U.S. Livestock Project Protocol
Version 3.0
ERRATA AND CLARIFICATIONS

The Climate Action Reserve (Reserve) published its U.S. Livestock Project Protocol Version 3.0 (LSPP V3.0) in September 2010. While the Reserve intends for the LSPP V3.0 to be a complete, transparent document, it recognizes that correction of errors and clarifications will be necessary as the protocol is implemented and issues are identified. This document is an official record of all errata and clarifications applicable to the LSPP V3.0.[1]

Per the Reserve's Program Manual, both errata and clarifications are considered effective on the date they are first posted on the Reserve website. The effective date of each erratum or clarification is clearly designated below. All listed and registered livestock projects must incorporate and adhere to these errata and clarifications when they undergo verification. The Reserve will incorporate both errata and clarifications into future versions of the LSPP.

All project developers and verification bodies must refer to this document to ensure that the most current guidance is adhered to in project design and verification. Verification bodies shall refer to this document immediately prior to uploading any Verification Statement to assure all issues are properly addressed and incorporated into verification activities.

If you have any questions about the updates or clarifications in this document, please contact Policy at: policy@climateactionreserve.org or (213) 891-1444 x3.

[1] See Section 4.3.4 of the Climate Action Reserve Program Manual for an explanation of the Reserve's policies on protocol errata and clarifications. "Errata" are issued to correct typographical errors. "Clarifications" are issued to ensure consistent interpretation and application of the protocol. For document management and program implementation purposes, both errata and clarifications to the LSPP are contained in this single document.

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Errata and Clarifications (arranged by protocol section)

Section 5

1. Calculating the van't Hoff-Arrhenius Factor (ERRATUM – March 28, 2012)

Section: 5.1 (Modeling Baseline Methane Emissions)

Context: The first step involved in Equation 5.3 (pages 15-16) is the calculation of the van't Hoff-Arrhenius factor (*f*). This factor estimates the percentage of volatile solids (VS) that will be biologically available for degradation in the baseline lagoon, depending on the ambient temperature. The equation is set up with a base temperature of 30°C (86°F), based on the assumption that this is the point at which biological availability will reach its maximum. One resultant outcome is that if a temperature of greater than 30°C is input for T_2, the calculated value of *f* will be greater than 100%, which is physically impossible.

Additionally, the reference source for this equation states that, under actual field conditions, the value of *f* is not likely exceed 95% (Mangino et al., 2001). Thus, the user-calculated value for *f* should never exceed 0.95 (95%), which occurs when T_2 > 29.5°C. The current calculation is taken from this specific reference, but the limit of 95% was erroneously omitted.

Correction: The following text shall be added to the definition of T_2 in Equation 5.3 on page 16:

> "If T_2 > 29.5°C then *f* = 0.95."

2. Source for VS_{table} (CLARIFICATION – March 28, 2012)

Section: 5.1 (Modeling Baseline Methane Emissions)

Context: Box 5.1 on page 18 gives guidance on the calculation of VS_L for use in Equation 5.4. Users are directed to use Table B.5 to find the appropriate VS value for their animal type and reporting year. This guidance states that "[i]f the current year's table is not available, use the most current year." It is not clear that this statement is referring to the table's availability from the source (U.S. EPA), and not just the most recent table printed in the protocol appendix.

Clarification: Project developers shall use the VS value from the U.S. EPA Greenhouse Gas Inventory[2] that matches the relevant reporting year, or the most current year that is available. For convenience, the Reserve Livestock Calculation Tool[3] includes the most up-to-date tables, with units converted to match those in the protocol. The updated tables can be found in the worksheet "XIV. Reference Tables." Project developers shall refer to the tables provided in the calculation tool even if they choose not to use this tool for their project quantification.

3. Source for Typical Average Mass (TAM) (CLARIFICATION – July 19, 2012)

Section: 5.1 (Modeling Baseline Methane Emissions)

Context: Box 5.1 on page 18 provides guidance on the calculation of daily volatile solids (VS) for different livestock categories. In order to adjust the VS value for each particular livestock

[2] http://epa.gov/climatechange/emissions/usgginventory.html
[3] http://www.climateactionreserve.org/how/protocols/us-livestock/

category, the average animal mass may be determined using site-specific data, or referenced from Table B.2 in Appendix B. For the VS values in Table B.5, a new table is provided in the Beta Livestock Calculation Tool with each new update of the U.S. Environmental Protection Agency (EPA) publication of the annual Inventory of GHG Sources and Sinks. However, even though many of the values for TAM in Table B.2 are referenced from the same source, an updated table has not been provided by the Reserve. Thus it has not been clear whether or not it is possible to use more current values for TAM if they are available.

Project developers who plan to submit a livestock project using the California Air Resources Board's Compliance Offset Protocol should note that the default values used in that document are static.

Clarification: Project developers shall use the TAM value from the U.S. EPA Greenhouse Gas Inventory2 that matches the relevant reporting year, or the most current year that is available. For convenience, the Reserve Livestock Calculation Tool3 includes the most up-to-date tables. The updated tables can be found in the worksheet "XIV. Reference Tables." Project developers shall refer to the tables provided in the calculation tool even if they choose not to use this tool for their project quantification.

4. BCE Value for a Multistage Digester System (CLARIFICATION – July 19, 2012)

Section: 5.2 (Calculating Project Methane Emissions)

Context: Equation 5.6 on page 21 is used to calculate the methane emissions released from the biogas control system (BCS). On a monthly basis, projects must account for methane that is lost due to the biogas collection efficiency (BCE) of the digester system. Default values are provided, depending upon whether the system is an enclosed vessel or a covered lagoon.

It is not clear what value a project should choose for BCE if the BCS involves more than one stage, and the stages do not utilize the same type of digester technology.

Clarification: If the project BCS includes an enclosed vessel anaerobic digester as well as a covered lagoon, in series, then the value for BCE shall be determined based on one of the following scenarios:

1. If the biogas flow from each digester system is monitored separately, then the BCE shall be a weighted average of the two systems based on the total monthly biogas flow from each system. For example, if 50 percent of the total monthly biogas flow was collected from each digester system, the BCE would be calculated as follows: $(0.98 \times 0.5) + (0.95 \times 0.5) = 0.965$.

2. If the biogas flow from each digester system is combined prior to the flow measurement device, then the BCE shall be weighted like so: 70 percent weight will be given to the BCE of the initial digester technology and 30 percent weight to the BCE of the secondary digester technology. For example, if the project employs an enclosed vessel digester, followed by a covered lagoon, the BCE would be: $(0.98 \times 0.7) + (0.95 \times 0.3) = 0.971$.

5. Accounting for Methane Emissions during Temporary Project Shutdown (CLARIFICATION – October 29, 2013)

Section: 5.2 (Calculating Project Methane Emissions)

Context: The third full paragraph of Section 5.2 reads: "Although not common under normal digester operation, it is possible that a venting event may occur due to catastrophic failure of digester cover materials, the digester vessel, or the gas collection system. In the event that a catastrophic system failure results in the venting of biogas, the quantity of methane released to the atmosphere shall be estimated according to Equation 5.7 below."

Equation 5.7 on page 22 provides guidance for calculating the quantity of methane released during a venting event, which is added to the total Project Methane Emissions from the BCS, as calculated in Equation 5.6. Equation 5.7 accounts for two releases of biogas: the initial release of biogas being stored in the digester, and then the daily release of additional gas that is generated in the digester until the gas collection system is functional.

The intent of the current guidance is to account for situations where the project digester continues to receive and treat manure, but the gas collection system is discovered to be compromised. In situations where the project digester has been shut down for longer periods of time, biogas is typically released from the digester and then project manure directed to an anaerobic system (e.g. either the covers are taken off the digester or manure is diverted to open lagoons) that would meet the definition in Section 3.4. During such longer shutdowns, it has not been clear whether this entire period of time should be considered a venting event and, if so, how quantification of emissions should proceed.

Clarification: The following text shall be inserted between Equation 5.7 and Equation 5.8 on page 22:

"A venting event occurs when the project digester continues to process manure, but biogas is vented directly to the atmosphere (e.g. through a rip in a lagoon cover or a broken pipe). Projects that experience a venting event shall continue to use Equation 5.7 to calculate the resulting project methane emissions.

A project shutdown occurs when the project digester is no longer functional. This occurs when the project reverts to an open, uncontrolled, anaerobic manure treatment system (e.g. the manure is redirected to open, anaerobic lagoons, or the cover is completely removed from a covered lagoon digester and no heating or mixing occurs). A project shutdown is defined as a venting event on the day of the shutdown, and then a cessation of project operations until the BCS is once again operable.

In the case where the project BCS is shut down and the manure is treated in an open, uncontrolled, anaerobic system (meeting the definition in Section 3.4), the project scenario shall be assumed to be equal to the baseline scenario. In this case the project must quantify the release of stored biogas (MS_{BCS} in Equation 5.7) at the time that the system is shut down, but not the subsequent daily release of biogas from the open lagoons. In these situations the project will cease quantification of emission reductions until the BCS is once again operational."

6. MCF Value for a Covered Liquid Effluent Storage System (CLARIFICATION – July 19, 2012)

Section: 5.2 (Calculating Project Methane Emissions)

Context: Equation 5.8 on page 22 is used to calculate the methane emissions released from the treatment of the effluent upon leaving the anaerobic digester. To complete this calculation, the project developer must select the appropriate value for the methane conversion factor (MCF) based on the type of treatment system (usually an open effluent pond). Table B.6 in Appendix B is the source for the MCF values to be used in this equation.

In the case of a project that installs an impermeable cover on the effluent pond, effectively creating a second anaerobic digester, it is not clear how to determine the correct MCF value. Table B.6 lists the MCF value for an anaerobic digester as a range, from 0 percent to 100 percent, and directs the reader to use Formula 1 to determine the correct MCF. This formula, which was included as a footnote to the table in the original IPCC source, was omitted from the Livestock Project Protocol. In addition, it is not clear how to apply this formula for use in determining the MCF of a covered effluent pond. In the original source document, Formula 1 is not intended for determining the MCF of a covered effluent storage pond, but rather for determining the MCF of an entire digester system. Thus, the terms are not defined appropriately for this purpose.

Clarification: If the project elects to install an impermeable cover over its liquid effluent storage system, and to collect the methane gas from this covered storage and connect it to the biogas control system (BCS), it may be considered to be part of the project digester system, rather than a separate effluent treatment system. The fate of the effluent from this covered storage would then need to be quantified using Equation 5.8.

If the effluent from the project digester is directed to a covered liquid effluent storage system, and the biogas from this storage system is not collected and destroyed, then the following scenarios apply:

1. If the effluent from this system is applied directly to land, the value of $PE_{CH4,EP}$ shall be equal to the quantity of methane released directly from this storage system, divided by 0.95 (the biogas collection efficiency, or BCE, of a covered lagoon digester). The monitoring of biogas flow and methane concentration shall follow the requirements of Section 6. For any periods where biogas data from this system are missing or not in conformance with Section 6, Equation 5.8 shall be used to determine the quantity of methane for those periods, applying a value of 1.0 for MCF_{ep}.

2. If the effluent from the covered liquid effluent storage system is directed to another treatment system (i.e. not land-applied), the additional methane released from this further treatment must be quantified. The following adapted version of Formula 1 shall be applied to determine the MCF value for a covered liquid effluent storage system in this case. Use of this formula requires that the biogas production of the covered liquid effluent storage system be metered. If the biogas from this system is not metered, the value of MCF_{ep} shall be 1.0. For any periods when biogas from this system is not metered, the value of MCF_{ep} shall be 1.0, and these periods shall be quantified separately from the formula below.

Formula 1: MCF value for a covered liquid effluent storage system with additional effluent treatment

$$MCF_{ep} = \frac{\frac{CH_{4,meter,ep}}{0.95} + (MCF_{add} \times B_{0,ep} \times 0.3 \times VS_{ep} \times 0.68 \times d)}{B_{0,ep} \times VS_{ep} \times 0.68 \times d}$$

Where,

			Units
MCF_{ep}	=	Methane conversion factor for a covered liquid effluent storage system	fraction
$CH_{4,meter,ep}$	=	Total quantity of methane released (uncombusted) from the effluent storage system. Biogas flow and methane concentration must be metered according to the requirements of Section 6	kg CH_4
0.95	=	Biogas collection efficiency (BCE) of a covered lagoon digester	fraction
MCF_{add}	=	Methane conversion factor for the additional treatment of effluent after the covered liquid effluent storage system. Project developers shall use the MCF value that corresponds to the treatment system	fraction
$B_{0,ep}$	=	Maximum methane producing capacity (of VS dry matter) (see guidance in Equation 5.8)	m^3CH_4/kg VS
0.3	=	Default value representing the amount of VS that exits the covered liquid effluent storage system as a percentage of the VS entering the covered liquid effluent storage system	fraction
VS_{ep}	=	Volatile solid to covered liquid effluent storage system (see guidance in Equation 5.8)	kg/day
0.68	=	Density of methane (1 atm, 60°F)	kg/m^3
d	=	Number of days in reporting period	days

7. Emissions from Land Application (ERRATUM – July 19, 2012)

Section: 5.2 (Calculating Project Methane Emissions)

Context: Equation 5.8 on page 22 is used to quantify the methane emissions associated with the effluent pond that receives and stores the effluent from the anaerobic digester. Though the title of the equation implies that it is only to be used for quantifying the methane from an effluent pond, footnote 28 clarifies that this same equation is to be used to quantify the methane emissions from an alternative form of effluent storage or treatment. However, this footnote erroneously includes land application as a form of treatment that shall be quantified as a source of project emissions.

Correction: Per Table 4.1 on page 11, the methane emissions from land application (SSR 7) are excluded from the greenhouse gas assessment boundary for livestock projects. However, if the effluent is transported offsite for land application elsewhere, the fossil fuel emissions associated with this transportation must be quantified as project emissions (Equation 5.11).

8. Service Providers for Site-Specific Destruction Efficiency Testing (CLARIFICATION – January 21, 2014)

Section: 5.2 (Calculating Project Methane Emissions)

Context: Footnote 26 on page 21 states that service providers used to determine site-specific values for methane destruction efficiency must be "state or local agency accredited." It is not clear what specific options are available and permissible to projects located in a state or locality which does not have an accreditation program for source test service providers. Similar language exists in footnote 32 on page 24 and in the first full paragraph on page 65 in Appendix B.

Clarification: The intent of this requirement is to ensure that any source testing conducted for the determination of a site-specific value for methane destruction efficiency is of a quality that would be acceptable for compliance by a regulatory body. The following text shall be added to the end of footnote 26 on page 21, footnote 32 on page 24, and after the paragraph mentioned above on page 65:

> "If neither the state nor locality relevant to the project site offer accreditation for source testing service providers, projects may use an accredited service provider from another U.S. state or domestic locality. Alternatively, projects may choose a non-accredited service provider, under the following conditions: 1) the service provider must provide verifiable evidence of prior testing which was accepted for compliance by a domestic regulatory agency, and 2) the prior testing procedures must be substantially similar to the procedures used for determining methane destruction efficiency for the project destruction device(s)."

Section 6

9. Metering Multiple Destruction Devices (CLARIFICATION – October 26, 2011)

Section: 6.1 (Monitoring Requirements)

Context: Footnote 34 on page 26 states that: "A single meter may be used for multiple, identical destruction devices. In this instance, methane destruction in these units will be eligible only if both units are verified to be operational."

The Reserve has determined that in certain situations it may be acceptable for one flow meter to be used to monitor the flow of gas to multiple destruction devices without fulfilling the requirement that they be identical or that they all be operational. Such an arrangement will require extra steps for verification, depending on the situation and the monitoring data that are available.

Clarification: The following text shall replace footnote 34 on page 26:

"A single flow meter may be used for multiple destruction devices under certain conditions. If all destruction devices are of identical efficiency and verified to be operational, no additional steps are necessary for project registration. Otherwise, the destruction efficiency of the least efficient destruction device shall be used as the destruction efficiency for all destruction devices monitored by this meter.

If there are any periods when not all destruction devices are operational, methane destruction during these periods will be eligible provided that the verifier can confirm all of the following conditions are met:

a. The destruction efficiency of the least efficient destruction device in operation shall be used as the destruction efficiency for all destruction devices monitored by this meter; and
b. All devices are either equipped with valves on the input gas line that close automatically if the device becomes non-operational (requiring no manual intervention), or designed in such a manner that it is physically impossible for gas to pass through while the device is non-operational; and
c. For any period where one or more destruction device within this arrangement is not operational, it must be documented that the remaining operational devices have the capacity to destroy the maximum gas flow recorded during the period. For devices other than flares, it must be shown that the output corresponds to the flow of gas."

10. Methane Concentration Measurement Frequency (ERRATUM – July 12, 2011)

Section: 6.1 (Monitoring Requirements)

Context: On page 26 of LSPP V3.0, the third bullet states that "The fraction of methane in the biogas, measured with a continuous analyzer or, alternatively, with quarterly measurements." However, on page 27, Figure 6.1 states "CH_4 = Continuous or *monthly* measurement of the concentration of CH_4 in the Biogas" (emphasis added).

Correction: Figure 6.1 shall now read: "CH_4 = Continuous or quarterly measurement of the concentration of CH_4 in the Biogas."

11. Monitoring Operational Status (CLARIFICATION – October 29, 2013)

Section: 6.1 (Monitoring Requirements)

Context: The first and second paragraphs of page 27 in Section 6.1 states that "[o]perational activity of the destruction devices shall be monitored and documented at least hourly to ensure actual methane destruction. … If for any reason the destruction device or the operational monitoring equipment…is inoperable, then all metered biogas going to the particular device shall be assumed to be released to atmosphere…[and] the destruction efficiency of the device must be assumed to be zero."

Certain types of destruction devices, such as internal combustion engines and most large boiler systems, are designed in such a way that gas may not flow through the device if it is not operational. It has not been clear how the requirements of Section 6.1 apply to these devices. There has been confusion related to the clarification issued on October 26, 2011 regarding Metering Multiple Destruction Devices.

Clarification: The first sentence of the first paragraph on page 27 shall be read to apply to all destruction devices in use during the reporting period. The clarification regarding Metering Multiple Destruction Devices (October 26, 2011) shall not be construed to relax the requirement for hourly operational data for all destruction devices. Rather, that clarification is allowing a specific metering arrangement during periods when one or more devices are known to be not operating. All destruction devices must have their operational status monitored and recorded at least hourly. If these data are missing or never recorded for a particular device, that device will be assumed to be not operating and will be assigned a destruction efficiency of zero for all flow data that are assigned to that device.

12. Meter Field Check Procedures (CLARIFICATION – October 29, 2013)

Section: 6.2 (Biogas Measurement Instrument QA/QC)

Context: The first paragraph below the first bulleted list of page 28 in Section 6.2 states that "[i]f the field check on a piece of equipment reveals accuracy outside of a +/- 5% threshold, calibration by the manufacturer or a certified service provider is required for that piece of equipment."

Certain types of biogas flow meters and methane analyzers are susceptible to measurement drift due to buildup of moisture or contaminants on the metering sensor, even if the equipment itself is not out of calibration. If the as-found condition of the meter is outside of the accuracy threshold, but the as-left condition (after cleaning) is within the accuracy threshold, it is not clear whether a full calibration is still required for this piece of equipment. In some cases the manufacturer provides specific guidance to this effect.

Clarification: The following text shall be inserted after the first paragraph following the bulleted list on page 28:

"The as-found condition (percent drift) of a field check must always be recorded. If the meter is found to be measuring outside of the +/- 5% threshold for accuracy, the data must be adjusted for the period beginning with the last successful field check or calibration event up until the meter is confirmed to be in calibration. If, at the time of the failed field check, the meter is cleaned and checked again, with the as-left condition found to be within the accuracy threshold, a full calibration is not required for that piece of equipment. This shall be considered a failed field check, followed by a successful field check. The data adjustment shall be based on the percent drift recorded at the time of the failed field check. However, if the as-left condition remains outside of the +/- 5% accuracy threshold, calibration is required by the manufacturer or a certified service provider for that piece of equipment."

13. Adjustments to Metered Biogas Flow Data (ERRATUM – July 12, 2011)

Section: 6.2 (Biogas Measurement Instrument QA/QC)

Context: On page 28 of LSPP V3.0, the protocol provides two requirements that govern how metered flow data is scaled in the event that a meter has been confirmed during a calibration event to be outside the allowable +/- 5% accuracy threshold. These two requirements for scaling the data are not intended for livestock project GHG accounting, and are not conservative.

Correction: The requirements on page 28 of the LSPP V3.0 shall be replaced with the following requirement:

1. For calibrations that indicate the flow meter was outside the +/- 5% accuracy threshold, the project developer shall estimate total emission reductions using i) the metered values without correction, and ii) the metered values adjusted based on the greatest

calibration drift recorded at the time of calibration. The lower of the two emission reduction estimates shall be reported as the scaled emission reduction estimate.

Section 7

14. Initial Reporting and Verification Period (ERRATUM – July 12, 2011)

Section: 7.3.1 (Initial Reporting and Verification Period)

Context: On page 38 of LSPP V3.0, the protocol states that “[o]nce a project is registered and has had at least 6 months of emissions reductions verified, the project developer may choose one of the verification options below.” The 6 month requirement is inconsistent with the original intent of the protocol, which was to maximize the flexibility of reporting periods and verification schedules. To remain consistent with the original intent of the verification options, the 6 month reporting period requirement shall be changed to a “one quarter” or 3 month reporting period requirement.

Correction: The protocol shall be corrected to read “[o]nce a project is registered and has had at least 3 months of emissions reductions verified, the project developer may choose one of the verification options below.”

15. Reporting and Verification Cycle – Option 2 (CLARIFICATION – July 12, 2011)

Section: 7.3.3 (Option 2: Twelve-Month Verification Period with Desktop Verification)

Context: On page 39 of LSPP V3.0, the protocol states that under Option 2, “[d]esktop verifications are allowed only for a single 12-month verification period in between 12-month verification periods that are verified by a site visit. Sub-annual verification periods are not allowed under this option.” This verification option is intended to provide greater flexibility and ease verification costs for livestock projects. However, the disallowance of sub-annual (i.e. less than 12-month) verification periods, in particular for the initial verification, is inconsistent with the intent of the requirements in Section 7.3.1 (p.38) of the protocol.

Clarification: The protocol shall be clarified to read “[f]or projects using this option, the initial verification in this cycle shall be a full verification, including a site visit, and shall cover a minimum of 3 months and maximum 12 months of project data. All subsequent reporting periods under this option shall be 12-month reporting periods.”

16. Reporting and Verification Cycle – Option 2: Protocol Version Changes (CLARIFICATION – July 12, 2011)

Section: 7.3.3 (Option 2: Twelve-Month Verification Period with Desktop Verification)

Context: On page 39 of LSPP V3.0, the protocol states that under Option 2, “[d]esktop verifications are allowed only for a single 12-month verification period in between 12-month verification periods that are verified by a site visit. Sub-annual verification periods are not allowed under this option.” This verification option is intended to provide greater flexibility and ease verification costs for livestock projects. However, the protocol does not provide explicit guidance for the scenario in which a project developer wishes to upgrade to the latest protocol version (e.g. move from Version 2.1 to 3.0) while also taking advantage of the desktop verification option.

Clarification: The protocol shall be clarified to read "[p]rojects that wish to upgrade to the latest protocol version from a previous version whilst simultaneously taking advantage of the desktop verification option shall be allowed to do so, provided: i) the verification of the previous reporting period (e.g. under Version 2.1 or 2.2) was a full verification, including site-visit, and covered a minimum of 3 months of project data, and ii) the two additional requirements specified in Section 7.3.3 are satisfied.

17. Reporting and Verification Cycle – Option 3: Monitoring Report (CLARIFICATION – July 12, 2011)

Section: 7.3.4 (Option 3: Twenty-Four Month Maximum Verification Period)

Context: On page 40 of LSPP V3.0, the protocol states that "[u]nder this option, the verification period cannot exceed 24 months and the project's monitoring plan and a project monitoring report must be submitted to the Reserve for the interim 12-month reporting period. The project monitoring plan and monitoring report must be submitted for projects that choose Option 3 to meet the annual documentation requirement of the Reserve program. They are meant to provide the Reserve with information and documentation on a project's operations and performance. They also demonstrate how the project's monitoring plan was met over the course of the first half of the verification period." In this context, it is unclear what information is to be provided in the monitoring plan, and what is to be provided in the monitoring report, and where any overlap may exist. For clarity and ease of use, the Reserve will require only one document, hereafter referred to as "monitoring report" to meet the interim documentation requirement under this option. The template available online provides guidance on what is expected from a monitoring report.

Clarification: The protocol shall be clarified to read "[u]nder this option, the verification period cannot exceed 24 months and the project's monitoring report must be submitted to the Reserve for the interim 12-month reporting period. The project monitoring report must be submitted for projects that choose Option 3 to meet the annual documentation requirement of the Reserve program. They are meant to provide the Reserve with information and documentation on a project's operations and performance, and adherence to the project's monitoring plan."

18. Reporting and Verification Cycle – Option 3: Interim Reporting Period (CLARIFICATION – July 12, 2011)

Section: 7.3.4 (Option 3: Twenty-Four Month Maximum Verification Period)

Context: On page 40 of LSPP V3.0, the protocol states that "[t]he monitoring report shall be submitted within 30 days of the end of the reporting period." While the terms "reporting period" and "verification period" are defined in the protocol glossary, with verification period referring to a period that may cover multiple reporting periods under Section 7.3.4, the language regarding when the monitoring report is to be submitted is potentially unclear.

Clarification: The protocol shall be clarified to read "[t]he monitoring report shall be submitted within 30 days of the end of the *interim* reporting period. The only exception to this requirement is for projects that verify under option 3 as part of a protocol upgrade, and fall within the specific timeline outlined below."

19. Reporting and Verification Cycle – Option 3: Protocol Version Changes (CLARIFICATION – July 12, 2011)

Section: 7.3.4 (Option 3: Twenty-Four Month Maximum Verification Period)

Context: On page 40 of LSPP V3.0, the protocol states that under Option 3, "[t]he verification period cannot exceed 24 months and the project's monitoring report must be submitted to the Reserve for the interim 12-month reporting period and… [t]he monitoring report shall be submitted within 30 days of the end of the interim reporting period." This verification option is intended to provide greater flexibility and ease verification costs for livestock projects. However, the protocol does not provide explicit guidance for the scenario in which a project developer had previously verified under a prior protocol version, but now wishes to upgrade to the latest protocol version (e.g. move from Version 2.1 to 3.0) and immediately utilize the 24-month verification period option. The Reserve recognizes that, for projects that previously registered under an older protocol version, the submission of the monitoring report 30 days after the interim period may be difficult to achieve.

Clarification: The protocol shall be clarified to read:

"… [t]he monitoring report shall be submitted within 30 days of the end of the interim reporting period.

Projects that wish to upgrade to LSPP V3.0 and immediately utilize the 24-month verification period shall be allowed to do so, provided that the verification of the previous reporting period (e.g. under Version 2.1 or 2.2) was a full verification, including a site visit, and covered a minimum of 3 months of project data.

Additionally, projects meeting the above criteria shall be allowed to submit the *interim* monitoring report to the Reserve within 30 days of the end of their 24-month verification period (as opposed to the end of the *interim* reporting period) if, and only if, the project's previous verified reporting period ended on or before 12/31/2009. All livestock projects utilizing the 24-month reporting period that do not meet this requirement must submit the monitoring report within 30 days of the end of the interim reporting period."

Appendix B

20. Default Destruction Efficiency for Upgrade and Injection into Natural Gas Pipeline (CLARIFICATION – July 12, 2011)

Section: Table B.7 (Biogas Destruction Efficiency Default Values by Destruction Device)

Context: On page 65 of LSPP V3.0, the protocol provides a table with default values for approved destruction devices that may be used by project developers. The last destruction device listed, described as: "Upgrade and injection into natural gas pipeline," has a listed default destruction efficiency of 98% (0.98). This default destruction efficiency is derived as an average value appropriate for scenarios where the methane component of the biogas is injected into a transmission/distribution system and ultimately distributed to unknown end-users in the residential or commercial sector, or to unknown industrial plants or power stations. This default factor is not intended to be used for scenarios where biogas is destroyed by a third party under a direct-use agreement. Under such a scenario, the destruction efficiency should correspond to the type of destruction device that is used by the third party.

Clarification: The entry in the last row of the first column of Table B.7 on page 65 shall be clarified to read "Upgrade and injection into natural gas *transmission and distribution* pipeline."

21. Default Destruction Efficiency Footnote References (ERRATUM – July 12, 2011)

Section: Table B.7 (Biogas Destruction Efficiency Default Values by Destruction Device)

Context: On page 65 of LSPP V3.0, the protocol provides a table with default values for approved destruction devices that may be used by project developers. The footnote citations provided in Table B.7 are not correct for many of the destruction device efficiencies.

Correction: The following table containing the correct footnote references for each destruction device should replace Table B.7 on page 65.

Biogas Destruction Device	Biogas Destruction Efficiency (BDE)*
Open Flare	0.96[1]
Enclosed Flare	0.995[2]
Lean-Burn Internal Combustion Engine	0.936[2]
Rich-Burn Internal Combustion Engine	0.995[2]
Boiler	0.98[2]
Microturbine or Large Gas Turbine	0.995[2]
Upgrade and Use of Gas as CNG/LNG Fuel	0.95[2]
Upgrade and Injection into Natural Gas Pipeline	0.98[3]

Source:
[1] Seebold, J.G., et al., Reaction Efficiency of Industrial Flares, 2003
[2] The default destruction efficiencies for this source are based on a preliminary set of actual source test data provided by the Bay Area Air Quality Management District. The default destruction efficiency values are the lesser of the twenty fifth percentile of the data provided or 0.995. These default destruction efficiencies may be updated as more source test data is made available to the Reserve.
[3] The Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories gives a standard value for the fraction of carbon oxidized for gas destroyed of 99.5% (Reference Manual, Table 1.6, page 1.29). It also gives a value for emissions from processing, transmission and distribution of gas which would be a very conservative estimate for losses in the pipeline and for leakage at the end user (Reference Manual, Table 1.58, page 1.121). These emissions are given as 118,000kgCH_4/PJ on the basis of gas consumption, which is 0.6%. Leakage in the residential and commercial sectors is stated to be 0 to 87,000kgCH_4/PJ, which equates to 0.4%, and in industrial plants and power station the losses are 0 to 175,000kg/CH_4/PJ, which is 0.8%. These leakage estimates are compounded and multiplied. The methane destruction efficiency for landfill gas injected into the natural gas transmission and distribution system can now be calculated as the product of these three efficiency factors, giving a total efficiency of (99.5% * 99.4% * 99.6%) 98.5% for residential and commercial sector users, and (99.5% * 99.4% * 99.2%) 98.1% for industrial plants and power stations.[4]

[4] GE AES Greenhouse Gas Services, Landfill Gas Methodology, Version 1.0 (July 2007).

Appendix D

22. Data Substitution when Operational Data are Missing (ERRATUM – October 29, 2013)

Section: Appendix D (Data Substitution)

Context: There are three parameters necessary for the quantification of biogas destruction: biogas flow volume, methane concentration, and operational status of the destruction device. Section D.1 on page 75 provides a methodology for the substitution of missing biogas flow or methane concentration data. Data on the operational status of a destruction device are not eligible for substitution. Substitution of one parameter (i.e. flow or concentration) is only allowed if both other parameters are successfully recorded during the data gap. Thus, to employ the data substitution methodology, it is required that the record of operational status be intact during the gap.

This data substitution methodology was originally developed to resolve incidents of missing methane destruction data in landfill gas projects. Under that project type, excluding the data gap entirely is equivalent to the use of a destruction efficiency (DE) value of zero, whereas the same is not true for a livestock project. In the case of the Livestock Project Protocol, there is additional guidance on page 27 of Section 6.1 that requires the use of a DE value of zero for periods where the destruction device is inoperable, or the operational data are missing. This procedure effectively provides substitution of missing operational data with the assumption that the device was inoperable during the data gap. The effect of this substitution is an increase in project emissions, resulting in a more conservative estimate of emission reductions, regardless of whether the ultimate estimate of emission reductions is based on the modeled baseline or the metered methane destruction.

Because of the nature of the quantification methodology for livestock projects, and the ways that it differs from that of landfill projects, it is appropriate and conservative to carry out flow or methane data substitution, even if the destruction device is inoperable. Under this protocol, the quantification of emission reductions will be more conservative than if the data substitution were not employed.

Correction: The guidance on page 27 of Section 6.1 shall supersede the guidance in Appendix D. The following text shall be inserted after the second paragraph of Section D.1 in Appendix D:

“If the destruction device is inoperable, or its operational data are missing, the destruction efficiency for the device shall be zero during that period of time. Data substitution may be employed for missing biogas flow or methane concentration data during periods of missing operational data, provided the dataset is able to fulfill all other requirements of this data substitution methodology. The data substitution methodology shall be employed in the manner resulting in the greatest level of conservativeness for the quantification of emission reductions.”

23. Data Substitution for Continuous Methane Data (CLARIFICATION – October 29, 2013)

Section: Appendix D (Data Substitution)

Context: The data substitution methodology in Appendix D may not be used for data gaps that are greater than seven days. However, the minimum measurement frequency for methane concentration data is once per quarter (three months). For projects that measure methane concentration at a frequency that is greater than quarterly, it is not clear how methane values should be applied during gaps of more than one week but less than an entire quarter.

Clarification: As long as a livestock project has at least one methane concentration reading per quarter, the project may satisfy the monitoring requirements in Section 6.1. A livestock project may have gaps between methane concentration readings that are greater than one week without this being considered “missing data” as it is conceived in Appendix D. Thus, project developers may devise a reasonable approach by which to assign a value to periods of time between recorded methane concentration values. The verifier shall confirm that the value(s) applied by the project is reasonable and conservative. No data substitution may be applied if there are no methane concentration readings during an entire quarter.