Errata and Clarifications

METHODOLOGY FOR THE QUANTIFICATION, MONITORING, REPORTING AND VERIFICATION OF GREENHOUSE GAS EMISSIONS REDUCTIONS AND REMOVALS FROM PLUGGING ORPHANED OIL AND GAS WELLS IN THE U.S. AND CANADA

VERSION 1.0

2024-09-13

This Errata and Clarifications document is supplemental to the ACR Methodology *Plugging Orphaned Oil and Gas Wells in the U.S. and Canada*, *Version 1.0* ("the Methodology") and applies to all projects registered under the Methodology. Each erratum and clarification contained herein is effective as of its posting date listed below. This document may be updated as supplemental information or clarifications are needed. Project Developers and Verification Bodies shall adhere to the errata and clarifications when implementing projects and conducting verification activities.

1. Clarification: Acronyms (2024-09-09)

The following acronyms are added:

acf	Actual cubic foot
API	American Petroleum Institute
ASTM	American Society for Testing and Materials
atm	Atmospheric pressure
cm	Centimeter
F	Fahrenheit
g	Gram
hr	Hour

ISO	International Organization for Standardization
Kg	Kilogram
lb	Pound
m^2	Square meter
MT	Metric ton
psi	Pound per square inch
PSIA	Pound per square inch absolute
PSIG	Pound per square inch gauge
R	Rankine
scf	Standard cubic feet

2. Clarifications: Well Eligibility Requirements (2024-09-09)

a. The text of the second bullet of Section 1.1 states "The well is emitting … prevent the release." This text is updated to: "The well is found to be emitting methane when first accessed by the parties involved in the project, as named in the GHG Project Plan, including the project proponent, project developer, entities holding title to the land, and other project participants such as technical consultants and qualified measurement specialists)"

b. In Section 1.1, a new bullet is added which states: "There is no regulatory or other legal requirement to prevent the release of methane"

3. Clarifications: Reporting Period (2024-09-09)

a. Section 1.2 states "The reporting period begins … its own reporting timeline" This text is updated to: "The reporting period begins on the date that a well in the project first meets the post-plugging monitoring requirements of Section 4.7. The reporting period ends on the date that the last well in the project meets the post-plugging monitoring requirements of Section 4.7. For clarity, the duration of the reporting period is the time between the first and last wells completing post-plugging monitoring."

b. Section 1.2 states "Validation must be completed within 12 months of the plugging of the last well in the project." For clarity, validation must be completed within 12 months of the date of plugging (e.g., cementing of a well) for the last well plugged in

the project. This is distinct from the first post-plugging monitoring, which is the trigger for the Start Date, start of the Reporting Period, and start date of the Crediting Period.

4. Clarification: Crediting Period (2024-06-13)

Section 1.3 states "Per the *ACR Standard* … update the methodology." This text is updated to: "Per the *ACR Standard*, the project Crediting Period is the length of time for which a GHG Project Plan is valid, and during which a project can generate credits against its baseline scenario. Orphaned well plugging activities developed under this methodology will have a single, non-renewable Crediting Period. Each well is eligible for crediting for 20 years based on Enverus oilfield data on wells currently classified as orphaned by states that demonstrates that the last production date was, on average, 17 years prior to that data being accessed. There is a significant population of unknown orphaned wells and projections for many additional wells to become orphaned. As additional data becomes available that defines orphaned well degradation, potentially high emission rates, and the emission decline curve, ACR will update the methodology.

The Crediting Period begins when it is first demonstrated through post-plugging measurements that there are no emissions from a well plugged as part of a project (i.e., the same date as the project start date and Reporting Period start date). The Crediting Period ends twenty years after it is demonstrated through post-plugging measurements that there are no emissions from the final well measured in the project (i.e., the same date as the Reporting Period end date). All wells in a project must be plugged and demonstrated through post-plugging measurements that there are no emissions within 24 months of the project start date, resulting in a maximum Crediting Period duration across all wells in the project of 22 years."

5. Clarification: Project Locations in Multiple Countries (2024-09-09)

Per this clarification, Project Proponents implementing project activities that result in GHG emissions reductions or removals being generated within the geographic boundary of more than one country must independently quantify GHG emissions reductions and/or removals achieved within each country and register them as separate projects.

6. Erratum: Evidence or Attestation that an Orphaned Well is Leaking (2024-06-13 and 2024-09-09)

In Section 4, a top bullet is added which states "Verifiable evidence that the well was found to be emitting methane when first accessed by the parties involved in the project, or an attestation as such signed by Project Proponent (and Project Developer Account Holder, if not the same entity), must be submitted as part of the project documentation."

7. Clarifications: Approval of Methane Measurement Methods (2024-06-13)

a. The text of first bullet of Section 4 states "Methods to measure emissions … during GHG Project Plan preparation." This text is updated to: "Project Proponents shall submit a Methane Measurement Method Approval Form to ACR and obtain approval prior to collection of pre-plugging methane measurements. More detail provided in Section 4.1."

b. Text in third paragraph of Section 4.1 states "Project proponents shall consult … the below ACR Requirements:" This text is updated to: "Project Proponents shall submit a Methane Measurement Method Approval Form to ACR for approval. The form shall be submitted during GHG Project Plan preparation (after project listing) and approved prior to collection of pre-plugging methane measurements. This form collects information about the parties participating in the project methane measurement activities, the name and qualifications of the qualified measurement specialist(s), and the proposed method(s) and equipment. Completed forms and any supplemental documents shall be uploaded to the Project Documents section for the applicable project on the ACR Registry. ACR will assess this information for consistency with the intent of the methodology and principles of accuracy and conservativeness, but approval of the form does not guarantee a successful verification or the issuance of carbon credits. ACR will upload the reviewed form to the ACR Registry when approved. In the final GHG Project Plan, Project Proponents must provide documentation that equipment was administered correctly, including calibration; demonstrate that the flow rates measured were within the specified range for the equipment used; and that the equipment, as administered in the field, met all accuracy and precision requirements set out in this methodology and the *ACR Standard*, including:"

c. The text in Section 4.2 that states "Measurement methods design shall … sampling may contact ACR" is removed.

8. Clarifications: Ambient Methane Measurements (2024-09-09)

a. Bullet 3 of Section 4 states "Ambient emissions measurements taken … 1 ppm or less" This text is updated to: "Ambient emissions measurements taken during pre-plugging sampling events and post-plugging measurements must be completed with a detection limit of 1 ppm or less. Ambient emissions measurements are not required during pre-plugging sampling events if measurement equipment is directly connected to the leaking well, and therefore not impacted by the ambient methane."

b. Bullet 1 in "Before Plugging" in Section 4 states "Ambient methane concentration measurements need to be collected prior sampling." This text is updated to: "Ambient methane concentration measurements shall be collected immediately preceding or

concurrent with each pre-plugging sampling event (if required) and the post-plugging measurements."

c. Bullet 1 in Section 4.2 states "Prior to sampling, background … to each sampling event." This text is updated to: "Immediately preceding or concurrent with each pre-plugging sampling event (if required) and the post-plugging measurements, background levels of methane must be recorded from a distance of 10-15 feet upwind of the well to be plugged. For the purposes of this requirement, 'upwind' means in the direction that the wind is blowing from at the time of measurement. This measurement may be taken with the same sampling device as the well measurements."

9. Errata: Methane Analyzer Specifications (2024-09-09)

a. Section 4.1.1 states "Combustible gas or multi-gas species analyzers that measure a range of gases including methane shall not be used." This text is updated to: "Combustible gas or multi-gas sensors typically used for determining explosion risk shall not be used."

b. Bullet 1 in Section 4.1.1 includes environmental conditions for which the instrument must be suitable. In addition to temperature and humidity, the equipment shall also be appropriate for well conditions such as flow rate, pressure, the presence of fluid, and must be used in a manner that ensures accuracy and safety.

10. Clarifications: Readings Required (2024-06-13, 2024-09-09, and 2024-09-13)

a. Bullet 3 in Section 4.1 states "Date, time, and location … data can be verified." This text is updated to: "Measurements of methane concentration, well gas flow rate, and flowing pressure (if wellhead is present) must be measured and recorded simultaneously. Methane-specific flow rates may be collected in lieu of separate measurements for methane concentration and well gas flow rate. Each reading shall include documentation of the measurement date, time, and location so measured data can be verified."

b. Section 4.1.2 states "Emissions measurements, taken over … slope of less than 1%." This text is updated to: "Emissions measurements are required to determine pre-plugging methane flow for every well in the project boundary. Two pre-plugging sampling events, at least 30-days apart, are required at each well, as demonstrated in Figure 3." Figure 4 is removed.

c. Section 5.2, bullet 3, first sub-bullet states "Measurements of methane … pictures or reports." This text is updated to: "Measurements of simultaneously collected methane concentrations, well gas flow rate, and flowing pressure (if wellhead is present) over

reported sampling event – including time-stamped, georeferenced videos, pictures or reports".

11. Errata: Readings Required (2024-09-09)

a. Per this erratum, it is acceptable to provide gas chromatography lab analysis in lieu of pre-plugging field measurements of methane concentration. If utilized, gas samples shall be taken directly from the well gas flow during or immediately after each pre-plugging sampling event, where well gas flow rate and pressure are measured and recorded, which will be considered as simultaneously collected/measured as stipulated by the earlier clarifications. The gas samples must undergo separate lab analysis (i.e., not combined). Gas sampling must be conducted according to GPA 2166, ISO 10715, API 14.1 or equivalent internationally recognized principles and in accordance with instrument manufacturer and lab specifications to result in a sample that is representative of the well gas stream. Lab analysis shall be conducted according to ASTM D1945, ASTM D1946, ISO 6974, GPA 2261 or equivalent internationally recognized principles. The lower of the methane concentrations from the two samples, as documented by the lab-issued gas concentration report(s), shall be used in Equation 1. It is recommended that multiple samples be taken or ample gas quantity be sampled to enable multiple analyses.

b. Per this erratum, flowing pressure shall be measured and recorded for all wells included in a project where a wellhead is present. If measurement equipment is directly connected to the leaking well, flowing pressure shall be measured and recorded. If a wellhead is present and measurement equipment is not directly connected to the leaking well, flowing pressure shall be measured and recorded (e.g., Hi Vol Gauge Pressure on the Hi Flow Meter) and barometric pressure deducted.

   References to measurements of wellhead pressure contained in earlier clarifications are changed to flowing pressure and applicability language in previously published clarifications has been modified accordingly.

12. Errata: Emissions Stabilization Requirements (2024-09-09)

a. Section 4.1.4 title is changed to "Stabilization Requirements for Measurements"

b. Section 4.1.4 states "Methane emission rates can … not eligible for crediting." This text is updated to: "Regardless of method, simultaneous measurements of methane concentration, well gas flow rate (or methane emission rate if methane is measured directly), and flowing pressure (if required) must be recorded at consecutive 10-minute intervals, or more frequently and averaged over consecutive 10-minute periods. The entire period over which these measurements are taken must be at least

2 hours (i.e., the "2-hour stability period"). These readings are used to determine methane emission rate stability. During each pre-plugging sampling event described in Section 4.1.2, the methane emission rate, measured directly or calculated from simultaneously measured methane concentration and well gas flow rate, must stabilize for a minimum of two hours. Flowing pressure (if required) must also be stable over the two-hour sampling period, though this data will not be used as part of the calculations. To be considered stable over the minimum 2-hour period, the following criteria must be met:

- The 10-minute interval methane emission rates (standard cubic feet per hour, or scf/hr) over the minimum 2-hour stability period, corrected for moisture content (if applicable) and ambient methane concentration, do not vary from one another by a factor greater than 10;
- The 10-minute interval methane emission rates (scf/hr) over the minimum 2-hour stability period, corrected for moisture content (if applicable) and ambient methane concentration, fall within ±10% of the average methane emission rate. The average is calculated as the arithmetic mean of the 10-minute interval methane emission rates (scf/hr) over the minimum 2-hour stability period, corrected for moisture content (if applicable) and ambient methane concentration. Over a 2-hour stability period, a minimum of eleven of the twelve 10-minute interval data points must fall within this bound. If the stability period is longer than two hours, the minimum number of 10-minute interval points that must be within ±10% of the average increases proportionally and rounded up to the nearest whole number (e.g., 17 of 18 data points, 22 of 23 data points, and 22 of 24 data points must be within ±10%); and
- The 10-minute interval flowing pressure readings (psi) over the minimum 2-hour stability period fall within ±10% of the average flowing pressure. The average is calculated as the arithmetic mean of the 10-minute interval methane emission rates (psi) over the minimum 2-hour stability period. Over a 2-hour stability period, a minimum of eleven of the twelve 10-minute interval data points must fall within this bound. If the stability period is longer than two hours, the minimum number of 10-minute interval points that must be within ±10% of the average increases proportionally and rounded up to the nearest whole number (e.g., 17 of 18 data points, 22 of 23 data points, and 22 of 24 data points must be within ±10%).

The arithmetic mean of all 10-minute interval methane emission rates (scf/hr) and corrected for moisture content (if applicable) and ambient methane concentration (if applicable) measured during the minimum 2-hour stability period will be considered the average methane emission rate for that sampling event. To demonstrate stability over time, the average methane emission rate from the second sampling event at least 30 days later must be within 10% of the average of first sampling event.

If the observed methane emission rates during initial measurement do not meet the above criteria, additional measurements may be collected."

13. Clarification: Post-Plugging Monitoring (2024-09-09)

Section 4.7 states "The test shall involve … that well are granted." This text is updated to: "A methane detector shall be used to screen the ground surface and any portion of the plugged well casing that remains above grade after plugging. For buried wells, a surface area of 1 square meter (1 m^2) above the wellhead shall be measured. The detector can be a handheld methane sensor and shall have a lower detection limit of 1 ppm methane or less. The equipment shall be placed within 5 centimeters (5 cm) of the ground and/or well casing. Each area requiring screening shall be screened for at least 5 minutes. If a methane concentration exceeding 2 ppm above background is detected, the methane emissions rate must be measured in accordance with the approved Methane Measurement Method Approval Form. The methane emission rate, corrected for pressure and temperature, measured directly or calculated from simultaneously measured methane concentration and well gas flow rate shall not exceed 1.0 gram per hour (g/hr). If the measured methane emission rate exceeds 1.0 gram per hour (g/hr), then the plugged well shall be re-plugged and re-tested prior to credits being issued for that well."

14. Errata: Data Adjustments (2024-09-09)

a. Depending on the measurement equipment used, well gas flow rate data may need to be corrected for standard temperature and pressure. If the gas flow measurement equipment does not internally correct flow rate to standard conditions, the project proponent must normalize the measured well gas flow rate by applying a correction using Equation A, which normalizes the values to a standard pressure of 1 atm and standard temperature of 60° F. If the flow measurement equipment used normalizes readings to a standard pressure of 1 atm and standard temperature of 32° F, 60° F, or 68° F, no further correction to standard conditions shall be applied. The density factor used in Equation 1 (ρ) shall align with the standard temperature applied in any correction (internal to the equipment or manually using Equation A).

Equation A: Well Gas Flow Rate Correction for Temperature and Pressure

$$\text{Corrected } Q_{\text{measured,i}} = Q_{\text{measured,i}} \times \frac{519.67}{\text{Gas Temp}_{\text{measured,i}}} \times \frac{\text{Gas Pressure}_{\text{measured,i}}}{1}$$

WHERE

Corrected $Q_{measured,i}$	Well gas flow rate for 10-minute interval, *i*, from minimum 2-hour stability period of both pre-plugging sampling events for well *p*, corrected for temperature and pressure (scf/hr) If correction for standard temperature and pressure is required, this value shall be used as $Q_{measured,i}$ in Equation 1.
$Q_{measured,i}$	Well gas flow rate for 10-minute interval, *i*, from minimum 2-hour stability period of both pre-plugging sampling events for well *p* (acf/hr)
519.67	519.67 degrees Rankine (°R)
Gas $Temp_{measured,i}$	Measured absolute temperature of well gas flow for 10-minute interval, *i* (°R, where °R = °F + 459.67)
Gas $Pressure_{measured,i}$	Measured absolute pressure of flowing pressure for 10-minute interval, *i* (atm) Convert PSIG (psi gauge) to PSIA (psi absolute) by adding 1 atm; convert PSIA to atm by multiplying by 0.068046.

b. Depending on the measurement method and measurement equipment used, concentrations of methane in the well gas stream or methane-specific flow rates may need to be corrected for ambient methane concentration. If the method and equipment employed can result in ambient methane concentration levels impacting these measurements, the project proponent must normalize the measured concentrations of methane in the well gas stream or measured methane-specific flow rates by applying a deduction using Equation B or Equation C, as applicable.

The deduction shall only be applied in instances where the ambient methane concentration can be detected and registered within the measurement of methane concentrations of the well gas or methane-specific flow rates. If these are measured through a direct connection method, and therefore not impacted by the ambient methane concentration, no deduction shall be made.

Equation B: Deduction for Ambient Methane Concentration When Measuring Well Gas Flow Rate & Concentration of Methane in the Gas Stream Separately in Pre-Plugging Measurements

$$\text{Corrected Conc}_{\text{measured},i} = \text{Conc}_{\text{measured},i} - \text{Conc}_{\text{measured,ambient}}$$

WHERE

$\textbf{Corrected Conc}_{\textbf{measured},i}$	Concentration of methane in the well gas stream for each 10-minute interval, *i*, from minimum 2-hour stability period of both pre-plugging sampling events for well *p* (%) If a deduction for ambient methane is required, this value shall be used as $\text{Conc}_{\text{measured},i}$ in Equation 1
$\textbf{Conc}_{\textbf{measured},i}$	Concentration of methane in the well gas stream for each 10-minute interval, *i*, from minimum 2-hour stability period of both pre-plugging sampling events for well *p* (%) Measurements in ppm shall be converted to percent by dividing ppm by 10,000.
$\textbf{Conc}_{\textbf{measured,ambient}}$	Concentration of methane in ambient measurement (%) Measurements in ppm shall be converted to percent by dividing ppm by 10,000.

Equation C: Deduction for Ambient Methane Concentration When Measuring Methane-Specific Flow Rate in Pre-Plugging Measurements

$$\text{Corrected Q}_{\text{measured},i} \times \text{Conc}_{\text{measured},i} = \text{CH4}_{\text{measured},i} \times \frac{\left(1{,}000{,}000 - \text{Conc}_{\text{measured,ambient}}\right)}{1{,}000{,}000}$$

WHERE

$\textbf{Corrected Q}_{\textbf{measured},i} \times \textbf{Conc}_{\textbf{measured},i}$	Terms in Equation 1 equal to methane-specific flow rate for each 10-minute interval, *i*, from minimum 2-hour stability period of both pre-plugging sampling events for well *p* (scf/hr) If deduction for ambient methane is required, this value shall be used as $\text{Q}_{\text{measured},i} \times \text{Conc}_{\text{measured},i}$ in Equation 1

$\mathbf{Conc_{measured,i}}$	Concentration of methane in the well gas stream for each 10-minute interval, *i*, from minimum 2-hour stability period of both pre-plugging sampling events for well *p* (%)
$\mathbf{CH4_{measured,i}}$	Methane-specific flow rate for 10-minute interval, *i*, from minimum 2-hour stability period of both pre-plugging sampling events for well *p* (scf/hr)
1,000,000	100% parts per million
$\mathbf{Conc_{measured,ambient}}$	Concentration of methane in ambient measurement (ppm)

15. Errata: Equation Updates (2024-06-13, 2024-09-09, and 2024-09-13)

Equations within the methodology are updated as follows:

a. A new Equation 1 is added to Section 4.2.1 to calculate the annual emission rate for a single well.

Text is added: "The annual emission rate for each well is calculated using readings from stability periods of both pre-plugging sampling events in Equation 1."

Equation 1: Annual Emission Rate for a Well

$$Q_{pre-plugging,p} = \frac{\sum_{i=1}^{n}\left(Q_{measured,i} \times Conc_{measured,i} \times MCF\right)}{n} \times \rho \times 0.454 \times 8{,}760$$

WHERE

$\mathbf{Q_{pre-plugging,p}}$	Methane emission rate for well, *p* (Kg CH_4/year)
$\mathbf{Q_{measured,i}}$	Well gas flow rate for 10-minute interval, *i*, from minimum 2-hour stability period of both pre-plugging sampling events for well *p* (scf/hr)
$\mathbf{Conc_{measured,i}}$	Concentration of methane in the well gas stream for 10-minute interval, *i*, from minimum 2-hour stability period of both pre-plugging sampling events for well *p* (%)

MCF	Moisture correction factor = 1 when $Q_{measured,i}$ and $Conc_{measured,i}$ are measured on a dry basis or if both are measured on a wet basis. = 1-(f_{H2O}) when $Q_{measured,i}$ is measured on a wet basis and $Conc_{measured,i}$ is measured on a dry basis. = 1/[1-(f_{H2O})] when $Q_{measured,i}$ is measured on a dry basis and $Conc_{measured,i}$ is measured on a wet basis. (f_{H2O}) = Moisture content of the methane, volumetric basis (cubic feet water per cubic feet emitted gas) The measurement is on a wet basis if it is performed directly on the well gas flow. Measurements made where fluid is removed prior to the measurement are considered to be made on a dry basis. (U.S. EPA, 2019)
n	Number of 10-minute intervals, *i*, from stability periods of both pre-plugging sampling events (minimum 2-hours each for a minimum quantity of 24 interval readings)
ρ	Standard density of methane (lb CH_4/scf CH_4) If $Q_{measured,i}$ is standardized to 1 atm and 32° F, use 0.0447 If $Q_{measured,i}$ is standardized to 1 atm and 60° F, use 0.0423 If $Q_{measured,i}$ is standardized to 1 atm and 68° F, use 0.0416
0.454	Conversion of lb to Kg
8,760	Hours per year

b. Equation 1 from the methodology becomes Equation 2 and is updated from calculating annual baseline emissions to baseline emissions during the Crediting Period.

The text states “The baseline (pre-plugging) emissions, BE (t CO_2e/year), are computed using:” This text is updated to: “The baseline (pre-plugging) emissions over the Crediting Period for all wells in the project, BE (MT CO_2e), is calculated using Equation 2.”

Equation 2: Baseline Emissions (Pre-Plugging)

$$BE = \frac{\sum_{p=1}^{w}(Q_{pre-plugging,p})}{1{,}000} \times GWP_{100CH4} \times 20$$

WHERE

BE	Baseline emissions over the Crediting Period for all wells in project (MT CO_2e)
$Q_{pre-plugging,p}$	Methane emission rate for well, p (Kg CH_4/year) from Equation 1
w	Total number of wells to be plugged in a project
1,000	Conversion of Kg to MT
GWP_{100CH4}	100-year global warming potential for methane (CH_4)
20	Years in Crediting Period

c. Section 4.3 and Equation 2 from the methodology is removed.

d. Equation 3 from the methodology is updated to:

Equation 3: Project CO_2 Emissions from Fossil Fuel Combustion for Equipment Used at Plugging Project

$$PE = \sum_{j=1}^{y} \frac{FF_j \times EF_j}{1{,}000}$$

WHERE

PE	Project CO_2 emissions from fossil fuel combustion for equipment used at plugging project (MT CO_2e)
FF_j	Quantity of fossil fuel, j, consumed (gallons)[20] in all plugging activities required for project completion

[20] Plugging records that show diesel/gasoline used during plugging activities need to be shared with ACR for verification.

EF_j	Fuel specific emission factor for fuel, *j* 10.49 Kg CO_2e per gallon diesel, and 8.81 Kg CO_2e per gallon of gasoline[21]
1,000	Conversion of Kg to MT
y	Number of fossil fuels used at plugging project

e. Section 4.6 and Equation 4 from the methodology are removed. Uncertainty is addressed by the standard uncertainty deduction discussed in the text of Section 6.2 and applied in Equation 5.

f. Equation 5 from the methodology is updated to:

Text is added: "The total GHG emission reductions achieved by the project, minus the 5% uncertainty deduction for all projects is calculated using Equation 5."

Equation 5: Total GHG Emission Reductions

$$\mathbf{TotalER} = (\mathbf{BE} - \mathbf{PE}) \times (\mathbf{1} - \mathbf{UNC})$$

WHERE

TotalER	Total emissions reductions from project (MT CO_2e)
BE	Baseline emissions over Crediting Period for all wells in project (MT CO_2e) from Equation 2
PE	Project CO_2 emissions from fossil fuel combustion for equipment used at plugging project (MT CO_2e) from Equation 3
UNC	5% uncertainty deduction

g. Section 4.9 and Equation 6 from the methodology are removed.

[21] U.S. EPA Emission Factors for Greenhouse Gas Inventories (2024). Adapted from tables 1 and 5. https://www.epa.gov/climateleadership/ghg-emission-factors-hub

16. Errata: Data Collection and Parameters to be Monitored (2024-09-09)

a. The following are added to the list of data that must be collected and reported in Section 5.2:

- The time window comprising the 2-hour stability period
- Average (arithmetic mean) of all 10-minute interval flowing pressure (psi) over the minimum 2-hour stability period, if required

b. The following are added to the list of data inputs for the calcuation of the project baseline emissions and project emissions reductions in Section 5.2:

- Average (arithmetic mean) of all 10-minute interval methane emission rates (scf/hr), corrected for moisture content (if applicable) and ambient methane concentration (if applicable), over the minimum 2-hour stability period
- If gas chromatography is utilized in lieu of field measurements of methane concentration, lab results for all samples submitted and analyzed, with the time stamp of the samples and standards followed for collection and analysis noted
- If well gas flow requires correction for temperature and pressure, absolute temperature of well gas flow and absolute pressure of flowing pressure for 10-minute intervals over the minimum 2-hour stability period
- If required for moisture correction factor, moisture content of the methane (cubic feet water per cubic feet emitted gas)
- Pre-plugging and post-plugging ambient methane measurements (ppm, %)
- Post-plugging measurements of methane concentration (ppm) and, if required, methane emission rate (scf/hr)

c. The following are added to the list of information about the well that shall be provided in Section 5.2:

- Evidence of methane emissions from obtained during initial leak detection of the well, or attestation that the well was found to be emitting methane when first accessed by the parties involved in the project

17. Erratum: Update 5.2.1 Parameters (2024-06-13 and 2024-09-09)

Table 5.2.1 is updated as follow and only reflects measured parameters:

UNIT	PARAMETER	SOURCE	BASELINE OR PROJECT	FREQUENCY OF MONITORING
scf/hr	$Q_{measured,i}$	Field measurements	Baseline	Two minimum 2-hour sampling events/well
%	$Conc_{measured,i}$	Field measurements or field sample and gas chromatography analysis	Baseline	Two minimum 2-hour sampling events/well or, for gas chromatography, minimum 1 per sampling event
psi	Flowing pressure	Field measurements	Baseline, if wellhead is present	Two minimum 2-hour sampling events/well
ppm	$Conc_{measured,ambient}$	Field measurements	Baseline, if not directly connected	Two minimum 2-hour sampling events/well
Temperature of well gas flow	$Gas\ Temp_{(measured,i)}$	Field measurements	Baseline, if normalization to standard temperature and pressure is required	Two minimum 2-hour sampling events/well
ft^3 H_2O/scf well gas flow	f_{H2O}	Field measurements	Baseline, if required for moisture correction factor	1 per sampling events
number of 10-minute intervals from pre-plugging sampling events	n	Field measurements	Baseline	Two minimum 2-hour sampling events/well
volume	V_{eff}	Field measurements (for non-steady state enclosure-based measurements)	Baseline	Two minimum 2-hour sampling events/well

UNIT	PARAMETER	SOURCE	BASELINE OR PROJECT	FREQUENCY OF MONITORING
$\frac{\text{mass}}{\text{volume} \times \text{time}}$	$\frac{dC}{dt}$	Field measurements (for non-steady state enclosure-based measurements)	Baseline	Two minimum 2-hour sampling events/well
$\frac{\text{volume}}{\text{time}}$	q	Field measurements (for non-steady state enclosure-based measurements)	Baseline	Two minimum 2-hour sampling events/well
$\frac{\text{mass}}{\text{volume}}$	C_{eq}	Field measurements (for non-steady state enclosure-based measurements)	Baseline	Two minimum 2-hour sampling events/well
$\frac{\text{mass}}{\text{volume}}$	C_b	Field measurements (for non-steady state enclosure-based measurements)	Baseline	Two minimum 2-hour sampling events/well
wells	w	Project documentation	Baseline and Project	1/project
gallons	FF_j	Fuel measurement	Project	1/fuel/plugging activity
ppm	Post-plugging methane screening	Field measurements	Project	1/well
g/hour	Post-plugging methane emission rate	Field measurement	Project	1/well, if required based on results of screening
ppm	Pre-plugging: $Conc_{measured,ambient}$ Post-plugging: ambient methane emissions	Field measurements	Baseline and Project	Pre-plugging: 1/sampling event Post-plugging: 1/well

18. Clarification: Definitions (2024-06-13 and 2024-09-09)

The following definition is added:

Sampling Event	Refers to a single, minimum 2-hour period for the simultaneous collection of methane concentration, well gas flow rate, and flowing pressure (required if wellhead is present) from an orphaned well. Methane-specific flow rates may be collected in lieu of separate measurements for methane concentration and well gas flow rate.

19. Clarification: Environmental Conditions (2024-06-13 and 2024-09-09)

Seventh bullet in Section 5.2 states "Environmental conditions: precipitation … wind speed (onsite measurement required)." This text is updated to: "Onsite environmental conditions must be reported in the final GHG Project Plan to confirm that the measurement equipment used is within its operational range. It is acceptable to use third party information (weather reports or apps) to collect this information. Information to be reported includes precipitation, temperature, humidity, wind speed, and barometric pressure."

20. Errata: References (2024-09-09)

The following references are added:

American Petroleum Institute (API). (2022). Manual of Petroleum Measurement Standards Chapter 14 – Natural Gas Fluids Measurement, Section 1 – Collecting and Handling of Natural Gas Samples for Custody Transfer. https://www.apiwebstore.org/standards/14_1

American Society for Testing and Materials (ASTM). (2019). ASTM D1945-14 Standard Test Method for Analysis of Natural Gas by Gas Chromatography. https://www.astm.org/d1945-14r19.html

American Society for Testing and Materials (ASTM). (2019). ASTM D1946-90 Standard Practice for Analysis of Reformed Gas by Gas Chromatography. https://www.astm.org/d1946-90r19.html

GPA Midstream Association. (2022). GPA 2166-22 Obtaining Natural Gas Samples for Analysis by Gas Chromatography. https://my.midstreamassociation.org/publications-store/publications

GPA Midstream Association. (2020). GPA 2261-20 Analysis for Natural Gas and Similar Gaseous Mixtures by Gas Chromatography. https://my.midstreamassociation.org/publications-store/publications

International Organizations for Standards (ISO). (2012). ISO 6974-1:2012 Natural gas — Determination of composition and associated uncertainty by gas chromatography, Part 1: General guidelines and calculation of composition. https://www.iso.org/standard/55839.html

International Organizations for Standards (ISO). (2012). ISO 6974-2:2012 Natural gas — Determination of composition and associated uncertainty by gas chromatography, Part 2: Uncertainty calculations. https://www.iso.org/standard/44108.html

International Organizations for Standards (ISO). (2018). ISO 6974-3:2018 Natural gas — Determination of composition and associated uncertainty by gas chromatography, Part 3: Precision and bias. https://www.iso.org/standard/68632.html

International Organizations for Standards (ISO). (2000). ISO 6974-4:2000 Natural gas — Determination of composition and associated uncertainty by gas chromatography, Part 4: Determination of nitrogen, carbon dioxide and C1 to C5 and C6+ hydrocarbons for a laboratory and on-line measuring system using two columns. https://www.iso.org/standard/25855.html

International Organizations for Standards (ISO). (2014). ISO 6974-5:2014 Natural gas — Determination of composition and associated uncertainty by gas chromatography, Part 5: Isothermal method for nitrogen, carbon dioxide, C1 to C5 hydrocarbons and C6+ hydrocarbons. https://www.iso.org/standard/57080.html

International Organizations for Standards (ISO). (2022). ISO 10715:2022 Natural gas — Gas sampling. https://www.iso.org/standard/76105.html

United States Environmental Protection Agency (U.S. EPA). (2009). 40 CFR Part 98 Subpart HH. https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-HH

United States Environmental Protection Agency (U.S. EPA). (2024). 40 CFR Part 60 Subpart OOOOb. https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-60/subpart-OOOOb

United States Environmental Protection Agency (U.S. EPA). (2019). Q352. What are definitions of wet and dry gas in subpart HH? https://ccdsupport.com/confluence/pages/viewpage.action?pageId=91259587

United States Environmental Protection Agency (U.S. EPA). (2024). 2024 GHG Emission Factors Hub https://www.epa.gov/climateleadership/ghg-emission-factors-hub