

Greenhouse Gas Reporting Program

XML Reporting Instructions for Inputs Verifier Tool (IVT) Subpart P - Hydrogen Production

United States Environmental Protection Agency
Climate Change Division
Washington, DC

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These instructions explain how to upload 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 uploaded.

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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 reporting year (RY) 2010.

Beginning with RY 2014, e-GGRT uses two separate schemas: one schema defines requirements for reporting data elements through e-GGRT, and the other defines requirements for uploading certain equation inputs to the Inputs Verifier Tool (IVT). These instructions specifically relate to the equation inputs uploaded to IVT. IVT will perform electronic verification on the entered inputs to emission equations and use the entered inputs to calculate the emission equation results. IVT will not retain the entered inputs (i.e., the inputs are not reporting requirements under Part 98); instead, IVT will conduct certain checks at the time of data entry and generate a verification summary. The EPA will not have access to the entered inputs either during the time of entry or any time thereafter.

The XML schemas define 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.

II. Summary of Changes

No.	Change Description	Applicable Reporting Years
1	MonthApplicable was added to EquationP1FeedStockInputs	2017 and after
2	MonthApplicable was added to EquationP2FeedStockInputs	2017 and after
3	MonthApplicable was added to EquationP3FeedStockInputs	2017 and after

III. E-GGRT IVT XML Overview

The e-GGRT IVT XML schema is made up of a root data element 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.

All IVT 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 IVT XML schema.

An XML upload must only contain data for a single facility. All data for a facility must be uploaded in a single complete file and must include all required inputs for all of the relevant direct emitter subparts applicable to the facility. It is not possible to upload a subset of any portion of a facility's input data to add, delete, correct or update. The entire report must be re-uploaded to make any modification at all. Each subsequent upload for the same facility replaces all of the previously uploaded data.

The e-GGRT IVT XML schema includes information about the units of measure and allowable values for the data elements. For rules regarding the unit of measure or allowable values for a specific data element, please refer to the appropriate Schema Excerpts and Data Element Definitions tables in Part III of these instructions.

The e-GGRT IVT XML schema is available for download at the e-GGRT help website:

<http://www.ccdsupport.com/confluence/display/help/Inputs+Verifier+Tool+and+the+XML+Reporting+Method?src=search>. By clicking the Inputs Verifier Tool XML Schema link, you can download a zip file containing subpart-specific IVT schemas and a schema with summary content that is relevant for all IVT XML files.

The e-GGRT help website also provides support for understanding screen errors that users see if the IVT xml is rejected: <http://www.ccdsupport.com/confluence/display/help/IVT+XML+Acceptance+Criteria>. At this link, the user will find information on schema conformance, facility id / reporting year mismatch, and unit / feedstock match failure messaging.

Table 1
Using Numbers in IVT XML Uploads

Number Format	Description
Rounding	Non-emissions quantitative data uploaded by the user (e.g., a monthly HHV sample result, a monthly feedstock quantity, etc.) will not need to be rounded.
Percentages	If a value must be expressed as a percentage, then the number should be within the range of 0 to 100 (percent), e.g., 85.5% should be expressed as 85.5.
Fractions	If a value must be expressed as a decimal fraction, then the number should be within the range of 0 to 1, e.g., 1/4 should be expressed 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.

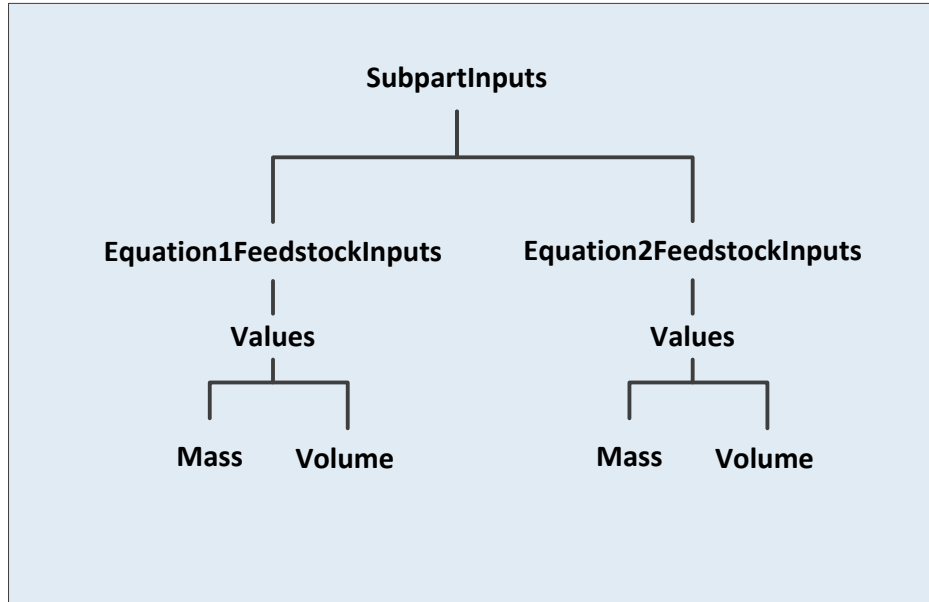
- **XML Schema:** An XML schema describes the structure of an XML document. The schema also defines the set of rules to which the XML document must conform in order to be considered "valid".
- **XML file:** A file containing data organized into a structured document using XML markup.
- **Data Element:** 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 identify 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 upload 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, "Facility Identifier" is the root, and just like in many other family trees, there is more than one item with the same name (e.g., "Unit Name"). The easiest way to distinguish these items is by referencing them in terms of their parent-child relationships, e.g., Equation2FeedstockInputs/Values vs. Equation1FeedstockInputs/Values.

Figure 1 Example of an XML Tree



This document provides a step-by-step description of how to temporarily upload data into IVT using the XML schema. Please note the following:

- **Unit names, feedstock names, and product names uploaded via the IVT XML file must match the unit names, feedstock names, and product names within the corresponding e-GGRT Annual Emissions Report exactly.** In most cases, units of measure do not need to be included in the IVT XML file, because they are associated automatically in e-GGRT. Detail on units of measure are provided in the schema diagram excerpts and the data elements definition tables.
- **The Annual Report XML file must be uploaded before uploading the IVT XML file.** IVT XML data for multiple subparts may be combined in one file. Correction of inaccurate data within either the IVT XML or the Annual Report XML files will, in most cases, require reporters to re-upload both files.
- **The inputs data in the IVT XML file do not persist within e-GGRT if the user logs out, closes the browser, or if the user's session times out due to an extended period of inactivity; they must be saved on a local drive and must be re-uploaded each time the record is opened and viewed within e-GGRT.**
- **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** include it in the facility's XML file.
- **Data elements must be ordered as defined by the schema.** The figures and tables in this document depict the specific sequence in which data elements must be arranged in the facility's IVT XML file in order to produce a well-formed XML file.
- **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 data 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 IVT XML file and to identify the data elements that are required (must be uploaded) 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.
- **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 include it in the facility's IVT 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 IVT XML file. If a parent element is not required, then **do not** include any of its child data elements in the facility's IVT XML file.

The following sample schema diagram and data elements definition table depict the bulleted items discussed above.

Figure 2
Monthly Inputs Type Schema Diagram

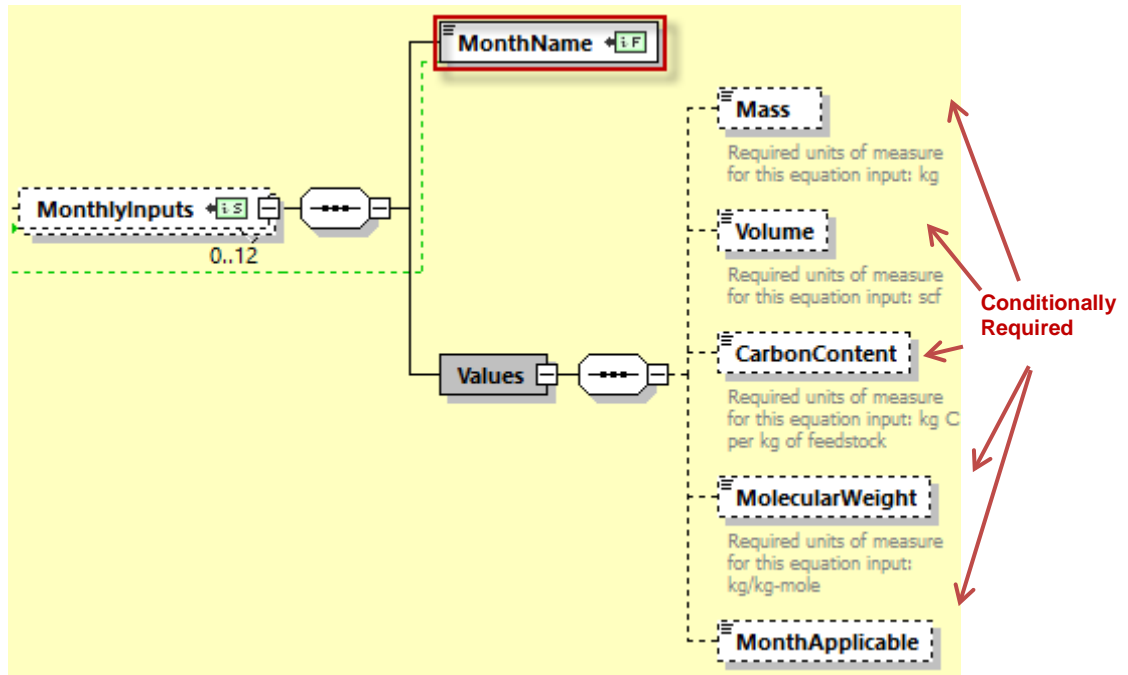


Table 2
Monthly Inputs Type Data Element Definitions

Data Element Name	Description
MonthlyInputs	Parent Element: A collection of data elements containing the monthly inputs for units using gaseous feedstock.
Month Name	Required: Specify the month for which values are being provided (e.g., “January”, “February”, etc).
Values	Parent Element: A collection of data elements containing the monthly inputs for units using gaseous feedstock.
Mass	The quantity of the gaseous fuel or feedstock consumed during the month (kg). Conditionally Required: This data element is only required if the gaseous feedstock is measured in mass units of measure and MonthApplicable is True.
Volume	The quantity of the gaseous fuel or feedstock consumed during the month (scf).

	Conditionally Required: This data element is only required if the gaseous feedstock is measured in volumetric units of measure and MonthApplicable is True.
CarbonContent	The average carbon content of the gaseous fuel or feedstock for the specified month (kg carbon per kg fuel or feedstock). Conditionally Required: If MonthApplicable is True
MolecularWeight	The average molecular weight of the gaseous fuel or feedstock for the specified month (kg per kg-mole). Conditionally Required: This data element is required only if the gaseous feedstock is measured in volumetric units of measure and MonthApplicable is True
MonthApplicable	Conditionally Required: True or False. Specify False when a month is not applicable. If this data element is omitted the node is treated as if MonthApplicable is True.

Section III provides details on the XML schema and reporting requirements for Subpart P feedstock and fuel usage data submitted through the IVT for hydrogen production units using non-CEMS (mass balance) calculation methodology. The IVT does not apply to hydrogen production units using the CEMS calculation methodology.

IV. IVT Submittals for Subpart P – Hydrogen Production Units

This section provides a description of how to upload the inputs data for the Subpart P IVT using the XML schema. In accordance with 40 CFR 98.163, facilities must calculate the annual CO₂ emissions from each hydrogen production process unit using the fuel and feedstock material balance approach.

1.0 Facility Inputs

Prior to compiling the inputs data for each type of fuel or feedstock, the general facility data should be defined. These data elements are described below in Table 3 and the XML file format is illustrated in Excerpt 1.

**Table 3
Facility Input Details Data Element Definitions**

Data Element Name	Description
Facility Inputs – name	Specify the registered name of the facility
Facility Inputs – id	Specify the 6-digit facility ID
Facility Inputs – Reporting Year	Specify the reporting year
Facility Inputs – Last Update Date	Specify the date associated with the most recent file update.

Excerpt 1 illustrates a portion of the XML file that can be used for the Facility Inputs data described above. See Appendix A for an example of a complete XML file that can be submitted through the IVT.

**XML Excerpt 1
Facility Inputs Information Details**

```

<FacilityInputs lastUpdateDate="2014-08-11" reportingYear="2014" id="544768" name="SP Industries"
  <SubpartInputs>
    <SubpartPInputs>

      --- Insert XML for Subpart P Unit data - Equation P-1, P-2, and/or P-3 ---

    </SubpartPInputs>
  </SubpartInputs>
</FacilityInputs>
    
```

2.0 Subpart P Inputs

The inputs data for Subpart P facilities can be submitted for one or more of the three emission equations outlined in §98.163(b). The required inputs data are unique to each equation. Feedstock inputs must be uploaded for each relevant fuel or feedstock type. Equations P-1 (paragraph (b) (1)), P-2 (paragraph (b) (2)), and P-3 (paragraph (b) (3)) pertain to units using gaseous, liquid, and solid feedstocks and fuels, respectively.

Subpart P Inputs (High-Level)

The schema is organized by Subpart P unit and then by Subpart P equation. Figure 3 below shows the high level structure of the Subpart P IVT schema and Table 4 provides detailed data element descriptions.

Figure 3
Subpart P Inputs Type High-Level Schema Structure
Showing Required Equation Order

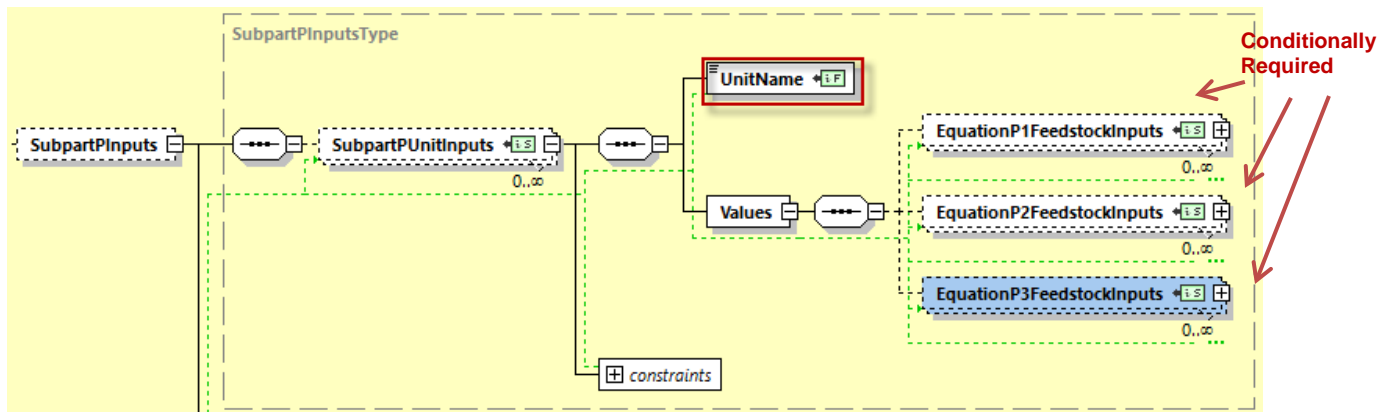


Table 4
Data Element Definitions for Subpart P Inputs Type (High Level)

Data Element Name	Description
SubpartPInputsType	Parent Element: A collection of data elements containing the unit inputs for Subpart P processes
SubpartPUnitInputs	Parent Element: A collection of data elements containing the unit name and the inputs required for units using gaseous, liquid or solid feedstock (see §98.163).
UnitName	The name of the units for which inputs are being uploaded. Important: The unit name must match EXACTLY the unit name in the facility's annual emissions report to e-GGRT.
Values	Parent Element: A collection of data elements describing inputs for Subpart P units.

2.1 Gaseous Fuel and Feedstock - Equation P-1 [§98.163(b) (1)]

For gaseous fuel and feedstock inputs data, Equation P-1 will be used to calculate CO₂ emissions. As indicated below, the fuel or feedstock quantity can be provided in terms of either mass or volume. Following the formula and list of variables, the corresponding XML data are illustrated in Figure 4 and described in Table 5.

$$CO_2 = \left(\sum_{n=1}^k \frac{44}{12} * Fdstk_n * CC_n * \frac{MW}{MVC} \right) * 0.001 \quad (\text{Eq. P-1})$$

[View or download PDF](#)

Where:

CO₂ = Annual CO₂ process emissions arising from fuel and feedstock consumption (metric tons/yr).

Fdstk_n = Volume or mass of the gaseous fuel or feedstock used in month n (scf (at standard conditions of 68 °F and atmospheric pressure) or kg of fuel or feedstock).

CC_n = Average carbon content of the gaseous fuel or feedstock for month n (kg carbon per kg of fuel or feedstock).

MW_n = Average molecular weight of the gaseous fuel or feedstock for month n (kg/kg-mole). If you measure mass, the term "MW_n/MVC" is replaced with "1".

MVC = Molar volume conversion factor (849.5 scf per kg-mole at standard conditions).

k = Months in the year.

44/12 = Ratio of molecular weights, CO₂ to carbon. 0.001 = Conversion factor from kg to metric tons.

Figure 4
Gaseous Fuel and Feedstock Information Details Schema Diagram (Equation P-1)

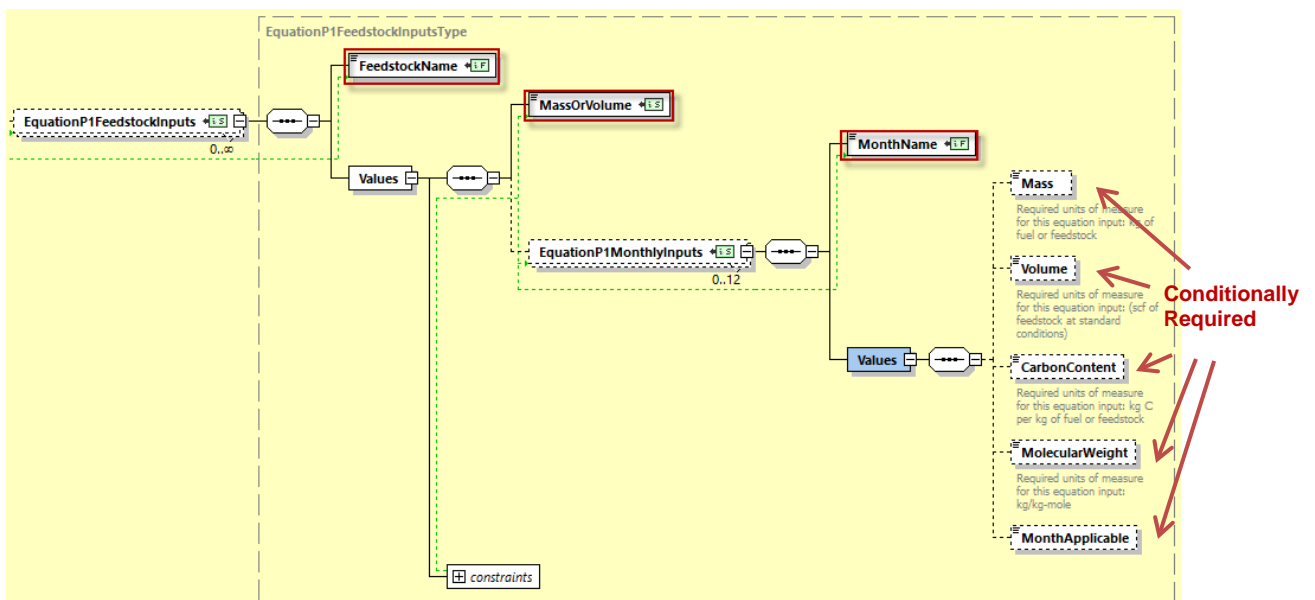


Table 5
Subpart P IVT Information Details Data Element Definitions – Equation P-1

Data Element Name	Description
EquationP1FeedstockInputs	Parent Element: A collection of data elements containing the inputs required for units using gaseous fuel or feedstock (see 40 CFR 98.163(b) (1)).
FeedstockName	Required: Specify the name of the gaseous fuel or feedstock.
Values	Parent Element: A collection of data elements that indicates mass or volume for units using gaseous fuel or feedstock (see 40 CFR 98.163(b) (1)).
MassOrVolume	Required: Selection for how gaseous fuel is measured: Mass or Volume.
EquationP1MonthlyInputs	Parent Element: A collection of data elements containing the monthly inputs for units using gaseous fuel or feedstock (see 40 CFR 98.163(b) (1)).
MonthName	Required: Specify the month for which values are being provided (e.g., “January”, “February”, etc).
Values	Parent Element: A collection of data elements containing the monthly inputs for units using gaseous fuel or feedstock (see 40 CFR 98.163(b) (1)).
Mass	The quantity of the gaseous fuel or feedstock consumed during the month (kg). Conditionally Required: This data element is only required if the gaseous feedstock is measured in mass units of measure and MonthApplicable is True.
Volume	The quantity of the gaseous fuel or feedstock consumed during the month (scf). Conditionally Required: This data element is only required if the gaseous feedstock is measured in volumetric units of measure and MonthApplicable is True
CarbonContent	The average carbon content of the gaseous fuel or feedstock for the specified month (kg carbon per kg fuel or feedstock). Conditionally Required: If MonthApplicable is True
MolecularWeight	The average molecular weight of the gaseous fuel or feedstock for the specified month (kg per kg-mole). Conditionally Required: This data element is required only if the gaseous feedstock is measured in volumetric units of measure and MonthApplicable is True
MonthApplicable	Conditionally Required: True or False. Specify False when a month is not applicable. If this data element is omitted the node is treated as if MonthApplicable is True.

Excerpts 2 and 3 below illustrate a portion of the XML file that can be used to upload Gaseous Fuel or Feedstock inputs data to the IVT in terms of mass or volume, respectively. Data for January and February

are shown. Data for March through December would be uploaded in a similar format. See Appendix A for an example of a complete XML file that can be submitted through the IVT for gaseous fuel measured in terms of mass and volume, respectively.

XML Excerpt 2

Gaseous Fuel or Feedstock (Mass) – Equation P-1 Information Details

```
<SubpartPUnitInputs>
  <UnitName>UnitP1</UnitName>
  <Values>
    <EquationP1FeedstockInputs>
      <FeedstockName>FP1-M</FeedstockName>
      <Values>
        <MassOrVolume>Mass</MassOrVolume>
        <EquationP1MonthlyInputs>
          <MonthName>January</MonthName>
          <Values>
            <Mass>12000</Mass>
            <CarbonContent>0.5</CarbonContent>
            <MonthApplicable>True</MonthApplicable>
          </Values>
        </EquationP1MonthlyInputs>
        <EquationP1MonthlyInputs>
          <MonthName>February</MonthName>
          <Values>
            <MonthApplicable>False</MonthApplicable>
          </Values>
        </EquationP1MonthlyInputs>

        --- Insert XML for Subpart P Unit monthly data for March through December ---

      </Values>
    </EquationP1FeedstockInputs>
  </Values>
</SubpartPUnitInputs>
```

XML Excerpt 3

Gaseous Fuel or Feedstock (Volume) – Equation P-1 Information Details

```

<SubpartPUnitInputs>
  <UnitName>UnitP1</UnitName>
  <Values>
    <EquationP1FeedstockInputs>
      <FeedstockName>FP1-V</FeedstockName>
      <Values>
        <MassOrVolume>Volume</MassOrVolume>
        <EquationP1MonthlyInputs>
          <MonthName>January</MonthName>
          <Values>
            <Volume>12000</Volume>
            <CarbonContent>0.5</CarbonContent>
            <MolecularWeight>11</MolecularWeight>
            <MonthApplicable>True</MonthApplicable>
          </Values>
        </EquationP1MonthlyInputs>
        <EquationP1MonthlyInputs>
          <MonthName>February</MonthName>
          <Values>
            <MonthApplicable>False</MonthApplicable>
          </Values>
        </EquationP1MonthlyInputs>

        --- Insert XML for Subpart P Unit monthly data for March through December ---

      </Values>
    </EquationP1FeedstockInputs>
  </Values>
</SubpartPUnitInputs>

```

2.2 Liquid Fuel and Feedstock - Equation P-2 [§98.163(b) (2)]

For liquid fuel and feedstock inputs data, Equation P-2 will be used to calculate CO₂ emissions. As indicated below, the fuel or feedstock quantity can be provided in terms of either mass or volume. Following the formula and list of variables, the corresponding XML data are illustrated in Figure 5 and described in Table 6.

$$CO_2 = \left(\sum_{n=1}^k \frac{44}{12} * Fdstk_n * CC_n \right) * 0.001 \quad (\text{Eq. P-2})$$

[View or download PDF](#)

Where:

CO₂ = Annual CO₂ emissions arising from fuel and feedstock consumption (metric tons/yr).

Fdstk_n = Volume or mass of the liquid fuel or feedstock used in month n (gallons or kg of fuel or feedstock).

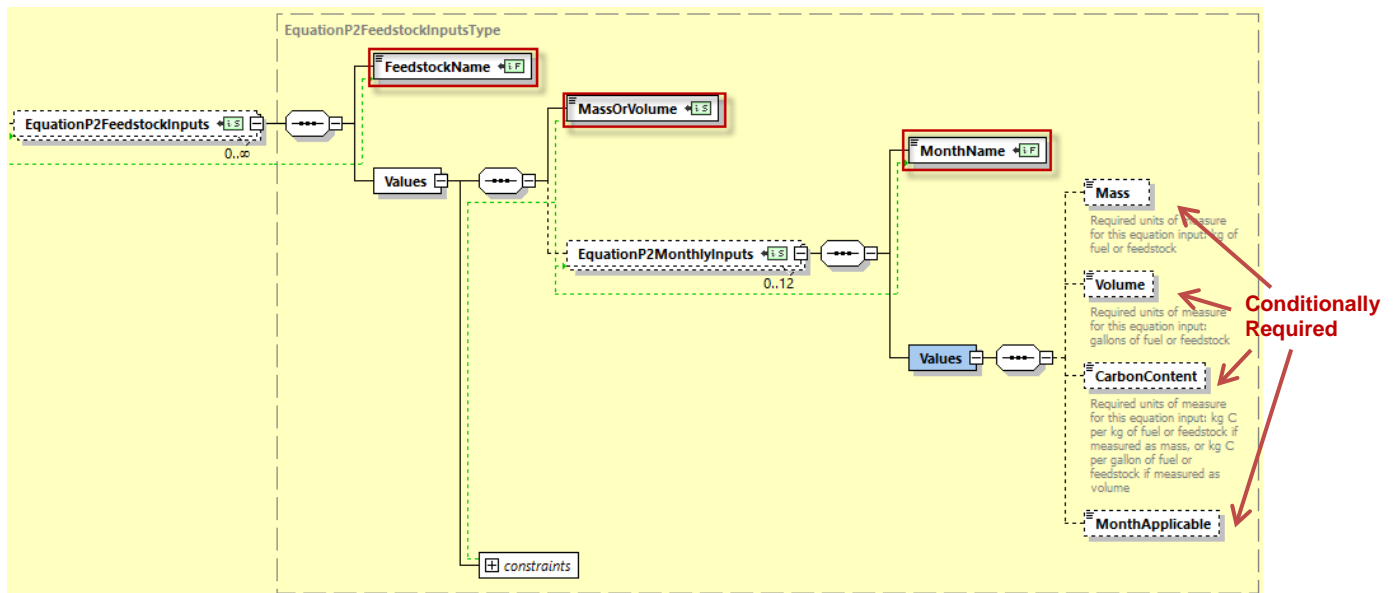
CC_n = Average carbon content of the liquid fuel or feedstock, for month n (kg carbon per gallon or kg of fuel or feedstock).

k = Months in the year.

44/12 = Ratio of molecular weights, CO₂ to carbon.

0.001 = Conversion factor from kg to metric tons.

**Figure 5
Liquid Fuel and Feedstock Information Details Schema Diagram (Equation P-2)**



**Table 6
Subpart P IVT Information Details Data Element Definitions – Equation P-2**

Data Element Name	Description
EquationP2FeedstockInputs	Parent Element: A collection of data elements containing the inputs required for units using liquid fuel or feedstock (see 40 CFR 98.163(b) (2)).
FeedstockName	Required: Specify the name of the liquid fuel or feedstock.
Values	Parent Element: A collection of data elements that indicates mass or volume for units using liquid fuel or feedstock (see 40 CFR 98.163(b) (2)).
MassOrVolume	Required: Selection for how liquid fuel is measured: Mass or Volume.
EquationP2MonthlyInputs	Parent Element: A collection of data elements containing the monthly inputs for units using liquid fuel or feedstock (see 40 CFR 98.163(b) (2)).
MonthName	Required: Specify the month for which values are being provided (e.g., “January”, “February”, etc).
Values	Parent Element: A collection of data elements containing the monthly inputs for units using liquid fuel or feedstock (see 40 CFR 98.163(b) (2)).
Mass	The quantity of the liquid fuel or feedstock consumed during the month (kg). Conditionally Required: This data element is only required if the gaseous feedstock is measured in mass units of measure and MonthApplicable is True.
Volume	The quantity of the liquid fuel or feedstock consumed during the month (gal). Conditionally Required: This data element is only required if the gaseous feedstock is measured in volumetric units of measure and MonthApplicable is True
CarbonContent	The average carbon content of the liquid fuel or feedstock for the specified month (kg carbon per kg of fuel or feedstock (if the quantity is expressed in mass units) or kg carbon per gallon of fuel or feedstock (if the quantity is expressed in volumetric units). Conditionally Required: If MonthApplicable is True
MonthApplicable	Conditionally Required: True or False. Specify False when a month is not applicable. If this data element is omitted the node is treated as if MonthApplicable is True.

Excerpts 4 and 5 below illustrate a portion of the XML file that can be used to upload Liquid Fuel or Feedstock inputs data to the IVT in terms of mass or volume, respectively. Data for January and February are shown. Data for March through December would be uploaded in a similar format. See Appendix A for

an example of a complete XML file that can be submitted through the IVT for liquid fuel measured in terms of mass and volume, respectively.

XML Excerpt 4

Liquid Fuel Unit (Mass) – Equation P-2 Information Details

```

<SubpartPUnitInputs>
  <UnitName>UnitP2</UnitName>
  <Values>
    <EquationP2FeedstockInputs>
      <FeedstockName>FP2-M</FeedstockName>
      <Values>
        <MassOrVolume>Mass</MassOrVolume>
        <EquationP2MonthlyInputs>
          <MonthName>January</MonthName>
          <Values>
            <Mass>12000</Mass>
            <CarbonContent>0.5</CarbonContent>
            <MonthApplicable>Trues</MonthApplicable>
          </Values>
        </EquationP2MonthlyInputs>
        <EquationP2MonthlyInputs>
          <MonthName>February</MonthName>
          <Values>
            <MonthApplicable>False</MonthApplicable>
          </Values>
        </EquationP2MonthlyInputs>

        --- Insert XML for Subpart P Unit monthly data for March through December ---

      </Values>
    </EquationP2FeedstockInputs>
  </Values>
</SubpartPUnitInputs>

```


XML Excerpt 5

Liquid Fuel Unit (Volume) – Equation P-2 Information Details

```

<SubpartPUnitInputs>
  <UnitName>UnitP2</UnitName>
  <Values>
    <EquationP2FeedstockInputs>
      <FeedstockName>FP2-V</FeedstockName>
      <Values>
        <MassOrVolume>Volume</MassOrVolume>
        <EquationP2MonthlyInputs>
          <MonthName>January</MonthName>
          <Values>
            <Volume>12000</Volume>
            <CarbonContent>0.5</CarbonContent>
            <MonthApplicable>True</MonthApplicable>
          </Values>
        </EquationP2MonthlyInputs>
        <EquationP2MonthlyInputs>
          <MonthName>February</MonthName>
          <Values>
            <MonthApplicable>False</MonthApplicable>
          </Values>
        </EquationP2MonthlyInputs>

        --- Insert XML for Subpart P Unit monthly data for March through December ---

      </Values>
    </EquationP2FeedstockInputs>
  </Values>
</SubpartPUnitInputs>

```

2.3 Solid Fuel and Feedstock - Equation P-3 [§98.163(b) (3)]

For solid fuel and feedstock inputs data, Equation P-3 will be used to calculate CO₂ emissions. As indicated below, the fuel or feedstock can only be provided in terms of mass. Following the formula and list of variables, the corresponding XML data are illustrated in Figure 6 and described in Table 7.

$$CO_2 = \left(\sum_{n=1}^k \frac{44}{12} * Fdstk_n * CC_n \right) * 0.001 \quad (\text{Eq. P-3})$$

[View or download PDF](#)

Where:

CO₂ = Annual CO₂ emissions from fuel and feedstock consumption in metric tons per month (metric tons/yr).

Fdstk_n = Mass of solid fuel or feedstock used in month n (kg of fuel or feedstock).

CC_n = Average carbon content of the solid fuel or feedstock, for month n (kg carbon per kg of fuel or feedstock).

k = Months in the year.

44/12 = Ratio of molecular weights, CO₂ to carbon.

0.001 = Conversion factor from kg to metric tons.

Figure 6
Solid Fuel and Feedstock Information Details Schema Diagram (Equation P-3)

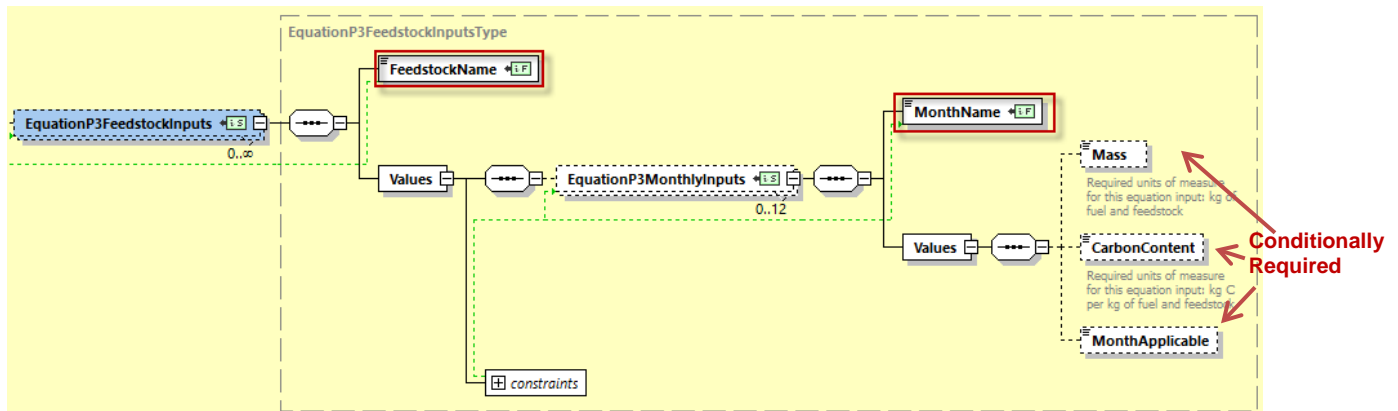


Table 7
Subpart P IVT Information Details Data Element Definitions – Equation P-3

Data Element Name	Description
EquationP3FeedstockInputs	Parent Element: A collection of data elements containing the inputs required for units using solid fuel or feedstock (see 40 CFR 98.163(b) (3)).
FeedstockName	Required: Specify the name of the solid fuel or feedstock.
EquationP3MonthlyInputs	Parent Element: A collection of data elements containing the monthly inputs for units using solid fuel or feedstock (see 40 CFR 98.163(b) (3)).
MonthName	Required: Specify the month for which values are being provided (e.g., “January”, “February”, etc).
Values	Parent Element: A collection of data elements containing the monthly inputs for units using solid fuel or feedstock (see 40 CFR 98.163(b) (3)).
Mass	The quantity of the solid fuel or feedstock consumed during the month (kg). Conditionally Required: If MonthApplicable is True
CarbonContent	The average monthly carbon content of the solid fuel or feedstock for the specified month (kg carbon per kg of fuel or feedstock). Conditionally Required: If MonthApplicable is True
MonthApplicable	Conditionally Required: True or False. Specify False when a month is not applicable. If this data element is omitted the node is treated as if MonthApplicable is True.

Excerpt 6 below illustrates a portion of the XML file that can be used to upload Solid Fuel or Feedstock inputs data to the IVT in terms of mass. Data for January and February are shown. Data for March through December would be uploaded in a similar format. See Appendix A for an example of a complete XML file that can be submitted through the IVT for solid fuel measured in terms of mass.

XML Excerpt 6

Solid Fuel Unit (Mass) – Equation P-3 Information Details

```
<SubpartPUnitInputs>
  <UnitName>UnitP3</UnitName>
  <Values>
    <EquationP3FeedstockInputs>
      <FeedstockName>FP3-M</FeedstockName>
      <Values>
        <EquationP3MonthlyInputs>
          <MonthName>January</MonthName>
          <Values>
            <Mass>12000</Mass>
            <CarbonContent>0.5</CarbonContent>
            <MonthApplicable>True</MonthApplicable>
          </Values>
        </EquationP3MonthlyInputs>
        <EquationP3MonthlyInputs>
          <MonthName>February</MonthName>
          <Values>
            <MonthApplicable>False</MonthApplicable>
          </Values>
        </EquationP3MonthlyInputs>
        --- Insert XML for Subpart P Unit monthly data for March through December ---
      </Values>
    </EquationP3FeedstockInputs>
  </Values>
</SubpartPUnitInputs>
```

V. Appendix A Sample XML Documents for Subpart X IVT

[98.163(b) (1) – (3)]

Note: The data values below do not reflect an actual facility's data. Additional sample XML files with Subpart P IVT data are posted on the e-GGRT help site. The following excerpts illustrate the XML file structure for the inputs data associated with five scenarios: 1) Equation P1 – Volume; 2) Equation P1 – Mass; 3) Equation P2 – Volume; 4) Equation P2 – Mass; and 5) Equation P3 – Mass.

```
<FacilityInputs lastUpdateDate="2018-08-11" reportingYear="2017" id="544768" name="SP Industries"
  <SubpartInputs>
    <SubpartPInputs>
      <SubpartPUnitInputs>
        <UnitName>UnitP1</UnitName>
        <Values>
          <EquationP1FeedstockInputs>
            <FeedstockName>FP1-M</FeedstockName>
            <Values>
              <MassOrVolume>Mass</MassOrVolume>
              <EquationP1MonthlyInputs>
                <MonthName>January</MonthName>
                <Values>
                  <Mass>12000</Mass>
                  <CarbonContent>0.5</CarbonContent>
                  <MonthApplicable>True</MonthApplicable>
                </Values>
              </EquationP1MonthlyInputs>
              <EquationP1MonthlyInputs>
                <MonthName>February</MonthName>
                <Values>
                  <MonthApplicable>False</MonthApplicable>
                </Values>
              </EquationP1MonthlyInputs>
              <EquationP1MonthlyInputs>
                <MonthName>March</MonthName>
                <Values>
                  <Mass>12000</Mass>
                  <CarbonContent>0.5</CarbonContent>
                  <MonthApplicable>True</MonthApplicable>
                </Values>
              </EquationP1MonthlyInputs>
            </EquationP1MonthlyInputs>
          </EquationP1FeedstockInputs>
        </Values>
      </SubpartPUnitInputs>
    </SubpartPInputs>
  </SubpartInputs>
</FacilityInputs>
```

```
<MonthName>April</MonthName>
<Values>
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  <CarbonContent>0.5</CarbonContent>
  <MonthApplicable>True</MonthApplicable>
</Values>
</EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
  <MonthName>May</MonthName>
  <Values>
    <Mass>12000</Mass>
    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
  <MonthName>June</MonthName>
  <Values>
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    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
  <MonthName>July</MonthName>
  <Values>
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    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
  <MonthName>August</MonthName>
  <Values>
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    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
  <MonthName>September</MonthName>
  <Values>
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    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP1MonthlyInputs>
```

```

    </Values>
  </EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
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    <CarbonContent>0.5</CarbonContent>
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</EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
  <MonthName>November</MonthName>
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</EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
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  </Values>
</EquationP1MonthlyInputs>
</Values>
</EquationP1FeedstockInputs>
</Values>
</SubpartPUnitInputs>
<SubpartPUnitInputs>
  <UnitName>UnitP1</UnitName>
  <Values>
    <EquationP1FeedstockInputs>
      <FeedstockName>FP1-V</FeedstockName>
      <Values>
        <MassOrVolume>Volume</MassOrVolume>
      <EquationP1MonthlyInputs>
        <MonthName>January</MonthName>
        <Values>
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          <CarbonContent>0.5</CarbonContent>
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          <MonthApplicable>True</MonthApplicable>
        </Values>
      </EquationP1MonthlyInputs>
    </EquationP1FeedstockInputs>
  </Values>
</SubpartPUnitInputs>

```

```
</EquationP1MonthlyInputs>
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  </Values>
</EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
  <MonthName>March</MonthName>
  <Values>
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  </Values>
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<EquationP1MonthlyInputs>
  <MonthName>April</MonthName>
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  </Values>
</EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
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    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
  <MonthName>June</MonthName>
  <Values>
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    <CarbonContent>0.5</CarbonContent>
    <MolecularWeight>11</MolecularWeight>
    <MonthApplicable>True</MonthApplicable>
  </Values>
```



```
</EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
  <MonthName>July</MonthName>
  <Values>
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    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
  <MonthName>August</MonthName>
  <Values>
    <Volume>12000</Volume>
    <CarbonContent>0.5</CarbonContent>
    <MolecularWeight>11</MolecularWeight>
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  </Values>
</EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
  <MonthName>September</MonthName>
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  </Values>
</EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
  <MonthName>October</MonthName>
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    <MolecularWeight>11</MolecularWeight>
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  </Values>
</EquationP1MonthlyInputs>
<EquationP1MonthlyInputs>
  <MonthName>November</MonthName>
  <Values>
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    <CarbonContent>0.5</CarbonContent>
    <MolecularWeight>11</MolecularWeight>
    <MonthApplicable>True</MonthApplicable>
  </Values>
```

```

    </EquationP1MonthlyInputs>
  <EquationP1MonthlyInputs>
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</EquationP1FeedstockInputs>
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<SubpartPUnitInputs>
  <UnitName>UnitP2</UnitName>
  <Values>
    <EquationP2FeedstockInputs>
      <FeedstockName>FP2-M</FeedstockName>
      <Values>
        <MassOrVolume>Mass</MassOrVolume>
        <EquationP2MonthlyInputs>
          <MonthName>January</MonthName>
          <Values>
            <Mass>12000</Mass>
            <CarbonContent>0.5</CarbonContent>
            <MonthApplicable>True</MonthApplicable>
          </Values>
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        <EquationP2MonthlyInputs>
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            <MonthApplicable>No</MonthApplicable>
          </Values>
        </EquationP2MonthlyInputs>
        <EquationP2MonthlyInputs>
          <MonthName>March</MonthName>
          <Values>
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            <CarbonContent>0.5</CarbonContent>
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          </Values>
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          <MonthName>April</MonthName>

```

```
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</EquationP2MonthlyInputs>
<EquationP2MonthlyInputs>
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<EquationP2MonthlyInputs>
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<EquationP2MonthlyInputs>
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  </Values>
</EquationP2MonthlyInputs>
```

```

    </EquationP2MonthlyInputs>
  <EquationP2MonthlyInputs>
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      <CarbonContent>0.5</CarbonContent>
      <MonthApplicable>True</MonthApplicable>
    </Values>
  </EquationP2MonthlyInputs>
  <EquationP2MonthlyInputs>
    <MonthName>November</MonthName>
    <Values>
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      <CarbonContent>0.5</CarbonContent>
      <MonthApplicable>True</MonthApplicable>
    </Values>
  </EquationP2MonthlyInputs>
  <EquationP2MonthlyInputs>
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      <MonthApplicable>True</MonthApplicable>
    </Values>
  </EquationP2MonthlyInputs>
</Values>
</EquationP2FeedstockInputs>
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</SubpartPUnitInputs>
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  <Values>
    <EquationP2FeedstockInputs>
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            <CarbonContent>0.5</CarbonContent>
            <MonthApplicable>True</MonthApplicable>
          </Values>
        </EquationP2MonthlyInputs>
      </EquationP2MonthlyInputs>
    </EquationP2MonthlyInputs>
  </EquationP2MonthlyInputs>

```

```
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<Values>
  <MonthApplicable>False</MonthApplicable>
</Values>
</EquationP2MonthlyInputs>
<EquationP2MonthlyInputs>
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  <Values>
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    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
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<EquationP2MonthlyInputs>
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  <Values>
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  </Values>
</EquationP2MonthlyInputs>
<EquationP2MonthlyInputs>
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  <Values>
    <Volume>12000</Volume>
    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP2MonthlyInputs>
<EquationP2MonthlyInputs>
  <MonthName>June</MonthName>
  <Values>
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    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
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<EquationP2MonthlyInputs>
  <MonthName>July</MonthName>
  <Values>
    <Volume>12000</Volume>
    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP2MonthlyInputs>
```

```
<EquationP2MonthlyInputs>
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  <Values>
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    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP2MonthlyInputs>
<EquationP2MonthlyInputs>
  <MonthName>September</MonthName>
  <Values>
    <Volume>12000</Volume>
    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP2MonthlyInputs>
<EquationP2MonthlyInputs>
  <MonthName>October</MonthName>
  <Values>
    <Volume>12000</Volume>
    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP2MonthlyInputs>
<EquationP2MonthlyInputs>
  <MonthName>November</MonthName>
  <Values>
    <Volume>12000</Volume>
    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP2MonthlyInputs>
<EquationP2MonthlyInputs>
  <MonthName>December</MonthName>
  <Values>
    <Volume>12000</Volume>
    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP2MonthlyInputs>
</EquationP2FeedstockInputs>
</Values>
</SubpartPUnitInputs>
<SubpartPUnitInputs>
```

```

<UnitName>UnitP3</UnitName>
<Values>
  <EquationP3FeedstockInputs>
    <FeedstockName>FP3-M</FeedstockName>
    <Values>
      <EquationP3MonthlyInputs>
        <MonthName>January</MonthName>
        <Values>
          <Mass>12000</Mass>
          <CarbonContent>0.5</CarbonContent>
          <MonthApplicable>True</MonthApplicable>
        </Values>
      </EquationP3MonthlyInputs>
      <EquationP3MonthlyInputs>
        <MonthName>February</MonthName>
        <Values>
          <MonthApplicable>False</MonthApplicable>
        </Values>
      </EquationP3MonthlyInputs>
      <EquationP3MonthlyInputs>
        <MonthName>March</MonthName>
        <Values>
          <Mass>12000</Mass>
          <CarbonContent>0.5</CarbonContent>
          <MonthApplicable>True</MonthApplicable>
        </Values>
      </EquationP3MonthlyInputs>
      <EquationP3MonthlyInputs>
        <MonthName>April</MonthName>
        <Values>
          <Mass>12000</Mass>
          <CarbonContent>0.5</CarbonContent>
          <MonthApplicable>True</MonthApplicable>
        </Values>
      </EquationP3MonthlyInputs>
      <EquationP3MonthlyInputs>
        <MonthName>May</MonthName>
        <Values>
          <Mass>12000</Mass>
          <CarbonContent>0.5</CarbonContent>
          <MonthApplicable>True</MonthApplicable>
        </Values>
      </EquationP3MonthlyInputs>
      <EquationP3MonthlyInputs>
        <MonthName>June</MonthName>

```

```
<Values>
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  <CarbonContent>0.5</CarbonContent>
  <MonthApplicable>True</MonthApplicable>
</Values>
</EquationP3MonthlyInputs>
<EquationP3MonthlyInputs>
  <MonthName>July</MonthName>
  <Values>
    <Mass>12000</Mass>
    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP3MonthlyInputs>
<EquationP3MonthlyInputs>
  <MonthName>August</MonthName>
  <Values>
    <Mass>12000</Mass>
    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP3MonthlyInputs>
<EquationP3MonthlyInputs>
  <MonthName>September</MonthName>
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    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP3MonthlyInputs>
<EquationP3MonthlyInputs>
  <MonthName>October</MonthName>
  <Values>
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    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
</EquationP3MonthlyInputs>
<EquationP3MonthlyInputs>
  <MonthName>November</MonthName>
  <Values>
    <Mass>12000</Mass>
    <CarbonContent>0.5</CarbonContent>
    <MonthApplicable>True</MonthApplicable>
  </Values>
```



```
    </EquationP3MonthlyInputs>
  <EquationP3MonthlyInputs>
    <MonthName>December</MonthName>
    <Values>
      <Mass>12000</Mass>
      <CarbonContent>0.5</CarbonContent>
      <MonthApplicable>True</MonthApplicable>
    </Values>
  </EquationP3MonthlyInputs>
</EquationP3MonthlyInputs>
</EquationP3FeedstockInputs>
</Values>
</SubpartPUnitInputs>
</SubpartPInputs>
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</FacilityInputs>
```