

**GHG Emission Factor Development Project for Selected
Sources in the Natural Gas Industry**

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Quarterly Progress Report

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Submitted to

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Project Overview

Methane (CH₄) is the primary component of natural gas and is also a potent greenhouse gas (GHG). Emissions of CH₄ from natural gas production, processing, and distribution are among the top ten source categories of greenhouse gas emissions in the United States, expressed on a CO₂ equivalent basis. The overall goal of the project is to update default CH₄ emission factors for selected processes and equipment used in the natural gas industry. The default emission factors will be updated by compiling and synthesizing existing data for a variety of source categories and by acquiring new emission rate measurement data for selected sources where existing data have unacceptably large uncertainties or are insufficiently representative of current practices or equipment.

The project is organized into four tasks:

- *Task 1, Data Synthesis and Gap Analysis:* The purposes of this task are to: (1) identify, compile, and synthesize existing CH₄ emission factor and activity factor data; (2) critically review the quality and representativeness of the existing data; (3) recommend and prioritize emission source characteristics for new data collection efforts under Task 3.
- *Task 2, Technical Plan Development:* The purpose of this task is to develop technical work plans and detailed cost estimates for conducting data collection and measurement studies aimed at filling the emission data gaps identified in Task 1. In doing so, we will consider the range of potential activity data metrics that could be used for updating default emission factors and gather preliminary data on relevant metrics to ensure that all the major subgroups of equipment or processes are taken into account.
- *Task 3, Measurements and Analysis:* The purposes of this task are to: (1) execute the technical plans developed in Task 2, contingent on authorization by EPA; and (2) analyze the resulting data to develop new default emission factors and uncertainty estimates for the measured sources.
- *Task 4, Reporting and Dissemination:* The purpose of this task is to report on the default emission factors developed in Tasks 1 and 3 of this study, including the methods used in the process. Reporting and communication with stakeholders will be integrated into all of the tasks and a final reporting will disseminate project results.

Progress on Tasks

Task 1

A draft review of sources of emission factor and/or activity factor data that may have relevance to the natural gas sources of interest was prepared at the end of 2008. A series of stakeholder conference calls to solicit input on the report were organized (calls were held beginning in January, 2009) and an updated literature review was prepared. The updated review, dated March 31, 2009, was posted to the project web site:

(<http://www.utexas.edu/research/ceer/GHG/tasks.htm>)

On a subsequent conference call (May 12, 2009), stakeholders identified additional reports and reports that, while not currently available, would likely become available during the lifetime of the project. These reports will be incorporated into the Task 1 report as they emerge, so the report will continue to be updated throughout the project.

Task 2

During the first quarter of 2009 a work plan specifying methods and procedures for gathering additional data needed for updating factors used for estimating methane emissions from centrifugal and reciprocating compressors used in natural gas processing was drafted. A series of stakeholder conference calls to solicit input on the plan were organized (calls were held beginning in January, 2009). A second draft of the work plan was added to the project web site: (<http://www.utexas.edu/research/ceer/GHG/tasks.htm>). During the third quarter, final updates were made to the Quality Assurance Project Plan (QAPP) for compressor sampling, in anticipation of sampling beginning in the fourth quarter of 2009 and the first quarter of 2010. The QAPP for compressor sampling was approved in late October, prior to sampling in November.

Task 3

During the second and third quarters of 2009, the focus was on identifying compressor sampling sites. At least 4 different companies considered opening multiple sites to the study team. During the third quarter, negotiations for site access reached the final stages with 2 of the companies. These discussions were finalized and full execution of the site access agreements occurred during the fourth quarter of 2009 (October 2009). Both of these companies made multiple sites available for sampling, with multiple compressors at each site. The University has also procured additional liability insurance through November 2010, with an option to extend coverage, if necessary.

Sampling at the first group of sites in east Texas, all belonging to a single company, occurred for a week in November, 2009. A second week of sampling occurred in February, 2010, at a group of sites belonging to a different company in west Texas. The strategy in conducting the sampling has been to collect as much data as possible at the sites, using three different types of instruments, and to perform a detailed cost analysis of the sampling program. Table 1 describes the instruments that were deployed at the sites.

Table 1. Summary of sampling done to date

Ownership of site	Type/Number of Compressors	Date sampled	IR Screening	Hi Flow on Component leaks	Vent pipes measured
Company 1	Recip./6	11/3/09	√	√	√*
Company 1	Recip./5	11/4/09	√	√	√*
Company 2	Centrif./3	11/3/09	√	√	√*
Company 2	Recip.	2/23/10	√	√	√
Company 2	Recip.	2/24/10	√	√	√

*Vent pipes were measured during a sampling event in May 2010

The most significant findings in this first round of sampling were high emission rates in the vent pipes at the sites for Company #2, summarized in Table 2.

	scfm*	Mscfy**	GRI/EPA Data Mscf/compressor/year
Average blowdown vent for compressors at idle	27.30	14,347	3683
Average blowdown vent for compressors running	16.76	8,807	
Average packing vent	26.25	13,798	396

*standard cubic feet per minute

**thousand standard cubic feet per year

Originally, the vent pipes at Company #1 sites had not been sampled because a lift was required to access the vent pipes, and the use of lifts had not been in the original study plan. Based on the findings at the Company #2 sites, the Company #1 sites were revisited, with lifts, and the vent pipes were sampled in May 2010.

Plans for Next Quarter

Task 1

The literature review will be updated, as appropriate, on an on-going basis.

Task 3

A draft sampling report, based on the initial round of sampling, will be prepared in June 2010. The report will also contain a recommendation for additional sampling. A conference call will be scheduled for late June or early July will be scheduled with the stakeholder group to discuss the initial results and to discuss the draft plan for the remainder of the sampling, based on available funding.