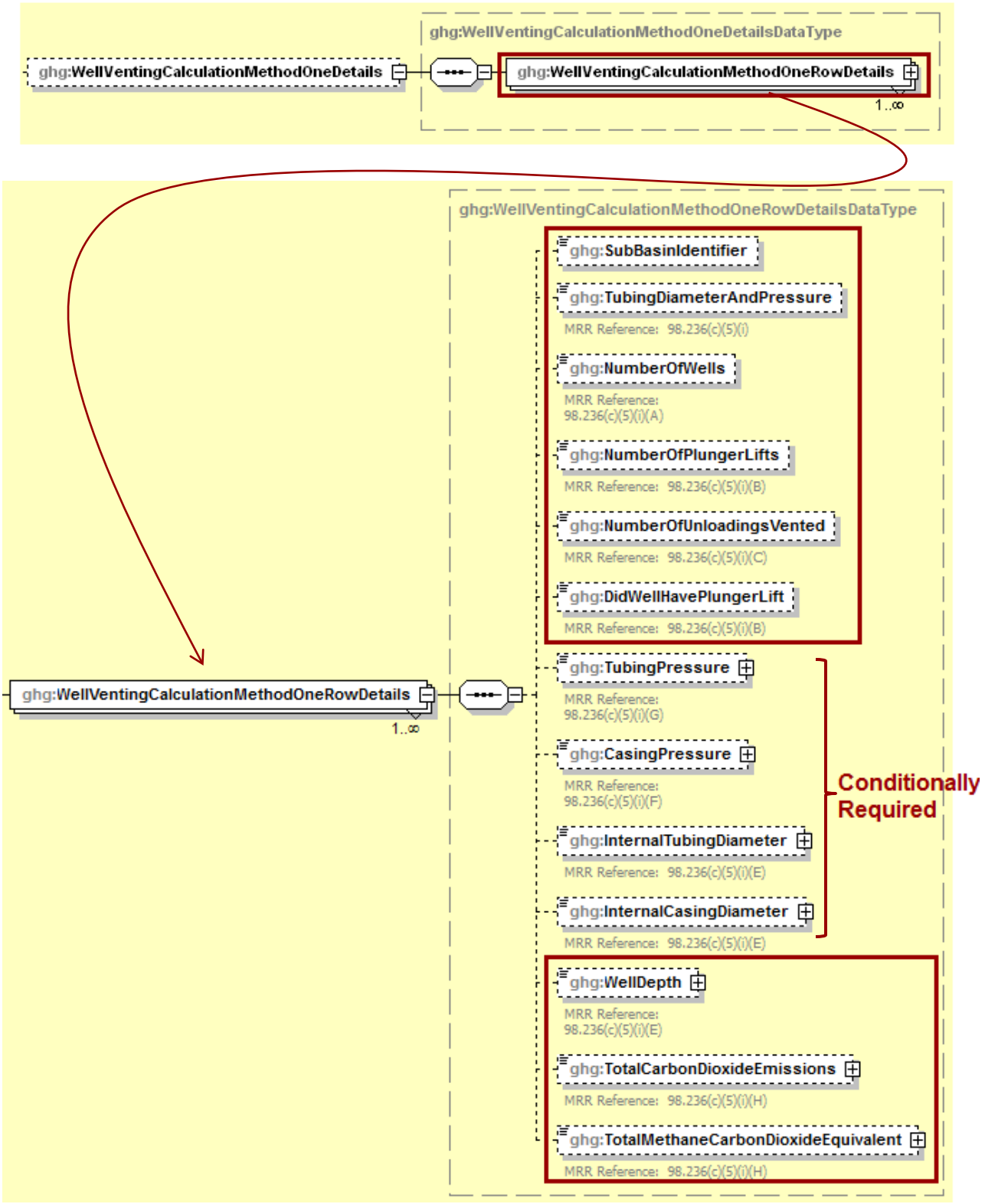
Data Element Name	Description
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions for all well venting for liquids unloading combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any well venting for liquids unloading subject to reporting under 98.232 during the reporting year.
TotalCarbonDioxideEquivalent	Total combined CO_2 and CH_4 emissions for all well venting for liquids unloading combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any well venting for liquids unloading subject to reporting under 98.232 during the reporting year.
DidFacilityHaveWellVenting	Indicate (Yes/No) if the facility had any well venting for liquids unloading subject to reporting under 98.232 in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 17
Example for Well Venting Details

```
<ghg:WellVentingDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM=" Metric Tons ">13799.6</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">13313873.4</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM=" Metric Tons ">13327673.0</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DidFacilityHaveWellVenting>Yes</ghg:DidFacilityHaveWellVenting>
      <ghg:BAMMIndicator>No</ghg:BAMMIndicator>
      <ghg:SubstituteDataIndicator>Yes</ghg:SubstituteDataIndicator>
      <ghg:WellVentingCalculationMethodOneDetails>
            <See example for Well Venting Calculation Methodology 1 Details>
      </ghg:WellVentingCalculationMethodOneDetails>
      <ghg:WellVentingCalculationMethodTwoDetails>
            <See example for Well Venting Calculation Methodology 2 Details>
      </ghg:WellVentingCalculationMethodTwoDetails>
      <ghg:WellVentingCalculationMethodThreeDetails>
            <See example for Well Venting Calculation Methodology 3 Details>
      </ghg:WellVentingCalculationMethodThreeDetails>
</ghg:WellVentingDetails>
```

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

Figure 22
Well Venting Calculation Methodology 1 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.

If Calculation Methodology 1 was used to calculate emissions (refer to Equation W-7 of 98.233), report the following [98.236(c)(5)(i)]:

- The unique identity of the sub-basin category (see Sub-Basin Identification for the naming convention)
- The identity of each tubing diameter group and pressure group combination within each sub-basin category.
  - ≤1 inch, ≤25 psig
  - ≤1 inch, >25 psig and ≤60 psig
  - ≤1 inch, >60 psig and ≤110 psig
  - ≤1 inch, >110 psig and ≤200 psig
  - ≤1 inch, >200 psig
  - >1 inch and <2.375 inches, ≤25 psig
  - >1 inch and <2.375 inches, >25 psig and ≤60 psig
  - >1 inch and <2.375 inches, >60 psig and ≤110 psig
  - >1 inch and <2.375 inches, >110 psig and ≤200 psig
  - >1 inch and <2.375 inches, >200 psig
  - ≥2.375 inches, ≤25 psig
  - ≥2.375 inches, >25 psig and ≤60 psig
  - ≥2.375 inches, >60 psig and ≤110 psig
  - ≥2.375 inches, >110 psig and ≤200 psig
  - ≥2.375 inches, >200 psig

  Note: Use the exact values referenced in the data element description table listed below.

For each tubing diameter group and pressure group combination within each sub-basin category, report the following [98.236(c)(5)(i)]:

- Number of wells vented to the atmosphere for liquids unloading. [98.236(c)(5)(i)(A)]
- Number of plunger lifts. [98.236(c)(5)(i)(B)]
- Cumulative number of unloadings vented to the atmosphere. [98.236(c)(5)(i)(C)]
- For the single well selected for installation of the recording flow meter, report the following:
  - Whether the selected well from the tubing diameter and pressure group combination had a plunger lift. [98.236(c)(5)(i)(B)]
  - If the well had a plunger lift, report the tubing pressure, in psia for the well. [98.236(c)(5)(i)(G)]
  - If the well did not have a plunger lift, report the casing pressure, in psia, for the well. [98.236(c)(5)(i)(F)]
  - If the well had a plunger lift, report the internal tubing diameter in inches. [98.236(c)(5)(i)(E)]
  - If the well did not have a plunger lift, report the internal casing diameter in inches. [98.236(c)(5)(i)(E)]
  - The well depth of the well, in feet. [98.236(c)(5)(i)(E)]

- The annual CO_2 and CH_4 emissions, expressed in metric tons CO_2e for each gas. [98.236(c)(5)(i)(H)]

Table 19
Well Venting Calculation Methodology 1 Details Data Element Definitions

Data Element Name	Description
WellVentingCalculationMethodOneDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any sub-basins using Calculation Methodology 1 for well venting for liquids unloading subject to reporting under 98.232 in the reporting year.
WellVentingCalculationMethodOneRowDetails	**Parent Element:** A collection of data elements to report for each sub-basin and each tubing diameter group and pressure group combination using Calculation Methodology 1 for well venting for liquids unloading.
SubBasinIdentifier	Sub-basin ID. [98.236(c)(5)] See Sub-Basin Identification for the required naming convention.
TubingDiameterAndPressure	The tubing diameter group and pressure group combination within the specified sub-basin category. See list of allowable values. [98.236(c)(5)(i)] <1 inch, <25 psig <1 inch, >25 psig and <60 psig <1 inch, >60 psig and <110 psig <1 inch, >110 psig and <200 psig <1 inch, >200 psig >1 inch and <2.375 inches, <25 psig >1 inch and <2.375 inches, >25 psig and <60 psig >1 inch and <2.375 inches, >60 psig and <110 psig >1 inch and <2.375 inches, >110 psig and <200 psig >1 inch and <2.375 inches, >200 psig >2.375 inches, <25 psig >2.375 inches, >25 psig and <60 psig >2.375 inches, >60 psig and <110 psig >2.375 inches, >110 psig and <200 psig >2.375 inches, >200 psig
NumberOfWells	Number of wells vented for liquids unloading in the specified tubing diameter group and pressure group combination within the specified sub-basin category. [98.236(c)(5)(i)(A)]
NumberOfPlungerLifts	Number of plunger lifts in the specified tubing diameter group and pressure group combination within the specified sub-basin category. [98.236(c)(5)(i)(B)]

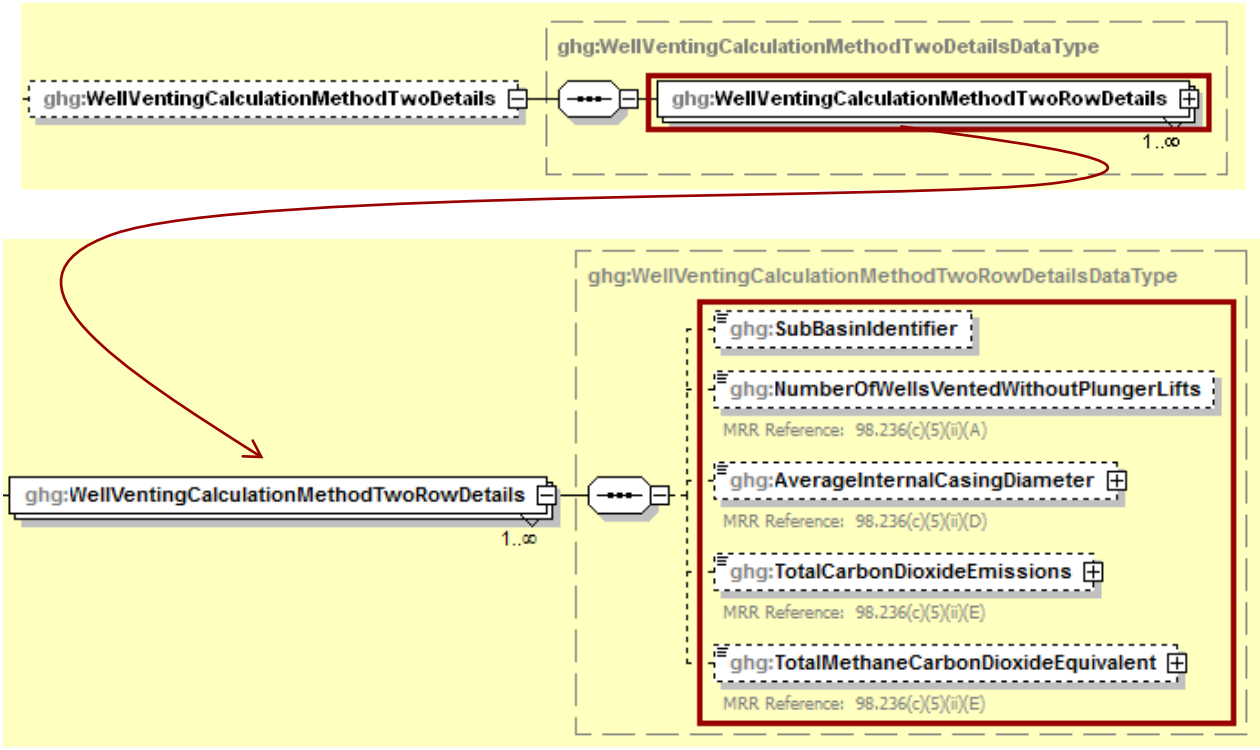
Data Element Name	Description
NumberOfUnloadingsVented	Cumulative number of unloadings vented to the atmosphere for the specified tubing diameter group and pressure group combination within the specified sub-basin category. [98.236(c)(5)(i)(C)]
DidWellHavePlungerLift	Indicate (Yes/No) if the well selected for the installation of the recording flow meter from the specified tubing diameter and pressure group within the specified sub-basin category had a plunger lift. [98.236(c)(5)(i)(B)]
TubingPressure	**Conditionally Required:** If the well selected for the installation of the recording flow meter from the specified tubing diameter and pressure group within the specified sub-basin category had a plunger lift, report the tubing pressure in psia. [98.236(c)(5)(i)(G] Set the units of measure to "psia" in the attribute **pressureUOM**.
CasingPressure	**Conditionally Required:** If the well selected for the installation of the recording flow meter from the specified tubing diameter and pressure group within the specified sub-basin category did not have a plunger lift, report the casing pressure in psia. [98.236(c)(5)(i)(F)] Set the units of measure to "psia" in the attribute **pressureUOM**.
InternalTubingDiameter	**Conditionally Required:** If the well selected for the installation of the recording flow meter from the specified tubing diameter and pressure group within the specified sub-basin category had a plunger lift, report the internal tubing diameter in inches. [98.236(c)(5)(i)(E)] Set the units of measure to "inches" in the attribute **heightUOM**.
InternalCasingDiameter	**Conditionally Required:** If the well selected for the installation of the recording flow meter from the specified tubing diameter and pressure group within the specified sub-basin category did not have a plunger lift, report the internal casing diameter in inches. [98.236(c)(5)(i)(E)] Set the units of measure to "inches" in the attribute **heightUOM**.
WellDepth	Depth of the well for the installation of the recording flow meter from the specified tubing diameter and pressure group within the specified sub-basin category in feet. [98.236(c)(5)(i)(E)] Set the units of measure to "feet" in the attribute **heightUOM**.
TotalCarbonDioxideEmissions	Total CO_2 emissions in metric tons for the specified tubing diameter group and pressure group combination within the specified sub-basin category. [98.236(c)(5)(i)(H)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalMethaneCarbonDioxideEquivalent	Total CH_4 emissions in metric tons CO_2e for the specified tubing diameter group and pressure group combination within the specified sub-basin category. [98.236(c)(5)(i)(H)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 18
Example for Well Venting Calculation Methodology 1 Details

```
<ghg:WellVentingCalculationMethodOneDetails>
      <ghg:WellVentingCalculationMethodOneRowDetails>
            <ghg:SubBasinIdentifier>360 – ALFALFA, OK (3) - Oil</ghg:SubBasinIdentifier>
            <ghg:TubingDiameterAndPressure>&lt;1 inch, &gt;200 psig</ghg:TubingDiameterAndPressure>
            <ghg:NumberOfWells>612</ghg:NumberOfWells>
            <ghg:NumberOfPlungerLifts>692</ghg:NumberOfPlungerLifts>
            <ghg:NumberOfUnloadingsVented>75720</ghg:NumberOfUnloadingsVented>
            <ghg:DidWellHavePlungerLift>No</ghg:DidWellHavePlungerLift>
            <ghg:CasingPressure pressureUOM="psia">102.34</ghg:CasingPressure>
            <ghg:InternalCasingDiameter heightUOM="inches">5.45</ghg:InternalCasingDiameter>
            <ghg:WellDepth heightUOM="feet">41461.5</ghg:WellDepth>
            <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">369.3</ghg:TotalCarbonDioxideEmissions>
            <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">356217.2</ghg:TotalMethaneCarbonDioxideEquivalent>
      </ghg:WellVentingCalculationMethodOneRowDetails>
</ghg:WellVentingCalculationMethodOneDetails>
```

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

Figure 23
Well Venting Calculation Methodology 2 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.

If Calculation Methodology 2 (without plunger lifts) was used to calculate emissions (refer to Equation W-8 of 98.233), report the following for each sub-basin category [98.236(c)(5)(ii)]:

- The unique identity of the sub-basin category (see Sub-Basin Identification for the naming convention).
- Number of wells vented to the atmosphere for liquids unloading (without plunger lifts). [98.236(c)(5)(ii)(A)]
- Average internal casing diameter, in inches, of all of the wells in the sub-basin category. [98.236(c)(5)(ii)(D)]
- The annual CO_2 and CH_4 emissions, expressed in metric tons CO_2e for each GHG gas. [98.236(c)(5)(ii)(E)]

Table 20
Well Venting Calculation Methodology 2 Details Data Element Definitions

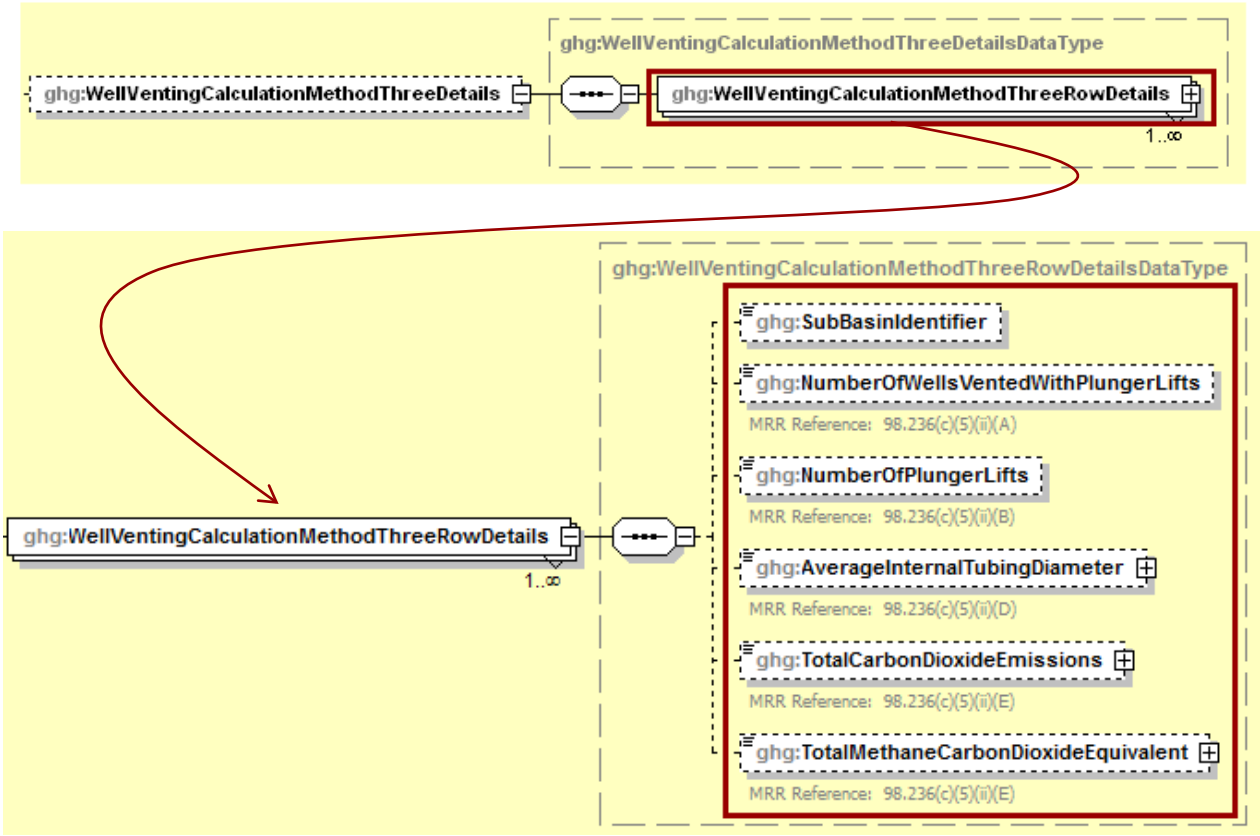
Data Element Name	Description
WellVentingCalculationMethodTwoDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any sub-basins using Calculation Methodology 2 (without plunger lifts) for well venting for liquids unloading subject to reporting under 98.232 in the reporting year.
WellVentingCalculationMethodTwoRowDetails	**Parent Element:** A collection of data elements to report for each sub-basin category using Calculation Methodology 2 (without plunger lifts) for well venting for liquids unloading.
SubBasinIdentifier	Sub-basin ID. [98.236(c)(5)] See Sub-Basin Identification for the required naming convention.
NumberOfWellsVentedWithoutPlungerLifts	Number of wells vented for liquids unloading (without plunger lifts) in the specified sub-basin category. [98.236(c)(5)(ii)(A)]
AverageInternalCasingDiameter	The average internal casing diameter in inches of all the wells in the specified sub-basin category. [98.236(c)(5)(ii)(D)] Set the units of measure to "inches" in the attribute **heightUOM**.
TotalCarbonDioxideEmissions	Total CO_2 emissions in metric tons for the specified sub-basin category. [98.236(c)(5)(ii)(E)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalMethaneCarbonDioxideEquivalent	Total CH_4 emissions in metric tons CO_2e for the specified sub-basin category. [98.236(c)(5)(ii)(E)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 19
Example for Well Venting Calculation Methodology 2 Details

```
<ghg:WellVentingCalculationMethodTwoDetails>
    <ghg:WellVentingCalculationMethodTwoRowDetails>
        <ghg:SubBasinIdentifier>30 – CADDO, OK (15) - High permeability gas</ghg:SubBasinIdentifier>
        <ghg:NumberOfWellsVentedWithoutPlungerLifts>612</ghg:NumberOfWellsVentedWithoutPlungerLifts>
        <ghg:AverageInternalCasingDiameter heightUOM="inches">7.23</ghg:AverageInternalCasingDiameter>
        <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">6530.5</ghg:TotalCarbonDioxideEmissions>
        <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">6300719.5</ghg:TotalMethaneCarbonDioxideEquivalent>
    </ghg:WellVentingCalculationMethodTwoRowDetails>
</ghg:WellVentingCalculationMethodTwoDetails>
```

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

Figure 24
Well Venting Calculation Methodology 3 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.

If Calculation Methodology 3 (with plunger lifts) was used to calculate emissions (refer to Equation W-9 of 98.233), report the following for each sub-basin category [98.236(c)(5)(ii)]:

- The unique identity of the sub-basin category (see Sub-Basin Identification for the naming convention).
- Number of wells vented to the atmosphere for liquids unloading (with plunger lifts). [98.236(c)(5)(ii)(A)]
- Number of plunger lifts. [98.236(c)(5)(ii)(B)]
- Average internal tubing diameter, in inches, of all of the wells in the sub-basin category. [98.236(c)(5)(ii)(D)]
- The annual CO_2 and CH_4 emissions, expressed in metric tons CO_2e for each GHG gas. [98.236(c)(5)(ii)(E)]

Table 21
Well Venting Calculation Methodology 3 Details Data Element Definitions

Data Element Name	Description
WellVentingCalculationMethodThreeDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any sub-basins using Calculation Methodology 3 (with plunger lifts) for well venting for liquids unloading subject to reporting under 98.232 in the reporting year.
WellVentingCalculationMethodThreeRowDetails	**Parent Element:** A collection of data elements to report for each sub-basin category using Calculation Methodology 3 (with plunger lifts) for well venting for liquids unloading.
SubBasinIdentifier	Sub-basin ID. [98.236(c)(5)] See Sub-Basin Identification for the required naming convention.
NumberOfWellsVentedWithPlungerLifts	Number of wells vented for liquids unloading (with plunger lifts) in the specified sub-basin category. [98.236(c)(5)(ii)(A)]
NumberOfPlungerLifts	The number of plunger lifts in the specified sub-basin category. [98.236(c)(5)(ii)(B)]
AverageInternalTubingDiameter	The average internal tubing diameter in inches of all the wells in the specified sub-basin category. [98.236(c)(5)(ii)(D)] Set the units of measure to “inches” in the attribute **heightUOM**.
TotalCarbonDioxideEmissions	Total CO_2 emissions in metric tons for the specified sub-basin category. [98.236(c)(5)(ii)(E)] Set the units of measure to “Metric Tons” in the attribute **massUOM**.

Data Element Name	Description
TotalMethaneCarbonDioxideEquivalent	Total CH_4 emissions in metric tons CO_2e for the specified sub-basin category. [98.236(c)(5)(ii)(E)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 20
Example for Well Venting Calculation Methodology 3 Details

```
      <ghg:WellVentingCalculationMethodThreeDetails>
            <ghg:WellVentingCalculationMethodThreeRowDetails>
                  <ghg:SubBasinIdentifier>360 – DEWEY, OK (43) - High permeability gas</ghg:SubBasinIdentifier>
                  <ghg:NumberOfWellsVentedWithPlungerLifts>692</ghg:NumberOfWellsVentedWithPlungerLifts>
                  <ghg:NumberOfPlungerLifts>692</ghg:NumberOfPlungerLifts>
                  <ghg:AverageInternalTubingDiameter heightUOM="inches">4.53</ghg:AverageInternalTubingDiameter>
                  <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">369.3</ghg:TotalCarbonDioxideEmissions>
                  <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">356217.2</ghg:TotalMethaneCarbonDioxideEquivalent>
            </ghg:WellVentingCalculationMethodThreeRowDetails>
      </ghg:WellVentingCalculationMethodThreeDetails>
</ghg:WellVentingDetails>
```

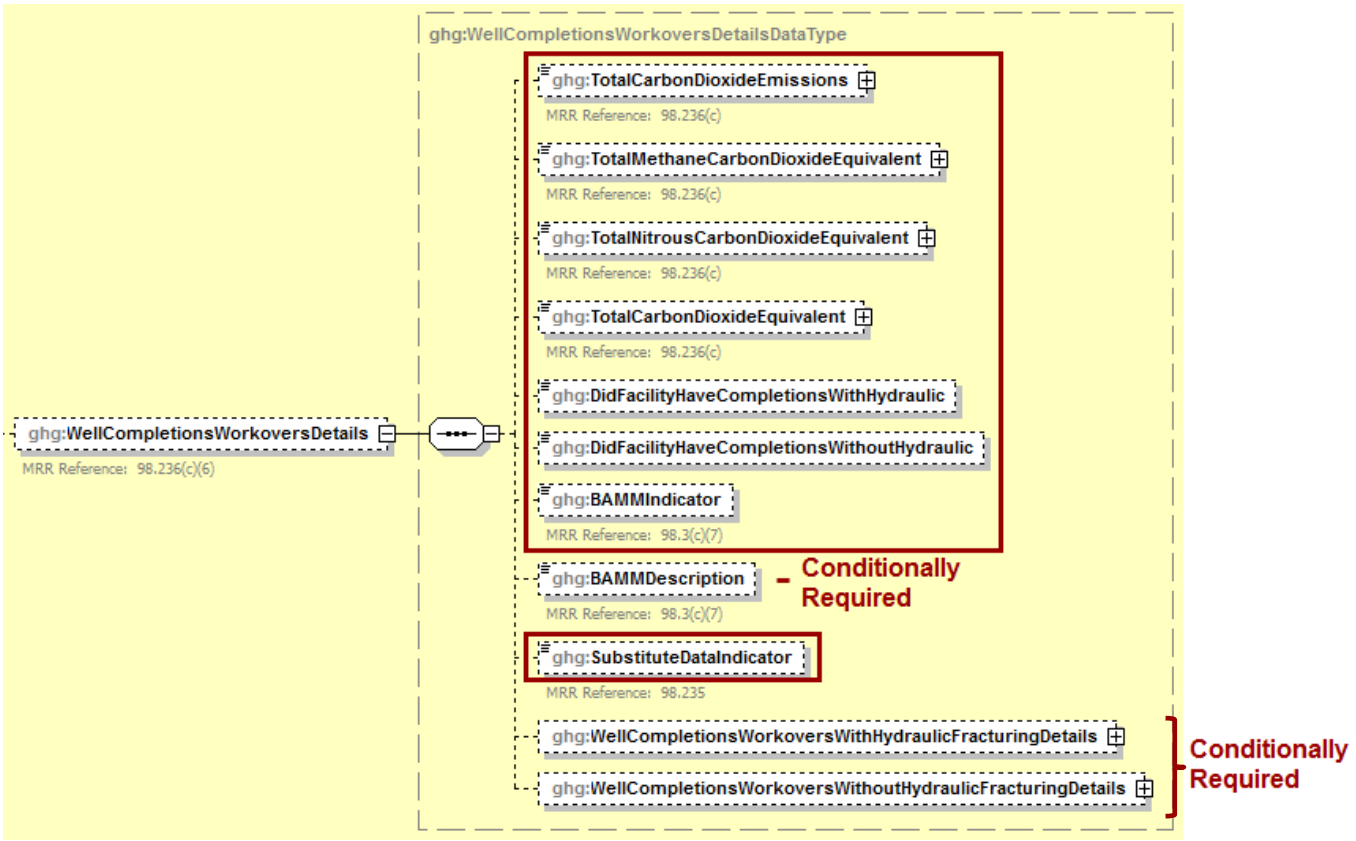
Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

9.0 Gas Well Completions and Workovers

This topic provides a step-by-step description of how to report gas well completions and workovers information for a facility. This section is applicable to and required for the onshore petroleum and natural gas production industry segment only.

Figure 25
Gas Well Completions and Workovers 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 gas well completions and workovers, report the following:

- The CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for all gas well completions and workovers combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e, total N_2O emissions in CO_2e and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any gas well completions or workovers subject to reporting under 98.232 during the reporting year.
  - The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the following data elements:

- "CompletionsVentingCarbonDioxideEmissions" for well completions with hydraulic fracturing.
- "CompletionsFlaringCarbonDioxideEmissions" for well completions with hydraulic fracturing.
- "WorkoversVentingCarbonDioxideEmissions" for workovers with hydraulic fracturing.
- "WorkoversFlaringCarbonDioxideEmissions" for workovers with hydraulic fracturing.
- "VentingCarbonDioxideEmissions" for well completions without hydraulic fracturing.
- "FlaringCarbonDioxideEmissions" for well completions without hydraulic fracturing.

o The value to report for "TotalMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:

- "CompletionsVentingMethaneCarbonDioxideEquivalent" for well completions with hydraulic fracturing.
- "CompletionsFlaringMethaneCarbonDioxideEquivalent" for well completions with hydraulic fracturing.
- "WorkoversVentingMethaneCarbonDioxideEquivalent" for workovers with hydraulic fracturing.
- "WorkoversFlaringMethaneCarbonDioxideEquivalent" for workovers with hydraulic fracturing.
- "VentingMethaneCarbonDioxideEquivalent" for well completions without hydraulic fracturing.
- "FlaringMethaneCarbonDioxideEquivalent" for well completions without hydraulic fracturing.

o The value to report for "TotalNitrousCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:

- "CompletionsFlaringNitrousCarbonDioxideEquivalent" for completions with hydraulic fracturing.
- "WorkoversFlaringNitrousCarbonDioxideEquivalent" for workovers with hydraulic fracturing.
- "FlaringNitrousCarbonDioxideEquivalent" for well completions without hydraulic fracturing.

o The value to report for "TotalCarbonDioxideEquivalent" equals the sum of the values reported for "TotalCarbonDioxideEmissions", "TotalMethaneCarbonDioxideEquivalent" and "TotalNitrousCarbonDioxideEquivalent".

- Whether the facility had any gas well completions or workovers with hydraulic fracturing subject to reporting under 98.232 in the reporting year.
- Whether the facility had any gas well completions or workovers without hydraulic fracturing subject to reporting under 98.232 in the reporting year.

- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

Table 22
Gas Well Completions and Workovers Details Data Element Definitions

Data Element Name	Description
WellCompletionsWorkoversDetails	**Parent Element:** A collection of data elements to report for gas well completions and workovers. [98.236(c)(6)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions for all gas well completions and workovers combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any gas well completions or workovers subject to reporting under 98.232 during the reporting year.
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions for all gas well completions and workovers combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any gas well completions or workovers subject to reporting under 98.232 during the reporting year.
TotalNitrousCarbonDioxideEquivalent	Annual N_2O emissions for all gas well completions and workovers combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any gas well completions or workovers subject to reporting under 98.232 during the reporting year.
TotalCarbonDioxideEquivalent	Total combined CO_2, CH_4 and N_2O emissions for all gas well completions and workovers combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any gas well completions or workovers subject to reporting under 98.232 during the reporting year.
DidFacilityHaveCompletionsWithHydraulic	Indicate (Yes/No) if the facility had any gas well completions or workovers WITH hydraulic fracturing subject to reporting under 98.232 in the reporting year.
DidFacilityHaveCompletionsWithoutHydraulic	Indicate (Yes/No) if the facility had any gas well completions or workovers WITHOUT hydraulic fracturing subject to reporting under 98.232 in the reporting year.

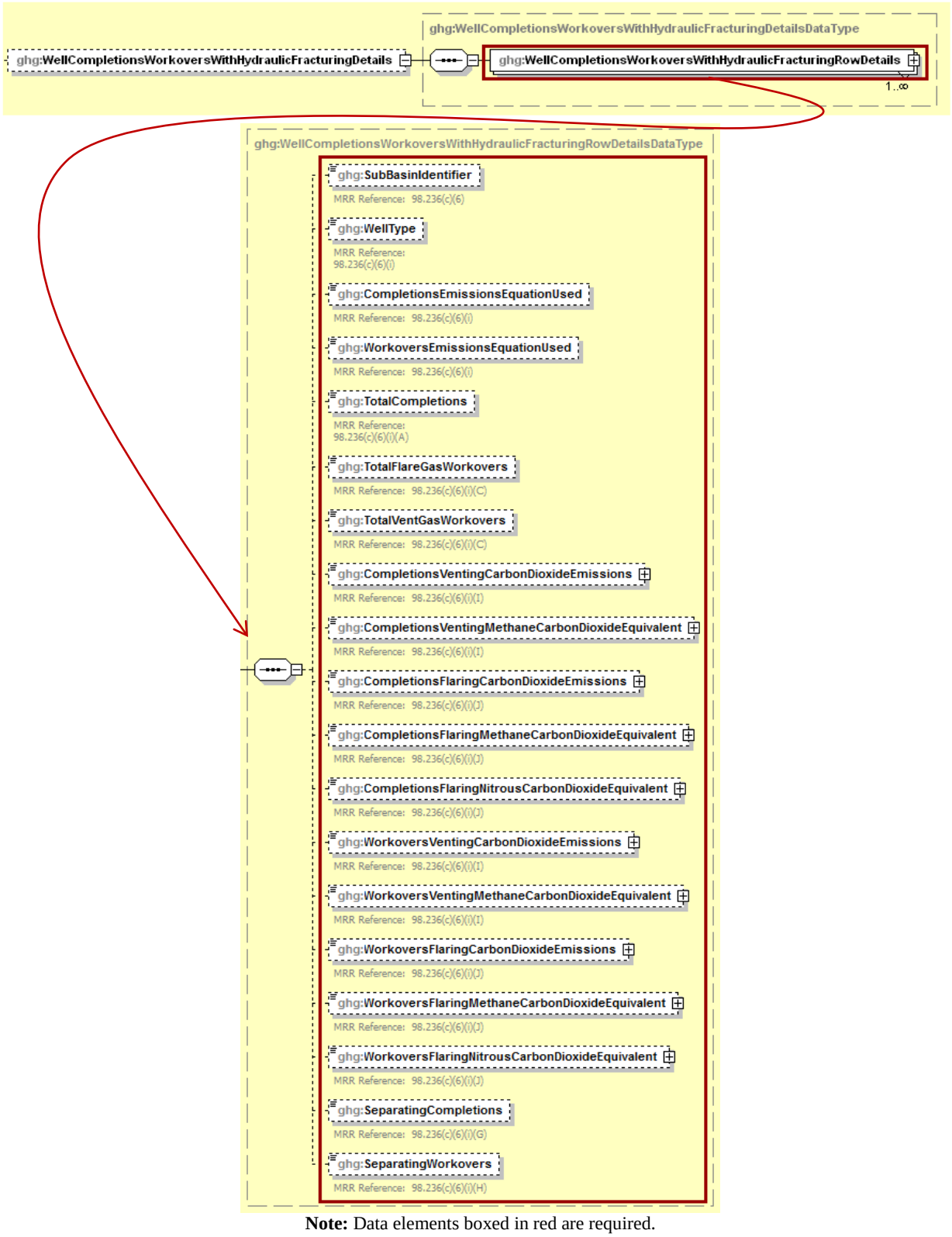
Data Element Name	Description
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 21
Example for Gas Well Completions and Workovers Details

```
<ghg:WellCompletionsWorkoversDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">52548.8</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">291108.6</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalNitrousCarbonDioxideEquivalent massUOM="Metric Tons">26.2</ghg:TotalNitrousCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">343684.0</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DidFacilityHaveCompletionsWithHydraulic>Yes</ghg:DidFacilityHaveCompletionsWithHydraulic>
      <ghg:DidFacilityHaveCompletionsWithoutHydraulic>Yes</ghg:DidFacilityHaveCompletionsWithoutHydraulic>
      <ghg:BAMMIndicator>No</ghg:BAMMIndicator>
      <ghg:SubstituteDataIndicator>Yes</ghg:SubstituteDataIndicator>
      <ghg:WellCompletionsWorkoversWithHydraulicFracturingDetails>
            <See example for Well Completions and Workovers with Hydraulic Fracturing>
      </ghg:WellCompletionsWorkoversWithHydraulicFracturingDetails>
      <ghg:WellCompletionsWorkoversWithoutHydraulicFracturingDetails>
            <See example for Well Completions and Workovers without Hydraulic Fracturing>
      </ghg:WellCompletionsWorkoversWithoutHydraulicFracturingDetails>
</ghg:WellCompletionsWorkoversDetails>
```

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

Figure 26
Gas Well Completions and Workovers with Hydraulic Fracturing Schema Diagram



Note: Data elements boxed in red are required.

If the facility performed any gas well completions and/or workovers with hydraulic fracturing during the reporting year, then report the following [98.236(6)(i)]:

- The unique identity of the sub-basin category (see Sub-Basin Identification for the naming convention).
- The well type (horizontal or vertical).
- For each sub-basin category and well type combination (refer to Equation W-10A and W-10B of 98.233), report the following [98.236(6)(i)]:
  - The equation used to calculate emissions from gas well completions with hydraulic fracturing. [98.236(c)(6)(i)]
  - The equation used to calculate emissions from gas well workovers with hydraulic fracturing. [98.236(c)(6)(i)]
  - Total count of all types of completions combined in the reporting year. [98.236(6)(i)(A)]
  - Total count of well workovers in the reporting year that flare gas. [98.236(6)(i)(C)]
  - Total count of well workovers in the reporting year that vent gas to the atmosphere. [98.236(6)(i)(C)]
  - Annual CO_2 and CH_4 emissions that resulted from venting gas directly to the atmosphere, expressed in metric tons CO_2e for each gas, from gas well completions. [98.236(6)(i)(I)]
  - Annual CO_2, CH_4 and N_2O emissions that resulted from flares, expressed in metric tons CO_2e for each gas, from gas well completions. [98.236(6)(i)(J)]
  - Annual CO_2 and CH_4 emissions that resulted from venting gas directly to the atmosphere, expressed in metric tons CO_2e for each gas, from well workovers. [98.236(6)(i)(I)]
  - Annual CO_2, CH_4 and N_2O emissions that resulted from flares, expressed in metric tons CO_2e for each gas, from well workovers. [98.236(6)(i)(J)]
  - The number of gas well completions in the reporting year which employed purposely designed equipment that separates natural gas from the backflow. [98.236(6)(i)(G)]
  - The number of well workovers in the reporting year which employed purposely designed equipment that separates natural gas from the backflow. [98.236(6)(i)(H)]

Table 23
Gas Well Completions and Workovers with Hydraulic Fracturing
Data Element Definitions

Data Element Name	Description
WellCompletionsWorkoversWithHydraulicFracturingDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any gas well completions or workovers with hydraulic fracturing subject to reporting under 98.232 in the reporting year.

Data Element Name	Description
WellCompletionsWorkoversWithHydraulicFracturingRowDetails	**Parent Element:** A collection of data elements to report for gas well completions and workovers with hydraulic fracturing for each sub-basin and well type combination.
SubBasinIdentifier	Sub-basin ID. [98.236(c)(6)] See Sub-Basin Identification for the required naming convention.
WellType	Well type. See list of allowable values. [98.236(c)(6)(i)] Horizontal Vertical
CompletionsEmissionsEquationUsed	The equation used to calculate emissions from gas well completions with hydraulic fracturing for the specified sub-basin category and well type combination. [98.236(c)(6)(i)] See list of allowable values. Eq. W-10A and Estimated Flow Rates (based Eq. W-11A or Eq. W-11B) Eq. W-10A and Measured Flow Rates Eq. W-10A and Both Estimated and Measured Flow Rates Equation W-10B
WorkoversEmissionsEquationUsed	The equation used to calculate emissions from gas well workovers with hydraulic fracturing for the specified sub-basin category and well type combination. [98.236(c)(6)(i)] See list of allowable values. Eq. W-10A and Estimated Flow Rates (based Eq. W-11A or Eq. W-11B) Eq. W-10A and Measured Flow Rates Eq. W-10A and Both Estimated and Measured Flow Rates Equation W-10B
TotalCompletions	Total count of all types of completions combined for the specified sub-basin category and well type combination. [98.236(c)(6)(i)(A)]
TotalFlareGasWorkovers	Total count of workovers that flare gas for the specified sub-basin category and well type combination. [98.236(c)(6)(i)(C)]

Data Element Name	Description
TotalVentGasWorkovers	Total count of workovers that vent gas to the atmosphere for the specified sub-basin category and well type combination. [98.236(c)(6)(i)(C)]
CompletionsVentingCarbonDioxideEmissions	CO_2 emissions from venting for completions in metric tons for the specified sub-basin category and well type combination. [98.236(c)(6)(i)(I)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
CompletionsVentingMethaneCarbonDioxideEquivalent	CH_4 emissions from venting for completions in metric tons CO_2e for the specified sub-basin category and well type combination. [98.236(c)(6)(i)(I)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
CompletionsFlaringCarbonDioxideEmissions	CO_2 emissions from flaring for completions in metric tons for the specified sub-basin category and well type combination. [8.236(c)(6)(i)(J)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
CompletionsFlaringMethaneCarbonDioxideEquivalent	CH_4 emissions from flaring for completions in metric tons CO_2e for the specified sub-basin category and well type combination. [98.236(c)(6)(i)(J)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
CompletionsFlaringNitrousCarbonDioxideEquivalent	N_2O emissions from flaring for completions in metric tons CO_2e for the specified sub-basin category and well type combination. [98.236(c)(6)(i)(J)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
WorkoversVentingCarbonDioxideEmissions	CO_2 emissions from venting for workovers in metric tons for the specified sub-basin category and well type combination. [98.236(c)(6)(i)(I)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
WorkoversVentingMethaneCarbonDioxideEquivalent	CH_4 emissions from venting for workovers in metric tons CO_2e for the specified sub-basin category and well type combination. [98.236(c)(6)(i)(I)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

Data Element Name	Description
WorkoversFlaringCarbonDioxideEmissions	CO_2 emissions from flaring for workovers in metric tons for the specified sub-basin category and well type combination. [8.236(c)(6)(i)(J)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
WorkoversFlaringMethaneCarbonDioxideEquivalent	CH_4 emissions from flaring for workovers in metric tons CO_2e for the specified sub-basin category and well type combination. [98.236(c)(6)(i)(J)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
WorkoversFlaringNitrousCarbonDioxideEquivalent	N_2O emissions from flaring for workovers in metric tons CO_2e for the specified sub-basin category and well type combination. [98.236(c)(6)(i)(J)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
SeparatingCompletions	Number of gas well completions that employed purposely designed equipment that separates natural gas from the backflow for the specified sub-basin category and well type combination. [98.236(c)(6)(i)(G)]
SeparatingWorkovers	Number of workovers that employed purposely designed equipment that separates natural gas from the backflow for the specified sub-basin category and well type combination. [98.236(c)(6)(i)(H)]

XML Excerpt 22
Example for Gas Well Completions and Workovers with Hydraulic Fracturing Details

```
<ghg:WellCompletionsWorkoversWithHydraulicFracturingDetails>
 <ghg:WellCompletionsWorkoversWithHydraulicFracturingRowDetails>
       <ghg:SubBasinIdentifier>360 – ALFALFA, OK (3) - Shale gas</ghg:SubBasinIdentifier>
       <ghg:WellType>Horizontal</ghg:WellType>
       <ghg:CompletionsEmissionsEquationUsed>Equation W-10B</ghg:CompletionsEmissionsEquationUsed>
       <ghg:WorkoversEmissionsEquationUsed>Eq. W-10A and Measured Flow Rates</ghg:WorkoversEmissionsEquationUsed>
       <ghg:TotalCompletions>76</ghg:TotalCompletions>
       <ghg:TotalFlareGasWorkovers>11</ghg:TotalFlareGasWorkovers>
       <ghg:TotalVentGasWorkovers>11</ghg:TotalVentGasWorkovers>
       <ghg:CompletionsVentingCarbonDioxideEmissions massUOM="Metric
 Tons">248.8</ghg:CompletionsVentingCarbonDioxideEmissions>
       <ghg:CompletionsVentingMethaneCarbonDioxideEquivalent massUOM="Metric
 Tons">239952.7</ghg:CompletionsVentingMethaneCarbonDioxideEquivalent>
       <ghg:CompletionsFlaringCarbonDioxideEmissions massUOM="Metric
 Tons">43967.1</ghg:CompletionsFlaringCarbonDioxideEmissions>
       <ghg:CompletionsFlaringMethaneCarbonDioxideEquivalent massUOM="Metric
 Tons">4995.0</ghg:CompletionsFlaringMethaneCarbonDioxideEquivalent>
       <ghg:CompletionsFlaringNitrousCarbonDioxideEquivalent massUOM="Metric
 Tons">22.2</ghg:CompletionsFlaringNitrousCarbonDioxideEquivalent>
       <ghg:WorkoversVentingCarbonDioxideEmissions massUOM="Metric
 Tons">46.8</ghg:WorkoversVentingCarbonDioxideEmissions>
       <ghg:WorkoversVentingMethaneCarbonDioxideEquivalent massUOM="Metric
 Tons">45073.2</ghg:WorkoversVentingMethaneCarbonDioxideEquivalent>
       <ghg:WorkoversFlaringCarbonDioxideEmissions massUOM="Metric
 Tons">8259.0</ghg:WorkoversFlaringCarbonDioxideEmissions>
       <ghg:WorkoversFlaringMethaneCarbonDioxideEquivalent massUOM="Metric
 Tons">938.3</ghg:WorkoversFlaringMethaneCarbonDioxideEquivalent>
       <ghg:WorkoversFlaringNitrousCarbonDioxideEquivalent massUOM="Metric
 Tons">4.2</ghg:WorkoversFlaringNitrousCarbonDioxideEquivalent>
       <ghg:SeparatingCompletions>6</ghg:SeparatingCompletions>
       <ghg:SeparatingWorkovers>4</ghg:SeparatingWorkovers>
 </ghg:WellCompletionsWorkoversWithHydraulicFracturingRowDetails>
</ghg:WellCompletionsWorkoversWithHydraulicFracturingDetails>
```

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

Figure 27
Gas Well Completions and Workovers without Hydraulic Fracturing Schema Diagram

Note: Data elements boxed in red are required.

If the facility performed any gas well completions and/or workovers without hydraulic fracturing during the reporting year, then report the following [98.236(6)(ii)]:

- The unique identity of the sub-basin category (see Sub-Basin Identification for the naming convention).
- For each sub-basin category (refer to Equation W-13 of 98.233), report the following [98.236(6)(ii)]:
  - Total number of days of gas venting to the atmosphere during backflow for completion. [98.236(6)(ii)(C)]
  - Annual CO_2 and CH_4 emissions that resulted from venting for gas well completions and workovers, expressed in metric tons CO_2e for each gas. [98.236(6)(ii)(D)]

- Annual CO_2, CH_4 and N_2O emissions that resulted from flaring for gas well completions and workovers, expressed in metric tons CO_2e for each gas. [98.236(6)(ii)(E)]

Table 24
Gas Well Completions and Workovers without Hydraulic Fracturing
Data Element Definitions

Data Element Name	Description
WellCompletionsWorkoversWithoutHydraulicFracturingDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any gas well completions or workovers without hydraulic fracturing subject to reporting under 98.232 in the reporting year.
WellCompletionsWorkoversWithoutHydraulicFracturingRowDetails	**Parent Element:** A collection of data elements to report for gas well completions and workovers without hydraulic fracturing for each sub-basin and well type combination.
SubBasinIdentifier	Sub-basin ID. [98.236(c)(6)] See Sub-Basin Identification for the required naming convention.
TotalGasVentingDays	Total number of days of gas venting during backflow for completion for the specified sub-basin category. [98.236(c)(6)(ii)(C)]
VentingCarbonDioxideEmissions	CO_2 emissions from venting for completions and workovers in metric tons for the specified sub-basin category. [98.236(c)(6)(ii)(D)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
VentingMethaneCarbonDioxideEquivalent	CH_4 emissions from venting for completions and workovers in metric tons CO_2e for the specified sub-basin category. [98.236(c)(6)(ii)(D)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringCarbonDioxideEmissions	CO_2 emissions from flaring for completions and workovers in metric tons for the specified sub-basin category. [98.236(c)(6)(ii)(E)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringMethaneCarbonDioxideEquivalent	CH_4 emissions from flaring for completions and workovers in metric tons CO_2e for the specified sub-basin category. [98.236(c)(6)(ii)(E)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

Data Element Name	Description
FlaringNitrousCarbonDioxideEquivalent	N_2O emissions from flaring for completions and workovers in metric tons CO_2e for the specified sub-basin category. [98.236(c)(6)(ii)(E)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 23
Example for Gas Well Completions and Workovers without Hydraulic Fracturing

```
<ghg:WellCompletionsWorkoversWithoutHydraulicFracturingDetails>
 <ghg:WellCompletionsWorkoversWithoutHydraulicFracturingRowDetails>
       <ghg:SubBasinIdentifier>360 – BACA, CO (9) - Shale gas</ghg:SubBasinIdentifier>
       <ghg:TotalGasVentingDays>31</ghg:TotalGasVentingDays>
       <ghg:VentingCarbonDioxideEmissions massUOM="Metric Tons">0.1</ghg:VentingCarbonDioxideEmissions>
       <ghg:VentingMethaneCarbonDioxideEquivalent massUOM="Metric
 Tons">72.0</ghg:VentingMethaneCarbonDioxideEquivalent>
       <ghg:FlaringCarbonDioxideEmissions massUOM="Metric Tons">13.2</ghg:FlaringCarbonDioxideEmissions>
       <ghg:FlaringMethaneCarbonDioxideEquivalent massUOM="Metric
 Tons">1.5</ghg:FlaringMethaneCarbonDioxideEquivalent>
       <ghg:FlaringNitrousCarbonDioxideEquivalent massUOM="Metric Tons">0.1</ghg:FlaringNitrousCarbonDioxideEquivalent>
 </ghg:WellCompletionsWorkoversWithoutHydraulicFracturingRowDetails>
</ghg:WellCompletionsWorkoversWithoutHydraulicFracturingDetails>
```

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

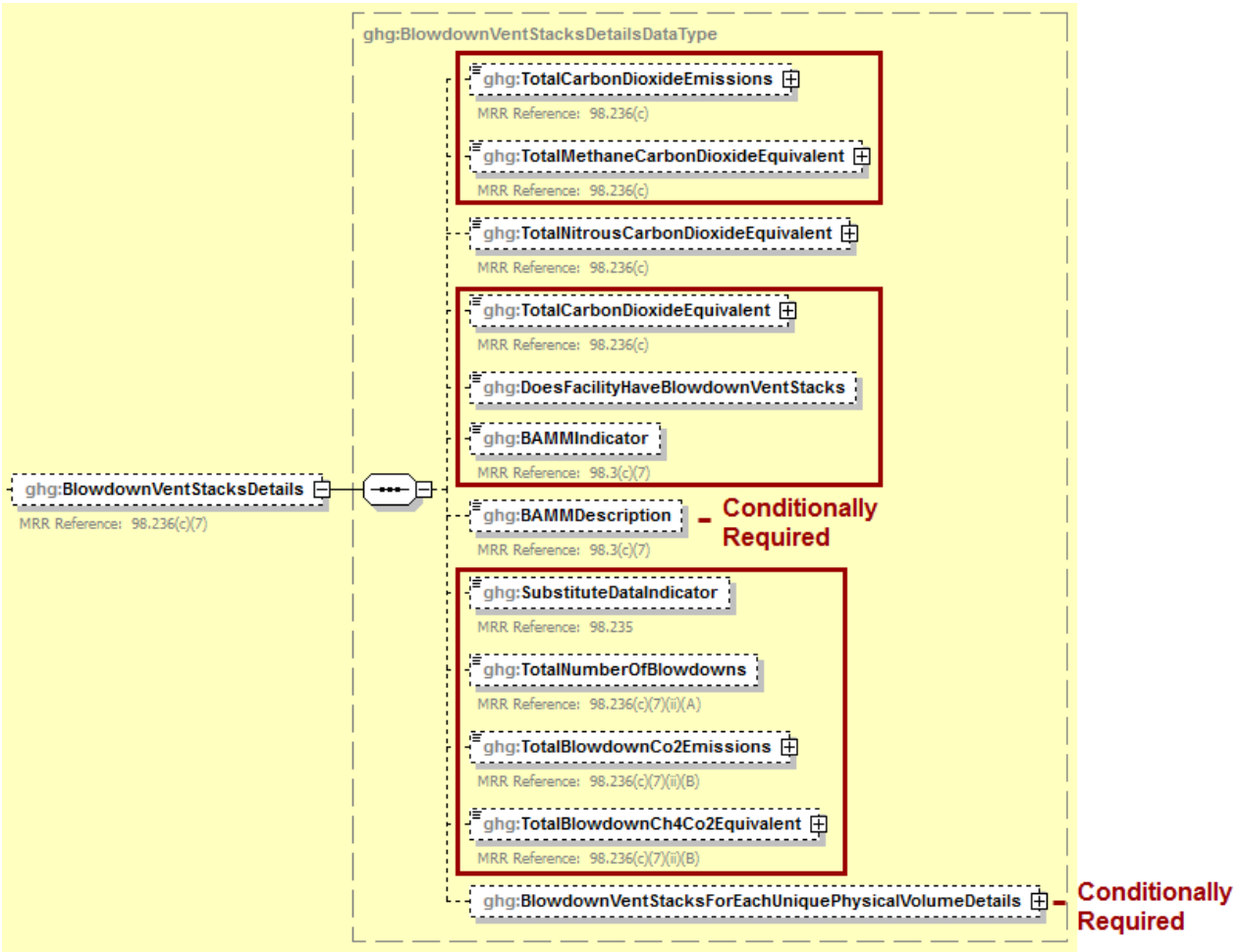
Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

10.0 Blowdown Vent Stacks

This topic provides a step-by-step description of how to report blowdown vent stacks information for a facility. This section is applicable to and required for the following industry segments only:

- Onshore natural gas processing
- Onshore natural gas transmission compression
- LNG import and export equipment

Figure 28
Blowdown Vent Stacks 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 blowdown vent stacks, report the following:

- The CO_2 and CH_4 emissions totals and the total CO_2e emissions for all blowdown vent stacks combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any blowdown vent stacks subject to reporting under 98.232 during the reporting year.
  - The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the following data elements:
    - "TotalBlowdownCo2Emissions" for all unique volumes blown down only once during the reporting year.
    - "TotalCarbonDioxideEmissions" for each unique physical volume blown down more than once in the reporting year.
  - The value to report for "TotalMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:
    - "TotalBlowdownCh4Co2Equivalent" for all unique volumes blown down only one during the reporting year.
    - "TotalMethaneCarbonDioxideEquivalent" for each unique physical volume blown down more than once in the reporting year.
  - The value to report for "TotalCarbonDioxideEquivalent" equals the sum of the values reported for "TotalCarbonDioxideEmissions" and "TotalMethaneCarbonDioxideEquivalent".
- Whether the facility had any blowdown vent stacks subject to reporting under 98.232 in the reporting year.
- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

For the blowdown vent stack emission source, (refer to Equation W-14A and Equation W-14B of 98.233), if there were any unique volumes that were blown down only once during the reporting year, report the following for all combined [98.236(c)(7)(ii)]. **Note:** Report "0" if the facility did not have any unique volumes that were blown down only once during the reporting year.

- Total number of unique physical volumes that were blown down only once during the reporting year. [98.236(c)(7)(ii)(A)]
- Annual CO_2 and CH_4 emissions from all unique physical volumes as an aggregate per facility, expressed in metric tons CO_2e for each gas. [98.236(c)(7)(ii)(B)]

Table 25
Blowdown Vent Stacks Details Data Element Definitions

Data Element Name	Description
BlowdownVentStacksDetails	**Parent Element:** A collection of data elements to report for blowdown vent stacks. [98.236(c)(7)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions from all blowdown vent stacks combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any blowdown vent stacks subject to reporting under 98.232 during the reporting year.
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions from all blowdown vent stacks combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any blowdown vent stacks subject to reporting under 98.232 during the reporting year.
TotalCarbonDioxideEquivalent	Total combined CO_2 and CH_4 emissions from all blowdown vent stacks combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any blowdown vent stacks subject to reporting under 98.232 during the reporting year.
DoesFacilityHaveBlowdownVentStacks	Indicate (Yes/No) if the facility had any blowdown vent stacks subject to reporting under 98.232 in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]
TotalNumberOfBlowdowns	**Conditionally Required:** If there were any unique volumes that were blown down only once during the reporting year, report the total number of unique volumes that were blown down only once during the reporting year. [98.236(c)(7)(ii)(A)]. Report "0" if the facility did not have any unique volumes that were blown down only once during the reporting year.

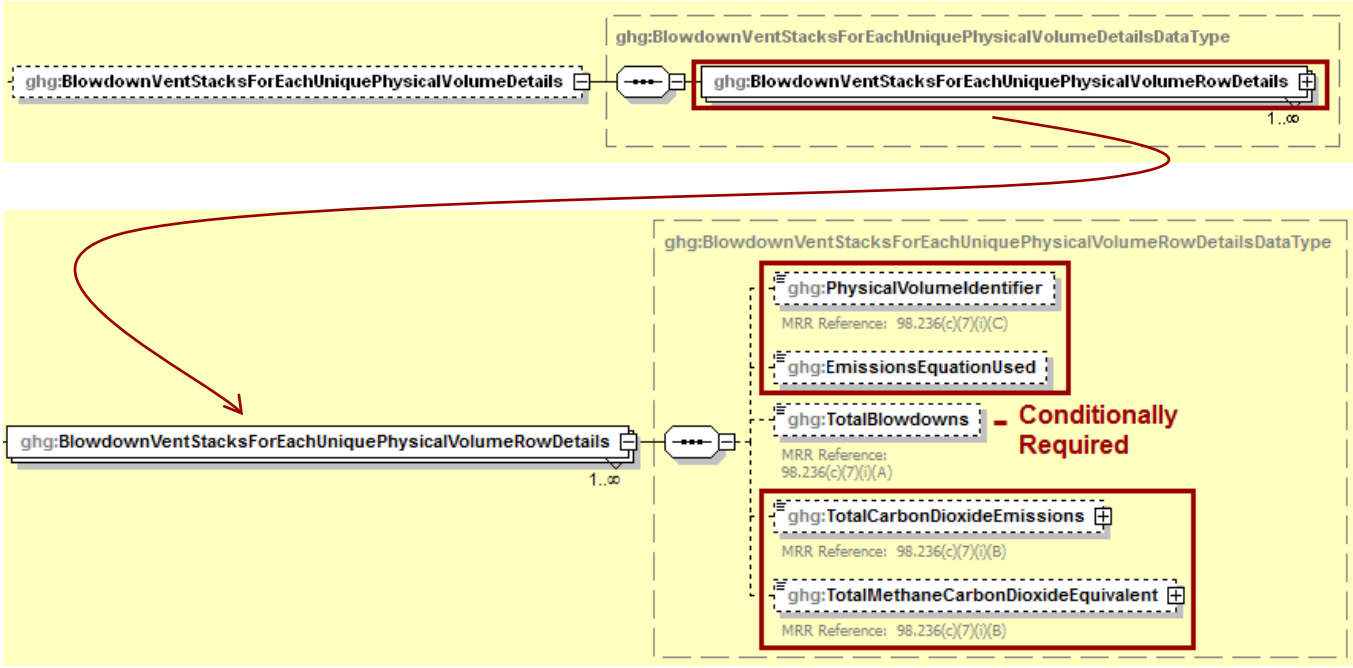
Data Element Name	Description
TotalBlowdownCo2Emissions	**Conditionally Required:** If there were any unique volumes that were blown down only once during the reporting year, report the total CO_2 emissions in metric tons from all unique volumes that were blown down only once during the reporting year. [98.236(c)(7)(ii)(B)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. Report "0" if the facility did not have any unique volumes that were blown down only once during the reporting year.
TotalBlowdownCh4Co2Equivalent	**Conditionally Required:** If there were any unique volumes that were blown down only once during the reporting year, report the total CH_4 emissions in metric tons CO_2e from all unique volumes that were blown down only once during the reporting year. [98.236(c)(7)(ii)(B)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. Report "0" if the facility did not have any unique volumes that were blown down only once during the reporting year.

XML Excerpt 24
Example for Blowdown Vent Stacks Details

```
<ghg:BlowdownVentStacksDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">19.1</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">13812.8</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">13831.9</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DoesFacilityHaveBlowdownVentStacks>Yes</ghg:DoesFacilityHaveBlowdownVentStacks>
      <ghg:BAMMIndicator>Yes</ghg:BAMMIndicator>
      <ghg:BAMMDescription>Description of BAMM</ghg:BAMMDescription>
      <ghg:SubstituteDataIndicator>Yes</ghg:SubstituteDataIndicator>
      <ghg:TotalNumberOfBlowdowns>12</ghg:TotalNumberOfBlowdowns>
      <ghg:TotalBlowdownCo2Emissions massUOM="Metric Tons">9.9</ghg:TotalBlowdownCo2Emissions>
      <ghg:TotalBlowdownCh4Co2Equivalent massUOM="Metric Tons">6960.5</ghg:TotalBlowdownCh4Co2Equivalent>
      <ghg:BlowdownVentStacksForEachUniquePhysicalVolumeDetails>
            <See example for Blowdown Vent Stacks for Each Physical Volume Details>
      </ghg:BlowdownVentStacksForEachUniquePhysicalVolumeDetails>
</ghg:BlowdownVentStacksDetails>
```

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

Figure 29
Blowdown Vent Stacks for Each Physical Volume 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 the blowdown vent stack emission source, (refer to Equation W-14A and Equation W-14B of 98.233), for each unique physical volume that is blown down **more than once** during the reporting year, report the following [98.236(c)(7)(i)]:

- A unique name or ID number for the unique physical volume. [98.236(c)(7)(i)(C)]
- The equation used to calculate emissions (Equation W-14A or Equation W-14B).
- If Equation W-14B was used, the total number of blowdowns for the unique physical volume in the reporting year. [98.236(c)(7)(i)(A)]
- Annual CO_2 and CH_4 emissions for the unique physical blowdown volume, expressed in metric tons CO_2e for each gas. [98.236(c)(7)(i)(B)]

Table 26
Blowdown Vent Stacks for Each Physical Volume Details Data Element Definitions

Data Element Name	Description
BlowdownVentStacksForEachUniquePhysicalVolumeDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if there were any physical volumes that were blown down **more than once** during the reporting year subject to reporting under 98.232.
BlowdownVentStacksForEachUniquePhysicalVolumeRowDetails	**Parent Element:** A collection of data elements to report for each unique physical volume that is blown down more than once during the reporting year.
PhysicalVolumeIdentifier	Unique name or ID for the unique physical volume that is blown down more than once during the reporting year. [98.236(c)(7)(i)(C)]
EmissionsEquationUsed	The equation used to calculate natural gas venting emissions for the specified unique physical volume. See list of allowable values. W-14A W-14B
TotalBlowdowns	**Conditionally Required:** If using Equation W-14B, report the total number of blowdowns for the specified unique physical volume in the reporting year. [98.236(c)(7)(i)(A)]
TotalCarbonDioxideEmissions	Total CO_2 emissions in metric tons for the specified unique physical volume. [98.236(c)(7)(i)(B)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalMethaneCarbonDioxideEquivalent	Total CH_4 emissions in metric tons CO_2e for the specified unique physical volume. [98.236(c)(7)(i)(B)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 25
Example for Blowdown Vent Stacks for Each Physical Volume Details

```
      <ghg:BlowdownVentStacksForEachUniquePhysicalVolumeDetails>
            <ghg:BlowdownVentStacksForEachUniquePhysicalVolumeRowDetails>
                  <ghg:PhysicalVolumeIdentifier>001</ghg:PhysicalVolumeIdentifier>
                  <ghg:EmissionsEquationUsed>W-14B</ghg:EmissionsEquationUsed>
                  <ghg:TotalBlowdowns>10</ghg:TotalBlowdowns>
                  <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">9.2</ghg:TotalCarbonDioxideEmissions>
                  <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">6852.3</ghg:TotalMethaneCarbonDioxideEquivalent>
            </ghg:BlowdownVentStacksForEachUniquePhysicalVolumeRowDetails>
      </ghg:BlowdownVentStacksForEachUniquePhysicalVolumeDetails>
</ghg:BlowdownVentStacksDetails>
```

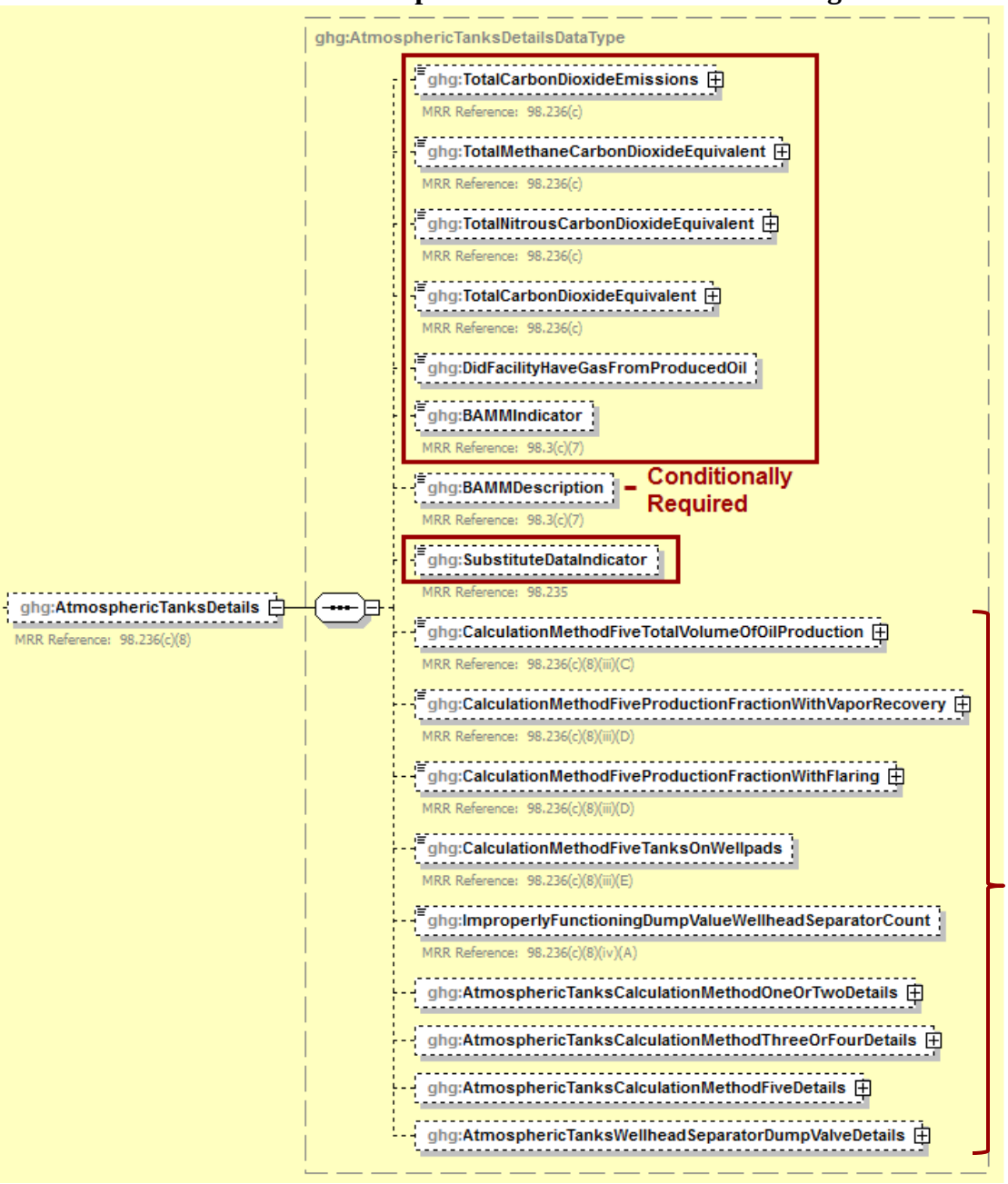
Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

11.0 Gas from Produced Oil Sent to Atmospheric Tanks

This topic provides a step-by-step description of how to report gas from produced oil sent to atmospheric tanks information for a facility. This section is applicable to and required for the onshore petroleum and natural gas production industry segment only.

Figure 30
Atmospheric Tanks 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 gas from produced oil sent to atmospheric tanks, report the following:

- The CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for all gas emitted from produced oil sent to atmospheric tanks combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e, total N_2O emissions in CO_2e and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any gas from produced oil sent to atmospheric tanks subject to reporting under 98.232 during the reporting year.
  - The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the following data elements:
    - "VentingCarbonDioxideEmissions" using Calculation Methodology 1 or 2.
    - "FlaringCarbonDioxideEmissions" using Calculation Methodology 1 or 2.
    - "VentingCarbonDioxideEmissions" using Calculation Methodology 3 or 4.
    - "FlaringCarbonDioxideEmissions" using Calculation Methodology 3 or 4.
    - "VentingCarbonDioxideEmissions" using Calculation Methodology 5.
    - "FlaringCarbonDioxideEmissions" using Calculation Methodology 5.
    - "VentingCarbonDioxideEmissions" from improperly functioning dump valves.
  - The value to report for "TotalMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:
    - "VentingMethaneCarbonDioxideEquivalent" using Calculation Methodology 1 or 2.
    - "FlaringMethaneCarbonDioxideEquivalent" using Calculation Methodology 1 or 2.
    - "VentingMethaneCarbonDioxideEquivalent" using Calculation Methodology 3 or 4.
    - "FlaringMethaneCarbonDioxideEquivalent" using Calculation Methodology 3 or 4.
    - "VentingMethaneCarbonDioxideEquivalent" using Calculation Methodology 5.
    - "FlaringMethaneCarbonDioxideEquivalent" using Calculation Methodology 5.
    - "VentingMethaneCarbonDioxideEquivalent" from improperly functioning dump valves.
  - The value to report for "TotalNitrousCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:
    - "FlaringNitrousCarbonDioxideEquivalent" using Calculation Methodology 1 or 2.
    - "FlaringNitrousCarbonDioxideEquivalent" using Calculation Methodology 3 or 4.
    - "FlaringNitrousCarbonDioxideEquivalent" using Calculation Methodology 5.
  - The value to report for "TotalCarbonDioxideEquivalent" equals the sum of the values reported for "TotalCarbonDioxideEmissions", "TotalMethaneCarbonDioxideEquivalent" and "TotalNitrousCarbonDioxideEquivalent".
- Whether the facility had any gas from produced oil sent to atmospheric tanks subject to reporting under 98.232 in the reporting year.

- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]
- If gas was emitted from produced oil sent to atmospheric tanks for wellhead gas-liquid separators and wells ***with throughput less than 10 barrels per day, using Calculation Methodology 5*** of 98.233(j) Equation W-15 of 98.233, report the following by facility/basin [98.236(c)(8)(iii)]:
  - Total volume of oil production in barrels per year. [98.236(c)(8)(iii)(C)]
  - Best estimate of fraction of production sent to tanks with assumed vapor recovery system control measures. [98.236(c)(8)(iii)(D)]
  - Best estimate of fraction of production sent to tanks with assumed flaring of tank vapors control measures. [98.236(c)(8)(iii)(D)]
  - Count of hydrocarbon tanks on well pads. [98.236(c)(8)(iii)(E)]
- ***If a wellhead separator dump valve is functioning improperly during the reporting year*** (refer to Equation W-16 of 98.233), report the following for the facility/basin [98.236(c)(8)(iv)]:
  - Count of wellhead separators that dump valve factor is applied. [98.236(c)(8)(iv)(A)]

Table 27
Atmospheric Tanks Details Data Element Definitions

Data Element Name	Description
AtmosphericTanksDetails	**Parent Element:** A collection of data elements to report for gas from produced oil sent to atmospheric tanks. [98.236(c)(8)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions for all gas from produced oil sent to atmospheric tanks combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any gas from produced oil sent to atmospheric tanks subject to reporting under 98.232 during the reporting year.
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions for all gas from produced oil sent to atmospheric tanks combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any gas from produced oil sent to atmospheric tanks subject to reporting under 98.232 during the reporting year.

Data Element Name	Description
TotalNitrousCarbonDioxideEquivalent	Annual N_2O emissions for all gas from produced oil sent to atmospheric tanks combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any gas from produced oil sent to atmospheric tanks subject to reporting under 98.232 during the reporting year.
TotalCarbonDioxideEquivalent	Total combined CO_2, CH_4 and N_2O emissions for all gas from produced oil sent to atmospheric tanks combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any gas from produced oil sent to atmospheric tanks subject to reporting under 98.232 during the reporting year.
DidFacilityHaveGasFromProducedOil	Indicate (Yes/No) if the facility had any gas from produced oil sent to atmospheric tanks subject to reporting under 98.232 in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]
CalculationMethodFiveTotalVolumeOfOilProduction	**Conditionally Required:** Report only if calculation method five was used. Total volume of oil production in barrels per year for the facility/basin. [98.236(c)(8)(iii)(C)] Set the units of measure to "barrels per year" in the attribute **volUOM**.
CalculationMethodFiveProductionFractionWithVapor Recovery	**Conditionally Required:** Report only if calculation method five was used. Fraction of production sent to tanks with assumed vapor recovery system control measures for the facility/basin. [98.236(c)(8)(iii)(D)] Set the units of measure to "fraction (number between 0 and 1)" in the attribute **fractionUOM**.

Data Element Name	Description
CalculationMethodFiveProductionFractionWithFlaring	**Conditionally Required:** Report only if calculation method five was used. Fraction of production sent to tanks with assumed flaring of tank vapors control measures for the facility/basin. [98.236(c)(8)(iii)(D)] Set the units of measure to "fraction (number between 0 and 1)" in the attribute **fractionUOM**.
CalculationMethodFiveTanksOnWellpads	**Conditionally Required:** Report only if calculation method five was used. Count of hydrocarbon tanks on wellpads for the facility/basin. [98.236(c)(8)(iii)(E)].
ImproperlyFunctioningDumpValveWellheadSeparator Count	**Conditionally Required:** Report only if facility had improperly functioning dump valve wellhead separators. Count of wellhead separators that dump valve factor is applied in the specified sub-basin. [98.236(c)(8)(iv)(A)].

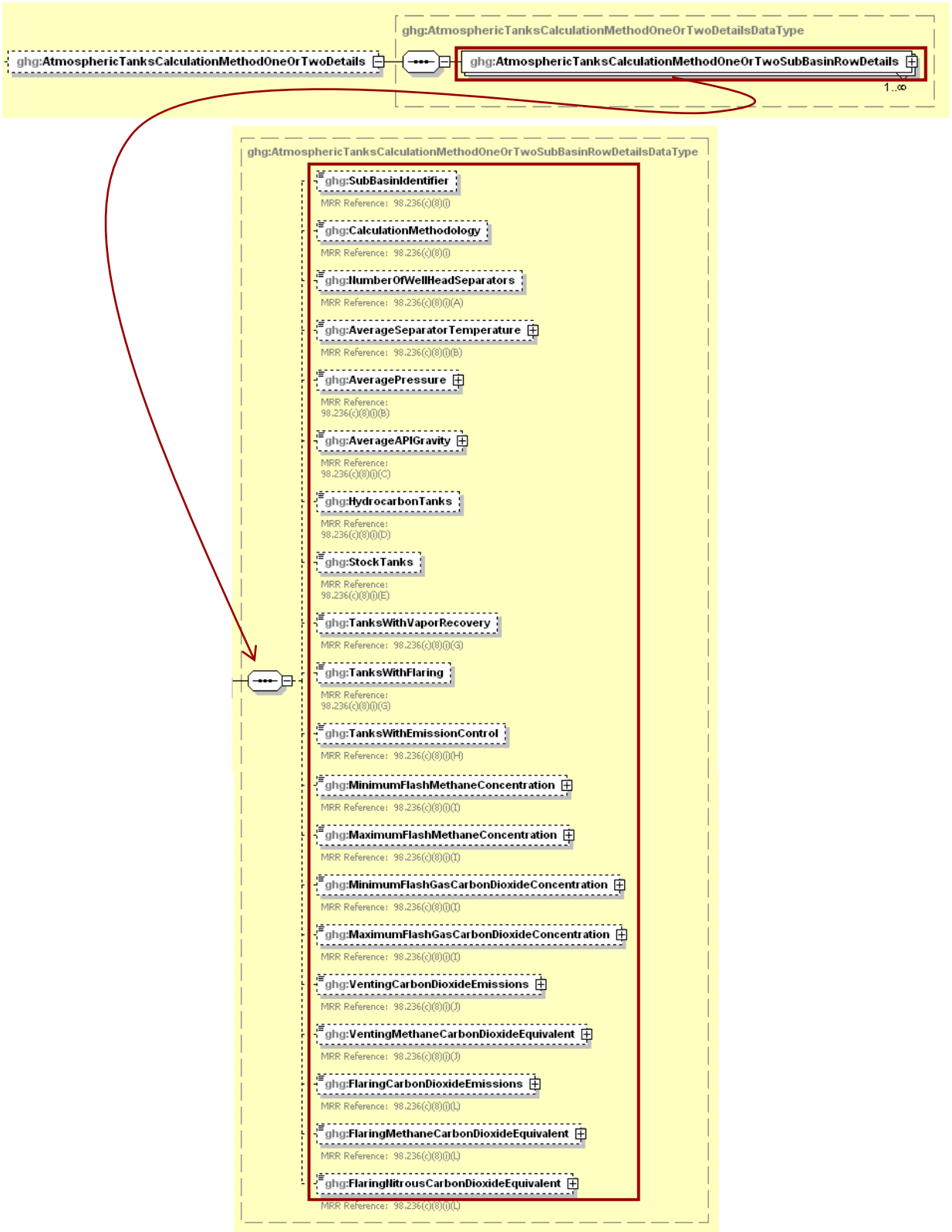
XML Excerpt 26
Example for Atmospheric Tanks Details

```
<ghg:AtmosphericTanksDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">1296690.4</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">2235231.3</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalNitrousCarbonDioxideEquivalent massUOM="Metric Tons">400.3</ghg:TotalNitrousCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">3532322.0</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DidFacilityHaveGasFromProducedOil>Yes</ghg:DidFacilityHaveGasFromProducedOil>
      <ghg:BAMMIndicator>Yes</ghg:BAMMIndicator>
      <ghg:BAMMDescription>BAMM Description</ghg:BAMMDescription>
      <ghg:SubstituteDataIndicator>No</ghg:SubstituteDataIndicator>
      <ghg:CalculationMethodFiveTotalVolumeOfOilProduction volUOM="barrels per
year">472292</ghg:CalculationMethodFiveTotalVolumeOfOilProduction>
      <ghg:CalculationMethodFiveProductionFractionWithVaporRecovery fractionUOM="fraction (number between 0 and
1)">0.5</ghg:CalculationMethodFiveProductionFractionWithVaporRecovery>
      <ghg:CalculationMethodFiveProductionFractionWithFlaring fractionUOM="fraction (number between 0 and
1)">0.6</ghg:CalculationMethodFiveProductionFractionWithFlaring>
      <ghg:TanksOnWellpads>210</ghg:TanksOnWellpads>
      <ghg:ImproperlyFunctioningDumpValveWellheadSeparators>2656</ghg:improperlyFunctioningDumpValveWellheadSepar
ators>
      <ghg:AtmosphericTanksCalculationMethodOneOrTwoDetails>
            <See example for Atmospheric Tanks Calculation Methodology 1 or 2 Details>
      </ghg:AtmosphericTanksCalculationMethodOneOrTwoDetails>
      <ghg:AtmosphericTanksCalculationMethodThreeOrFourDetails>
            <See example for Atmospheric Tanks Calculation Methodology 3 or 4 Details>
      </ghg:AtmosphericTanksCalculationMethodThreeOrFourDetails>
      <ghg:AtmosphericTanksCalculationMethodFiveDetails>
            <See example for Atmospheric Tanks Calculation Methodology 5 Details>
      </ghg:AtmosphericTanksCalculationMethodFiveDetails>
      <ghg:AtmosphericTanksWellheadSeparatorDumpValveDetails>
```

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

Note: The facility should report emissions collectively. Reporters are not restricted to using only one calculation methodology per sub-basin and may use the requisite methods to report collective emissions, by sub-basin, for their facility.

Figure 31
Atmospheric Tanks Calculation Methodology 1 or 2 Details Schema Diagram



Note: Data elements boxed in red are required.

For gas emitted from produced oil sent to atmospheric tanks for wellhead gas-liquid separator with ***oil throughput greater than or equal to 10 barrels per day, using Calculation Methodology 1 or 2*** of 98.233(j), report the following by sub-basin category [98.236(c)(8)(i)]:

- The unique identity of the sub-basin category (see Sub-Basin Identification for the naming convention).
- Number of wellhead separators sending oil to atmospheric tanks. [98.236(c)(8)(i)(A)]
- Estimated average separator temperature, in degrees Fahrenheit. [98.236(c)(8)(i)(B)]
- Estimated average separator pressure, in psig. [98.236(c)(8)(i)(B)]
- Estimated average sales oil stabilized API gravity, in degrees. [98.236(c)(8)(i)(C)]
- Count of hydrocarbon tanks at well pads. [98.236(c)(8)(i)(D)]
- Best estimate of count of stock tanks not at well pads receiving your oil. [98.236(c)(8)(i)(E)]
- Count of tanks with vapor recovery system emissions control measures for tanks at well pads. [98.236(c)(8)(i)(G)]
- Count of tanks with flaring emissions control measures for tanks at well pads. [98.236(c)(8)(i)(G)]
- Best estimate of count of stock tanks assumed to have emissions control measures not at well pads, receiving your oil. [98.236(c)(8)(i)(H)]
- Range of concentrations of CO_2 in flash gas. [98.236(c)(8)(i)(I)]
  - Minimum concentration of CO_2 in flash gas (volumetric fraction)
  - Maximum concentration of CO_2 in flash gas (volumetric fraction)
- Range of concentrations of CH_4 in flash gas. [98.236(c)(8)(i)(I)]
  - Minimum concentration of CH_4 in flash gas (volumetric fraction)
  - Maximum concentration of CH_4 in flash gas (volumetric fraction)
- Annual CO_2 and CH_4 emissions that resulted from venting gas to the atmosphere, expressed in metric tons CO_2e for each gas, for all wellhead gas-liquid separators or storage tanks using Calculation Methodology 1 or 2 of 98.233(j). [98.236(c)(8)(i)(J)]
- Annual CO_2, CH_4 and N_2O emissions that resulted from flaring gas, expressed in metric tons CO_2e for each gas, for all wellhead gas-liquid separators or storage tanks using Calculation Methodology 1 or 2 of 98.233(j). [98.236(c)(8)(i)(L)]

Table 28
Atmospheric Tanks Calculation Methodology 1 or 2 Details Data Element Definitions

Data Element Name	Description
AtmosphericTanksCalculationMethodOneOrTwoDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any sub-basins with wellhead gas-liquid separators with oil throughput >10 barrels/day using Calculation Methodologies 1 or 2 subject to reporting under 98.232 in the reporting year.
AtmosphericTanksCalculationMethodOneOrTwoSubBasinRowDetails	**Parent Element:** A collection of data elements to report for each sub-basin with wellhead gas-liquid separator with oil throughput >10 barrels/day using Calculation Methodologies 1 or 2.
SubBasinIdentifier	Sub-basin ID. [98.236(c)(8)(i)] See Sub-Basin Identification for the required naming convention.
CalculationMethodology	Calculation methodology used to calculate emissions. See list of allowable values. [98.236(c)(8)(i)] Calculation Methodology 1 Calculation Methodology 2
NumberOfWellHeadSeparators	Number of wellhead separators sending oil to atmospheric tanks for the specified sub-basin. [98.236(c)(8)(i)(A)]
AverageSeparatorTemperature	Estimated average separator temperature in degrees Fahrenheit for the specified sub-basin. [98.236(c)(8)(i)(B)] Set the units of measure to “Fahrenheit” in the attribute **tempUOM**.
AveragePressure	Estimated average separator pressure in psig for the specified sub-basin. [98.236(c)(8)(i)(B)] Set the units of measure to “psig” in the attribute **pressureUOM**.
AverageAPIGravity	Estimated average sales oil stabilized API gravity in degrees for the specified sub-basin. [98.236(c)(8)(i)(C)] Set the units of measure to “degrees” in the attribute **densityUOM**.
HydrocarbonTanks	Count of hydrocarbon tanks at well pads in the specified sub-basin. [98.236(c)(8)(i)(D)]
StockTanks	Best estimate of count of stock tanks not at well pads receiving your oil in the specified sub-basin. [98.236(c)(8)(i)(E)]
TanksWithVaporRecovery	Count of tanks with vapor recovery system emission control measures at well pads for the specified sub-basin. [98.236(c)(8)(i)(G)]

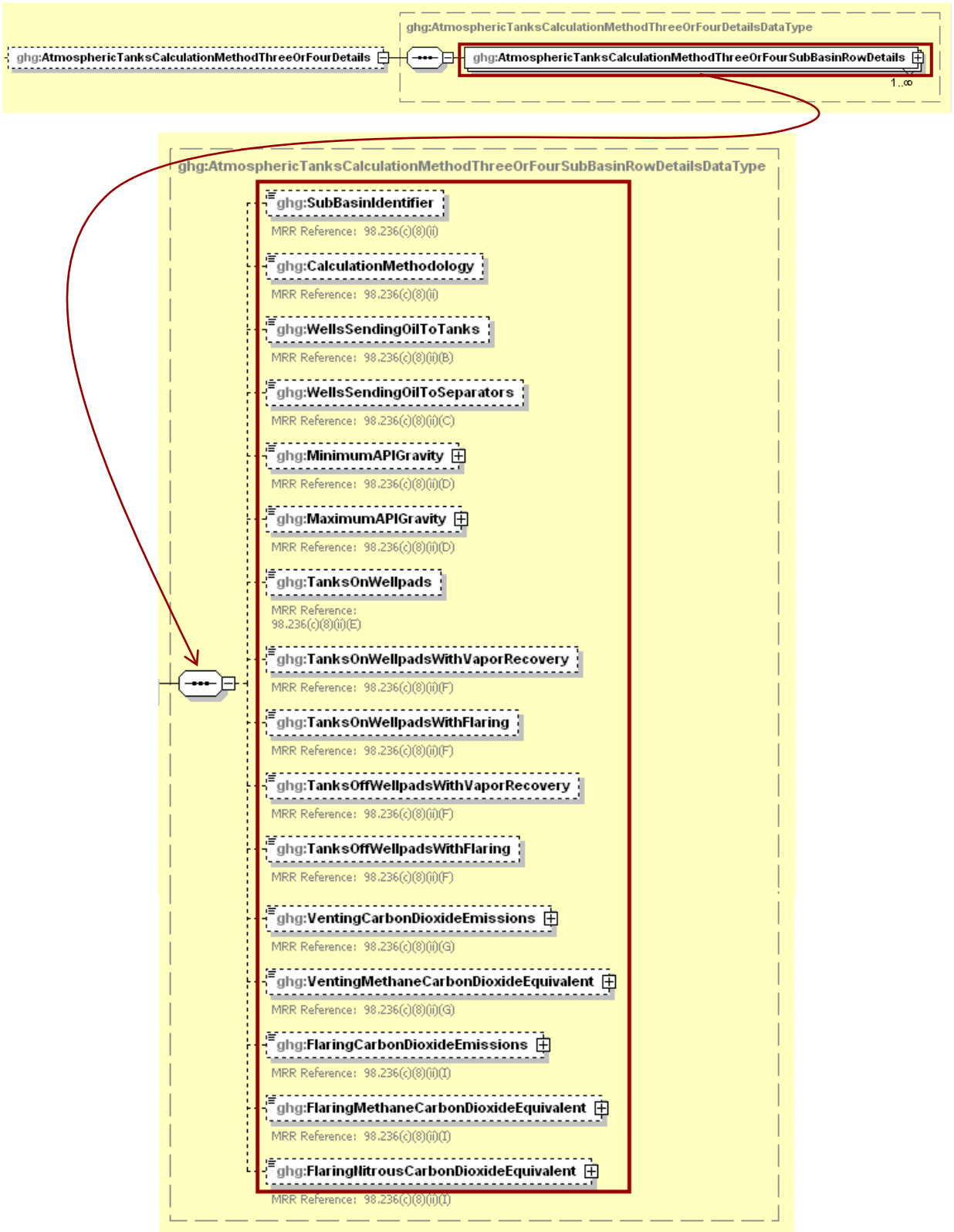
Data Element Name	Description
TanksWithFlaring	Count of tanks with flaring emission control measures at well pads in the specified sub-basin. [98.236(c)(8)(i)(G)]
TanksWithEmissionControl	Best estimate of count of stock tanks assumed to have emission control measures, not at well pads, receiving your oil in the specified sub-basin. [98.236(c)(8)(i)(H)]
MinimumFlashMethaneConcentration	Minimum concentration of CH_4 in flash gas as a volumetric fraction in the specified sub-basin. [98.236(c)(8)(i)(I)] Set the units of measure to "volumetric fraction" in the attribute **fractionUOM**.
MaximumFlashMethaneConcentration	Maximum concentration of CH_4 in flash gas as a volumetric fraction in the specified sub-basin. [98.236(c)(8)(i)(I)] Set the units of measure to "volumetric fraction" in the attribute **fractionUOM**.
MinimumFlashGasCarbonDioxideConcentration	Minimum concentration of CO_2 in flash gas as a volumetric fraction in the specified sub-basin. [98.236(c)(8)(i)(I)] Set the units of measure to "volumetric fraction" in the attribute **fractionUOM**.
MaximumFlashGasCarbonDioxideConcentration	Maximum concentration of CO_2 in flash gas as a volumetric fraction in the specified sub-basin. [98.236(c)(8)(i)(I)] Set the units of measure to "volumetric fraction" in the attribute **fractionUOM**.
VentingCarbonDioxideEmissions	CO_2 emissions from venting in metric tons in the specified sub-basin. [98.236(c)(8)(i)(J)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
VentingMethaneCarbonDioxideEquivalent	CH_4 emissions from venting in metric tons CO_2e in the specified sub-basin. [98.236(c)(8)(i)(J)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringCarbonDioxideEmissions	CO_2 emissions from flaring in metric tons in the specified sub-basin. [98.236(c)(8)(i)(L)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringMethaneCarbonDioxideEquivalent	CH_4 emissions from flaring in metric tons CO_2e in the specified sub-basin. [98.236(c)(8)(i)(L)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringNitrousCarbonDioxideEquivalent	N_2O emissions from flaring in metric tons CO_2e in the specified sub-basin. [98.236(c)(8)(i)(L)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 27
Example for Atmospheric Tanks Calculation Methodology 1 or 2 Details

```
<ghg:AtmosphericTanksCalculationMethodOneOrTwoDetails>
      <ghg:AtmosphericTanksCalculationMethodOneOrTwoSubBasinRowDetails>
            <ghg:SubBasinIdentifier>360 - ALFALFA, OK (3) - Oil</ghg:SubBasinIdentifier>
            <ghg:CalculationMethodology>Calculation Methodology 1</ghg:CalculationMethodology>
            <ghg:NumberOfWellHeadSeparators>2656</ghg:NumberOfWellHeadSeparators>
            <ghg:AverageSeparatorTemperature tempUOM="Fahrenheit">80</ghg:AverageSeparatorTemperature>
            <ghg:AveragePressure pressureUOM="psig">870</ghg:AveragePressure>
            <ghg:AverageAPIGravity densityUOM="degrees">68</ghg:AverageAPIGravity>
            <ghg:HydrocarbonTanks>1744</ghg:HydrocarbonTanks>
            <ghg:StockTanks>1744</ghg:StockTanks>
            <ghg:TanksWithVaporRecovery>872</ghg:TanksWithVaporRecovery>
            <ghg:TanksWithFlaring>872</ghg:TanksWithFlaring>
            <ghg:TanksWithEmissionControl>872</ghg:TanksWithEmissionControl>
            <ghg:MinimumFlashMethaneConcentration fractionUOM="volumetric
fraction">0.7</ghg:MinimumFlashMethaneConcentration>
            <ghg:MaximumFlashMethaneConcentration fractionUOM="volumetric
fraction">0.82</ghg:MaximumFlashMethaneConcentration>
            <ghg:MinimumFlashGasCarbonDioxideConcentration fractionUOM="volumetric
fraction">0.8</ghg:MinimumFlashGasCarbonDioxideConcentration>
            <ghg:MaximumFlashGasCarbonDioxideConcentration fractionUOM="volumetric
fraction">0.93</ghg:MaximumFlashGasCarbonDioxideConcentration>
            <ghg:VentingCarbonDioxideEmissions massUOM="Metric Tons">21680.5</ghg:VentingCarbonDioxideEmissions>
            <ghg:VentingMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">724714.1</ghg:VentingMethaneCarbonDioxideEquivalent>
            <ghg:FlaringCarbonDioxideEmissions massUOM="Metric Tons">626013</ghg:FlaringCarbonDioxideEmissions>
            <ghg:FlaringMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">14494.3</ghg:FlaringMethaneCarbonDioxideEquivalent>
            <ghg:FlaringNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">199.8</ghg:FlaringNitrousCarbonDioxideEquivalent>
      </ghg:AtmosphericTanksCalculationMethodOneOrTwoSubBasinRowDetails>
</ghg:AtmosphericTanksCalculationMethodOneOrTwoDetails>
```

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

Figure 32
Atmospheric Tanks Calculation Methodology 3 or 4 Details Schema Diagram



Note: Data elements boxed in red are required.

For gas emitted from produced oil sent to atmospheric tanks for wells with ***oil production greater than or equal to 10 barrels per day, using Calculation Methodology 3 or 4*** of 98.233(j), report the following by sub-basin category [98.236(c)(8)(ii)]:

- The unique identity of the sub-basin category (see Sub-Basin Identification for the naming convention).
- The calculation methodology used to calculate emissions. [98.236(c)(8)(ii)]
- Total number of wells sending oil directly to tanks. [98.236(c)(8)(ii)(B)]
- Total number of wells sending oil to separators off the well pads. [98.236(c)(8)(ii)(C)]
- Sales oil API gravity range for wells sending oil directly to tanks and wells sending oil to separators off the well pads, in degrees. [98.236(c)(8)(ii)(D)]
  - Minimum sales oil API Gravity for wells in 98.236(c)(8)(ii)(B) and 98.236(c)(8)(ii)(C) (degrees)
  - Maximum sales oil API Gravity for wells in 98.236(c)(8)(ii)(B) and 98.236(c)(8)(ii)(C) (degrees)
- Count of hydrocarbon tanks on wellpads. [98.236(c)(8)(ii)(E)]
- Count of hydrocarbon tanks on well pads assumed to have vapor recovery system emissions control measures. [98.236(c)(8)(ii)(F)]
- Count of hydrocarbon tanks on well pads assumed to have flaring of tank vapors emissions control measures. [98.236(c)(8)(ii)(F)]
- Count of hydrocarbon tanks off well pads assumed to have vapor recovery system emissions control measures. [98.236(c)(8)(ii)(F)]
- Count of hydrocarbon tanks off well pads assumed to have flaring of tank vapors emissions control measures. [98.236(c)(8)(ii)(F)]
- Annual CO_2 and CH_4 emissions that resulted from venting gas to the atmosphere, expressed in metric tons CO_2e for each gas, at the sub-basin level for Calculation Methodology 3 or 4 of 98.233(j). [98.236(c)(8)(ii)(G)]
- Annual CO_2, CH_4 and N_2O emissions that resulted from flaring gas, expressed in metric tons CO_2e for each gas, at the sub-basin level for Calculation Methodology 3 or 4 of 98.233(j). [98.236(c)(8)(ii)(I)]

Table 29
Atmospheric Tanks Calculation Methodology 3 or 4 Details Data Element Definitions

Data Element Name	Description
AtmosphericTanksCalculationMethodThreeOrFourDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any sub-basins with wellhead gas-liquid separators with oil throughput >10 barrels/day using Calculation Methodologies 3 or 4 subject to reporting under 98.232 in the reporting year.

Data Element Name	Description
AtmosphericTanksCalculationMethodThreeOrFourSubBasinRowDetails	**Parent Element:** A collection of data elements to report for each sub-basin with wellhead gas-liquid separator with oil throughput >10 barrels/day using Calculation Methodologies 3 or 4.
SubBasinIdentifier	Sub-basin ID. [98.236(c)(8)(ii)] See Sub-Basin Identification for the required naming convention.
CalculationMethodology	Calculation methodology used to calculate emissions for the specified sub-basin. See list of allowable values. [98.236(c)(8)(ii)] Calculation Methodology 3 Calculation Methodology 4
WellsSendingOilToTanks	Total number of wells sending oil directly to tanks in the specified sub-basin. [98.236(c)(8)(ii)(B)]
WellsSendingOilToSeparators	Total number of wells sending oil to separators off the wellpads in the specified sub-basin. [98.236(c)(8)(ii)(C)]
MinimumAPIGravity	Minimum sales oil API gravity for wells in 98.236(c)(8)(ii)(B) and 98.236(c)(8)(ii)(C) for the specified sub-basin in degrees. [98.236(c)(8)(ii)(D)] Set the units of measure to “degrees” in the attribute **densityUOM**.
MaximumAPIGravity	Maximum sales oil API gravity for wells in 98.236(c)(8)(ii)(B) and 98.236(c)(8)(ii)(C) for the specified sub-basin in degrees. [98.236(c)(8)(ii)(D)] Set the units of measure to “degrees” in the attribute **densityUOM**.
TanksOnWellpads	Count of hydrocarbon tanks on wellpads in the specified sub-basin. [98.236(c)(8)(ii)(E)]
TanksOnWellpadsWithVaporRecovery	Count of hydrocarbon tanks on wellpads assumed to have vapor recovery system emission control measures in the specified sub-basin. [98.236(c)(8)(ii)(F)]
TanksOnWellpadsWithFlaring	Count of hydrocarbon tanks on wellpads assumed to have flaring of tank vapors emission control measures in the specified sub-basin. [98.236(c)(8)(ii)(F)]
TanksOffWellpadsWithVaporRecovery	Count of hydrocarbon tanks off wellpads assumed to have vapor recovery system emission control measures in the specified sub-basin. [98.236(c)(8)(ii)(F)]
TanksOffWellpadsWithFlaring	Count of hydrocarbon tanks off wellpads assumed to have flaring of tank vapors emission control measures in the specified sub-basin. [98.236(c)(8)(ii)(F)]

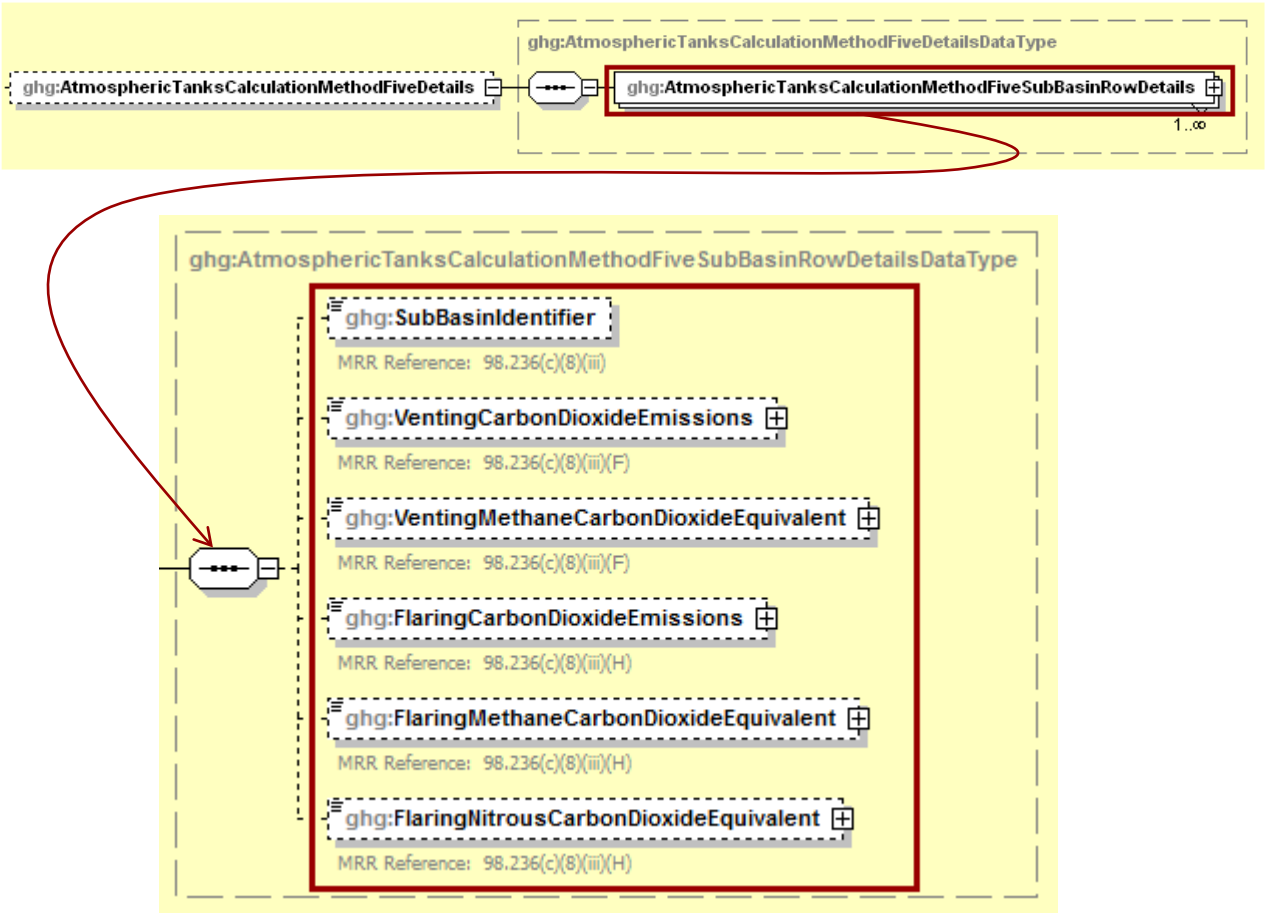
Data Element Name	Description
VentingCarbonDioxideEmissions	CO_2 emissions from venting in the specified sub-basin in metric tons. [98.236(c)(8)(ii)(G)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
VentingMethaneCarbonDioxideEquivalent	CH_4 emissions from venting in the specified sub-basin in metric tons CO_2e. [98.236(c)(8)(ii)(G)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringCarbonDioxideEmissions	CO_2 emissions from flaring in the specified sub-basin in metric tons. [98.236(c)(8)(ii)(I)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringMethaneCarbonDioxideEquivalent	CH_4 emissions from flaring in the specified sub-basin in metric tons CO_2e. [98.236(c)(8)(ii)(I)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringNitrousCarbonDioxideEquivalent	N_2O emissions from flaring in the specified sub-basin in metric tons CO_2e. [98.236(c)(8)(ii)(I)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 28
Example for Atmospheric Tanks Calculation Methodology 3 or 4 Details

```
<ghg:AtmosphericTanksCalculationMethodThreeOrFourDetails>
      <ghg:AtmosphericTanksCalculationMethodThreeOrFourSubBasinRowDetails>
            <ghg:SubBasinIdentifier>360 - BACA, CO (9) - Shale gas</ghg:SubBasinIdentifier>
            <ghg:CalculationMethodology>Calculation Methodology 3</ghg:CalculationMethodology>
            <ghg:WellsSendingOilToTanks>6973</ghg:WellsSendingOilToTanks>
            <ghg:WellsSendingOilToSeparators>6973</ghg:WellsSendingOilToSeparators>
            <ghg:MinimumAPIGravity densityUOM="degrees">15</ghg:MinimumAPIGravity>
            <ghg:MaximumAPIGravity densityUOM="degrees">68</ghg:MaximumAPIGravity>
            <ghg:TanksOnWellpads>1744</ghg:TanksOnWellpads>
            <ghg:TanksOnWellpadsWithVaporRecovery>872</ghg:TanksOnWellpadsWithVaporRecovery>
            <ghg:TanksOnWellpadsWithFlaring>872</ghg:TanksOnWellpadsWithFlaring>
            <ghg:TanksOffWellpadsWithVaporRecovery>872</ghg:TanksOffWellpadsWithVaporRecovery>
            <ghg:TanksOffWellpadsWithFlaring>872</ghg:TanksOffWellpadsWithFlaring>
            <ghg:VentingCarbonDioxideEmissions massUOM="Metric Tons">21680.5</ghg:VentingCarbonDioxideEmissions>
            <ghg:VentingMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">724714.1</ghg:VentingMethaneCarbonDioxideEquivalent>
            <ghg:FlaringCarbonDioxideEmissions massUOM="Metric Tons">604332.5</ghg:FlaringCarbonDioxideEmissions>
            <ghg:FlaringMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">14494.3</ghg:FlaringMethaneCarbonDioxideEquivalent>
            <ghg:FlaringNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">199.8</ghg:FlaringNitrousCarbonDioxideEquivalent>
      </ghg:AtmosphericTanksCalculationMethodThreeOrFourSubBasinRowDetails>
</ghg:AtmosphericTanksCalculationMethodThreeOrFourDetails>
```

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

Figure 33
Atmospheric Tanks Calculation Methodology 5 Sub-Basin Details Schema Diagram



Note: Data elements boxed in red are required.

For gas emitted from produced oil sent to atmospheric tanks for wellhead gas-liquid separators and wells with ***throughput less than 10 barrels per day, using Calculation Methodology 5*** of 98.233(j) Equation W-15 of 98.233, report the following by sub-basin category [98.236(c)(8)(iii)]:

- The unique identity of the sub-basin category (see Sub-Basin Identification for the naming convention).
- Annual CO_2 and CH_4 emissions that resulted from venting gas to the atmosphere, expressed in metric tons CO_2e for each gas, at the sub-basin level for Calculation Methodology 5 of 98.233(j). [98.236(c)(8)(iii)(F)]
- Annual CO_2, CH_4 and N_2O emissions that resulted from flaring gas, expressed in metric tons CO_2e for each gas, at the sub-basin level for Calculation Methodology 5 of 98.233(j). [98.236(c)(8)(iii)(H)]

Table 30
Atmospheric Tanks Calculation Methodology 5 Sub-Basin Details
Data Element Definitions

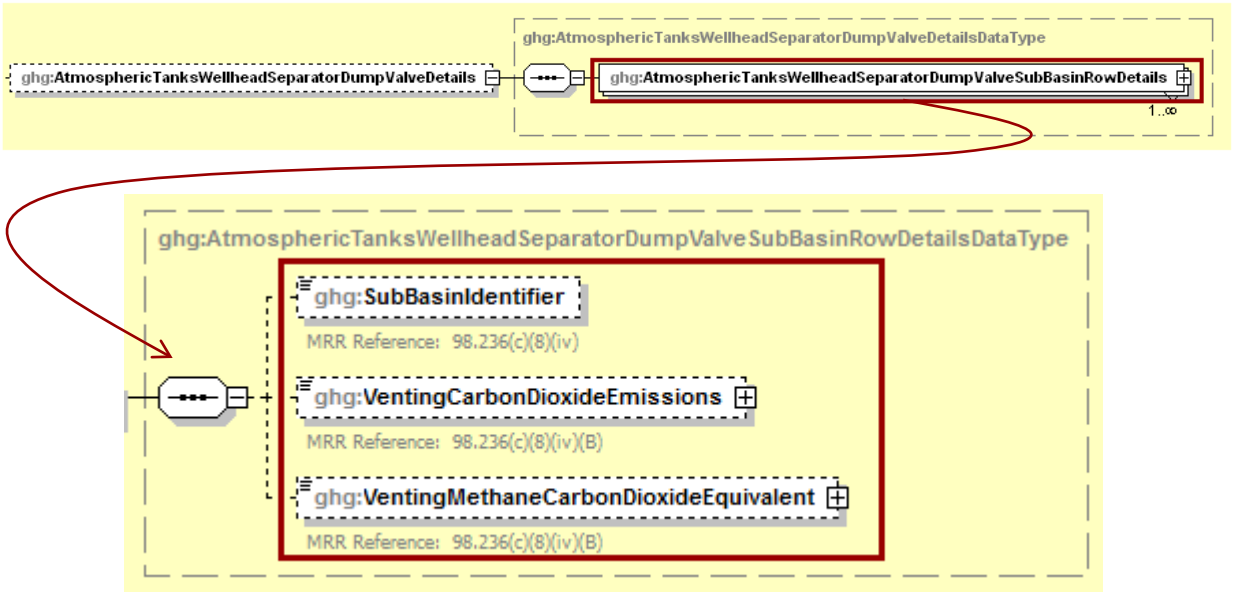
Data Element Name	Description
AtmosphericTanksCalculationMethodFiveDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any sub-basins with wellhead gas-liquid separators and wells with oil throughput <10 barrels/day using Calculation Methodology 5 subject to reporting under 98.232 in the reporting year.
AtmosphericTanksCalculationMethodFiveSubBasinRowDetails	**Parent Element:** A collection of data elements to report for each sub-basin with wellhead gas-liquid separators and wells with oil throughput <10 barrels/day using Calculation Methodology 5.
SubBasinIdentifier	Sub-basin ID. [98.236(c)(8)(iii)] See Sub-Basin Identification for the required naming convention.
VentingCarbonDioxideEmissions	CO_2 emissions from venting in the specified sub-basin in metric tons. [98.236(c)(8)(iii)(F)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
VentingMethaneCarbonDioxideEquivalent	CH_4 emissions from venting in the specified sub-basin in metric tons CO_2e. [98.236(c)(8)(iii)(F)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringCarbonDioxideEmissions	CO_2 emissions from flaring in the specified sub-basin in metric tons. [98.236(c)(8)(iii)(H)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringMethaneCarbonDioxideEquivalent	CH_4 emissions from flaring in the specified sub-basin in metric tons CO_2e. [98.236(c)(8)(iii)(H)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringNitrousCarbonDioxideEquivalent	N_2O emissions from flaring in the specified sub-basin in metric tons CO_2e. 98.236(c)(8)(iii)(H)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 29
Example for Atmospheric Tanks Calculation Methodology 5 Sub-Basin Details

```
<ghg:AtmosphericTanksCalculationMethodFiveDetails>
      <ghg:AtmosphericTanksCalculationMethodFiveSubBasinRowDetails>
            <ghg:SubBasinIdentifier>360 - CADDO, OK (15) - Coal seam</ghg:SubBasinIdentifier>
            <ghg:VentingCarbonDioxideEmissions massUOM="Metric Tons">123.5</ghg:VentingCarbonDioxideEmissions>
            <ghg:VentingMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">5946.8</ghg:VentingMethaneCarbonDioxideEquivalent>
            <ghg:FlaringCarbonDioxideEmissions massUOM="Metric Tons">401.1</ghg:FlaringCarbonDioxideEmissions>
            <ghg:FlaringMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">123.5</ghg:FlaringMethaneCarbonDioxideEquivalent>
            <ghg:FlaringNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">0.7</ghg:FlaringNitrousCarbonDioxideEquivalent>
      </ghg:AtmosphericTanksCalculationMethodFiveSubBasinRowDetails>
</ghg:AtmosphericTanksCalculationMethodFiveDetails>
```

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

Figure 34
Atmospheric Tanks Wellhead Separator Dump Valve Sub-Basin Details



Note: Data elements boxed in red are required.

If a wellhead separator dump valve is functioning improperly during the reporting year (refer to Equation W-16 of 98.233), report the following by sub-basin category [98.236(c)(8)(iv)]:

- The unique identity of the sub-basin category (see Sub-Basin Identification for the naming convention).
  - Annual CO_2 and CH_4 emissions from improperly functioning dump valves, expressed in metric tons CO_2e for each gas, at the sub-basin level (Equation W-16). [98.236(c)(8)(iv)(B)] **Note:** If reporting emissions for an improperly functioning wellhead separator dump valve, do not report emissions for that separator under Calculation Methodologies 1, 2 or 4.

Table 31
Atmospheric Tanks Wellhead Separator Dump Valve Sub-Basin Details
Data Element Definitions

Data Element Name	Description
AtmosphericTanksWellheadSeparatorDumpValveDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any sub-basins with a wellhead separator dump valve functioning improperly during the reporting year.
AtmosphericTanksWellheadSeparatorDumpValveSubBasinRowDetails	**Parent Element:** A collection of data elements to report for each sub-basin with a wellhead separator dump valve functioning improperly during the reporting year.

Data Element Name	Description
SubBasinIdentifier	Sub-basin ID. [98.236(c)(8)(iv)] See Sub-Basin Identification for the required naming convention.
VentingCarbonDioxideEmissions	CO_2 emissions from improperly functioning dump valves at the specified sub-basin in metric tons. [98.236(c)(8)(iv)(B)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If reporting emissions for an improperly functioning wellhead separator dump valve, do not report emissions for that separator under Calculation Methodologies 1, 2 or 4.
VentingMethaneCarbonDioxideEquivalent	CH4 emissions from improperly functioning dump valves at the specified sub-basin in metric tons CO2e. [98.236(c)(8)(iv)(B)] Set the units of measure to "Metric Tons" in the attribute massUOM. **Note:** If reporting emissions for an improperly functioning wellhead separator dump valve, do not report emissions for that separator under Calculation Methodologies 1, 2 or 4.

XML Excerpt 30
Example for Atmospheric Tanks Wellhead Separator Dump Valve Sub-Basin Details

```
      <ghg:AtmosphericTanksWellheadSeparatorDumpValveDetails>
            <ghg:AtmosphericTanksWellheadSeparatorDumpValveSubBasinRowDetails>
                  <ghg:SubBasinIdentifier>360 - DEWEY, OK (43) - Other tight reservoir rock</ghg:SubBasinIdentifier>
                  <ghg:VentingCarbonDioxideEmissions massUOM="Metric
Tons">22459.3</ghg:VentingCarbonDioxideEmissions>
                  <ghg:VentingMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">750744.2</ghg:VentingMethaneCarbonDioxideEquivalent>
            </ghg:AtmosphericTanksWellheadSeparatorDumpValveSubBasinRowDetails>
      </ghg:AtmosphericTanksWellheadSeparatorDumpValveDetails>
</ghg:AtmosphericTanksDetails>
```

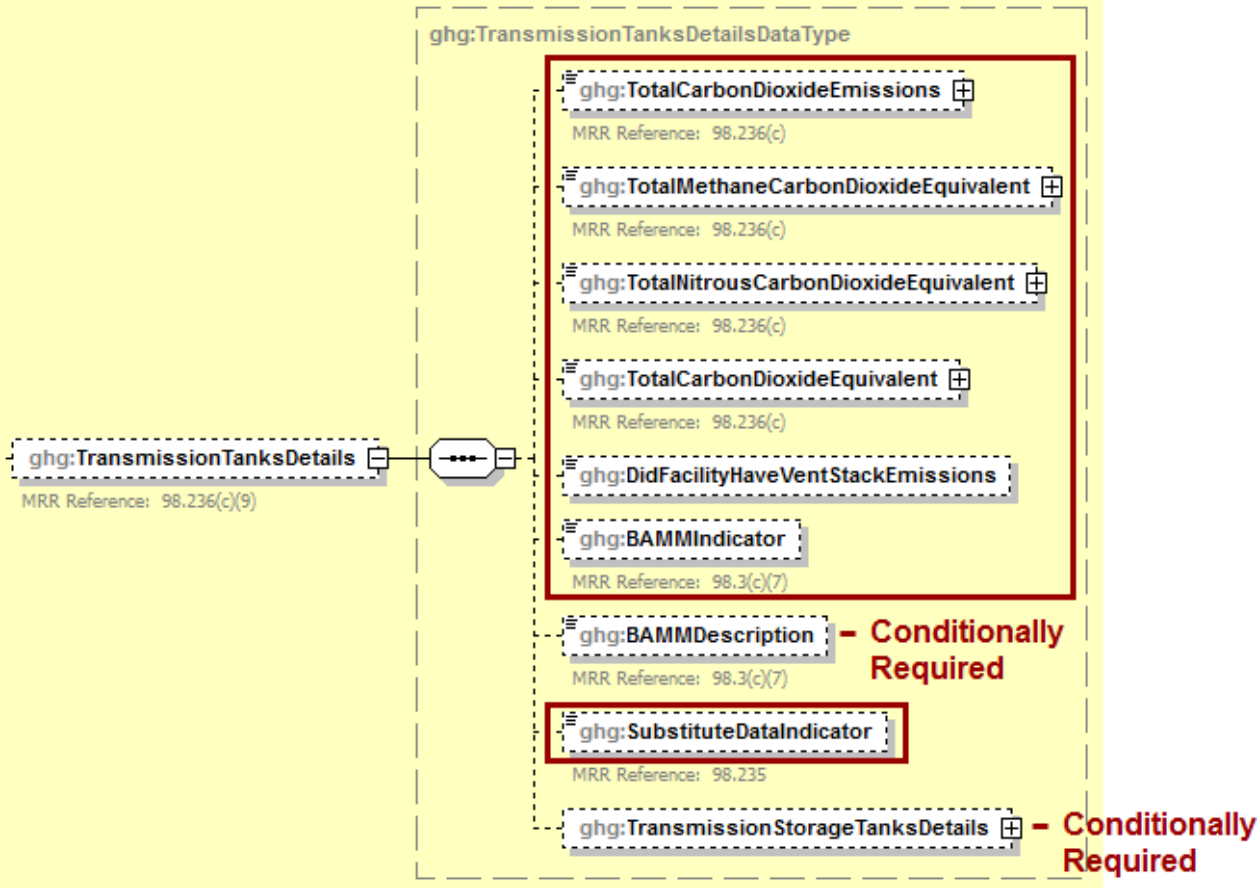
Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

12.0 Transmission Tanks

This topic provides a step-by-step description of how to report transmission tank emissions information for a facility. This section is applicable to and required for the onshore natural gas transmission compression industry segment only.

Figure 35
Transmission Tanks 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 transmission tanks, report the following:

- The CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for all vent stack emissions from compressor scrubber dump valve leakage that were quantified per 98.233(k) combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e, total N_2O emissions in CO_2e and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any vent stack emissions from compressor scrubber dump valve leakage that were quantified per 98.233(k) in the reporting year.
  - The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the following data elements:
    - "VentingCarbonDioxideEmissions" for each vent stack.

- "FlaringCarbonDioxideEmissions" for each vent stack.

- The value to report for "TotalMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:
  - "VentingMethaneCarbonDioxideEquivalent" for each vent stack.
  - "FlaringMethaneCarbonDioxideEquivalent" for each vent stack.
- The value to report for "TotalNitrousCarbonDioxideEquivalent" equals the sum of the values reported for the following data element:
  - "FlaringNitrousCarbonDioxideEquivalent" for each vent stack.
- The value to report for "TotalCarbonDioxideEquivalent" equals the sum of the values reported for "TotalCarbonDioxideEmissions", "TotalMethaneCarbonDioxideEquivalent" and "TotalNitrousCarbonDioxideEquivalent".

- Whether the facility had any vent stack emissions from a compressor scrubber dump valve leak that were quantified per 98.233(k) in the reporting year.
- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

Table 32
Transmission Tanks Details Data Element Definitions

Data Element Name	Description
TransmissionTanksDetails	**Parent Element:** A collection of data elements to report for transmission tanks. [98.236(c)(9)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions from all vent stack emissions from compressor scrubber dump valve leakage that were quantified per 98.233(k) combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any vent stack emissions from compressor scrubber dump valve leakage that were quantified per 98.233(k) in the reporting year.

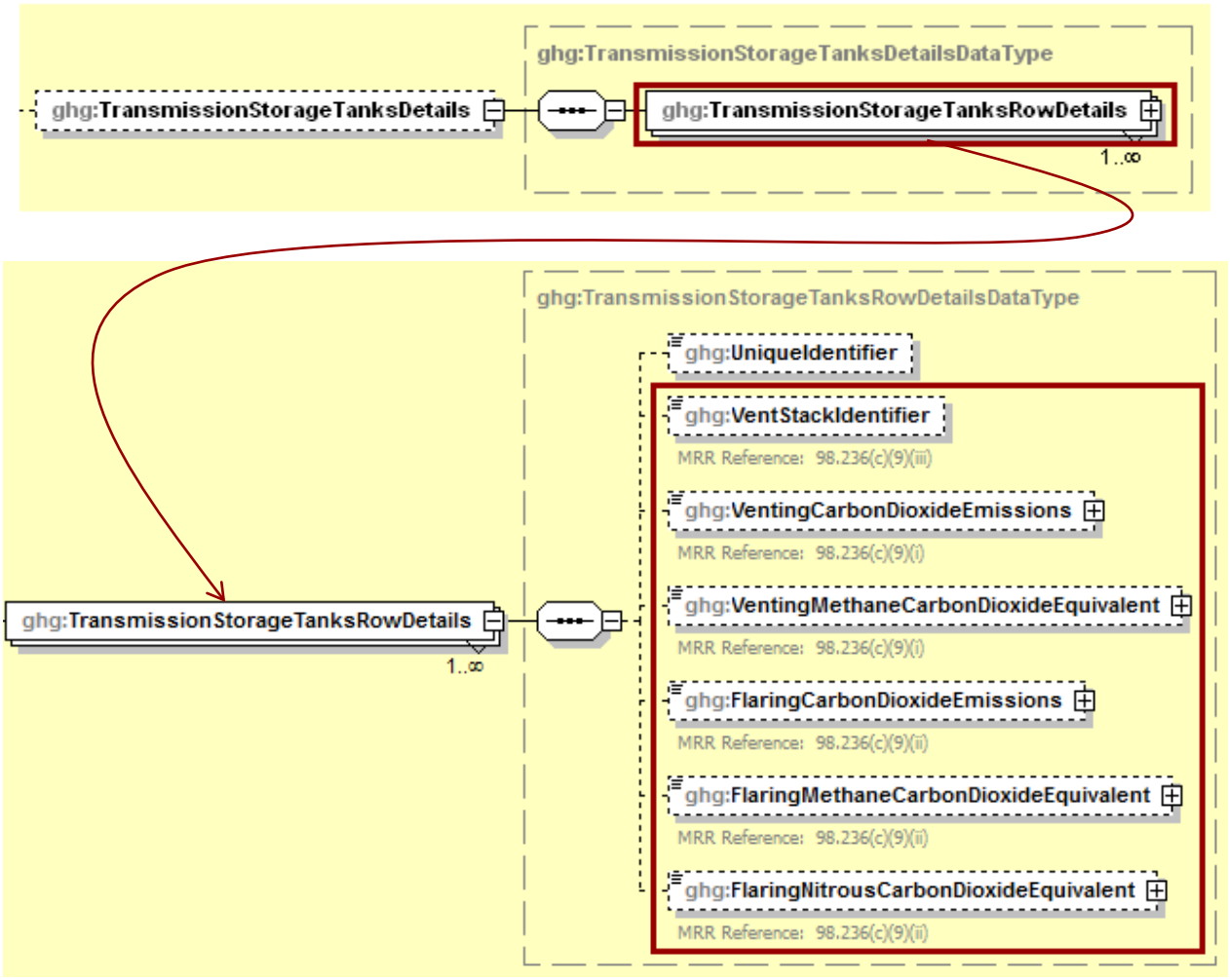
Data Element Name	Description
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions from all vent stack emissions from compressor scrubber dump valve leakage that were quantified per 98.233(k) combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any vent stack emissions from compressor scrubber dump valve leakage that were quantified per 98.233(k) in the reporting year.
TotalNitrousCarbonDioxideEquivalent	Annual N_2O emissions from all vent stack emissions from compressor scrubber dump valve leakage that were quantified per 98.233(k) combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any vent stack emissions from compressor scrubber dump valve leakage that were quantified per 98.233(k) in the reporting year.
TotalCarbonDioxideEquivalent	Total combined CO_2, CH_4 and N_2O emissions from all vent stack emissions from compressor scrubber dump valve leakage that were quantified per 98.233(k) combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any vent stack emissions from compressor scrubber dump valve leakage that were quantified per 98.233(k) in the reporting year.
DidFacilityHaveVentStackEmissions	Indicate (Yes/No) if the facility had any vent stack emissions from compressor scrubber dump valve leakage that were quantified per 98.233(k) in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 31
Example for Transmission Tanks Details

```
<ghg:TransmissionTanksDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">169433.3</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">129044.2</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalNitrousCarbonDioxideEquivalent massUOM="Metric Tons">12.5</ghg:TotalNitrousCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">298490</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DidFacilityHaveVentStackEmissions>Yes</ghg:DidFacilityHaveGasTransmissionTankEmissions>
      <ghg:BAMMIndicator>No</ghg:BAMMIndicator>
      <ghg:SubstituteDataIndicator>Yes</ghg:SubstituteDataIndicator>
      <ghg:TransmissionStorageTanksDetails>
            <See example for Transmission Storage Tanks Details>
      </ghg:TransmissionStorageTanksDetails>
</ghg:TransmissionTanksDetails>
```

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

Figure 36
Transmission Storage Tanks Details Schema Diagram



Note: Data elements boxed in red are required.

If the facility had any vent stack emissions from compressor scrubber dump valve leakage that were quantified per 98.233(k) in the reporting year, report the following for each vent stack [98.236(c)(9)]:

- A unique name or ID number for the vent stack monitored according to 40 CFR 98.233(k). [98.236(c)(9)(iii)]
- Annual CO_2 and CH_4 emissions that resulted from venting gas directly to the atmosphere, expressed in metric tons CO_2e for each gas. [98.236(c)(9)(i)]
- Annual CO_2, CH_4 and N_2O emissions that resulted from flaring process gas expressed in metric tons CO_2e for each gas. [98.236(c)(9)(ii)]

Table 33
Transmission Storage Tanks Details Data Element Definitions

Data Element Name	Description
TransmissionStorageTanksDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any vent stack emissions from compressor scrubber dump valve leakage that were quantified per 98.233(k) in the reporting year.
TransmissionStorageTanksRowDetails	**Parent Element:** A collection of data elements to report for each vent stack.
VentStackIdentifier	A unique name or identifier associated with the vent stack. [98.236(c)(9)(iii)]
VentingCarbonDioxideEmissions	CO_2 emissions from venting gas directly to the atmosphere from the specified vent stack in metric tons. [98.236(c)(9)(i)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
VentingMethaneCarbonDioxideEquivalent	CH_4 emissions from venting gas directly to the atmosphere from the specified vent stack in metric tons CO_2e. [98.236(c)(9)(i)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringCarbonDioxideEmissions	CO_2 emissions from flaring process gas from the specified vent stack in metric tons. [98.236(c)(9)(ii)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringMethaneCarbonDioxideEquivalent	CH_4 emissions from flaring process gas from the specified vent stack in metric tons CO_2e. [98.236(c)(9)(ii)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringNitrousCarbonDioxideEquivalent	N_2O emissions from flaring process gas from the specified vent stack in metric tons CO_2e. [98.236(c)(9)(ii)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 32
Example for Transmission Storage Tanks Details

```
      <ghg:TransmissionStorageTanksDetails>
            <ghg:TransmissionStorageTanksRowDetails>
                  <ghg:VentStackIdentifier>101</ghg:VentStackIdentifier>
                  <ghg:VentingCarbonDioxideEmissions massUOM="Metric Tons">1</ghg:VentingCarbonDioxideEmissions>
                  <ghg:VentingMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">699.1</ghg:VentingMethaneCarbonDioxideEquivalent>
                  <ghg:FlaringCarbonDioxideEmissions massUOM="Metric Tons">0</ghg:FlaringCarbonDioxideEmissions>
                  <ghg:FlaringMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">0</ghg:FlaringMethaneCarbonDioxideEquivalent>
                  <ghg:FlaringNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">0</ghg:FlaringNitrousCarbonDioxideEquivalent>
            </ghg:TransmissionStorageTanksRowDetails>
            <ghg:TransmissionStorageTanksRowDetails>
                  <ghg:VentStackIdentifier>102</ghg:VentStackIdentifier>
                  <ghg:VentingCarbonDioxideEmissions massUOM="Metric
Tons">172.7</ghg:VentingCarbonDioxideEmissions>
                  <ghg:VentingMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">125828.6</ghg:VentingMethaneCarbonDioxideEquivalent>
                  <ghg:FlaringCarbonDioxideEmissions massUOM="Metric
Tons">169259.6</ghg:FlaringCarbonDioxideEmissions>
                  <ghg:FlaringMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">2516.5</ghg:FlaringMethaneCarbonDioxideEquivalent>
                  <ghg:FlaringNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">12.5</ghg:FlaringNitrousCarbonDioxideEquivalent>
            </ghg:TransmissionStorageTanksRowDetails>
      </ghg:TransmissionStorageTanksDetails>
</ghg:TransmissionTanksDetails>
```

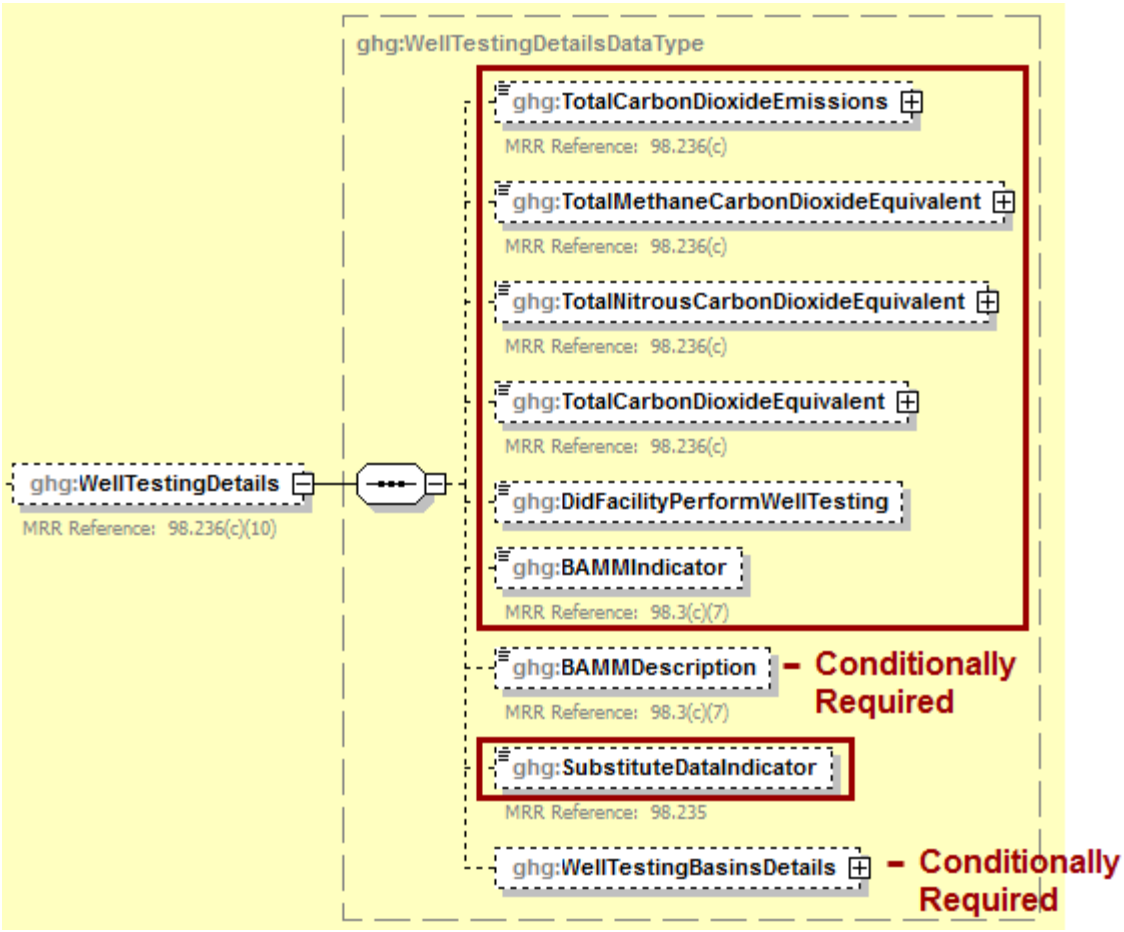
Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

13.0 Well Testing Venting and Flaring

This topic provides a step-by-step description of how to report well testing information for a facility. This section is applicable to and required for the onshore petroleum and natural gas production industry segment only.

Figure 37
Well Testing 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 well testing, report the following:

- The CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for all well testing venting and flaring combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e, total N_2O emissions in CO_2e and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any well testing that resulted in venting or flaring subject to reporting under 98.232 during the reporting year.

- The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the following data elements:
  - "VentingCarbonDioxideEmissions" for the basin.
  - "FlaringCarbonDioxideEmissions" for the basin.
- The value to report for "TotalMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:
  - "VentingMethaneCarbonDioxideEquivalent" for the basin.
  - "FlaringMethaneCarbonDioxideEquivalent" for the basin.
- The value to report for "TotalNitrousCarbonDioxideEquivalent" equals the value reported for the following data element:
  - "FlaringNitrousCarbonDioxideEquivalent" for the basin.
- The value to report for "TotalCarbonDioxideEquivalent" equals the sum of the values reported for "TotalCarbonDioxideEmissions", "TotalMethaneCarbonDioxideEquivalent" and "TotalNitrousCarbonDioxideEquivalent".

- Whether the facility performed well testing that resulted in venting or flaring subject to reporting under 98.232 in the reporting year.
- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

Table 34
Well Testing Details Data Element Definitions

Data Element Name	Description
WellTestingDetails	**Parent Element:** A collection of data elements to report for well testing. [98.236(c)(10)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions from all well testing combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any well testing that resulted in venting or flaring subject to reporting under 98.232 during the reporting year.
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions from all well testing combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any well testing that resulted in venting or flaring subject to reporting under 98.232 during the reporting year.

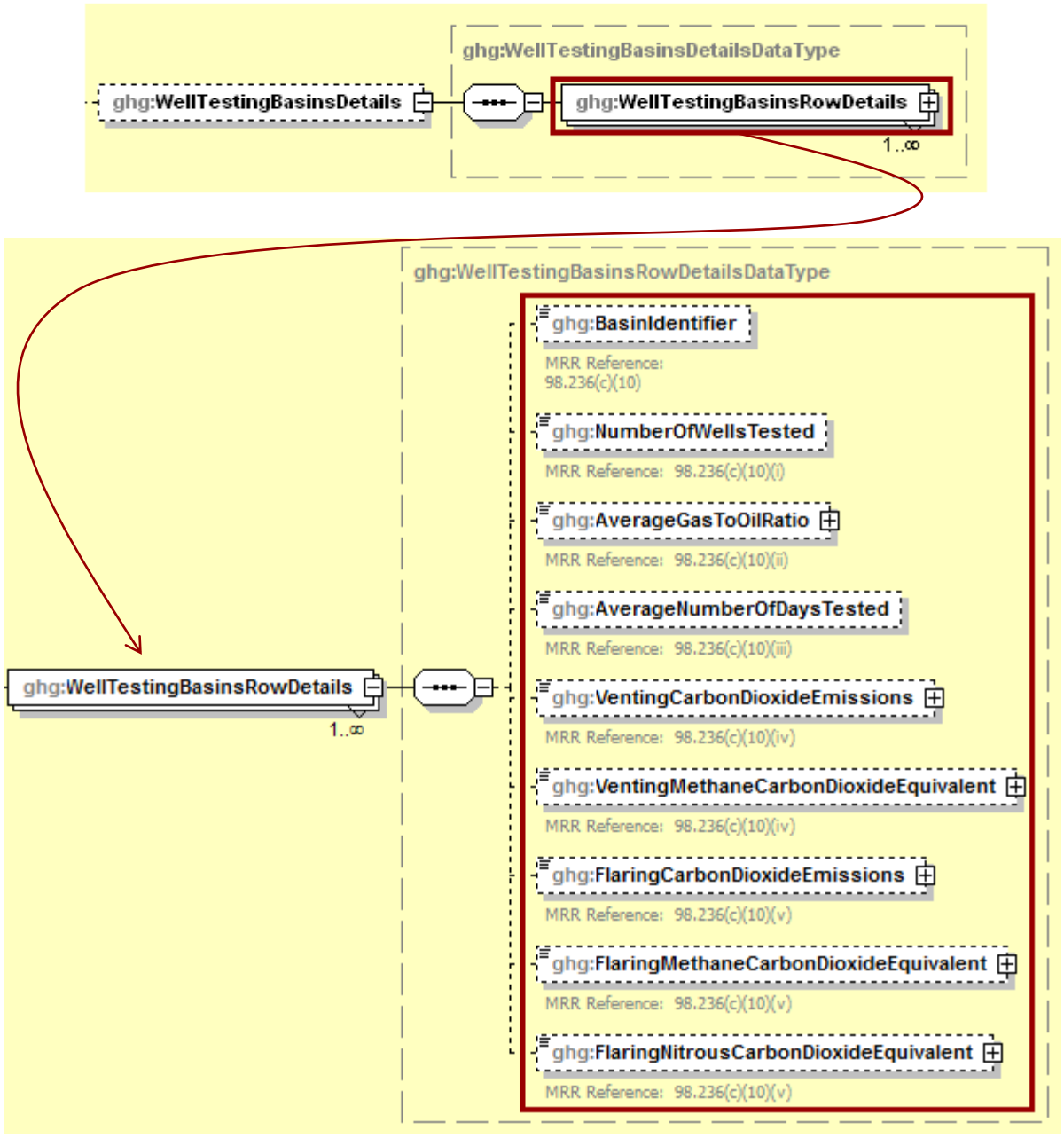
Data Element Name	Description
TotalNitrousCarbonDioxideEquivalent	Annual N_2O emissions from all well testing combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any well testing that resulted in venting or flaring subject to reporting under 98.232 during the reporting year.
TotalCarbonDioxideEquivalent	Total combined CO_2, CH_4 and N_2O emissions from all well testing combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any well testing that resulted in venting or flaring subject to reporting under 98.232 during the reporting year.
DidFacilityPerformWellTesting	Indicate (Yes/No) if the facility performed well testing that resulted in venting or flaring subject to reporting under 98.232 in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 33
Example for Well Testing Details

```
<ghg:WellTestingDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">170.6</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">208.8</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">234.6</ghg:TotalNitrousCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">614.0</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DidFacilityPerformWellTesting>Yes</ghg:DidFacilityPerformWellTesting>
      <ghg:BAMMIndicator>Yes</ghg:BAMMIndicator>
      <ghg:BAMMDescription>BAMM Description</ghg:BAMMDescription>
      <ghg:SubstituteDataIndicator>Yes</ghg:SubstituteDataIndicator>
      <ghg:WellTestingBasinsDetails>
            <See example for Well Basin Testing Details>
      </ghg:WellTestingBasinsDetails>
</ghg:WellTestingDetails>
```

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

Figure 38
Well Testing Basin Details Schema Diagram



Note: Data elements boxed in red are required.

If the facility performed well testing that resulted in venting or flaring in the reporting year (refer to Equation W-17A or W-17B of 98.233), report the following [98.236(c)(10)]:

- The unique identity of the basin (see Basin Identification for the naming convention). [98.236(c)(10)]
- Number of wells tested in the basin in the reporting year. [98.236(c)(10)(i)]

- Average gas to oil ratio for the basin in cubic feet of gas per barrel of oil. [98.236(c)(10)(ii)]
- Average number of days that the wells were tested in the basin. [98.236(c)(10)(iii)]
- The annual CO_2 and CH_4 emissions at the basin/facility level, expressed in metric tons CO_2e for each gas, from well testing venting. [98.236(c)(10)(iv)]
- The annual CO_2, CH_4 and N_2O emissions at the basin/facility level, expressed in metric tons CO_2e for each gas, from well testing flaring. [98.236(c)(10)(v)]

Table 35
Well Testing Basin Details Data Element Definitions

Data Element Name	Description
WellTestingBasinsDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility performed well testing that resulted in venting or flaring subject to reporting under 98.232 in the reporting year.
WellTestingBasinsRowDetails	**Parent Element:** A collection of data elements to report if the facility performed well testing that resulted in venting or flaring in the reporting year.
BasinIdentifier	Basin ID. [98.236(c)(10)] See Basin Identification for the required naming convention.
NumberOfWellsTested	Number of wells tested in reporting year. [98.236(c)(10)(i)]
AverageGasToOilRatio	Average gas to oil ratio in cubic feet of gas per barrel oil. [98.236(c)(10)(ii)] Set the units of measure to "cubic feet of gas per barrel of oil" in the attribute **fractionUOM**.
AverageNumberOfDaysTested	Average number of days that wells was tested. [98.236(c)(10)(iii)]
VentingCarbonDioxideEmissions	Total CO_2 emissions from venting from the basin in metric tons. [98.236(c)(10)(iv)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
VentingMethaneCarbonDioxideEquivalent	Total CH_4 emissions from venting from the basin in metric tons CO_2e. [98.236(c)(10)(iv)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringCarbonDioxideEmissions	Total CO_2 emissions from flaring for the basin in metric tons. [98.236(c)(10)(v)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
FlaringMethaneCarbonDioxideEquivalent	Total CH_4 emissions from flaring for the basin in metric tons CO_2e. [98.236(c)(10)(v)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

Data Element Name	Description
FlaringNitrousCarbonDioxideEquivalent	Total N_2O emissions from flaring for the basin in metric tons CO_2e. [98.236(c)(10)(v)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 34
Example for Well Basin Testing Details

```
      <ghg:WellTestingBasinsDetails>
            <ghg:WellTestingBasinsRowDetails>
                  <ghg:BasinIdentifier>360 – Anadarko Basin</ghg:BasinIdentifier>
                  <ghg:NumberOfWellsTested>54</ghg:NumberOfWellsTested>
                  <ghg:AverageGasToOilRatio fractionUOM="cubic feet of gas per barrel of
oil">12.3</ghg:AverageGasToOilRatio>
                  <ghg:AverageNumberOfDaysTested>87</ghg:AverageNumberOfDaysTested>
                  <ghg:VentingCarbonDioxideEmissions massUOM="Metric
Tons">74.2</ghg:VentingCarbonDioxideEmissions>
                  <ghg:VentingMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">85.3</ghg:VentingMethaneCarbonDioxideEquivalent>
                  <ghg:FlaringCarbonDioxideEmissions massUOM="Metric
Tons">96.4</ghg:FlaringCarbonDioxideEmissions>
                  <ghg:FlaringMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">123.5</ghg:FlaringMethaneCarbonDioxideEquivalent>
                  <ghg:FlaringNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">234.6</ghg:FlaringNitrousCarbonDioxideEquivalent>
            </ghg:WellTestingBasinsRowDetails>
      </ghg:WellTestingBasinsDetails>
</ghg:WellTestingDetails>
```

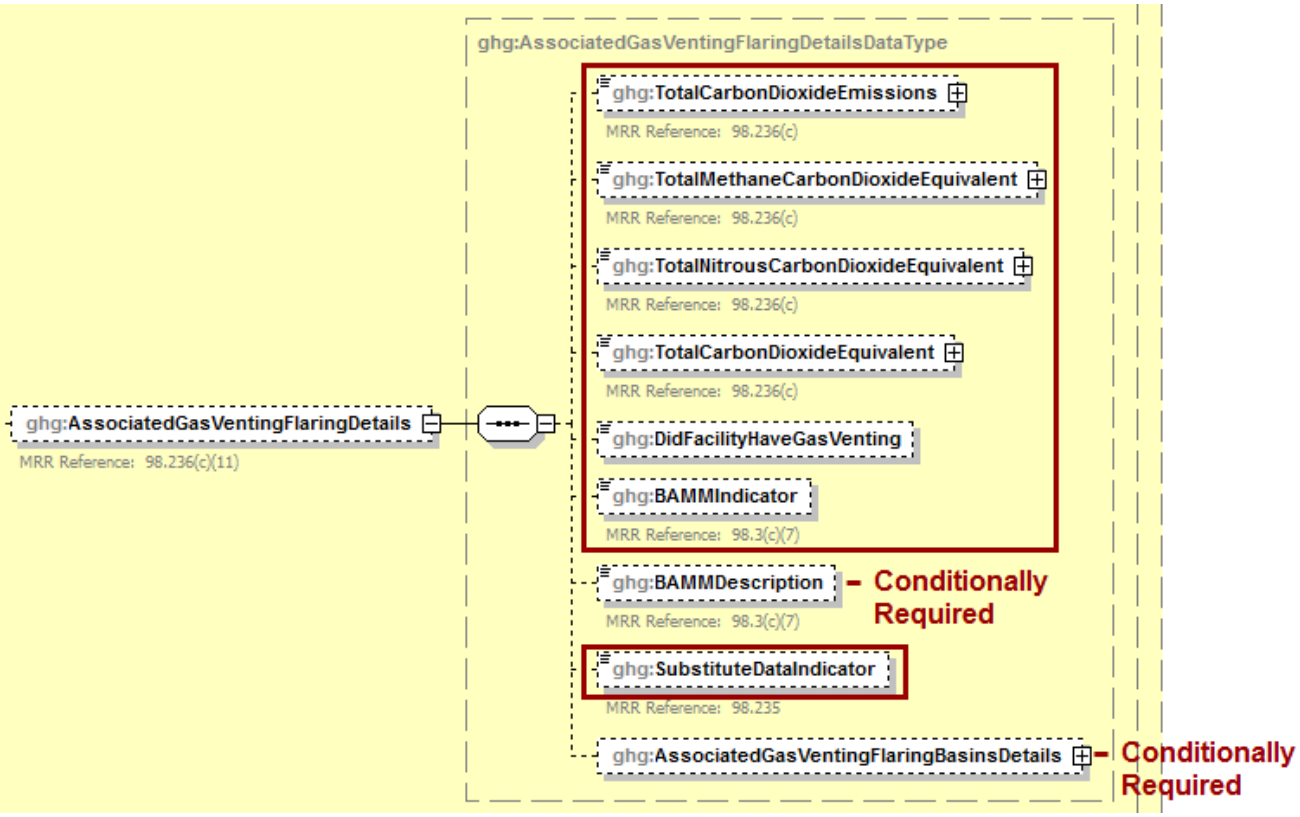
Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

14.0 Associated Gas Venting and Flaring

This topic provides a step-by-step description of how to report associated gas venting and flaring information for a facility. This section is applicable to and required for the onshore petroleum and natural gas production industry segment only.

Figure 39
Associated Gas Venting and Flaring 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 associated gas venting and flaring, report the following:

- The CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for all associated gas venting and flaring combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e, total N_2O emissions in CO_2e and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any associated gas venting and flaring subject to reporting under 98.232 during the reporting year.
  - The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the following data elements:
    - "VentingCarbonDioxideEmissions" for the basin.

- "FlaringCarbonDioxideEmissions" for the basin.

- The value to report for "TotalMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:
  - "VentingMethaneCarbonDioxideEquivalent" for the basin.
  - "FlaringMethaneCarbonDioxideEquivalent" for the basin.
- The value to report for "TotalNitrousCarbonDioxideEquivalent" equals the value reported for the following data element:
  - "FlaringNitrousCarbonDioxideEquivalent" for the basin.
- The value to report for "TotalCarbonDioxideEquivalent" equals the sum of the values reported for "TotalCarbonDioxideEmissions", "TotalMethaneCarbonDioxideEquivalent" and "TotalNitrousCarbonDioxideEquivalent".

- Whether the facility had any associated gas venting or flaring subject to reporting under 98.232 in the reporting year.
- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

Table 36
Associated Gas Venting and Flaring Details Data Element Definitions

Data Element Name	Description
AssociatedGasVentingFlaringDetails	**Parent Element:** A collection of data elements to report for associated gas venting and flaring. [98.236(c)(11)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions from all associated gas venting and flaring reported combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any associated gas venting or flaring subject to reporting under 98.232 during the reporting year.
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions from all associated gas venting and flaring reported combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any associated gas venting or flaring subject to reporting under 98.232 during the reporting year.

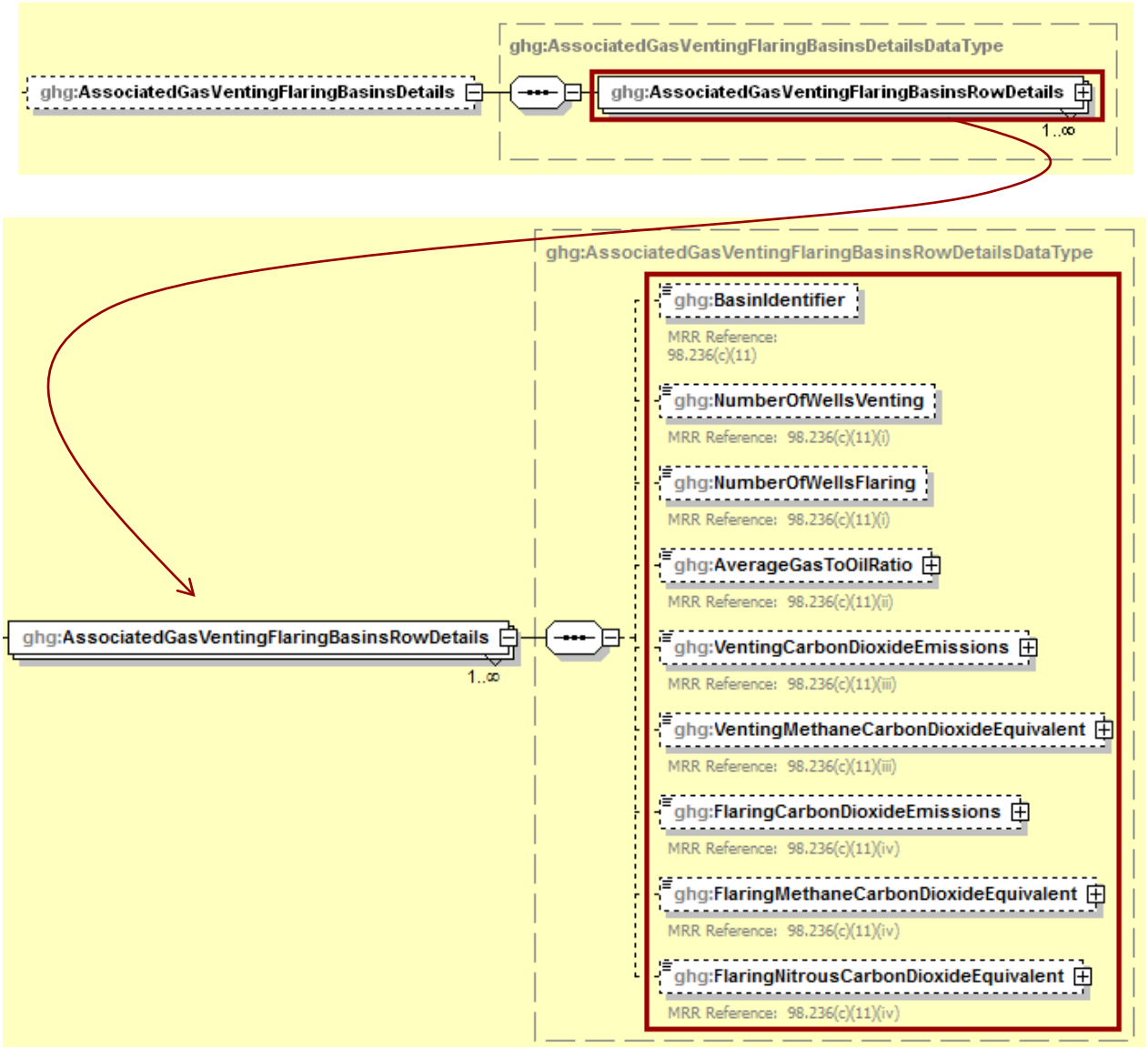
Data Element Name	Description
TotalNitrousCarbonDioxideEquivalent	Annual N_2O emissions from all associated gas venting and flaring reported combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any associated gas venting or flaring subject to reporting under 98.232 during the reporting year.
TotalCarbonDioxideEquivalent	Total combined CO_2, CH_4 and N_2O emissions from all associated gas venting and flaring reported combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have associated any gas venting or flaring subject to reporting under 98.232 during the reporting year.
DidFacilityHaveGasVenting	Indicate (Yes/No) if the facility had any associated gas venting or flaring subject to reporting under 98.232 in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 35
Example for Associated Gas Venting and Flaring Details

```
<ghg:AssociatedGasVentingFlaringDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">68649.9</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">19057.1</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalNitrousCarbonDioxideEquivalent massUOM="Metric Tons">0.3</ghg:TotalNitrousCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">87707.3</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DidFacilityHaveGasVenting>Yes</ghg:DidFacilityHaveGasVenting>
      <ghg:BAMMIndicator>Yes</ghg:BAMMIndicator>
      <ghg:BAMMDescription>BAMM description</ghg:BAMMDescription>
      <ghg:SubstituteDataIndicator>Yes</ghg:SubstituteDataIndicator>
      <ghg:AssociatedGasVentingFlaringBasinsDetails>
                  <See example for Associated Gas Venting and Flaring Basins Details>
      </ghg:AssociatedGasVentingFlaringBasinsDetails>
</ghg:AssociatedGasVentingFlaringDetails>
```

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

Figure 40
Associated Gas Venting and Flaring Basins Details Schema Diagram



Note: Data elements boxed in red are required.

If the facility had any associated gas venting or flaring (refer to Equation W-18 of 98.233), report the following for the basin/facility [98.236(c)(11)]:

- The unique identity of the basin (see Basin Identification for the naming convention). [98.236(c)(11)]
- Number of wells venting associated gas in the reporting year. [98.236(c)(11)(i)]
- Number of wells flaring associated gas in the reporting year. [98.236(c)(11)(i)]

- Average gas to oil ratio for the basin in cubic feet of gas per barrel of oil. [98.236(c)(11)(ii)]
- The annual CO_2 and CH_4 emissions at the basin/facility level, expressed in metric tons CO_2e for each gas, from associated gas venting. [98.236(c)(11)(iii)]
- The annual CO_2, CH_4 and N_2O emissions at the basin/facility level, expressed in metric tons CO_2e for each gas, from associated gas flaring. [98.236(c)(11)(iv)]

Table 37
Associated Gas Venting and Flaring Basins Details Data Element Definitions

Data Element Name	Description
AssociatedGasVentingFlaringBasinsDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any associated gas venting or flaring subject to reporting under 98.232 in the reporting year.
AssociatedGasVentingFlaringBasinsRowDetails	**Parent Element:** A collection of data elements to report for the basin.
BasinIdentifier	Basin ID. [98.236(c)(11)] See Basin Identification for the required naming convention.
NumberOfWellsVenting	Number of wells venting associated gas. [98.236(c)(11)(i)]
NumberOfWellsFlaring	Number of wells flaring associated gas. [98.236(c)(11)(i)]
AverageGasToOilRatio	Average gas to oil ratio for the basin in cubic feet of gas per barrel of oil. [98.236(c)(11)(ii)] Set the units of measure to "cubic feet of gas per barrel of oil" in the attribute **fractionUOM**.
VentingCarbonDioxideEmissions	CO_2 emissions from venting from the basin in metric tons. [98.236(c)(11)(iii)] Set the units of measure to “Metric Tons” in the attribute **massUOM**.
VentingMethaneCarbonDioxideEquivalent	CH_4 emissions from venting from the basin in metric tons CO_2e. [98.236(c)(11)(iii)] Set the units of measure to “Metric Tons” in the attribute **massUOM**.
FlaringCarbonDioxideEmissions	CO_2 emissions from flaring for the basin in metric tons. [98.236(c)(11)(iv)] Set the units of measure to “Metric Tons” in the attribute **massUOM**.
FlaringMethaneCarbonDioxideEquivalent	CH_4 emissions from flaring for the basin in metric tons CO_2e. [98.236(c)(11)(iv)] Set the units of measure to “Metric Tons” in the attribute **massUOM**.

Data Element Name	Description
FlaringNitrousCarbonDioxideEquivalent	N_2O emissions from flaring for the basin in metric tons CO_2e. [98.236(c)(11)(iv)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 36
Example for Associated Gas Venting and Flaring Basins Details

```
<ghg:AssociatedGasVentingFlaringBasinsDetails>
      <ghg:AssociatedGasVentingFlaringBasinsRowDetails>
            <ghg:BasinIdentifier>360 - Anadarko Basin</ghg:BasinIdentifier>
            <ghg:NumberOfWellsVenting>18</ghg:NumberOfWellsVenting>
            <ghg:NumberOfWellsFlaring>34</ghg:NumberOfWellsFlaring>
            <ghg:AverageGasToOilRatio fractionUOM="cubic feet of gas per barrel of
oil">622921275.7</ghg:AverageGasToOilRatio>
            <ghg:VentingCarbonDioxideEmissions massUOM="Metric Tons">19.8</ghg:VentingCarbonDioxideEmissions>
            <ghg:VentingMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">19049.4</ghg:VentingMethaneCarbonDioxideEquivalent>
            <ghg:FlaringCarbonDioxideEmissions massUOM="Metric Tons">68630.1</ghg:FlaringCarbonDioxideEmissions>
            <ghg:FlaringMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">7.7</ghg:FlaringMethaneCarbonDioxideEquivalent>
            <ghg:FlaringNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">0.3</ghg:FlaringNitrousCarbonDioxideEquivalent>
      </ghg:AssociatedGasVentingFlaringBasinsRowDetails>
</ghg:AssociatedGasVentingFlaringBasinsDetails>
```

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

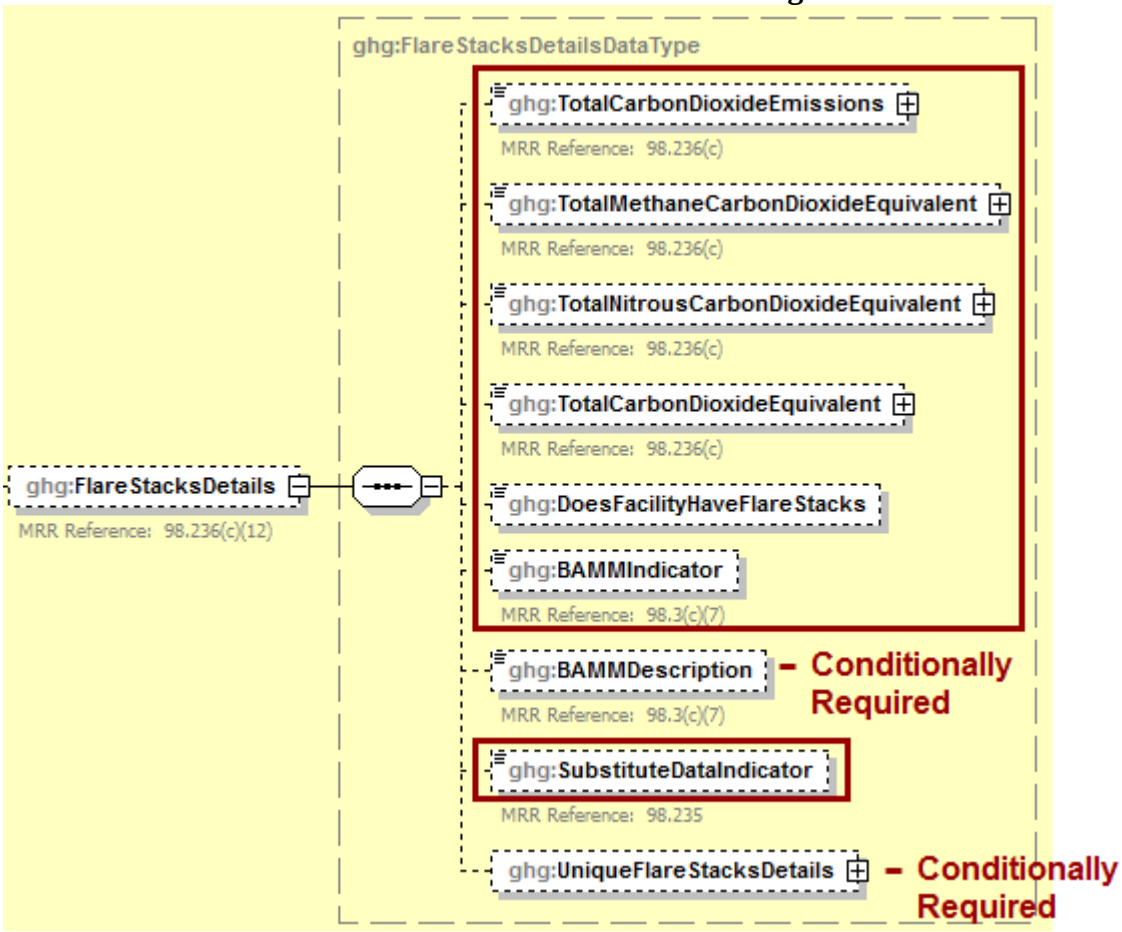
Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

15.0 Flare Stacks

This topic provides a step-by-step description of how to report flare stack information for a facility. This section is applicable to and required for the following industry segments only:

- Onshore petroleum and natural gas production
- Onshore natural gas processing

Figure 41
Flare Stack 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 flare stacks, report the following:

- The CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for all flare stacks combined which are **not** reported for another source type in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e, total N_2O emissions in CO_2e and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any flare stacks subject to reporting under 98.232 during the reporting year.

- The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the following data elements:
  - "CombustedAndUncombustedCarbonDioxide" for all flare stacks for which a CEMS was used.
  - "UncombustedCarbonDioxideEmissions" for all flare stacks for which a CEMS was not used.
  - "CombustedCarbonDioxideEmissions" for all flare stacks for which a CEMS was not used.
- The value to report for "UncombustedMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the following data element:
  - "UncombustedMethaneCarbonDioxideEquivalent" for all flare stacks for which a CEMS was not used.
- The value to report for "TotalNitrousCarbonDioxideEquivalent" equals the sum of the values reported for the following data element:
  - "NitrousCarbonDioxideEquivalent" for all flare stacks for which a CEMS was not used.
- The value to report for "TotalCarbonDioxideEquivalent" equals the sum of the values reported for "TotalCarbonDioxideEmissions", "TotalMethaneCarbonDioxideEquivalent" and "TotalNitrousCarbonDioxideEquivalent".

- Whether the facility had any flare stacks subject to reporting under 98.232 in the reporting year.
- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

Table 38
Flare Stack Details Data Element Definitions

Data Element Name	Description
FlareStacksDetails	**Parent Element:** A collection of data elements to report for flare stacks. [98.236(c)(12)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions from all flare stacks reported combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any flare stacks subject to reporting under 98.232 during the reporting year.

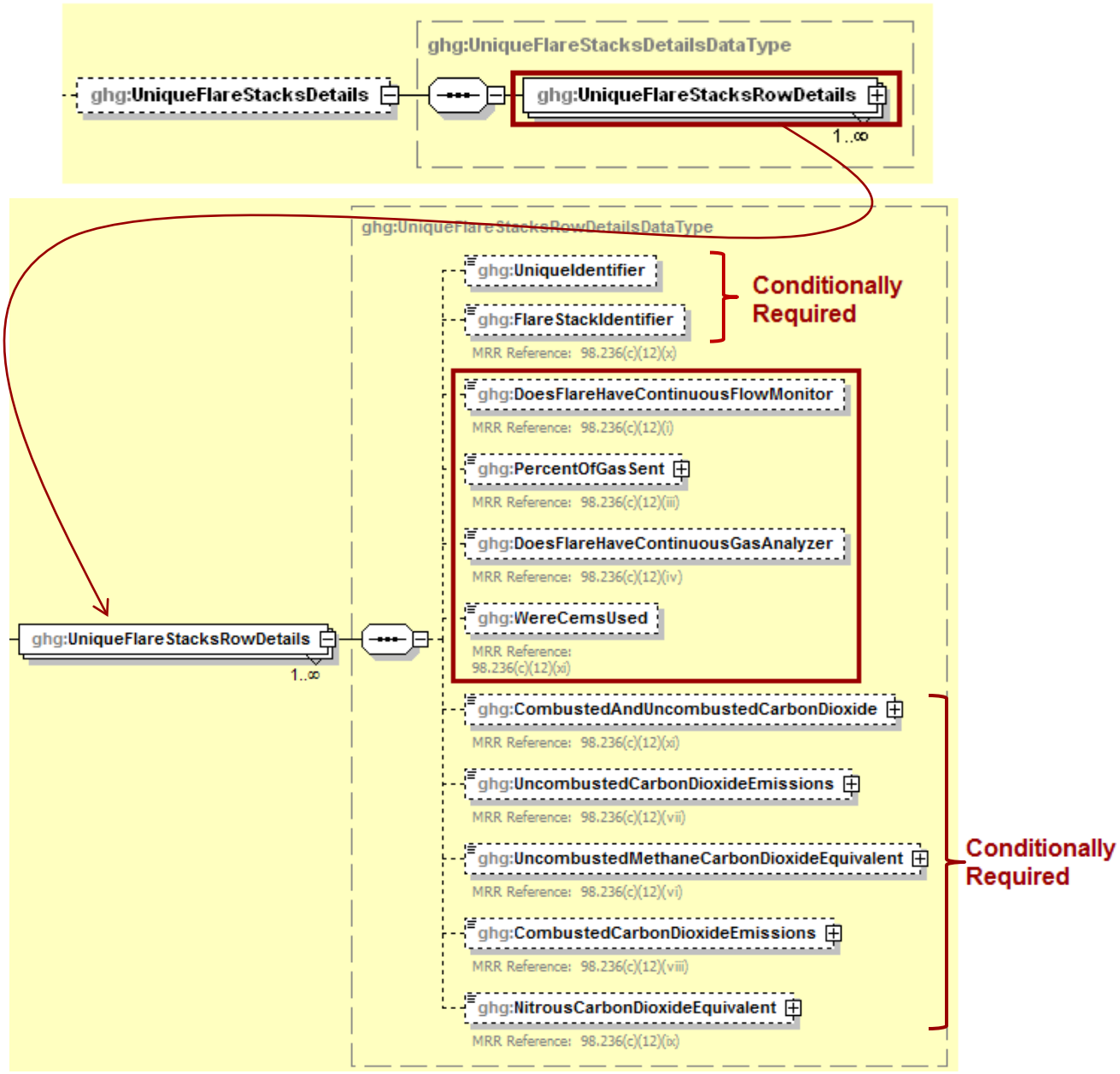
Data Element Name	Description
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions from all flare stacks reported combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any flare stacks subject to reporting under 98.232 during the reporting year.
TotalNitrousCarbonDioxideEquivalent	Annual N_2O emissions from all flare stacks reported combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any flare stacks subject to reporting under 98.232 during the reporting year.
TotalCarbonDioxideEquivalent	Total combined CO_2, CH_4 and N_2O emissions from all flare stacks reported combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any flare stacks subject to reporting under 98.232 during the reporting year.
DoesFacilityHaveFlareStacks	Indicate (Yes/No) if the facility had any flare stacks subject to reporting under 98.232 in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 37
Example for Flare Stack Details

```
<ghg:FlareStacksDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">158068.8</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">8.8</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalNitrousCarbonDioxideEquivalent massUOM="Metric Tons">0.3</ghg:TotalNitrousCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">158077.9</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DoesFacilityHaveFlareStacks>Yes</ghg:DoesFacilityHaveFlareStacks>
      <ghg:BAMMIndicator>Yes</ghg:BAMMIndicator>
      <ghg:BAMMDescription>Description of BAMM</ghg:BAMMDescription>
      <ghg:SubstituteDataIndicator>Yes</ghg:SubstituteDataIndicator>
      <ghg:UniqueFlareStacksDetails>
            <See example for Unique Flare Stacks Details>
      </ghg:UniqueFlareStacksDetails>
</ghg:FlareStacksDetails>
```

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

Figure 42
Unique Flare Stacks 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.

If the facility had flare stacks (refer to Equation W-19, W-20 and W-21 of 98.233), report the following for each flare [98.236(c)(12)]:

- For the onshore petroleum and natural gas production industry segment only, a sequential identification number for the flare stack. **Note:** This number is used for reference only in the event that there is a validation message associated with the flare stack data.
- For the onshore natural gas processing industry segment only, a unique name or ID number for the flare stack. [98.236(c)(12)(x)]

- Whether the flare has a continuous flow monitor. [98.236(c)(12)(i)]
- The percent of gas sent to un-lit flare determined by engineering estimate and process knowledge based on best available data and operating records. [98.236(c)(12)(iii)]
- Whether the flare has a continuous gas analyzer. [98.236(c)(12)(iv)]
- Whether a CEMS was used to measure CO_2 emissions for the flare stack. [98.236(c)(12)(xi)]
- If a CEMS was used to measure CO_2 emissions for the flare stack, report the combusted CO_2 and uncombusted CO_2 as a combined number in metric tons. **Note:** Report "0" if the flare is reported for another source type. [98.236(c)(12)(xi)]
- If a CEMS was not used to measure CO_2 emissions for the flare stack, report the uncombusted CO_2 emissions, in metric tons CO_2e (refer to Equation W-20 of 98.233). **Note:** Report "0" if the flare is reported for another source type. [98.236(c)(12)(vii)]
- If a CEMS was not used to measure CO_2 emissions for the flare stack, report the uncombusted CH_4 emissions, in metric tons CO_2e (refer to Equation W-19 of 98.233). **Note:** Report "0" if the flare is reported for another source type. [98.236(c)(12)(vi)]
- If a CEMS was not used to measure CO_2 emissions for the flare stack, report the combusted CO_2 emissions, in metric tons CO_2e (refer to Equation W-21 of 98.233). **Note:** Report "0" if the flare is reported for another source type. [98.236(c)(12)(viii)]
- If a CEMS was not used to measure CO_2 emissions for the flare stack, report the N_2O emissions, in metric tons CO_2e. **Note:** Report "0" if the flare is reported for another source type. [98.236(c)(12)(ix)]

Note: If flare emissions for a particular flare are reported for another source type, you must still report all required data elements, but report "0" for the emissions values.

Table 39
Unique Flare Stacks Details Data Element Definitions

Data Element Name	Description
UniqueFlareStacksDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any flare stacks subject to reporting under 98.232 in the reporting year.
UniqueFlareStacksRowDetails	**Parent Element:** A collection of data elements to report for each flare stack.
UniqueIdentifier	**Conditionally Required:** For the onshore petroleum and natural gas production industry segment only, a unique ID for the flare stack. Please number flare stacks sequentially.
FlareStackIdentifier	**Conditionally Required:** For the onshore natural gas processing industry segment only, a unique name or ID for the flare stack. [98.236(c)(12)(x)]

Data Element Name	Description
DoesFlareHaveContinuousFlowMonitor	Indicate (Yes/No) if the specified flare has a continuous flow monitor. [98.236(c)(12)(i)]
PercentOfGasSent	Percent of gas sent to un-lit flare. [98.236(c)(12)(iii)] Set the units of measure to "Number (between 0 and 100)" in the attribute **percentUOM**.
DoesFlareHaveContinuousGasAnalyzer	Indicate (Yes/No) if the specified flare has a continuous gas analyzer. [98.236(c)(12)(iv)]
WereCemsUsed	Indicate (Yes/No) if CEMS was used to measure CO_2 emissions for the specified flare stack. [98.236(c)(12)(xi)]
CombustedAndUncombustedCarbonDioxide	**Conditionally Required:** If CEMS was used, report the combusted and uncombusted CO_2 combined in metric tons from the specified flare stack. [98.236(c)(12)(xi)] **Note:** Report "0" if the flare emissions are reported on another source type. Set the units of measure to "Metric Tons" in the attribute **massUOM**.
UncombustedCarbonDioxideEmissions	**Conditionally Required:** If CEMS was **not** used, report the uncombusted CO_2 emissions in metric tons from the specified flare stack. [98.236(c)(12)(vii)] **Note:** Report "0" if the flare emissions are reported on another source type. Set the units of measure to "Metric Tons" in the attribute **massUOM**.
UncombustedMethaneCarbonDioxideEquivalent	**Conditionally Required:** If CEMS was **not** used, report the uncombusted CH_4 emissions in metric tons CO_2e from the specified flare stack. [98.236(c)(12)(vi)] **Note:** Report "0" if the flare emissions are reported on another source type. Set the units of measure to "Metric Tons" in the attribute **massUOM**.
CombustedCarbonDioxideEmissions	**Conditionally Required:** If CEMS was **not** used, report the combusted CO_2 emissions in metric tons from the specified flare stack. [98.236(c)(12)(viii)] **Note:** Report "0" if the flare emissions are reported on another source type.
NitrousCarbonDioxideEquivalent	**Conditionally Required:** If CEMS was **not** used, report the N_2O emissions in metric tons CO_2e from the specified flare stack. [98.236(c)(12)(ix)] **Note:** Report "0" if the flare emissions are reported on another source type. Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 38
Example for Unique Flare Stacks Details

```
      <ghg:UniqueFlareStacksDetails>
            <ghg:UniqueFlareStacksRowDetails>
                  <ghg:UniqueIdentifier>1</ghg:UniqueIdentifier>
                  <ghg:DoesFlareHaveContinuousFlowMonitor>Yes</ghg:DoesFlareHaveContinuousFlowMonitor>
                  <ghg:PercentOfGasSent percentUOM="Number (between 0 and 100)">55</ghg:PercentOfGasSent>
                  <ghg:DoesFlareHaveContinuousGasAnalyzer>Yes</ghg:DoesFlareHaveContinuousGasAnalyzer>
                  <ghg:WereCemsUsed>Yes</ghg:WereCemsUsed>
                  <ghg:CombustedAndUncombustedCarbonDioxide massUOM="Metric
Tons">79034.4</ghg:CombustedAndUncombustedCarbonDioxide>
            </ghg:UniqueFlareStacksRowDetails>
            <ghg:UniqueFlareStacksRowDetails>
                  <ghg:UniqueIdentifier>2</ghg:UniqueIdentifier>
                  <ghg:DoesFlareHaveContinuousFlowMonitor>No</ghg:DoesFlareHaveContinuousFlowMonitor>
                  <ghg:PercentOfGasSent percentUOM="Number (between 0 and 100)">65</ghg:PercentOfGasSent>
                  <ghg:DoesFlareHaveContinuousGasAnalyzer>No</ghg:DoesFlareHaveContinuousGasAnalyzer>
                  <ghg:WereCemsUsed>No</ghg:WereCemsUsed>
                  <ghg:UncombustedCarbonDioxideEmissions massUOM="Metric
Tons">22.8</ghg:UncombustedCarbonDioxideEmissions>
                  <ghg:UncombustedMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">8.8</ghg:UncombustedMethaneCarbonDioxideEquivalent>
                  <ghg:CombustedCarbonDioxideEmissions>79011.6</ghg:CombustedCarbonDioxideEmissions>
                  <ghg:NitrousCarbonDioxideEquivalent massUOM="Metric
Tons">0.3</ghg:NitrousCarbonDioxideEquivalent>
            </ghg:UniqueFlareStacksRowDetails>
      </ghg:UniqueFlareStacksDetails>
</ghg:FlareStacksDetails>
```

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

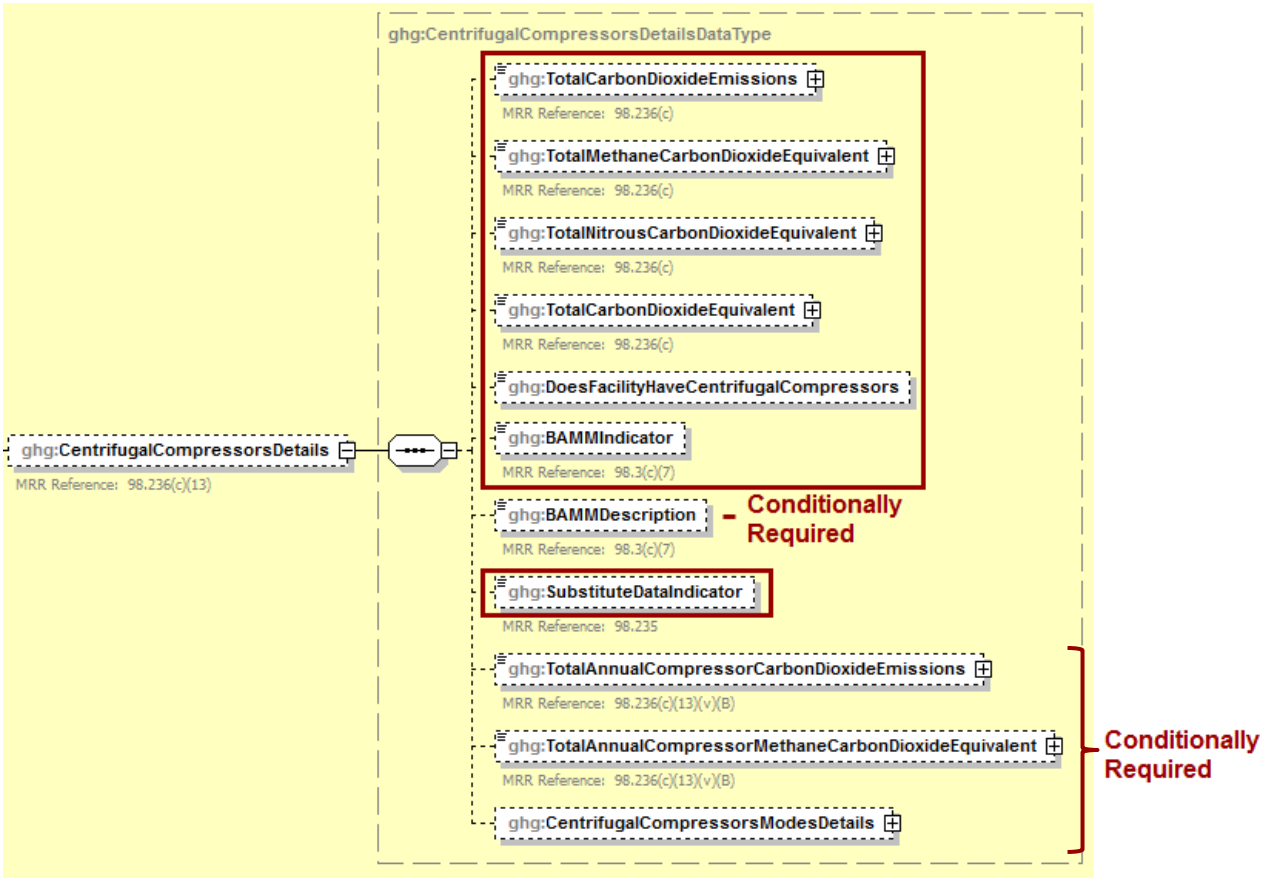
Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

16.0 Centrifugal Compressors

This topic provides a step-by-step description of how to report centrifugal compressor information for a facility. This section is applicable to and required for the following industry segments only:

- Onshore petroleum and natural gas production
- Onshore natural gas processing
- Onshore natural gas transmission compression
- Underground natural gas storage
- Liquefied natural gas (LNG) storage
- LNG import and export equipment

Figure 43
Centrifugal Compressors 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 centrifugal compressors, report the following:

- The CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for all centrifugal compressors combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e, total N_2O emissions in CO_2e and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any centrifugal compressors subject to reporting under 98.232 during the reporting year.
  - The value to report for "TotalCarbonDioxideEmissions" depends upon the industry segment:
    - For centrifugal compressors in the onshore petroleum and natural gas production industry segment only, the value to report for "TotalCarbonDioxideEmissions" equals the value reported for the data element "TotalAnnualCompressorCarbonDioxideEmissions".
    - For centrifugal compressors in all other industry segments, the value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for data element "TotalAnnualCarbonDioxideEmissions".
  - The value to report for "TotalMethaneCarbonDioxideEquivalent" depends upon the industry segment:
    - For centrifugal compressors in the onshore petroleum and natural gas production industry segment only, the value to report for "TotalMethaneCarbonDioxideEquivalent" equals the value reported for the data element "TotalAnnualCompressorMethaneCarbonDioxideEquivalent".
    - For centrifugal compressors in all other industry segments, the value to report for "TotalMethaneCarbonDioxideEquivalent" equals the sum of the values reported for data element "TotalAnnualMethaneCarbonDioxideEquivalent".
  - The value to report for "TotalNitrousCarbonDioxideEquivalent" depends upon the industry segment:
    - For centrifugal compressors in the onshore petroleum and natural gas production industry segment only, the value to report for "TotalNitrousCarbonDioxideEquivalent" equals the value reported for the data element "TotalAnnualCompressorNitrousCarbonDioxideEquivalent".
    - For centrifugal compressors in all other industry segments, the value to report for "TotalNitrousCarbonDioxideEquivalent" equals the sum of the values reported for data element "TotalAnnualNitrousCarbonDioxideEquivalent".
  - The value to report for "TotalCarbonDioxideEquivalent" equals the sum of the values reported for "TotalCarbonDioxideEmissions", "TotalMethaneCarbonDioxideEquivalent" and "TotalNitrousCarbonDioxideEquivalent".
- Whether the facility had any centrifugal compressors with wet or dry seals subject to reporting under 98.232 in the reporting year.
- Whether BAMM was used for any parameters to calculate GHG emissions. [98.3(c)(7)]

- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]
- For centrifugal compressors in the onshore petroleum and natural gas production industry segment only (refer to Equation W-25 of 98.233), report the following:
  - Total annual CO_2 emissions in metric tons for all centrifugal compressors collectively. [98.236(c)(13)(v)(B)]
  - Total annual CH_4 emissions in metric tons of CO_2e for all centrifugal compressors collectively. [98.236(c)(13)(v)(B)]

Note: Emissions must be reported for centrifugal compressors in operating mode *and* not operating, depressurized node, even if the compressor was not measured in that mode.

Table 40
Centrifugal Compressors Details Data Element Definitions

Data Element Name	Description
CentrifugalCompressorsDetails	**Parent Element:** A collection of data elements to report for centrifugal compressors. [98.236(c)(13)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions from all centrifugal compressors combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any centrifugal compressors subject to reporting under 98.232 during the reporting year.
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions from all centrifugal compressors combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any centrifugal compressors subject to reporting under 98.232 during the reporting year.
TotalNitrousCarbonDioxideEquivalent	Annual N_2O emissions from all centrifugal compressors combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any centrifugal compressors subject to reporting under 98.232 during the reporting year.

Data Element Name	Description
TotalCarbonDioxideEquivalent	Total combined CO_2, CH_4 and N_2O emissions from all centrifugal compressors combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any centrifugal compressors subject to reporting under 98.232 during the reporting year.
DoesFacilityHaveCentrifugalCompressors	Indicate (Yes/No) if the facility had any centrifugal compressors with wet or dry seals subject to reporting under 98.232 in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]
TotalAnnualCompressorCarbonDioxideEmissions	**Conditionally Required:** For the onshore petroleum and natural gas production industry segment only, the total annual compressor CO_2 emissions in metric tons for all compressors combined. [98.236(c)(13)(v)(B)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalAnnualCompressorMethaneCarbonDioxideEquivalent	**Conditionally Required:** For the onshore petroleum and natural gas production industry segment only, the total annual compressor CH_4 emissions in metric tons CO_2e for all compressors combined. [98.236(c)(13)(v)(B)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 39
Example for Centrifugal Compressors Details

```
<ghg:CentrifugalCompressorsDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">1.9</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric Tons">9.8</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalNitrousCarbonDioxideEquivalent massUOM="Metric Tons">1.5</ghg:TotalNitrousCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">13.2</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DoesFacilityHaveCentrifugalCompressors>Yes</ghg:DoesFacilityHaveCentrifugalCompressors>
      <ghg:BAMMIndicator>No</ghg:BAMMIndicator>
      <ghg:SubstituteDataIndicator>No</ghg:SubstituteDataIndicator>
      <ghg:CentrigfugalCompressorsModesDetails>
                  <See example for Centrifugal Compressors Modes Details>
      </ghg:CentrifugalCompressorsModesDetails>
</ghg:CentrifugalCompressorsDetails>
```

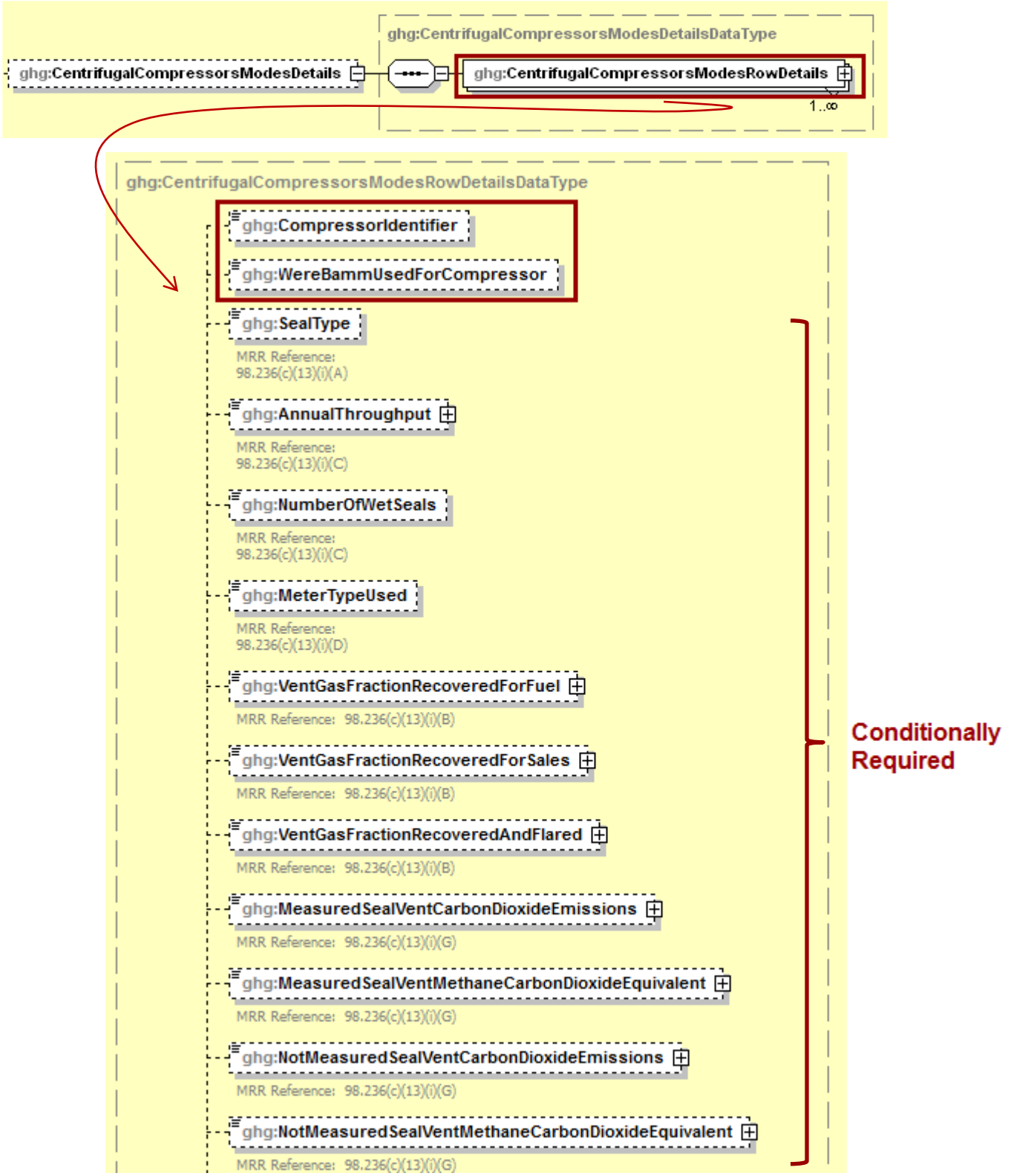
Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data for applicable industry segments other than the onshore petroleum and natural gas production industry segment.

XML Excerpt 40
Example for Centrifugal Compressors Details for Onshore Petroleum and Natural Gas Production

```
<ghg:CentrifugalCompressorsDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">65.5</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">8644.7</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalNitrousCarbonDioxideEquivalent massUOM="Metric Tons">4.7</ghg:TotalNitrousCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">8710.2</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DoesFacilityHaveCentrifugalCompressors>Yes</ghg:DoesFacilityHaveCentrifugalCompressors>
      <ghg:BAMMIndicator>No</ghg:BAMMIndicator>
      <ghg:SubstituteDataIndicator>No</ghg:SubstituteDataIndicator>
      <ghg:TotalAnnualCompressorCarbonDioxideEmissions massUOM="Metric
Tons">65.5</ghg:TotalAnnualCompressorCarbonDioxideEmissions>
      <ghg:TotalAnnualCompressorMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">8644.7</ghg:TotalAnnualCompressorMethaneCarbonDioxideEquivalent>
</ghg:CentrifugalCompressorsDetails>
```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data for the onshore petroleum and natural gas production industry segment only.

Figure 44
Centrifugal Compressors Modes Details (Part 1 of 3) 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 the onshore natural gas processing, onshore natural gas transmission compression, underground natural gas storage, liquefied natural gas (LNG) storage and LNG import and export equipment industry segments only, if the facility had any centrifugal compressors subject to reporting under 98.232 during the reporting year, then report the following for each centrifugal compressor:

- The unique identity of the compressor.
- Whether BAMM was used to estimate emissions from the compressor.
- The compressor's seal type (wet or dry). [98.236(c)(13)(i)(A)]
- For centrifugal compressors in operating mode *with wet seals only* (refer to Equations W-22 through W-24 of 98.233), report the following:
    - The annual throughput using an engineering calculation based on best available data in MMscf. [98.236(c)(13)(i)(C)]
    - Number of wet seals connected to the degassing vent. [98.236(c)(13)(i)(A)]
    - Type of meters used for making measurements. [98.236(c)(13)(i)(D)]
    - Fraction of vent gas recovered for fuel. [98.236(c)(13)(i)(B)]
    - Fraction of vent gas recovered for sales. [98.236(c)(13)(i)(B)]
    - Fraction of vent gas recovered and flared. 98.236(c)(13)(i)(B)]
    - Seal Vent emissions, report the following:

      Note 1: Report either measured seal vent CO_2 and CH_4 emissions **or** not measured seal vent CO_2 and CH_4 emissions, but not both pairs of data or one GHG from each pair.

      Note 2: If a centrifugal compressor was measured and had no emissions for a particular GHG while in operating mode during the reporting year, then report "0" for that GHG's measured seal vent emissions.

      Note 3: If a centrifugal compressor was never in the operating mode during the reporting year, then report "0" for not measured seal vent CO_2 and CH_4 emissions.

        - Measured seal vent CO_2 emissions in metric tons (refer to Equation W-22 through W-24 of 98.233). [98.236(c)(13)(i)(G)]
        - Measured seal vent CH_4 emissions in metric tons of CO_2e (refer to Equation W-22 through W-24 of 98.233). [98.236(c)(13)(i)(G)]

        OR

        - Not measured seal vent CO_2 emissions in metric tons (refer to Equation W-22 through W-24 of 98.233). [98.236(c)(13)(i)(G)]
        - Not measured seal vent CH_4 emissions in metric tons of CO_2e (refer to Equation W-22 through W-24 of 98.233). [98.236(c)(13)(i)(G)]

Figure 45
Centrifugal Compressors Modes Details (Part 2 of 3) Schema Diagram

Note: Please see page 4 of this document for more information on conditionally required elements.

- For centrifugal compressors in operating mode with wet or dry seals, report the following:

  Note 1: Report either measured blowdown vent CO_2 and CH_4 emissions **or** not measured blowdown vent CO_2 and CH_4 emissions, but not both pairs of data or one GHG from each pair.

  Note 2: If a centrifugal compressor was measured and had no emissions for a particular GHG while in operating mode during the reporting year, then report "0" for that GHG's measured seal vent emissions.

  Note 3: If a centrifugal compressor was never in the operating mode during the reporting year, then report "0" for not measured seal vent CO_2 and CH_4 emissions.

  - Measured blowdown vent CO_2 emissions in metric tons (refer to Equation W-22 through W-24 of 98.233). [98.236(c)(13)(ii)(C)]
  - Measured blowdown vent CH_4 emissions in metric tons of CO_2e (refer to Equation W-22 through W-24 of 98.233). [98.236(c)(13)(ii)(C)]

  OR

  - Not measured blowdown vent CO_2 emissions in metric tons (refer to Equation W-22 through W-24 of 98.233). [98.236(c)(13)(ii)(C)]

- Not measured blowdown vent CH_4 emissions in metric tons of CO_2e (refer to Equation W-22 through W-24 of 98.233). [98.236(c)(13)(ii)(C)]

- For centrifugal compressors in not operating, depressurized mode with wet or dry seals (refer to Equations W-22 through W-24 of 98.233), report the following:

  Note 1: Report either measured isolation valve leakage CO_2 and CH_4 emissions **or** not measured blowdown vent CO_2 and CH_4 emissions, but not both pairs of data or one GHG from each pair.

  Note 2: If a centrifugal compressor was measured and had no emissions for a particular GHG while in not operating, depressurized mode during the reporting year, then report "0" for that GHG's measured isolation valve leakage emissions.

  Note 3: If a centrifugal compressor was never in the not operating, depressurized mode during the reporting year, then report "0" for not measured isolation valve leakage CO_2 and CH_4 emissions.

  - Measured isolation valve leakage CO_2 emissions in metric tons (refer to Equation W-22 through W-24 of 98.233). [98.236(c)(13)(iii)(C)]
  - Measured isolation valve leakage CH_4 emissions in metric tons CO_2e (refer to Equation W-22 through W-24 of 98.233). [98.236(c)(13)(iii)(C)]

  OR

  - Not measured isolation valve leakage CO_2 emissions in metric tons (refer to Equation W-22 through W-24 of 98.233). [98.236(c)(13)(iii)(C)]
  - Not measured isolation valve leakage CH_4 emissions in metric tons CO_2e (refer to Equation W-22 through W-24 of 98.233). [98.236(c)(13)(iii)(C)]

Figure 46
Centrifugal Compressors Modes Details (Part 3 of 3) 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 all centrifugal compressors, report if the compressor vented emissions to a flare.
- For centrifugal compressors which vented emissions to a flare, report the following:
  - Total annual CO_2 emissions from flaring for all modes of operation combined in metric tons. [98.236(c)]
  - Total annual CH_4 emissions from flaring for all modes of operation combined in metric tons CO_2e. [98.236(c)]
  - Total annual N_2O emissions from flaring for all modes of operation combined in metric tons CO_2e. [98.236(c)]
- For centrifugal compressors in all operating modes, report the total annual CO_2 emissions from all modes of operation combined in metric tons (refer to Equation W-22 through W-24 of 98.233). [98.236(c)(13)(iv)] The value to report for "TotalAnnualCarbonDioxideEmissions" equals the sum of the values reported for the following data elements:
  - "MeasuredSealVentCarbonDioxideEmissions" for each centrifugal compressor.
  - "NotMeasuredSealVentCarbonDioxideEmissions" for each centrifugal compressor.

- "MeasuredBlowdownVentCarbonDioxideEmissions" for each centrifugal compressor.
- "NotMeasuredBlowdownVentCarbonDioxideEmissions" for each centrifugal compressor.
- "MeasuredIsolationValveCarbonDioxideEmissions" for each centrifugal compressor.
- "NotMeasuredIsolationValveCarbonDioxideEmissions" for each centrifugal compressor.
- "FlaringCarbonDioxideEmissions" for each centrifugal compressor.

- For centrifugal compressors in all operating modes, report total annual CH_4 emissions from all modes of operation combined in metric tons of CO_2e (refer to Equation W-22 through W-24 of 98.233). [98.236(c)(13)(iv)] The value to report for "TotalAnnualMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:
  - "MeasuredSealVentMethaneCarbonDioxideEquivalent" for each centrifugal compressor.
  - "NotMeasuredSealVentMethaneCarbonDioxideEquivalent" for each centrifugal compressor.
  - "MeasuredBlowdownVentMethaneCarbonDioxideEquivalent" for each centrifugal compressor.
  - "NotMeasuredBlowdownVentMethaneCarbonDioxideEquivalent" for each centrifugal compressor.
  - "MeasuredIsolationValveMethaneCarbonDioxideEquivalent" for each centrifugal compressor.
  - "NotMeasuredIsolationValveMethaneCarbonDioxideEquivalent" for each centrifugal compressor.
  - "FlaringMethaneCarbonDioxideEquivalent" for each centrifugal compressor.
- For centrifugal compressors in all operating modes, report total annual N_2O emissions from all modes of operation combined in metric tons of CO_2e. [98.236(c)] The value to report for "TotalAnnualNitrousCarbonDioxideEquivalent" equals the sum of the values reported for the data element "FlaringNitrousCarbonDioxideEquivalent".

Note: If a compressor had no emissions in all operating modes, report "0".

Table 41
Centrifugal Compressors Modes Details Data Element Definitions

Data Element Name	Description
CentrifugalCompressorsModesDetails	**Parent Element (Conditionally Required):** For all applicable industry segments except the onshore petroleum and natural gas production industry segment, a collection of data elements to report if there were any centrifugal compressors subject to reporting under 98.232 in the reporting year.
CentrifugalCompressorsModesRowDetails	**Parent Element:** A collection of data elements to report for each centrifugal compressor.
CompressorIdentifier	Unique name or ID number for the centrifugal compressor.
WereBammUsedForCompressor	Indicate (Yes/No) if BAMM were used to calculate GHG emissions for the specified centrifugal compressor.
SealType	The seal type of the specified compressor. See list of allowable values. Wet Dry
AnnualThroughput	**Conditionally Required:** For centrifugal compressors in operating mode with wet seals, the annual throughput using an engineering calculation based on best available data in million SCF. [98.236(c)(13)(i)(C)] Set the units of measure to "MMscf" in the attribute **volUOM**
NumberOfWetSeals	**Conditionally Required:** For centrifugal compressors in operating mode with wet seals, the number of wet seals connected to the degassing vent. [98.236(c)(13)(i)(A)]
MeterTypeUsed	**Conditionally Required:** For centrifugal compressors in operating mode with wet seals, the type of meter used for making measurements. [98.236(c)(13)(i)(D)] See list of allowable values. Temporary Continuous BAMM

Data Element Name	Description
VentGasFractionRecoveredForFuel	**Conditionally Required:** For centrifugal compressors in operating mode with wet seals, the fraction of vent gas recovered for fuel. [98.236(c)(13)(i)(B)] Set the units of measure to "decimal fraction" (a number between 0 and 1) in the attribute **fractionUOM**.
VentGasFractionRecoveredForSales	**Conditionally Required:** For centrifugal compressors in operating mode with wet seals, the fraction of vent gas recovered for sales. [98.236(c)(13)(i)(B)] Set the units of measure to "decimal fraction" (a number between 0 and 1) in the attribute **fractionUOM**.
VentGasFractionRecoveredAndFlared	**Conditionally Required:** For centrifugal compressors in operating mode with wet seals, the fraction of vent gas recovered and flared. [98.236(c)(13)(i)(B)] Set the units of measure to "decimal fraction" (a number between 0 and 1) in the attribute **fractionUOM**.
MeasuredSealVentCarbonDioxideEmissions	**Conditionally Required:** For centrifugal compressors in operating mode with wet seals, the measured seal vent CO_2 emissions for the specified compressor in metric tons. [98.236(c)(13)(i)(G)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both seal vent CO_2 emissions and seal vent CH_4 emissions as both measured or both not measured.
MeasuredSealVentMethaneCarbonDioxideEquivalent	**Conditionally Required:** For centrifugal compressors in operating mode with wet seals, the measured seal vent CH_4 emissions for the specified compressor in metric tons CO_2e. [98.236(c)(13)(i)(G)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both seal vent CO_2 emissions and seal vent CH_4 emissions as both measured or both not measured.

Data Element Name	Description
NotMeasuredSealVentCarbonDioxideEmissions	**Conditionally Required:** For centrifugal compressors in operating mode with wet seals, the not measured seal vent CO_2 emissions for the specified compressor in metric tons. [98.236(c)(13)(i)(G)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both seal vent CO_2 emissions and seal vent CH_4 emissions as both measured or both not measured.
NotMeasuredSealVentMethaneCarbonDioxideEquivalent	**Conditionally Required:** For centrifugal compressors in operating mode with wet seals, the not measured seal vent CH_4 emissions for the specified compressor in metric tons CO_2e. [98.236(c)(13)(i)(G)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both seal vent CO_2 emissions and seal vent CH_4 emissions as both measured or both not measured.
MeasuredBlowdownVentCarbonDioxideEmissions	**Conditionally Required:** For centrifugal compressors in operating mode with wet or dry seals, the measured blowdown vent CO_2 emissions in metric tons for the specified compressor. [98.236(c)(13)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both blowdown vent CO_2 emissions and blowdown vent CH_4 emissions as both measured or both not measured.
MeasuredBlowdownVentMethaneCarbonDioxideEquivalent	**Conditionally Required:** For centrifugal compressors in operating mode with wet or dry seals, the measured blowdown vent CH_4 emissions metric tons CO_2e. [98.236(c)(13)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both blowdown vent CO_2 emissions and blowdown vent CH_4 emissions as both measured or both not measured.

Data Element Name	Description
NotMeasuredBlowdownVentCarbonDioxideEmissions	**Conditionally Required:** For centrifugal compressors in operating mode with wet or dry seals, the not measured blowdown vent CO_2 emissions in metric tons for the specified compressor. [98.236(c)(13)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both blowdown vent CO_2 emissions and blowdown vent CH_4 emissions as both measured or both not measured.
NotMeasuredBlowdownVentMethaneCarbonDioxideEquivalent	**Conditionally Required:** For centrifugal compressors in operating mode with wet or dry seals, the not measured blowdown vent CH_4 emissions metric tons CO_2e. [98.236(c)(13)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both blowdown vent CO_2 emissions and blowdown vent CH_4 emissions as both measured or both not measured.
MeasuredIsolationValveCarbonDioxideEmissions	**Conditionally Required:** For centrifugal compressors in not operating, depressurized mode with wet or dry seals, the measured isolation valve leakage CO_2 emissions in metric tons. [98.236(c)(13)(iii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both isolation valve CO_2 emissions and isolation valve CH_4 emissions as both measured or both not measured.
MeasuredIsolationValveMethaneCarbonDioxideEquivalent	**Conditionally Required:** For centrifugal compressors in not operating, depressurized mode with wet or dry seals, the measured isolation valve leakage CH_4 emissions in metric tons CO_2e. [98.236(c)(13)(iii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both isolation valve CO_2 emissions and isolation valve CH_4 emissions as both measured or both not measured.

Data Element Name	Description
NotMeasuredIsolationValveCarbonDioxideEmissions	**Conditionally Required:** For centrifugal compressors in not operating, depressurized mode with wet or dry seals, the not measured isolation valve leakage CO_2 emissions in metric tons. [98.236(c)(13)(iii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both isolation valve CO_2 emissions and isolation valve CH_4 emissions as both measured or both not measured.
NotMeasuredIsolationValveMethaneCarbonDioxideEquivalent	**Conditionally Required:** For centrifugal compressors in not operating, depressurized mode with wet or dry seals, the not measured isolation valve leakage CH_4 emissions in metric tons CO_2e. [98.236(c)(13)(iii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both isolation valve CO_2 emissions and isolation valve CH_4 emissions as both measured or both not measured.
DidCompressorVentEmissionsToFlare	Indicate (Yes/No) if the compressor vented emissions to a flare in the reporting year.
TotalAnnualFlaringCarbonDioxideEmissions	**Conditionally Required:** If the compressor vented emissions to flares, the total annual CO_2 emissions from flaring for all modes of operation combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM.**
TotalAnnualFlaringMethaneCarbonDioxideEquivalent	**Conditionally Required:** If the compressor vented emissions to flares, the total annual CH_4 emissions from flaring for all modes of operation combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM.**
TotalAnnualFlaringNitrousCarbonDioxideEquivalent	**Conditionally Required:** If the compressor vented emissions to flares, the total annual N_2O emissions from flaring for all modes of operation combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM.**

Data Element Name	Description
TotalAnnualCarbonDioxideEmissions	For centrifugal compressors in all operating modes, the total annual CO_2 emissions from all modes of operation combined in metric tons. [98.236(c)(13)(iv)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalAnnualMethaneCarbonDioxideEquivalent	For centrifugal compressors in all operating modes, the total annual CH_4 emissions from all modes of operation combined in metric tons CO_2e. [98.236(c)(13)(iv)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalAnnualNitrousCarbonDioxideEquivalent	For centrifugal compressors in all operating modes, the total annual N_2O emissions from all modes of operation combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 41
Example for a Centrifugal Compressor With Wet Seals in Operating Mode

```
<ghg:CentrifugalCompressorsModesDetails>
      <ghg:CentrifugalCompressorsModesRowDetails>
            <ghg:CompressorIdentifier>1</ghg:CompressorIdentifier>
            <ghg:WereBAMMUsedForCompressor>No</ghg:WereBAMMUsedForCompressor>
            <ghg:AnnualThroughput volUOM="MMscf">1493215.0</ghg:AnnualThroughput>
            <ghg:SealType>Wet</ghg:SealType>
            <ghg:NumberOfWetSeals>5</ghg:NumberOfWetSeals>
            <ghg:MeterTypeUsed>Temporary</ghg:MeterTypeUsed>
            <ghg:VentGasFractionRecoveredForFuel fractionUOM="fraction (number between 0 and
1)">0.3</ghg:VentGasFractionRecoveredForFuel>
            <ghg:VentGasFractionRecoveredForSales fractionUOM="fraction (number between 0 and
1)">0.4</ghg:VentGasFractionRecoveredForSales>
            <ghg:VentGasFractionRecoveredAndFlared fractionUOM="fraction (number between 0 and
1)">0.5</ghg:VentGasFractionRecoveredAndFlared>
            <ghg:MeasuredSealVentCarbonDioxideEmissions massUOM="Metric
Tons">1.6</ghg:MeasuredSealVentCarbonDioxideEmissions>
            <ghg:MeasuredSealVentMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">1111.3</ghg:MeasuredSealVentMethaneCarbonDioxideEquivalent>
            <ghg:MeasuredBlowdownVentCarbonDioxideEmissions massUOM="Metric
Tons">0.0</ghg:MeasuredBlowdownVentCarbonDioxideEmissions>
            <ghg:MeasuredBlowdownVentMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">46.6</ghg:MeasuredBlowdownVentMethaneCarbonDioxideEquivalent>
            <ghg:MeasuredIsolationValveCarbonDioxideEmissions massUOM="Metric
Tons">0.1</ghg:MeasuredIsolationValveCarbonDioxideEmissions>
            <ghg:MeasuredIsolationValveMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">115.5</ghg:MeasuredIsolationValveMethaneCarbonDioxideEquivalent>
            <ghg:TotalAnnualCarbonDioxideEmissions massUOM="Metric
Tons">1.7</ghg:TotalAnnualCarbonDioxideEmissions>
            <ghg:TotalAnnualMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">1273.4</ghg:TotalAnnualMethaneCarbonDioxideEquivalent>
</ghg:CentrifugalCompressorsModesRowDetails>
```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data. This example shows how to report a centrifugal compressor that has wet seals in operating mode.

XML Excerpt 42
Example for a Centrifugal Compressors with Dry Seals in Operating Mode

```
<ghg:CentrifugalCompressorsModesRowDetails>
      <ghg:CompressorIdentifier>2</ghg:CompressorIdentifier>
      <ghg:WereBammUsedForCompressor>No</ghg:WereBammUsedForCompressor>
      <ghg:AnnualThroughput volUOM="MMscf">1493208.3</ghg:AnnualThroughput>
      <ghg:SealType>Dry</ghg:SealType>
      <ghg:NotMeasuredBlowdownVentCarbonDioxideEmissions massUOM="Metric
Tons">0.0</ghg:NotMeasuredBlowdownVentCarbonDioxideEmissions>
      <ghg:NotMeasuredBlowdownVentMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">46.6</ghg:NotMeasuredBlowdownVentMethaneCarbonDioxideEquivalent>
      <ghg:NotMeasuredIsolationValveCarbonDioxideEmissions massUOM="Metric
Tons">0.1</ghg:NotMeasuredIsolationValveCarbonDioxideEmissions>
      <ghg:NotMeasuredIsolationValveMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">115.5</ghg:NotMeasuredIsolationValveMethaneCarbonDioxideEquivalent>
      <ghg:TotalAnnualCarbonDioxideEmissions massUOM="Metric Tons">0.1</ghg:TotalAnnualCarbonDioxideEmissions>
      <ghg:TotalAnnualMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">162.1</ghg:TotalAnnualMethaneCarbonDioxideEquivalent>
</ghg:CentrifugalCompressorsModesRowDetails>
```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data. This example shows how to report a centrifugal compressor that has dry seals in operating mode.

XML Excerpt 43
Example for a Centrifugal Compressor which did not Operate in the Reporting Year

```
<ghg:CentrifugalCompressorsModesRowDetails>
      <ghg:CompressorIdentifier>3</ghg:CompressorIdentifier>
      <ghg:WereBammUsedForCompressor>No</ghg:WereBammUsedForCompressor>
      <ghg:MeasuredIsolationValveCarbonDioxideEmissions massUOM="Metric
Tons">0.1</ghg:MeasuredIsolationValveCarbonDioxideEmissions>
      <ghg:MeasuredIsolationValveMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">115.5</ghg:MeasuredIsolationValveMethaneCarbonDioxideEquivalent>
      <ghg:DidCompressorVentEmissionsToFlare>No</ghg:DidCompressorVentEmissionsToFlare>
      <ghg:TotalAnnualCarbonDioxideEmissions massUOM="Metric Tons">0.1</ghg:TotalAnnualCarbonDioxideEmissions>
      <ghg:TotalAnnualMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">115.5</ghg:TotalAnnualMethaneCarbonDioxideEquivalent>
      <ghg:TotalAnnualNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">115.5</ghg:TotalAnnualNitrousCarbonDioxideEquivalent>
</ghg:CentrifugalCompressorsModesRowDetails>
```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data. This example shows how to report a centrifugal compressor that did not operate in the reporting year.

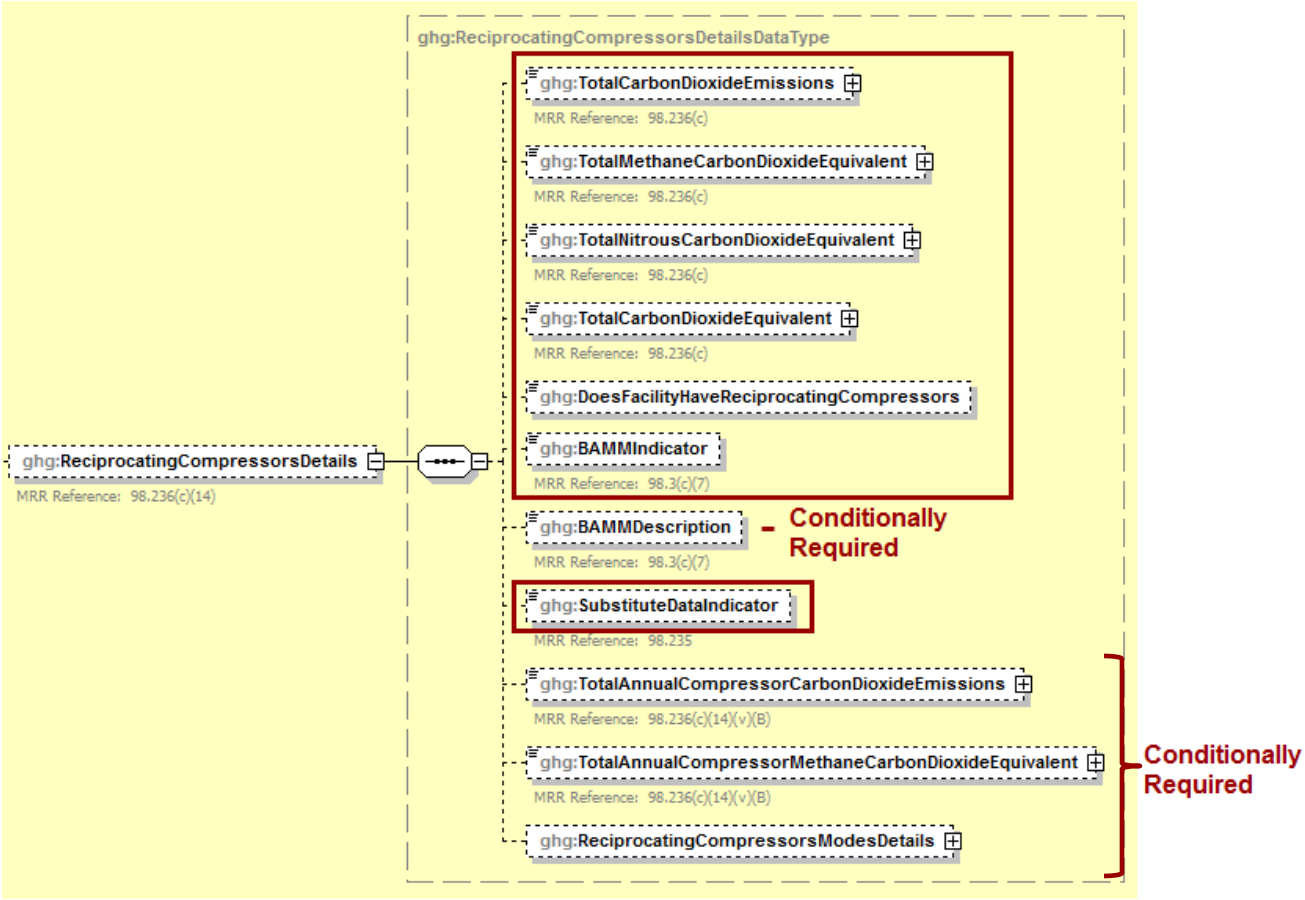
Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

17.0 Reciprocating Compressors

This topic provides a step-by-step description of how to report reciprocating compressor information for a facility. This section is applicable to and required for the following industry segments only:

- Onshore petroleum and natural gas production
- Onshore natural gas processing
- Onshore natural gas transmission compression
- Underground natural gas storage
- Liquefied natural gas (LNG) storage
- LNG import and export equipment d – t

Figure 47
Reciprocating Compressors 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 reciprocating compressors, report the following:

- The CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for all reciprocating compressors combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e, total N_2O emissions in CO_2e and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any reciprocating compressors subject to reporting under 98.232 during the reporting year.
  - The value to report for "TotalCarbonDioxideEmissions" depends upon the industry segment:
    - For reciprocating compressors in the onshore petroleum and natural gas production industry segment only, the value to report for "TotalCarbonDioxideEmissions" equals the value reported for the data element "TotalAnnualCompressorCarbonDioxideEmissions".
    - For reciprocating compressors in all other industry segments, the value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for data element "TotalAnnualCarbonDioxideEmissions".
  - The value to report for "TotalMethaneCarbonDioxideEquivalent" depends upon the industry segment:
    - For reciprocating compressors in the onshore petroleum and natural gas production industry segment only, the value to report for "TotalMethaneCarbonDioxideEquivalent" equals the value reported for the data element "TotalAnnualCompressorMethaneCarbonDioxideEquivalent".
    - For reciprocating compressors in all other industry segments, the value to report for "TotalMethaneCarbonDioxideEquivalent" equals the sum of the values reported for data element "TotalAnnualMethaneCarbonDioxideEquivalent".
  - The value to report for "TotalNitrousCarbonDioxideEquivalent" depends upon the industry segment:
    - For reciprocating compressors in the onshore petroleum and natural gas production industry segment only, the value to report for "TotalNitrousCarbonDioxideEquivalent" equals the value reported for the data element "TotalAnnualCompressorNitrousCarbonDioxideEquivalent".
    - For reciprocating compressors in all other industry segments, the value to report for "TotalNitrousCarbonDioxideEquivalent" equals the sum of the values reported for data element "TotalAnnualNitrousCarbonDioxideEquivalent".
  - The value to report for "TotalCarbonDioxideEquivalent" equals the sum of the values reported for "TotalCarbonDioxideEmissions", "TotalMethaneCarbonDioxideEquivalent" and "TotalNitrousCarbonDioxideEquivalent".
- Whether the facility had any reciprocating compressors subject to reporting under 98.232 in the reporting year.
- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]

- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]
- For all reciprocating compressors in the onshore petroleum and natural gas production industry segment only (refer to Equation W-25 of 98.233), report the following:
  - Total annual CO_2 emissions for all reciprocating compressors from all modes of operation combined in metric tons. [98.236(c)(14)(v)(B)]
  - Total annual CH_4 emissions for all reciprocating compressors from all modes of operation combined in metric tons CO_2e. [98.236(c)(14)(v)(B)]
  - Total annual N_2O emissions for all reciprocating compressors from all modes of operation combined in metric tons CO_2e. [98.236(c)]

Table 42
Reciprocating Compressors Details Data Element Definitions

Data Element Name	Description
ReciprocatingCompressorsDetails	**Parent Element:** A collection of data elements to report for reciprocating compressors. [98.236(c)(13)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions from all reciprocating compressors combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any reciprocating compressors subject to reporting under 98.232 during the reporting year.
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions from all reciprocating compressors combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any reciprocating compressors subject to reporting under 98.232 during the reporting year.
TotalNitrousCarbonDioxideEquivalent	Annual N_2O emissions from all reciprocating compressors combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any reciprocating compressors subject to reporting under 98.232 during the reporting year.

Data Element Name	Description
TotalCarbonDioxideEquivalent	Total combined CO_2 and CH_4 emissions from all reciprocating compressors combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any reciprocating compressors subject to reporting under 98.232 during the reporting year.
DoesFacilityHaveReciprocatingCompressors	Indicate (Yes/No) if the facility had any reciprocating compressors subject to reporting under 98.232 in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]
TotalAnnualCompressorCarbonDioxideEmissions	**Conditionally Required:** For the onshore petroleum and natural gas production industry segment only, the total annual compressor CO_2 emissions in metric tons for all compressors combined. [98.236(c)(14)(v)(B)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalAnnualCompressorMethaneCarbonDioxideEquivalent	**Conditionally Required:** For the onshore petroleum and natural gas production industry segment only, the total annual compressor CH_4 emissions in metric tons CO_2e for all compressors combined. [98.236(c)(14)(v)(B)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalAnnualCompressorNitrousCarbonDioxideEquivalent	**Conditionally Required:** For the onshore petroleum and natural gas production industry segment only, the total annual compressor N_2O emissions in metric tons CO_2e for all compressors combined. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 44
Example for Reciprocating Compressors Details

```
<ghg:ReciprocatingCompressorsDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">2.2</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">1455.2</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalNitrousCarbonDioxideEquivalent massUOM="Metric Tons">15.1</ghg:TotalNitrousCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">11472.5</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DoesFacilityHaveReciprocatingCompressors>Yes</ghg:DoesFacilityHaveCentrifugalCompressors>
      <ghg:BAMMIndicator>No</ghg:BAMMIndicator>
      <ghg:SubstituteDataIndicator>No</ghg:SubstituteDataIndicator>
      <ghg:ReciprocatingCompressorsModesDetails>
                  <See example for Reciprocating Compressors Modes Details>
      </ghg:ReciprocatingCompressorsModesDetails>
 </ghg:ReciprocatingCompressorsDetails>
```

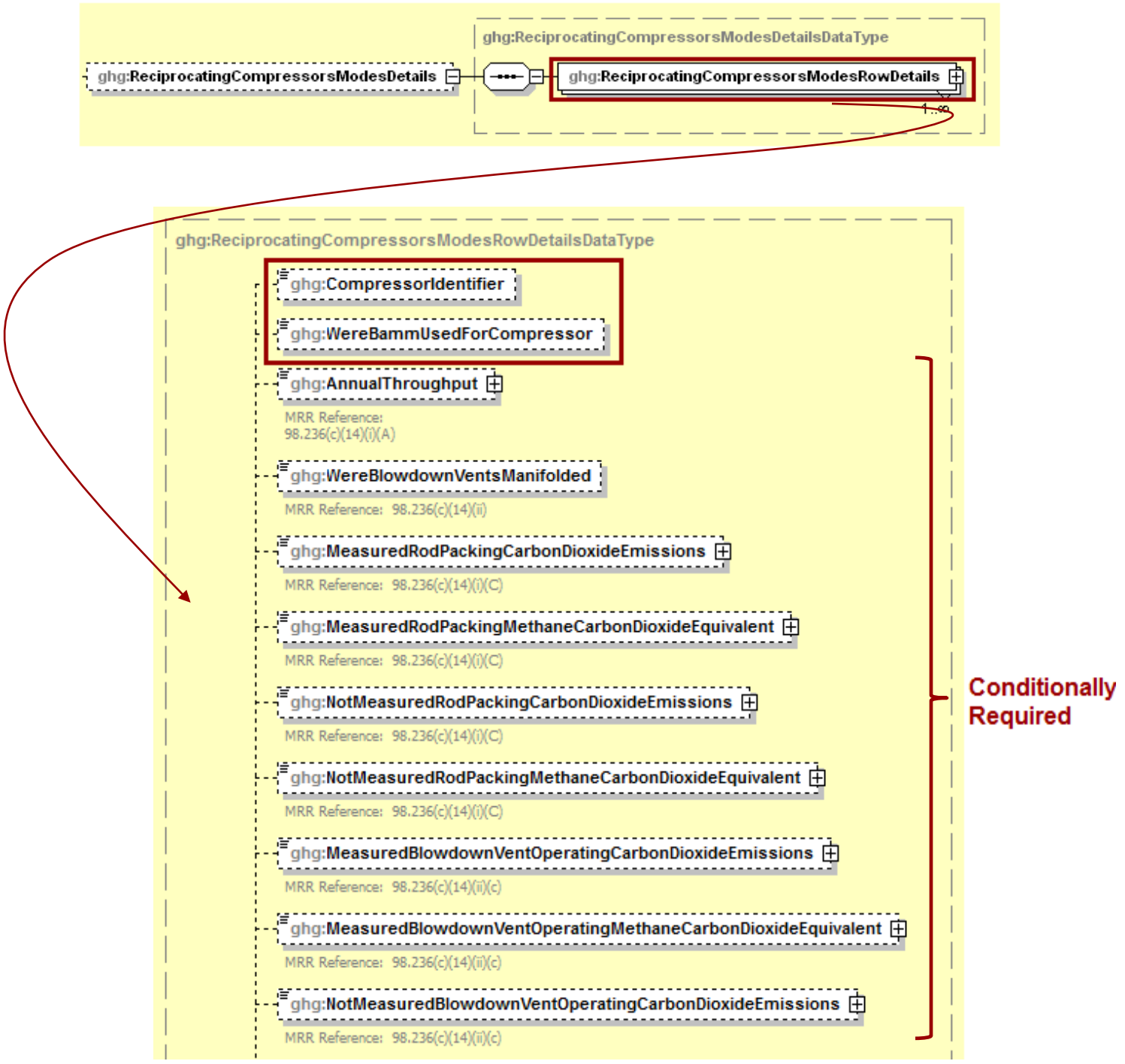
Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data for applicable industry segments other than the onshore petroleum and natural gas production industry segment.

XML Excerpt 45
Example for Reciprocating Compressors Details for Onshore Petroleum and Natural Gas Production

```
<ghg:ReciprocatingCompressorsDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">55.5</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">7644.7</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalNitrousCarbonDioxideEquivalent massUOM="Metric Tons">15.1</ghg:TotalNitrousCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">7715.1</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DoesFacilityHaveReciprocatingCompressors>Yes</ghg:DoesFacilityHaveCentrifugalCompressors>
      <ghg:BAMMIndicator>No</ghg:BAMMIndicator>
      <ghg:SubstituteDataIndicator>No</ghg:SubstituteDataIndicator>
      <ghg:TotalAnnualCompressorCarbonDioxideEmissions massUOM="Metric
Tons">55.5</ghg:TotalAnnualCompressorCarbonDioxideEmissions>
      <ghg:TotalAnnualCompressorMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">7644.7</ghg:TotalAnnualCompressorMethaneCarbonDioxideEquivalent>
```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data for the onshore petroleum and natural gas production industry segment only.

Figure 48
Reciprocating Compressors Modes Details (Part 1 of 3) 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 reciprocating compressors in the onshore natural gas processing, onshore natural gas transmission compression, underground natural gas storage, liquefied natural gas (LNG) storage, LNG import and export equipment industry segments, if the facility had any reciprocating compressors subject to

reporting under 98.232 during the reporting year, then report the following for each reciprocating compressor:

- The unique identity of the compressor.
- Whether BAMM was used to estimate emissions from the compressor.
- For reciprocating compressors in operating mode, report the following:
    - Annual throughput using an engineering calculation based on best available data in MMscf. [98.236(c)(13)(i)(C)]
    - Whether the blowdown vents were manifolded to rod packing vents.
    - Rod packing emissions values:

      Note 1: Report either measured rod packing CO_2 and CH_4 emissions **or** not measured rod packing CO_2 and CH_4 emissions values, but not both pairs of data or one GHG from each pair.

      Note 2: If a reciprocating compressor was measured and had no emissions for a particular GHG while in operating mode during the reporting year, then report "0" for that GHG's measured rod packing emissions.

      Note 3: If a reciprocating compressor was never in the operating mode during the reporting year, then report "0" for not measured rod packing CO_2 and CH_4 emissions.

        - Measured rod packing CO_2 emissions in metric tons (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(i)(C)]
        - Measured rod packing CH_4 emissions in metric tons CO_2e (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(i)(C)]

      OR

        - Not measured rod packing CO_2 emissions in metric tons (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(i)(C)]
        - Not measured rod packing CH_4 emissions in metric tons CO_2e (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(i)(C)]
    - For reciprocating compressors with blowdown vents which were not manifolded to rod packing vents, when in operating mode, report the following:

      Note 1: Report either measured blowdown vent CO_2 and CH_4 emissions **or** not measured blowdown vent CO_2 and CH_4 emissions, but not both pairs of data, or one GHG from each pair.

      Note 2: If a reciprocating compressor was measured and had no emissions for a particular GHG while in operating mode during the reporting year, then report "0" for that GHG's measured blowdown vent emissions.

      Note 3: If a reciprocating compressor was never in the operating mode during the reporting year, then report "0" for not measured blowdown vent CO_2 and CH_4 emissions.

- Measured blowdown vent CO_2 emissions in metric tons (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(ii)(C)]
- Measured blowdown vent CH_4 emissions in metric tons CO_2e (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(ii)(C)]

OR

- Not measured blowdown vent CO_2 emissions in metric tons (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(ii)(C)]
- Not measured blowdown vent CH_4 emissions in metric tons CO_2e (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(ii)(C)]

Figure 49
Reciprocating Compressors Modes Details (Part 2 of 3) Schema Diagram

Note: Please see page 4 of this document for more information on conditionally required elements.

- For reciprocating compressors with blowdown vents which were not manifolded to rod packing vents, when in standby pressurized mode (refer to Equations W-26 through W-28), report the following:

Note 1: Report either measured blowdown vent CO_2 and CH_4 emissions **or** not measured blowdown vent CO_2 and CH_4 emissions, but not both pairs of data, or one GHG from each pair.

Note 2: If a reciprocating compressor was measured and had no emissions for a particular GHG while in standby pressurized mode during the reporting year, then report "0" for that GHG's measured blowdown vent emissions.

Note 3: If a reciprocating compressor was never in the standby pressurized mode during the reporting year, then report "0" for not measured blowdown vent CO2 and CH4 emissions.

- Measured blowdown vent CO_2 emissions in metric tons (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(ii)(C)]
- Measured blowdown vent CH_4 emissions in metric tons CO2e (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(ii)(C)]

OR

- Not measured blowdown vent CO_2 emissions in metric tons (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(ii)(C)]
- Not measured blowdown vent CH_4 emissions in metric tons CO2e (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(ii)(C)]

- For reciprocating compressors in not operating, depressurized mode (refer to Equations W-26 through W-28 of 98.233), report the following:

Note 1: Report either measured isolation valve leakage CO_2 and CH_4 emissions **or** not measured isolation valve leakage CO_2 and CH_4 emissions, but not both pairs of data, or one GHG from each pair.

Note 2: If a reciprocating compressor was measured and had no emissions for a particular GHG while in not operating, depressurized mode during the reporting year, then report "0" for that GHG's measured isolation valve leakage emissions.

Note 3: If a reciprocating compressor was never in the not operating, depressurized mode during the reporting year, then report "0" for not measured isolation valve leakage CO_2 and CH_4 emissions

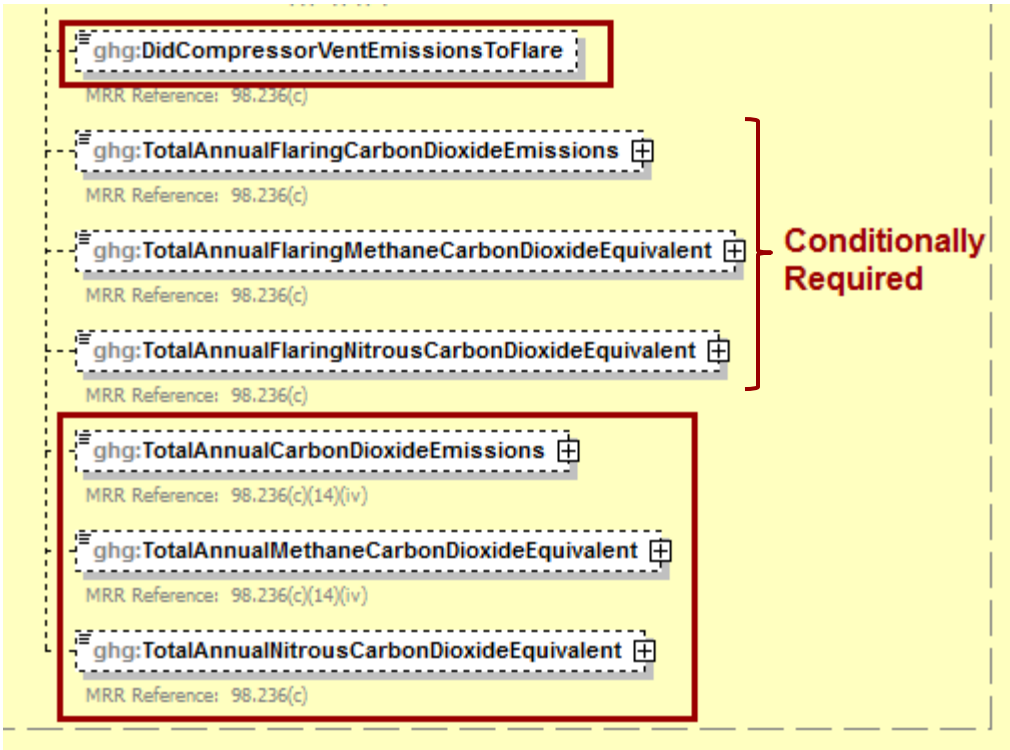
- Measured isolation valve leakage CO_2 emissions in not operating, depressurized mode in metric tons (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(iii)(C)]
- Measured isolation valve leakage CH_4 emissions in not operating, depressurized mode in metric tons CO_2e (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(iii)(C)]

OR

- Not measured isolation valve leakage CO_2 emissions in not operating, depressurized mode in metric tons (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(iii)(C)]

Not measured isolation valve leakage CH_4 emissions in not operating, depressurized mode in metric tons CO_2e (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(iii)(C)]

Figure 50
Reciprocating Compressors Modes Details (Part 3 of 3) Schema Diagram



Note: Boxed data elements are required for all compressors.

- For all reciprocating compressors, report if the compressor vented emissions to a flare.
- For reciprocating compressors which vented emissions to a flare, report the following:
  - Total annual CO_2 emissions from flaring for all modes of operation combined in metric tons. [98.236(c)]
  - Total annual CH_4 emissions from flaring for all modes of operation combined in metric tons CO_2e. [98.236(c)]
  - Total annual N_2O emissions from flaring for all modes of operation combined in metric tons CO_2e. [98.236(c)]
- For reciprocating compressors in all modes, report total annual CO_2 emissions from all modes of operation combined in metric tons (refer to Equation W-26 through W-28 of 98.233). [98.236(c)(14)(iv)] The value to report for "TotalAnnualCarbonDioxideEmissions" equals the sum of the values reported for the following data elements:
  - "MeasuredRodPackingCarbonDioxideEmissions" for each reciprocating compressor.
  - "NotMeasuredRodPackingCarbonDioxideEmissions" for each reciprocating compressor.

- "MeasuredBlowdownVentOperatingCarbonDioxideEmissions" for each reciprocating compressor.
- "NotMeasuredBlowdownVentOperatingCarbonDioxideEmissions" for each reciprocating compressor.
- "MeasuredBlowdownVentStandbyCarbonDioxideEmissions" for each reciprocating compressor.
- "NotMeasuredBlowdownVentStandbyCarbonDioxideEmissions" for each reciprocating compressor.
- "MeasuredIsolationValveCarbonDioxideEmissions" for each reciprocating compressor.
- "NotMeasuredIsolationValveCarbonDioxideEmissions" for each reciprocating compressor.
- "FlaringCarbonDioxideEmissions" for each reciprocating compressor.

- For reciprocating compressors in all modes, report total annual CH_4 emissions from all modes of operation combined in metric tons CO_2e (refer to Equation W-27 and Equation W-28 of 98.233). [98.236(c)(14)(iv)] The value to report for "TotalAnnualMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:
  - "MeasuredRodPackingMethaneEmissions" for each reciprocating compressor.
  - "NotMeasuredRodPackingMethaneEmissions" for each reciprocating compressor.
  - "MeasuredBlowdownVentOperatingMethaneCarbonDioxideEquivalent" for each reciprocating compressor.
  - "NotMeasuredBlowdownVentOperatingMethaneCarbonDioxideEquivalent" for each reciprocating compressor.
  - "MeasuredBlowdownVentStandbyMethaneCarbonDioxideEquivalent" for each reciprocating compressor.
  - "NotMeasuredBlowdownVentStandbyMethaneCarbonDioxideEquivalent" for each reciprocating compressor.
  - "MeasuredIsolationValveMethaneCarbonDioxideEquivalent" for each reciprocating compressor.
  - "NotMeasuredIsolationValveMethaneCarbonDioxideEquivalent" for each reciprocating compressor.
  - "FlaringMethaneCarbonDioxideEquivalent" for each reciprocating compressor.
- For reciprocating compressors in all modes, report total annual N_2O emissions from all modes of operation combined in metric tons CO_2e. [98.236(c)] The value to report for "TotalAnnualNitrousCarbonDioxideEquivalent" equals the sum of the values reported for the data element "FlaringNitrousCarbonDioxideEquivalent".

Note: If a compressor had no emissions in all operating modes, report "0".

Table 43
Reciprocating Compressors Modes Details Data Element Definitions

Data Element Name	Description
ReciprocatingCompressorsModesDetails	**Parent Element (Conditionally Required):** For all applicable industry segments except the onshore petroleum and natural gas production industry segment, a collection of data elements to report if the facility had any reciprocating compressors subject to reporting under 98.232 in the reporting year.
ReciprocatingCompressorsModesRowDetails	**Parent Element:** A collection of data elements to report for each reciprocating compressor.
CompressorIdentifier	Unique name or ID number for the reciprocating compressor.
WereBammUsedForCompressor	Indicate (Yes/No) if BAMM were used to calculate GHG emissions for the specified reciprocating compressor.
AnnualThroughput	**Conditionally Required:** For reciprocating compressors in operating mode, the annual throughput using an engineering calculation based on best available data in million SCF. [98.236(c)(14)(i)(A)] Set the units of measure to "MMscf" in the attribute **volUOM**.
WereBlowdownVentsManifolded	Indicate (Yes/No) whether the blowdown vents were manifolded to rod packing vents for the specified compressor.
MeasuredRodPackingCarbonDioxideEmissions	**Conditionally Required:** For reciprocating compressors in operating mode, the measured rod packing CO_2 emissions for the specified reciprocating compressor, when in operating mode (refer to Equation W-26 of 98.233). [98.236(c)(14)(i)(C)] Set the units of measure to “Metric Tons” in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report “0”. Report both rod packing CO_2 emissions and rod packing CH_4 emissions as both measured or both not measured.

Data Element Name	Description
MeasuredRodPackingMethaneEmissions	**Conditionally Required:** For reciprocating compressors in operating mode, the measured rod packing CH_4 emissions for the specified reciprocating compressor, when in operating mode, in metric tons CO_2e (refer to Equation W-26 of 98.233). [98.236(c)(14)(i)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both rod packing CO_2 emissions and rod packing CH_4 emissions as both measured or both not measured.
NotMeasuredRodPackingCarbonDioxideEmissions	**Conditionally Required:** For reciprocating compressors in operating mode, the not measured rod packing CO_2 emissions for the specified reciprocating compressor, when in operating mode (refer to Equations W-27 and W-28 of 98.233). [98.236(c)(14)(i)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both rod packing CO_2 emissions and rod packing CH_4 emissions as both measured or both not measured.
NotMeasuredRodPackingMethaneEmissions	**Conditionally Required:** For reciprocating compressors in operating mode, the not measured rod packing CH_4 emissions for the specified reciprocating compressor, when in operating mode, in metric tons CO_2e (refer to Equations W-26 and W-28 of 98.233). [98.236(c)(14)(i)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both rod packing CO_2 emissions and rod packing CH_4 emissions as both measured or both not measured.

Data Element Name	Description
MeasuredBlowdownVentOperatingCarbonDioxideEmissions	**Conditionally Required:** For reciprocating compressors in operating mode with blowdown vents which were not manifolded to rod packing vents, the measured blowdown vent CO_2 emissions for the specified reciprocating compressor, when in operating mode (refer to Equations W-27 and W-28 of 98.233). [98.236(c)(14)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both blowdown vent CO_2 emissions and blowdown vent CH_4 emissions as both measured or both not measured.
MeasuredBlowdownVentOperatingMethaneCarbonDioxideEquivalent	**Conditionally Required:** For reciprocating compressors in operating mode with blowdown vents which were not manifolded to rod packing vents, the measured blowdown vent CH_4 emissions for the specified reciprocating compressor, when in operating mode, in metric tons CO_2e (refer to Equations W-27 and W-28 of 98.233). [98.236(c)(14)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both blowdown vent CO_2 emissions and blowdown vent CH_4 emissions as both measured or both not measured.
NotMeasuredBlowdownVentOperatingCarbonDioxideEmissions	**Conditionally Required:** For reciprocating compressors in operating mode with blowdown vents which were not manifolded to rod packing vents, the not measured blowdown vent CO_2 emissions for the specified reciprocating compressor, when in operating mode (refer to Equations W-27 and W-28 of 98.233). [98.236(c)(14)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both blowdown vent CO_2 emissions and blowdown vent CH_4 emissions as both measured or both not measured.

Data Element Name	Description
NotMeasuredBlowdownVentOperatingMethaneCarbonDioxideEquivalent	**Conditionally Required:** For reciprocating compressors in operating mode with blowdown vents which were not manifolded to rod packing vents, the not measured blowdown vent CH_4 emissions for the specified reciprocating compressor, when in operating mode, in metric tons CO_2e (refer to Equations W-27 and W-28 of 98.233). [98.236(c)(14)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both blowdown vent CO_2 emissions and blowdown vent CH_4 emissions as both measured or both not measured.
MeasuredBlowdownVentStandbyCarbonDioxideEmissions	**Conditionally Required:** For reciprocating compressors in standby pressurized mode, the measured blowdown vent CO_2 emissions for the specified reciprocating compressor vents not manifold to rod packing vents (refer to Equations W-26 through W-28). [98.236(c)(14)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both blowdown vent CO_2 emissions and blowdown vent CH_4 emissions as both measured or both not measured.
MeasuredBlowdownVentStandbyMethaneCarbonDioxideEquivalent	**Conditionally Required:** For reciprocating compressors in standby pressurized mode, the measured blowdown vent CH_4 emissions for the specified reciprocating compressor vents not manifold to rod packing vents in metric tons of CO_2e (refer to Equations W-26 through W-28). [98.236(c)(14)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both blowdown vent CO_2 emissions and blowdown vent CH_4 emissions as both measured or both not measured.

Data Element Name	Description
NotMeasuredBlowdownVentStandbyCarbonDioxideEmissions	**Conditionally Required:** For reciprocating compressors in standby pressurized mode, the not measured blowdown vent CO_2 emissions for the specified reciprocating compressor vents not manifold to rod packing vents (refer to Equations W-26 through W-28). Report for the specified compressor. [98.236(c)(14)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both blowdown vent CO_2 emissions and blowdown vent CH_4 emissions as both measured or both not measured.
NotMeasuredBlowdownVentStandbyMethaneCarbonDioxideEquivalent	**Conditionally Required:** For reciprocating compressors in standby pressurized mode, the not measured blowdown vent CH_4 emissions for the specified reciprocating compressor vents not manifold to rod packing vents in metric tons of CO_2e (refer to Equations W-26 through W-28). [98.236(c)(14)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both blowdown vent CO_2 emissions and blowdown vent CH_4 emissions as both measured or both not measured.
MeasuredIsolationValveCarbonDioxideEmissions	**Conditionally Required:** For reciprocating compressors in not operating, depressurized mode, the measured isolation valve leakage CO_2 emissions for the specified reciprocating compressor. [98.236(c)(14)(iii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both isolation valve CO_2 emissions and isolation valve CH_4 emissions as both measured or both not measured.
MeasuredIsolationValveMethaneCarbonDioxideEquivalent	**Conditionally Required:** For reciprocating compressors in not operating, depressurized mode, the measured isolation valve leakage CH_4 emissions for the specified reciprocating compressor in metric tons of CO_2e. [98.236(c)(14)(iii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both isolation valve CO_2 emissions and isolation valve CH_4 emissions as both measured or both not measured.

Data Element Name	Description
NotMeasuredIsolationValveCarbonDioxideEmissions	**Conditionally Required:** For reciprocating compressors in not operating, depressurized mode, the not measured isolation valve leakage CO_2 emissions for the specified reciprocating compressor. [98.236(c)(14)(iii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both isolation valve CO_2 emissions and isolation valve CH_4 emissions as both measured or both not measured.
NotMeasuredIsolationValveMethaneCarbonDioxideEquivalent	**Conditionally Required:** For reciprocating compressors in not operating, depressurized mode, the not measured isolation valve leakage CH_4 emissions for the specified reciprocating compressor in metric tons of CO_2e. [98.236(c)(14)(iii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** If the compressor has no emissions in this mode, report "0". Report both isolation valve CO_2 emissions and isolation valve CH_4 emissions as both measured or both not measured.
DidCompressorVentEmissionsToFlare	Indicate (Yes/No) if the compressor vented emissions to a flare in the reporting year.
TotalAnnualFlaringCarbonDioxideEmissions	**Conditionally Required:** If the compressor vented emissions to flares, the total annual CO_2 emissions from flaring for all modes of operation combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM.**
TotalAnnualFlaringMethaneCarbonDioxideEquivalent	**Conditionally Required:** If the compressor vented emissions to flares, the total annual CH_4 emissions from flaring for all modes of operation combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM.**
TotalAnnualFlaringNitrousCarbonDioxideEquivalent	**Conditionally Required:** If the compressor vented emissions to flares, the total annual N_2O emissions from flaring for all modes of operation combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM.**
TotalAnnualCarbonDioxideEmissions	For reciprocating compressors in all modes, the total annual compressor CO_2 emissions from all modes of operation combined for the specified compressor. [98.236(c)(14)(iv)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

Data Element Name	Description
TotalAnnualMethaneCarbonDioxideEquivalent	For reciprocating compressors in all modes, the total annual compressor CH_4 emissions from all modes of operation combined for the specified compressor, in metric tons CO_2e. [98.236(c)(14)(iv)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalAnnualNitrousCarbonDioxideEquivalent	For reciprocating compressors in all modes, the total annual compressor N_2O emissions from all modes of operation combined for the specified compressor, in metric tons CO_2e. [98.236(c)(14)(iv)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 46
Example for a Reciprocating Compressor in Operating Mode

```
<ghg:ReciprocatingCompressorsModesDetails>
      <ghg:ReciprocatingCompressorsModesRowDetails>
            <ghg:CompressorIdentifier>1</ghg:CompressorIdentifier>
            <ghg:WereBammUsedForCompressor>No</ghg:WereBammUsedForCompressor>
            <ghg:AnnualThroughput volUOM="MMscf">581563</ghg:AnnualThroughput>
            <ghg:MeasuredRodPackingCarbonDioxideEmissions massUOM="Metric
Tons">0.0</ghg:MeasuredRodPackingCarbonDioxideEmissions>
            <ghg:MeasuredRodPackingMethaneEmissions massUOM="Metric
Tons">13.2</ghg:MeasuredRodPackingMethaneEmissions>
            <ghg:MeasuredBlowdownVentOperatingCarbonDioxideEmissions massUOM="Metric
Tons">0.2</ghg:MeasuredBlowdownVentOperatingCarbonDioxideEmissions>
            <ghg:MeasuredBlowdownVentOperatingMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">133.8</ghg:MeasuredBlowdownVentOperatingMethaneCarbonDioxideEquivalent>
            <ghg:MeasuredBlowdownVentStandbyCarbonDioxideEmissions massUOM="Metric
Tons">0.1</ghg:MeasuredBlowdownVentStandbyCarbonDioxideEmissions>
            <ghg:MeasuredBlowdownVentStandbyMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">55.8</ghg:MeasuredBlowdownVentStandbyMethaneCarbonDioxideEquivalent>
            <ghg:NotMeasuredIsolationValveCarbonDioxideEmissions massUOM="Metric
Tons">0.9</ghg:NotMeasuredIsolationValveCarbonDioxideEmissions>
            <ghg:NotMeasuredIsolationValveMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">626.2</ghg:NotMeasuredIsolationValveMethaneCarbonDioxideEquivalent>
            <ghg:DidCompressorVentEmissionsToFlare>Yes</ghg:DidCompressorVentEmissionsToFlare >
            <ghg:TotalAnnualFlaringCarbonDioxideEmissions massUOM="Metric
Tons">3.4</ghg:TotalAnnualFlaringCarbonDioxideEmissions>
            <ghg:TotalAnnualFlaringMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">113.1</ghg:TotalAnnualFlaringMethaneCarbonDioxideEquivalent>
            <ghg:TotalAnnualFlaringNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">1.6</ghg:TotalAnnualFlaringNitrousCarbonDioxideEquivalent >
            <ghg:TotalAnnualCarbonDioxideEmissions massUOM="Metric Tons">1.3</ghg:TotalAnnualCarbonDioxideEmissions>
            <ghg:TotalAnnualMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">829.0</ghg:TotalAnnualMethaneCarbonDioxideEquivalent>
            <ghg:TotalAnnualNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">23.1</ghg:TotalAnnualNitrousCarbonDioxideEquivalent>
      </ghg:ReciprocatingCompressorsModesRowDetails>
```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data for applicable industry segments other than the onshore petroleum and natural gas production industry segment.

XML Excerpt 47
Example for a Reciprocating Compressor which did not Operate in the Reporting Year

```
<ghg:ReciprocatingCompressorsModesRowDetails>
      <ghg:CompressorIdentifier>2</ghg:CompressorIdentifier>
      <ghg:WereBammUsedForCompressor>No</ghg:WereBammUsedForCompressor>
      <ghg:MeasuredIsolationValveCarbonDioxideEmissions massUOM="Metric
Tons">0.9</ghg:MeasuredIsolationValveCarbonDioxideEmissions>
      <ghg:MeasuredIsolationValveMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">626.2</ghg:MeasuredIsolationValveMethaneCarbonDioxideEquivalent>
      <ghg:DidCompressorVentEmissionsToFlare>No</ghg:DidCompressorVentEmissionsToFlare >
      <ghg:TotalAnnualCarbonDioxideEmissions massUOM="Metric Tons">0.9</ghg:TotalAnnualCarbonDioxideEmissions>
      <ghg:TotalAnnualMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">626.2</ghg:TotalAnnualMethaneCarbonDioxideEquivalent>
      <ghg:TotalAnnualNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">0.0</ghg:TotalAnnualNitrousCarbonDioxideEquivalent>
```

Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data for applicable industry segments other than the onshore petroleum and natural gas production industry segment.

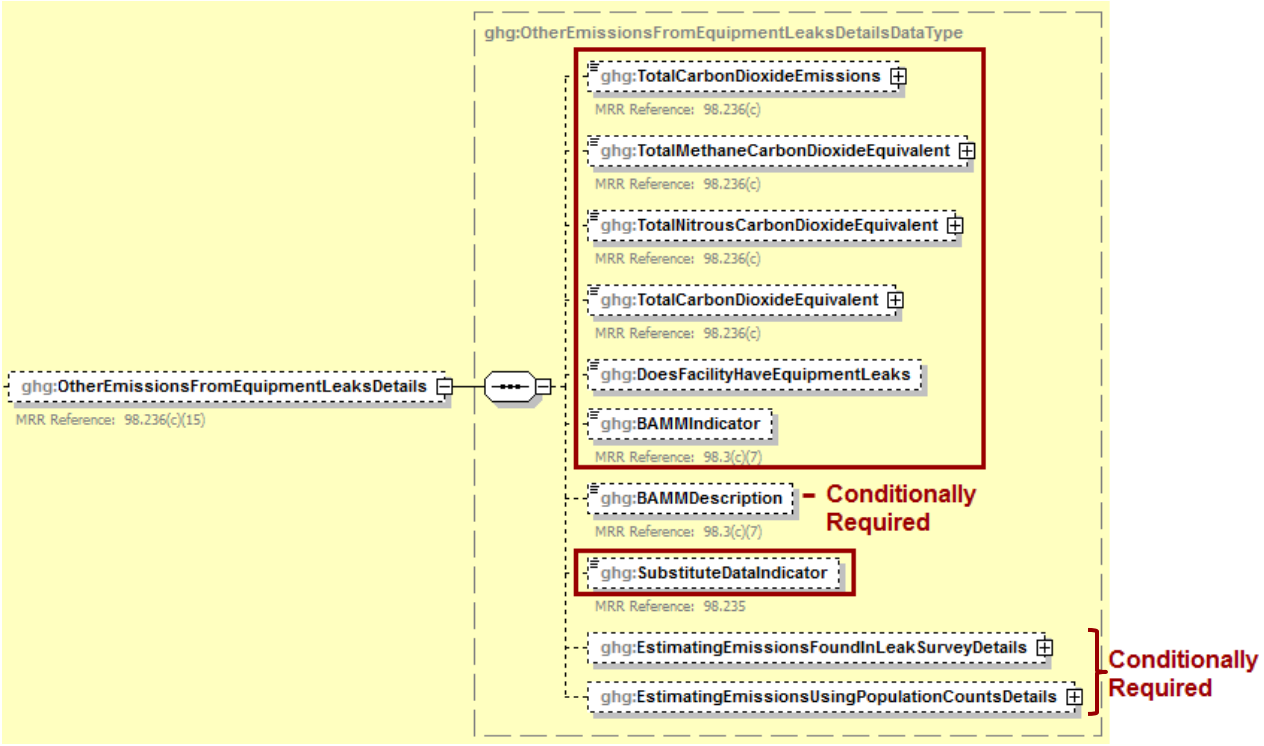
Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

18.0 Other Emissions from Equipment Leaks Estimated Using Emission Factors

This topic provides a step-by-step description of how to report other emissions from equipment leaks estimated using emissions factors for a facility. This section is applicable to and required for the following industry segments only:

- Onshore petroleum and natural gas production
- Onshore natural gas processing
- Onshore natural gas transmission compression
- Underground natural gas storage
- Liquefied natural gas (LNG) storage
- LNG import and export equipment
- Natural gas distribution

Figure 51
Other Emissions From Equipment Leaks 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 other emissions from equipment leaks estimated using emission factors, report the following:

- The CO_2 and CH_4 emissions totals and the total CO_2e emissions for all reciprocating compressors combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e and total CO_2e emissions). [98.236(c)] **Note 1:** Report "0" if the facility did not have any equipment leaks subject to reporting under 98.232 during the reporting year. **Note 2:** The natural gas distribution industry segment must report "0" here and report equipment leaks under the local distribution company's source type.
  - The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the following data elements:
    - "CarbonDioxideEmissions" for each component type that used emissions factors for estimating emissions for equipment leaks found in each leak survey.
    - "CarbonDioxideEmissions" for each component type that used emissions factors for estimating emissions for equipment leaks calculated using population counts and factors.
  - The value to report for "TotalMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:
    - "MethaneCarbonDioxideEquivalent" for each component type that used emissions factors for estimating emissions for equipment leaks found in each leak survey.
    - "MethaneCarbonDioxideEquivalent" for each component type that used emissions factors for estimating emissions for equipment leaks calculated using population counts and factors.
  - The value to report for "TotalCarbonDioxideEquivalent" equals the sum of the values reported for "TotalCarbonDioxideEmissions" and "TotalMethaneCarbonDioxideEquivalent".
- Whether the facility had any equipment leaks subject to reporting under 98.232 in the reporting year.
- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

Table 44
Other Emissions From Equipment Leaks Details Data Element Definitions

Data Element Name	Description
OtherEmissionsFromEquipmentLeaksDetails	**Parent Element:** A collection of data elements to report for other emissions from equipment leaks estimated using emission factors. [98.236(c)(15)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions for all equipment leaks combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note 1:** Report "0" if the facility did not have any applicable equipment leaks subject to reporting under 98.232 during the reporting year. **Note 2:** The natural gas distribution industry segment must report "0" here and report equipment leaks under the local distribution company's source type.
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions for all equipment leaks combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note 1:** Report "0" if the facility did not have any applicable equipment leaks subject to reporting under 98.232 during the reporting year. **Note 2:** The natural gas distribution industry segment must report "0" here and report equipment leaks under the local distribution company's source type.
TotalCarbonDioxideEquivalent	Total combined CO_2 and CH_4 emissions for all equipment leaks combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note 1:** Report "0" if the facility did not have any applicable equipment leaks subject to reporting under 98.232 during the reporting year. **Note 2:** The natural gas distribution industry segment must report "0" here and report equipment leaks under the local distribution company's source type.
DoesFacilityHaveEquipmentLeaks	Indicate (Yes/No) if the facility had any equipment leaks subject to reporting under 98.232 in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]

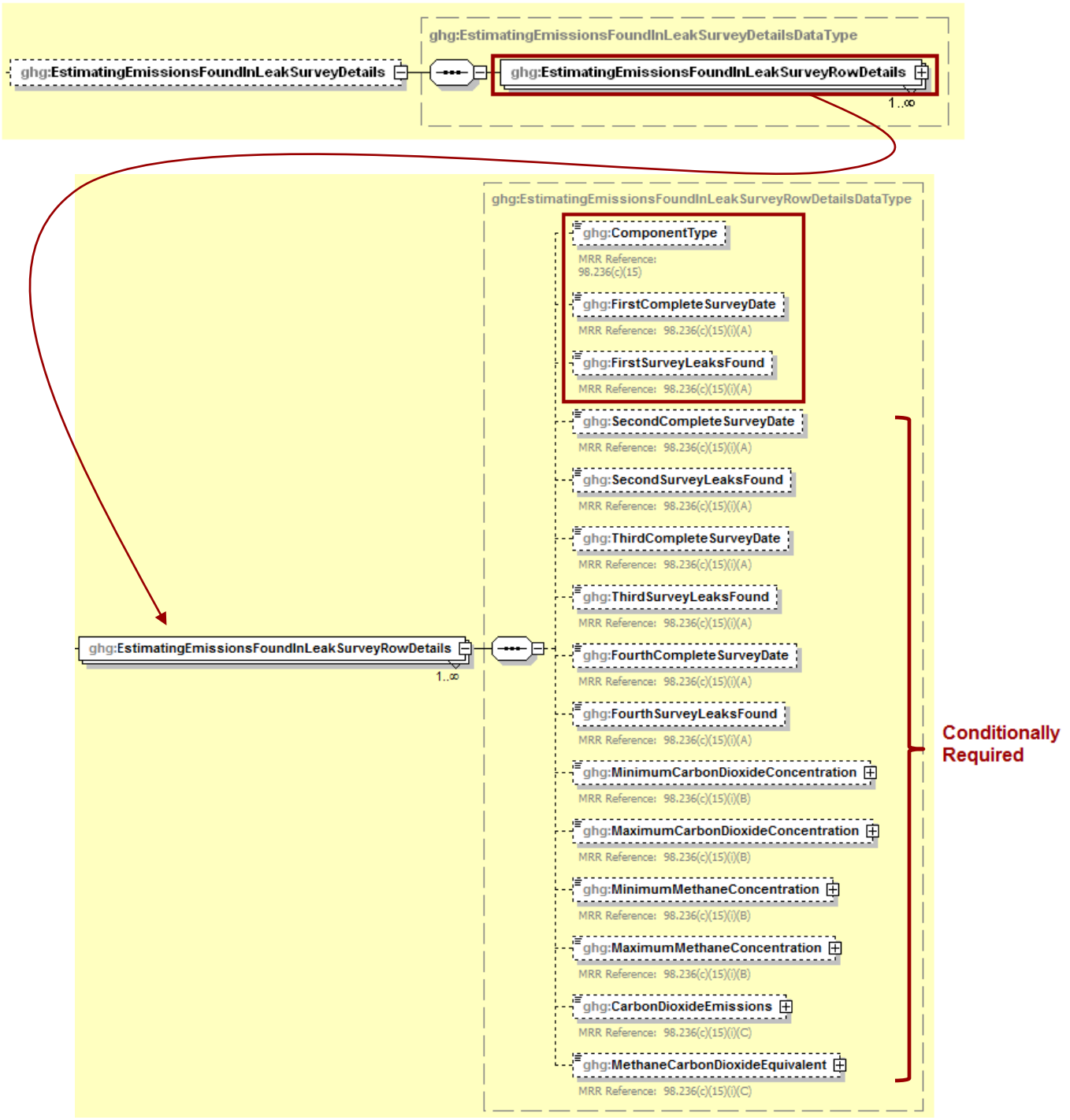
Data Element Name	Description
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 48
Example for Other Emissions From Equipment Leaks Details

```
<ghg:OtherEmissionsFromEquipmentLeaksDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">7.7</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">5338.9</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">5346.6</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DoesFacilityHaveEquipmentLeaks>Yes</ghg:DoesFacilityHaveEquipmentLeaks>
      <ghg:BAMMIndicator>Yes</ghg:BAMMIndicator>
      <ghg:BAMMDescription>BAMM Description</ghg:BAMMDescription>
      <ghg:SubstituteDataIndicator>No</ghg:SubstituteDataIndicator>
      <ghg:EstimatingEmissionsFoundInLeakSurveyDetails>
                        <See example for Estimating Emissions Found in Leak Survey Details>
      </ghg:EstimatingEmissionsFoundInLeakSurveyDetails>
      <ghg:EstimatingEmissionsUsingPopulationCountsDetails>
                        <See example for Estimating Emissions Using Population Counts Details>
      </ghg:EstimatingEmissionsUsingPopulationCountsDetails>
</ghg:OtherEmissionsFromEquipmentLeaksDetails>
```

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

Figure 52
Estimating Emissions Found in Leak Survey 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 component type (major equipment type for the onshore petroleum and natural gas production industry segment) for which there is a leaker emission factor in Table W-2 for the onshore natural gas processing industry segment, Table W-3 for the onshore natural gas transmission compression industry segment, Table W-4 for the underground natural gas storage industry segment, Table W-5 for the liquefied natural gas (LNG) storage industry segment, Table W-6 for the LNG import and export equipment industry segment and Table W-7 for the natural gas distribution industry segment that uses emission factors for estimating emissions (refer to 98.233(q) and (r)), for equipment leaks found in each leak survey (refer to 98.233(q)), report the following [98.236(c)(15)(i)]:

- Date of each complete survey. [98.236(c)(15)(i)(A)]
- For each complete survey date, report the total count of leaks found. [98.236(c)(15)(i)(A)]
- For the onshore natural gas processing industry segment only, report the following:
  - The minimum concentration of CO_2 (refer to Equation W-30 of 98.233). [98.236(c)(15)(i)(B)]
  - The maximum concentration of CO_2 (refer to Equation W-30 of 98.233). [98.236(c)(15)(i)(B)]
  - The minimum concentration of CH_4 (refer to Equation W-30 of 98.233). [98.236(c)(15)(i)(B)]
  - The maximum concentration of CH_4 (refer to Equation W-30 of 98.233). [98.236(c)(15)(i)(B)]

For applicable industry segments other than natural gas distribution, report the annual CO_2 and CH_4 emissions, in metric tons CO_2e for each gas (refer to parameter GHG_i in Equation W-30 of 98.233), by component type. [98.236(c)(15)(i)(C)]

Table 45
Estimating Emissions Found in Leak Survey Details Data Element Definitions

Data Element Name	Description
EstimatingEmissionsFoundInLeakSurveyDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any component types that used emission factors for estimating emissions for equipment leaks found in each leak survey in the reporting year.
EstimatingEmissionsFoundInLeakSurveyRowDetails	**Parent Element:** A collection of data elements to report for each component type that uses emission factors for estimating emissions for equipment leaks found in each leak survey.

Data Element Name	Description
ComponentType	Component type for the equipment leak. See list of allowable values. [98.236(c)(15)] Compressor Components, Gas Service - Valve Compressor Components, Gas Service - Connector Compressor Components, Gas Service - Open-Ended Line Compressor Components, Gas Service - Pressure Relief Valve Compressor Components, Gas Service - Meter Non-compressor Components, Gas Service - Valve Non-compressor Components, Gas Service - Connector Non-compressor Components, Gas Service - Open-Ended Line Non-compressor Components, Gas Service - Pressure Relief Valve Non-compressor Components, Gas Service - Meter Storage Station, Gas Service - Valve Storage Station, Gas Service - Connector Storage Station, Gas Service - Open-Ended Line Storage Station, Gas Service - Pressure Relief Valve Storage Station, Gas Service - Meter LNG Storage, LNG Service - Valve LNG Storage, LNG Service - Pump Seal LNG Storage, LNG Service - Connector LNG Storage, LNG Service - Other LNG Storage, LNG Terminal - Valve LNG Storage, LNG Terminal - Pump Seal LNG Storage, LNG Terminal - Connector LNG Storage, LNG Terminal - Other LDC, T-D Stations - Connector LDC, T-D Stations - Block Valve LDC, T-D Stations - Control Valve LDC, T-D Stations - Pressure Relief Valve LDC, T-D Stations - Orifice Meter LDC, T-D Stations - Regulator LDC, T-D Stations - Open-ended Line
FirstCompleteSurveyDate	Date of the first complete survey (YYYY-MM-DD). [98.236(c)(15)(i)(A)]
FirstSurveyLeaksFound	Total count of leaks found in the first complete survey. [98.236(c)(15)(i)(A)] **Note:** Report "0" if there were no leaks found.

Data Element Name	Description
SecondCompleteSurveyDate	**Conditionally Required:** If a second survey was completed, the date of the second complete survey (YYYY-MM-DD). [98.236(c)(15)(i)(A)]
SecondSurveyLeaksFound	**Conditionally Required:** If a second survey was completed, the total count of leaks found in the second complete survey. [98.236(c)(15)(i)(A)] **Note:** Report "0" if there were no leaks found.
ThirdCompleteSurveyDate	**Conditionally Required:** If a third survey was completed, the date of the third complete survey (YYYY-MM-DD). [98.236(c)(15)(i)(A)]
ThirdSurveyLeaksFound	**Conditionally Required:** If a third survey was completed, the total count of leaks found in the third complete survey. [98.236(c)(15)(i)(A)] **Note:** Report "0" if there were no leaks found.
FourthCompleteSurveyDate	**Conditionally Required:** If a fourth survey was completed, the date of the fourth complete survey (YYYY-MM-DD). [98.236(c)(15)(i)(A)]
FourthSurveyLeaksFound	**Conditionally Required:** If a fourth survey was completed, the total count of leaks found in the fourth complete survey. [98.236(c)(15)(i)(A)] **Note:** Report "0" if there were no leaks found.
MinimumCarbonDioxideConcentration	**Conditionally Required:** For the onshore natural gas processing industry segment only, for the range of concentration of CO_2 in the complete surveys, the minimum concentration of CO_2 (volumetric fraction). [98.236(c)(15)(i)(B)] Set the units of measure to "volumetric fraction" in the attribute **fractionUOM**.
MaximumCarbonDioxideConcentration	**Conditionally Required:** For the onshore natural gas processing industry segment only, for the range of concentration of CO_2 in the complete surveys, the maximum concentration of CO_2 (volumetric fraction). [98.236(c)(15)(i)(B)] Set the units of measure to "volumetric fraction" in the attribute **fractionUOM**.
MinimumMethaneConcentration	**Conditionally Required:** For the onshore natural gas processing industry segment only, for the range of concentration of CH_4 in the complete surveys, the minimum concentration of CH_4 (volumetric fraction). [98.236(c)(15)(i)(B)] Set the units of measure to "volumetric fraction" in the attribute **fractionUOM**.

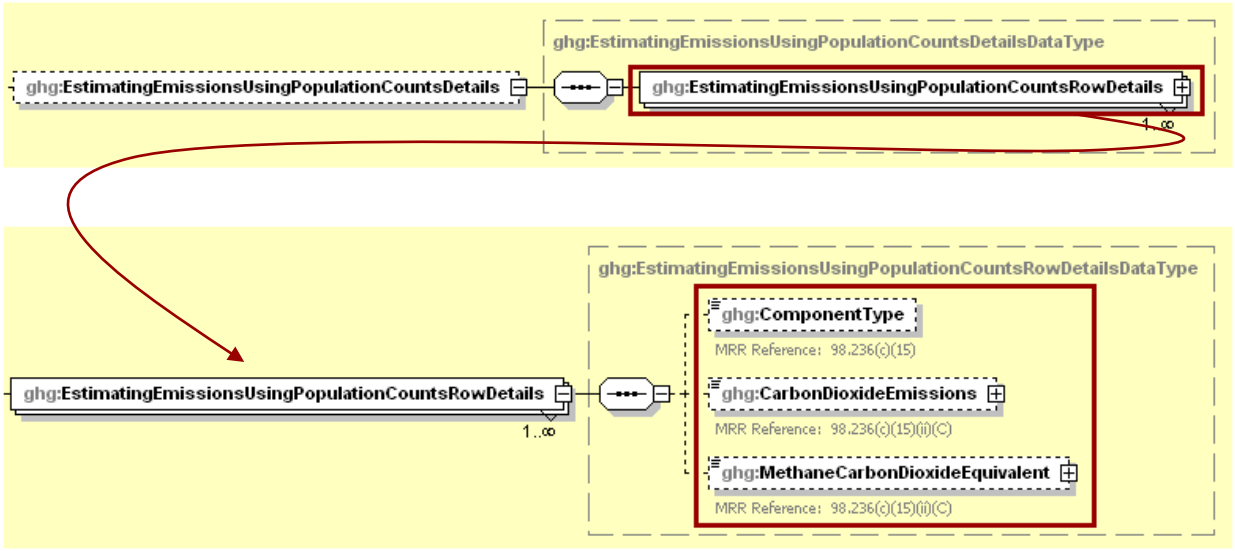
Data Element Name	Description
MaximumMethaneConcentration	**Conditionally Required:** For the onshore natural gas processing industry segment only, for the range of concentration of CH_4 in the complete surveys, the maximum concentration of CH_4 (volumetric fraction). [98.236(c)(15)(i)(B)] Set the units of measure to "volumetric fraction" in the attribute **fractionUOM**.
CarbonDioxideEmissions	**Conditionally Required:** For applicable industry segments other than natural gas distribution, report the total CO_2 emissions for the specified leak source in metric tons. [98.236(c)(15)(i)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
MethaneCarbonDioxideEquivalent	**Conditionally Required:** For applicable industry segments other than natural gas distribution, report the total CH_4 emissions for the specified leak source in metric tons CO_2e. [98.236(c)(15)(i)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 49
Example for Estimating Emissions Found in Leak Survey Details

```
<ghg:EstimatingEmissionsFoundInLeakSurveyDetails>
      <ghg:EstimatingEmissionsFoundInLeakSurveyRowDetails>
            <ghg:ComponentType>Storage Station, Gas Service - Valve</ghg:ComponentType>
            <ghg:FirstCompleteSurveyDate>2011-03-13</ghg:FirstCompleteSurveyDate>
            <ghg:FirstSurveyLeaksFound>2</ghg:FirstSurveyLeaksFound>
            <ghg:SecondCompleteSurveyDate>2011-06-13</ghg:SecondCompleteSurveyDate>
            <ghg:SecondSurveyLeaksFound>1</ghg:SecondSurveyLeaksFound>
            <ghg:ThirdCompleteSurveyDate>2011-09-13</ghg:ThirdCompleteSurveyDate>
            <ghg:ThirdSurveyLeaksFound>0</ghg:ThirdSurveyLeaksFound>
            <ghg:FourthCompleteSurveyDate>2011-12-13</ghg:FourthCompleteSurveyDate>
            <ghg:FourthSurveyLeaksFound>1</ghg:FourthSurveyLeaksFound>
            <ghg:MinimumCarbonDioxideConcentration fractionUOM="volumetric
fraction">0.5</ghg:MinimumCarbonDioxideConcentration>
            <ghg:MaximumCarbonDioxideConcentration fractionUOM="volumetric
fraction">0.85</ghg:MaximumCarbonDioxideConcentration>
            <ghg:MinimumMethaneConcentration fractionUOM="volumetric
fraction">0.05</ghg:MinimumMethaneConcentration>
            <ghg:MaximumMethaneConcentration fractionUOM="volumetric
fraction">0.15</ghg:MaximumMethaneConcentration>
            <ghg:CarbonDioxideEmissions massUOM="Metric Tons">0.0</ghg:CarbonDioxideEmissions>
            <ghg:MethaneCarbonDioxideEquivalent massUOM="Metric Tons">7.2</ghg:MethaneCarbonDioxideEquivalent>
      </ghg:EstimatingEmissionsFoundInLeakSurveyRowDetails>
```

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

Figure 53
Estimating Emissions Using Population Counts Details Schema Diagram



Note: Data elements boxed in red are required.

For applicable industry segments other than natural gas distribution, if there were any equipment leaks calculated using population counts and factors (refer to 98.233(r)), report the following for each component type [98.236(c)(15)(ii)]:

- Annual CO_2 and CH_4 emissions, in metric tons CO_2e for each gas (refer to Equation W-31 of 98.233). [98.236(c)(15)(ii)(C)]

Table 46
Estimating Emissions Using Population Counts Details Data Element Definitions

Data Element Name	Description
EstimatingEmissionsUsingPopulationCounts Details	**Parent Element (Conditionally Required):** For applicable industry segments other than natural gas distribution, a collection of data elements to report if any component type (major equipment type for onshore production) used emission factors for estimating emissions for equipment leaks calculated using population counts and factors in the reporting year.

Data Element Name	Description
EstimatingEmissionsUsingPopulationCounts RowDetails	**Parent Element:** A collection of data elements to report for each component type (major equipment type for onshore production) that used emission factors for estimating emissions for equipment leaks calculated using population counts and factors.
ComponentType	Component type (major equipment type for onshore production) for the equipment leak. See list of allowable values. [98.236(c)(15)] Storage wellheads, Gas Service - Connector Storage wellheads, Gas Service - Valve Storage Wellheads, Gas Service - Pressure Relief Valve Storage Wellheads, Gas Service - Open Ended Line LNG Compressor - Vapor Recovery Compressor Onshore, gas service - valve Onshore, gas service - connector Onshore, gas service - open-ended line Onshore, gas service - pressure relief valve Onshore, light crude service - valve Onshore, light crude service - flange Onshore, light crude service - connector Onshore, light crude service - open-ended line Onshore, light crude service - other Onshore, heavy crude service - valve Onshore, heavy crude service - flange Onshore, heavy crude service - connector Onshore, heavy crude service - open-ended line Onshore, heavy crude service - other
CarbonDioxideEmissions	CO_2 emissions for the specified component type (major equipment type for onshore production) in metric tons. [98.236(c)(15)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
MethaneCarbonDioxideEquivalent	CH_4 emissions for the specified component type (major equipment type for onshore production) in metric tons CO_2e. [98.236(c)(15)(ii)(C)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 50
Example for Estimating Emissions Using Population Counts Details

```
<ghg:EstimatingEmissionsUsingPopulationCountsDetails>
      <ghg:EstimatingEmissionsUsingPopulationCountsRowDetails>
            <ghg:ComponentType>Onshore, gas service - valve</ghg:ComponentType>
            <ghg:CarbonDioxideEmissions massUOM="Metric Tons">15.9</ghg:CarbonDioxideEmissions>
            <ghg:MethaneCarbonDioxideEquivalent massUOM="Metric
Tons">12587.3</ghg:MethaneCarbonDioxideEquivalent>
      </ghg:EstimatingEmissionsUsingPopulationCountsRowDetails>
</ghg:EstimatingEmissionsUsingPopulationCountsDetails>
```

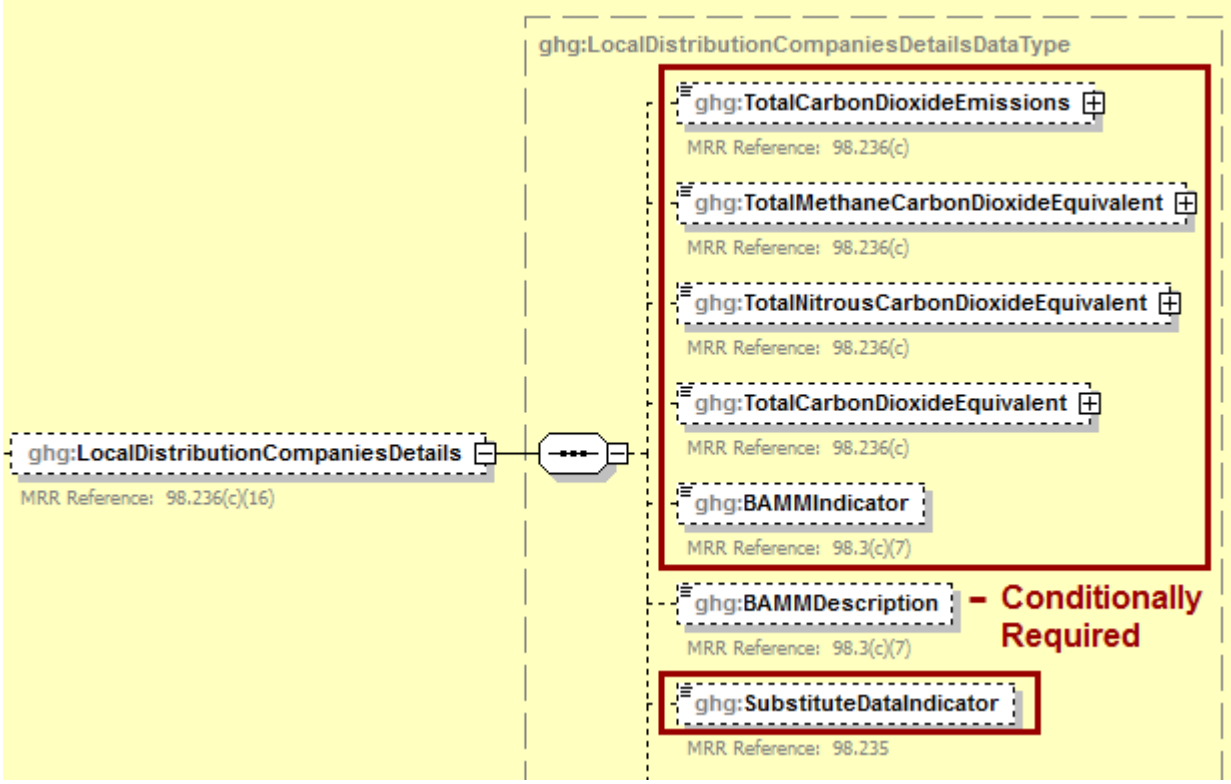
Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

19.0 Local Distribution Companies

This topic provides a step-by-step description of how to report information for a local distribution company. This section is applicable to and required for the natural gas distribution industry segment only.

Figure 54
Local Distribution Companies Details (Part 1 of 3) 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 local distribution companies, report the following:

- The CO_2 and CH_4 emissions totals and the total CO_2e emissions for all above grade metering-regulating stations, all below grade metering-regulating stations, all distribution mains and all distribution services combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e and total CO_2e emissions). [98.236(c)]
  - The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the following data elements:
    - "AnnualCarbonDioxideAboveGradeMeteringStations".
    - "AnnualCarbonDioxideBelowGradeMeteringStations".
    - "AnnualCarbonDioxideDistributionMains".

- "AnnualCarbonDioxideDistributionServices".

- The value to report for "TotalMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:
  - "AnnualMethaneAboveGradeMeteringStations".
  - "AnnualMethaneBelowGradeMeteringStations".
  - "AnnualMethaneDistributionMains".
  - "AnnualMethaneDistributionServices".
- The value to report for "TotalCarbonDioxideEquivalent" equals the sum of the values reported for "TotalCarbonDioxideEmissions" and "TotalMethaneCarbonDioxideEquivalent".

- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

Table 47
Local Distribution Companies Details (Part 1 of 3) Data Element Definitions

Data Element Name	Description
LocalDistributionCompaniesDetails	**Parent Element:** A collection of data elements to report for local distribution companies. [98.236(c)(16)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions for all above grade metering-regulating stations, all below grade metering-regulating stations, all distribution mains and all distribution services combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions for all above grade metering-regulating stations, all below grade metering-regulating stations, all distribution mains and all distribution services combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalCarbonDioxideEquivalent	Total combined CO_2 and CH_4 emissions for all above grade metering-regulating stations, all below grade metering-regulating stations, all distribution mains and all distribution services combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**.

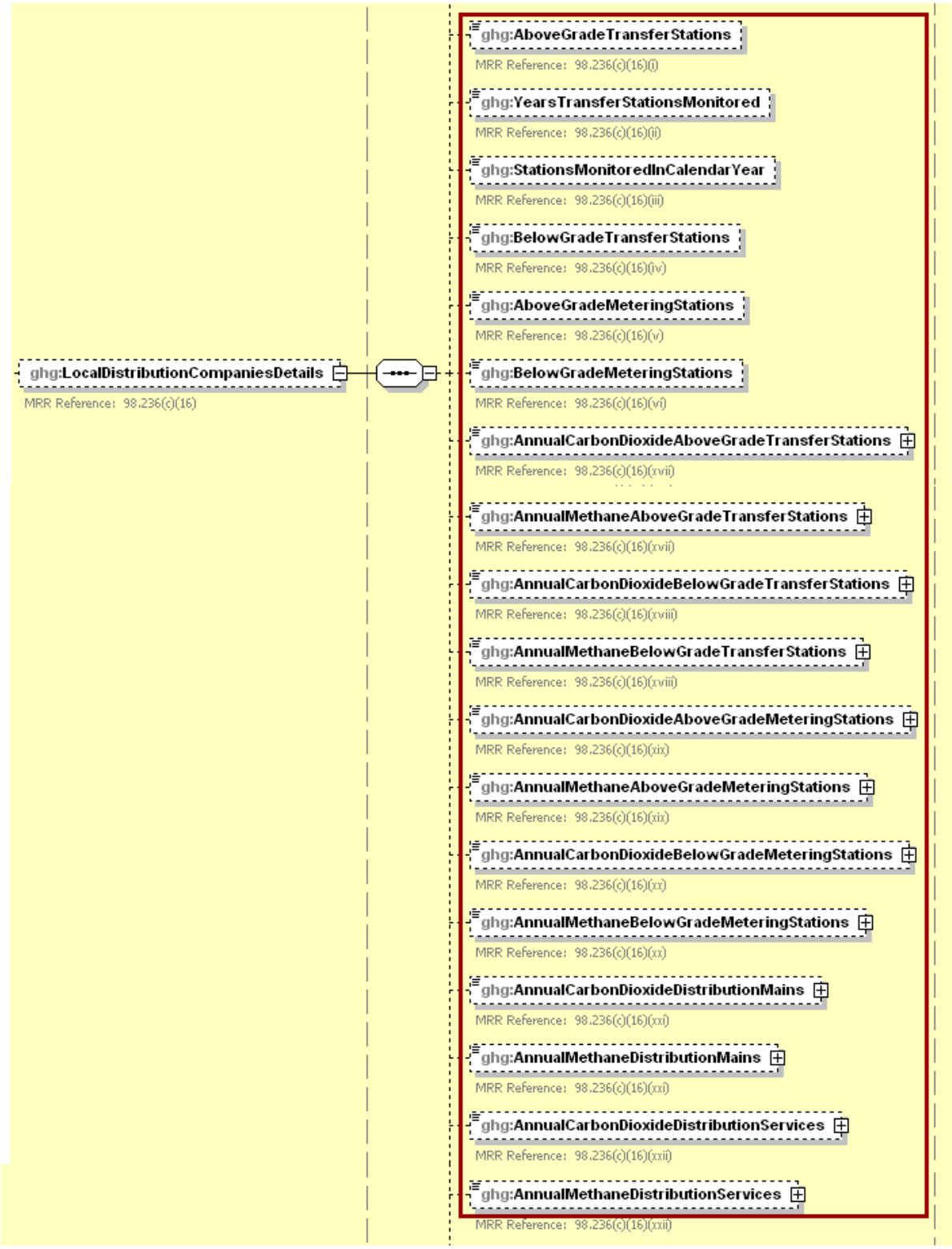
Data Element Name	Description
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 51
Example for Local Distribution Companies Details (Part 1 of 3)

```
<ghg:LocalDistributionCompaniesDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">806.0</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">561904.0</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">562710.0</ghg:TotalCarbonDioxideEquivalent>
      <ghg:BAMMIndicator>Yes</ghg:BAMMIndicator>
      <ghg:BAMMDescription>BAMM Description</ghg:BAMMDescription>
      <ghg:SubstituteDataIndicator>Yes</ghg:SubstituteDataIndicator>
```

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

Figure 55
Local Distribution Companies Details (Part 2 of 3) Schema Diagram



Note: Data elements boxed in red are required.

For local distribution companies, report the following [98.236(c)(16)]:

- Total number of above grade T-D transfer stations in the facility. [98.236(c)(16)(i)]
- Number of years over which all T-D transfer stations will be monitored at least once. [98.236(c)(16)(ii)]
- Number of T-D stations monitored in reporting year. [98.236(c)(16)(iii)]
- Total number of below grade T-D transfer stations in the facility. [98.236(c)(16)(iv)]
- Total number of above grade metering-regulating stations (this count will include above grade T-D transfer stations) in the facility. [98.236(c)(16)(v)]
- Total number of below grade metering-regulating stations (this count will include below grade T-D transfer stations) in the facility. [98.236(c)(16)(vi)]
- Annual CO_2 and CH_4 emissions, in metric tons CO_2e for each gas, from all above grade T-D transfer stations combined. [98.236(c)(16)(xvii)]
- Annual $CO_2$and CH_4 emissions, in metric tons CO_2e for each gas, from all below grade T-D transfer stations combined. [98.236(c)(16)(xviii)]
- Annual $CO_2$and CH_4 emissions, in metric tons CO_2e for each gas, from all above grade metering-regulating stations (including T-D transfer stations) combined. [98.236(c)(16)(xix)]
- Annual $CO_2$and CH_4 emissions, in metric tons CO_2e for each gas, from all below grade metering-regulating stations (including T-D transfer stations) combined. [98.236(c)(16)(xx)]
- Annual $CO_2$and CH_4 emissions, in metric tons CO_2e for each gas, from all distribution mains combined. [98.236(c)(16)(xxi)]
- Annual $CO_2$and CH_4 emissions, in metric tons CO_2e for each gas, from all distribution services combined. [98.236(c)(16)(xxi)]

Note: All data elements are required. If your facility does not have any metering-regulating stations or transmission-distribution transfer stations, report "0" for the applicable data element(s).

Table 48
Local Distribution Companies Details (Part 2 of 3) Data Element Definitions

Data Element Name	Description
AboveGradeTransferStations	Total number of above grade T-D transfer stations in the facility. [98.236(c)(16)(i)]
YearsTransferStationsMonitored	Number of years over which all T-D transfer stations will be monitored at least once. [98.236(c)(16)(ii)]
StationsMonitoredInCalendarYear	Number of T-D stations monitored in the reporting year. [98.236(c)(16)(iii)]

Data Element Name	Description
BelowGradeTransferStations	Total number of below grade T-D transfer stations in the facility. [98.236(c)(16)(iv)]
AboveGradeMeteringStations	Total number of above grade metering-regulating stations in the facility (this count will include above grade T-D transfer stations). [98.236(c)(16)(v)]
BelowGradeMeteringStations	Total number of below grade metering-regulating stations in the facility (this count will include below grade T-D transfer stations). [98.236(c)(16)(vi)]
AnnualCarbonDioxideAboveGradeTransferStations	Annual CO_2 emissions from all above grade T-D transfer stations combined in metric tons. [98.236(c)(16)(xvii)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
AnnualMethaneAboveGradeTransferStations	Annual CH_4 emissions from all above grade T-D transfer stations combined in metric tons CO_2e. [98.236(c)(16)(xvii)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
AnnualCarbonDioxideBelowGradeTransferStations	Annual CO_2 emissions from all below grade T-D transfer stations combined in metric tons. [98.236(c)(16)(xviii)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
AnnualMethaneBelowGradeTransferStations	Annual CH_4 emissions from all below grade T-D transfer stations combined in metric tons CO_2e. [98.236(c)(16)(xviii)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
AnnualCarbonDioxideAboveGradeMeteringStations	Annual CO_2 emissions from all above grade metering-regulating stations (including T-D transfer stations) combined in metric tons. [98.236(c)(16)(xix)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
AnnualMethaneAboveGradeMeteringStations	Annual CH_4 emissions from all above grade metering-regulating stations (including T-D transfer stations) combined in metric tons CO_2e. [98.236(c)(16)(xix)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
AnnualCarbonDioxideBelowGradeMeteringStations	Annual CO_2 emissions from all below grade metering-regulating stations (including T-D transfer stations) combined in metric tons. [98.236(c)(16)(xx)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
AnnualMethaneBelowGradeMeteringStations	Annual CH_4 emissions from all below grade metering-regulating stations (including T-D transfer stations) combined in metric tons CO_2e. [98.236(c)(16)(xx)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

Data Element Name	Description
AnnualCarbonDioxideDistributionMains	Annual CO_2 emissions from all distribution mains combined in metric tons. [98.236(c)(16)(xxi)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
AnnualMethaneDistributionMains	Annual CH_4 emissions from all distribution mains combined in metric tons CO_2e. [98.236(c)(16)(xxi)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
AnnualCarbonDioxideDistributionServices	Annual CO_2 emissions from all distribution services combined in metric tons. [98.236(c)(16)(xxii)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
AnnualMethaneDistributionServices	Annual CH_4 emissions from all distribution services combined in metric tons CO_2e. [98.236(c)(16)(xxii)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 52
Example for Local Distribution Companies Details (Part 2 of 3)

```
        <AboveGradeTransferStations>300</AboveGradeTransferStations>
        <YearsTransferStationsMonitored>5</YearsTransferStationsMonitored>
        <StationsMonitoredInCalendarYear>300</StationsMonitoredInCalendarYear>
        <BelowGradeTransferStations>97</BelowGradeTransferStations>
        <AboveGradeMeteringStations>1141</AboveGradeMeteringStations>
        <BelowGradeMeteringStations>498</BelowGradeMeteringStations>
        <AnnualCarbonDioxideAboveGradeTransferStations massUOM="Metric
Tons">14.0</AnnualCarbonDioxideAboveGradeTransferStations>
        <AnnualMethaneAboveGradeTransferStations massUOM="Metric
Tons">940875.0</AnnualMethaneAboveGradeTransferStations>
        <AnnualCarbonDioxideBelowGradeTransferStations massUOM="Metric
Tons">4.0</AnnualCarbonDioxideBelowGradeTransferStations>
        <AnnualMethaneBelowGradeTransferStations massUOM="Metric
Tons">247060.0</AnnualMethaneBelowGradeTransferStations>
        <AnnualCarbonDioxideAboveGradeMeteringStations massUOM="Metric
Tons">1.0</AnnualCarbonDioxideAboveGradeMeteringStations>
        <AnnualMethaneAboveGradeMeteringStations massUOM="Metric
Tons">444.0</AnnualMethaneAboveGradeMeteringStations>
        <AnnualCarbonDioxideBelowGradeMeteringStations massUOM="Metric
Tons">3.0</AnnualCarbonDioxideBelowGradeMeteringStations>
        <AnnualMethaneBelowGradeMeteringStations massUOM="Metric
Tons">2279.0</AnnualMethaneBelowGradeMeteringStations>
        <AnnualCarbonDioxideDistributionMains massUOM="Metric Tons">599.0</AnnualCarbonDioxideDistributionMains>
        <AnnualMethaneDistributionMains massUOM="Metric Tons">417614.0</AnnualMethaneDistributionMains>
        <AnnualCarbonDioxideDistributionServices massUOM="Metric Tons">203.0</AnnualCarbonDioxideDistributionServices>
<AnnualMethaneDistributionServices massUOM="Metric Tons">141567.0</AnnualMethaneDistributionServices>
```

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

Figure 56
Local Distribution Companies Details (Part 3 of 3) Schema Diagram

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 more information). In accordance with the rule, e-GGRT is not currently collecting data used as inputs to emission

- Leak factor for meter/regulator run developed in Equation W-32 of 98.233. [98.236(c)(16)(viii)]
- Number of miles of unprotected steel distribution mains. [98.236(c)(16)(ix)]
- Number of miles of protected steel distribution mains. [98.236(c)(16)(x)]
- Number of miles of plastic distribution mains. [98.236(c)(16)(xi)]
- Number of miles of cast iron distribution mains. [98.236(c)(16)(xii)]
- Number of unprotected steel distribution services. [98.236(c)(16)(xiii)]
- Number of protected steel distribution services. [98.236(c)(16)(xiv)]
- Number of plastic distribution services. [98.236(c)(16)(xv)]

- Number of copper distribution services. [98.236(c)(16)(xvi)]

Table 49
Local Distribution Companies Details (Part 3 of 3) Data Element Definitions

Data Element Name	Description
MeterRegulatorLeakFactor	**Optional:** Leak factor for meter/regulator run developed in Equation W-32 of 98.233. [98.236(c)(16)(viii)]
MilesOfUnprotectedSteelDistributionMains	**Optional:** Number of miles of unprotected steel distribution mains. [98.236(c)(16)(ix)] Set the unit of measure to "Miles" in the attribute **distanceUOM**.
MilesOfProtectedSteelDistributionMains	**Optional:** Number of miles of protected steel distribution mains. [98.236(c)(16)(x)] Set the unit of measure to "Miles" in the attribute **distanceUOM**.
MilesOfPlasticDistributionMains	**Optional:** Number of miles of plastic distribution mains. [98.236(c)(16)(xi)] Set the unit of measure to "Miles" in the attribute **distanceUOM**.
MilesOfCastIronDistributionMains	**Optional:** Number of miles of cast iron distribution mains. [98.236(c)(16)(xii)] Set the unit of measure to "Miles" in the attribute **distanceUOM**.
UnprotectedSteelDistributionServices	**Optional:** Number of unprotected steel distribution services. [98.236(c)(16)(xiii)]
ProtectedSteelDistributionServices	**Optional:** Number of protected steel distribution services. [98.236(c)(16)(xiv)]
PlasticDistributionServices	**Optional:** Number of plastic distribution services. [98.236(c)(16)(xv)]
CopperDistributionServices	**Optional:** Number of copper distribution services. [98.236(c)(16)(xvi)]

XML Excerpt 53
Example for Local Distribution Companies Details (Part 3 of 3)

```
        <ghg:MeterRegulatorLeakFactor>25.34</ghg:MeterRegulatorLeakFactor>
        <ghg:MilesOfUnprotectedSteelDistributionMains
distanceUOM="Miles">50.56</ghg:MilesOfUnprotectedSteelDistributionMains>
        <ghg:MilesOfProtectedSteelDistributionMains
distanceUOM="Miles">75.78</ghg:MilesOfProtectedSteelDistributionMains>
        <ghg:MilesOfPlasticDistributionMains distanceUOM="Miles">100.91</ghg:MilesOfPlasticDistributionMains>
        <ghg:MilesOfCastIronDistributionMains distanceUOM="Miles">125.23</ghg:MilesOfCastIronDistributionMains>
        <ghg:UnprotectedSteelDistributionServices>25</ghg:UnprotectedSteelDistributionServices>
        <ghg:ProtectedSteelDistributionServices>105</ghg:ProtectedSteelDistributionServices>
        <ghg:PlasticDistributionServices>113</ghg:PlasticDistributionServices>
        <ghg:CopperDistributionServices>200</ghg:CopperDistributionServices>
</ghg:LocalDistributionCompaniesDetails>
```

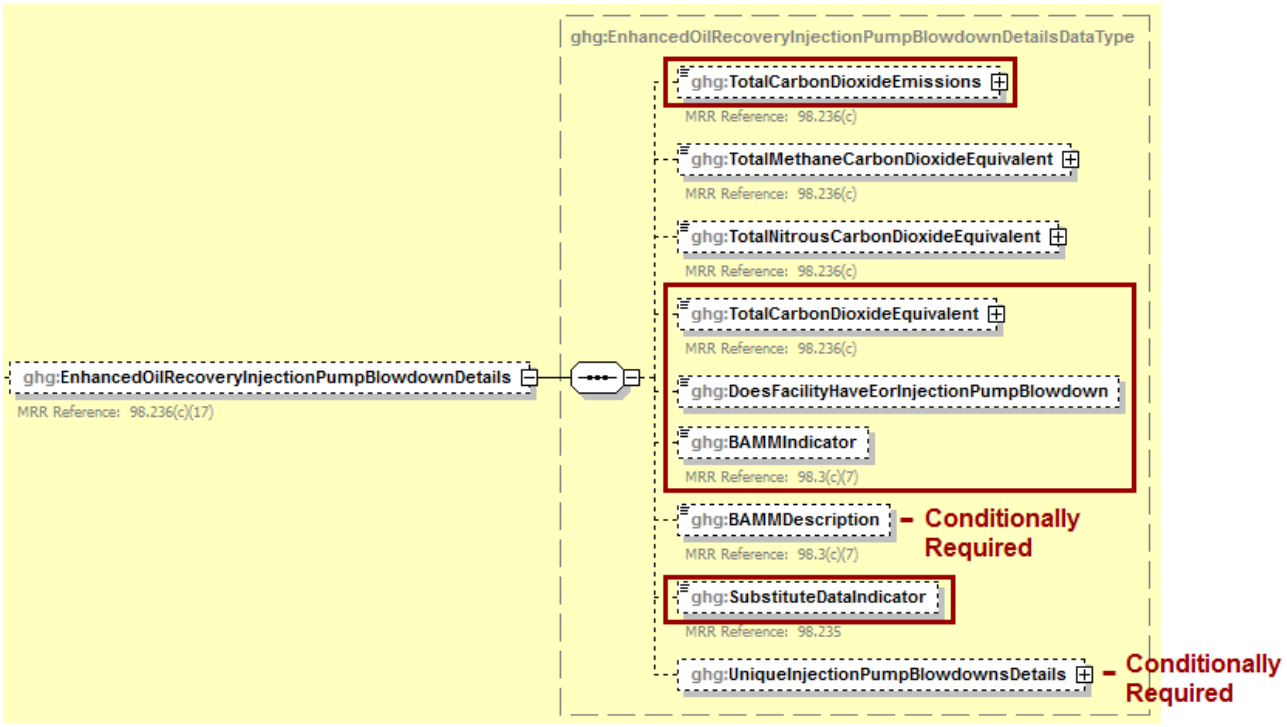
Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

20.0 Enhanced Oil Recovery (EOR) Injection Pump Blowdown

This topic provides a step-by-step description of how to report EOR injection pump blowdown information for a facility. This section is applicable to and required for the onshore petroleum and natural gas production industry segment only.

Figure 57
EOR Injection Pump Blowdown 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.

Report the following for EOR injection pump blowdown:

- The CO_2 emissions totals and the total CO_2e emissions for all EOR injection pump blowdowns combined in metric tons of CO_2e (total CO_2 emissions and total CO_2e emissions). [98.236(c)]
  Note: Report "0" if the facility did not have any enhanced oil recovery injection pump blowdown subject to reporting under 98.232 in the reporting year.
  - The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the data element "CarbonDioxideEmissions" for each EOR injection pump.
  - The value to report for "TotalCarbonDioxideEquivalent" equals the value reported for "TotalCarbonDioxideEmissions".
- Whether the facility had any enhanced oil recovery injection pump blowdown subject to reporting under 98.232 in the reporting year.

- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

Table 50
EOR Injection Pump Blowdown Details Data Element Definitions

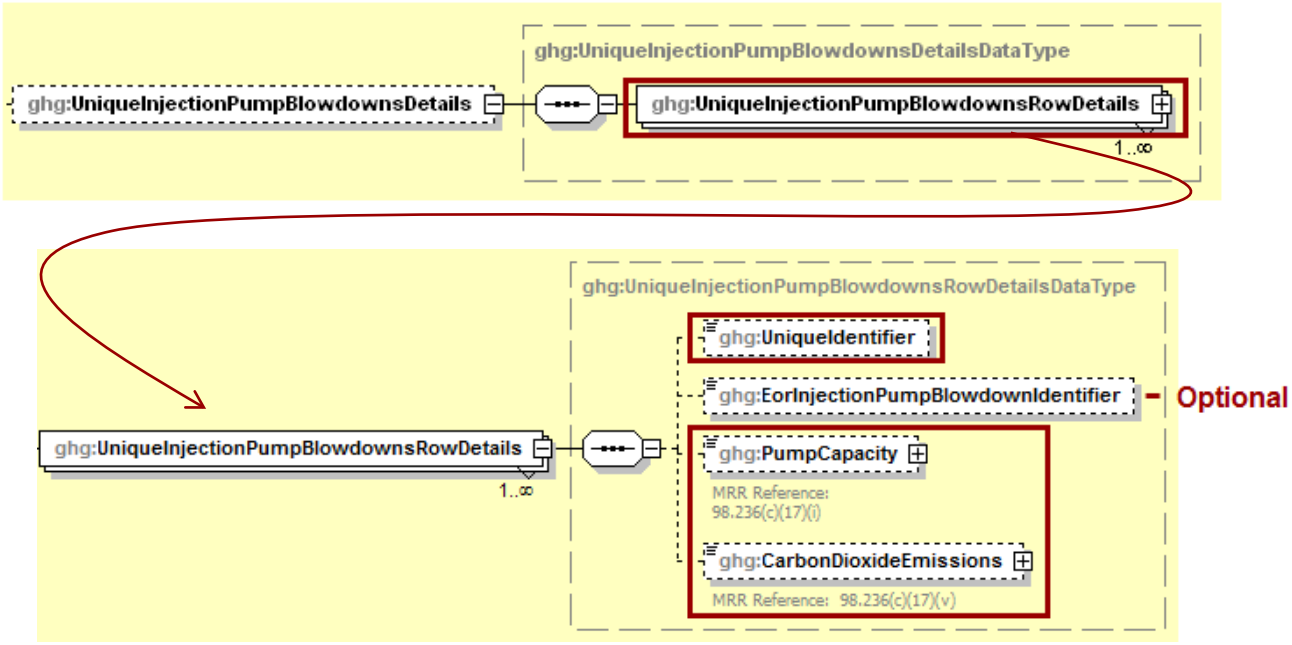
Data Element Name	Description
EnhancedOilRecoveryInjectionPumpBlowdown Details	**Parent Element:** A collection of data elements to report for enhanced oil recovery injection pump blowdown. [98.236(c)(17)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions from all EOR injection pumps combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any enhanced oil recovery injection pump blowdown subject to reporting under 98.232 in the reporting year.
TotalCarbonDioxideEquivalent	Total combined CO_2 and CH_4 emissions from all EOR injection pumps combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any enhanced oil recovery injection pump blowdown subject to reporting under 98.232 in the reporting year.
DoesFacilityHaveEorInjectionPumpBlowdown	Indicate (Yes/No) if the facility had enhanced oil recovery injection pump blowdown subject to reporting under 98.232 in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 54
Example for EOR Injection Pump Blowdown Details

```
<ghg:EnhancedOilRecoveryInjectionPumpBlowdownDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">32824.4</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">32824.4</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DoesFacilityHaveEorInjectionPumpBlowdown>Yes</ghg:DoesFacilityHaveEorInjectionPumpBlowdown>
      <ghg:BAMMIndicator>No</ghg:BAMMIndicator>
      <ghg:SubstituteDataIndicator>No</ghg:SubstituteDataIndicator>
      <ghg:UniqueInjectionPumpBlowdownsDetails>
            <See example for Unique Injection Pump Blowdowns Details>
      </ghg:UniqueInjectionPumpBlowdownsDetails>
</ghg:EnhancedOilRecoveryInjectionPumpBlowdownDetails>
```

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

Figure 58
Unique Injection Pump Blowdowns Details Schema Diagram



Note: Data elements boxed in red are required.

For each EOR injection pump (refer to Equation W-37 of 98.233), report the following [98.236(c)(17)]:

- A sequential identification number for the EOR injection pump. **Note:** This number is used for reference only in the event that there is a validation message associated with the EOR injection pump data.
- An optional identifier for the EOR injection pump.
- Pump capacity, in barrels per day. [98.236(c)(17)(i)]
- Annual CO_2 in metric tons. [98.236(c)(17)(v)]

Table 51
Unique Injection Pump Blowdowns Details Data Element Definitions

Data Element Name	Description
UniqueInjectionPumpBlowdownsDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had enhanced oil recovery injection pump blowdown subject to reporting under 98.232 in the reporting year.
UniqueInjectionPumpBlowdownsRowDetails	**Parent Element:** A collection of data elements to report for each EOR injection pump.
UniqueIdentifier	A unique ID for the EOR injection pump. Please number pumps sequentially.
EorInjectionPumpBlowdownIdentifier	**Optional:** Unique name or ID number for the EOR injection pump.
PumpCapacity	Pump capacity of the specified EOR injection pump in barrels per day. [98.236(c)(17)(i)] Set the units of measure to "barrels per day" in the attribute **volUOM**.
CarbonDioxideEmissions	Annual CO_2 emissions from the specified EOR injection pump in metric tons. [98.236(c)(17)(v)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 55
Example for Unique Injection Pump Blowdowns Details

```
    <ghg:UniqueInjectionPumpBlowdownsDetails>
        <ghg:UniqueInjectionPumpBlowdownsRowDetails>
            <ghg:UniqueIdentifier>1</ghg:UniqueIdentifier>
            <ghg:PumpCapacity volUOM="barrels per day">1058.3697</ghg:PumpCapacity>
            <ghg:CarbonDioxideEmissions massUOM="Metric Tons">16462.2</ghg:CarbonDioxideEmissions>
        </ghg:UniqueInjectionPumpBlowdownsRowDetails>
        <ghg:UniqueInjectionPumpBlowdownsRowDetails>
            <ghg:UniqueIdentifier>2</ghg:UniqueIdentifier>
            <ghg:PumpCapacity volUOM="barrels per day">1264.321</ghg:PumpCapacity>
            <ghg:CarbonDioxideEmissions massUOM="Metric Tons">16362.2</ghg:CarbonDioxideEmissions>
        </ghg:UniqueInjectionPumpBlowdownsRowDetails>
    </ghg:UniqueInjectionPumpBlowdownsDetails>
</ghg:EnhancedOilRecoveryInjectionPumpBlowdownDetails>
```

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

Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

21.0 Enhanced Oil Recovery (EOR) Hydrocarbon Liquids Dissolved CO_2

This topic provides a step-by-step description of how to report EOR hydrocarbon liquids dissolved CO_2 information for a facility. This section is applicable to and required for the onshore petroleum and natural gas production industry segment only.

Figure 59
EOR Hydrocarbon Liquids Dissolved CO_2 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 EOR hydrocarbon liquids dissolved CO_2, report the following:

- The CO_2 emissions totals and the total CO_2e emissions for all sub-basin categories combined in metric tons of CO_2e (total CO_2 emissions and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any pneumatic devices subject to reporting under 98.232 during the reporting year.
  - The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the data element "CarbonDioxideEmissions" for each sub-basin.
  - The value to report for "TotalCarbonDioxideEquivalent" equals the value reported for "TotalCarbonDioxideEmissions".
- Whether the facility had any enhanced oil recovery hydrocarbon liquids dissolved CO_2 subject to reporting under 98.232 in the reporting year.
- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and

time period BAMM was used. [98.3(c)(7)]

- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

Table 52
EOR Hydrocarbon Liquids Dissolved CO_2 Details Data Element Definitions

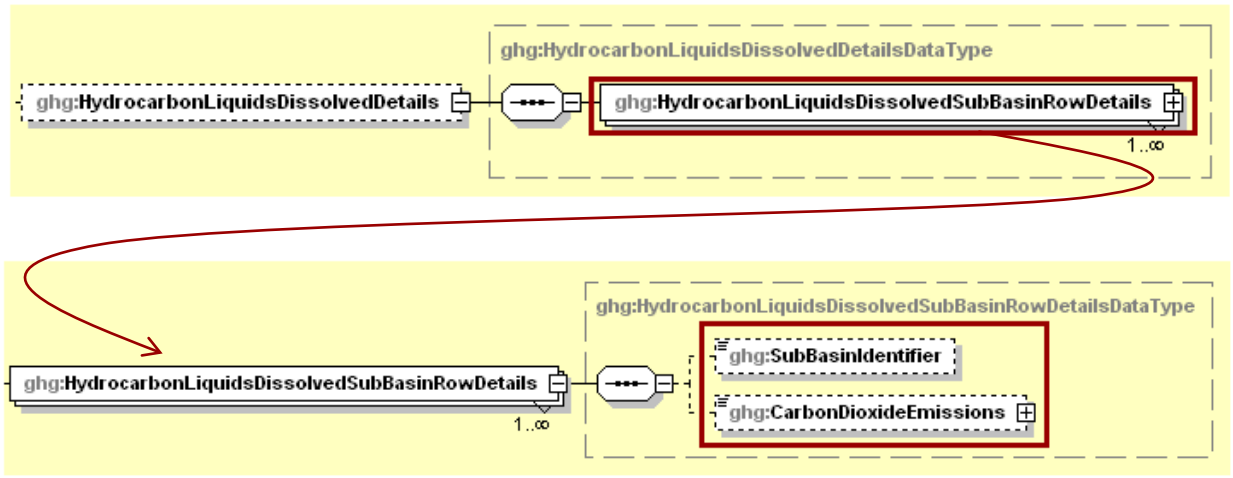
Data Element Name	Description
EnhancedOilRecoveryHydrocarbonLiquids DissolvedDetails	**Parent Element:** A collection of data elements to report for enhanced oil recovery hydrocarbon liquids dissolved CO_2. [98.236(c)(18)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions from all sub-basins reported combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any enhanced oil recovery hydrocarbon liquids dissolved CO_2 subject to reporting under 98.232 during the reporting year.
TotalCarbonDioxideEquivalent	Annual CO_2 emissions from all sub-basins reported combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any enhanced oil recovery hydrocarbon liquids dissolved CO_2 subject to reporting under 98.232 during the reporting year.
DoesFacilityHaveEorLiquidsDissolved	Indicate (Yes/No) if the facility had enhanced oil recovery hydrocarbon liquids dissolved CO_2 subject to reporting under 98.232 in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 56
Example for EOR Hydrocarbon Liquids Dissolved CO_2 Details

```
<ghg:EnhancedOilRecoveryHydrocarbonLiquidsDissolvedDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">338.7</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">338.7</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DoesFacilityHaveEorLiquidsDissolved>Yes</ghg:DoesFacilityHaveEorLiquidsDissolved>
      <ghg:BAMMIndicator>Yes</ghg:BAMMIndicator>
      <ghg:BAMMDescription>BAMM Description</ghg:BAMMDescription>
      <ghg:SubstituteDataIndicator>Yes</ghg:SubstituteDataIndicator>
      <ghg:HydrocarbonLiquidsDissolvedDetails>
            <See example for EOR Hydrocarbon Liquids Dissolved Sub-Basin CO2 Details>
      </ghg:HydrocarbonLiquidsDissolvedDetails>
</ghg:EnhancedOilRecoveryHydrocarbonLiquidsDissolvedDetails>
```

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

Figure 60
EOR Hydrocarbon Liquids Dissolved Sub-Basin CO_2 Details Schema Diagram



Note: Data elements boxed in red are required.

For EOR hydrocarbon liquids dissolved CO_2 for each sub-basin category (refer to Equation W-38 of 98.233), report the following for each sub-basin category [98.236(c)(18)]:

- The unique identity of the sub-basin category (see Sub-Basin Identification for the naming convention).
- Annual CO_2 emissions at the sub-basin level, expressed in metric tons CO_2e. [98.236(c)(18)(iii)]

Table 53
EOR Hydrocarbon Liquids Dissolved Sub-Basin CO_2 Details Data Element Definitions

Data Element Name	Description
HydrocarbonLiquidsDissolvedDetails	**Parent Element (Conditionally Required):** A collection of data elements to report for sub-basins if the facility had enhanced oil recovery hydrocarbon liquids dissolved CO_2 subject to reporting under 98.232 in the reporting year.
HydrocarbonLiquidsDissolvedSubbasinRowDetails	**Parent Element:** A collection of data elements to report for each sub-basin.
SubBasinIdentifier	Sub-basin ID. See Sub-Basin Identification for the required naming convention.
CarbonDioxideEmissions	Annual CO_2 emissions in metric tons for the specified sub-basin. [98.236(c)(18)(iii)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 57
Example for EOR Hydrocarbon Liquids Dissolved Sub-Basin CO_2 Details

```
<ghg:HydrocarbonLiquidsDissolvedDetails>
    <ghg:HydrocarbonLiquidsDissolvedSubBasinRowDetails>
        <ghg:SubBasinIdentifier>360 - ALFALFA, OK (3) - Oil</ghg:SubBasinIdentifier>
        <ghg:CarbonDioxideEmissions massUOM="Metric Tons">7.5</ghg:CarbonDioxideEmissions>
    </ghg:HydrocarbonLiquidsDissolvedSubBasinRowDetails>
    <ghg:HydrocarbonLiquidsDissolvedSubBasinRowDetails>
        <ghg:SubBasinIdentifier>360 - BACA, CO (9) - Shale gas</ghg:SubBasinIdentifier>
        <ghg:CarbonDioxideEmissions massUOM="Metric Tons">331.2</ghg:CarbonDioxideEmissions>
    </ghg:HydrocarbonLiquidsDissolvedSubBasinRowDetails>
</ghg:HydrocarbonLiquidsDissolvedDetails>
</ghg:EnhancedOilRecoveryHydrocarbonLiquidsDissolvedDetails>
```

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

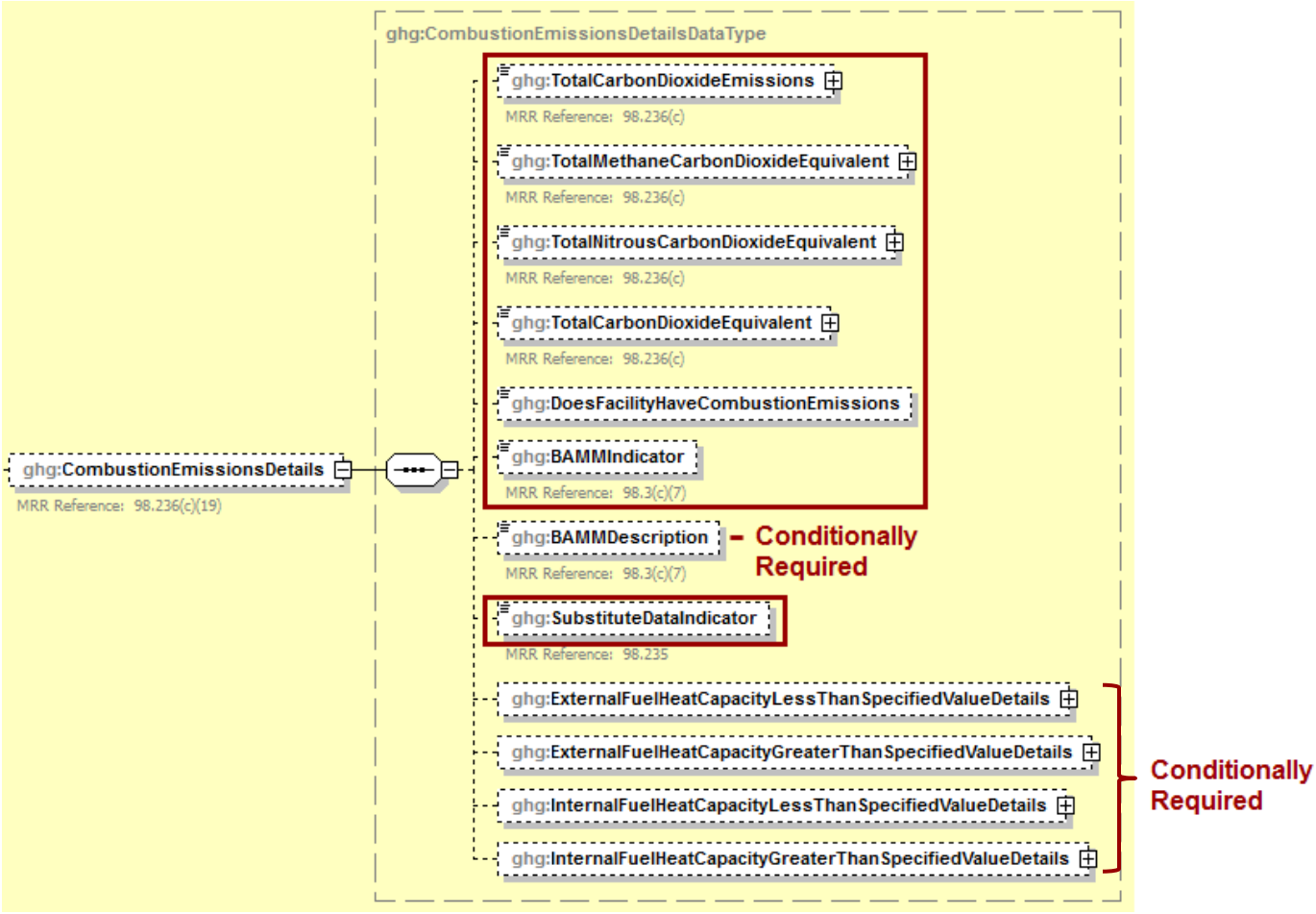
Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

22.0 Onshore Petroleum and Natural Gas Production and Natural Gas Distribution Combustion Emissions

This topic provides a step-by-step description of how to report onshore petroleum and natural gas production and natural gas distribution combustion emissions information for a facility. This section is applicable to and required for the following industry segments only:

- Onshore petroleum and natural gas production
- Natural gas distribution

Figure 61
Combustion Emissions 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 combustion emissions, report the following:

- The CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions from all combustion emissions combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e, total N_2O emissions in CO_2e and total CO_2e emissions). [98.236(c)] **Note:** Report "0" if the facility did not have any combustion emissions subject to reporting under 98.232(c)(22) during the reporting year.
  - The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the following data elements:
    - "CarbonDioxideEmissions" for each external fuel combustion unit with a heat capacity greater than 5 mmBtu/hr.
    - "CarbonDioxideEmissions" for each internal fuel combustion unit with a heat capacity greater than 1 mmBtu/hr.
  - The value to report for "TotalMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:
    - "MethaneCarbonDioxideEquivalent" for each external fuel combustion unit with a heat capacity greater than 5 mmBtu/hr.
    - "MethaneCarbonDioxideEquivalent" for each internal fuel combustion unit with a heat capacity greater than 1 mmBtu/hr.
  - The value to report for "TotalNitrousCarbonDioxideEquivalent" equals the sum of the values reported for the following data elements:
    - "NitrousCarbonDioxideEquivalent" for each external fuel combustion unit with a heat capacity greater than 5 mmBtu/hr.
    - "NitrousCarbonDioxideEquivalent" for each internal fuel combustion unit with a heat capacity greater than 1 mmBtu/hr.
  - The value to report for "TotalCarbonDioxideEquivalent" equals the sum of the values reported for "TotalCarbonDioxideEmissions", "TotalMethaneCarbonDioxideEquivalent" and "TotalNitrousCarbonDioxideEquivalent".
- Whether the facility had any combustion emissions subject to reporting under 98.232(c)(22) in the reporting year.
- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

Table 54
Combustion Emissions Details Data Element Definitions

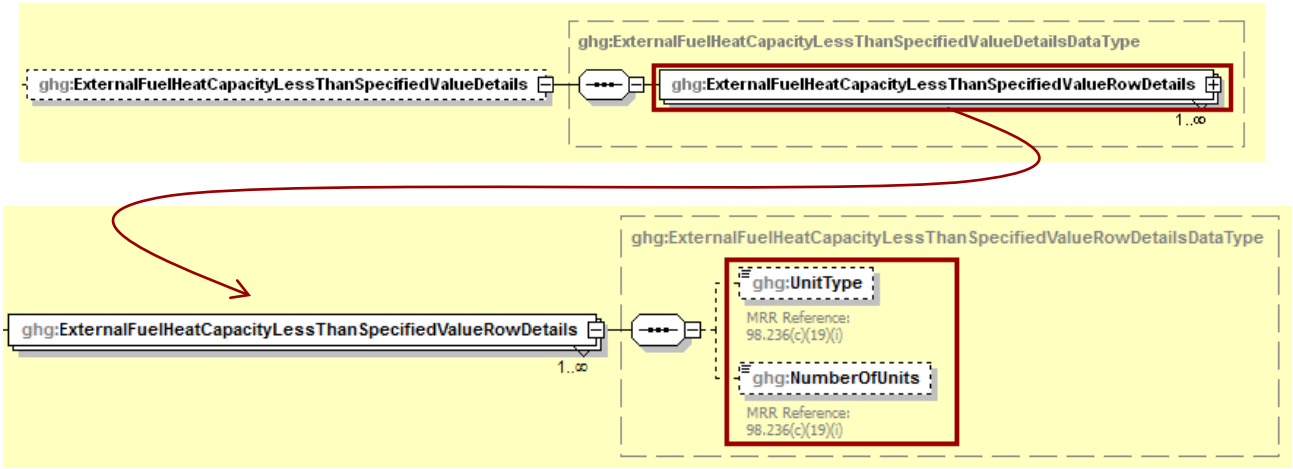
Data Element Name	Description
CombustionEmissionsDetails	**Parent Element:** A collection of data elements to report for onshore petroleum and natural gas production and natural gas distribution combustion emissions. [98.236(c)(19)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions from all units reported combined in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any combustion emissions subject to reporting under 98.232(c)(22) during the reporting year.
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions from all units reported combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any combustion emissions subject to reporting under 98.232(c)(22) during the reporting year.
TotalNitrousCarbonDioxideEquivalent	Annual N_2O emissions from all units reported combined in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any combustion emissions subject to reporting under 98.232(c)(22) during the reporting year.
TotalCarbonDioxideEquivalent	Total combined CO_2, CH_4 and N_2O emissions from all units reported combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**. **Note:** Report "0" if the facility did not have any combustion emissions subject to reporting under 98.232(c)(22) during the reporting year.
DoesFacilityHaveCombustionEmissions	Indicate (Yes/No) if the facility had combustion emissions subject to reporting under 98.232(c)(22) in the reporting year.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 58
Example for Combustion Emissions Details

```
<ghg:CombustionEmissionsDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">35.7</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">102.3</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalNitrousCarbonDioxideEquivalent massUOM="Metric
Tons">16.7</ghg:TotalNitrousCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">154.7</ghg:TotalCarbonDioxideEquivalent>
      <ghg:DoesFacilityHaveCombustionEmissions>Yes</ghg:DoesFacilityHaveCombustionEmissions>
      <ghg:BAMMIndicator>Yes</ghg:BAMMIndicator>
      <ghg:BAMMDescription>BAMM Description</ghg:BAMMDescription>
      <ghg:SubstituteDataIndicator>Yes</ghg:SubstituteDataIndicator>
      <ghg:ExternalFuelHeatCapacityLessThanSpecifiedValueDetails>
            <See example for External Fuel Combustion Unit (less than or equal to 5 mmBtu/hr) Details>
      </ghg:ExternalFuelHeatCapacityLessThanSpecifiedValueDetails>
      <ghg:ExternalFuelHeatCapacityGreaterThanSpecifiedValueDetails>
            <See example for External Fuel Combustion Unit (greater than 5 mmBtu/hr) Details>
      </ghg:ExternalFuelHeatCapacityGreaterThanSpecifiedValueDetails>
      <ghg:InternalFuelHeatCapacityLessThanSpecifiedValueDetails>
            <See example for Internal Fuel Combustion Unit (less than or equal to 1 mmBtu/hr or 130 horsepower) Details>
      </ghg:InternalFuelHeatCapacityLessThanSpecifiedValueDetails>
      <ghg:InternalFuelHeatCapacityGreaterThanSpecifiedValueDetails>
            <See example for Internal Fuel Combustion Unit (greater than 1 mmBtu/hr) Details>
      </ghg:InternalFuelHeatCapacityGreaterThanSpecifiedValueDetails>
</ghg:CombustionEmissionsDetails>
```

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

Figure 62
External Fuel Combustion Unit (less than or equal to 5 mmBtu/hr) Details Schema Diagram



Note: Data elements boxed in red are required.

For combustion emissions subject to reporting under 98.232(c)(19), report the following for each type of external fuel combustion unit with a heat capacity equal to or less than 5 mmBtu/hr [98.236(c)(19)]:

- The type of unit. [98.236(c)(19)(i)]
- The cumulative number of units of the type. [98.236(c)(19)(i)]

Table 55
External Fuel Combustion Unit (less than or equal to 5 mmBtu/hr) Details Data Element Definitions

Data Element Name	Description
ExternalFuelHeatCapacityLessThanSpecifiedValueDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any external fuel combustion units with a heat capacity equal to or less than 5 mmBtu/hr subject to reporting under 98.232(c)(22) in the reporting year.
ExternalFuelHeatCapacityLessThanSpecifiedValueRowDetails	**Parent Element:** A collection of data elements to report for each type of external fuel combustion unit with a heat capacity equal to or less than 5 mmBtu/hr.

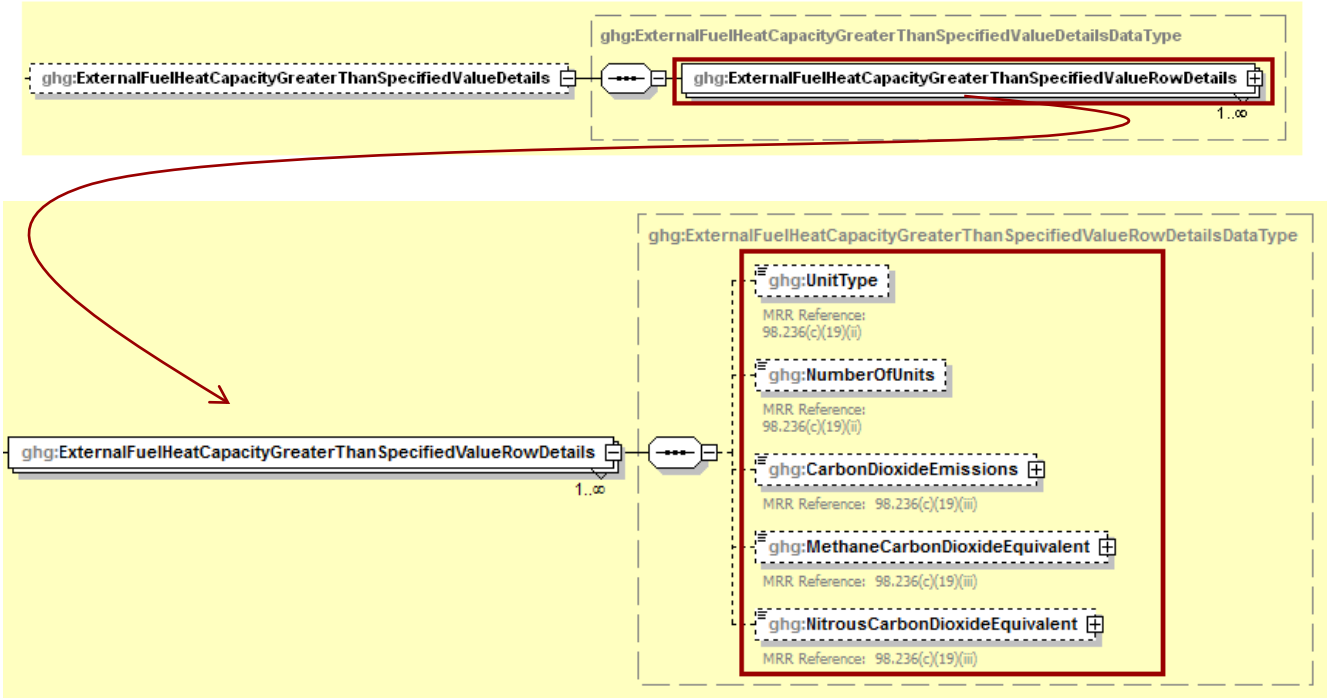
Data Element Name	Description
UnitType	Type of unit. See list of allowable values. [98.236(c)(19)(i)] Well drilling and completion equipment Workover equipment Natural gas dehydrators Steam boilers Process heaters
NumberOfUnits	Number of units of the type specified. [98.236(c)(19)(i)]

XML Excerpt 59
Example for External Fuel Combustion Unit (less than or equal to 5 mmBtu/hr) Details

```
<ghg:ExternalFuelHeatCapacityLessThanSpecifiedValueDetails>
      <ghg:ExternalFuelHeatCapacityLessThanSpecifiedValueRowDetails>
            <ghg:UnitType>Steam boilers</ghg:UnitType>
            <ghg:NumberOfUnits>17</ghg:NumberOfUnits>
      </ghg:ExternalFuelHeatCapacityLessThanSpecifiedValueRowDetails>
      <ghg:ExternalFuelHeatCapacityLessThanSpecifiedValueRowDetails>
            <ghg:UnitType>Natural gas dehydrators</ghg:UnitType>
            <ghg:NumberOfUnits>23</ghg:NumberOfUnits>
      </ghg:ExternalFuelHeatCapacityLessThanSpecifiedValueRowDetails>
</ghg:ExternalFuelHeatCapacityLessThanSpecifiedValueDetails>
```

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

Figure 63
External Fuel Combustion Unit (greater than 5 mmBtu/hr) Details Schema Diagram



Note: Data elements boxed in red are required.

For combustion emissions subject to reporting under 98.232(c)(19), report the following for each type of external fuel combustion unit with a heat capacity greater than 5 mmBtu/hr [98.236(c)(19)]:

- The type of unit. [98.236(c)(19)(ii)]
- The cumulative number of units of the type. [98.236(c)(19)(ii)]
- The annual CO_2, CH_4 and N_2O emissions from the type of unit, expressed in metric tons CO_2e for each gas. [98.236(c)(19)(iii)]

Table 56
External Fuel Combustion Unit (greater than 5 mmBtu/hr) Details Data Element Definitions

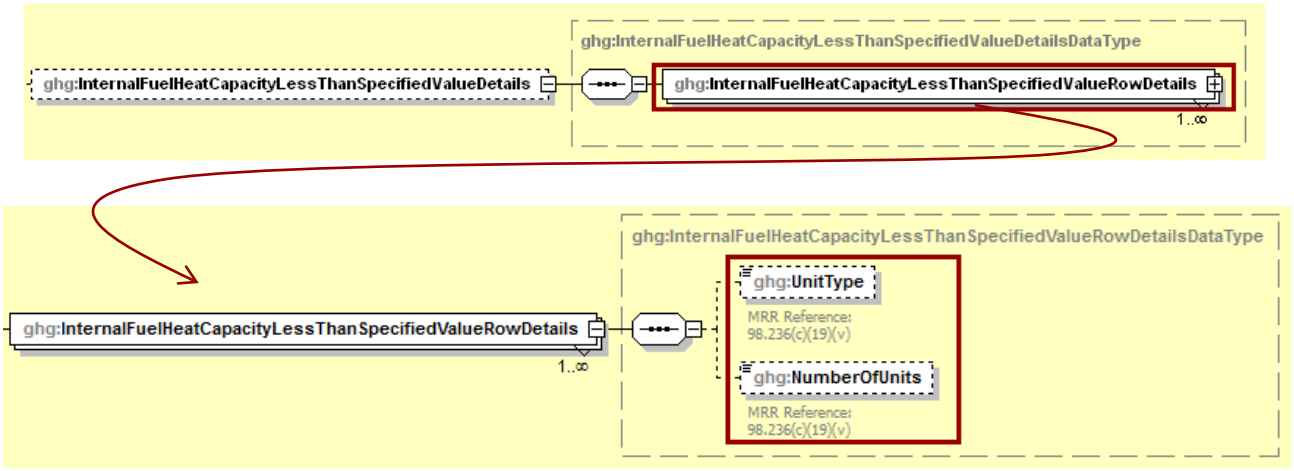
Data Element Name	Description
ExternalFuelHeatCapacityGreaterThanSpecifiedValueDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any external fuel combustion units with a heat capacity greater than 5 mmBtu/hr subject to reporting under 98.232(c)(22) in the reporting year.
ExternalFuelHeatCapacityGreaterThanSpecifiedValueRowDetails	**Parent Element:** A collection of data elements to report for each type of external fuel combustion unit with a heat capacity greater than 5 mmBtu/hr.
UnitType	Type of unit. See list of allowable values. [98.236(c)(19)(ii)] Well drilling and completion equipment Workover equipment Natural gas dehydrators Steam boilers Process heaters
NumberOfUnits	Number of units of the type specified. [98.236(c)(19)(ii)]
CarbonDioxideEmissions	Annual CO_2 emissions from the specified type of unit in metric tons. [98.236(c)(19)(iii)] Set the units of measure to “Metric Tons” in the attribute **massUOM**.
MethaneCarbonDioxideEquivalent	Annual CH_4 emissions from the specified type of unit in metric tons CO_2e. [98.236(c)(19)(iii)] Set the units of measure to “Metric Tons” in the attribute **massUOM**.
NitrousCarbonDioxideEquivalent	Annual N_2O emissions from the specified type of unit in metric tons CO_2e. [98.236(c)(19)(iii)] Set the units of measure to “Metric Tons” in the attribute **massUOM**.

XML Excerpt 60
Example for External Fuel Combustion Unit (greater than 5 mmBtu/hr) Details

```
<ghg:ExternalFuelHeatCapacityGreaterThanSpecifiedValueDetails>
      <ghg:ExternalFuelHeatCapacityGreaterThanSpecifiedValueRowDetails>
            <ghg:UnitType>Process heaters</ghg:UnitType>
            <ghg:NumberOfUnits>41</ghg:NumberOfUnits>
            <ghg:CarbonDioxideEmissions massUOM="Metric Tons">6.1</ghg:CarbonDioxideEmissions>
            <ghg:MethaneCarbonDioxideEquivalent massUOM="Metric Tons">15.2</ghg:MethaneCarbonDioxideEquivalent>
            <ghg:NitrousCarbonDioxideEquivalent massUOM="Metric Tons">3.9</ghg:NitrousCarbonDioxideEquivalent>
      </ghg:ExternalFuelHeatCapacityGreaterThanSpecifiedValueRowDetails>
      <ghg:ExternalFuelHeatCapacityGreaterThanSpecifiedValueRowDetails>
            <ghg:UnitType>Steam boilers </ghg:UnitType>
            <ghg:NumberOfUnits>54</ghg:NumberOfUnits>
            <ghg:CarbonDioxideEmissions massUOM="Metric Tons">6.2</ghg:CarbonDioxideEmissions>
            <ghg:MethaneCarbonDioxideEquivalent massUOM="Metric Tons">30.4</ghg:MethaneCarbonDioxideEquivalent>
            <ghg:NitrousCarbonDioxideEquivalent massUOM="Metric Tons">3.9</ghg:NitrousCarbonDioxideEquivalent>
      </ghg:ExternalFuelHeatCapacityGreaterThanSpecifiedValueRowDetails>
</ghg:ExternalFuelHeatCapacityGreaterThanSpecifiedValueDetails>
```

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

Figure 64
Internal Fuel Combustion Unit (less than or equal to 1 mmBtu/hr or 130 horsepower) Details Schema Diagram



Note: Data elements boxed in red are required.

For combustion emissions subject to reporting under 98.232(c)(19), report the following for each type of internal fuel combustion unit with a heat capacity equal to or less than 1 mmBtu/hr or 130 horsepower [98.236(c)(19)]:

- The type of unit. [98.236(c)(19)(v)]
- The cumulative number of units of the type. [98.236(c)(19)(v)]

Table 57
Internal Fuel Combustion Unit (less than or equal to 1 mmBtu/hr or 130 horsepower) Details Data Element Definitions

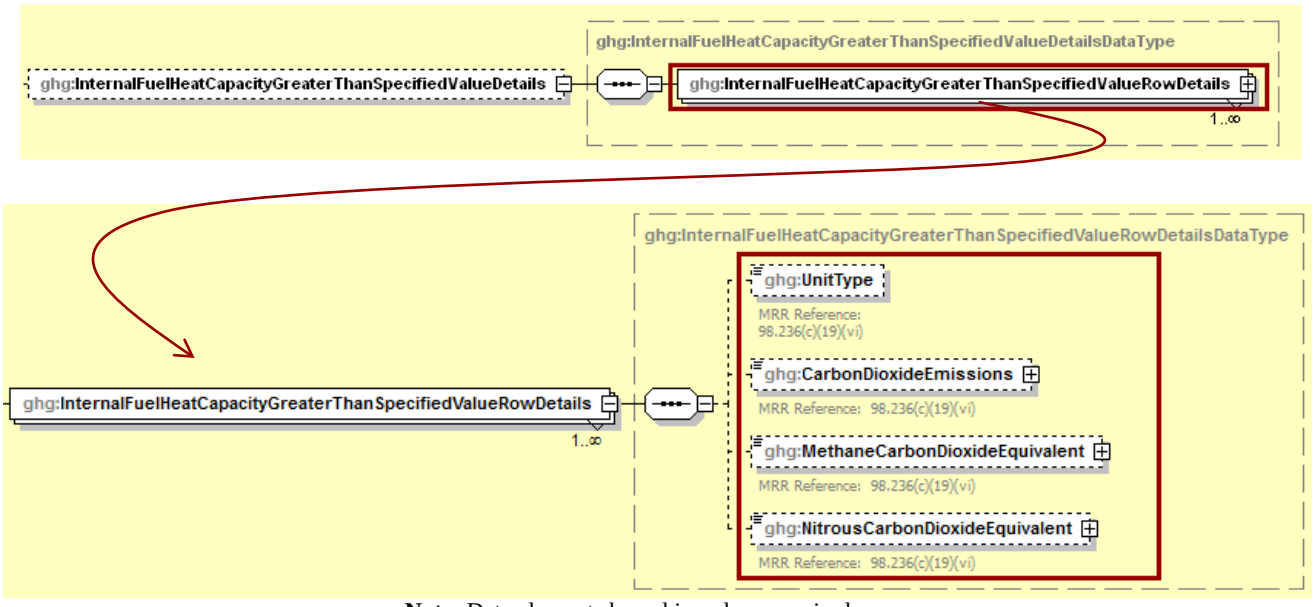
Data Element Name	Description
InternalFuelHeatCapacityLessThanSpecifiedValueDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any internal fuel combustion units with a heat capacity equal to or less than 1 mmBtu/hr or 130 horsepower subject to reporting under 98.232(c)(22) in the reporting year.
InternalFuelHeatCapacityLessThanSpecifiedValueRowDetails	**Parent Element:** A collection of data elements to report for each type of internal fuel combustion unit with a heat capacity equal to or less than 1 mmBtu/hr or 130 horsepower.
UnitType	Type of unit. See list of allowable values. [98.236(c)(19)(v)] Well drilling and completion equipment Workover equipment Electrical generators
NumberOfUnits	Number of units of the type specified. [98.236(c)(19)(v)]

XML Excerpt 61
Example for Internal Fuel Combustion Unit (less than or equal to 1 mmBtu/hr or 130 horsepower) Details

```
<ghg:InternalFuelHeatCapacityLessThanSpecifiedValueDetails>
    <ghg:InternalFuelHeatCapacityLessThanSpecifiedValueRowDetails>
        <ghg:UnitType>Workover equipment</ghg:UnitType>
        <ghg:NumberOfUnits>22</ghg:NumberOfUnits>
    </ghg:InternalFuelHeatCapacityLessThanSpecifiedValueRowDetails>
    <ghg:InternalFuelHeatCapacityLessThanSpecifiedValueRowDetails>
        <ghg:UnitType>Electrical generators</ghg:UnitType>
        <ghg:NumberOfUnits>44</ghg:NumberOfUnits>
    </ghg:InternalFuelHeatCapacityLessThanSpecifiedValueRowDetails>
</ghg:InternalFuelHeatCapacityLessThanSpecifiedValueDetails>
```

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

Figure 65
Internal Fuel Combustion Unit (greater than 1 mmBtu/hr) Details Schema Diagram



Note: Data elements boxed in red are required.

For combustion emissions subject to reporting under 98.232(c)(19), report the following for each type of internal fuel combustion unit with a heat capacity greater than 1 mmBtu/hr [98.236(c)(19)]:

- The type of unit. [98.236(c)(19)](vi)]
- The annual CO_2, CH_4 and N_2O emissions from the type of unit, expressed in metric tons CO_2e for each gas. [98.236(c)(19)](vi)]

Table 58
Internal Fuel Combustion Unit (greater than 1 mmBtu/hr) Details Data Element Definitions

Data Element Name	Description
InternalFuelHeatCapacityGreaterThanSpecifiedValueDetails	**Parent Element (Conditionally Required):** A collection of data elements to report if the facility had any internal fuel combustion units with a heat capacity greater than 1 mmBtu/hr subject to reporting under 98.232(c)(22) in the reporting year.
InternalFuelHeatCapacityGreaterThanSpecifiedValueRowDetails	**Parent Element:** A collection of data elements to report for each type of internal fuel combustion unit with a heat capacity greater than 1 mmBtu/hr.

Data Element Name	Description
UnitType	Type of unit. See list of allowable values. [98.236(c)(19)(vi)] Well drilling and completion equipment Workover equipment Natural gas compressors Electrical generators
CarbonDioxideEmissions	Annual CO_2 emissions from the specified type of unit in metric tons. [98.236(c)(19)(vi)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
MethaneCarbonDioxideEquivalent	Annual CH_4 emissions from the specified type of unit in metric tons CO_2e. [98.236(c)(19)(vi)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
NitrousCarbonDioxideEquivalent	Annual N_2O emissions from the specified type of unit in metric tons CO_2e. [98.236(c)(19)(vi)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 62
Example for Internal Fuel Combustion Unit (greater than 1 mmBtu/hr) Details

```
      <ghg:InternalFuelHeatCapacityGreaterThanSpecifiedValueDetails>
            <ghg:InternalFuelHeatCapacityGreaterThanSpecifiedValueRowDetails>
                  <ghg:UnitType>Electrical generators</ghg:UnitType>
                  <ghg:CarbonDioxideEmissions massUOM="Metric Tons">11.5</ghg:CarbonDioxideEmissions>
                  <ghg:MethaneCarbonDioxideEquivalent massUOM="Metric
Tons">28.0</ghg:MethaneCarbonDioxideEquivalent>
                  <ghg:NitrousCarbonDioxideEquivalent massUOM="Metric
Tons">4.1</ghg:NitrousCarbonDioxideEquivalent>
            </ghg:InternalFuelHeatCapacityGreaterThanSpecifiedValueRowDetails>
            <ghg:InternalFuelHeatCapacityGreaterThanSpecifiedValueRowDetails>
                  <ghg:UnitType>Workover equipment</ghg:UnitType>
                  <ghg:CarbonDioxideEmissions massUOM="Metric Tons">11.9</ghg:CarbonDioxideEmissions>
                  <ghg:MethaneCarbonDioxideEquivalent massUOM="Metric
Tons">28.7</ghg:MethaneCarbonDioxideEquivalent>
                  <ghg:NitrousCarbonDioxideEquivalent massUOM="Metric
Tons">4.8</ghg:NitrousCarbonDioxideEquivalent>
            </ghg:InternalFuelHeatCapacityGreaterThanSpecifiedValueRowDetails>
      </ghg:InternalFuelHeatCapacityGreaterThanSpecifiedValueDetails>
</ghg:CombustionEmissionsDetails>
```

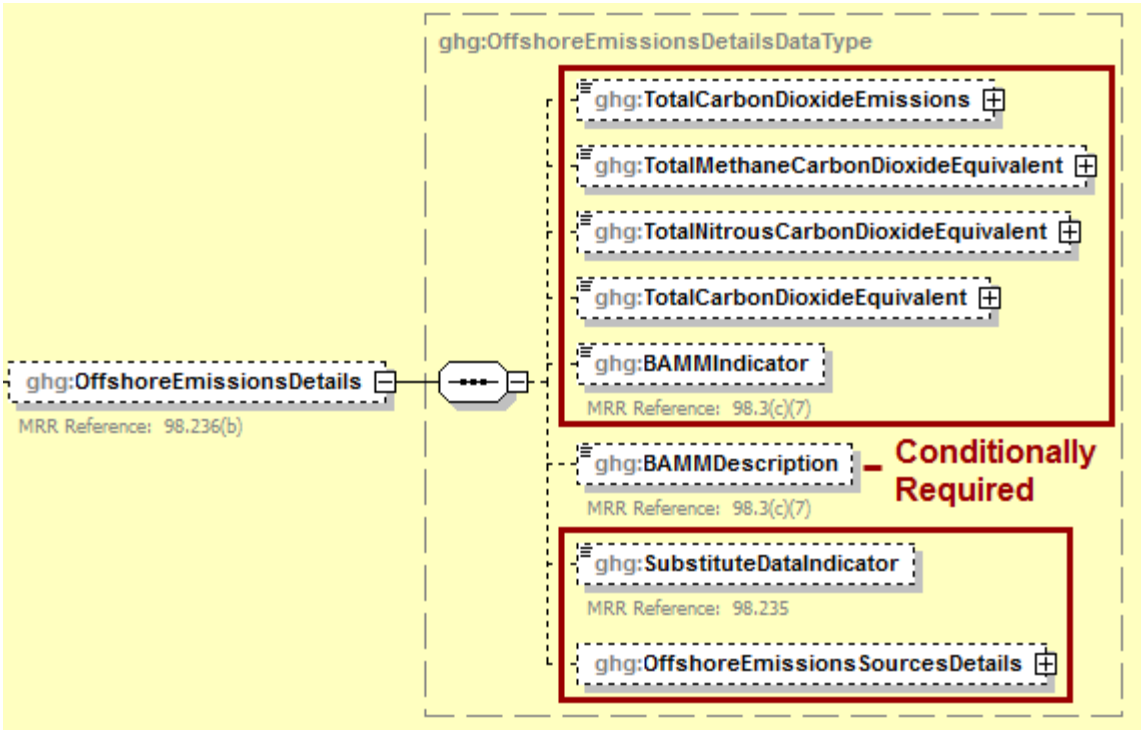
Note: The code excerpt above is presented here to demonstrate the concept of reporting greenhouse gas emissions data.

Please see Required Sources to Report by Industry Segment for additional source types applicable to and required for each industry segment.

23.0 Offshore Sources [98.236(b)]

This topic provides a step-by-step description of how to report offshore sources information for a facility. This section is applicable to and required for the offshore petroleum and natural gas production industry segment only.

Figure 66
Offshore Emissions 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 offshore emissions, report the following:

- The CO_2, CH_4 and N_2O emissions totals and the total CO_2e emissions for all offshore emissions sources combined in metric tons of CO_2e (total CO_2 emissions, total CH_4 emissions in CO_2e, total N_2O emissions in CO_2e and total CO_2e emissions). [98.236(c)]
  - The value to report for "TotalCarbonDioxideEmissions" equals the sum of the values reported for the data element "CarbonDioxideEmissions" for each emission source.
  - The value to report for "TotalMethaneCarbonDioxideEquivalent" equals the sum of the values reported for the data element "MethaneCarbonDioxideEquivalent" for each emission source.
  - The value to report for "TotalNitrousCarbonDioxideEquivalent" equals the sum of the values reported for the data element "NitrousCarbonDioxideEquivalent" for each emission source.

- The value to report for "TotalCarbonDioxideEquivalent" equals the sum of the values reported for "TotalCarbonDioxideEmissions", "TotalMethaneCarbonDioxideEquivalent" and "TotalNitrousCarbonDioxideEquivalent".

- Whether BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
- If BAMM were used, a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
- Whether missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

Table 59
Offshore Emissions Details Data Element Definitions

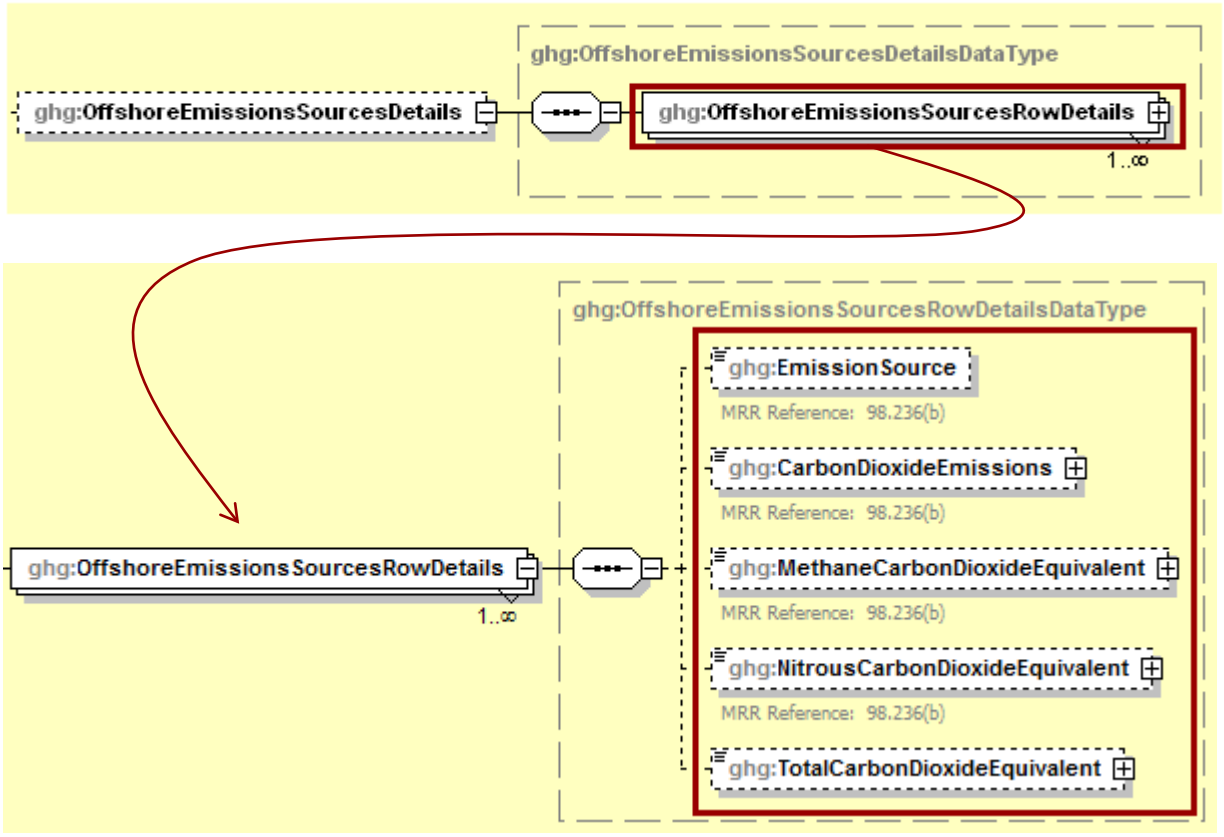
Data Element Name	Description
OffshoreEmissionsDetails	**Parent Element:** A collection of data elements to report for Total Emissions from Offshore Source Emissions. [98.236(b)]
TotalCarbonDioxideEmissions	Annual CO_2 emissions from all sources combined in metric tons. [98.236(a)(2)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalMethaneCarbonDioxideEquivalent	Annual CH_4 emissions from all sources combined in metric tons CO_2e. [98.236(a)(2)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalNitrousCarbonDioxideEquivalent	Annual N_2O emissions from all sources combined in metric tons CO_2e. [98.236(a)(2)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalCarbonDioxideEquivalent	Total combined CO_2, CH_4 and N_2O emissions from all sources combined in metric tons CO_2e. Set the units of measure to "Metric Tons" in the attribute **massUOM**.
BAMMIndicator	Indicate (Yes/No) if BAMM were used for any parameters to calculate GHG emissions. [98.3(c)(7)]
BAMMDescription	**Conditionally Required:** If BAMM were used, provide a brief description of the BAMM used, parameters measured by BAMM and time period BAMM was used. [98.3(c)(7)]
SubstituteDataIndicator	Indicate (Yes/No) if missing data procedures were used for any parameters to calculate GHG emissions. [98.235]

XML Excerpt 63
Example for Subpart W Source Reporting Details

```
<ghg:OffshoreEmissionsDetails>
      <ghg:TotalCarbonDioxideEmissions massUOM="Metric Tons">5454.6</ghg:TotalCarbonDioxideEmissions>
      <ghg:TotalMethaneCarbonDioxideEquivalent massUOM="Metric
Tons">3232.4</ghg:TotalMethaneCarbonDioxideEquivalent>
      <ghg:TotalNitrousCarbonDioxideEquivalent massUOM="Metric Tons
>1010.9</ghg:TotalNitrousCarbonDioxideEquivalent>
      <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">9697.9</ghg:TotalCarbonDioxideEquivalent>
      <ghg:BAMMIndicator>Yes</ghg:BAMMIndicator>
      <ghg:BAMMDescription>BAMM Description</ghg:BAMMDescription>
      <ghg:SubstituteDataIndicator>Yes</ghg:SubstituteDataIndicator>
      <ghg:OffshoreEmissionsSourcesDetails>
            <See example for Offshore Emissions Sources Details>
      </ghg:OffshoreEmissionsSourcesDetails>
</ghg:OffshoreEmissionsDetails>
```

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

Figure 67
Offshore Emissions Sources Details Schema Diagram



Note: Data elements boxed in red are required.

For offshore petroleum and natural gas production, report under Subpart W the emissions of CH_4, CO_2 and N_2O as applicable to the source type (in metric tons CO_2e per year at standard conditions) individually for all of the emissions source types listed in the most recent BOEMRE study except for combustion emission source types [98.236(b)]:

Offshore production facilities under BOEMRE jurisdiction shall report the same annual emissions as calculated and reported by BOEMRE in data collection and emissions estimation study published by BOEMRE referenced in 30 CFR 250.302 through 304 (GOADS). For any calendar year that does not overlap with the most recent BOEMRE emissions study publication year, report the most recent BOEMRE reported emissions data published by BOEMRE referenced in 30 CFR 250.302 through 304 (GOADS). Adjust emissions based on the operating time for the facility relative to the operating time in the most recent BOEMRE published study. [98.233(s)(1)(i), 98.233(s)(2)(i)]

Offshore production facilities that are not under BOEMRE jurisdiction shall use monitoring methods and calculation methodologies published by BOEMRE referenced in 30 CFR 250.302 through 304 to calculate and report emissions (GOADS). For any calendar year that does not overlap with the most recent BOEMRE emissions study publication, report the most recent reported emissions data with emissions adjusted based on the operating time for the facility relative to operating time in the previous reporting period. [98.233(s)(1)(i), 98.233(s)(2)(i)]

Note: Combustion emissions other than flaring must be reported under Subpart C.

Table 60
Offshore Emissions Sources Details Data Element Definitions

Data Element Name	Description
OffshoreEmissionsSourcesDetails	**Parent Element:** A collection of data elements to report for offshore petroleum and natural gas production facilities. [98.236(b)]
OffshoreEmissionsSourcesRowDetails	**Parent Element:** A collection of data elements to report for each applicable offshore emissions source. Report data for each source separately.
EmissionSource	Emission source. See the list of allowable values. [98.236(b)] Amine Unit Combustion Flares - Light Smoke - No Pilot Fuel-flaring Combustion Flares - Light Smoke - Pilot Fuel - pilot Combustion Flares - Light Smoke - Pilot Fuel-flaring Combustion Flares - Medium Smoke - No Pilot Fuel - flaring Combustion Flares - Medium Smoke - Pilot Fuel - flaring Combustion Flares - Medium Smoke - Pilot Fuel - pilot Combustion Flares - No Smoke - No Pilot Fuel - flaring Combustion Flares - No Smoke - Pilot Fuel - flaring Combustion Flares - No Smoke - Pilot Fuel - pilot

Data Element Name	Description
	Fugitives - Compressor centrifugal dry - gas Fugitives - Compressor centrifugal dry - NG liq Fugitives - Compressor centrifugal dry - heavy oil Fugitives - Compressor centrifugal dry - light oil Fugitives - Compressor centrifugal dry - oil/water Fugitives - Compressor centrifugal dry - oil/water/gas Fugitives - Compressor centrifugal wet - gas Fugitives - Compressor centrifugal wet - NG liq Fugitives - Compressor centrifugal wet - heavy oil Fugitives - Compressor centrifugal wet - light oil Fugitives - Compressor centrifugal wet - oil/water Fugitives - Compressor centrifugal wet - oil/water/gas Fugitives - Compressor reciprocating - gas Fugitives - Compressor reciprocating - NG liq Fugitives - Compressor reciprocating - heavy oil Fugitives - Compressor reciprocating - light oil Fugitives - Compressor reciprocating - oil/water Fugitives - Compressor reciprocating - oil/water/gas Fugitives - Connectors - gas Fugitives - Connectors - NG liq Fugitives - Connectors - heavy oil Fugitives - Connectors - light oil Fugitives - Connectors - oil/water Fugitives - Connectors - oil/water/gas Fugitives - Flanges - gas Fugitives - Flanges - NG liq Fugitives - Flanges - heavy oil Fugitives - Flanges - light oil Fugitives - Flanges - oil/water Fugitives - Flanges - oil/water/gas Fugitives - Open-Ended Lines - gas Fugitives - Open-Ended Lines - NG liq Fugitives - Open-Ended Lines - heavy oil Fugitives - Open-Ended Lines - light oil Fugitives - Open-Ended Lines - oil/water Fugitives - Open-Ended Lines - oil/water/gas Fugitives - Other Equipment - gas Fugitives - Other Equipment - NG liq Fugitives - Other Equipment - heavy oil Fugitives - Other Equipment - light oil

Data Element Name	Description
	Fugitives - Other Equipment - oil/water Fugitives - Other Equipment - oil/water/gas Fugitives - Pumps - gas Fugitives - Pumps - NG liq Fugitives - Pumps - heavy oil Fugitives - Pumps - light oil Fugitives - Pumps - oil/water Fugitives - Pumps - oil/water/gas Fugitives - Valves - gas Fugitives - Valves - NG liq Fugitives - Valves - heavy oil Fugitives - Valves - light oil Fugitives - Valves - oil/water Fugitives - Valves - oil/water/gas Glycol Dehydrator Unit Losses from Flashing Mud Degassing - oil-based muds Mud Degassing - water-based muds Mud Degassing - synthetic-based muds Pneumatic Pump Pressure/Level Controllers Storage Tank Operations - crude oil Storage Tank Operations - condensate Cold Vent
CarbonDioxideEmissions	Annual CO_2 emissions from the specified source at standard conditions in metric tons. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
MethaneCarbonDioxideEquivalent	Annual CH_4 emissions from the specified source at standard conditions in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
NitrousCarbonDioxideEquivalent	Annual N_2O emissions from the specified source at standard conditions in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.
TotalCarbonDioxideEquivalent	Total combined CO_2, CH_4 and N_2O emissions for the specified source at standard conditions in metric tons CO_2e. [98.236(c)] Set the units of measure to "Metric Tons" in the attribute **massUOM**.

XML Excerpt 64
Example for Offshore Emissions Sources Details

```
      <ghg:OffshoreEmissionsSourcesDetails>
            <ghg:OffshoreEmissionsSourcesRowDetails>
                  <ghg:EmissionSource>Amine gas sweetening unit</ghg:EmissionSource>
                  <ghg:CarbonDioxideEmissions massUOM="Metric Tons">98.7</ghg:CarbonDioxideEmissions>
                  <ghg:MethaneCarbonDioxideEquivalent massUOM="Metric
Tons">87.6</ghg:MethaneCarbonDioxideEquivalent>
                  <ghg:NitrousCarbonDioxideEquivalent massUOM="Metric
Tons">76.5</ghg:NitrousCarbonDioxideEquivalent>
                  <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">262.8</ghg:TotalCarbonDioxideEquivalent>
            </ghg:OffshoreEmissionsSourcesRowDetails>
            <ghg:OffshoreEmissionsSourcesRowDetails>
                  <ghg:EmissionSource>Minor source, caisson</ghg:EmissionSource>
                  <ghg:CarbonDioxideEmissions massUOM="Metric Tons">98.7</ghg:CarbonDioxideEmissions>
                  <ghg:MethaneCarbonDioxideEquivalent massUOM="Metric
Tons">87.6</ghg:MethaneCarbonDioxideEquivalent>
                  <ghg:NitrousCarbonDioxideEquivalent massUOM="Metric
Tons">76.5</ghg:NitrousCarbonDioxideEquivalent>
                  <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">262.8</ghg:TotalCarbonDioxideEquivalent>
            </ghg:OffshoreEmissionsSourcesRowDetails>
            <ghg:OffshoreEmissionsSourcesRowDetails>
                  <ghg:EmissionSource>Flare: light smoke, no continuous pilot, flare</ghg:EmissionSource>
                  <ghg:CarbonDioxideEmissions massUOM="Metric Tons">98.7</ghg:CarbonDioxideEmissions>
                  <ghg:MethaneCarbonDioxideEquivalent massUOM="Metric
Tons">87.6</ghg:MethaneCarbonDioxideEquivalent>
                  <ghg:NitrousCarbonDioxideEquivalent massUOM="Metric
Tons">76.5</ghg:NitrousCarbonDioxideEquivalent>
                  <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">262.8</ghg:TotalCarbonDioxideEquivalent>
            </ghg:OffshoreEmissionsSourcesRowDetails>
            <ghg:OffshoreEmissionsSourcesRowDetails>
                  <ghg:EmissionSource>Flare: light smoke, with continuous pilot, flare</ghg:EmissionSource>
                  <ghg:CarbonDioxideEmissions massUOM="Metric Tons">98.7</ghg:CarbonDioxideEmissions>
                  <ghg:MethaneCarbonDioxideEquivalent massUOM="Metric
Tons">87.6</ghg:MethaneCarbonDioxideEquivalent>
                  <ghg:NitrousCarbonDioxideEquivalent massUOM="Metric
Tons">76.5</ghg:NitrousCarbonDioxideEquivalent>
                  <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">262.8</ghg:TotalCarbonDioxideEquivalent>
            </ghg:OffshoreEmissionsSourcesRowDetails>
            <ghg:OffshoreEmissionsSourcesRowDetails>
                  <ghg:EmissionSource>Flare: light smoke, with continuous pilot, pilot</ghg:EmissionSource>
                  <ghg:CarbonDioxideEmissions massUOM="Metric Tons">98.7</ghg:CarbonDioxideEmissions>
                  <ghg:MethaneCarbonDioxideEquivalent massUOM="Metric
Tons">87.6</ghg:MethaneCarbonDioxideEquivalent>
                  <ghg:NitrousCarbonDioxideEquivalent massUOM="Metric
Tons">76.5</ghg:NitrousCarbonDioxideEquivalent>
                  <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">262.8</ghg:TotalCarbonDioxideEquivalent>
            </ghg:OffshoreEmissionsSourcesRowDetails>
            <ghg:OffshoreEmissionsSourcesRowDetails>
                  <ghg:EmissionSource>Flare: medium smoke, with continuous pilot, flare</ghg:EmissionSource>
                  <ghg:CarbonDioxideEmissions massUOM="Metric Tons">98.7</ghg:CarbonDioxideEmissions>
                  <ghg:MethaneCarbonDioxideEquivalent massUOM="Metric
Tons">87.6</ghg:MethaneCarbonDioxideEquivalent>
                  <ghg:NitrousCarbonDioxideEquivalent massUOM="Metric
Tons">76.5</ghg:NitrousCarbonDioxideEquivalent>
                  <ghg:TotalCarbonDioxideEquivalent massUOM="Metric Tons">262.8</ghg:TotalCarbonDioxideEquivalent>
            </ghg:OffshoreEmissionsSourcesRowDetails>
          </ghg:OffshoreEmissionsSourcesDetails>
</ghg:OffshoreEmissionsDetails>
```

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

24.0 Facility-Level Roll-up Emissions

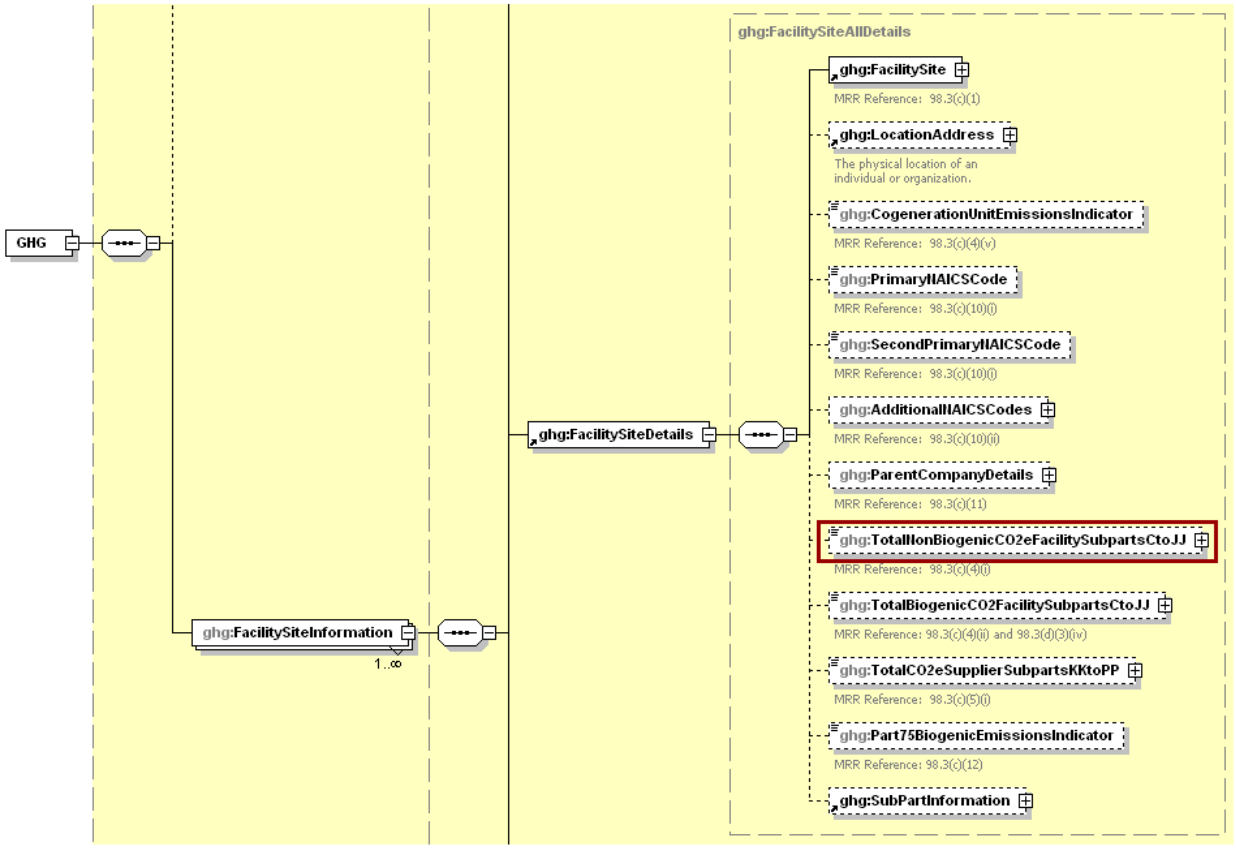
Each facility must report the following facility-level emission totals:

- Total CO_2 equivalent (CO_2e) emissions (excluding biogenic CO_2) aggregated across all direct emitter source categories (Subparts C-HH) associated with the facility.
- Total biogenic CO_2 emissions aggregated across all direct emitter source categories (Subparts C-HH) associated with the facility.

Each supplier must report the following supplier totals:

- Total CO_2e 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 68
Facility-Level Roll-up Emissions Schema Diagram



Note: Data elements boxed in red are required.

For Subpart W, report total emissions for CO_2e (excluding biogenic CO_2) by adding the value reported for the data element "TotalReportedCarbonDioxideEquivalent" to the total CO_2e emissions (excluding biogenic CO_2) aggregated across all source category Subparts associated with the facility.

Note: You must follow the rounding rules found in Table 1.

Table 61
Facility-Level Roll-up Emissions Data Element Definitions

Data Element Name	Description
TotalNonBiogenicCO2eFacilitySubpartsCtoJJ	Add the total CO_2e value for Subpart W in metric tons to the total CO_2e 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**.

XML Excerpt 65
Example for Facility-Level Roll-up Emissions

```
<ghg:TotalNonBiogenicCO2eFacilitySubpartsCtoJJ massUOM="Metric Tons">19223587.1</ghg:TotalNonBiogenicCO2eFacilitySubpartsCtoJJ>
```

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

III. Appendix A - Sample XML Document for Subpart W

Sample XML Document for Subpart W - Onshore Petroleum and Natural Gas Production industry segment

(Note: Data values do not reflect an actual facility's emissions. Additional sample XML files for Subpart W 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 xmlns="http://www.ccdsupport.com/schema/ghg">
    <FacilitySiteInformation>
        <CertificationStatement>The designated representative or alternate designated representative must sign (i.e., agree to) this certification statement. If you are an agent and you click on "SUBMIT", you are not agreeing to the certification statement, but are submitting the certification statement on behalf of the designated representative or alternate designated representative who is agreeing to the certification statement. An agent is only authorized to make the electronic submission on behalf of the designated representative, not to sign (i.e., agree to) the certification statement.</CertificationStatement>
        <ReportingYear>2011</ReportingYear>
        <FacilitySiteDetails>
            <FacilitySite>
                <FacilitySiteIdentifier>526300</FacilitySiteIdentifier>
                <FacilitySiteName>Subpart W Test Facility - Onshore Prod 4</FacilitySiteName>
            </FacilitySite>
            <LocationAddress>
                <LocationAddressText>685 Glassheel Pkwy</LocationAddressText>
                <LocalityName>Glaxton</LocalityName>
                <StateIdentity>
                    <StateCode>ME</StateCode>
                </StateIdentity>
                <AddressPostalCode>13234</AddressPostalCode>
            </LocationAddress>
            <CogenerationUnitEmissionsIndicator>Y</CogenerationUnitEmissionsIndicator>
            <PrimaryNAICSCode>211111</PrimaryNAICSCode>
            <ParentCompanyDetails>
                <ParentCompany>
                    <ParentCompanyLegalName>Subpart W Parent Company 4</ParentCompanyLegalName>
                    <StreetAddress>7878 Victory Lane</StreetAddress>
                    <City>Mexicana</City>
                    <State>TX</State>
                    <Zip>77764</Zip>
                    <PercentOwnershipInterest>100</PercentOwnershipInterest>
                </ParentCompany>
            </ParentCompanyDetails>
            <TotalNonBiogenicCO2eFacilitySubpartsCtoJJ massUOM="Metric Tons">6811992.8</TotalNonBiogenicCO2eFacilitySubpartsCtoJJ>
            <TotalBiogenicCO2FacilitySubpartsCtoJJ massUOM="Metric Tons">0</TotalBiogenicCO2FacilitySubpartsCtoJJ>
            <TotalCO2eSupplierSubpartsKKtoPP massUOM="Metric Tons">0</TotalCO2eSupplierSubpartsKKtoPP>
            <SubPartInformation>
                <SubPartW>
                    <GHGasInfoDetails>
                        <GHGasName>Methane</GHGasName>
                        <GHGasQuantity massUOM="Metric Tons">
                            <CalculatedValue>180933</CalculatedValue>
```

```
                    </GHGasQuantity>
                </GHGasInfoDetails>
                <GHGasInfoDetails>
                    <GHGasName>Nitrous Oxide</GHGasName>
                    <GHGasQuantity massUOM="Metric Tons">
                        <CalculatedValue>1.611</CalculatedValue>
                    </GHGasQuantity>
                </GHGasInfoDetails>
                <GHGasInfoDetails>
                    <GHGasName>Carbon Dioxide</GHGasName>
                    <GHGasQuantity massUOM="Metric Tons">
                        <CalculatedValue>3011900.4</CalculatedValue>
                    </GHGasQuantity>
                </GHGasInfoDetails>
                <SubPartWReportingFormsDetails>
                    <SubpartWSummaryDetails>
                        <SelectedIndustrySegmentNumber>2</SelectedIndustrySegmentNumber>
                        <SelectedIndustrySegmentName>Onshore petroleum and natural gas production [98.230(a)(2)]</SelectedIndustrySegmentName>
                        <AnnualGaseousThroughput volUOM="MMscf">1</AnnualGaseousThroughput>
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