MEMORANDUM

DATE: August 2013

TO: Docket EPA-HQ-OAR-2010-0929

FROM: Lisa Grogan-McCulloch

SUBJECT: **Evaluation of Alternative Verification Approaches For Greenhouse Gas Reporting Rule Subparts for which Reporting of Inputs to Emission Equations was Deferred to March 31, 2015**

1.0 Introduction and Purpose of Analysis

In the August 25, 2011 final rule deferring reporting to March 31, 2015 of certain inputs to emission equations under 40 CFR part 98 (76 FR 53057), the EPA expressed its intent to further evaluate these inputs to emission equations (hereafter referred to as "'inputs to equations' data elements"). The EPA outlined a four-step process for this evaluation in the August 25, 2011 final rule and in a supporting memorandum entitled "Process for Evaluating and Potentially Amending Part 98 Inputs to Emission Equations" (docket EPA-HQ-OAR-2010-0929). The purpose of this memorandum is to describe the review undertaken for the fourth step of the evaluation process: the EPA's analysis of alternative verification methods that would not require reporting of the "inputs to equations" data elements. This review evaluates alternative verification methods for 25 subparts, based on the results of steps one through three of the four-step process. The review was not undertaken for subparts W and II because the EPA's evaluation of these inputs under Step 2 did not identify the need to proceed to the next steps.[1]

Section 2.0 of this memorandum summarizes the EPA's current verification process. Section 3.0 of this memorandum summarizes the review of alternative verification approaches suggested in comments to the Call for Information, which was issued on December 27, 2013 (75 FR 81366) to request additional information to conduct its evaluation of "inputs to equations" data elements. Section 4.0 discusses an alternative verification method that consists of an electronic verification tool developed by the EPA, enhanced recordkeeping requirements, and additional reporting requirements.

2.0 EPA's Current Verification Process

[1] The review was not conducted for "inputs to equations" data elements in subpart I because reporting of the "inputs to equations" data elements for that subpart was addressed in a separate proposed action [see 77 FR 63538]. Additionally, the evaluation of the subpart C "inputs to equations" data elements in this memorandum encompasses the one subpart A "input to equation" data element. As a result, the one subpart A "input to equation" data element is not listed explicitly in this memorandum.

During the first 3 years of the Greenhouse Gas Reporting Program (GHGRP), the EPA has had success developing and using an electronic reporting and verification system for all subparts reporting under the program. The current verification approach for the GHGRP consists of requiring facility self-certification of the annual reports along with the EPA conducting electronic verification checks of the data entered into e-GGRT, followed by direct follow-up with facilities if necessary. For subparts where the reporting of inputs to emission equations was deferred until 2015, these checks have been conducted using reported data other than inputs to emission equations (the reporting of which was deferred). For "supplier" subparts[2] (and starting in reporting year 2012 for subparts with inputs to emission equations that were deferred until 2013), these checks have been conducted using reported data that include the data needed to calculate outputs of the equations. Reporters under these subparts have been entering into e-GGRT the data needed to calculate the annual GHG quantities.

During reporting year 2010, the EPA developed approximately 1,400 electronic verification checks to verify reported data. Based on these verification checks, the EPA followed up with facilities regarding potential data quality errors for approximately 2,360 of the approximately 6,700 facilities that reported in reporting year 2010. In reporting year 2011, the EPA programmed an additional 1,000 checks into e-GGRT for the subparts that were reporting for the second year, expanding the number of checks to 2,400. The EPA also programmed into e-GGRT, for 2011, approximately 1,300 checks for the newly-reporting subparts. During reporting year 2011, the EPA followed up with approximately 3,440 of the approximately 8,000 facilities that reported.

3.0 Evaluation of Alternative Verification Methods Suggested by Commenters

The Call for Information notice specifically requested commenter input on alternative verification approaches that would not require reporting to the EPA those data elements for which reporting may cause competitive harm. In response, the EPA received input from 16 commenters suggesting alternative verification methods. The comments expressed support for the following verification methods: (1) self-certification, (2) EPA compliance inspection/audits only, (3) implementation of third party auditing or third party verification, and (4) a verification approach similar to the EPA's Toxic Release Inventory (TRI). These verification approaches are discussed in sections 3.1 through 3.4.

3.1 Self-certification

Given the complexity of the GHG monitoring and reporting requirements, the large number of reporters (over 8,000), and the need for high quality data, self-certification alone is not sufficient

[2] Supplier subparts (subparts LL through PP of Part 98) apply to fossil fuel suppliers and industrial gas suppliers. The e-GGRT system currently calculates equation outputs for suppliers using reported equations inputs. Subpart MM reporters began using e-GGRT for reporting in Reporting Year 2012.

to ensure that GHG emissions are being reporting accurately. The EPA's experience with reviewing the 2010 and 2011 reporting year annual reports showed that there have been errors made in GHG emissions reporting. Self-certification alone would not address these errors. As mentioned in section 2.0 of this memorandum, the EPA's verification process for the 2010 and 2011 reporting years resulted in the EPA identifying thousands of potential reporting errors and reporters resubmitting numerous corrected reports. Based on this experience, self-certification alone, without the EPA verification, would result in a significantly reduced ability to verify emissions and ensure compliance with the GHGRP.

3.2 EPA Compliance Inspections/Audits

Given that more than 8,000 facilities and suppliers in more than 40 source categories submit annual reports, it would be possible for the EPA to visit only a very small fraction of the reporting facilities in any given year (e.g., even if the EPA visited 100 facilities, that would be only 1.25 percent of reporters). Therefore, relying solely on on-site compliance inspections as the primary method of verifying reported GHG data is impractical and would not be cost effective. Even if on-site audits were to identify, and result in correction of, monitoring and reporting problems at some of the visited facilities, there would be numerous other facilities that would not have been visited and that potentially would have made significant errors that would not have been identified and corrected. In order to ensure compliance, the EPA's verification approach needs to collect enough information about all facilities to allow sufficient assessment of the data quality prior to performing on-site audits. For example, the EPA's current verification approach allows the EPA to identify many reporting errors and allow for their resolution without the time and expense of on-site visits. Using the information obtained through this process, compliance inspections are better targeted toward facilities or sectors most likely to have significant, unresolved verification issues.

3.3 Third Party Verification

Commenters on the Call for Information suggested third party verification as an alternative verification method. The EPA had previously considered third party verification, but decided against its implementation. Refer to the EPA's full rationale for not selecting third party verification in the October 30, 2009 final rule (74 FR 56260). The following is a summary of this rationale, as well as an explanation of why the EPA has determined that these reasons still apply:

- The costs to the reporters of hiring third party verifiers would be substantial, given the more than 8,000 reporters under the GHGRP. If the EPA were to adopt third party verification at this juncture, the cost to the reporters would be the same as originally estimated, which was thousands of dollars per reporting facility. While the EPA received some comments on the Call for Information supporting third party verification, the vast majority of reporters did not submit comments supporting this approach.

- A centralized emissions verification system, as opposed to third party verification (which is de-centralized), provides a greater ability for the EPA to identify trends and outliers in data and thereby assist with targeted follow-up review. The data collected through the GHGRP, beyond collected inputs to emission equations, are used for verification purposes as well as to inform future GHG policy development. The EPA has utilized the national data set to verify the reported emissions as well as to gain a fuller picture of the emissions profile of the different sectors, and will continue to do so in the future.

- Developing the third party verification approach would require the EPA to establish and develop emissions verification protocols and a system to qualify and accredit third party verifiers, as well as to develop and administer a process to ensure that verifiers hired by reporting facilities do not have conflicts of interest. Such a program would require the EPA to review numerous individual conflict of interest screening determinations made each time a reporter hires a third party verifier, which would be time-consuming. Even if the EPA were to partner with an existing program or organization to accredit verifiers, the EPA would still need to develop the criteria and systems described above to implement the GHGRP and ensure high quality emissions verification given the unique reporting requirements of the GHGRP. If the EPA were to adopt third party verification at this juncture, the EPA would still have to develop the infrastructure described above to support it. Not only would this take several years to put into place, this approach would not build upon the success of the thousands of verification checks that the EPA has developed over the first few years of the program.

- Third party verification would potentially result in delays in the publication of the annual data and could result in facilities responding to inquiries from both the EPA and third party verifiers. Under a third party verification system, a facility would contract with a third party verifier and provide the verifier detailed data (by March 31) so that the third party could perform the verification. The third party verifiers would perform on-site visits to many of the facilities as part of the verification process. After conducting the verification according to required protocols, the third party verifier would submit their findings to the facility with errors identified, which the facility could then correct. For existing third party GHG verification programs, this verification process generally takes three to six months. Given the large number of facilities (over 8,000) that would need to have third party verifications conducted, sufficient time would need to be allowed for this step. After receiving the data that has undergone third party verification, the EPA would review the data prior to release. The EPA would then perform additional electronic checks on the full set of reported data because using such checks and statistical analyses on the entire data set would likely reveal inconsistencies and errors in addition to those identified by the third party verifier. If the EPA identified additional potential reporting errors, the EPA would then contact the facility to resolve the issue. It would be inefficient for the EPA to perform verification of the data reported by facilities at the same time as the third party verification is ongoing, because the EPA and the third party verifier would likely be communicating duplicative, or possibly conflicting, requests to the same facility regarding potential errors. As a result, this verification would likely be conducted after third party verification is complete. If the EPA allows the same 4-month period it has in previous years for these the EPA verification activities prior to publication/release of

data, then data would be released eight to ten months after the March 31 reporting date. This approach would not only potentially lengthen the time it would take to publish data, but would also potentially require facilities to respond to both third party verifiers as well as the EPA.

3.4 Verification in EPA's Toxic Release Inventory (TRI) Program

The TRI program requires annual facility level reporting of the amount of toxic chemicals released to the environment or otherwise managed as wastes. Some aspects of the TRI program are similar to the GHGRP. The TRI reports contain a signed self-certification that the information reported is accurate. Each facility must also keep records of how emissions were calculated, including supporting materials, documents, calculations, worksheets, and other information used. This approach is similar to the self-certification approached described in section 3.2, and has the same disadvantages if not used in combination with other verification methods. In addition, to improve the quality of the TRI data, the EPA provides extensive training and assistance to reporters, free electronic software to facilitate electronic submission of data, conducts electronic data checks, and contact facilities to resolve reporting errors. However, the TRI is a different type of program than the GHGRP in that it does not require specific monitoring and calculation approaches, but rather requires that estimates be based on the best available information. TRI estimates can be based on monitoring, emission factors, mass balance, and/or other methods for over 600 chemicals and chemical categories. In contrast, the GHGRP prescribes a set of specific calculation methods, or equations, for individual source categories, processes, and emission units, so that data collected from multiple facilities are consistent and comparable. The data entered into these equations, which are "inputs to equations" data elements, often include process or production data specific to each facility's operations. These "inputs to equations" data elements play an important role in the EPA's ability to verify GHGRP emissions and ensure compliance with the program. Therefore, given the additional specification provided by the GHGRP, it is necessary that the EPA assess whether calculations were conducted correctly and according to the appropriate equation specified in Part 98, as well as conduct additional verification checks (e.g., assessing whether appropriate monitoring methods were used). While there is some similarity in the verification approaches of the two programs, direct application of the approach used for verification of the TRI program would result in a significantly reduced ability to verify emissions and ensure compliance with the GHGRP.

4.0 Summary and Evaluation of an Alternative Verification Method Using an Inputs Verification Tool, Enhanced Recordkeeping, and Additional Reporting

During the EPA's consideration of alternative verification methods, the EPA evaluated an approach involving the use of an electronic inputs verification tool, enhanced recordkeeping requirements, and additional reporting requirements. Section 4.1 describes the inputs verification tool and options considered for implementation, section 4.2 describes the enhanced verification

requirements, section 4.3 describes the additional reporting requirements, and section 4.4 reviews the effectiveness of this verification approach at verifying emissions and ensuring compliance with the GHGRP.

4.1 Description of Inputs Verification Tool and Options for Implementation

The EPA evaluated the use of a verification approach similar to the verification approach currently used for the supplier subparts, where data needed to calculate the outputs of the equations are entered into e-GGRT and used to calculate the annual GHG emission values, followed by EPA verification of these emission values. The EPA considered using a similar approach whereby "inputs to equations" data elements would be entered into a new inputs verification tool within e-GGRT in such a way that the "inputs to equations" data elements could be used for data verification, but not be reported to the EPA. The EPA considered several approaches for implementing this concept. The options are discussed below.

Inputs Verification Tool – Deployed within E-GGRT with Inputs Saved Locally by Users

The first option the EPA considered was to have an inputs verification tool be deployed within e-GGRT with the "inputs to equations" data elements saved locally by the reporters. This option would be integrated without interrupting the current electronic reporting process. Under this approach, to access this inputs verification tool, reporters would log into e-GGRT. They would enter data elements required for the annual report as well as specified "inputs to equations" data elements. The tool would operate securely within e-GGRT, as a transient process, which means that data entered into the tool would be temporarily saved in the tool while the reporter is actively using the tool, but would not be persisted (i.e., saved) within the e-GGRT database. Data entered into the tool would be discarded when the user's session with e-GGRT ends.

If the reporter were to exit the inputs verification tool prior to completing data entry or submitting their annual report, the tool would generate a file of entered "inputs to equations" data elements, and allow the reporter to download the file. The reporter would have the option to upload this file into the tool when they next use the tool. This option would avoid facilities from needing to re-enter "inputs to equations" data elements that were entered in previous e-GGRT sessions.

After the reporter enters specified "inputs to equations" data elements into the inputs verification tool, the tool would calculate the annual GHG emissions values. The tool would use the following information in calculating these values: (1) "inputs to equations" data elements, (2) information entered into e-GGRT identifying which Part 98 calculation method was selected (if applicable), and (3) the selected Part 98 calculation method. Once the annual GHG emissions values are calculated, the values would be pre-filled into the appropriate reporting fields within e-GGRT. Reporters would then have the opportunity to override the annual GHG emissions values calculated by the tool with their own calculated value.

Prior to annual report submittal, the inputs verification tool would conduct a series of verification checks, including the following:

- Verification checks on the annual GHG emission values calculated by the inputs verification tool. Reporters would have the opportunity to override and revise the values calculated by the tool; however should this occur, the tool would note this decision, as well as any discrepancy, which would prompt the EPA for further review after the reporter submits the annual report.

- Verification checks on entered "inputs to equations" data elements. For example, the tool would check: (1) whether all required data were entered; (2) whether entered "inputs to equations" data element values are within the expected ranges for the data elements; and (3) whether expected relationships exist between certain "inputs to equations" data elements and certain other reported data elements (e.g., process raw material or throughput data that are not "inputs to equations" data elements).

Some of these checks would be conducted as the reporter enters "inputs to equations" data elements (i.e., using "real-time" checking), and other checks would be conducted after the reporter has entered all specified "inputs to equations" data elements, because some algorithms may compare certain "inputs to equations" data elements (e.g., production quantity) to GHG emission values at the subpart or facility level. Also, prior to submittal of the annual report, the inputs verification tool would generate a verification summary containing the results of the verification checks. The verification summary would specify whether any potential errors, as described above, were identified, without specifying the "inputs to equations" data elements. The reporter would have an opportunity to review the verification summary and make necessary revisions to the entered "inputs to equations" data elements and the reported data elements. Additionally, the tool would generate a file listing all entered "inputs to equations" data elements to be kept by the reporter as a record of these data (refer to section 4.2 for further discussion of this recordkeeping requirement).

Inputs Verification Tool – Deployed within E-GGRT with Inputs Encrypted and Saved at EPA

The EPA also considered having "inputs to equations" data elements entered into an inputs verification tool within e-GGRT, encrypting the "inputs to equations" data, and storing the encrypted data at the EPA. This option would have the same functionality as the inputs verification tool deployed within e-GGRT with the "inputs to equations" data elements saved locally. The difference in approach is that the data would be stored at the EPA in an encrypted manner. The data would be indecipherable to the EPA and could only be decrypted with the key that would be held by representatives for that facility. The "inputs to equations" data elements would not be submitted to the EPA as part of the annual report. Like the first option discussed, the inputs verification tool in this option would run verification checks on the "inputs to equations" data elements, calculate emissions, and submit the verification summary to the EPA.

Additionally, like the first option, the tool would generate a file listing all entered "inputs to equations" data elements to be kept by the reporter as a record of these data (refer to section 4.2 for further discussion of this recordkeeping requirement)

The EPA identified some benefits with the encryption option. First, users would be able to enter a portion of their "inputs to equations" data elements, log out, and then resume data entry in a later session without having to save "inputs to equations" data elements locally each time. Second, multiple users would be able to work on a facility's 'inputs to equations" data elements concurrently or independently without needing to coordinate which downloaded "inputs to equations" file is the most recent file; however, as described below, multiple users would need to coordinate/share the encryption key so that each user could access the data entered into the inputs verification tool.

The EPA also identified several limitations with the encryption option. One factor is that members of the GHG reporting community may be uncomfortable with having the "inputs to equations" data elements stored at the EPA (in an encrypted manner). Another consideration is the encryption key would have to be managed by the user; if the key were lost, the data could not be recovered by EPA support. If this occurred, users would have to re-enter "inputs to equations" data elements into the inputs verification tool, resulting in increased burden to users. A third limitation is that if a reporter has multiple users and/or facilities, the users would have to coordinate the facility-specific encryption keys among various users across multiple facilities. In order to access the data entered into the inputs verification tool, each user from a facility would need to know the encryption key. Lastly, the encryption key would be a separate "password" from the general e-GGRT log-in process (one for e-GGRT and one for the inputs verification tool), resulting in increased burden to both reporters (i.e., forgotten passwords) and the EPA (i.e., providing technical support for use of e-GGRT and the inputs verification tool).

Inputs Verification Tool – Application Installed and Run on User's Computer

The EPA considered having the inputs verification tool be a compiled application that would need to be installed on an individual user's desktop computer rather than using a web-based system. In this option, the EPA would develop and distribute a desktop, client-side application that reporters would download, install, and use locally. The user would enter the "inputs to equations" data elements into the desktop application, which would perform the appropriate verification checks and calculations. The application would save "inputs to equations" data elements to the user's local computer or drive and would transmit only the verification summary (which, as mentioned above, would not contain "inputs to equations" data elements) to e-GGRT. Additionally, like the first two options, the tool would generate a file listing all entered "inputs to equations" data elements to be kept by the reporter as a record of these data (refer to section 4.2 for further discussion of this recordkeeping requirement).

A benefit of the desktop application is that all "inputs to equations" data elements would be managed by users on their own computers and no "inputs to equations" data elements would be transmitted to the EPA.

The EPA identified several challenges inherent in this option, as follows.

- *Limits in functionality:* A desktop application may limit the scope of verification that the EPA could perform. The EPA would not be able to easily run verification checks between the "inputs to equations" data elements and the information reported to the EPA through the GHGRP annual report. For example, in subpart X, facilities report annual production in the GHG report and monthly production as an input, but the data could not easily be compared if they are stored in different places. In addition, it would be difficult for the EPA to add to or revise the verification checks in the application, because it would require individual users to perform periodic application updates requiring administrative privileges. The EPA would need to limit the number of updates in the software, which may limit the EPA from improving the process as enhancements are identified.
- *Burden to users*: The desktop application approach would likely increase the burden to users. First, users would need to have administrator privileges for their machines to install a local, client-side application. In many corporate environments, this is not possible without the assistance of information technology (IT) professionals and/or exceptions to existing IT security policies. It is likely that the application would need to be updated at least once each year; for example, to add verification checks or to refine ranges. In these cases, users would need to download and install the new version. Furthermore, it would be labor-intensive and difficult for the EPA to develop a standalone application that replicates logic already present in e-GGRT, which assists users in such ways as guiding them to use the correct equations. This would most likely result in increased burden to users due to additional necessary follow-up by the EPA during the post-submission verification process.
- *Burden to the EPA*: Developing a desktop application would likely increase the cost to the EPA. The EPA would need to develop versions of the application that are specific to different operating systems and then update the applications whenever the operating system changes. Also, if the software had problems or bugs, the EPA would have to update the application, post the new release, and ask users to download and install it. There would be a significant increase in the burden to answer questions that users typically experience during installation. Additionally, the EPA would need to develop a method to ensure the facilities are using the correct version of the software as updates occur.

4.2 Description of Enhanced Recordkeeping Requirements

Because there may be more direct follow-up verification activities with the use of the inputs verification tool, the EPA considered two enhancements to recordkeeping requirements. First, the EPA considered extending the record retention period from 3 to 5 years. It would be important that relevant records are available to the EPA for follow-up activities with facilities, including on-site audits if necessary, regarding potential errors, discrepancies, or questions. Should an EPA inspector visit a facility, it would be important to be able to examine not only the current year's records, but also those from previous years, because previous years' data would provide year-to-year comparisons, which are useful for verifying the current year's data. A 5-year record retention period would ensure the availability of relevant records for the follow-up activities described above.

Second, the EPA considered revisions to the recordkeeping format for "inputs to equations" data elements. Currently, reporters have the option to maintain records of their "inputs to equations" data elements in one or more electronic or hard copy files. Requiring reporters to maintain an electronic or hard copy of the single file generated by the inputs verification tool (i.e., a file listing all "inputs to equations" data elements entered into the tool) would ensure that the EPA could readily access these data during site visits, enabling the EPA to quickly and efficiently perform calculations and data checks.

4.3 Description of Additional Reporting Requirements

To improve the efficiency of the data verification process under this alternative approach using the inputs verification tool described in section 4.1 and the enhanced recordkeeping described in section 4.2, the EPA considered supplementing the information available to the EPA under the GHGRP by requiring reporting of additional data. Certain additional data would enable the EPA to perform additional verification checks, thereby minimizing the number of follow-up activities. Such data would provide information on the activity level at the facility, emission factors, characteristics of carbon-containing streams, and other process information that provide key information for verification (e.g., data confirming that emissions are appropriate for a given activity-level, and data estimating expected emissions based on data provided).

4.4 Review of Effectiveness of Using an Inputs Verification Tool, Enhanced Recordkeeping, and Additional Reporting To Accomplish Data Verification

In the October 30, 2009 final rule (74 FR 56282 – 56283), the EPA described its verification approach as the following two-step process:

- Initial automated review of reported data, using an electronic data quality assurance program built into the data system, for use by reporters and the EPA to help assure the completeness and accuracy of data.

- Based on the initial review results, follow up with facilities regarding potential errors, discrepancies, or questions, including on-site audits.

The use of the inputs verification tool to conduct verification checks on the "inputs to equations" data elements (as described in section 4.1) would build on the EPA's experience with electronic reporting and verification during the first two years of the GHGRP. As discussed in more detail in section 2.0, for reporting years 2010 and 2011, the EPA used electronic verification checks to verify data and follow up with thousands of facilities. For 2011 alone, based on 3,700 types of checks, the EPA followed up with approximately 3,440 of the approximately 7,900 reporting facilities.

The inputs verification tool utilizes the same approach that the EPA currently uses for calculating and verifying data submitted for supplier subparts (and starting in reporting year 2012, inputs to emission equations for which the reporting deadline was deferred until 2013), except that e-GGRT would not retain the "inputs to equations" data elements entered into the tool, as described in section 4.1. Once the annual report is submitted, the EPA would review the verification summary generated by the inputs verification tool, along with verification summaries that are currently generated using data currently collected through the annual report. By requiring use of the inputs verification tool, the EPA would have the additional certainty that reported annual GHG emissions values either were calculated correctly (because the values calculated by the tool were submitted to the EPA) or that the EPA would be made aware that there were discrepancies between values calculated by the tool and values submitted to the EPA. This additional certainty, combined with the additional information provided by the range and algorithm verification checks conducted on the "inputs to equations" data elements themselves, would provide the EPA with the information necessary to conduct further verification once the annual report is submitted.

Once data verification within the inputs verification tool is completed and the annual report is submitted, the EPA would conduct the same verification checks that it currently conducts (following annual report submittal) on data reported via e-GGRT and additional verification checks using the information provided by the additional reporting requirements. Regarding any needed follow-up with facilities, the enhanced recordkeeping requirements described in section 4.2 (i.e., 5-year retention period and uniform format) would ensure that the EPA has adequate time to efficiently examine the "inputs to equations" data elements on-site.