Organizations that Submitted Comments on the Livestock Project Protocols Version 2.0

1. AgRefresh (AR)
2. California Dept. of Food and Agriculture (CDFA)
3. Daniel Farchy - project developer (DF)
4. Environmental Power Corporation and Microgy, INC (EPCM)
5. Terra Pass (TP)
6. Western United Dairymen (WUD)

The comment letters can be viewed in their entirety on our website at the following web address: http://www.climateregistry.org/tools/protocols/project-protocols/livestock.html

SUMMARY OF PUBLIC COMMENTS

A. GENERAL COMMENTS

A1. Fuel Cells as Combustion Device (CDFA)

On page 2 it states that in order for a project to qualify "... the ultimate fate of the methane must be combustion." If a commercially available fuel cell stack were installed to convert the bio-methane to electricity, it would equivalently accomplish methane destruction electrochemically without combustion, thus avoiding NOx emissions. To avoid inadvertently excluding this technology, I suggest replacing "combustion" with "combustion or chemical oxidation" or with "chemical conversion to CO2.

> **RESPONSE**: Agreed, fuel cell technology should not be excluded. Language was inserted to address this issue. Whenever appropriate, the word "combustion" has been replaced with "destruction]

A2. Improvements to the Methodology (DF)

I would like to congratulate CCAR on the revised protocol, and acknowledge several changes from version 1, which I believe result in significant improvements to the methodology. The increased use of lookup tables has an important impact on improving the simplicity of implementing the monitoring plan for farmers. I believe this will reduce errors in the data gathering, and generally increase the number of feasible livestock GHG offset projects.

> **RESPONSE**: Thanks for the supportive comments, we agree with your assessment.

A3. Consideration of User Feedback (WUD)

WUD would like to applaud CCAR for considering the comments of those using the protocol and using those comments to improve the protocol.

> **RESPONSE**: Thanks for the supportive comments.

A4. Biogas Collection Efficiency (TP)
Most project developers do not report a rated capture efficiency of their digesters. This is due in large part to an overall lack of system level control of these projects, and the fact that designs vary widely and are customized to site specific factors such as scale, energy outputs, use of heating and budget. A default factor, such as ACM0010's 15%, seems appropriate allowing project developers to justify a lower BCE if they so choose, with a clear and easy way for project proponents to justify their BCE.

> **RESPONSE**: Agreed. A default collection efficiency has been provided (85% - consistent with ACM0010). Additionally, language was added allowing for project developers to provide verifiable site specific collection efficiencies.

A5. Exclusion of Non-Anaerobic Lagoon Manure Management Systems from Project Eligibility (EPCM)
New language has been added to the Protocol stating, "Livestock operations that do not have an anaerobic lagoon in the baseline operation are not eligible to undertake a project under this protocol." Microgy would strongly recommend that CCAR reconsider the exclusion of non-anaerobic-lagoon manure management systems for Protocol eligibility, because doing so effectively discourages mitigation of an important source of anthropogenic greenhouse gas (GHG) emissions. Such discouragement may in fact dissuade project developers from pursuing biogas control projects that could otherwise provide significant societal benefits. At the very least, Microgy would respectfully suggest that CCAR consider qualifying language for alternative systems versus their complete exclusion.

> **RESPONSE**: The current version of the protocol represents the control of methane emissions that would have been generated through uncontrolled, anaerobic manure treatment systems. Though, in order to not limit the scope of future versions of the protocol we have removed the language of concern.

A6. Eligibility of Co-Digesting Activities (EPCM)
The proposed Protocol defined projects for which it would be applicable as "the installation of a biogas control system that captures and combusts methane gas from manure treatment and/or storage facilities on livestock operations." Microgy considers that the definition could lead to the understanding that if the manure from the treatment systems is mixed with co-digestion material, the protocol would not be applicable.

> **RESPONSE**: The Registry feels that footnote 3 clearly indicates that co-digestion activities are not precluded. It is not deemed necessary at this point to alter the language.

A7. Project Crediting Period (AR)
Discussion of the project crediting period states that, "Project developers are eligible to register GHG reductions with the California Registry according to this protocol for a period of ten years. The first reduction year commences after the biogas control system becomes operational." AgRefresh suggests that the crediting period begin the first year that the project registers credits with the Climate Action Reserve.

> **RESPONSE**: The date which a project begins operation is a conservative temporal boundary for determining the beginning of the crediting period. It is essential to define a finite crediting period in order to ensure the additionality of

the emissions reductions generated. Therefore the allowable crediting period will remain as stated in the draft protocol.

A8. Nitrous Oxide Emissions (DF)
Box 1, 'the Registry's treatment of nitrous oxide emissions' states that the Registry is likely to incorporate nitrous oxide-derived emission reductions into a later version of the Protocol. However, it is not clear from the text whether early adopters of this project protocol will be grandfathered in, and allowed to add these offsets to existing project.

RESPONSE: Based on discussions with the academics working on N2O emission model development, it is unclear as to when the quantification methodology for N2O reduction will be ready to be incorporated into the Livestock Protocol. Until the specific data requirements for such a methodology are known to the Registry, we are unable to speculate on the possibility of back-crediting for N2O reductions.

B. PROJECT MONITORING AND REPORTING

B1. Arrangement of Flow Meters (WUD)
The required arrangement of flow meters (Figure 2 on page 25) appears to require excessive meters, as one flow meter could be removed from this arrangement and still provide all of the required information. The requirement for flow meters should be flexible, and should only require that there be adequate gas meters to measure he total biogas produced as well as the amount that is combusted in each combustion device.

RESPONSE: Agreed. It is apparent that the arrangement of flow meters in Figure 2 on page 25 has one more meter than is necessary to adequately measure the total flow and the flow to each combustion device. Language has been inserted into the protocol to clarify this issue.

B2. Inoperable Combustion Device Monitoring Equipment (EPCM, AR)
The protocol states that "in the event that the combustion device monitoring equipment is inoperable, all metered biogas shall be assumed to be released to the atmosphere during the period of inoperability." While we recognize the goal of this statement towards being conservative in estimating project emissions, it seems that in some cases this may be excessive. It is suggested that CCAR allow for the use of electrical generation records to show that the combustion device was operable. It is also suggested that CCAR should not depart from the guidance of the USEPA 40 CFR Part 75 Subpart D 75.33 by assigning a zero methane destruction value when the combustion device monitoring equipment is down.

RESPONSE: The approach of not crediting for reductions for periods which the combustion device is inoperable has been found to be consistent with other GHG emissions reduction accounting programs. For the purpose of ensuring conservativeness we have left the language in the protocol as is.

B3. Guidance for QA/QC (AR)
Regarding section VI, pg.24: AgRefresh suggests that the protocol include guidance for the Quality Assurance and Quality Control procedures that should be used for

calibration of project monitoring equipment for biogas flow and combustion, and methane concentration of biogas.

> **RESPONSE**: The California Registry believes that language in the Project Monitoring section provides ample guidance for QA/QC procedures. We suggest that project developers employ internal QA/QC of all data acquisition and instrument calibration procedures.

C. CALCULATION METHODOLOGY

C1. Baseline Emissions Calculations (TP)

We believe that the draft protocol may omit an important mechanism for ground-truthing modeled data at digester projects. In ACM0010 and the CCX protocol the calculated baseline emissions of methane are compared to the actual metered quantity of biogas sent to combustion devices and the lesser of those two quantities is used as the baseline, thereby crediting only actual methane destruction. Relying solely on modeled methane emissions to calculate total emissions reductions may undermine market perception of the environmental credibility of CCAR offsets.

> **RESPONSE**: Agreed. Consistent with our goal of providing conservative and consistent methodologies, we have built in a requirement for the comparison of modeled emissions reductions and actual metered biogas destruction and the lesser of the two values will be required to be used for the quantification of emissions reductions.

C2. Equation 4a – Project Methane emission from BCS (CDFA)

The algebra in the equation appears to be wrong. Taking the reciprocal (of the collection efficiency BCE) of a decimal percent will result in a number greater than one, such that when BDE is subtracted (if BDE is a small decimal percent), the result could return a result greater than 1, which when multiplied by the total metered methane returns a quantity for lost methane greater than the total metered methane—an obviously erroneous result.

> **RESPONSE**: Do not agree. As a simple example, assume a covered lagoon produces 200 tons of methane in a month. Now assume that the collection efficiency is only 50%, and combustion efficiency is 90%. In this example, 200 tons is produced, but only 100 tons is metered (collection efficiency of 50%). Of this 100 tons that is metered, only 90% is combusted resulting with total methane emissions of 100 tons (from uncollected methane) + 10tons (from combustion inefficiency) = 110 tons. This is more than the metered quantity of 100 tons. Plugging these numbers into equation 4a gives (100tons *(1/.5 - .90)) = 110 tons. The equation is correct as written.

C3. Equation 2a (CDFA)

What does the letter ‘S’ represent under the summation sign?

> **RESPONSE**: The ‘S’ represents ‘collection systems’ i.e. the equation is summing emissions from each Livestock Category and each manure treatment system (lagoons, ponds, dry lot etc.).

C4. Equation 4a – F_{Total} term (CDFA, AR, DF))
The term "landfill" gas should read "biogas" in equation 4a and elsewhere.

> **RESPONSE**: Thanks, error has been corrected.

C5. Use of gas data for determining emission reductions (DF)
I believe that in calculating emission reductions, the option of using gas data gathered from the digester – measured as the product of biogas flow at the digester outlet and methane fraction in the biogas – to directly measure the methane captured by the system, should be available to project developers. There are two key reasons I believe that this data should also be acceptable as a means of calculating project emission reductions: ease of implementation, and an efficiency incentive. In the first instance, monitored data is expected to be an accurate record of the methane emission reductions, and is simple to gather and requires less ex ante assumptions that might not accurately reflect the situation on a particular farm. In the second instance, the protocol as written provides little incentive for efficient digester design. By basing reductions on actual gas flow measurements, actual system performance is measured, providing strong incentive for the adoption of best available technology.

> **RESPONSE**: The Registry agrees that metered gas data should be utilized to a greater extent, as the data provides useful information regarding the actual operating performance of the digester, as well as the accuracy of the baseline calculation. See comment C1 for further details on utilizing metered biogas data in the emission reduction calculations.

C6. Default Value for Volatile Solids to the Effluent Pond (DF)
It is appreciated that the assumptions with regards to the parameter *VSep* 'volatile solids to the effluent pond' have been brought into line with the CDM methodology (ACM0010).

> **RESPONSE**: The *VSep* 'volatile solids to the effluent pond' term represents the amount of volatile solids that exit the digester having not undergone decomposition (as a percentage of the VS entering the digester). This material, if subsequently treated or stored anaerobically, can result with further significant methane emissions in the project scenario. The default factor of 30% was changed to 20% in the latest public draft of the protocol. However, upon further feedback from academics focused on digester research, it has become apparent that the previous default percentage of 30% is a more appropriate and conservative factor. Thus, this factor will be changed back to 30%.

C7. Calculating Emissions from the Effluent Pond (AR)
Agrefresh suggests that an equation be provided in order to calculate the VSep factor, as the factor has a major significance for the project methane emissions. Additionally, prject developers should be able to develop a site specific VSep factor based on verifiable site specific data. We also suggest using the Van't Hoff Arrhenius equation (used for the baseline calculations) to calculate the emissions from the Effluent Pond. This would allow project developers to account for the solids removal in the effluent pond. Currently, there is no way to account for this activity, leading to an over estimation of project emissions.

> **RESPONSE**: It is agreed that there should be an equation for calculating VSep and we have added the appropriate equation to the project calculations. For the

second point, the California Registry can not provide prescriptive, verifiable guidance for quantifying site specific VSep factors, therefore we will continue to require the use of the 30% value for calculating VSep. Regarding the final point, the California Registry feels that it is appropriately conservative to maintain the current annual calculation (utilizing an annual MCF calculation opposed to a monthly Van't Hoff Arrhenius equation) for calculating emissions from the effluent pond.

C8. Monthly Volatile Solids Available for Degradation

Equation 2b utilizes the monthly volatile solids available for degradation in order to calculate baseline methane emissions. The Beta Calctool worksheet IV, allows for the "zeroing out" of the waste remaining from the previous month when solids are removed from the anaerobic system. AgRefresh suggests that based on site specific management and design practices of project operators zeroing out is not sufficient, and the current equations and instructions in the Beta Calctool result in overestimation of baseline emissions. Project operators often remove liquids containing volatile solids on a seasonal basis for field application, without completely removing all of the solids. The Calctool suggests that solids removal can only be accounted for when it is removed 100%. Therefore during months where any liquids containing volatile solids are removed from the anaerobic system, these would not be "zeroed out", and they would still be included in the estimation of baseline emissions. In our experience, there could be several months out of the year where significant portions of volatile solids would be removed from the system in the baseline scenario, but the calculation of baseline emissions would still include these volatile solids leading to an overestimation of baseline emissions.

RESPONSE: While we agree with the above assessment, there is not a methodology available to account for this "liquid removal" that would have an acceptable degree of certainty. However, in order to ensure that the baseline is not being materially over estimated, we have built in additional requirements for determining the baseline emissions (see comment C1).

C8. De Minimis CO2 (AR)

The explanation of de minimis CO2 estimation vs. calculation (Pg 13 pararapgh 3) is confusing and should be revised

RESPONSE: Agree. Paragraph revised.

C9. Equation 2b – System Calibration Factor (AR)

Equation 2b includes the use of a "system calibration factor" of .8 that is designed to "account for management and design practices that result in the loss of volatile solids from the management system." The use of such a factor is effective towards achieving a conservative calculation of baseline emissions however, for some projects this calibration factor is excessively conservative resulting in under estimation of baseline emissions. AgRefresh suggests revising the protocol to allow project developers to utilize site specific "system calibration factors" based on their "management and design practices." Such site specific factors would need to be supported by verifiable documentation in order to assess the appropriateness of the factor used.

RESPONSE: The system calibration factor is indeed necessary to ensure conservatism in the baseline calculation. At this point, the California Registry can not provide guidance for the verification of site specific calibration factors. Therefore, For conservatism and consistency, the system calibration factor will remain at 0.8 for all projects.

C10. GWP of Methane (AR)
We suggest the use of a more up to date GWP of 25 based on the IPCC's FAR.

RESPONSE: We agree that the current GWP of 21 does not reflect the most recent research. However, it is essential to maintain consistency with international accounting standards, and thus will update the GWP when the international community adopts an updated GWP for methane (most likely with a post-Kyoto Agreement).

C11. Site-specific Variables (AR)
Regarding section V.2, pg.17, footnote 22: It may be helpful to project developers if an explicit list of places in the calculation where site specific variables can be substituted, and supported with verifiable documentation were provided.

RESPONSE: In retrospect, the California Registry has decided to remove this footnote all together. The modeled baseline emissions should be calculated using equations 2a, 2b and 2c as written in the protocol.

C12. Baseline Calculation Variables (AR)
Regarding section V.2, pg.18: There appear to be typos in paragraph 5 that make it confusing.

RESPONSE: Agree. Language updated.

C13. Methane from Sources Other than the BCS (AR)
Regarding section V.3, pg.19: In the discussion of project methane emissions it might be helpful to readers and users of the protocol if examples of "methane from sources in the waste treatment and storage category other than the biogas control system, and associated effluent pond" were provided.

RESPONSE: Agree. Examples given.

D. CCAR LIVESTOCK CALCULATION TOOL VERSION 2.0

D1. Calculation Tool on Website (DF)
There are numerous references to the "CCAR Livestock Calculation Tool," however there is no such tool on the CCAR website.

RESPONSE: We have had the calculation tool available for review online since 6/25/08, and we welcome continued feedback regarding the calculation tool at any time. The Beta-Version Livestock Calculation Tool Version 2.0 is available at:http://www.climateregistry.org/resources/docs/protocols/project/livestock/CCAR_LS_BetaTool_Version_2.0.xls .

D2. VSep default (AR)
Worksheet IIIa, Section IIIa.B: Input for Project methane emissions from the BCS effluent pond says that VSep should be 20% of the VS that enter the digester. In contrast the formula for this calculation in worksheet XIII says 30%. We assume that 20% is the value that should be used, but maintain the comments in 9a above.

> **RESPONSE**: Thank you for pointing out the discrepancy…refer to the responses to comments C6 and C7 for further discussion of the VSep variable.

D3. Biogas Mass Flow Calculation (AR)
Worksheet VII, column E for V(scf/day) links to Worksheet IIIa, column E for F(scf/month). It seems that the either the label should be changed for consistency or the calculation needs to change to adjust for the number of days in the month.

> **RESPONSE**: Thank you for pointing out the discrepancy. Column E on Worksheet VII is labeled wrong and will be corrected. However the calculation is correct.

D4. Locking the Calc Tool (AR)
We understand the need to keep the Beta Calctool locked. A consequence of this is that the user cannot conduct formula auditing in excel with is helpful in learning how the tool works. If it is possible to accomplish both of these at the same time it may be beneficial to users of the Calctool.

> **RESPONSE**: We will look into how this might be accomplished. For now, it is necessary to keep the tool locked to the public to provide the necessary assurance that the calculation methodologies remain as intended by the California Registry.