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Comments on Regional Greenhouse Gas Initiative (RGGI) Draft Model Rule

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Our comment for the RGGI Staff Working Group is to consider expanding the type of technologies that can qualify for the award of CO_2 emissions offset allowances, under Section XX-10.5 CO_2 Emissions Offset Project standards, Subdivision **(e) Avoided methane emissions from agricultural manure management operations** of the public review model rule draft (RGGI, 2006). As currently written, only anaerobic digesters can be accepted for generation of credits. Our recommendation is to also include projects that reduce greenhouse gas (GHG) emissions using aerobic treatment systems.

The offset portion of the draft model rule can be substantially improved with the incorporation of advanced technologies that use aerobic treatment such as the recently approved environmentally superior technologies (EST) developed to replace anaerobic swine lagoons in North Carolina (Williams, 2006). In addition to the strict environmental standards with which EST's need to comply (i.e., the elimination of pathogens, ammonia emissions, odor, heavy metals, phosphorus, discharge to surface and ground water, etc.), they are also very effective in reducing GHG emissions (both methane and N_2O), even more than anaerobic digesters per-se (Vanotti et al., 2006).

Anaerobic lagoons and open anaerobic structures are widely used to treat and store manure from confined livestock production facilities throughout the USA. Accordingly, the draft model rule properly identifies them as the baseline scenario ("uncontrolled anaerobic storage conditions," section XX-10.5-e-3 of RGGI, 2006) that is used to determine emission reductions by an offset project. There are two basic approaches to reduce methane (CH_4) emissions in the USA using offset projects. One is the approach written on the draft model rule where methane is produced using anaerobic digestion in closed and controlled conditions, followed by thermal destruction of the methane. In other words, in this approach the volatile solids (VS) in manure are first converted to methane and CO_2, and the methane portion is subsequently oxidized to CO_2. The other approach (missing from the draft rule) is the use of aerobic treatment that directly converts (oxidizes) the VS into CO_2. In both cases, emission reductions result from the difference between offset project and baseline emissions. Thus, from the point of view of reducing GHG emissions from animal manure management operations, there is no scientific basis to exclude the aerobic treatment approach from the model rule under consideration, especially when these technologies have been developed and are readily available for use.

Aerobic treatment of manure is an accepted manure management system under protocols adopted through the United Nations Framework Convention on Climate Change (UNFCCC). For example, aerobic treatment of liquid and aerobic composting of solids are included in the report *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (Table 4.11) requested by UNFCC for the Intergovernmental Panel on Climate Change (IPCC). This report (IPCC, 2000) is used extensively for development of protocols adopted by UNFCCC for certification of GHG emissions reduction credits. For this reason, aerobic treatments are also included as plausible scenarios in the two

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methodologies approved by UNFCCC for the agriculture sector: *GHG Emission Reduction From Manure Management Systems* (AM0006, 2004), and *Greenhouse Gas Mitigation From Improved Animal Waste Management Systems in Confined Animal Feeding Operations* (AM0016, 2006). Both methodologies are currently being considered for consolidation under a "Consolidated methodology for greenhouse gas mitigation from manure management systems" [UNFCCC, CDM 24th Meeting Report, Agenda sub-item 3(b)-32,33, May 12, 2006]. The model rule draft (Section XX-10.3-b, RGGI, 2006) also considers eligible CO_2 retirements the certified greenhouse gas emissions reduction credits issued pursuant to the UNFCCC or protocols adopted through the UNFCCC process.

Methodology AM0006 (2004) provides the needed tools to integrate manure management systems that may comprise several treatment stages, including anaerobic and aerobic processes, for determination of GHG emission reductions. For this reason, we think this type of approach can be adapted for the RGGI offset portion of the model rule to incorporate a variety of available advanced manure treatment technologies and systems that use anaerobic and/or aerobic processes that can effectively eliminate GHG emissions from agricultural manure management operations in the USA. In this UNFCCC approved methodology, once the boundaries of the project activity are defined, emissions are determined separately for each treatment stage comprising the system. Emission reductions due to changes in the manure management are calculated as the difference between emissions in the baseline scenario and emissions in all stages of manure management that are part of the project. The method considers not only methane reductions but also N_2O reductions. Total emission reductions of the project are the sum of methane and N_2O emission reductions by the manure management system (AM0006, 2004).

The following is a brief description of the alternative approaches and demonstration of GHG emissions reductions that result when aerobic systems are implemented in confined swine operations. A design project (Vives et al., 2004), implemented in two phases by Chilean food producer Agrosuper at their 118,800-head swine operation, reduced annual GHG emissions by 81,026 Tonnes CO_2-eq (63.3% reduction) using anaerobic digester and thermal destruction technology to replace the open anaerobic lagoon technology (first phase). In a second phase of the same project, they further reduced annual GHG emissions to a total of 116,993 Tonnes CO_2-eq (91.4% reduction) with the installation of aerobic post-treatment. In the USA, an EST verification project (Vanotti et al., 2005) implemented by Super Soils Systems USA of Clinton, NC, at a 4,360-head swine operation reduced annual GHG emissions by 4,633 Tonnes CO_2-eq (98.9% reduction) using an aerobic treatment system (Vanotti et al., 2006) that replaced the anaerobic lagoon.

In conclusion, consideration of EST projects that use aerobic manure treatment for the award of CO_2 emissions offset allowances under the CO_2 Budget Trading Program. Regional Greenhouse Gas Initiative will have the dual benefit of reducing GHG emissions and facilitate adoption of clean technologies by USA farmers.

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