

## STATUS OF GREENHOUSE GAS EMISSION REDUCTION PROJECTS IN FLORIDA

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### ABSTRACT

While there is a general sense of enthusiasm for greenhouse gas (GHG) emission reduction projects through proactive landfill gas (LFG) collection and control within the solid waste industry, a surprisingly low number of these projects have actually come to fruition. Because relatively few LFG projects have been developed solely for the purpose of generating GHG emission reduction credits, some landfill owners are hesitant to invest money to design and construct a landfill gas collection and control system (GCCS) or to enter into a contract with an outside developer for a carbon credit project. In some cases landfill owners are reluctant to move forward with a project until the carbon credit market further matures. Others move very slowly because there is not a long list of successful projects that can provide them an example roadmap for how best to develop a project.

This paper discusses the design, permitting, implementation, and administrative aspects of GHG emission reduction credit projects that were attempted or are in progress at landfills in Florida. The sites range in size from 1.4 to 6 million tons of waste in place and the sale of verified emission reductions (VERs) at these sites all require the issuance of a public request for proposals (RFP). One site that is discussed had a GCCS in place prior to the deadline for New Source Performance Standards (NSPS) compliance; another is approaching a deadline to install a GCCS in order to comply with the NSPS, and the others are smaller sites that would not normally have considered LFG collection and control prior to the advent of the carbon credit market. The approaches taken by each site vary substantially, include using passive solar-spark flares with flow monitoring equipment, installing an interim GCCS in order to expedite the permitting and installation phases, and using existing leachate collection and removal system (LCRS) infrastructure as the primary method of landfill gas collection.

The authors discuss the design criteria used for each project and hurdles with respect to permitting, documenting emission reductions, and convincing landfill owners to proceed with the projects. An example RFP is also presented, as well as guidance for landfill owners who are considering issuing an RFP for the sale of VERs.

Lastly, recommendations are made for consideration by regulatory agencies and design engineers to aid in expediting the permitting process for these environmentally beneficial projects

### CARBON CREDIT MARKET ACTIVITY IN FLORIDA

By way of background, it is important to note that the majority of municipal solid waste (MSW) landfills in Florida are owned by municipal governments or local solid waste authorities, with Waste Management being the largest private landfill owner. Other national and regional solid waste management companies own a relatively small percentage of the MSW landfills in the state.

At present, the authors of this paper are not aware of any carbon credit transactions at landfills in Florida. Until recently, proactively installing a GCCS to monetize carbon credits has not been at the forefront of LFG planning. In many cases, landfill owners have scrambled to piece together LFG collection systems just shortly before a landfill becomes subject to the NSPS and miss out on potentially significant revenue streams.

However, several counties are now actively pursuing LFG-based GHG emission reduction projects or have considered such projects. One county, which is not covered in this paper and is located in Southwest Florida, recently signed a landfill gas energy (LFGE) project contract with a developer that includes revenue sharing for carbon credits that are generated, but the design for that GCCS has not been finalized or approved by the regulatory agency, and the sale of any carbon credits from that project likely will not occur until 2010, at the earliest.

## **GREENHOUSE GAS PROJECT APPROACHES TAKEN IN FLORIDA**

Other landfills across the state are working to monetize carbon credits either through the marketing of credits from LFG collection systems installed prior to the requirements of the NSPS or are installing a GCCS solely for the creation of carbon credits. Four of these sites and the approaches they have taken are described below.

### **Landfill "A"**

The situation at this site highlights the financial impacts of the rapidly changing market for carbon credits. This site, which is located in Central Florida, has several distinct landfill disposal areas that require LFG collection and control in accordance with the NSPS. Newer landfill cells, which were constructed on a separate portion of the site, are less than five years old and not yet subject to the requirements to install and operate a GCCS. The owner of Landfill "A" took a proactive approach to LFG emission control and installed a GCCS that utilizes a series of horizontal collectors and a candlestick flare to control LFG emissions from the new landfill area.

The following is pertinent information on the landfill disposal area in which "early" LFG controls are installed:

- Year waste acceptance commenced: 2005
- Current waste in place: approximately 2.7 million tons of MSW
- Annual waste disposal rate: 678,000 tons per year (approximate)
- Current and future expected LFG recovery rate: 900 scfm at 50% methane
- Method of LFG collection: Horizontal collectors
- Method of LFG control: Candlestick flare
- Flow measurement device: Thermal mass flow meter
- Methane concentration monitoring: Monthly, using handheld field instruments
- Expected carbon credit volume: 96,000 tonnes CO<sub>2e</sub> per year

Prior to recent shifts in the market toward carbon credits that meet the requirements of the Climate Action Reserve (formerly the California Climate Action Registry (CCAR)), the proactive "early" collection of LFG from areas of Landfill "A" that are not yet required by the NSPS to have LFG controls presented a potential revenue stream of up to \$400,000 per year. The exclusion of early action LFG collection and control in Version 2.0 of the CCAR Landfill Project Reporting Protocol will likely reduce the interest in and the number of bidders for future credits from this site.

**Design Approach Utilized:** As stated above, the County has been proactive in its approach to LFG management at this site. A plan for managing LFG (including a GCCS design and permit) was in place upon opening the landfill cell in 2005. SCS Field Services was placed under contract to provide GCCS construction and operation, maintenance, and monitoring (OM&M) services soon after the landfill cell opened. This ensured that horizontal collectors were installed after the completion of designated lifts in each subcell, resulting in comprehensive gas collection throughout the landfill. Collected LFG is conveyed to the flare station via header pipe that was installed outside the waste footprint during construction of the cell and other related infrastructure.

This approach of using horizontal collectors installed with 30- to 40-foot vertical spacing will continue in future cells and will allow the County to potentially continue generating carbon credits as the landfill expands laterally into new cells.

**Data Acquisition and Recordkeeping:** The County is utilizing an industry-standard blower/flare skid that includes chart recorders to record the gas flow rate and flare flame temperature. Methane concentration is documented through routine monitoring with a calibrated Landtec GEM-2000. A methane analyzer may be added in the future to provide more thorough records of gas composition.

**Carbon Credit Sale Status:** An RFP for the sale of carbon credits at this site is expected to be issued in the first half of 2009. The RFP will be for carbon credits only; the County will maintain ownership of the GCCS and the rights to use the LFG for energy recovery.

**Obstacles Encountered and Lessons Learned:** Important lessons learned from this site's experience are as follows:

- **Quickly changing market conditions:** When the issue of carbon credits was first discussed at this site, the carbon credit market was relatively young and outside of a few well known examples of sales through the Chicago Climate Exchange (CCX), there were few LFG-based projects that provided a framework for structuring a RFP. As time passed and the RFP was delayed, the majority of buyers began focusing their purchasing strategy on credits that comply with the CCAR protocol. Because this site is currently only able to generate carbon credits through early-action LFG emission controls, the field of prospective buyers of credits from this site has shrunk considerably.

- **Incomplete records:** While records were maintained for most of 2006, due to a recordkeeping error, no records of flow rate or combustion temperature exist for 2007, which means that no vintage credits can be claimed for that year. Because the County otherwise might have been able to monetize those credits, the missing records represent a loss of potential revenue.
- **Use of horizontal collectors in active landfill areas:** By installing horizontal collectors throughout the landfill as filling progressed, the landfill owner was in a position to capture LFG much sooner than if a GCCS based on vertical extraction wells was used.

#### Landfill "B"

Located in west-central Florida, Landfill "B" is a MSW landfill that will be required to control LFG emissions in accordance with the NSPS in 2010. While in the process of designing a comprehensive GCCS, the landfill owner took a unique approach to generating carbon credits by utilizing data acquisition equipment on solar-spark ignited passive flares at leachate collection and removal system (LCRS) riser pipes to combust LFG. Relevant information for the landfill and GCCS is provided below:

- Year waste acceptance started: 1984
- Current waste in place: approximately 6.6 million tons of MSW
- Annual waste disposal rate: 460,000 tons per year (approximate)
- Estimated LFG generation rate: 1,800 scfm at 50% methane
- Approximate LFG flow rate to passive flares: 100 scfm
- Method of LFG collection: Passive flares tied in to LCRS risers
- Flow measurement device: Orifice plate with differential pressure transducers
- Data recording: Differential pressure across orifice plate and flare flame temperature recorded by datalogger
- Methane concentration monitoring: Monthly, using handheld field instruments
- Expected carbon credit volume (interim system): 10,000 tonnes CO<sub>2</sub>e per year
- Expected carbon credit volume (final system): 175,000 tonnes CO<sub>2</sub>e per year

**Project Approach:** State and local permitting requirements can greatly impact the speed with which a project can be implemented, as is the case at Landfill "B".

This site is located in a Florida Department of Environmental Protection (FDEP) district in which the permitting process takes significantly longer than it does in other regions of the state. Therefore, fast-tracking the GCCS design and construction was not possible, resulting in lost revenue from potential sale of carbon credits as well as the continued fugitive emission of LFG to the atmosphere.

To account for the permitting delay, the County is attempting to monetize carbon credits generated through the use of passive flares that are installed at LCRS risers. Additional credits will be monetized from the active GCCS if it is brought on line before the NSPS deadline.

SCS has recommended that the County conduct additional non-methane organic compound (NMOC) Tier 2 testing once the GCCS is in place to determine whether the NMOC emission rate still triggers the LFG collection and control requirements of the NSPS. If additional testing, which is permissible under the NSPS, shows that NMOC emissions are below the regulatory threshold, the County will be able to avoid operating the GCCS under the NSPS and can generate additional carbon credits in the future. This approach is expected to yield between 150,000 and 175,000 tonnes of CO<sub>2</sub> equivalent emission reductions per year.

**Data Acquisition and Recordkeeping:** The passive flare system utilizes the following equipment to record flow rate to and the combustion temperature of the flares:

- Orifice plate: Oripac Model No. 5300
- Pressure gauge/transducer: Dwyer Model No. 605
- Thermocouple: Omega Model No. OMCP TC-4000
- Pressure Differential Datalogger: Omega Model No. OMCP Volt 110
- Methane concentration: Weekly readings using a calibrated GEM-2000

**Carbon Credit Sale Status:** The County issued an RFP in 2008 for providing all services to validate and verify the credits and to purchase all credits generated. The County received two bids: one bidder proposed a price of \$4.00 per tonne, while the other bidder proposed to sell the credits on the CCX and share the revenue received from the sale with the County. Because both bidders used an incorrect version of the bid form, the County's procurement department invalidated the bids. As of February 2009, the County has not reissued the RFP.

**Obstacles Encountered and Lessons Learned:**

Important lessons learned from this site’s experience are as follows:

- **Permitting procedures impact project development:** Regardless of the fact that the installation of a GCCS is a beneficial project that contributes to reducing atmospheric emissions and would contribute toward the Florida Governor’s stated intention of reducing GHG emissions from the state, rigid permitting requirements delayed this project by over nine months. This delay resulted in the loss of approximately 75,000 tonnes of VERs.
- **Delays in the RFP process:** One key delay in this project was in ushering the RFP through the County procurement department. This was partially due to the “fear of the unknown” and not having the benefit of other county governments that had already been through the process. If a good example RFP that was used for an identical situation at another government-owned site had been available, it is likely that the process would have been expedited.

**Landfill “C”**

Landfill “C” is a relatively small MSW landfill located on the west coast of Florida. While there are several landfill cells on site that were closed prior to 1991, the carbon credit project focuses on the active, geomembrane-lined MSW cell. Because the landfill is not projected to trigger the GCCS requirements of the NSPS for several years, SCS and the County recognized that the installation of a GCCS ahead of NSPS deadlines could accomplish several objectives.

An important aspect of this project is that the County solid waste management director and the public works director recognized the benefits of this project from the beginning and were instrumental in moving the project forward. The County immediately recognized several potential benefits:

- Revenue generated from carbon credit sales would offset the GCCS construction and operating costs.
- The landfill closure plan includes LFG control measures. By installing a GCCS and offsetting construction costs, the future closure costs for the site would decrease. This reduces the financial assurance cost to the County.
- An active GCCS would allow the County to determine sustainable LFG flow rates prior to investing time or money into evaluating the

feasibility of self-developing a LFG energy project.

Pertinent information about the landfill is summarized below:

- Year waste acceptance commenced: 1991 (lined, active cells)
- Current waste in place: approximately 1.4 million tons of MSW
- Annual waste disposal rate: 100,000 tons per year (approximate)
- Estimated LFG generation rate: 500 scfm at 50% methane
- Method of LFG collection: LCRS tie-ins, vertical extraction wells (proposed)
- Method of LFG control: Candlestick flare (proposed)
- Flow measurement device: Thermal mass flow meter (proposed)
- Methane concentration monitoring: Methane analyzer (proposed)
- Expected carbon credit volume: 40,000 tonnes CO2e per year

**Project Approach:** Landfill “C” is located in the same FDEP district as Landfill “B”, and therefore, the County understood that a standard design and permitting process would result in significant delays to collecting LFG. Therefore, the County chose to do this project in two phases.

- Phase 1 – The first phase includes what is referred to as the “interim system” and consists of LCRS risers connected to a skid-mounted candlestick flare. Because well drilling or below grade header piping within the waste footprint are not included in this phase, FDEP required only a minor modification to the solid waste operating permit rather than a solid waste construction permit.
- Phase 2 – The second phase includes a GCCS composed of 10 extraction wells, tie-ins to additional LCRS risers, and below grade header.

By using this phased approach, the schedule for generating carbon credits has been reduced by approximately six months, resulting in approximately \$75,000 of projected cost savings.

**Carbon Credit Sale Status:** The County anticipates issuing a public RFP for the sale of carbon credits generated by the interim system in late 2009.

**Obstacles Encountered and Lessons Learned:** Lessons learned from this site's experience include:

- **Delays due to permitting process:** As with Landfill "B", the primary obstacle faced by this project was the lengthy permitting process imposed by FDEP.
- **Incorporation of unique site features in the design:** In order to minimize construction costs, the interim and final GCCS take advantage of the unique, at least for Florida, configuration of the landfill. Because the landfill base grades are up to 60 feet below surrounding ground surface, the GCCS relies heavily on LFG collection from LCRS risers. This reduces the need for vertical extraction wells and allows LFG collection from active landfill areas without interfering with landfill operations.

#### **Landfill "D"**

The fourth landfill, which is in Northwest Florida, is a relatively small MSW landfill that also is not expected to be subject to the NSPS requirements for LFG collection for several years.

Information about the landfill is summarized below:

- Year waste acceptance commenced: 1978 (lined, active cells)
- Current waste in place: approximately 1.6 million tons of MSW
- Annual waste disposal rate: 75,000 tons per year (approximate)
- Estimated LFG generation rate: 450 scfm at 50% methane
- Method of LFG collection: LCRS tie-ins, vertical extraction wells (proposed)
- Method of LFG control: Candlestick flare (proposed)
- Flow measurement device: Thermal mass flow meter (proposed)
- Methane concentration monitoring: Methane analyzer (proposed)
- Expected carbon credit volume: 21,000 tonnes CO<sub>2</sub>e per year

**Project Status:** While County staff and several County Commissioners are open to pursuing a GHG project, there is even more enthusiasm on the part of the Commission for developing a LFG energy project at the site. Unfortunately, after starting to move forward with a project focused on a small, relatively inexpensive GCCS that could start to generate carbon credits and demonstrate whether actual LFG recovery rates could sustain an energy project, the project has stalled as various parties have been engaged in

lobbying the County Commission for the rights to develop an energy project at the landfill.

In one case, the local electric utility approached the County stating their interest in generating electricity from the LFG. Months later the utility company determined that the quantity of recoverable LFG would not be sufficient to sustain LFG-fired engines and abandoned the project. A private solid waste management company also lobbied the Commission to have an opportunity to develop a LFG energy project, which also bore no fruit for the County.

#### **Obstacles Encountered and Lessons Learned:**

- **Delays due to management decisions:** The delays in this project are not unique to County governments. For a myriad of reasons, those with responsibility for the financial health and environmental performance of an organization, whether public government or private industry, can impact whether a project moves forward quickly or is delayed for an extended period of time. This can be the case regardless of short- or long-term financial benefits that a carbon credit project may provide.
- **Project momentum:** From the standpoint of project development, this case demonstrates the importance of aggressively moving a project forward in order to avoid institutional inertia that can occur when a project remains in the planning stages for an extended period of time. Consultants have an important role to play in these projects, from analyzing the advantages and disadvantages of potential courses of action to guiding landfill owners through the nuances of the carbon market.

#### **EXAMPLE REQUEST FOR PROPOSALS**

One common complaint among landfill owners is that there are few satisfactory example RFPs that can be used as a starting point for developing their own RFP. In an effort to assist landfill owners, an example RFP is included at the end of this paper. This RFP is for the sale of both vintage and future credits and includes basic site information, LFG recovery projections, descriptions of the GCCS, information on responsibilities for validation and verification of credits, and a bid form.

#### **RECOMMENDATIONS FOR REGULATORY AGENCIES AND DESIGN ENGINEERS**

Because of the beneficial nature of LFG control-based carbon credit projects, the regulatory community can assist in the implementation of these projects by streamlining the permitting process, where possible. In some parts of Florida, for example, the solid waste permitting process, not the air permitting process, has delayed the control of

thousands of tonnes of CO<sub>2</sub> equivalent emissions and resulted in the loss of hundreds of thousands of dollars in potential carbon credit revenue. With respect to solid waste construction permits, state agencies could assist these projects by establishing guidelines for their district offices to focus on the most pertinent aspects of a proposed system such as the distances that wells will be offset from the bottom liner and the method of condensate disposal. Our experience has been that too many projects are getting bogged down during the permitting process as engineers and landfill owners answer regulatory agency questions that apply to relatively minor issues such as pipe crushing calculations, header sizing, and issues related to construction details.

Design engineers should approach carbon credit projects with a clear understanding of the project's goals and a thorough knowledge of the protocol under which the credits will be verified and sold. The design process for these projects includes more cost/benefit analyses than might normally be prepared for typical GCCS designs. Designers will want to consider the most cost effective and efficient method of LFG extraction and conveyance, condensate removal, and combustion. Selection of flow meters and the decision of whether to install methane analyzers are very important issues and can have a significant impact on the value and number of credits generated.

#### **SUMMARY**

Though carbon credit projects have been slow to materialize in the Southeast U.S., several factors point toward more projects being developed in the coming year.

1. Revenue potential - One of the primary factors that we see contributing to this growth is the revenue potential of these projects. With the recent economic downturn and related decline in government revenue, proactive LFG collection and control systems offer an additional source of revenue for landfill owners.
2. Landfill owners are becoming more comfortable with the idea of carbon credits. While the market is still unknown to many landfill owners, more and more are investigating how to "get in the game". We expect that as more deals are made in 2009 there will be a ripple effect throughout the industry in the Southeast that will continue into 2010.
3. Additional benefits of carbon credit projects are becoming well known, such as:

- Reduction of landfill closure costs. If landfill closure plans call for a GCCS or even a passive vent system, landfill owners are recognizing that by installing a GCCS and paying for its cost with carbon credit revenue, they are reducing future capital expenses and reducing the amount of money that needs to be accounted for in financial assurance reports.
- Better understanding of recoverable LFG flow rates at the site and whether the landfill can support a future LFG energy project.
- Odor control and reducing LFG impacts on groundwater. Proactively collecting LFG reduces the potential for odors and groundwater impacts from LFG.
- Positive public relations. Proactively controlling LFG and being able to advertise to the public that greenhouse gas emissions are being reduced can improve relationships with neighbors, host communities of landfills, and the general public.

The future of the carbon market and the direction of future regulations are far from settled. However, landfill owners are recognizing that LFG emission reduction projects have a role to play in this developing market, and that it is important to begin thinking of LFG collection and control outside of the familiar bounds of the NSPS and other existing regulatory programs.

**EXAMPLE REQUEST FOR PROPOSAL FOR  
SALE OF GREENHOUSE GAS EMISSION REDUCTION CREDITS**

**NOTICE TO BIDDERS**  
**GREENHOUSE GAS EMISSION REDUCTION CREDITS**

The Board of County Commissioners of \_\_\_\_\_ County, (State) will receive bids for the purchase of Greenhouse Gas Emission Reduction Credits from the voluntary combustion of landfill gas at the \_\_\_\_\_ Landfill. Information on the landfill and the gas collection system that is responsible for the creation of the emission reduction credits is provided below.

All bids must be original and delivered by hand, delivery service, or mail to the (County Department), (address); and must be received by 2:00 p.m. local time on \_\_\_\_\_, at which time bids will be publicly opened and read aloud. Bids are to be sealed and clearly labeled "**BID - Greenhouse Gas Emission Reduction Credits**". Bids received after the time set for the bid opening will be rejected and returned unopened to the bidder. All interested parties are invited to attend.

Questions concerning the project should be directed to (County contact name), of the (County Department) at (phone number).

Project documents, including drawings and reports, may be viewed at the (County Department or Purchasing Agency name and address); or the (landfill name and address).

A **NON-MANDATORY** pre-bid conference will be held on \_\_\_\_\_ at \_\_\_\_\_ a.m. local time at the (meeting location). All interested parties are invited to attend.

The Board of County Commissioners reserves the right to waive informalities in bids, to reject any or all bids with or without cause, and to accept the bid that in its judgment is in the best interest of \_\_\_\_\_ County, (State).

\_\_\_\_\_ County does not discriminate on the basis of race, color, national origin, sex, religion, age, or handicapped status in the employment or provision of service.

Vendors mailing proposals should allow for normal mail delivery time to ensure timely receipt by \_\_\_\_\_ County. Vendors assume the risk for method of delivery chosen. \_\_\_\_\_ County assumes no responsibility for delays or failure of any delivery service to meet the submission deadline or failure to deliver to the designated recipient. Submittals may not be faxed or otherwise electronically submitted.

## Request for Proposals

### Purchase of Greenhouse Gas Emission Reduction Credits from Landfill Gas Collection and Control System

\_\_\_\_\_ Landfill, (City, State)

\_\_\_\_\_ Landfill is owned and operated by \_\_\_\_\_, and consists of the following waste disposal areas: \_\_\_\_\_. The site (is/is not) subject to New Source Performance Standards (NSPS) and gas collection and control systems (GCCS) are installed (list the landfill areas where a GCCS is installed) areas in accordance with Title 40 of the Code of Federal Regulations, Part 60, Subpart WWW, Section 60.752(b)(2)(ii).

#### BACKGROUND LANDFILL INFORMATION

\_\_\_\_\_ County is proactively collecting LFG and controlling methane emissions from (landfill areas). This \_\_\_\_\_-acre municipal solid waste landfill area first received waste in \_\_\_\_\_, and therefore is not required to have a GCCS until \_\_\_\_\_. \_\_\_\_\_ County wishes to sell verified emission reductions (VERs) from the early control of landfill gas (LFG) at the landfill.

#### **(Landfill Area Name) Background Information**

*(In this section, the owner should provide a description of the landfill, its bottom liner, capped areas, age of waste, date waste acceptance commenced and is projected to end, GCCS components, control device, and any other pertinent information that may aid the bidders in providing bid prices.)*

Background information for Cell \_\_\_\_\_ is provided below:

- Began accepting waste:
- Waste type: municipal solid waste
- Current waste in place: \_\_\_\_\_ million tons (approximate)
- Annual waste disposal rate: \_\_\_\_\_ tons per year (approximate)
- Cover system: \_\_\_\_\_
- Current and estimated future LFG recovery rate: \_\_\_\_\_ scfm
- Methane concentration of collected LFG: \_\_\_\_\_%
- Flare type: \_\_\_\_\_
- Flow measurement device: \_\_\_\_\_
- Gas flow rate and flare combustion temperature records: Recorded by (describe method of record keeping)
- Frequency of methane concentration monitoring: \_\_\_\_\_

## **Future Landfill Development Description**

The future Cell \_\_\_\_\_ will be constructed (description of location of future landfill areas) and will encompass \_\_\_\_\_ acres. Cell \_\_\_\_\_ is estimated to open in approximately (month, year), when filling in Cell \_\_\_\_\_ is completed. The County plans to collect LFG from Cell \_\_\_\_\_ using (describe the proposed GCCS and approach to LFG collection) .

## **BID FORM**

Bidders shall use the bid form included with this request for proposals. No substitutions shall be accepted. Additional information regarding the bid form is as follows:

- **VER Quantities** – The quantity of VERs listed on the bid form are estimates of the tonnes that \_\_\_\_\_ County anticipates can be validated and verified. \_\_\_\_\_ County makes no guarantee of the number of credits that will be available to the successful bidder. The successful bidder shall be required to purchase all credits generated.
- **Vintage Credits for (vintage year(s))** – \_\_\_\_\_ County has supporting documentation (gas concentration readings, flow rate records, and combustion temperature records) for years \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

## **ANTICIPATED CONTRACT TERM**

The contract term shall be for two years (i.e., through the sale of credits generated in 2010), unless this contract is terminated by \_\_\_\_\_ County. \_\_\_\_\_ County shall have the option to exercise two one-year extensions to allow the purchase of credits generated in 2011 and 2012.

## **VALIDATION AND VERIFICATION OF EMISSION REDUCTION CREDITS**

The successful bidder shall be responsible for performing and paying for the validation and verification of all credits. The County will supply the successful bidder with the following documentation to verify vintage and future credits:

- Chart records for flow rate and flare flame temperature.
- Records of the methane concentration at the flare inlet. This data has been and will continue to be obtained using a calibrated Landtec GEM-2000 infrared gas analyzer. Calibration records are available for the readings.
- Calibration certification for the flow meter.

- If a continuous methane analyzer is installed by the County in the future, methane concentration of the gas that is recorded by the analyzer will be provided to the bidder.

## **PURCHASE OF CREDITS**

The requirements for and schedule to purchase all verified credits are provided below.

### **Obligation to Purchase All Verified Credits**

Successful bidder shall be obligated to purchase all verified credits for each year at the bid price indicated on the bid form.

### **Schedule for Initial Verification and Payment**

The successful bidder shall begin the process of verifying vintage credits within 30 days of award of the project by \_\_\_\_\_ County. The bidder shall submit payment to \_\_\_\_\_ County for all verified vintage credits within three (3) calendar months of award. Copies of verification documentation shall be submitted to \_\_\_\_\_ County with each payment.

### **Schedule for Subsequent Verification and Payments**

The first payment of non-vintage credits (i.e., those generated in 2009) shall be made no later than August 31, 2009, unless approved otherwise in writing by the (Landfill owner). Subsequent payments shall be made at such time as credits are aggregated, "banked", or sold by bidder, but no later than three months after the end of each calendar year.

Copies of verification documentation shall be submitted to \_\_\_\_\_ County with each payment.

## **RIGHTS FOR GAS USE**

\_\_\_\_\_ County reserves the right to use the landfill gas for such purposes as it may desire (e.g., flaring, production of electricity, direct burn, etc.). \_\_\_\_\_ County retains the rights to all other environmental attributes for destruction of the gas, displacement of fossil fuels, renewable energy production, etc.

## **AWARD**

\_\_\_\_\_ County intends to award sale of VERs to the highest Total Bid, as indicated on the Bid Form, which is deemed to be in the best interest of the County. Upon award, the successful bidder shall enter into an agreement setting forth the details and requirements for purchase of the credits from \_\_\_\_\_ County.

**BID FORM**  
**GREENHOUSE GAS EMISSION REDUCTION CREDITS**  
**LANDFILL,** \_\_\_\_\_

Bidder shall indicate in the appropriate area, your bid price for the purchase of the available Greenhouse Gas (GHG) Emission Reduction Credits, also known as verified emissions reductions (VERs). The quantity of VERs available for purchase listed below are estimates. The successful bidder shall be obligated to purchase all VERs generated in each of the subject years.

Bid Item No.	Bid Item Description	Unit	Quantity	Unit Price (\$)	Total Line Item Bid (\$)
1	Purchase of <b>2007 Vintage VERs</b>	Tonnes	8,900		
2	Purchase of <b>2008 Vintage VERs</b>	Tonnes	65,000		
3	Purchase of <b>2009 VERs</b>	Tonnes	96,000		
4	Purchase of <b>2010 VERs</b>	Tonnes	96,000		
5	Purchase of <b>2011 VERs</b>	Tonnes	50,000		
6	Purchase of <b>2012 VERs</b>	Tonnes	50,000		
<b>Total</b>					

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Name, Title**

\_\_\_\_\_  
**Company Name**