MEMORANDUM

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Date: February 10, 2009

Subject: **Review of Verification Systems in Environmental Reporting Programs**

The purposes of this memorandum are to (1) summarize common systems for third party verification used in U.S. and international greenhouse gas (GHG) reporting programs, (2) summarize EPA regulatory program approaches for data verification, including the acid rain program approach, (3) discuss issues and considerations for EPA's decision on whether the mandatory GHG reporting rule will require third party verification or rely on facility self-certification of reports with (or without) EPA verification, (4) discuss cost differences between third party verification versus self-certification with EPA verification approaches, and (5) identify the types of data that would need to be reported if EPA were to verify the data rather than require third party verification. Attachments provide additional details.

1.0 SUMMARY OF COMMON THIRD PARTY VERIFICATION SYSTEMS REQUIRED BY GHG REPORTING PROGRAMS

Several mandatory and voluntary GHG reporting programs require independent third party verification of reported emissions. Each reporting company must contract with a private verification firm that will review the GHG emissions inventory and underlying documentation and submit a finding as to whether the company's GHG report is accurate. Each GHG reporting program has procedures for accrediting third party verifiers and guidance on how the verification is to be performed (e.g., what types of documentation the reporting company must provide to the verifier, what activities the verifier must perform, what criteria they must address in their review of the GHG emission estimates, what documentation the verifier must produce). This summary focuses on the requirements of the following programs, which are representative of third party verification systems: California Air Resources Board (CARB) mandatory GHG reporting rule (developed pursuant to Assembly Bill (AB) 32); the California Climate Action Registry (CCAR) voluntary reporting program; The Climate Registry reporting program developed by a consortium of U.S. states, Indian tribes, Canadian provinces and Mexican states; and the European Union Emissions Trading System (EU ETS). Key elements of the verification process are described.

1.1 Why is Third Party Verification Used?

Third party verification is used to address the need for consistency and a high level of confidence in the reported GHG emissions. Accurate data are especially important if the reported emissions are used to determine compliance with a cap and trade program or other regulatory program requiring GHG emissions reductions. The Climate Registry General Verification Protocol (version 1.0) states that "The purpose of third-party verification is to provide confidence to users

... that the emission data submitted to the Registry represents a faithful, true, and fair account of emissions – free of material misstatements and conforming to the Registry's accounting and reporting rules". It also states that "It [third-party verification] is required by the California Climate Action Registry and is recommended by the Department of Energy's 1605(b) program. Third-party verification has also been relied upon successfully by several regulatory programs, including the EU ETS, the United Kingdom GHG Emissions Trading System, and Alberta's Specified Gas Emitters Program." It further states that "The California Air Resources Board also plans to use third-party verification in its mandatory reporting program."

1.2 Accreditation of Third Party Verifiers

All of the programs reviewed have a process for accrediting third party verification firms. Companies reporting their emissions must choose a verification firm that is accredited by the particular reporting program. For some programs, government agencies are responsible for accrediting the verifiers (e.g., CARB and some EU ETS countries). Other programs (several EU ETS countries), have independent accreditation services that certify the verifiers.

The Climate Registry partnered with the American National Standards Institute (ANSI) to accredit third party verifiers. A pilot program was initiated in 2008 and ANSI accredited the first batch of verifiers in December 2008. The ANSI certification process ensures consistency with:

- ISO 14065:2007 – Greenhouse Gases – Requirements for GHG validation and verification bodies for use in accreditation or other forms of recognition.
- ISO 14064-3:2007 – Greenhouse Gases – Part 3: Specification with guidance for the validation and verification of GHG assertions.
- Specific GHG calculation and reporting requirements of The Climate Registry.

Under the various accreditation programs, applicants must submit qualification packages. These generally provide information on the firm (e.g., legal status, organizational structure, liability insurance). They also describe the firm's management policies and systems to avoid conflict of interest (COI), provide staff training and oversight, ensure that appropriate teams of staff are assigned to verification activities, and ensure that proper GHG verification procedures are followed and that activities are appropriately documented. In addition, programs typically require the firm to designate a minimum number of "lead verifiers" (called "lead auditors" for EU ETS) and a minimum number of other verifiers on staff. The programs each have minimum education and experience requirements for verifiers and lead verifiers, including experience conducting GHG verifications or other similar audits of emissions inventory data. Lead verifiers typically must complete program-specific training and pass an exam.

The accrediting agency reviews the qualifications package and may conduct visits to the applicant's offices to review documentation and interview staff. The accrediting agency will then approve or deny the application. The accreditation agency may also conduct ongoing surveillance and may accompany verifiers on site visits to ensure they are performing verifications in accordance with program requirements.

Details on the accreditation processes for the CARB mandatory reporting program, CCAR, The Climate Registry, and the EU ETS are contained in Attachment A.

1.3 Addressing Conflict of Interest

In order to ensure independent and objective verifications, all of the GHG reporting programs reviewed have provisions for addressing COI. During the accreditation process, verifiers must demonstrate that they have systems in place to determine if COI exists, to forego verifications that have a high potential for COI, and to monitor potential (emerging) COI. Under the CARB, CCAR, and The Climate Registry GHG reporting programs, each time a company reporting GHG emissions engages a verifier, the verifier must conduct a case-specific COI evaluation. Each program specifies criteria for evaluating COI and for reporting and keeping records of these determinations.

If the evaluation establishes that the potential for COI is low, then the verifier can generally proceed to enter a contract with the reporter and conduct the verification, however the verification firm must first submit a COI assessment form (or COI notification form) to the program (e.g., The Climate Registry; CCAR). The COI evaluation must be documented and is subject to audit. Some programs have specified timelines to review and provide feedback on the COI assessment forms. For example, The Climate Registry conducts a screening review of all submitted COI forms within 15 days, and may undertake a more detailed review of selected forms within an additional 15 days and provide findings to the verifier. If the potential for COI is high, then the verifier must generally forego conducting the verification, although The Climate Registry has provisions for developing a plan to avoid, eliminate, or otherwise mitigate the COI to an acceptable level. In such cases a COI mitigation form is submitted to The Climate Registry for review and approval.

The verification firm must monitor for potential COI throughout the period of the verification engagement and for a period of time afterward (e.g., 1 year) and avoid taking on any work that would have a high potential to create a COI.

1.4 Conducting the Verification

The third party verifiers review the inventory and certify whether it is accurate and free of material misstatement. For some programs, a discrepancy is defined as “material” (significant) if overall reported emissions differ from emissions estimated by the verifier by 5% or more. To perform the verifications, the verifier reviews the company’s data collection and data management systems, the methodologies and factors used to estimate emissions, and the information being reported. While verifiers do not review all activity data or emissions measurement data records and calculations, they review a sample and they typically conduct site visits to a subset of the company’s facilities. During site visits, the verifiers observe the facility’s operations and monitoring equipment, review documentation, and meet with staff.

While the steps in conducting the verification are described a little differently in each program, they are similar. Lists of steps from The Climate Registry, the EU ETS, and CARB are summarized here. A certification activities checklist from CCAR, which contains similar steps, is included in Attachment B.

The Climate Registry verification process is consistent with ISO 14064:3 and includes additional specific requirements. A summary of core verification activities described in the May 2008 General Verification Protocol (version 1.0) is as follows:

1. Assess conformance with The Climate Registry requirements.

2. Assess completeness of the emissions report. Assess and sample the reporter's emission source inventory (e.g., facility, source, fuels) to ensure that all sources of GHG emissions are properly identified and that the inventory reflects the appropriate boundaries, consolidation methodologies, and GHG emissions.

3. Perform a risk assessment based on review of information systems and "controls" (i.e., management systems). Review the methodologies the reporter used to calculate emissions and the systems in place to prevent data collection, data handling, and calculation errors. Assess the level of uncertainty associated with each identified source/GHG. Identify the areas with the greatest potential for material misstatements.

4. Select a sample/develop a sampling plan. The document states "It is not cost-effective to attempt a verification of ALL of the emissions data provided in an emission report. Rather, the verification body must choose a sample of the data for detailed evaluation." The sample is selected based on the results of the risk assessment, focusing on those emission sources, facilities, data systems, and processes that pose the greatest risk of material discrepancies. (The document refers to ISO 14064-3 for steps in developing a risk-based sampling plan.) The sampling procedure generally involves conducting site visits to a subset of the reporting company's facilities. The minimum number of visits ranges from 1 site visit for a company reporting on 1 to 3 facilities to 2% of the company's facilities for a company reporting on over 1,000 facilities.

5. Verify emission estimates against verification criteria. "The Registry does not expect nor require verification bodies to review all of the Reporter's documents and recheck all of their calculations. To ensure that data meet a minimum quality standard on an entity-wide basis, verification bodies should concentrate their activities on the areas that have the greatest uncertainty and amount of emissions." Verification steps include:

   - Gathering evidence through site visit observations, document review, interviews, etc.
   - Reviewing GHG data (original data sources, spreadsheet calculations, documentary evidence that inspections, calibrations, etc., were done).
   - Crosschecking GHG calculations.
   - Evaluating material discrepancy.
   - Assessing reported emissions and documenting findings. This step includes determining whether the materiality threshold of 5% has been met. This means that errors in emissions estimation adding up to 5% of the corporation's (reporting entity's) total emissions are allowed. Direct and indirect emissions errors are tallied separately.

The verifier informs the reporter of reporting errors and assesses corrective actions taken by the reporter. The verifier then documents their findings in a detailed Verification Report that is shared with the reporter but is treated as confidential and not submitted to The Climate Registry. The verifier also prepares a brief signed Verification Statement documenting the verification activities and outcomes. This statement is submitted to The Climate Registry and is made publicly available upon completion of the verification process.

The Climate Registry developed an optional verification activities checklist covering the verification steps described above. It is contained in Attachment C.

A 5-year verification cycle is allowed, under which a comprehensive verification is conducted in the first year, and a more streamlined process can be used in the second through fifth years. Each reporter must change their verifier after 5 years. The accreditation body (ANSI) and The Climate Registry's Oversight Panel may participate in site visits and audit verification activities as part of their ongoing program oversight roles.

The ***EU ETS*** "Commission Decision of 18 July 2007 establishing guidelines for the monitoring and reporting of GHG emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council" lists the following verification methodology:

1. Strategic analyses. Review the monitoring plan and other documents submitted by the reporter. Understand the sources of GHG emissions and the data and calculation procedures, and systems used to determine GHG emissions.

2. Risk analysis. Analyze the inherent risks and control risks related to the scope and complexity of the emission sources and procedures that could lead to material misstatements. Develop a verification plan commensurate with the risk analysis. The plan includes a list of activities, schedule of activities, and process explaining how the activities will be conducted. It also includes a data sampling plan.

3. Verification. Conduct a site visit when appropriate to inspect monitoring equipment, conduct interviews, and collect documentary evidence. Implement the verification plan including review of a sample of the data. Confirm validity of information used to calculate uncertainty level, verify that the reporter is implementing their approved monitoring plan, and identify missing data. Determine misstatements and non-conformities.

4. Internal Verification Report. Prepare an internal report that documents the findings of the verification process. This is retained by the verifier but not submitted. The report is used to determine whether the emissions report contains material misstatements or other issues.

5. Verification Report. This report presents the verification methodology, findings, and verification opinion. The verifier submits the report to the reporter, and the reporter then includes it with their annual emissions report to the government agency implementing the EU ETS. The annual emissions report is satisfactory if the verifier finds no material misstatements or material non-conformities. The material misstatement criteria are 5% for small and medium sources and 2% for large sources.

The ***CARB*** core verification activities, from its "Mandatory Reporting of Greenhouse Gas Emissions: Instructional Guidance for Operators," December 2008 document, and its mandatory reporting rule, are consistent with ISO 14064-3 requirements, and include the following:

1. Verification and Risk-based Sampling Plans. Verifiers must develop a Verification Plan that includes dates of proposed meetings and site visits, types of proposed documentation

and data reviews, and expected date for completing verification services. The Sampling Plan should be based on a strategic analysis developed from document reviews and interviews to assess the likely nature, scale, and complexity of the verification services. The Sampling Plan should include a ranking of the emission sources by amount of contribution to total CO_2e emissions, and a ranking of emission sources with the largest calculation uncertainty, including a qualitative assessing of risk as related to data acquisition equipment; data sampling and frequency; data processing and tracking; emissions calculations; data reporting; and management policies or practices.

2. Data checks. These checks will ensure that appropriate methods and/or emission factors were used. Data checks will be performed on a reasonable number of data, based on the potential risk for a material misstatement.

3. A materiality threshold of 5% is required. This means that errors in emissions estimation adding up to 5% of the overall facility CO_2e emissions are allowed.

4. Verification Report and Opinion. At the end of the verification process, the verification body will provide the facility operator with a detailed verification report. The report must be retained by the operator for 5 years. The verification body must also provide a verification opinion to the facility operator and to CARB.

The regulation allows for a 3-year verification cycle. A more comprehensive verification effort is required in the first year compared to the second and third years. Facility operators must change verification bodies at least once every 6 years to avoid complacency and potential for COI. As part of its program oversight, CARB staff may participate in any verification to audit the performance of verifiers. Facility operators and verifiers are required to share the information used as part of the verification process with CARB staff that participate in the verification.

1.5 Types of Data Reporters Must Provide to Verifiers

In general, reporting companies must provide verifiers with their emissions report, an inventory of facilities and emission sources, documentation of GHG emission estimation methodologies and procedures, documentation on software/programs used to determine GHG emissions, documentation of control (i.e., management) systems in place to prevent errors, and the data needed by the verifier to implement their verification and sampling plan. Data includes activity data, emission measurements, and monitoring data. In addition, the reporter must allow the verifier to conduct site visits, interview personnel, and review all additional detailed data records and documentation needed to conduct the verification activities. The verifier is given access to more detailed documents, data, and records than the information that is reported to the programs.

The Climate Registry and ***CCAR*** provide similar lists of documents that may be reviewed during verification. It is implied that these documents/data must be provided by the reporting company to the verifier. Table 1 includes a general list based on both programs. Table 1 does not contain data for indirect emissions because the focus of the federal GHG reporting rule is primarily direct emissions.

Table 1. Documents/Data to be Provided to Verifier During Certification

General Identifying Emission Sources	
Emission Source Inventory	Facility inventory Emission source inventory • Stationary source inventory • Mobile source inventory • Fuel inventory
Understanding Management Systems and Methodologies	
Responsibilities for Implementing GHG Management Plan	Organization chart GHG management plan Documentation and retention plan
Training	Training manual Procedures manual Consultant qualifications statement
Methodologies	Protocols used (if in addition to the program's General Reporting Protocol) Control systems documentation Software/program documentation and users' guides
Verifying Emission Estimates	
Direct Emissions from Mobile Combustion	Fuel purchase records Fuel in stock Vehicle miles traveled Inventory of vehicles Emission factors (if not default) Combustion Efficiency Oxidation factors Global warming potentials Meter calibration information
Direct Emissions from Stationary Combustion	Monthly utility bills Fuel purchase records CEMs data Inventory of stationary combustion facilities Emission factors (if not default) Combustion Efficiency Oxidation factors Global warming potentials Meter calibration information
Direct Emissions from Process Activities	Raw material inputs Production output or hours of operation Calculation methodology Emission factors Control equipment efficiency and reliability Uncontrolled GHG emission measurements Chemical analyses and methods CEMS data

Table 1. Documents/Data to be Provided to Verifier During Certification

Refrigeration systems	Refrigerant purchase records Refrigerant sales records Leak test results or maintenance practices Numbers and types of equipment Emissions history Calculation methodology Emission factors Global warming potentials
Landfills	Waste-in-place data Waste landfilled Calculation methodology Emission factors Emissions history Global warming potentials
Coal mines	Coal production data submitted to EIA Quarterly MSHA report Calculation methodology Emission factors Global warming potentials
Natural Gas Pipelines	Gas throughput data Leak test results or maintenance practices Numbers and types of equipment Emissions history Calculation methodology Emission factors Global warming potentials
Electric Transmission and Distribution	Sulfur hexafluoride purchase records Leak test results or maintenance practices Numbers and types of equipment Emissions history Calculation methodology Emission factors Global warming potentials

Adapted from Table 1 "Documents to be Reviewed During Verification" in CCAR General Verification Protocol, Version 3.0, August 2008, and Table 4.1 "Documents that may be Reviewed During Verification Activities" in The Climate Registry General Verification Protocol, Version 1.0, May 2008.

In addition to the general data submittal requirements, there are several source- and project-specific protocols from CCAR that require additional data to be provided by registry participants during verification. These are summarized in Attachment D for the sources/projects relevant to the federal mandatory GHG reporting rule: utilities, cement manufacturing, landfill methane offset projects, and livestock biogas offset projects. Currently, CCAR is developing and/or assessing the feasibility of developing several other source-specific reporting/verification protocols which may contain additional requirements for reporting and allowing access to data during certification. These include protocols address natural gas transmission and distribution, blended cement, boiler efficiency, bus fleet upgrade, bus rapid transit, nitrous oxide reduction in acid plants, and truck stop electrification. In addition, The Climate Registry has indicated their

intent to develop industry-specific reporting protocols, and these could also have implications for the data provided to verifiers.

The ***CARB*** mandatory reporting rule does not contain a specific list of documents to be provided to the verifier, although the rule does require the verification team to collect and review all information that, in the professional judgment of the team, is needed in the verification process.

The ***EU ETS*** "Commission Decision of 18 July 2007 establishing guidelines for the monitoring and reporting of GHG emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council" contains a list of records that the reporting source must maintain "to allow for reproducibility of the determination of emissions by the verifier or another third party." Following is an abbreviated version of this list.

For calculation-based methodologies:

- The list of all source streams monitored.
- Activity data used for any calculation of the emissions for each source stream.
- Documents justifying the selection of the monitoring methodology.
- Documentation of the monitoring methodology and results from the development of activity-specific emission factors and proofs of approval.
- Documentation of the processes of collection of activity data.
- Activity data and emission factors submitted for years preceding the time period covered by the trading scheme.
- Documentation of the responsibilities in connection to the emissions monitoring.
- The annual emissions report.
- Any other information identified as required to verify reported emissions.

The following additional information shall be retained for measurement-based methodologies:

- List of all emission sources monitored.
- Documentation justifying the selection of a measurement-based methodology.
- Data used for the uncertainty analysis of emissions from each emission source.
- Data used for the corroborating calculations.
- Detailed technical description of the continuous measurement system including documentation of approval from the competent authority.
- Raw and aggregated data from the continuous measurement system, including documentation of changes over time, the log-book on tests, down-times, calibrations, servicing and maintenance.
- Documentation of any changes of the continuous measurement system.

1.6 Time Frames for Third Party Verification

The third party verification programs reviewed generally allow 3 to 6 months for verification. CCAR allows 4 months for verification. Annual emission reports must be submitted by June 30 for the previous calendar year, and verification opinions must be reported by October 31. The proposed CARB mandatory reporting rule has emission reporting deadlines of April 1 or June 1 (depending upon the sector) and verification must be completed within 6 months, or by October 1 or December 1, respectively. Under The Climate Registry emission reports are due June 30 and

verification must be completed by December 15. The EU has the shortest timeline. The verification report must be submitted by March 31 for the previous calendar year. Some verifiers start the process early, prior to the end of the calendar year, to meet the March 31 deadline.

2.0 SUMMARY OF TYPICAL EPA AIR REGULATORY PROGRAM AND INVENTORY APPROACHES TO VERIFICATION OF DATA

This section summarizes the data verification approaches typically used in EPA air regulatory programs and inventory efforts. The programs reviewed include:

- OTAQ fuel quality programs, because they are among the few programs that require third party verification and certification of data.
- The acid rain program, which requires extensive data reporting used to support a cap and trade program. This includes reporting of CO_2 data by electric generating units.
- Other EPA air regulatory programs, including new source performance standards (NSPS) and national emission standards for hazardous air pollutants (NESHAP).
- The Toxics Release Inventory (TRI) reporting program, which requires numerous facilities across industrial sectors to report emissions data to EPA.
- The national emissions inventory (NEI), under which states report facility and unit-specific data to EPA for a national inventory of criteria and hazardous air pollutants.
- The Inventory of U.S. Greenhouse Gas Emissions and Sinks, which is submitted on an annual basis to the United Nations Framework Convention on Climate Change.

2.1 OTAQ Fuel Quality Programs

The EPA's Office of Transportation and Air Quality (OTAQ) has authority to regulate fuels and additives under the Clean Air Act. Three fuels programs contained in 40 CFR Part 80, entitled "Regulation of Fuels and Fuel Additives", require "attest engagements" (a form of third party verification):

1. Standards for Reformulated and Conventional Gasoline. In 1995, this program established standards for cleaner burning gasoline (reformulated gasoline or RFG) to reduce motor vehicle emissions of smog-forming and toxic pollutants. RFG is required in cities with the worst smog problems, and about 30% of the gasoline sold in the U.S. is RFG.
2. The Tier II sulfur program. This rule, promulgated in 2000, reduces the sulfur levels in gasoline, which will help ensure the effectiveness of motor vehicle emission control technologies.
3. Renewable Fuels Standard (RFS) program. These rules were recently established under the Energy Policy Act of 2005, and require that gasoline sold in the U.S. contains a minimum volume of renewable fuel.

These rules require fuel producers (refiners and for the RFS rules renewable fuel producers) and importers to conduct sampling and analysis of fuels, keep records, and submit reports. The data reported includes production data and product information. In general, emissions data are not reported, although for the RFG program some emission performance calculation results are reported. All of the reported information may be identified as confidential business information (CBI). All three rules require reporting parties to engage independent certified public

accountants (CPAs) or certified internal auditors to perform annual attest engagements. The purpose of this third party verification is to determine if a company's internal records support their reported data and representations.

For example, the Tier II regulations promulgated in 2000 require refiners and importers to submit, on an annual basis, a report that demonstrates compliance with the applicable sulfur standards and data on individual batches of gasoline including the batch volume and sulfur content. Approximately 250 facilities submit reports under this program. The RFG/conventional gasoline (CG) rule requires similar annual reports. Both the Tier II and the RFG/CG rules require the CPA or internal auditor to verify that the company's internal records support the annual report. In addition, the Tier II rule requires the attest auditor to review the sulfur credit generation, credit trading, credit purchasing, credit selling, corporate pool averaging, and small refiner issues (as applicable) contained in the Tier II rules. The RFS program specifies compliance and enforcement provisions for facility registration, recordkeeping and reporting requirements, program enforcement, and various credit tracking mechanisms. Any renewable fuel producer or importer, gasoline refiner or importer, or other renewable identification number (RIN) owner must use an independent auditor (i.e., a CPA) to conduct an annual review of records regarding renewable fuel production, RIN generation, RIN transaction activity, and compliance.

Under these programs, only a limited amount of product information (e.g., product testing results) are reported, but a significant amount of supporting information must be retained by the reporting company. The attest engagement is essentially an "audit of records," and is a compliance mechanism to verify that the limited amount of information reported to EPA is accurate. Annual reports are submitted each year (e.g., at the end of February for the previous calendar year). Attest engagement certifications must be completed three months later (e.g., by the end of May). Reporters have the option to re-submit their reported data based on the results of their attest engagement. EPA encourages this type of self-correcting, and it is a common practice, which indicates that the attest engagement programs are working effectively.

Because the type of data reported does not require complex technical calculations or specialized technical expertise, CPAs can conduct the audits. (This is significantly different from the state and international GHG reporting programs that developed program-specific accreditation programs for third party verifiers and require verifiers to demonstrate specialized technical training and GHG inventory experience.) The information collection request (ICR) for the RFS rule estimated the typical annual cost of attest engagements to be $3,408 for each reporting entity.

In addition to the attest engagement requirements noted above for fuels and additives, OTAQ compiles information on the RFG program fuel properties and emissions performance based on data generated from surveys conducted by the RFG Survey Association as a requirement of EPA regulations. The RFG Survey Association is an association of refiners, importers and blenders. These surveys collect and analyze samples from retail gasoline stations. Currently, over 150 surveys are conducted each year, with a total of more than 10,000 samples collected and analyzed.

2.2 Acid Rain Cap and Trade Program

The acid rain program was established by EPA in 1995 under Title IV of the Clean Air Act. It regulates SO_2 and NO_x emissions from electric generating units (EGUs) that burn fossil fuels and that serve a generator with a capacity that exceeds 25 MW. For those units, 40 CFR Part 75 requires continuous monitoring and reporting of SO_2, CO_2, NO_x, and heat input. The reported SO_2 data are used for a cap and trade program to reduce acid rain. The reported NO_x data are used to determine compliance with NO_x reduction requirements. The explanatory statement for the December 2007 Consolidated Appropriations Amendment that provided funding for EPA to establish a mandatory GHG reporting rule specified that the EPA has discretion to use existing reporting requirements for EGUs under section 821 of the Clean Air Act (the acid rain program) for the mandatory GHG reporting rule. To determine CO_2 emissions, the Part 75 rules specifies the use of continuous emissions monitoring systems (CEMS) or the use of fuel sampling and fuel feed rate data. Low emitting oil- and gas-fired units also have the option to use default emission rates and records of fuel usage to estimate CO_2 emissions. In practice, all coal-fired EGUs are using CEMS data for CO_2 emissions.

The acid rain program has been recognized for the completeness and high quality of data reported to the program. The program does not require third party verification of the data. Instead, facilities must sign the reports to self-certify that the reported data is accurate, and EPA relies on systems that encourage proper data collection and reporting, as well as extensive EPA verification of reported data.

In order to ensure proper data collection, EPA included in the rule:

- Detailed requirements for monitoring methods including stringent QA standards to demonstrate monitor accuracy and precision.
- Stringent data substitution procedures to estimate emissions during monitor downtime, which provide incentives to minimize downtime.
- Automatic penalties for facilities that do not comply with their annual emissions allowances. (The penalties significantly exceed the cost of purchasing allowances.)

EPA also conducts extensive verification of the reported emissions. To provide sufficient data for EPA to verify whether mass emissions have been correctly determined, the rule requires the following types of data to be reported and kept on site by the source:

- Hourly emissions data from CEMS.
- Heat input and load (output) data.
- Results of any required QA tests.
- Operating hours for the calendar year.
- Tons of SO_2, NO_x, and CO_2 emitted quarterly and annually.
- Other data useful for verifying mass emissions from the source.

Attachment E provides further details on the data that must be reported by facilities using CEMS or alternative CO_2 emission calculation methodologies.

To allow effective review of the large volume of data reported, EPA requires facilities to submit data electronically in a standard format. A major advantage of a standardized electronic format is

that is allows electronic audits by the reporting facility and by EPA to identify erroneous data. EPA provides a QA software tool to reporting sources so they can routinely check their electronic report formatting and calculations before submittal to EPA. Use of this software is optional, but is advantageous to the reporting facilities because it minimizes the number of problem submittals and the potential need to revise and resubmit their emission reports.

EPA verifies quarterly and annual reported data by using the tools that are available to facilities and several electronic audit tools that are not provided to the reporting facilities. These tools are used to check for inconsistent data (e.g., poor correlation between unit heat input and electrical output), check specific problem areas (e.g., proper missing data substitution), and develop lists of target facilities for field audits (site visits) based on statistical criteria or suspect data. When EPA data checks identify errors in the quarterly or annual reports, notifications are generated through an automated process and electronically sent to facilities. Facilities must resolve the error and re-submit the form. EPA generates, and facilities respond to, a large number of error notifications each year, indicating that the electronic tools have been an effective method of auditing reports. The 2006 acid rain program information collection request (ICR) supporting statement estimated that 3,537 facilities submit quarterly reports for a total of 14,148 reports per year, and that 3,429 EPA-generated error messages are sent and responded to each year.

EPA conducts field audits of selected EGUs for enforcement purposes. Prior to conducting site visits, EPA reviews the unit's monitoring plan and examines recent and historical data submittals. During the site visits, EPA reviews records (including maintenance logs and the QA plan for the unit), observes QA tests conducted by EGU staff, interviews personnel, and may perform independent tests of the monitoring systems. Recently, approximately 10 facilities per year have been visited by EPA and its contractors. State agencies visit a few additional facilities. Early in the program, when the reporting requirements were less well understood and the electronic data verification programs were not as fully developed, EPA and states conducted a larger number of audits. In addition, in the first year of reporting, facilities had to submit site-specific monitoring plans and notify EPA regional offices and states in advance of initial certification tests of the CEMS. State agencies assisted EPA in reviewing the monitoring plans and observed many certification tests.

Compliance assistance is also provided to encourage proper reporting. In addition to providing electronic reporting tools, EPA developed a Plain English Guide to the Part 75 rule, maintains a Web site with useful information, and answers official petitions for clarification and guidance submitted by sources. In addition, EPA staff spend significant time answering questions from regulated sources by phone and e-mail.

2.3 New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP) Programs

Under section 111 of the Clean Air Act, EPA develops NSPS to regulate criteria pollutant emissions from new, modified, and reconstructed sources. Regulations are developed for each source category (e.g., industrial/commercial steam generating units, municipal waste combustors, landfills, cement plants, petroleum refineries, secondary lead smelters) and are codified in 40 CFR part 60. The NSPS contain emission standards that are based on application of best demonstrated technologies. NESHAP are developed under section 112 of the Clean Air Act and codified in 40 CFR Part 63. NESHAP regulate hazardous air pollutant emissions. Like NSPS,

they are developed on a source category basis. Various NSPS and NESHAP apply to the many of the same facilities that will be required to submit reports under the federal mandatory GHG reporting rule. The NSPS and NESHAP emission standards are expressed in a variety of formats, such as emission rates, stack gas pollutant concentrations, percent reduction, or mass emissions. The rules may also contain equipment and work practice specification. NSPS and NESHAP, with rare exceptions, do not require reporting of annual emissions, but they contain specific monitoring, reporting, and recordkeeping requirements sufficient to determine continuous compliance with the emission standards. These may include initial or periodic emission tests, CEMS, monitoring of process or control device operating parameters, calculations, and associated reports and records. Testing and monitoring requirements typically specify sampling and analysis methods and QA procedures that sources must follow. The NESHAP for major sources of hazardous air pollutants typically require semiannual compliance reports. NSPS reports are often less frequent, but vary by source category. The reports are submitted to the appropriate EPA regional office and to the state regulatory agency if the state has been delegated authority to implement and enforce the NSPS or NESHAP. Most state agencies have taken delegation of the rules.

EPA does not require third party verification of NSPS and NESHAP compliance reports. The NESHAP General Provisions require a responsible official to sign summary reports, excess emissions reports, malfunction reports, and other types of reports to self-certify their accuracy. EPA and states agencies review the reported data, perform site inspections, and take enforcement actions to ensure compliance with the rule. Because EPA delegates most implementation and enforcement authorities to states but maintains an oversight role, compliance verification is a shared responsibility between EPA and states. Data verification and EPA compliance assistance and enforcement activities contain some similarities to, as well as many differences from, the acid rain program procedures.

The NSPS and NESHAP programs are similar to the acid rain program in the following ways:

- The rules (especially NESHAP) contain detailed testing and monitoring requirement. When CEMS or other metering is required, the rules include specific methods, performance specifications, QA/QC checks, and documentation requirements that sources must follow.
- The rules require sufficient data records and documentation that an EPA or state auditor can verify compliance. However, for most rules, the more detailed data are retained on site and only summary data or excess emissions above the level allowed by the standard are reported.
- For some source categories, EPA provides compliance assistance to enable facilities to understand rule requirements and thereby encourages accurate data collection and compliance. These include plain English guides, example reporting forms, and other materials. EPA or state staff answer questions from facilities.
- EPA or states review the data submitted by sources to identify potential noncompliance.
- EPA or state inspectors conduct site inspections to determine compliance. During the visits, they observe equipment and operating practices, review records, interview site personnel, and observe emission testing and monitoring.
- EPA and states target certain industry sectors and facilities for enforcement initiatives.

The NSPS and NESHAP programs are different from the acid rain program in the following ways:

- There is no standard electronic reporting format.
- Reports are submitted to and reviewed by states and EPA regional offices rather than by a headquarters EPA office.
- The reported data are not assembled into a common database.
- The individual states are the first line of enforcement activities.
- The level of detail of reported data is less than for the acid rain program. For example, the acid rain program requires reporting of hourly CEMS data. For most NESHAP, hourly data would be retained on site. Only summary data (e.g., daily or 30-day averages) or data that are outside the required limits would be reported.

2.4 Toxics Release Inventory (TRI) Program

The TRI program was established under the Emergency Planning and Community Right-to-Know Act (EPCRA) and the rules are contained in 40 CFR Part 372. TRI requires annual facility-level reporting of the amount of approximately 650 toxic chemicals routinely or accidentally released to the environment (air, water, land). Facilities within specified NAICS codes covering a wide range of industrial sectors must report if they manufacture, process, or otherwise use TRI chemicals above established thresholds. Approximately 23,000 facilities report, including facilities in manufacturing industries, metal and coal mining, electric utilities, and other industrial sectors. Reports include total annual stack and fugitive emissions of each listed toxic chemical released to the air. The reports also contain a signed self-certification that the information reported is accurate. Reporters must use a standardized reporting form and are encouraged to submit reports electronically. No information is reported on the specific manufacturing processes, emissions points, or types of routine or accidental emissions included in the total stack emissions and fugitive emissions estimates. Each facility must keep records of how emissions were calculated, including supporting materials, documents, calculations, worksheets, and other information used.

To assure the quality of TRI data, EPA provides extensive training and assistance to reporters. EPA provides free electronic reporting software to facilitate electronic submission of data and improve consistency. EPA also conducts electronic data quality checks, contacts facilities to resolve reporting errors, and takes enforcement actions against violators to deter incorrect reporting.

All of the EPA Regional offices hold in-person training workshops for reporters every spring, and EPA also provides on-line Web training, with over 50 training opportunities offered in 2008. The training covers rule requirements, thresholds, example calculations, reporting software, common reporting errors, and industry-specific guidance. The TRI reporting requirements do not require installation of monitors or use of any specific methods for emissions calculations, but EPA developed several industry-specific guidance documents to assist reporters in developing their estimates. The documents contain information on typical release points from industrial processes and applicable methodologies, which can include calculations such as mass balances or emission factors if emissions are not monitored.

In the mid to late 1990s, EPA conducted over 150 site visits to assist facilities in TRI compliance. EPA contractors visited sites, observed processes, reviewed reports and records, and identified potential reporting errors, omissions, and ways to improve calculations. The results were not used for enforcement purposes. They were used by the facilities to improve reporting and by EPA to identify issues, common errors, and lessons-learned that were subsequently included in training sessions, guidance documents, and other TRI outreach materials. EPA maintains a Web site with useful information and a telephone hotline for questions about the TRI program and the reporting forms.

EPA has developed standardized reporting forms. The program is transitioning from desktop electronic reporting forms to Web-based forms that allow on-line submittal and self-certification of the data. The Web-based forms have enhanced real-time data consistency and completeness checks and automated calculators for the summary section of the report to avoid mathematical errors and ensure consistency with data entered in other sections of the report. These tools enable reporting facilities to reduce errors in the initial report submissions. Paper-based reporting is also allowed, but electronic reporting is strongly encouraged and is used by over 97% of reporters according to the November 2007 ICR supporting statement. Once all data are entered into the database, EPA performs further automated data quality checks, including comparison of data with prior year submissions, and comparison across each industry and among similar size facilities to identify outliers and potential errors. Notices of error are generated through an automated process and sent to facilities, who can then resubmit corrected forms electronically.

In addition to the QA and verification mechanisms, EPA can take enforcement actions against facilities that fail to report or that violate reporting and recordkeeping requirements in the rules. For example, in May 2008 EPA announced a penalty of over $80,000 paid by an electronics facility for failure to submit timely, complete, and correct reports of lead emissions.

2.5 National Emissions Inventory (NEI)

EPA's Air Quality Assessment Division prepares the NEI, which is a national database of air emissions information provided by state and local air agencies, tribes, and industry (to a limited extent). The database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants. Stationary point source emissions that must be inventoried and reported are those that emit over a threshold amount of at least one criteria pollutant. Many states also inventory and report stationary sources that emit amounts below the thresholds for each pollutant. The point source NEI includes over 60,000 facilities. Point source information that is required consists of site information, including facility name, address, and type of industry; process information detailing the types of air pollution emission sources; air pollution emission estimates (including annual emissions); control devices in place; stack parameters; and location information.

EPA ensures the quality of the NEI by establishing a standard electronic reporting format, providing QA software to state and local agencies who submit data, and performing additional electronic QA/QC activities once the data are received by EPA.

Currently, the NEI Input Format (NIF) is the format most widely used by state and local agencies to transfer data to the EPA. QA software for the NIF is available so that the NEI data can be verified by state and local agencies prior to submitting data to EPA. This software was developed

to help the state and local agencies ensure the data prepared for submission meets the minimum input standards required by the NEI. The software can perform two types of QA: format and content. Format checks are divided into two parts: database structure and record requirements. Content checks assess the numerical ranges for emission estimates, stack parameters, and location data.

EPA implements additional verification activities after receiving the data. EPA performs more detailed, automated checks on the data structure, location coordinates, stack parameters, and emissions data. These checks identify inconsistent data, outliers, and other suspect data. EPA provides feedback to the data submitter to resolve issues identified by EPA's verification activities. EPA tracks all communications to help ensure transparency and reproducibility of the NEI. EPA's future plans for the NEI consist of implementation of an even more automated QA system, whereby data submitters receive almost immediate QA feedback upon data transmittal. Despite the improved system, EPA still plans to conduct additional QA/QC analyses on the submitted data. These additional checks are expected to be completed within approximately 2 months after the date of data submittal and will be performed again in future years when new data are submitted and updated versions of the NEI are developed.

Because the data are submitted by state and local agencies and are not used for regulatory compliance purposes, EPA does not conduct site visits or reviews of facility records.

2.6 Inventory of U.S. Greenhouse Gas Emissions and Sinks

The United States submits the greenhouse gas inventory to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) as an annual reporting requirement. The UNFCCC treaty, ratified by the United States in 1992, sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. The U.S. has submitted the greenhouse gas inventory to the United Nations every year since 1993 and has gained a reputation for preparing the highest quality inventory in the world. EPA prepares the annual report in collaboration with experts from multiple federal agencies, including the U.S. Department of Energy, U.S. Department of Agriculture, U.S. Department of Transportation, U.S. Department of Defense, the State Department, and others.

The UNFCCC Secretariat supports the Parties to the UNFCCC, including through collection, internal verification, and review of information and data provided by the Parties. Inventories from each submitting country are reviewed following international guidelines. The initial reviews are carried out by the UNFCCC Secretariat to ensure that each assessment is conducted consistently and in a technically sound manner.

The verification process for national inventory data submitted by the United States and other countries is carried out in three phases. The first two phases rely on internal UNFCCC verification; the third phase involves a more in-depth audit of the inventory. In the first phase, the Secretariat carries out an initial check, which is an automated review that provides immediate quality assurance to verify that the inventory submission is complete and in the correct format as required by the Secretariat. The second phase is a broader automated review that synthesizes and assesses basic inventory information, such as emissions trends, activity data and implied emissions factor for a single country, and then across countries. These verification checks serve to highlight any potential problems with the submitted data and identify outliers. The third stage

of the review is carried out by the Secretariat in cooperation with an independent, international team of experts. This in-depth country-level review may occur in the country subject to the review, or may happen at a centralized location.

3.0 ALTERNATIVE APPROACHES FOR VERIFICATION FOR THE MANDATORY GHG REPORTING RULE

EPA has three basic options for certification and verification of data submitted under the mandatory reporting rule:

1. Facility self-certification and third party verification paid for by the reporting companies.
2. Facility self-certification with EPA verification of submitted data.
3. Facility self-certification with little or no independent verification of submitted data.

Option 1 is the approach taken by several state and international mandatory and voluntary GHG reporting programs, as described in Section 1.0. Third party verification is also required by the OTAQ fuel quality programs, but it is somewhat different from the state GHG reporting programs. OTAQ generally requires reporting of fuel production and product data rather than emissions data. The third party verifications do not require specialized technical knowledge and can be performed by CPAs, so EPA does not have to accredit third party verifiers. Because the audits are simpler and can be performed by CPAs, the cost for reporting facilities to hire auditors is lower than for GHG emissions verification.

Option 2 is used by many major EPA reporting and regulatory programs developed under the Clean Air Act, including the acid rain program, NSPS, NESHAP, and permitting programs. Under these programs, a responsible corporate official signs a certification stating that the information reported is accurate and complete. The EPA and/or state agencies perform verification of reported data, follow-up with facilities on potential errors and discrepancies, and conduct compliance assistance and enforcement activities to ensure accurate reporting.

Option 3 would require a responsible corporate official to sign a certification statement that the information reported is accurate and complete. However, unlike option 2, EPA would rely on this self-certification and would not perform verification of reported data. Because EPA would not try to verify emissions calculations, the facility would not have to submit detailed supporting data for the emissions estimates.

This section presents some issues and considerations associated with the three approaches.

3.1 Self-Certification with Third Party Verification Approach

Under the self-certification with third party verification approach, companies that must report their emissions would be required to hire third party verifiers to conduct the verification activities described in section 1.0. While the reporters would sign a statement (self-certification) that their emission reports are complete and accurate, the third party verifiers would independently certify that the reported emissions are accurate and free of material misstatements. Under this approach, records supporting GHG emissions calculations would be retained at the facility and provided to verifiers, but less of this supporting information would be reported to EPA. (EPA would not need as much detailed supporting data because EPA would not try to

check the emissions calculations. Instead, EPA would rely on the verifiers to identify errors and assure the quality of the reported emissions data.)

If EPA were to implement a third party verification approach, a number of decisions would need to be made. While EPA could build on elements of third party verification systems used in state or international mandatory and voluntary GHG reporting programs, EPA would need to create systems that match the scope and intent of the federal mandatory GHG reporting rule and enable EPA to enforce its requirements. Some program elements EPA would need to consider and develop include:

- Develop specific criteria that applicants must meet to become verifiers.
- Determine the process for accrediting verifiers. (Would EPA do the accreditation, rely on another organization such as ANSI, or accept verifier accreditations from state programs?)
- Establish processes to ensure that verifiers are independent and objective and that they do not have a COI for each facility-level verification they perform.
- Develop and deliver verifier training, both general and for specific source categories.
- Develop or adopt existing verification protocols and tools to ensure consistent approaches.
- Provide for ongoing monitoring of verifiers to ensure verifiers are competent and that required verification procedures are followed.
- Determine which data and methodology information (type and level of detail) must be reported to EPA and which are provided to the verifier and/or retained as records but are not reported.
- Develop requirements for content and submittal of verification statements and reports, and whether they become public information.
- Develop procedures for EPA verification of data. Even if third party verification is done, EPA would still need to review the data and conduct enforcement activities if GHG emissions are misrepresented.

3.2 Self-Certification with EPA Verification Approach

Under this approach a responsible corporate official would sign a certification stating that the information reported is accurate and complete. (Under the Clean Air Act, civil and criminal penalties apply if the certifier knowingly misrepresents or omits required information.) Facilities would be required to report detailed information supporting the GHG emission estimates to EPA so that EPA could perform activities to verify that the reported emissions were correctly calculated and appear accurate. The EPA and/or state agencies would perform extensive verification of reported data, follow-up with facilities to resolve potential errors and discrepancies, and conduct audits, as described in sections 2.2 through 2.4 of this memorandum for similar programs.

If EPA chooses to require companies to self-certify reported data, followed by EPA verification of the data, a number of decisions would need to be made. Many of these decisions would be required regardless of whether third party verification is required, but the approaches will be different if EPA chooses to perform (possibly with state agency assistance) all data verification activities instead of using third party verifiers. Decisions include:

- Determine whether regulated facilities will be *required* to report electronically in a standard format to facilitate data verification or whether other electronic formats or hard copy will be allowed.
- Determine which data and methodology information (type and level of detail) must be reported to EPA versus maintained on-site as records. If third party verification in not done, then EPA would need more detailed reporting of activity data and calculations in order to verify the emissions estimates. However, because GHG emissions are being reported but not regulated, the high level of detail required for EGUs in the acid rain program reports (e.g., hourly data) might not be necessary.
- Develop electronic data QA programs for use by reporters and EPA. As described in section 2 for the acid rain and other EPA programs, this is a primary means of auditing reported data and identifying errors and suspicious data.
- Determine whether EPA and/or states will directly receive reported data and what role state agencies will play in data verification.
- Develop procedures for selecting sample facilities and conducting site visits to observe monitoring procedures, review records, and determine compliance. If third party verification is not used, EPA and/or states would likely want to visit more sites.

3.3 Self-Certification without Independent Verification Approach

Under this option, a responsible corporate official would sign a certification statement that the information reported is accurate and complete. EPA would rely on this self-certification to assure the quality of the reported data and would not perform verification of reported data. Because EPA would not try to verify emissions calculations, the facility would not have to submit detailed supporting data for the emissions estimates. This option is under consideration because the GHG reporting rule will require only reporting of GHG emissions; it will not regulate GHG emissions. Unlike the acid rain program and the NESHAP program, the GHG rule will not require any emissions reductions or contain any emissions limits. The purpose of the GHG reporting is informational and the data will not be used to determine compliance with any emission regulation. Therefore, a less stringent level of verification, and lower data quality, might be acceptable.

Some implications of this option are as follows:

- The reporting costs to facilities would be lower than under the other options because facilities would not have to pay for third party verifiers and they could submit less detailed reports than under approach 2 (self-certification with EPA verification approach). However, facilities would still have to monitor emissions or activity data, perform GHG emission calculations, and keep detailed records supporting the GHG emissions estimates, so they would still experience recordkeeping costs.
- This option would reduce costs for EPA since EPA staff would not be performing verification activities.
- The data quality would be lower than under the other two approaches because of the lack on any independent verification. Given the lower quality, potential inconsistency, and increased uncertainty, the data would be less useful to EPA, Congress, and other agencies in developing future GHG policies and programs. The data could also be less useful to the reporting companies who might wish to develop their own corporate GHG strategies and to the public. As indicated in section 2.1, EPA/OTAQ has found that third party

verification results in numerous corrections to facility-reported fuels data. State and international agencies require GHG emissions verification because they have found that it increases data quality. Similarly, EPA/OAP has found that EPA verification of reported acid rain program data results in EPA sending a large number of error notifications; as a result, many facilities correct and resubmit reports, improving data quality.

3.4 Comparison of the Self-Certification with Third Party Verification Approach Versus the Self-Certification with EPA Verification Approach

If EPA decides that verification of GHG emission estimates by someone other than the reporting facility is needed, EPA will need to decide between the third party verification approach and the EPA verification approach. The following table compares these two approaches in the areas of: consistency with other programs; costs to reporters; reporting schedules; centralization, depth, and consistency of verification functions; types of data to be reported; and COI. Costs considerations for reporters and EPA under both approaches are further discussed in section 4.

Table 2. Comparison of Approaches

Consistency with Other Programs
Self-Certification with Third Party Verification approach: • Is consistent with major state mandatory and voluntary reporting programs and some international programs (e.g., The Climate Registry, CARB mandatory GHG reporting rule, CCAR, and the EU ETS). • However, if EPA elected to require third party verification, EPA would need to develop its own third party verification requirements and protocols for the GHG rule (building on the state programs), because the verification and accreditation requirements are program-specific.
Self-certification with EPA Verification approach: • Is consistent with other EPA emissions reporting programs (e.g. acid rain, TRI, NSPS and NESHAP) and inventories. The EPA/OTAQ fuel programs require third party audits, but they are different from GHG reporting programs. Because the OTAQ audits are conducted by CPAs, EPA does not have to operate an accreditation program. Because the audits are simpler and do not require specialized technical knowledge, costs for reporters to hire auditors are lower than for emissions verification.
Costs to Reporters
Self-Certification with Third Party Verification approach: • Higher costs to reporters due to the need to hire third party verifiers (verification costs might range from $2,000 to $40,000 per facility as detailed in section 4). • These costs could be particularly burdensome for small businesses.
Self-Certification with EPA Verification approach: • Does not impose any costs for hiring verifiers on reporting companies. EPA (in cooperation with state agencies) performs the verification role.
Reporting Schedules
Self-Certification with Third Party Verification approach: • State GHG reporting programs provide four to six months after initial report submittal for third party verification of GHG emissions. If similar time were allowed in the EPA GHG reporting rule, this would delay EPA review and use of the reported data.
Self-Certification with EPA Verification approach: • No time required for third party verification, so no delay in EPA's initiation of verification activities and use of the data.

Table 2. Comparison of Approaches

Centralization and Consistency of Verification Functions
Self-Certification with Third Party Verification approach:
• Would result in more site visits with actual observation and detailed review of more facilities' data management systems, on-site records, and calculations. Third party verifiers spend significant time performing verifications, and under state GHG reporting programs they must visit a sample of each company's facilities. • Potential risk of inconsistent results because verification responsibilities are spread amongst numerous and diverse verifiers. Risk is reduced by developing verification protocols and verifier accreditation programs, but staff experience and company practices are key and will differ over time and among verifiers. Ongoing EPA monitoring of verifiers would be needed. • Price competition, budgets, and increased demand for verification services could create an incentive for reduced quality of verifications. Oversight would be needed. • Because each verifier is focused on specific facilities, and no one is reviewing all the reports from the industry, there is no opportunity for economies of scale, and errors that could be uncovered from big-picture comparisons could be missed.
Self-Certification with EPA Verification approach:
• EPA verification allows use of standardized electronic QA tools, providing consistent verification and taking advantage of economies of scale. Use of sophisticated electronic tools on a single database that contains all reporting facilities allows comparison of data across facilities and sectors, and identifies issues that audits focused on a single facility or company could miss. • Fewer facilities would be visited than under third party verification programs. EPA verification and compliance programs would not have the budget to visit all or most facilities since thousands of facilities will be reporting. • However, EPA can maximize effectiveness of the visits they conduct by targeting facilities based on electronic verification and consistency checks, facility complexity, and program experience. • If EPA includes states in the verification process, additional facilities could be visited by states and EPA could take advantage of state staff knowledge of specific facilities gained through permitting and other air programs.
Types of Data to be Reported
Self-Certification with Third Party Verification approach:
• Could reduce the amount of data that needs to be reported to EPA because the third party verifiers would review records and calculation procedures to determine that reported data are accurate.
Self-Certification with EPA Verification approach:
• EPA would need more detailed reporting of activity data and calculations in order to verify the emissions estimates. • The additional data could result in more industry claims that reported data are CBI. However, EPA has procedures for receipt, handling, and safeguarding CBI data, and receives CBI data under other reporting programs (e.g., the OTAQ fuel programs, TRI, air permitting programs).
Conflict of Interest (COI)
Self-Certification with Third Party Verification approach:
• Under state GHG reporting programs, third party verifiers must make site-specific COI determinations for each company/ facility they audit. EPA will get thousands of notices of COI findings and will need to track these and audit selected determinations to ensure verifiers are impartial and unbiased.
Self-Certification with EPA Verification approach:
• EPA and state agencies are unbiased, so have no COI issues. If EPA uses contactors to assist with verification, it will be only a limited number of companies and EPA already implements stringent COI procedures on its contacts (including regulatory development and enforcement contracts) that ensure its contractors are free of COI.

4.0 COST CONSIDERATIONS

This section discusses the cost burden to the reporting industry and the EPA cost burden for review of reports and verification activities under the self-certification with third party verification approach and the self-certification with EPA verification approach.

4.1 Costs to Reporting Facilities for Data Collection and Reporting under the Self-Certification with Third Party Verification Approach and Self-Certification with EPA Verification Approach

Verification Costs. One obvious cost difference between the self-certification with third party verification approach and the self-certification with EPA verification approach is the need for companies that are reporting emissions to hire third party verifiers. Limited information is publicly available on the costs paid to verifiers because the contracts are private.

For the CARB mandatory reporting rule, a summary of financial and economic analysis prepared by CARB staff includes the cost ranges for third party verification presented in table 3. The cost information used to assemble the table was self-reported by about 20 CCAR facilities based on their approximate costs or estimated by 13 facilities that will be subject to the CARB mandatory rule and responded to a CARB survey. These verification costs should be viewed as rough ranges.

Table 3. Third Party Verification Cost Ranges by Facility Classification

Facility Type	Annual Verification Costs ($)	
	Low	High
Cement Plants	3,000	8,000
Oil Refineries	10,000	40,000
Hydrogen Plants	2,000	5,000
Electricity Generation Facilities	4,000	7,000
Cogeneration Facilities	2,000	8,000
Electric Retail Providers	10,000	40,000
$\geq$25,000 metric ton CO_2 Facilities[1]	1,000	3,000

[1]Includes facilities in any sector with stationary combustion sources that emit at least 25,000 metric tons CO_2/year.

At a Webinar presented by The Climate Registry on April 2, 2008, entitled "Overview of The Registry," the presenter stated that verification costs could range from $5,000 to $12,000 for a midsize manufacturing company with 2 or 3 facilities. During a "Technical Public Workshop" held by The Climate Registry on February 15, 2008, an estimate of $20,000 to $30,000 was mentioned for a typical manufacturing company (the number of facilities was not specified). These ranges are generally consistent with anecdotal information ERG has heard regarding a few companies (some with multiple facilities) that have been verified under the CCAR program.

Other Costs. The cost to industry for gathering data, reporting, and recordkeeping is expected not to differ significantly between the self-certification with third party verification approach and the self-certification with EPA verification approach. The same information collection, monitoring, and GHG emission calculation methodologies and requirements would apply in both

cases. Under the self-certification with EPA verification approach, the reporter would need to report fairly detailed activity data, emission factors, monitoring data, and calculation methodology to EPA; but under the third party verification approach, they would have to report the same data to their verifier, resulting in similar burden. The record retention requirement and costs would be the same under both approaches because in either case, the reporter would need to retain sufficient documentation for another party (EPA and/or a verifier) to recreate the reported GHG emission estimates. The ICR for this rule will provide estimated reporting and recordkeeping costs for typical facilities as well as total national costs to the affected industries.

4.2 Costs to EPA under Self-Certification with Third Party Verification Approach and Self-Certification with EPA Verification Approach

The self-certification with EPA verification approach could be expected to have higher costs for EPA because, without third party verification, EPA would likely want to perform detailed reviews of data handling procedures and methodologies for more individual facilities and would likely conduct a greater number of site visits to perform compliance audits. However, state agencies might conduct some of the verification activities and inspections, which would make use of local facility knowledge state staff have gained through permitting and other air programs, and reduce EPA's costs. Furthermore, as discussed in section 2.2, the costs to EPA can be minimized by requiring standard electronic reporting formats, which reduce data handling time, allow electronic data checks, and enable EPA to better target potential problem facilities for further investigation.

To provide a rough idea of the Agency costs that might be expected for EPA's data review and verification activities, the acid rain program and TRI toxic chemical release ICR supporting statements were reviewed. An ICR will be prepared for the proposed and final GHG reporting rule. Those ICRs will provide detailed estimates of the respondent and Agency costs for the GHG reporting rule incorporating EPA's decisions about which sources must report, the specific data to be reported, the method of reporting, the reporting frequency, and the steps EPA plans to take to develop GHG program reporting tools, perform QA/QC of reported data, conduct audits, and provide compliance assistance.

Agency Costs for Review and Verification of Acid Rain Program Forms. The acid rain program ICR renewal dated April 4, 2006 estimates that EPA review and verification of the quarterly reports require an average of 2 hours of time per report at a labor cost of $54.64/hour. The ICR assumes EPA receives 3,537 emission reports per quarter, for a total of 14,148 reports per year. EPA's total annual hour burden is estimated as 28,296 hours for a cost of $1,546,376. The ICR notes that the relatively low average burden per report reflects increasing familiarity with the program and improved automated tools. Reporting facilities submit the required data directly to an EPA electronic data system. The EPA burden includes time to perform automated electronic checks on the report database, review results, generate and send error notifications to facilities (using and automated process) and follow up on suspicious data. The ICR indicates that 3,429 error notifications are sent each year. The ICR indicates that average burden of 2 hours ($109) per report also includes time for EPA to conduct site visits to perform detailed audits of approximately 10 facilities per year. The ICR does not specify the number of hours required for EPA staff to conduct each site visit (including preparation, conducting the visit, summarizing the results, and taking follow-up actions), but it might be similar to the 30 hours the ICR estimates for facility staff to handle an EPA site audit.

Agency Cost for TRI Reporting Program. The TRI program requires approximately 23,000 reporting facilities to submit annual form R reports, or a form A report if they meet lower threshold requirements. The reports contain estimates of environmental releases of toxic chemicals. A separate form R is needed for each chemical, so many of the facilities fill out multiple form Rs. For those facilities using form A, multiple chemicals can be reported on a single form A. The TRI toxic chemical release reporting ICR supporting statement dated November 15, 2007 estimates EPA receives 66,571 form Rs and 10,255 form As per year. The total annual EPA cost associated with this reporting program is $8,060,000 reflecting 50 full time equivalents (FTE) of EPA labor and other costs (e.g., storage costs). The labor includes 13 FTEs from EPA regional offices. The total EPA costs by type of activity are summarized in Table 4.

Table 4. Agency Cost for TRI Reporting Program

Category of Activity	Annual Cost
Data processing: Entering or uploading data into the database, data quality reviews (conducted electronically), making inquiries to resolve discrepancies, distributing and updating electronic data submissions programs and creating new software, data analysis, data center rent and form storage	$4,700,000
Outreach and training: Telephone hotline, providing technical guidance, delivering training courses, responding to user support requests	$1,100,000
Information dissemination: Public data release, Internet, data access tools	$810,000
Policy and petitions: Analyses to support petitions, revise list of chemicals, rulemaking, review trade secret claims	$1,080,000
Compliance and enforcement: Technical assistance, compliance outreach, facility inspections, enforcement cases	$37,000
Total	$8,060,000
Information in this table is summarized from tables 9 and 10 of the November 15, 2007 TRI Form R Toxic Chemical Release Reporting ICR Supporting Statement	

The EPA data processing portion of the costs ($4,700,000) averages $61.25 for each form R and $59.63 for each form A received. This is based on 97% electronic data submittal (either through the central data exchange or on CD) and 3% hard copy reports. As shown in table 4, data processing (which includes electronic data verification checks, error notices, and other follow-up on inconsistent reports) accounts for over half of these costs. Costs for outreach and training activities are also significant. The total $8,060,000 cost for all EPA activities equates to approximately $105 per form received, which is very similar to the acid rain program (although many of the TRI costs such as training are not directly associated with the number of forms received).

Implications for GHG Reporting Program Costs. For the mandatory GHG reporting rule, many more sources will be reporting than under the acid rain program. Thus, the total EPA burden will be higher even if the per report burden is similar (2 hours or $109 per report). Furthermore, the Agency burden per report for the GHG reporting program is likely to be higher than the acid rain program and the TRI program, at least for the first few years of GHG reporting. A much greater variety of source categories will be reporting than under the acid rain program, and the sources will need to include more detailed data than the TRI forms (e.g., the GHG program will require reporting of process-specific data, CEMS data, or activity data and emission factors which are not required in the TRI forms). For the GHG rule, EPA will likely develop several different

standard reporting formats tailored to the various source categories (e.g., the fields reported would differ between stationary combustion sources, biological process sources, industrial process sources, and mobile source categories). EPA could develop corresponding data checking software for each source category. In addition, many of the reporting sources will be less familiar with the GHG reporting program than the EGUs and TRI reporting sources currently are with the acid rain and TRI programs, so EPA might identify more problems with the reports, increasing the per report costs, at least in the first few years of the program. The costs to the Agency in the first couple years of the program will be higher due to costs to develop and refine software tools and because personnel will have less experience reviewing the data and conducting site audits, leading to more time per report. In subsequent years, system efficiencies would be realized and the Agency burden per report would decline.

The third party verification approach would also incur significant Agency costs, and might not cost much less than the self-certification with EPA verification approach. EPA would need to develop a program for accrediting third party verifiers, develop verifier training, review and approve verifier applications, and perform ongoing surveillance of verifiers. EPA would also need to develop and administer a process to ensure that verifiers hired by the reporting facility do not have COI. In addition, EPA would probably still want to develop electronic software checking tools in order to make comparisons across the full body of data reported by the reporting industries and identify suspect data. Even if a third party verification approach were used, EPA would need to conduct site audits, and accompany verifiers to some sites, to assure that the GHG emissions reporting rule is being properly implemented and to conduct enforcement as necessary. These costs will vary depending on the design of the third party verification program, the data reporting format and level of detail, and the number of audits EPA intends to conduct.

5.0 TYPES OF DATA REQUIRED TO BE REPORTED IF EPA RELIES ON SELF CERTIFICATION WITH EPA VERIFICATION

If EPA performs all verification of reported GHG emissions data rather than relying on third party verifiers, EPA will need to require reporting of sufficient monitoring data and activity data to determine if the reported GHG emission estimates are accurate and to identify sources with data discrepancies, insufficient data, and potential errors for further site-specific investigation. For each facility, emissions data would be needed for each source category at the facility at the level of disaggregation required by the GHG emission calculation protocol (e.g., each unit, process line, etc.) On a unit-by-unit basis, the following types of data would be needed:

- Activity data required to determine emissions of each GHG pollutant.
- Emission factors used for each calculation, and their basis if site-specific rather than default factors are used.
- Calculation methods (tiers) used for each unit and pollutant, and possibly sample calculations unless an automated calculation tool provided by EPA is used.
- Monitoring data if CEMS, flow meters, or other types of monitors are used to determine emissions. EPA will need to decide whether hourly data must be reported or whether summary or aggregated (compiled) data are sufficient, with continuous hourly records kept on site. For example, with a flow meter, it might be possible to require reporting of daily, weekly, or monthly cumulative flow instead of hourly flow, and the hourly records

would be retained on site. The level of summary that is appropriate might depend on the size of the facility, the calculation procedures, and how the data will be used.

- Information on monitor downtime, results of monitor QA checks, methods used to fill data gaps.
- Information on any malfunctions that increased emissions and how these emissions were accounted for in the annual emissions estimate.

The data reported to EPA would be similar to the types of information facilities must provide their verifiers under state GHG reporting programs, as described in section 1.5 (which lists general facility data and source-category specific data provided to verifiers for GHG emission source categories covered by The Climate Registry, CCAR, and the EU ETS programs). Attachment D provides additional details on sector-specific documentation that must be provided to CCAR verifiers for facilities in the power/utilities sector, cement sector, landfill methane offset projects, and livestock biogas offset projects.

For combustion sources, section 2.2 and Attachment E provide details on the data related to CO_2 emission estimates that must be reported, and additional data that must be recorded, under the acid rain program. At a maximum, for combustion sources, data reported under the GHG reporting rule would be the same as reported to EPA's acid rain program (see AttachmentE), but for smaller combustion sources that are not part of the cap and trade program, it is possible that less detail would be sufficient.

Details on the specific activity data and monitoring data for each source category that must be reported cannot be determined until the EPA technical working groups have determined the specific monitoring and GHG calculation methods that the rule will require. A separate memorandum will compile EPA's review of monitoring methods, GHG calculation approaches, and input data required by existing GHG reporting programs and protocols. For some source categories, different methods (tiers) will likely be allowed.

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ATTACHMENT A. SUMMARY OF VERIFIER ACCREDITATION PROCESSES

The CARB Verifier Accreditation process is contained in Section 95132 of the Mandatory Reporting Rule. Those firms seeking to become verifiers must submit an application that contains a listing of staff and qualifications that includes at least 2 lead verifiers, at least 5 total full time staff, $1million liability insurance, evidence of no judicial proceeding in 5 years, demonstrated policies and mechanisms to prevent COI, and demonstrated internal training mechanisms pertaining to verification activities.

Lead verifiers within the firm must submit a separate package that demonstrates the following:

- Successful completion of CARB-approved training; and
- Served as a project manager or in a lead capacity under either CCAR, the UK Accreditation System, or is accredited by a recognized agency for ISO 14064 or ISO 19011, <u>and</u> has performed at least 3 verifications by 12/31/07; <u>or</u>
- Has been a CARB-approved verifier for 2 continuous years and worked on 3 verifications; or
- Has worked as a project manager or lead person for at least 4 years in development of GHG or other air inventories, or as a lead environmental auditor.

Other verifiers (staff other than the lead verifier) must submit a separate qualifications package with academic background and work experience, and must successfully pass the CARB training. Also, there will be separate sector-specific verification requirements.

CCAR has a list of approved verification bodies and lead verifiers, and others may apply to be added, although CCAR is accrediting new verification bodies/lead verifiers for offset projects only. CCAR has discontinued entity verifier accreditation, and now defers to The Climate Registry's process. Those bodies and individuals seeking to become verifiers of GHG offset projects must submit a qualifications package and successfully complete training provided by CCAR.

The Climate Registry Verifier Accreditation. The Climate Registry partnered with the American National Institute of Standards (ANSI) to accredit third party verifiers. A pilot program was initiated in 2008 and ANSI accredited the first batch of verifiers in December 2008. The ANSI certification process ensures consistency with:

- ISO 14065:2007 – Greenhouse Gases – Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition
- ISO 14064-3:2007 – Greenhouse Gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions.
- Specific GHG calculation and reporting requirements of The Climate Registry.

In the future, The Climate Registry expects to partner with similar national standards organizations in Canada and Mexico – the Standards Council of Canada (SCC) and La Entidad Mexicana de Acreditación (EMA) – to perform accreditations in those countries.

A document "Guidance on Accreditation" Version 1.0, May 2008, lays out the accreditation process and criteria, and is briefly summarized in the following paragraphs.

Firms seeking to become verifiers will submit application and qualification packages to ANSI (or other accreditation bodies such as CSS or EMA if partnerships are established in the future). In general, the application packages contain information on the requested scope of accreditation (sectors and work areas), corporate and organizational aspects, relevant activities and office locations, quality management processes and systems, and an agreement to continually comply with program requirements. Application fees must also be paid. ANSI reviews the submittal, conducts site visits to the applicants' facilities to review documents and meet with personnel, and witnesses personnel performing verifications. After evaluation, ANSI makes a determination on accreditation. Lists of accredited verification bodies are periodically published on The Climate Registry Web site. After accreditation, ANSI will perform surveillance to ensure verifiers continue to operate in accordance with accreditation criteria. The Climate Registry has an oversight panel to oversee and monitor the accreditation process implemented by ANSI.

As part of the application for accreditation, verification firms must address key elements of ISO 14065: 2007. Part 4 of the "Guidance on Accreditation" document (version 1.0) contains a summary of ISO requirements for accreditation broken out into the following categories of requirements:

- General (legal, organizational, contractual)
- Impartiality (including avoidance of COI)
- Competency (technical expertise, processes to train and evaluate verification staff, demonstrated competence in performing verifications)
- Deployment and management of personnel
- Communications and records
- Verification processes (conduct verification in accordance with ISO 14064-3:2007)
- Appeal and complaints processes
- Management systems

In addition, applicants must meet listed requirements of The Climate Registry (summarized in Part 5 of the "Guidance on Accreditation"). These include COI requirements, indemnity insurance, and training in The Climate Registry general reporting protocol, verification protocol, and sector-specific issues, techniques for verification, and other listed procedures and systems. Applicants must also have at least two lead verifiers and an independent technical reviewer. They must also meet certain reporting and recordkeeping requirements specified by The Climate Registry.

The ***EU ETS*** does not have a single process for accreditation of verifiers, it varies across member states. Some, such as Ireland, have a national accreditation body. Others (Austria, Denmark, France, Finland, the Netherlands, Sweden, Spain, and the UK) have independent accreditation services that certify the verifiers. In some countries there is an exam. The European Standard EN45011, general requirements for bodies operating product certification systems, and associated European Cooperation for Accreditation (EA) guidance documents provide criteria for accreditation of verifiers and for conducting the verification process. These include EA Guidance For Recognition of Verification Bodies Under EU ETS Directive (January 18, 2005) and EA guidance documents for Verification of Greenhouse Gas Emissions within the UK Emissions Tracking Scheme (EQ-6/01) and Verification of Greenhouse gas Emissions for EU ETS (EA-6/03).

The EA guidance for verifiers enables the Member State to confirm that the verifier has the appropriate organizational controls, independence and impartiality safeguards, and arrangements for ensuring that competent verification teams are deployed to carry out in depth verification of reported emissions in accordance with the processes specified. A verifier should have personnel that meet the requirements of “GHG auditors” and “GHG lead auditors.” These include educational requirements, experience in EMS auditing and verification of environmental data, and formal training on EU ETS, emissions trading, data and information auditing, and performing a verification. GHG Lead Auditor Training Courses with exams and a practical exercise are offered by approved third parties. Lead auditors must also have served as an acting lead auditor for at least three complete verification assessments, and received positive evaluations from the responsible lead auditor. There is a transitional period, because for the initial period of the EU ETS verifications, it was expected that only a small number of individuals could comply with these requirements.

ATTACHMENT B. CCAR VERIFICATION ACTIVITIES CHECK LIST
Copied from CCAR General Verification Protocol, Version 3.0, August 2008

Table 4. Verification Activity Log

Verifier Company:		
California Registry Participant:		
Preparing for Verification	**Date Achieved**	
Bid on a Verification Contract		
Request determination of COI from California Registry		
Negotiate Contract with California Registry Participant		
Notify State of California and California Registry of Planned Verification Activities		
Conduct Kick-off Meeting With Participant		
Plan Verification Activities Based on Participant Characteristics		
Core Verification Activities		
Identify Emission Sources	**Date Achieved**	
Identify and list all facilities in the entity		
Identify and list all emission sources (indirect, mobile, stationary, process and fugitive)		
Identify and list all fuel types		
Rank all sources by magnitude on a carbon dioxide equivalent basis		
Assess any changes in geographic and organizational boundaries		
	Yes	**No**
1. Does the GHG emissions report include all processes and facilities under the management control of the participant?		
2. Does the report include all sources of GHG emissions within the geographic and organizational boundaries of the participant?		
3. Does the report include all applicable types of GHGs from each emission source within the geographic and organizational boundaries of the participant?		
4. Have any mergers, acquisitions, or divestitures occurred during the current reporting year?		
5. Have any activities been outsourced in the current year?		
6. If a baseline has been specified, has it been adjusted accordingly?		
7. Does the GHG emissions report include all processes and facilities under the management control of the participant?		
Review Methodologies and Management Systems	**Date Achieved**	
Evaluate procedures and systems for preparing emissions report		
Evaluate personnel and training for preparing emissions report		
Consider the uncertainty associated with methodologies and management systems		
	Yes	**No**
8. Are appropriate calculation methodologies/procedures used to manage GHG emissions at the source level? Are they appropriate given the uncertainty/risk associated with the emissions?		
9. Are appropriate methods used to manage and implement entity-wide GHG emissions reporting programs?		
10. If the participant has more than one facility, is the emissions data correctly aggregated and monitored?		
11. Is someone responsible for managing and reporting GHG emissions?		
12. Is that person qualified to do so?		
13. Is appropriate training provided to personnel assigned to GHG emissions reporting duties? If the participant relies on external staff to perform required activities, are the contractors' qualified to undertake such work?		
14. Are appropriate documents created to support and/or substantiate activities related to GHG emissions reporting activities, and is such documentation retained appropriately?		
15. Are appropriate mechanisms used to measure and review the effectiveness of GHG emissions reporting programs? For example, are policies, procedures, and practices evaluated and updated at appropriate intervals?		

Table 4. Verification Activity Log

16. Does the system account for the diversity of the sources that comprise each emission category? For example, are there multiple types of vehicles and other transportation devices that require different emission estimation methodologies?		
17. Do you know the diversity of GHGs emitted from each emission source category?		
18. Has the participant used the default emission factors and standardized estimation methods in the California Registry's General Reporting Protocol to calculate emissions in each source category?		
19. Has the participant or its technical assistance provider developed estimation methods independently?		
20. If participant uses alternative emission factors, are they documented and explained appropriately?		
21. Does the participant's GHG management system appropriately track emissions in all of the emission source categories?		
Assess Risk of Material Misstatement Associated with Management Systems/Procedures	**Date Achieved**	
Develop sampling procedures for sources based on risk of material misstatement		
Verify Emission Estimates		
Confirm total fuel consumption		
Confirm vehicle miles traveled		
Confirm that appropriate emission factors are used. If not default factors, ensure the derivation and explanation of increased accuracy is properly documented		
Calculate direct (mobile, stationary, process & fugitive) & indirect emissions based on sampling procedures		
Compare estimates from sample calculations to reported emissions		
Determine if there are any discrepancies between sample calculation and reported emissions		
Confirm that all material GHG emissions are included (that all emissions not included are either de minimis or not required)		
Determine if Discrepancies are Material or Immaterial	**Yes**	**No**
22. Based on the following table, have you visited an appropriate number of sites?		

Total Sites	Minimum Sample Size
2-10	30%
11-25	20%
26-50	15%
51-100	10%
101-250	5%
251-500	3%
501-1,000	2%
Over 1,000	1-2%

Total number of sites:_____
Total number visited:_____

23. Are the reported electricity, steam, and district heating and cooling use consistent with utility bills?		
24. Is the reported total stationary fuel use by fuel type consistent with the fuel use records?		
25. Is the reported total consumption of fuels in motor vehicles consistent with available documentation and by vehicle type? If the entity calculates transportation emissions based on vehicle mileage, is the reported vehicle mileage consistent with vehicle mileage records?		
26. Is the reported process and fugitive emissions consistent with activity data or maintenance records?		
27. Are the emission factors used by the participant appropriate? If California Registry default factors are not used, ensure that alternative emission factors provide increased accuracy and that the derivation and explanation of increased accuracy is properly documented and reasonable.		
28. Does a sample of the participant's calculations agree with your re-calculated direct (mobile, stationary, process & fugitive) & indirect emissions estimates? Have you documented your process for determining the appropriate sampling plan?		
29. Are all material GHG emissions included? Are all emissions that are considered de minimis emissions documented as such?		
30. Are the current year's reported emissions significantly different from the prior year?		
31. Has the accumulated change in reported emissions, since the last baseline update, changed by more than 10%? If so, has the baseline, if any, been recalculated?		

Table 4. Verification Activity Log

32. Are discrepancies between your emissions estimates and the participant's immaterial?		
Completing the Verification Process	**Date Achieved**	
Prepare a detailed Verification Report and submit to participant		
Prepare a Verification Opinion and submit to participant		
Conduct exit meeting with participant to discuss Verification Report & Opinion		
Provide records to participant for retention		

ATTACHMENT C. THE CLIMATE REGISTRY OPTIONAL VERIFICATION ACTIVITIES CHECKLIST

[Copied from The Climate Registry "General Verification Protocol" Version 1.0, May 2008, Appendix B1: Guidance for Completing Verification Activities (Optional)]

Verification Activities Check List		
Preparing for Verification	**Date Achieved**	
Bid on a Verification Contract		
Submit Case-Specific COI Assessment Form to Registry		
Negotiate Contract with Reporter		
Notify Accreditation Body and the Registry of Planned Verification Activities		
Conduct Kick-off Meeting With Reporter		
Develop Verification Plan		
Verification Activities **Assessing Conformance with the Registry's Requirements**	**Yes**	**No**
1. Is the Reporter a legal entity under U.S., Canadian or Mexican law?		
2. Is the Reporter a subsidiary of any other company, and if so is the parent company also reporting to the Registry?		
3. If the Reporter is submitting a transitional report, is the Reporter eligible to do so?		
4. If the Reporter has used any simplified estimation methods not prescribed in the General Reporting Protocol, do the emissions estimated using these methods constitute 5% or less of the Reporter's total emissions?		
5. If the answer to Question 4 is yes, are the simplified methods used appropriate, and are the results reasonable?		
6. Have any mergers, acquisitions, or divestitures occurred during the current reporting year?		
7. Have any activities been outsourced or insourced in the current year?		
8. Have any changes in calculation methods or data sources been made since the base year?		
9. If the answer to any of Questions 6, 7, and/or 8 is yes, would the cumulative effect of the mergers, acquisitions, divestitures, outsourcing, insourcing, and methodological changes on base year emissions exceed 5%?		
10. If the answer to Question 9 is yes, has the Reporter adjusted base year emissions?		
11. Has the Reporter provided all required emissions data?		

Verification Activities		
Assessing Completeness of Emission Report	**Date Achieved**	
Identify and list all Facilities in the Entity		
Identify and list all Emission Sources (of Scope 1 Mobile, Scope 1 Stationary, Scope 1 Process, Scope 1 Fugitive, Scope 2, Direct Biogenic CO_2 Mobile, and Direct Biogenic CO2 Stationary Emissions)		
Identify and list all Fuel Types		
Rank All Sources by Magnitude on a CO2e Basis		
Assess Any Changes in Geographic and Organizational Boundaries		
	Yes	**No**
12. [For Reporter's using the equity share approach] Does the emission report include all processes and facilities for which the Reporter holds an equity share? If not, why?		
13. [For Reporter's using the financial control approach] Does the emission report include all processes and facilities under the financial control of the Reporter? If not, why?		
14. [For Reporter's using the operational control approach] Does the emission report include all processes and facilities under the operational control of the Reporter? If not, why?		
15. Does the report include all facilities and sources of GHG emissions within the geographic boundaries of the Reporter? Or, if the Reporter is a Transitional Reporter, does the report include all facilities and sources within the states, provinces, and or native soverign nations that the Transitional Reporter has chosen?		
16. Does the report include all applicable types of GHGs from each facility and emission source within the geographic and organizational boundaries of the Reporter? Or, in the case of Transitional Reporters, does the report include all emissions of the GHGs that the Reporter has chosen to report (and, at a minimum, CO2) from each facility and emission source within the geographic and organizational boundaries of the transitional Reporter?		
17. Has the reporting entity included all of its Scope 1 and Scope 2 emissions for each facility?		
18. Have the Scope 1 emissions been broken down by source type (stationary combustion, mobile combustion, fugitive and process)?		
19. Have biogenic CO_2 emissions been reported separately from the Scope 1 emissions?		
Performing Risk Assessment Based on Review of Information Systems and Controls	**Date Achieved**	
Evaluate Procedures and Systems for Preparing Emission Report		
Evaluate Personnel and Training		
Assess if the uncertainty associated with methodologies and management systems is more than appropriate		

	Yes	No
20. Are the calculation methodologies/procedures used to compute GHG emissions at the source level among those described in the General Reporting Protocol? If not, why?		
21. If a non-GRP methodology has been used because the General Reporting Protocol does not provide any methodology for the particular source(s) in question, is the methodology that was used an industry standard for this source type(s)?		
22. Are appropriate methods used to manage and implement entity-wide GHG emissions reporting programs? If the Reporter has more than one facility, is the emissions data correctly monitored?		
23. Is a qualified individual responsible for managing and reporting GHG emissions?		
24. Is appropriate training provided to personnel assigned to GHG emissions reporting duties? If the Reporter relies on external staff to perform required activities, are the contractors' qualified to undertake such work?		
25. Are appropriate documents created to support and/or substantiate activities related to GHG emissions reporting activities, and is such documentation retained appropriately? For example, is such documentation maintained through reporting plans or procedures, utility bills, etc.?		
26. Are appropriate mechanisms used to measure and review the effectiveness of GHG emissions reporting programs? For example, are policies, procedures, and practices evaluated and updated at appropriate intervals?		
27. Does the system account for the diversity of the sources that comprise each emission category? For example, are there multiple types of vehicles and other transportation devices that require different emission estimation methodologies?		
28. Do you know the diversity of GHGs emitted from each emission source category?		
29. When available, has the Reporter used the emission factors, GWPs and standardized estimation methods in the Registry's General Reporting Protocol to calculate emissions in each source category?		
a. Are the methodologies, data sources and emission factors documented and explained appropriately?		
b. Has the Reporter correctly documented the General Reporting Protocol's tier ranking for each General Reporting Protocol methodology used?		
30. Does the Reporter's GHG management system appropriately track emissions in all of the emission source categories?		

Developing a Sample Plan	Date Achieved
Develop Sampling Procedures for Sources Based on Risk of Material Misstatement	

	Yes	No
31. Based on the following table, have you visited an appropriate number of sites?		

Sample Size

Total Facilities	Guidance for Sample Size
1-3	1
4-10	2
11-25	3
26-50	6
51-100	8
101-250	12
251-500	15
500-1,000	20
Over 1,000	2%

Total number of facilities:_____

Total number of facilities visited:_____

Verifying Emissions Estimates Against Verification Criteria	Date Achieved
Confirm Total Fuel Consumption	
Confirm Vehicle Miles Traveled	
Confirm that appropriate Emission Factors are Used. If not Default Factors, ensure the Derivation and Explanation of increased Accuracy is properly Documented	
Calculate Scope 1 (Mobile, Stationary, Process & Fugitive), Scope 2, and Direct Biogenic CO_2 (Mobile and Stationary) Based on Sampling Procedures	
Compare Estimates from Sample Calculations to Reported Emissions	
Determine if There are Any Discrepancies Between Sample Calculation and Reported Emissions	
Determine if any reporting errors have caused material misstatements	

	Yes	No
32. Are the reported electricity, steam, and district heating and cooling use consistent with utility bills?		
33. Is the reported total stationary fuel use by fuel type consistent with the fuel use records?		
34. Is the reported total consumption of fuels in motor vehicles consistent with available documentation and by vehicle type? If the entity calculates transportation emissions based on vehicle mileage, is the reported vehicle mileage consistent with vehicle mileage records?		
35. Is the reported process and fugitive emissions consistent with activity data or maintenance records?		
36. Are the emission factors used by the Reporter appropriate?		
a. If Registry default factors are not used, do the alternative emission factors provide increased accuracy?		
b. Is the derivation and explanation of increased accuracy properly documented and reasonable?		
37. Does a sample of the Reporter's calculations agree with your re-calculated Scope 1 (mobile, stationary, process & fugitive), Scope 2, and Direct Biogenic CO_2 (Mobile and Stationary) emissions estimates? Have you documented your process for determining the appropriate sampling plan?		
38. Are all required GHG emissions included?		
39. Are the current year's reported emissions significantly different from the base year? If so, what has changed from the base year?		
40. Are discrepancies between your emissions estimates and the Reporter's immaterial?		
Completing the Verification Process Date Achieved	**Date Achieved**	
Prepare a Detailed Verification Report & Submit to Reporter		
Prepare a Verification Statement & Submit to Reporter		
Conduct Verification Meeting with Reporter to Discuss & Finalize Verification Report & Statement		
Communicate Verification findings to the Registry via CRIS		
Retain Relevant Verification Documents & Records		

ATTACHMENT D. CCAR LIST OF DOCUMENTS/DATA THAT MUST BE PROVIDED TO VERIFIERS FOR THE POWER/UTILITY SECTOR, CEMENT SECTOR, LANDFILL METHANE REDUCTION OFFSET PROJECTS, AND LIVESTOCK BIOGAS OFFSET PROJECTS

D. 1 Power/Utility Sector

Power/Utility Reporting and Certification Protocols – These protocols require that a power/utility source report their total California direct and indirect emissions, although CCAR recommends reporting at the sub-entity (i.e., business level or facility) level to ensure transparency and facilitate easy of certification. The types of documents and data to be reviewed by the certifier during the power/utility certification process, in addition to those to be provided according to the General Reporting Protocol, are listed below.

Table D1. Documents/Data to be Provided by Source During Certification – Power/Utility Sector

Identifying Emission Sources	
Emission Source Inventory	CARROT report List of facility permits Facility plot plans showing direct emission sources Process flow diagrams Fuel purchases records, by fuel type State emission inventory reports U.S. EPA Acid Rain program reports
Organizational, Operation and Geographic Boundaries	List of emission sources, including stationary, mobile, fugitive and process sources Security and Exchange Commission (SEC): Form 10k Federal Energy Regulatory Commission (FERC): Form 1 (Annual Report of Major Electric Utility) and Form 2 (Major Natural Gas Pipeline Annual Report) EIA Forms 176, 191, 412, 423, 767, 857, 860, 861, 906, 920 State Public Utility Commission filings Corporate annual reports Map of operations
Understanding Management Systems and Methodologies	
Data Management Systems	Location of any centralized or decentralized data collection system Type of management system and parameters tracked Data acquisition and handling system
Training	Monitoring plan
Methodologies	Protocols used (if in addition to the PUP) Quality Assurance/Quality Control plans for CEMs

Table D1. Documents/Data to be Provided by Source During Certification – Power/Utility Sector

Verifying Emission Estimates	
Direct Emissions from Stationary Combustion	FERC Form 1 EIA forms Electronic data reports Data acquisition and handling system Relative accuracy test audit results Accuracy test results for fuel flow monitors Fuel meter data, and calibration and maintenance records Electric generation data (MWh) Steam general data (Mlbs) Air permits State and federal inventory reports Emission factors or protocols (in addition to GRP and PUP)
Direct Emissions from Fire Suppression Equipment	Fire suppression purchase records Emission factors or protocols (in addition to GRP and PUP)
Direct Fugitive Emissions from Handling and Storage of Solid Fuels	Coal purchase records Biomass purchase records Emission factors or protocols (in addition to GRP and PUP)
Direct Emissions from Process Activities	SO_2 scrubber installation and operation records Calcium carbonate purchase records Emission factors or protocols (in addition to GRP and PUP)
Direct Fugitive Emissions from Electricity Transmission and Distribution	State and federal inventory reports EPA SF_6 annual reporting form Transmission/substation maintenance and installation logs SF_6 activity logs SF_6 sales and recycling records Emission factors or protocols (in addition to GRP and PUP)

Adapted from Table 1 "Documents to be Reviewed During Certification Activities" in CCAR Power/Utility Certification Protocol, Version 1, April 2005.

D.2 Cement Sector

Cement Reporting and Certification Protocols – These protocols require that cement companies report their total California direct and indirect emissions, although CCAR recommends reporting at the sub-entity (i.e., business level or facility) level to ensure transparency and facilitate easy of certification. The types of documents and data to be reviewed by the certifier during the cement company certification process, in addition to those to be provided according to the General Reporting Protocol, are listed below.

Table D2. Documents/Data to be Provided by Source During Certification – Cement Sector

Identifying Emission Sources	
Emission Source Inventory	CARROT report Facility permits Facility plot plans showing direct emission sources Process flow diagrams Fuel purchases records by fuel type State emission inventory reports U.S. EPA Acid Rain reports
Organizational, Operational and Geographic Boundaries	Security and Exchange Commission forms Corporate annual reports Map of operations
Understanding Management Systems and Methodologies	
Data Management Systems	Local of centralized or decentralized data collection system Type of management system and parameters tracked Data acquisition and handling system
Training	Monitoring plan
Methodologies	Protocols used (if in addition to the GRP and Cement Protocol) Clinker or cement production tracking systems Quality assurance/quality control plans for CEMs
Verifying Emission Estimates	
Direct Emissions from Stationary Combustion	Electronic data reports Data acquisition and handling system Relative accuracy test audit results Accuracy test results for fuel flow monitors Fuel meter data, and calibration and maintenance records Electric general data (MWh) Steam generation data (Mlbs) Air permits State and federal inventory reports Emission factors or protocols (in addition to GRP and Cement Protocol)
Direct Emissions from Process Activities – Calcination of Raw Material to Produce Clinker	PCA annual energy and labor survey Internal clinker and cement production records Clinker and cement sales records Clinker stock changes Raw material input data regulatory air quality compliance documents
Direct Fugitive Emissions from Fire Suppression Equipment	Fire suppression purchase records Emission factors or protocols (in addition to GRP and Cement Protocol)
Direct Fugitive Emissions from Handling and Storage of Solid Fuels	Coal purchase records Biomass purchase records Emission factors or protocols (in addition to GRP and PUP)

Adapted from Table 1 "Documents to be Reviewed During Certification Activities" in CCAR Cement Certification Protocol, December 2005.

D.3 Landfill Methane Reduction Offset Projects

Landfill Project Reporting and Verification Protocols – Landfill project developers provide the following information to CCAR to inform the Registry of their intent to register emission reductions from a specific project.

- Form 1 – General Information:
  - Date of data collection
  - Form completed by (name)
  - Name of landfill
  - Address (including county)
  - Type of landfill (sanitary, controlled, open dump)
  - Landfill size (designed area for waste placement in acres or hectares)
  - Waste in place (cubic meters or tons)
  - Designed landfill capacity (cubic meters or tons)
  - Year landfill opened
  - Year landfill closed or estimated date of closure
  - Approximation of percent each type of waste (municipal, industrial, inert)
  - Average annual quantity of waste accepted at landfill (cubic meters or tons)
  - Description of any regulatory framework for landfill methane capture and control. Estimate of the date which the landfill will meet or exceed the 50 Mg/year threshold of calculated NMOC emissions per NSPS/Effluent Guidelines and type of testing that justifies the estimate (i.e., Tier 1 or Tier 2 NMOC emission rate estimates)
  - Description of local and state air and water quality, explosive gas, or other regulations pertinent to the project
  - Description of waste picker and recycling activities
  - Waste Characteristics. Estimated percentage for each type of waste: food waste, garden and park waste, wood, paper and textiles, plastics, concrete, metal, other inert waste
- Form 2: Pre-Existing Landfill Gas control System Information
  - Type of existing landfill gas collection and control system in place, if any (e.g., flare, energy recovery, etc.):
    - If landfill gas system is in place, is the system actively collecting or passively venting gas?
    - If flare or energy project is in place, what is the landfill gas flow rate (in scfm) and methane content?
    - Supply a copy of the as-built drawings for the existing system.
    - Name of system designer, address, and other contact information
  - When was system installed and operational?
- Form 3: Landfill Gas Utilization Information
  - Type of landfill gas utilization (e.g., flared, generation of electricity, etc.)
  - When was the system installed and operational?
  - If designed to generate electricity:
    - Type of engine-general set (e.g., internal combustion engine, micro turbine, fuel cell with name of manufacturer, model, power output rating [kW, MJ] for biogas, and nominal voltage)

        - Pretreatment of landfill gas (e.g., none, condensate trap, dryer, etc., with names of manufacturers, models, etc.)
        - Exhaust gas emission control (e.g., none, catalytic converter, etc.)
        - If interconnected with an electric utility, then provide name of utility and type of contract (e.g., sell all/buy all, surplus sale, or net metering)
        - If engine-generator set waste heat utilization, then describe heat source (e.g., cooling system or exhaust gas or both) and heat recovery capacity (BTU or kJ/hour)
    - If designed to use on-site as a boiler or furnace fuel, then describe the boiler or furnace including manufacturer, model, and rated capacity (BTU or kJ/hour)
    - If designed for landfill gas sale to a third party, then describe the method of processing, transport, and end use.

The following information must be provided by project developers for purposes of verification, and must be kept on site for a minimum of 5 years after the project is verified.

- System Information:
    - Relevant sections of the landfill operating permits (solid waste, air, water)
    - Project developer attestation to compliance with regulatory requirements relating to landfill gas project
    - Collection and control device information (installation dates, equipment list, etc.)
    - LFG flow meter information (model number, serial number, calibration procedures), and flow meter calibration data for each flow meter
    - Combustion device monitor information (model number, serial number, calibration procedures), and monitor calibration data for each combustion device
    - Methane monitoring information (model, serial number, calibration procedures) and monitor calibration data for each monitor
    - LFG flow data for each flow meter
    - Methane monitoring data for each monitor
    - CO_2e monthly, and annual tonnage calculations
    - Copies of the results of the NSPS/EG Tier 1 and/or Tier 2 NMOC emission rate estimates and projected date when the system start-up will be required by NSPS
    - Initial and annual verification records and results
- Calibrated Portable Gas analyzer Information:
    - Date, time, and location of methane measurements
    - Methane content of LFG (% by volume) for each measurement
    - Methane measurement instrument type and serial number
    - Date, time, and results of instrument calibration
    - Corrective measures taken if instrument does not meet performance specifications

D.4 Livestock Biogas Offset Projects

Livestock Project Reporting and Verification Protocols – Livestock project developers provide the following information to CCAR to inform the Registry of their intent to register emission reductions from a specific project.

- Form 1 – General Information:
    - Name of operation
    - Address (including county)
    - Latitude/longitude of project (degrees, minutes, seconds)
    - Description of the type of operation (e.g., dairy, swine, etc.)
    - If dairy, then provide:
        - Breed (e.g., Holstein, Guernsey, etc.)
        - Average number of lactating cows
        - Average number of dry cows
        - Average number of replacements
        - Respective fraction of the manure from the milking herd, dry cows, and replacements collected for digestion
        - Types(s) of manure collection systems (e.g., scrape, flush, etc.) and frequency of manure collection
    - If swine, then provide:
        - Type of swine operation (e.g., farrow-to-wean, farrow-plus-nursery, etc.)
        - Average number of sows and pregnant gilts and number of litters per sow-year
        - Average number of nursery pigs and number of nursery stage cycles per year
        - Average number of feeder pigs and number of grow/finish cycles per year
        - Type(s) of manure collection systems (e.g., flush, pull-plug pit, etc.) and frequency of manure collection
    - For animal operations other than those listed above:
        - Number and ages of animals
        - Type of manure collection system
    - Diagrammatic representation of the waste management system existing on the project site prior to project implementation
    - Characterize the anaerobic waste handling system(s) with respect to the specifications provided in the Natural Resources Conservation Service Conservation Practice Standard Waste Treatment Lagoon, No. 359, and/or Conservation Practice Standard, Waste Storage Facility, No. 313
    - Summary of permits obtained to build and operate the baseline anaerobic waste handling system
    - Is project required by any federal, state, or local regulations?
    - When did project first commence operation, or when is the project expected to commence operation?
    - What version or publication date of the Livestock Project Reporting Protocol is the project documentation based on?
    - Has a detailed monitoring plan been developed for this project? If not, what date will a monitoring plan be in place?
    - Have any vintage reduction tons from the project ever been registered with or claimed by another registry or program, or sold to another third party prior to submitting the project to the [Climate Action] Reserve? If yes, then reporter must complete a “Project Transfer” form.
- Form 2: Biogas Control System Information
    - Type of digester (e.g., mixed, plug-flow, attached film, etc.)
    - Name of system designer, address, and other contact information

- Digester design assumptions
    - Number and type of animals
    - For lactating cows, average live weight or average mile production
    - For swine, type(s) (e.g., gestating sows, lactating sows, etc.), and average live weight
    - Manure volume (ft^3/day or m^3/day)
    - Wastewater volume (ft^3/day or m^3/day) (e.g., none, milking center wastewater, confinement facility wash-down, etc.)
    - Other waste volume(s) (ft^3/day or m^3/day) (e.g., none, food processing wastes, etc.)
    - Pretreatment before digestion (e.g., none, gravity setline, stationary screen, etc.)
    - Treatment of digester effluent (e.g., none, solids separation by screening, etc., with details including use or method of disposal)
    - Method of digester effluent storage (e.g., none, earthen pond, etc.)
- Physical description
    - General description including types of construction materials (e.g., below grade, concrete channel plug-flow, etc.)
    - Dimensions (length and width, or diameter and height or depth)
    - Types(s), location(s),, and thickness(es) of insulation
    - Operating volume and ancillary biogas storage volume if present
    - Design hydraulic retention time
    - Design operating temperature
    - Compliance (yes or no) with applicable NRCS Conservation Practice Standard (No. 365/366)
- Description of pertinent local and state air and water quality regulations
- Summary of permits obtained to build and operate the biodigester waste handling system

• Form 3: Biogas Utilization Information:
- Describe biogas utilization (e.g., none, generation of electricity, etc.)
- If designed to generate electricity, then describe:
    - Type of engine-general set (e.g., internal combustion engine, micro turbine, fuel cell with name of manufacturer, model, power output rating [kW, MJ] for biogas, and nominal voltage)
    - Component integration (factory or owner)
    - Origin of equipment controller (e.g., manufacturer integrated, third party off-the-shelf, etc.)
    - System installer
    - Pretreatment of biogas (e.g., none, condensate trap, dryer, etc., with names of manufacturers, models, etc.)
    - Exhaust gas emission control (e.g., none, catalytic converter, etc.)
    - If interconnected with an electric utility, then provide name of utility and type of contract (e.g., sell all/buy all, surplus sale, or net metering)
    - If engine-generator set waste heat utilization, then describe heat source (e.g., cooling system or exhaust gas or both) and waste heat utilization (e.g., digester heating, water heating, space heating, etc.)
- If designed to use on-site as a boiler or furnace fuel, then describe the boiler or furnace including manufacturer, model, and rated capacity (BTU or kJ/hour)

- If designed for biogas sale to a third party, then describe the method of processing, transport, and end use.

No other specific reporting requirements are stipulated in the livestock project reporting protocol.

ATTACHMENT E. DATA THAT MUST BE REPORTED AND RECORDED UNDER THE ACID RAIN PROGRAM

Part 75 Recordkeeping and Reporting Requirements for CO_2

Under the acid rain program, facilities are required to submit quarterly reports to demonstrate ongoing compliance with the Part 75 emission limits. Quarterly reports include data and information collected under the general recordkeeping and monitoring plan procedures, and by certification and QA/QC activities. Table E1 summarizes the quarterly report contents including reporting of CO_2 emissions and the data used to determine CO_2 emissions for facilities using CEMS and facilities using alternative methods including Appendix G methods and the low mass emissions (LME) CO_2 estimation methodology instead of CEMS.

The recordkeeping requirements for CO_2 emissions are found in the provisions for general recordkeeping (40 CFR 75.57 and 75.58), the monitoring plan (40 CFR 75.53), and for certification, quality assurance, and quality control procedures (40 CFR 75.59). Table E2 summarizes the general recordkeeping requirements for operating parameters, CO_2 emissions monitoring systems, and alternative methods for estimating CO_2 emissions. Table E3 shows the records that are contained in the electronic and hardcopy portions of the monitoring plan.

In addition, the provisions for certification, QA, and QC procedures (40 CFR 75.59) specify very detailed recordkeeping requirements for the following types of QA/QC activities:

- Daily and 7-day calibration error tests and all off-line calibration demonstrations;
- Daily interference checks for each flow monitor;
- Linearity checks;
- Leak checks;
- Relative accuracy test audits; and
- Cycle time test.

Table E1. Summary of Quarterly Report Contents

Method of Compliance	Data and Information
CEMS	• Facility identification information (e.g., Facility/ORISPL number; reporting period, electronic data reporting format); • Certification, quality assurance, and quality control information and data (e.g., calibration tests; linearity checks, relative accuracy test audits); • Hourly emissions data and supporting information collected under the monitoring plan, recordkeeping, and certification and QA/QC provisions; • CO_2 emissions for quarter and cumulative for calendar year (tons); • Total heat input (mmBtu) for quarter and cumulative heat input for calendar year; • Unit or stack or common pipe header operating hours for quarter and cumulative unit or stack or common pipe header operating hours for calendar year.
Appendix G (combustion-related and sorbent-related emissions	• Date; • Daily combustion-formed CO_2 mass emissions (tons/day); • Flag indicator and adjustment value when the optional procedure to adjust combustion-formed CO_2 mass emissions for carbon retained in fly ash has been used (for coal-fired units); • Daily sorbent-related CO_2 mass emissions (tons/day) if controls generating CO_2 are used; and • Total daily CO_2 mass emissions from combustion-formed and sorbent-related emissions, if applicable (tons/day).
All LME units	• Date and hour; • Unit operating time; • Fuel type; • Hourly CO_2 mass emissions (tons); • Hourly calculated unit heat input in mmBtu; • Hourly unit output in gross load or steam load; • The method of determining hourly heat input: unit maximum rated heat input, unit long term fuel flow or group long term fuel flow; • Control status of the unit; and • Base or peak load indicator (as applicable); and • Multiple fuel flag.
Same as above(2) Low mass emission units using the optional long term fuel flow methodology to determine unit heat input shall report for each quarter:	• Type of fuel; • Beginning date and hour of long term fuel flow measurement period; • End date and hour of long term fuel flow period; • Quantity of fuel measured; • Units of measure; • Fuel GCV value used to calculate heat input; • Units of GCV; • Method of determining fuel GCV used; • Method of determining fuel flow over period; • Monitoring-system identification code; • Quarter and year; • Total heat input (mmBtu); and • Operating hours in period.

Table E2. General Recordkeeping Requirements

Method of Compliance	Hourly Records
Operating parameters	• Date and hour; • Unit operating time; • Hourly gross unit load; • Operating load range (hourly gross load of 1 to 10) • Hourly heat input rate (mmBtu/hr); • Identification code for formula used for heat input; and • F-factor for heat input calculation and indication of whether the diluent cap was used for heat input calculations for the hour (for CEMS units only).
CEMS	• Component-system identification code; • Date and hour; • Hourly average CO_2 concentration (%); • Hourly average volumetric flow rate (scfh); • Hourly average moisture content of flue gas (percent), where CO_2 concentration is measured on a dry basis; • Hourly wet- and dry-basis oxygen readings (% O_2) where the continuous moisture monitoring system consists of wet- and dry-basis oxygen analyzers; • Hourly average CO_2 mass emission rate (tons/hr); • Percent monitor data availability for the CO_2 and moisture monitoring systems (%); • Method of determination for hourly average CO_2 mass emission rate and hourly average CO_2 concentration, and for the hourly average moisture percentage (if applicable); • Identification code for emissions formula used to derive hourly average CO_2 mass emission rate; and • Indication of whether the diluent cap was used for CO_2 calculation for the hour.
Appendix G (combustion-related and sorbent-related emissions)	• Date; • Daily combustion-formed CO_2 mass emissions (tons/day); • Flag indicator and adjustment value when the optional procedure to adjust combustion-formed CO_2 mass emissions for carbon retained in fly ash has been used (for coal-fired units); • Daily sorbent-related CO_2 mass emissions (tons/day) if controls generating CO_2 are used; and • Total daily CO_2 mass emissions from combustion-formed and sorbent-related emissions, if applicable (tons/day).
All Low Mass Emission (LME) units	• Date and hour; • Unit operating time; • Fuel type; • Hourly CO_2 mass emissions (tons); • Hourly calculated unit heat input in mmBtu; • Hourly unit output in gross load or steam load; • The method of determining hourly heat input: unit maximum rated heat input, unit long term fuel flow or group long term fuel flow; • Control status of the unit; and • Base or peak load indicator (as applicable); and • Multiple fuel flag.

Table E2. General Recordkeeping Requirements

Method of Compliance	Hourly Records
LME Units using the optional long term fuel flow methodology to determine unit heat input	• Type of fuel; • Beginning date and hour of long term fuel flow measurement period; • End date and hour of long term fuel flow period; • Quantity of fuel measured; • Units of measure; • Fuel GCV value used to calculate heat input; • Units of GCV; • Method of determining fuel GCV used; • Method of determining fuel flow over period; • Monitoring-system identification code; • Quarter and year; • Total heat input (mmBtu); and • Operating hours in period.

Table E3. Monitoring Plan Records

Monitoring Plan Component	Recorded Information
Electronic portion	• Facility information (e.g., EIA and EPA ID numbers, boiler type, fuel type, hourly heat input capacity); • Identification of monitoring methodology; • Program information (e.g., program(s) for which the data are submitted, reporting frequency, State regulation code); • Identification and description of each monitoring system component; • Identification and description of all major hardware and software components of the automated data acquisition and handling system; • Explicit formulas for each measured emission parameter, mass emissions, or emission rates; • Inside cross-sectional area at flue exit and at flow monitoring location (for units with flow monitors, only); • Stack exit height above ground level and ground level elevation above sea level. • Monitoring location identification and facility identification codes as assigned under the Acid Rain Program as reported to the Energy Information Administration (EIA); • Scale, span, and maximum expected and potential measurements for each parameter monitor; • Information to validate and document constants and assumed or default values used for parameter monitoring; • The upper and lower boundaries of the range, normal load or operating level(s), most frequently used operating level(s), date of load analysis, and activation/deactivation dates for changes to load levels for each unit of common stack on which hardware CEMS are installed.
Hardcopy portion	• Identification of the test strategy; protocols for audits and calibrations; and calculations for determining maximum potential measurement values; • Detailed description of site locations for each monitoring component; • A data flow diagram showing information handling path (i.e., output signals of CEMS components to final reports); • Schematic diagram identifying entire gas handling system from boiler to stack for all affected units monitored by a CEMS; and • Stack and duct engineering diagrams for units monitored by a CEMS.