

Petroleum and Natural Gas Systems Covered Product Data Reporting and Verification Guidance

for California's Mandatory Greenhouse Gas Reporting Regulation

Introduction

This document provides guidance on the reporting and verification of covered product data for the petroleum and natural gas systems sector, as specified by the Regulation for the Mandatory Reporting of Greenhouse Gas (GHG) Emissions (title 17, California Code of Regulations, sections 95100 *et seq.*) (MRR). This guidance focuses on the requirements related to the reporting of covered product data¹ for onshore petroleum and natural gas production, natural gas processing, and natural gas liquid fractionating.

This guidance complements the [Petroleum and Natural Gas Systems Emissions Reporting Guidance](#) and the [Reporting and Verification Guidance for Natural Gas Liquid \(NGL\) Fractionators](#), which can both be found on the [Mandatory GHG Reporting Guidance Documents website](#). For additional information about covered product data reporting, including the requirement to exclude inaccurate covered product data, the use of financial transaction records, how covered product data are evaluated during verification for accuracy and conformance with the regulation, and other topics, view the [General Covered Product Data Reporting Guidance](#) document.

This guidance document describes the requirements of MRR. Unlike MRR, this guidance does not have the force of law, does not establish new mandatory requirements for GHG reporting, and in no way supplants, replaces, or amends any of the legal requirements of the Regulation. Conversely, an omission or truncation of regulatory requirements in this guidance does not relieve operators of their legal obligation to fully comply with all requirements of MRR.

The current document contains revisions to clarify the following changes resulting from MRR amendments that go into effect for 2018 data reported in 2019:

- Operators must use an annual weighted average high heat value (HHV) when quantifying the heat energy of associated gas and dry gas covered product data (sections 1, 4.2, 4.4)

¹ "Covered product data" means all product data needed for the allocation of allowances under sections 95870, 95890, and 95891 of the Cap-and-Trade Regulation, regardless of whether the Cap-and-Trade Regulation imposes a compliance obligation for the data year.

- GHG Monitoring Plans are required to reference simplified block diagrams

1 Summary of 2016 MRR Changes

In the 2016 MRR, sections 95131(b)(14) and 95156 were updated to include the following reporting and verification requirements.

- Beginning with 2017 data reported in 2018:
 - Verifiers are required to confirm that all covered product data conforms to the reporting requirements in MRR, and to document that in their sampling plan
- Beginning with 2018 data reported in 2019:
 - GHG Monitoring Plans are required to reference simplified block diagrams
 - An annual weighted average high heat value (HHV) must be used to quantify the heat energy of associated gas and dry gas covered product data
- Beginning with 2019 data reported in 2020:
 - Verifiers are required to conduct separate material misstatement evaluations for crude oil produced using thermal enhanced oil recovery (TEOR) (as described in section 95156(a)(7)) and for crude oil produced using non-TEOR (as described in section 95156(a)(8)).

2 GHG Monitoring Plan

The facility GHG Monitoring Plan must include specific information on the methods used to quantify the covered product data reported under MRR.

Individual facilities may use different methodologies to categorize crude oil and associated gas as being produced using TEOR or non-TEOR (including temperature measurements, steam/oil ratios, and API gravity). Facilities must provide a clear, facility-specific description of their categorization method in their monitoring plan, which verifiers should evaluate.

For some production fields, the facility produces crude by both TEOR and non-TEOR methods and then combines the product streams prior to the lease-automatic custody transfer (LACT) meter. In such cases, the LACT meter alone is insufficient to determine individual thermal and non-thermal production volumes, and the reporter must utilize additional methods, such as metering individual wells or utilizing well-testing data, to accurately quantify individual production volumes.

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As needed, facilities must provide to verifiers any additional data and/or a justification for their chosen methodology for distinguishing thermal and non-thermal production. Verifiers must use this information and their professional judgment to evaluate the accuracy of the thermal and non-thermal classification, and verifiers should request assistance from CARB staff as needed. At minimum, verifiers should confirm that a consistent method is applied to allocate production volumes back to individual wells and that the method is not biased toward thermal or non-thermal wells.

The GHG Monitoring Plan should include an explanation of how the operator assures that all covered product data are tracked, reported, and accurate to within +/-5 percent. CARB staff recommends that the GHG Monitoring Plan include both a description and a schematic diagram of covered product data flows from individual wells or other processing points to intermediate collection points, separators, other treatment units (e.g., dehydrators), storage tanks, LACT meters, and other metering systems.

Beginning with 2018 data reported in 2019, GHG Monitoring Plans are also required to reference simplified block diagrams that provide a clear visual representation of the positions of meters and sampling locations required for calculating covered product data relative to wells, processing points, and other equipment (MRR section 95105(c)). Verifiers should request this information from the reporter if it is not clear in the GHG Monitoring Plan.

Oil and gas production facilities are required to report disaggregated product data, including covered product data, at the level of individual wells for crude oil, associated gas, produced water, and dry gas to the California Division of Oil, Gas and Geothermal Resources (DOGGR). CARB recommends that the facility GHG Monitoring Plan describe the process that the facility uses to disaggregate data to individual wells for DOGGR reporting and how this process differs from MRR reporting, if applicable. DOGGR data that are available online may be used by verifiers as a cross check to evaluate MRR product data reporting, but cannot be expected to exactly match MRR data because the methods used to comply with MRR reporting differ from DOGGR reporting. Any cross-check between MRR data and DOGGR data will therefore be qualitative in nature, but may be useful for identifying potential reporting errors or incomplete reporting.

In addition, in the case that production amounts for a facility have increased or decreased by greater than 5 percent from the previous data year, CARB staff recommends that the GHG Monitoring Plan include a detailed description as to why the production changes occurred. The description may include information on newly acquired or sold leases; cyclic steam stimulation practices and/or "soak" periods; significant changes in drilling activity, such as development of new production wells; changes in well production status, such as idling of wells or reactivation of previously idle wells; equipment changes, especially changes in thermal production equipment; or other relevant information.

3 Covered Product Data Reporting Process

Section 95156(a) of MRR specifies that emissions and product data, including covered product data, must be disaggregated within the basin reporting footprint to the sub-facility level when reported via the California Electronic Greenhouse Gas Reporting Tool (Cal e-GGRT). Sub-facility is defined in terms of single townships or a group of contiguous or adjacent townships, as identified in the Public Land Survey System of the United States. Sub-facilities may be further disaggregated according to similar operational, geological, or geographical characteristics. Reporters should refer to the definition of "sub-facility" in section 95102(a) for additional information. Entities that have already been reporting emissions and product data, including covered product data, at the sub-facility level should continue reporting with the same subdivision of information; however, the facility's GHG Monitoring Plan must provide a map or a list identifying the townships, ranges, and section numbers that comprise the geographic boundaries of the sub-facilities. In the petroleum and natural gas systems sector, the term "facility" refers to the definitions in section 95102(a) of MRR, which generally define a facility as all GHG emissions sources located within a single geologic basin, as defined in 40 CFR Section 98.238, under common ownership or common control.

Covered product data must be further disaggregated between thermal and other-than-thermal (i.e., non-thermal) production processes at the sub-facility level.

The instructions in this section of this guidance document pertain *only* to the covered product data portions within the Subpart W spreadsheet that is uploaded to Cal e-GGRT.

4 Covered Product Data Reporting Methodology

Section 95103(l) requires reporting entities to exclude inaccurate covered product data and allows reporters to elect to exclude accurate covered product data. To be deemed accurate, the quantification method(s) must meet the criteria in section 95103(k).

4.1 Reporting Crude Oil and Natural Gas Liquids Produced

Crude oil and natural gas liquids (NGL) product data reported under section 95156 should be reported using one of two methodologies:

1. Lease Automatic Custody Transfer (LACT) meters or other financial transaction data: Crude oil covered product data may be tracked and reported to MRR from sales records referenced to LACT meters or other financial transaction data. LACT meters or other financial transaction data are considered to meet the calibration and accuracy requirements of MRR section 95103(k) as long as they meet the criteria for financial transaction meters in section 95103(k)(7). If LACT meter data or other financial transaction data (i.e., sales data) are used to report

covered product data, the facility can report the sales volume as the “produced” amount. Under this method, starting and ending inventory volumes in tanks and pipes (upstream from the LACT meters) should be excluded from covered product data volume. This is a different approach than that used for DOGGR reporting.

The same principles apply for reporting NGL covered product data. Financial transaction meters or records used to report covered product data are considered to meet the calibration and accuracy requirements in section 95103(k) provided that they meet the criteria for financial transaction meters in section 95103(k)(7).

2. Inventory Approach: Crude oil covered product data may also be reported as an aggregate of LACT meter or other financial transaction data plus end-of-data-year inventory volumes in tanks (upstream from the LACT meters) minus beginning-of-data-year inventory volumes in tanks (upstream from LACT meters). In this case, inventory amounts should be included in the covered product data reporting. If using inventory methods, the inventory amounts must be verified as accurate to +/-5 percent pursuant to section 95103(k)(11). As discussed directly above, the amounts reported using LACT meters are considered to meet the accuracy requirements in section 95103(k).

The same principles apply for reporting NGL covered product data. If inventory amounts are reported, they must be verified as accurate to +/-5 percent pursuant to section 95103(k)(11). Amounts reported using financial transaction meters or records are considered to meet the accuracy requirements in 95103(k) if they meet the criteria for financial transaction meters in section 95103(k)(7).

For either approach, the GHG Monitoring Plan must explicitly describe the accounting methods used to track these data for the facility. In addition, the permanent method selected for quantifying covered product data cannot be changed without CARB approval, pursuant to the requirements in section 95103(m).

4.2 Reporting Associated Gas Produced

Sections 95156(a)(9) and (10) describe the methods and requirements for quantifying the heat energy of produced associated gas. Beginning with 2018 data reported in 2019, the heat energy of produced associated gas must be calculated using the annual weighted average high heat value (HHV) of the produced gas.

The quantity of associated gas produced using both TEOR and non-TEOR production processes may be estimated using records from production or sales meters, as appropriate, or by using GOR (gas-oil-ratio) and GWR (gas-water-ratio) information from a flash liberation test. In the latter case, using the most disaggregated data available (e.g., field or tank farm level), operators shall multiply the barrels of crude oil

produced during the data year by a representative GOR measurement, then multiply the annual produced water volume by a representative GWR measurement, and finally sum the results to arrive at the volume of associated gas produced.

The term "total GOR," where it is used in MRR, refers to the total amount of associated gas per barrel of oil produced. For example, "total GOR" would include the amount of associated gas quantified using flash liberation tests, plus any associated gas separated (and subsequently metered or otherwise measured) from water and oil prior to the collection of flash liberation test samples. Total GOR may be used to quantify associated gas product data provided that no associated gas is double-counted and all reported product data meet the measurement accuracy requirements of section 95103(k). The annual weighted average HHV of the produced associated gas is then multiplied by the total associated gas volume for the data year to determine the heat energy (in MMBtu). Reporters must collect and average HHV measurements consistent with the frequency requirements in section 95153(y)(2)(D).

The following additional considerations apply when using the LACT meter, GOR, GWR, and produced water volume to quantify produced associated gas:

1. The GOR and GWR measurements must be representative of the crude oil at the LACT meter and produced water volume, respectively. For example, if there are five GOR measurements for oil flowing through a single LACT meter during a given year, the facility must calculate a weighted average GOR over the year before applying it to the LACT meter results to calculate the annual volume of associated gas produced.
2. GOR data from one field cannot be applied to a different field with a different LACT meter. For example, if a facility consists of two fields, field A and field B, within a basin and each field has its own LACT meter and a separate produced water volume, but a GOR measurement is only available from field A, the GOR measurement from field A cannot be applied to field B.

4.3 Reporting Dry Gas Produced

Pursuant to section 95156(b), operators must report the annual heat energy of dry gas produced in MMBtu. The annual weighted average HHV of produced dry gas must be multiplied by the total dry gas volume for the data year to determine the heat energy in MMBtu. Reporters must collect and average HHV measurements in a manner consistent with the frequency requirements in section 95153(y)(2)(D).

4.4 Reporting Natural Gas Processed

Onshore natural gas processing facilities that have an annual average throughput of 25 MMscf per day or greater must report the heat energy (in MMBtu) of associated gas, waste gas, and natural gas processed as covered product data in the "Onshore

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Production” tab of the Subpart W spreadsheet. As specified in section 95156(d), reporters must multiply the annual weighted average HHV of the processed gas by the annual volume of processed gas to determine heat energy in MMBtu. Reporters must collect and average HHV measurements in a manner consistent with the frequency requirements in section 95153(y)(2)(D). The annual amount of gas processed may be quantified using either the output volume or the throughput volume of the gas processing facility, as long as the metering device used to quantify the data meets the accuracy requirements in section 95103(k). In addition, onshore natural gas processing facilities that have an annual average throughput of 25 MMscf per day or greater must also report NGLs as covered product data in the “NGL” tab of the Subpart W spreadsheet, pursuant to MRR section 95156(c).

4.5 Onshore Petroleum and Natural Gas Production Reporting in Cal e-GGRT

The Cal e-GGRT reporting fields for sections 95156(a)-(b) and (d) of MRR are shown in Figure 1.

Figure 1. Sections 95156(a)-(b) and (d) Cal e-GGRT covered product reporting fields.

The screenshot shows a spreadsheet titled "Onshore Petroleum and Natural Gas Production". The main data area is a table with columns labeled A through EN. The table is divided into sections: "Onshore Petroleum and Natural Gas Production" (rows 1-6), "Covered Product Data" (rows 7-11), and "Onshore Processing" (rows 12-14). The "Covered Product Data" section includes the following columns:

Contiguous Property/Sub-Facility Name:	Total CO ₂ e for Electricity not consumed (MT CO ₂ e)	Barrels of crude oil produced using thermal enhanced oil recovery (covered product data)	Barrels of crude oil produced using methods other than thermal enhanced oil recovery (covered product data)	MMBtu of associated gas produced using thermal enhanced oil recovery (covered product data)	MMBtu of associated gas produced using methods other than thermal enhanced oil recovery (covered product data)	MMBtu of dry gas produced (covered product data)	(95156(d)) MMBtu associated gas, natural gas, and waste gases processed (covered product data)*
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0

* Note: An onshore natural gas processing facility that has an annual average throughput of 25 MMscf per day or greater must use this Onshore Production tab to report Natural Gas Processing covered product data, as applicable (95156(d)). Applicable NGL product data must also be reported in the NGL tab (95156(c)).

In addition to reporting covered product data, reporters must also enter a calculated emissions factor (EF) for onshore petroleum and natural gas production facilities with cogeneration, steam generators, and electricity generation sources (see Figure 2). Reporters should calculate this EF by dividing total CO₂e emissions by the total heat energy input (in MMBtu).

Figure 2. Steam and Electricity Generation Cal e-GGRT reporting fields.

Onshore Petroleum and Natural Gas Production													
A	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW	
1	Onshore Petroleum and Natural Gas Production												
2	TO ADD ROW(S) TO THE TABLE: click the Add Row(s) button.												
3	TO DELETE EXTRANEOUS ROWS: click the Delete Row(s) button.												
4	NOTE: You will need to enable macros to use the table.												
5													
6													
7	Steam Generator Sources						Steam Used (not Generated at Facility)			Electricity Generation			
8	Contiguous Property/Sub-Facility Name:	Total thermal energy generated (MMBtu)	Emission factor (MT CO ₂ e/ MMBtu)	Total CO ₂ e for total thermal energy generated (MT CO ₂ e)	Thermal energy not consumed (MMBtu)	Emission factor (MT CO ₂ e/ MMBtu)	Total CO ₂ e for thermal energy not consumed (MT CO ₂ e)	Total Steam Used but not Generated (MMBtu)	Emission factor (MT CO ₂ e/ MMBtu)	Total CO ₂ e for total steam used but not generated (MT CO ₂ e)	Net Electricity Generation (MWh)	Emission factor (MT CO ₂ e/ MWh)	Total CO ₂ e for Net Electricity Generation
9	Total	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
10													
11													
12													
13													
14													

4.6 Natural Gas Liquids Production Reporting in Cal e-GGRT

The operator of: 1) a NGL fractionating facility, 2) a natural gas processing facility, or 3) an onshore petroleum and natural gas production facility with a natural gas processing plant that processes less than 25 MMscf per day that produces any of the NGLs listed in MRR section 95156(c), must report annual production volumes for each NGL listed in sections 95156(c)(1)-(12) in the “NGL” tab of the Subpart W spreadsheet (see Figure 3). These annual production volumes are aggregated at the facility level and are covered product data.

In some cases, onshore petroleum and natural gas production facilities may remove a variety of NGLs from produced gas and re-inject these NGLs into barrels of crude oil, which are then sold to refiners. Pursuant to section 95156(c), operators must report the amount of any re-injected NGLs as covered product data pursuant to sections 95156(a)(7) or (8) and not as NGL covered product data. All other natural gas liquids produced at the facility should be reported as covered product data pursuant to section 95156(c).

Further details on reporting NGL data can be found in the [Reporting and Verification Guidance for Natural Gas Liquid Fractionators](#).

Figure 3. Cal e-GGRT reporting fields for NGL fractionators, natural gas processing facilities, and petroleum and natural gas production facilities with a natural gas processing plant with less than 25 MMscf per day throughput.

A		B	C	D	E
Natural Gas Fractionating or Processing Facility - Additional Data Reporting					
Facility Name					
Source Category (covered product data)		Barrels corrected to 60 degrees fahrenheit			
Total		0.0			
Ethane					
Ethylene					
Propane					
Propylene					
Butane					
Butylene					
Isobutane					
Isobutylene					
Pentanes plus					
Natural Gasoline					
Liquified Petroleum Gas					
Bulk natural gas liquids not included in the preceding list					
<p>Note: A natural gas processing facility or an onshore petroleum and natural gas production facility with a natural gas processing plant that process less than 25 MMscf per day, or a natural gas liquid fractionating facility must use this NGL table to report NGL covered product data, as applicable (95156(c)).</p>					
<p>An onshore natural gas processing facility that has an annual average throughput of 25 MMscf per day or greater should use the Onshore Production tab to report additional Natural Gas Processing covered product data, as applicable (95156(d)). These facilities must also use this NGL tab to report NGL covered product data pursuant to 95156(c).</p>					

5 Summary of Reporting Requirements

Table 1 summarizes the emissions and product data reporting requirements for onshore petroleum and natural gas production, along with the data verification requirements.

Table 1. Data reporting and verification requirements for onshore petroleum and natural gas production.

Reporting Requirement	Regulatory Section	Verification Requirement
Barrels of crude – TEOR	95156(a)(7)	For 2018 data reported in 2019, the total barrels of oil equivalent from crude, associated gas, and dry gas is assessed for material misstatement. Beginning with 2019 data reported in 2020, barrels of oil equivalent from TEOR and barrels of oil equivalent from non-TEOR are required to be separately assessed for material misstatement (MRR section 95131(b)(12)(E)). Each measurement (e.g., each meter) used to obtain product data is separately assessed for conformance with the measurement accuracy requirements in section 95103(k).
Barrels of crude – non-TEOR	95156(a)(8)	
Heat energy of associated gas – TEOR	95156(a)(9)	
Heat energy of associated gas – non-TEOR	95156(a)(10)	
Heat energy of dry gas produced	95156(b)	
Barrels of natural gas liquids produced	95156(c)	The sum of (total) barrels of natural gas liquids produced is assessed for material misstatement (section 95131(b)(12)). Each measurement of individual natural gas liquid products is separately assessed for conformance with the measurement accuracy requirements in section 95103(k).
Heat energy of associated gas, waste gas, and natural gas processed	95156(d)	The sum of the (total) heat energy (MMBtu) of associated gas, waste gas, and natural gas processed is assessed for material misstatement (section 95131(b)(12)). Each measurement method/device is separately assessed for conformance with the measurement accuracy requirements in section 95103(k).
Cogeneration sources	95156(a)(3)(A)(C)	Other production data are reviewed for conformance based on the verifier’s assessment of uncertainty risk, but are not assessed for material misstatement or conformance with the measurement
Steam generator sources	95156(a)(4)(A)(B)	
Steam used	95156(a)(6)	

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Electricity generation sources	95156(a)(5)(A)(B)	accuracy requirements. A reasonable estimate must be reported based on activity and production records.
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6 Additional Information

Detailed training materials for reporting using Cal e-GGRT:

<https://ww2.arb.ca.gov/mrr-tool>.

The GHG Mandatory Reporting Regulation, with full requirements:

<https://ww2.arb.ca.gov/mrr-regulation>.

Contact the MRR helpdesk: ghgreport@arb.ca.gov.

Contact the MRR verification helpdesk: ghgverify@arb.ca.gov.

For help with reporting or verification, please contact the appropriate staff member:

<https://ww2.arb.ca.gov/mrr-contacts>.