



# **Mandatory Greenhouse Gas Reporting Rule: EPA's Response to Public Comments**

**Volume No.: 41**

**Subpart PP—Suppliers of Carbon  
Dioxide**

# **Subpart PP—Suppliers of Carbon Dioxide**

**U. S. Environmental Protection Agency  
Office of Atmosphere Programs  
Climate Change Division  
Washington, D.C.**

## FOREWORD

This document provides EPA's responses to public comments on EPA's Proposed Mandatory Greenhouse Gas Reporting Rule. EPA published a Notice of Proposed Rulemaking in the Federal Register on April 10, 2009 (74 FR 16448). EPA received comments on this proposed rule via mail, e-mail, facsimile, and at two public hearings held in Washington, DC and Sacramento, California in April 2009. Copies of all comments submitted are available at the EPA Docket Center Public Reading Room. Comments letters and transcripts of the public hearings are also available electronically through <http://www.regulations.gov> by searching Docket ID *EPA-HQ-OAR-2008-0508*.

Due to the size and scope of this rulemaking, EPA prepared this document in multiple volumes, with each volume focusing on a different broad subject area of the rule. This volume of the document provides EPA's responses to significant public comments received for 40 CFR Part 98, Subpart PP—Suppliers of Carbon Dioxide (CO<sub>2</sub>).

Each volume provides the verbatim text of comments extracted from the original letter or public hearing transcript. For each comment, the name and affiliation of the commenter, the document control number (DCN) assigned to the comment letter, and the number of the comment excerpt is provided. In some cases the same comment excerpt was submitted by two or more commenters either by submittal of a form letter prepared by an organization or by the commenter incorporating by reference the comments in another comment letter. Rather than repeat these comment excerpts for each commenter, EPA has listed the comment excerpt only once and provided a list of all the commenters who submitted the same form letter or otherwise incorporated the comments by reference in table(s) at the end of each volume (as appropriate).

EPA's responses to comments are generally provided immediately following each comment excerpt. However, in instances where several commenters raised similar or related issues, EPA has grouped these comments together and provided a single response after the first comment excerpt in the group and referenced this response in the other comment excerpts. In some cases, EPA provided responses to specific comments or groups of similar comments in the preamble to the final rulemaking. Rather than repeating those responses in this document, EPA has referenced the preamble.

While every effort was made to include significant comments related to 40 CFR Part 98, Subpart PP—Suppliers of Carbon Dioxide in this volume, some comments inevitably overlap multiple subject areas. For comments that overlapped two or more subject areas, EPA assigned the comment to a single subject category based on an assessment of the principle subject of the comment. For this reason, EPA encourages the public to read the other volumes of this document with subject areas that may be relevant to 40 CFR Part 98, Subpart PP—Suppliers of Carbon Dioxide.

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# SUBPART PP—SUPPLIERS OF CARBON DIOXIDE

## 1. DEFINITION OF SOURCE CATEGORY

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**Commenter Name:** Kim Dang

**Commenter Affiliation:** Kinder Morgan Energy Partners, L.P.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0370.1

**Comment Excerpt Number:** 8

**Comment:** Kinder Morgan also suggests that the Proposed Rule be modified to include a de minimis provision for CO<sub>2</sub>/EOR systems to avoid imposing excessive reporting costs on minor emission points, much the same as the fugitive natural gas emissions. The surface equipment at a CO<sub>2</sub>/EOR operation is generally the same as that along the natural gas system, including engines, turbines, vents, flares, and fugitive components, such as flanges, pumps, valves, etc. There are thousands of fugitive component parts. Kinder Morgan therefore suggests that EPA require CO<sub>2</sub> emission reporting with a de minimis exception for negligible emission sources, by making the following changes to Subpart PP and Subpart A. [See DCN:EPA-HQ-OAR-2008-0508-0371.1 pp9-13 for more detailed edits, including strike-outs]

**Response:** CO<sub>2</sub> transport, injection, and storage facilities are not required to report under Subpart PP. See the Preamble, Section III.PP for the response to comment on carbon capture and storage (CCS) in *Definition of Source Category*.

Please see Preamble section II.K for more information about de minimis reporting for small emission points.

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**Commenter Name:** William A. Collins, Jr

**Commenter Affiliation:** Occidental Petroleum Corporation

**Document Control Number:** EPA-HQ-OAR-2008-0508-0452

**Comment Excerpt Number:** 8

**Comment:** Occidental agrees that a separate reporting protocol is warranted for CO<sub>2</sub> EOR, one which accounts for the CO<sub>2</sub> that is sequestered during EOR using a mass balance approach. As EPA recognizes in the preamble, most or all CO<sub>2</sub> injected for EOR becomes sequestered. Developing a system to account for these sequestered volumes will enable EOR using CO<sub>2</sub> to be recognized as a viable and proven technology for reducing GHG emissions. As discussed above, Occidental has significant experience managing the largest CO<sub>2</sub> EOR operations in the United States and we would be glad to work with EPA to develop such a protocol in a future rulemaking.

**Response:** See the Preamble, Section III.PP for the response to comment on carbon capture and storage (CCS) in *Definition of Source Category*.

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**Commenter Name:** Michael Moore

**Commenter Affiliation:** North American Carbon Capture and Storage Association (NACCSA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0688.1

**Comment Excerpt Number: 4**

**Comment:** Although we support EPA's decision not to include geologic sequestration in the proposed mandatory GHG reporting rule, we agree that a systemic approach to accounting for the movement of physical CO<sub>2</sub> throughout the CCS process is important. In particular, it will be crucial for CCS interests in the United States to agree upon and thereafter use a CCS protocol that provides for the uniform accounting treatment of CO<sub>2</sub> rights and liabilities during the CCS process. Nascent efforts are underway to develop such a protocol, and we would be pleased to discuss these developments with the Agency at its convenience.

**Response:** See the Preamble, Section III.PP for the response to comment on carbon capture and storage (CCS) in *Definition of Source Category*.

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**Commenter Name:** Michael Moore

**Commenter Affiliation:** North American Carbon Capture and Storage Association (NACCSA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0688.1

**Comment Excerpt Number:** 3

**Comment:** We encourage EPA to adopt a uniform approach to CCS regulation. Unfortunately, the early signals are that the Agency is heading down a path of piecemeal regulation. The proposed rule, for example, only requests comment on CO<sub>2</sub>-EOR, and while NACCSA supports CO<sub>2</sub>-EOR as a long term storage technology, we do not know why storage in other geologic formations was excluded from the discussion of possible reporting from geologic storage sites. Our concerns regarding lack of uniformity of CCS regulation were highlighted by EPA's separate proposal regarding the RFS rule. That proposal contemplates a variety of MMV, protocol and reporting aspects for CCS when employed at ethanol facilities. It is unclear to us why geologic storage regulations might vary as a function of source category (ethanol plants v. power plants, for example). Assuming that appropriate legislative authority may be established, we encourage EPA to coordinate its approach to CCS regulation to avoid a scenario under which different sources are treated differently, or that storage sites are treated one way for reporting purposes and another way for regulatory compliance purposes.

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*.

It is EPA's strong intention to harmonize CCS requirements across relevant statutory or other programs, including the RFS rule, in order to minimize any redundancy and any burden on reporters. EPA concurs that information from all types of source categories that meet the reporting criteria in Subpart PP – including ethanol facilities – will be useful under this final rulemaking. As a result, this final rule requires the reporting of data on capture of biogenic CO<sub>2</sub>. See the Preamble, Section III.PP for a response to a comment on exempting captured biogenic CO<sub>2</sub> in *Definition of Source Category*.

EPA did not intend to exclude storage from non-EOR facilities from the Subpart PP preamble discussion of possible reporting from geologic storage sites. EPA wrote in the proposed Subpart PP preamble that "...we have outlined initial thoughts about how geologic sequestration might be included in a reporting program for EOR sequestration or other types of geologic

sequestration. We welcome comments on the approach...for how to quantify and verify the amount of CO<sub>2</sub> sequestered in geologic formations" [emphasis added].

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**Commenter Name:** Michael Moore

**Commenter Affiliation:** North American Carbon Capture and Storage Association (NACCSA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0688.1

**Comment Excerpt Number:** 2

**Comment:** A reason why we support EPA's decision not to include geologic storage in the mandatory reporting rule is public perception. Experts agree that CCS is needed to meet climate change goals and that public perception of the safety of the technology is going to play a significant role in the technology's ongoing deployment. Inclusion of geologic storage as a reporting source category for purposes of preparing an inventory of major emitters of CO<sub>2</sub> might send a misleading message to the public about the anticipated safety of the technology. If geologic storage is to be included in the rule, the data elements identified by EPA for inclusion in the baseline "geologic sequestration report" appear overbroad and unnecessary for purposes of GHG inventory reporting. Many of the data elements, for example, will have been reported to and vetted by the Agency as part of the UIC permit process. Other data elements (e.g., overview of methods use to model subsurface behavior of CO<sub>2</sub>) are unrelated to emissions per se. Conversely, annual reporting of volumetric data might be appropriate for purposes of a GHG inventory rule. However, we would anticipate that the emissions reports from geologic storage sites would reflect "zero" emissions, so would question the utility of such reporting. Whatever was done, coordination within EPA (e.g., the Offices of Water and Air & Radiation, for example) and between EPA and other agencies/departments (e.g., forthcoming IRS guidance regarding volumes of CO<sub>2</sub> in "secure geologic storage") would be needed to avoid a scenario under which the identical geologic storage activity was subjected to different regulatory standards and reporting obligations through the piecemeal application of different legal authorities.

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble Section III.PP.3 for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

It is EPA's strong intention to harmonize CCS requirements across relevant statutory or other programs in order to minimize any redundancy and any burden on reporters. See the Preamble, Section III.PP for a discussion of harmonizing efforts in *Definition of Source Category*.

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**Commenter Name:** Michael Moore

**Commenter Affiliation:** North American Carbon Capture and Storage Association (NACCSA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0688.1

**Comment Excerpt Number:** 1

**Comment:** We support the decision of the EPA to not include geologic sequestration within the scope of the proposed rule. With its focus on atmosphere emissions and roots in the Clean Air Act, the proposed regulations for the mandatory reporting of greenhouse gases should be



appropriately focused on significant atmosphere source emissions. It might not have been "reasonable" for EPA, within the meaning of section 114(a) of the Clean Air Act (*id.* at 16,455), to expend resources to require emissions reporting from properly sited geologic storage when such storage is not expected to result in emissions to any media, let alone the atmosphere. The Intergovernmental Panel on Climate Change, in its seminal 2005 report, concluded that the fraction of CO<sub>2</sub> retained in "appropriate selected and managed geological reservoirs" is likely to exceed 99 percent over 1,000 years." [Footnote: See IPCC, Special Report on Carbon Dioxide Capture and Storage, § 1.6.3 (2005).]. The Global Energy Technology Strategy Program (GTSP), in its 2006 report, similarly concluded that at "a properly designed and well-managed CO<sub>2</sub> storage site, the chance of CO<sub>2</sub> leakage should be small"; and specifically with respect to atmospheric releases, the GTSP noted the following: Sudden releases of CO<sub>2</sub> are unlikely. To the extent that leakage does occur, the most likely pathways are transmissive faults and unsecured abandoned wells. In order to migrate back to the surface [and thus result in an atmospheric emission], a molecule of CO<sub>2</sub> would have to find its way through many layers of low-permeability rock, through which it might move only centimeters per century. Finding its way to the surface by moving upward through thousands of meters of solid rock could take millennia. [Footnote: See Carbon Dioxide Capture and Geologic Storage: A Core Element of a Global Energy Technology Strategy to Address Climate Change, at 20-21 (GTSP 2006).] Experience with ongoing CCS projects around the world, including but not limited to CO<sub>2</sub>-EOR, likewise suggests that atmospheric releases of CO<sub>2</sub> are not expected to be an issue. Indeed, we are not aware of any data to the contrary. As the Center for American Progress said in 2007: The large scale sequestration projects now underway provide reassuring evidence that leakage from CO<sub>2</sub> storage formations is unlikely. Long-term experience with FOR in oil and gas fields is also reassuring. The geology of these fields is well-known and their sealing potential well-established; they have been storing oil and gas for millions of years. [Footnote: See Global Warming and the Future of Coal: The Path of Carbon Capture & Storage, at 12, by K. Berlin and R. Sussman (Center for American Progress, May 2007).] In its seminal 2007 study, the Massachusetts Institute of Technology – after examining MMV data from the Sleipner, Weyburn, and In Salah projects – likewise concluded that "[n]one of these projects has detected CO<sub>2</sub> leakage of any kind ...." [Footnote: See The Future of Coal: Options for a Carbon-Constrained World, An Interdisciplinary MIT Study ("The Future of Coal"), at 48 (MIT 2007).]. After examining the trapping mechanism of geologic storage and the history of natural gas storage and CO<sub>2</sub>-EOR, MIT noted: Although substantial work remains to characterize and quantify these [trapping] mechanisms, they are understood well enough today to trust estimates of the percentage of CO<sub>2</sub> stored over some period of time – the result of decades of studies in analogous hydrocarbon systems, natural gas storage operations, and CO<sub>2</sub>-EOR. Specifically, it is very likely that the fraction of stored CO<sub>2</sub> will be greater than 99% for 1,000 years. Moreover, some mechanisms appear to be self-reinforcing. Additional work will reduce uncertainties associated with long-term efficacy and numerical estimates of storage volume capacity, but no knowledge gaps today appear to cast doubt on the fundamental likelihood of the feasibility of CCS. [Footnote: *Id.* at 44; see also OSPAR Workshop on the Environmental Impact of Placement of Carbon Dioxide in Geological Structures in the Maritime Area, Trondheim, Norway, Oct. 26-27 (2004) ("Studies of natural analogues and experience from ongoing storage products give confidence that CO<sub>2</sub> can be safely contained in geological formations for millions of years"); Towards the Use of CO<sub>2</sub> Capture and Storage in the EU Emissions Trading System, at 11, by J. Cozijnsen (SenterHolm 2005) ("For oil and gas reservoirs, the current leakage rate of CO<sub>2</sub> to the atmosphere is likely to be relatively small due to the fact that these geological structures have contained the petroleum and gas for tens to hundreds of millions of years [and a]t the Sleipner sub sea storage site in Norway, no leakage has so far been detected"); CO<sub>2</sub> Capture and Storage: A Key Carbon Abatement Option, at 125 (IEA 2008) (to the same effect).] And

while it is true that MMV technologies are anticipated to play an important role in the emerging CCS regulatory regimes, this does not mean that geologic storage sites are anticipated to be significant sources of air emissions. MMV technologies will track the movement of CO<sub>2</sub> within the target formation, thereby providing ample advance notice to site operators and regulators so operational adjustments may be made to ensure that emissions do not occur. [Footnote: The Future of Coal, at 21 ("Sites will ... create tailored, site-specific MMV systems that will be designed to detect potential leaks long before they pose any danger to drinking water supplies or surface ecosystems").]

EPA cites to a study that reportedly demonstrates CO<sub>2</sub> retention rates from CO<sub>2</sub>-EOR ranging from 38% to 100%, with the average retention being 71%. Id. We are aware of that study but disagree with EPA's interpretation of it. The study makes clear that all injected CO<sub>2</sub> remains in the closed-loop recycle systems of CO<sub>2</sub>-EOR floods. And while the study refers to the retention rates noted by the Agency, "retention" for purposes of the study means CO<sub>2</sub> retained per-sweep through the formation. "Retention" does not mean that amounts not retained are thereafter released (to the atmosphere or to any other environmental media for that matter). CO<sub>2</sub>-EOR is a closed loop system, with a certain percentage of injected CO<sub>2</sub> retained with each pass, the residual CO<sub>2</sub> recovered from the produced oil, and then reinjected. Over time, all of the CO<sub>2</sub> is deposited into secure geological storage. [See DCN:EPA-HQ-OAR-2008-0508-0688.1 for Figure 1 outlining a typical CO<sub>2</sub>-EOR operation provided by commenter]. It outlines in general terms why NACCSA believes that CO<sub>2</sub>-EOR results in the permanent storage of more than 99% of injected CO<sub>2</sub> with the losses, if any, associated only with fugitives associated with above-ground infrastructure.

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

It is EPA's strong intention to harmonize CCS requirements across relevant statutory or other programs in order to minimize any redundancy and any burden on reporters. See the Preamble, Section III.PP for a discussion of harmonizing efforts in *Definition of Source Category*.

In the proposed Subpart PP preamble, EPA cited a study about the term "retention rate". EPA understands from commenters that "retention rate" is defined as the amount of CO<sub>2</sub> that is injected into the underground formation (oil field), while the EOR site is operating and producing oil, and that is not recovered with the oil, and has to do with the efficiency of the CO<sub>2</sub> recycling process at an operating EOR site. EPA did not intend to suggest that "retention" equates to the amount of CO<sub>2</sub> sequestered in an underground formation. While EPA understands that some amount of CO<sub>2</sub> injected into oil and gas reservoirs for EOR purposes will be trapped in the subsurface, EPA concludes that site-specific elements beyond geophysical trapping parameters influence the amount of CO<sub>2</sub> securely sequestered. See the Preamble, Section III.PP.3 for a discussion of elements in *Definition of Source Category*.

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**Commenter Name:** Dirk Cockrum

**Commenter Affiliation:** Kinder Morgan Energy Partners, L.P.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0468.1

**Comment Excerpt Number:** 1

**Comment:** In the Preamble of the Proposed Rule, EPA referenced a study of CO<sub>2</sub> retention rates at EOR operations in the Permian Basin, and noted that reported retention rates ranged from 38 to 100%, with an average of 71%. The following paragraphs are from a June 8, 2009, letter from Reid Grigg of the New Mexico Petroleum Recovery Research Center (the author of the study EPA referenced) and support the arguments Kinder Morgan provided at page 8 of 73 of its comments as to why the EPA's interpretation of retention rates is incorrect. [See DCN: EPA-HQ-OAR-2008-0508-0370.1] During an EOR operation, the amount of CO<sub>2</sub> "retained" by a reservoir, as the term is used by petroleum engineers, is the amount of CO<sub>2</sub> that is not recovered with the oil for recycling and reuse for further oil extraction. The author of the study, Reid Grigg, explains in the attached letter that essentially all of the CO<sub>2</sub> that is not retained in the initial injection at an EOR site is captured and reinjected. Further, Mr. Grigg concludes that at the two EOR sites he has studied since 1972, there has been no leakage. June 8, 2009, "I have received use inquiries on the meaning of CO<sub>2</sub> retention with respect to a paper I prepared titled "Long-Term CO<sub>2</sub> Storage Using Petroleum Industry Experience" and published from a study conducted in 2001-2002. I believe there have been attempts to equate CO<sub>2</sub> retention, as used in this report, with CO<sub>2</sub> leakage burn a reservoir, with the implication that the CO<sub>2</sub> not retained in a geologic reservoir was lost to the atmosphere or into unintended zones. This is not correct! In the enhanced oil recovery (EOR) projects that were examined in this study, water/brine alternating with gas (WAG) injection was predominately used. Thus, in each C3SC, CO<sub>2</sub> was injected, alternating with brine injection, with a final, post-CO<sub>2</sub> brine flood. The retained CO<sub>2</sub> is stored in the reservoir in several forms: CO<sub>2</sub> dissolved in residual oil, CO<sub>2</sub> dissolved in brine saturation, and CO<sub>2</sub> as a residual free state (gas, liquid, or supercritical fluid, depending on the temperature and pressure of the reservoir). "Thus, by knowing the CO<sub>2</sub> retention value, the mass of CO<sub>2</sub> injected, and reservoir volume, pressure, and temperature, one could determine the CO<sub>2</sub> storage capacity for the reservoir. This would be a conservative value because to maximize storage one would not follow the CO<sub>2</sub> injection with a brine injection. Essentially 100% of the CO<sub>2</sub> that is not retained in the reservoir during the initial injection is captured at production wells where it is compressed and injected into a reservoir. As stated in the report, essentially 100% of the purchased CO<sub>2</sub> is in the system. Also, CO<sub>2</sub> is considered a valuable commodity and every effort is made to capture and reinject the produced CO<sub>2</sub>. In the same light, every effort is made to avoid leakage in surface equipment and in the borehole casing into any zone besides that zone of intended injection and production. These are well-characterized reservoirs with known seals; thus, no leakage is expected and none of those I have examined have any indication of knit age 1 am presently involved with monitoring two EOR projects; in the SACROC and Aneth fields. The first has undergone CO<sub>2</sub> injection since 1972 and the second for about one year. We have looked at both with a number of monitoring techniques and no leakage has been detected. In summary, petroleum reservoirs are presently the best bet for safe CO<sub>2</sub> storage because a history of seal integrity has been established and good estimates of storage capacity can be derived. Any questions, fee! free to contact me."

**Response:** Please see the response to the comment directly above, comment EPA-HQ-OAR-2008-0508-0688.1, excerpt 1.

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**Commenter Name:** Tiffany Rau

**Commenter Affiliation:** Hydrogen Energy International LLC (HEI)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0517.1

**Comment Excerpt Number:** 4

**Comment:** As has been recognized by EPA, it is important to understand that, at the option of the operator, when CO<sub>2</sub> is injected for use in EOR, geologic sequestration of CO<sub>2</sub> occurs during EOR operations and continues after EOR operations cease. The proposed rule may suggest otherwise by separately listing these activities from the CO<sub>2</sub> Supplier category (i.e., geologic sequestration and EOR). (See Proposed Rule § 98.420(b); 74 FR at 16725.) This was likely not EPA's intent because EPA has acknowledged that sequestration occurs during EOR activities (referencing study finding retention rate average of 71%) (74 FR at 16583-84). CO<sub>2</sub> EOR and Sequestration are not sequential processes but rather occur concurrently; indeed, sequestration of CO<sub>2</sub> occurs with every injection cycle. Currently, EOR operators purchase CO<sub>2</sub> for injection. This can represent a significant portion of the cost of an EOR project. Consequently, CO<sub>2</sub> is a valuable commodity to EOR operators and is treated accordingly. Because it is a valuable commodity in EOR operations, CO<sub>2</sub> is not emitted or vented to the atmosphere during operations or after operations cease. Any injected CO<sub>2</sub> that returns to the surface during production operations is separated from the produced hydrocarbons and recycled within an enclosed system back to the reservoir as part of the continuous EOR process. Sequestration of CO<sub>2</sub> within the pore spaces of the formation occurs with each injection cycle, necessitating the introduction of additional amounts of CO<sub>2</sub> to continue the EOR operation. For these well-selected, designed and managed geological storage sites, the CO<sub>2</sub> will be immobilized by various trapping mechanisms and be retained indefinitely without release to the atmosphere. Approximately 30% to 50% of the injected CO<sub>2</sub> volume typically remains permanently stored in the oil or gas reservoir after production operations cease regardless of efforts to recover the CO<sub>2</sub>. When the EOR operations cease, wells are closed, and an EOR operator could quite easily, at its option, manage operations to store all of the injected CO<sub>2</sub> for the long term (rather than recover a portion of it). EPA should be clear in its statements and/or rulemaking that, decades of industry experience and numerous field and scientific studies have shown, sequestration occurs during CO<sub>2</sub> EOR operations.

**Response:** Please see the response to the comment directly above, comment EPA-HQ-OAR-2008-0508-0688.1, excerpt 1.

EPA does not concur that citing a study on retention rates is equivalent to acknowledging that sequestration occurs during EOR activity. While EPA understands that some amount of CO<sub>2</sub> injected into oil and gas reservoirs for EOR purposes will be trapped in the subsurface, EPA concludes that site-specific elements beyond geophysical trapping parameters influence the amount of CO<sub>2</sub> securely sequestered. See the Preamble, Section III.PP for a discussion of such elements in *Definition of Source Category*.

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**Commenter Name:** Karen St. John

**Commenter Affiliation:** BP America Inc. (BP)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0631.1

**Comment Excerpt Number:** 109

**Comment:** As has been recognized by EPA, it is important to understand that, at the option of the operator, when CO<sub>2</sub> is injected for use in enhanced oil recovery (EOR), geologic sequestration of CO<sub>2</sub> occurs during EOR operations and continues after EOR operations cease. The proposed rule may suggest otherwise by separately listing these activities from the CO<sub>2</sub> Supplier category (i.e., geologic sequestration and EOR). (See Proposed Rule § 98.420(b); 74 FR at 16725.) This was likely not EPA's intent because EPA has acknowledged that sequestration occurs during EOR activities (referencing study finding retention rate average of 71%) (74 FR at 16583-84). CO<sub>2</sub> EOR and Sequestration are not sequential processes but rather occur

concurrently; indeed, sequestration of CO<sub>2</sub> occurs with every injection cycle. Currently, EOR operators purchase CO<sub>2</sub> for injection, which can represent a significant portion of the cost of an EOR project. Consequently, CO<sub>2</sub> is a valuable commodity to EOR operators and is treated accordingly. Because it is a valuable commodity in EOR operations, CO<sub>2</sub> is not emitted or vented to the atmosphere during operations or after operations cease. Any injected CO<sub>2</sub> that returns to the surface during production operations is separated from the produced hydrocarbons and recycled within an enclosed system back to the reservoir as part of the continuous EOR process. Sequestration of CO<sub>2</sub> within the pore spaces of the formation occurs with each injection cycle, necessitating the introduction of additional amounts of CO<sub>2</sub> to continue the EOR operation. For these well-selected, designed and managed geological storage sites, the CO<sub>2</sub> will be immobilized by various trapping mechanisms and be retained indefinitely without release to the atmosphere. Approximately 30% to 50% of the injected CO<sub>2</sub> volume typically remains permanently stored in the oil or gas reservoir after production operations cease regardless of efforts to recover the CO<sub>2</sub>. When the EOR operations cease, wells are closed, and an EOR operator could quite easily, at its option, manage operations to store all of the injected CO<sub>2</sub> for the long term (rather than recover a portion of it). EPA should be clear in its statements and/or rulemaking that, decades of industry experience and numerous field and scientific studies have shown, sequestration occurs during CO<sub>2</sub> EOR operations.

**Response:** See response to the comment directly above, comment EPA-HQ-OAR-2008-0508-05171.1, excerpt 4.

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**Commenter Name:** Tiffany Rau

**Commenter Affiliation:** Hydrogen Energy International LLC (HEI)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0517.1

**Comment Excerpt Number:** 3

**Comment:** HEI commends EPA for excluding geologic sequestration reporting from this proposed rulemaking. EPA states, however, that other “stakeholders have significant interest in the amount of CO<sub>2</sub> injected and geologically sequestered at EOR operations in order to demonstrate the effectiveness of EOR projects that ultimately intend to store CO<sub>2</sub> for long periods of time.” EPA then “outline[s] initial thoughts about how geologic sequestration might be included in a reporting program for EOR sequestration or other types of geologic sequestration,” and welcomes comment on the outlined approach. 74 FR at 16584. As further discussed below, HEI submits that EPA should not implement or suggest a reporting program under the present rulemaking which is not designed to focus EPA on the complexities and technical considerations specific to geologic sequestration. The central purpose of the proposed rule is to understand trends in GHG emissions and primary industrial sources of GHG emissions. The proposed rule, therefore, requires GHG emissions reporting from all sectors of industry. Carbon capture and storage, on the other hand, is one of the foremost recognized technologies to substantially reduce industrial CO<sub>2</sub> emissions and address climate change. Neither the purpose nor the statutory authorization relied upon by EPA for the proposed rule encompasses understanding, demonstrating or regulating CO<sub>2</sub> sequestration in the subsurface, whether in connection with EOR or not. EPA should not attempt to expand the scope of its remit and extend an emissions reporting rule to carbon storage in order to assess the effectiveness of subsurface sequestration (i.e. volumes of CO<sub>2</sub> injected versus stored). Any requirements for assessing the effectiveness of a storage site in order to evaluate the volume of CO<sub>2</sub> injected and stored permanently should be based on a set of procedures and monitoring efforts specifically designed for geologic sequestration. Carbon capture and storage will require a comprehensive uniform

scheme to assess and evaluate potential storage reservoirs that is based on certain performance-based criteria. Instituting a patchwork of regulations for this technology will impede its progress and potentially lead to complicated, duplicative and burdensome regulations that do not advance the safe and efficient deployment of this technology [Footnote: Regulations regarding geologic sequestration have been or are being developed on the federal level (i.e. DOE's Technical Guidelines for Voluntary Reporting of Greenhouse Gases, (1605(b)) Program, 2007, and EPA's Proposed Rule: Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO<sub>2</sub>) Geologic Sequestration (GS) Wells, 73 Fed. Reg. 43492-541, July 25, 2008). See also EPA's Review of Existing Programs Memorandum dated June 6, 2008. EPA's Proposed UIC Rule on GS mandates the same reporting requirements as suggested by EPA in this rulemaking. Similarly, legislation and regulations are being passed at the state level.]. HEI strongly discourages EPA from imposing regulations for geologic sequestration without due consideration and analysis specifically aimed at geologic sequestration as a climate mitigation technology, and implemented pursuant to clear authorizations granted by Congress regarding roles and responsibilities for the different agencies on both the federal and state level.

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

It is EPA's strong intention to harmonize CCS requirements across relevant statutory or other programs in order to minimize any redundancy and any burden on reporters. See the Preamble, Section III.PP for a discussion of harmonizing efforts in *Definition of Source Category*.

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**Commenter Name:** Karen St. John

**Commenter Affiliation:** BP America Inc. (BP)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0631.1

**Comment Excerpt Number:** 108

**Comment:** BP commends EPA for excluding geologic sequestration reporting from this proposed rulemaking. EPA states, however, that other "stakeholders have significant interest in the amount of CO<sub>2</sub> injected and geologically sequestered at EOR operations in order to demonstrate the effectiveness of EOR projects that ultimately intend to store CO<sub>2</sub> for long periods of time." EPA then "outline[s] initial thoughts about how geologic sequestration might be included in a reporting program for EOR sequestration or other types of geologic sequestration," and welcomes comment on the outlined approach. 74 FR at 16584 (emphases added). As further discussed below, BP submits that EPA should not implement or suggest a reporting program under the present rulemaking which is not designed to focus EPA on the complexities and technical considerations specific to geologic sequestration. The central purpose of the proposed rule is to understand trends in GHG emissions and primary industrial sources of GHG emissions. The proposed rule, therefore, requires GHG emissions reporting from all sectors of industry. Carbon capture and storage, on the other hand, is one of the foremost recognized technologies to substantially reduce industrial CO<sub>2</sub> emissions and address climate change. Neither the purpose nor the statutory authorization relied upon by EPA for the proposed rule encompasses understanding, demonstrating or regulating CO<sub>2</sub> sequestration in the subsurface, whether in connection with EOR or not. EPA should not attempt to expand the scope of its remit

and extend an emissions reporting rule to carbon storage in order to assess the effectiveness of subsurface sequestration (i.e. volumes of CO<sub>2</sub> injected versus stored). Any requirements for assessing the effectiveness of a storage site in order to evaluate the volume of CO<sub>2</sub> injected and stored permanently should be based on a set of procedures and monitoring efforts specifically designed for geologic sequestration. Carbon capture and storage requires a comprehensive uniform scheme to assess and evaluate potential storage reservoirs. Instituting a patchwork of regulations for this technology would impede its progress and potentially lead to complicated, duplicative and burdensome regulations that do not advance the safe and efficient deployment of this technology.[Footnote: Regulations regarding geologic sequestration have been or are being developed on the federal level (i.e. DOE's Technical Guidelines for Voluntary Reporting of Greenhouse Gases, (1605(b)) Program, 2007, and EPA's Proposed Rule: Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO<sub>2</sub>) Geologic Sequestration (GS) Wells, 73 Fed. Reg. 43492-541, July 25, 2008). See also EPA's Review of Existing Programs Memorandum dated June 6, 2008. EPA's Proposed UIC Rule on GS mandates the same reporting requirements as suggested by EPA in this rulemaking. Similarly, legislation and regulations are being passed at the state level. BP strongly discourages EPA from imposing regulations for geologic sequestration without due consideration and analysis specifically aimed at geologic sequestration as a climate mitigation technology, and implemented pursuant to clear authorizations granted by Congress regarding roles and responsibilities for the different agencies on both the federal and state level.] BP otherwise reserves its right to comment on the different generic categories put forth by EPA for a possible geologic sequestration report.

**Response:** See the response to the comment directly above, comment EPA-HQ-OAR-2008-0508-0517.1, excerpt 3.

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**Commenter Name:** Tiffany Rau

**Commenter Affiliation:** Hydrogen Energy International LLC (HEI)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0517.1

**Comment Excerpt Number:** 2

**Comment:** HEI strongly supports EPA's decision to exclude reporting of "fugitive emissions" from the carbon capture and storage chain and discourages EPA from imposing such a requirement in the future with respect to geologic sequestration sites. The proposed rule defines "fugitive emissions" as follows: [U]nintentional equipment emissions of methane and/or carbon dioxide containing natural gas or hydrocarbon gas (not including combustion flue gas) from emissions sources including, but not limited to, open ended lines, equipment connections or seals to the atmosphere.

Fugitive emissions also means CO<sub>2</sub> emissions resulting from combustion of natural gas in flares. See 74 FR at 16621. The preamble also notes that "fugitive emissions" are defined as "emissions that cannot reasonably pass through a stack, chimney, vent or other functionally equivalent opening." Id. at 1 6456. As is inherent in both of the foregoing definitions, fugitive emissions are generally defining unintentional and minor emissions from surface facilities. The concept of "fugitive emissions" simply should not apply and is a misconception when referencing a geologic sequestration site – rather, the appropriate analysis and focus should be and is potential leakage from a geologic sequestration site [Footnote: To the extent, EPA means "fugitive emissions" as only those that are "co-produced with oil/gas" (see 74 FR at 16584), as explained below, these are not emitted to the atmosphere in a CO<sub>2</sub> EOR and Sequestration project.]. In addition to the reasons discussed above, EPA should not require reporting "fugitive emissions"

from the geologic sequestration site because such information is impractical to measure, overly costly and burdensome, and will not lead to reliable and accurate data. For instance, the concept of “fugitive emissions” escaping from potentially transmissive faults and/or fractures is inappropriate given the diffuse nature of the potential flux, which will prove difficult to identify, locate and/or measure and will, in sum, be inconsequential. Any reporting data regarding the “fugitive emissions” from a geologic sequestration site will not have any meaningful relevance to the effectiveness of the overall geologic sequestration project. Finally, the concept of storage effectiveness should not be addressed by a GHG emissions reporting requirement, but rather should be and is being addressed by on-going EPA UIC rulemaking and other legislative and regulatory proceedings.

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

It is EPA’s strong intention to harmonize CCS requirements across relevant statutory or other programs in order to minimize any redundancy and any burden on reporters. See the Preamble, Section III.PP for a discussion of harmonizing efforts in *Definition of Source Category*.

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**Commenter Name:** Tiffany Rau

**Commenter Affiliation:** Hydrogen Energy International LLC (HEI)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0517.1

**Comment Excerpt Number:** 1

**Comment:** HEI applauds EPA’s decision to exclude the carbon capture and storage chain from the source category of CO<sub>2</sub> Suppliers in the proposed rule. The purpose of the proposed rule is to quantify and understand significant emission sources to the atmosphere and not to understand mitigation technologies. As EPA has stated in the Preamble, the primary purpose of EPA’s proposed rule is to gather comprehensive and accurate data to improve the government’s understanding of GHG emissions from industrial sources. The fundamental objective of this data and information gathering is to guide and inform the U.S. government’s future policy options and regulations with respect to climate change. 74 FR at 16456. Carbon capture and storage, on the other hand, is an important climate change mitigation technology and has been recognized as such by the Intergovernmental Panel on Climate Change (IPCC), governmental authorities, environmental NGOs, scientists and international bodies [Footnote: In 2005, the IPCC released a report, Carbon Dioxide Capture and Storage (the “IPCC CCS Report”), which was written by 125 contributing authors, and was extensively reviewed by over 200 others, including technical experts and government representatives from around the world. The IPCC CCS Report carefully weighs the technologies and the potential risk and concludes that, with appropriately selected and managed sites, CO<sub>2</sub> may be permanently sequestered in subsurface formations. The IPCC CCS Report notes that the early commercial scale geologic sequestration projects will probably employ CO<sub>2</sub> sequestration with EOR.]. Accordingly, a rule that aims to quantify and understand sources and trends of industrial GHG emissions to the atmosphere should not extend beyond its scope and attempt to assess the effectiveness of carbon capture and storage as an option for mitigating climate change or the amount of CO<sub>2</sub> sequestered in a geologic formation. Simply stated, a geologic sequestration site is not an “emission source.” Importantly, understanding and



quantifying the effectiveness of geologic sequestration in the subsurface requires a set of procedures and monitoring efforts specifically designed for a particular geologic sequestration site, which is beyond the scope of this proposed rule and beyond the statutory authority cited by EPA for this proposed rule. Consequently, EPA should exclude reporting from the carbon capture and storage chain from its final rule.

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

The “carbon capture and storage chain” is not excluded from the source category of CO<sub>2</sub> suppliers, as stated in the comment. Facilities with production process units that capture and supply CO<sub>2</sub> for commercial applications or that capture and maintain custody of a CO<sub>2</sub> stream in order to sequester or otherwise inject it underground are required to report the amount of CO<sub>2</sub> captured under Subpart PP; in addition facilities that extract or produce a CO<sub>2</sub> stream from production wells for purposes of supplying CO<sub>2</sub> for commercial applications or that extract and maintain custody of a CO<sub>2</sub> stream in order to sequester or otherwise inject it underground are required to report the amount of CO<sub>2</sub> produced under Subpart PP. Downstream processing, transport, injection, and storage facilities are not included in Subpart PP.

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**Commenter Name:** Marc J. Meteyer

**Commenter Affiliation:** Compressed Gas Association (CGA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0981.1

**Comment Excerpt Number:** 78

**Comment:** The CGA member companies will be active in the support of CCS projects moving forward. CCS technology will be critical in the long range goals of the nation to control GHG emissions and the global goal of combating global warming. Our membership supports stakeholder reporting of CO<sub>2</sub> sequestered in geological formations and the general approach of the geological sequestration report proposed in subpart PP.

**Response:** Thank you. See the Preamble, Section III.PP for a response to comments on carbon capture and storage (CCS) in *Definition of Source Category*.

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**Commenter Name:** See Table 2

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0679.1

**Comment Excerpt Number:** 251

**Comment:** Although EPA is not proposing inclusion of geologic sequestration, they are asking for comments for this relatively small source to “provide a more complete understanding of the efficacy of carbon capture and storage technologies as an option for mitigating CO<sub>2</sub> emissions” and to “quantify and verify the amount of CO<sub>2</sub> sequestered in geologic formations.” EPA notes that “a possible approach to include geologic sequestration might be to ask EOR operators to submit a geologic sequestration report [...] based on the amount of CO<sub>2</sub> injected minus any

fugitive emissions.” EPA goes on to identify a list of specific information to be included in the report. API comments: EOR cannot be confused with sequestration. EOR accounts for a relatively small percentage of emissions; requiring reporting from EOR places undue burden on operations that might not be subject to the rule otherwise. The following comments are specific to the reporting elements EPA outlines in the preamble: 1. There are not “sequestration sites”; the distinction relative to EOR projects (e.g. for demonstration for sufficient storage) should be reinforced. 2. Requiring EOR operators to submit a geologic sequestration report would require tracking and identifying emission sources which may not be subject to the rule otherwise. 3. Some of the data to be included in the report (e.g. a map showing the modeled aerial extent of the CO<sub>2</sub> plume over the lifetime of the project) is CBI, and is not relevant to emissions reporting. 4. Certain requirements (e.g. assessment of the risks of CO<sub>2</sub> leakage) extend beyond the scope of rulemaking for emission sources operated in normal process. 5. Requirements surrounding ‘baseline conditions’ are misplaced. There were likely no baseline conditions established for existing EOR projects. Effectiveness of the system to contain CO<sub>2</sub> may have been based on modeling and/or pilots within the field.

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

It is EPA’s strong intention to harmonize CCS requirements across relevant statutory or other programs in order to minimize any redundancy and any burden on reporters. See the Preamble, Section III.PP for a discussion of harmonizing efforts in *Definition of Source Category*.

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**Commenter Name:** See Table 2

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0679.1

**Comment Excerpt Number:** 248

**Comment:** EPA seeks comment on how to quantify and verify the amount of CO<sub>2</sub> sequestered in geologic formations. API comments: The information EPA is considering that all EOR operators submit, regardless of whether the operator is intending to store CO<sub>2</sub> or not, is unreasonable. EPA asks for data on fugitive emissions where there is no data to support the concept of fugitive emissions from an EOR site (see references above) nor are there technologies available to reliably measure soil/air fluxes (this was clearly established at the EPA public workshop on Underground Injection of CO<sub>2</sub> in Feb. 2008 in Arlington, VA). Moreover, many of the requests are well beyond the scope of this rulemaking, such as requiring “a map showing the modeled aerial extent of the CO<sub>2</sub> plume over the lifetime of the project” and “providing information which demonstrates sufficient storage capacity for the expected operating lifetime of the plant” (74 FR 68 16584). [footnote: The phrase “of the plant” begs the question, what plant? These are EOR facilities being discussed. Also, why would a regulatory agency - in its data collecting function - need to know whether there is sufficient storage capacity? This should be covered – if at all, and there are compelling reasons why not – by the proposed Class VI rules, not a reporting rule.] Currently, these are not requirements for Class II EOR wells, nor do they make any sense in a business-as usual EOR context. Indeed, almost every item of requested information is not within scope of this rulemaking and is in fact being addressed to a large extent

by the EPA's proposed CO<sub>2</sub> storage regulations. However, if EPA were to require submittal of this information – which API contends is not appropriate - and if the same information is required under another rule, compliance with the other rule should suffice for this rule. API does not believe the reporting rule should include CO<sub>2</sub> managed by CCS, since the intent of the reporting rule is to gather CO<sub>2</sub> emissions data to inform policy. By definition, neither CCS nor EOR should be considered a GHG emission source. Based on extensive studies conducted to date (e.g., Weyburn CO<sub>2</sub> Monitoring Project, Saline Aquifer Carbon Dioxide Storage project (SACS), CO<sub>2</sub> Store, etc.) the evidence is that there is no leakage associated with these types of operations (e.g. Weyburn, Sleipner, and In Salah). If in the future GHG reduction regulations are promulgated, offset credits should be granted to the quantity of CO<sub>2</sub> managed by an entity and tracked through the appropriate reporting mechanism.

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

It is EPA's strong intention to harmonize CCS requirements across relevant statutory or other programs in order to minimize any redundancy and any burden on reporters. See the Preamble, Section III.PP for a discussion of harmonizing efforts in *Definition of Source Category*

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**Commenter Name:** See Table 2

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0679.1

**Comment Excerpt Number:** 20

**Comment:** EPA states:” We are not proposing the inclusion of geologic sequestration in the proposed rulemaking. However, the Agency recognizes that there may be significant stakeholder interest in reporting the amount of CO<sub>2</sub> injected and geologically sequestered at EOR operations in order to demonstrate the effectiveness of EOR projects that ultimately intend to store the CO<sub>2</sub> for long periods of time...we have outlined initial thoughts about how geologic sequestration might be included in a reporting program for EOR sequestration or other types of geologic sequestration. We welcome comment on the approach outlined below or other suggestions for how to quantify and verify the amount of CO<sub>2</sub> sequestered in geologic formations”. (74 FR 68, page 16584) API Comments: EPA is confusing the practice of EOR with the practice of geologic storage. While CO<sub>2</sub> is trapped in the hydrocarbon formation during EOR and permanently stored, that does not make the site a geologic storage site (i.e. one where the wells would be permitted under EPA's proposed Class VI rule) and should not impose on the EOR operator the requirements associated with operating a geologic storage site. The information EPA is considering for EOR operators to submit is unreasonable. EPA is considering asking for data on fugitive emissions where there is no data to support the concept of fugitive emissions from an EOR site (see references in Exhibit 2) nor are there technologies available to reliably measure soil/air fluxes (this was clearly established at the EPA public workshop on Underground Injection of CO<sub>2</sub> in Feb. 2008 in Arlington, VA). Moreover, many of the requests are well beyond the scope of this rulemaking, such as requiring “a map showing the modeled aerial extent of the CO<sub>2</sub> plume over the lifetime of the project” and “providing information which demonstrates sufficient storage capacity for the expected operating lifetime of the plant” (74 FR

68 16584, emphasis added). Currently, these are not requirements for Class II EOR wells nor do they make any sense in a business-as-usual EOR context. Indeed, almost every item of requested information is not within scope of this rulemaking. Consistent with the above comments on EOR, API does not believe the reporting rule should include CO<sub>2</sub> managed by CCS either since the intent of the reporting rule is to gather CO<sub>2</sub> emissions data to inform policy. Despite extensive study (e.g., Weyburn CO<sub>2</sub> Monitoring Project, SACS, CO<sub>2</sub> Store, etc.) the evidence is that there is no leakage associated with these types of operations (e.g. Weyburn, Sliempner, and In Salah). If in the future GHG emission reduction regulations are promulgated, offset credits should be granted to the quantity of CO<sub>2</sub> managed by CCS and tracked through the appropriate reporting mechanism.

**Response:** See the response to the comment directly above, comment EPA-HQ-OAR-2008-0508-0679.1, excerpt 248.

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**Commenter Name:** Barbara A. Walz

**Commenter Affiliation:** Tri-State Generation and Transmission Association, Inc.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0495.1

**Comment Excerpt Number:** 10

**Comment:** Subpart PP requires reporting of CO<sub>2</sub> supplied for commercial applications from capture of CO<sub>2</sub> from a manufacturing process, fuel combustion source, or waste treatment; from CO<sub>2</sub> production wells; and from imports and exports of bulk CO<sub>2</sub>. It does not cover any reporting from facilities that process, transport, or store CO<sub>2</sub> (including long-term geologic sequestration of CO<sub>2</sub> and enhanced oil recovery). In doing so, EPA is focusing on quantifying the U.S. supply of bulk CO<sub>2</sub>, and assumes that the entire supply is emitted (Technical Support Document page 7). Although the preamble states: "We are not proposing the inclusion of geologic sequestration in the proposed rulemaking" (V.PP.1 page 708), EPA is seeking comment on whether reporting of geologic sequestration should be included in the rule, focusing more on any fugitive emissions from the sequestration. They also outline one approach that requires a one-time report on details of the sequestration site, and an annual reporting of quantities injected and any associated fugitive emissions.

Tri-State agrees that, at this point in time, it is appropriate to exclude the fugitive emissions from geologic sequestration of CO<sub>2</sub>. However, excluding any reporting of geologic sequestration, whether from enhanced oil recovery or other methods, would leave a critical gap in the information provided through this reporting system. While EPA seems to be focused on the geologic sequestration as a potential source of emissions, it is potentially more important to measure the portion of the CO<sub>2</sub> supply that is not emitted. There are several reasons for this: 1. Geologic sequestration is likely to be a critical component of any comprehensive, long-term GHG policy, and good data will be important for designing and assessing the sequestration components of any such policy. 2. Even though carbon capture and sequestration (CCS) technology is recognized as a critical technology for limiting GHG emissions from the electric power sector, it is not yet commercially available. It will be important to track the performance of pilot, demonstration, and "first-mover" commercial scale facilities in a consistent way. 3. If and when GHG emissions may be monetized, it will be critically important to electricity generators and potential markets to be able to adjust their CO<sub>2</sub> emissions to back out the portion that is sequestered and not emitted. For all these reasons, it is important for this rule to include the reporting of geologically stored CO<sub>2</sub>.

**Response:** In the Subpart PP TSD, EPA reflected a provisional accounting convention based on the 2006 IPCC Guidelines Reporting Convention suggested approach for counting a potential CO<sub>2</sub> source as emitted until nationally accepted protocols are developed for measurement, verification and reporting. By referencing this convention, we did not intent to imply that EPA believes that all of the CO<sub>2</sub> Supply is physically emitted to the atmosphere. EPA did not intend to characterize all CO<sub>2</sub> supplied to the economy as emissions and recognizes that there are a variety of applications for CO<sub>2</sub>, both emissive and non-emissive. See the Preamble, Section III.PP for a discussion of this in *Definition of Source Category*.

This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

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**Commenter Name:** Carol E. Whitman

**Commenter Affiliation:** National Rural Electric Cooperative Association (NRECA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0483.1

**Comment Excerpt Number:** 11

**Comment:** Include Reporting Requirements to Account for Geologically Sequestered CO<sub>2</sub>. Subpart PP requires reporting of CO<sub>2</sub> supplied for commercial applications from capture of CO<sub>2</sub> from a manufacturing process, fuel combustion source, or waste treatment; from CO<sub>2</sub> production wells; and from imports and exports of bulk CO<sub>2</sub>. It does not cover any reporting from facilities that process, transport, or store CO<sub>2</sub> (including long-term geologic sequestration of CO<sub>2</sub> and enhanced oil recovery). In doing so, EPA is focusing on quantifying the U.S. supply of bulk CO<sub>2</sub>, and assumes that the entire supply is emitted (Technical Support Document page 7). Even though the preamble states: We are not proposing the inclusion of geologic sequestration in the proposed rulemaking (V.PP.1, 74 Fed. Reg. 16584), EPA is seeking comment on whether reporting of geologic sequestration should be included in the rule, focusing more on any fugitive emissions from the sequestration. They also outline one approach that requires a one-time report on details of the sequestration site and an annual reporting of quantities injected and any associated fugitive emissions. We agree that, at this point in time, it is appropriate to exclude the fugitive emissions from geologic sequestration of CO<sub>2</sub>. However, excluding any reporting of the actual geologic sequestration itself, whether from enhanced oil recovery or other methods, would leave a critical gap in the information provided through this reporting system. While EPA seems to be focused on the geologic sequestration as a potential source of emissions, it is potentially more important to measure the portion of the CO<sub>2</sub> supply that is not emitted. There are several reasons for this: \* - Geologic sequestration is likely to be a critical component of any comprehensive, long-term GHG policy, and good data will be important for designing and assessing the sequestration components of any such policy. \* - Even though carbon capture and sequestration (CCS) technology is recognized as a critical technology for limiting GHG emissions from the electric power sector, it is not yet commercially available. It will be important to track the performance of pilot, demonstration, and “first-mover” commercial scale facilities in a consistent way. \* - And, at whatever point in time GHG emissions may be monetized, it will be critically important to fossil electricity generators and others to be able to adjust their CO<sub>2</sub> emissions to back out the portion that is sequestered and not emitted. For all these reasons, it is important for this rule to include the reporting of geologically stored CO<sub>2</sub>.

**Response:** See the response to the comment directly above, comment EPA-HQ-OAR-2008-0508-0495.1, excerpt 10.

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**Commenter Name:** Claire Olson

**Commenter Affiliation:** Basin Electric Power Cooperative

**Document Control Number:** EPA-HQ-OAR-2008-0508-0637.1

**Comment Excerpt Number:** 17

**Comment:** Basin Electric supports the following comments regarding geological sequestration of CO<sub>2</sub>, developed in conjunction with the NRECA. Subpart PP requires reporting of CO<sub>2</sub> supplied for commercial applications from capture of CO<sub>2</sub> from a manufacturing process, fuel combustion source, or waste treatment; from CO<sub>2</sub> production wells; and from imports and exports of bulk CO<sub>2</sub>. It does not cover any reporting from facilities that process, transport, or store CO<sub>2</sub> (including long-term geologic sequestration of CO<sub>2</sub> and enhanced oil recovery). In doing so, EPA is focusing on quantifying the U.S. supply of bulk CO<sub>2</sub>, and assumes that the entire supply is emitted. Even though the preamble states: "We are not proposing the inclusion of geologic sequestration in the proposed rulemaking"(V.PP.1 page 708), EPA is seeking comment on whether reporting of geologic sequestration should be included in the rule, focusing more on any fugitive emissions from the sequestration. EPA also outlines one approach that requires a one-time report on details of the sequestration site and an annual reporting of quantities injected and any associated fugitive emissions. Basin Electric agrees that, at this point in time, it is appropriate to exclude the fugitive emissions from geologic sequestration of CO<sub>2</sub>. However, excluding any reporting of geologic sequestration, whether from enhanced oil recovery or other methods, would leave a critical gap in the information provided through this reporting system. While EPA seems to be focused on the geologic sequestration as a potential source of emissions, it is potentially more important to measure the portion of the CO<sub>2</sub> supply that is not emitted. There are several reasons for this: 1. Geologic sequestration is likely to be a critical component of any comprehensive, long term GHG policy, and good data will be important for designing and assessing the sequestration components of any such policy. 2. Even though carbon capture and sequestration (CCS) technology is recognized as a critical technology for limiting GHG emissions from the electric power sector, it is not yet commercially available. It will be important to track the performance of pilot, demonstration, and "first-mover" commercial scale facilities in a consistent way. 3. If GHG emissions become monetized, it will be critically important to fossil electricity generators and others to be able to adjust their CO<sub>2</sub> emissions to back out the portion that is sequestered and not emitted. For all these reasons, it is important for this rule to include the reporting of geologically stored CO<sub>2</sub>. One option for reporting could include EPA recognizing and capturing any data reported as CO<sub>2</sub> reductions or net sequestration from the 1605b DOE reporting. Another option would be with the reporting of CO<sub>2</sub> export that is reported under a different section as a CO<sub>2</sub> supplier; where the quantity of CO<sub>2</sub> reported could also have a subsection report to designate the percentage of the CO<sub>2</sub> reported that is directed for sequestration FOR geologic sequestration.

**Response:** See our response to the comment directly above, comment EPA-HQ-OAR-2008-0508-0495.1, excerpt 10.

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**Commenter Name:** See Table 4

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0635

**Comment Excerpt Number:** 89

**Comment:** To facilitate implementation of the recommendations above, we recommend the following changes to its proposed rule text at Subpart PP [footnote: 354 In the alternative, EPA should consider incorporating the substance of these comments in other sections of the reporting rule if it is determined that section PP is not the appropriate place to incorporate reporting of activities at CO<sub>2</sub> injection sites.] 1. Rename the source category “Suppliers and Injectors of Carbon Dioxide, and Sequestration Operations” 2. Amend subpart (a) of proposed section 98.420 “Definition of the source category,” to read as follows, adding subparagraphs (4) and (5): “(a) The source category consists of the following: ... Geologic sequestration of CO<sub>2</sub> for which an Underground Injection Control permit is required under the Safe Drinking Water Act. Injection and subsequent production and/or processing of CO<sub>2</sub> for enhanced hydrocarbon recovery.” 3. Amend proposed section 98.420(b) by removing proposed paragraphs (1) and (2).

**Response:** See the Preamble, Section III.PP for the response to comment on carbon capture and storage (CCS) in *Definition of Source Category*.

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**Commenter Name:** See Table 4

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0635

**Comment Excerpt Number:** 88

**Comment:** In the future, GCS and EOR activities may be increasingly used for keeping anthropogenic CO<sub>2</sub> out of the atmosphere. In a separate effort, EPA should provide the framework for airside monitoring and reporting of potential emissions from these activities. In particular, detailed monitoring, accounting and reporting of air emissions should be developed for GCS sites (to assist in ensuring no more than negligible releases at a facility if it is properly sited, designed, and permitted), and should take into account all potential release pathways, including all parts of a well (wellhead, casing, cement, etc) as well as geologic pathways (faults, fractures, spill or discharge points, permeable layers etc). The development of an appropriate monitoring, accounting and reporting protocol may not fit within the timeline of the rest of this proposed rule. The intricacies and potential complexities of such a protocol merit stakeholder input and opportunity for public comment. Its timely completion, however, is crucial. We therefore urge EPA to commit to developing, at the earliest practicable date, a comprehensive protocol for monitoring, accounting and reporting of emissions from all types of GCS site (including at the very least saline formations and hydrocarbon reservoirs). Only when such a protocol for airside monitoring is issued can adequate CO<sub>2</sub> accounting be established for GCS sites and full public accountability of CO<sub>2</sub> sequestration effectiveness be achieved. This will lead to greater transparency and can also be used to test expectations that properly selected and regulated sequestration sites will permanently retain the injected CO<sub>2</sub>. [FOOTNOTE: 352 The IPCC Special Report on GCS concluded: Observations from engineered and natural analogues as well as models suggest that the fraction retained in appropriately selected and managed geological reservoirs is very likely to exceed 99% over 100 years and is likely to exceed 99% over 1,000 years. For well-selected, designed and managed geological storage sites, the vast majority of the CO<sub>2</sub> will gradually be immobilized by various trapping mechanisms and, in that case, could be retained for up to millions of years. Because of these mechanisms, storage could

become more secure over longer timeframes.] EPA should not delay finalizing the reporting rule until this protocol is finalized, but should proceed with requiring the basic flowrate monitoring outlined above. Developing a monitoring, accounting and reporting protocol is important to improve our knowledge of CO<sub>2</sub> injection and should not be delayed either. Once such a protocol has been finalized, EPA should incorporate the new detailed requirements for monitoring, accounting and reporting for GCS facilities into the rule.[footnote: 353 Sierra Club, speaking only for itself, further recommends that EPA not permit CCS operations until an initial airside monitoring protocol has been completed.]]

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

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**Commenter Name:** See Table 4

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0635

**Comment Excerpt Number:** 87

**Comment:** While the preamble describes “enhanced oil recovery” (EOR) as ongoing, recognizes that significant amounts of CO<sub>2</sub> are injected annually, and that there “may be significant stakeholder interest in reporting the amount of CO<sub>2</sub> injected and geologically sequestered at EOR operations,” EPA declines to require airside monitoring and reporting of CO<sub>2</sub> from that activity in this rule. Understanding basic mass balances, both at EOR and GCS sites is a necessary step in establishing a more detailed monitoring and reporting protocol. Developing the data set under the current rule will assist these efforts and should not entail significant additions to the rule since injection rate monitoring and well extraction CO<sub>2</sub> concentration analysis can be achieved with standard flowrate measurement equipment, which is typically already in place in the field. EPA is undertaking a concurrent, separate rulemaking to enable the permitting of a new class of CO<sub>2</sub> injection wells under the Safe Drinking Water Act’s Underground Injection Control (UIC) program, but that rulemaking does not adequately address sequestration effectiveness. First, the Safe Drinking Water Act does not address airside leakage concerns, as the Clean Air Act does. Second, although compliance with the Safe Drinking Water Act’s requirements may protect underground sources of drinking water and concurrently reduce the risk of atmospheric leakage, those requirements do not include monitoring of potential leakage out of the ground. As a first step, the reporting rule must require the tracking and reporting of streams that can be measured using standard instruments and techniques such as flowmeters for all EOR and GCS sites. These measurements should include the amounts injected at the wellhead (reported at the well or facility/operator level), the amounts produced or captured from produced fluids, and any other points needed to deduce the quantities that end up being directly re-injected or re-enter a pipeline, (vs. the quantities that escape to the atmosphere).

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position



on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

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**Commenter Name:** See Table 4

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0635

**Comment Excerpt Number:** 86

**Comment:** The rule fails to distinguish between different types of underground injection activity. In the preamble, the differences between geologic carbon sequestration (GCS) operations and EOR activities are not discussed. Unlike EOR, GCS projects may be undertaken solely for the purpose of permanently sequestering all the injected CO<sub>2</sub> from atmospheric release in any type of geologic reservoir. Instead of requiring reporting that promotes the development of data to document the different uses of CO<sub>2</sub>, the proposed rule text simply exempts EOR and GCS facilities from monitoring and reporting the amounts of injected CO<sub>2</sub>.

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

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**Commenter Name:** Kim Dang

**Commenter Affiliation:** Kinder Morgan Energy Partners, L.P.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0370.1

**Comment Excerpt Number:** 11

**Comment:** The Proposed Rule also excludes emissions from geologic sequestration sites, but welcomes comment on a potential method for reporting for sequestration sites. Kinder Morgan believes that scientific research has demonstrated that these sites do not produce emissions, and therefore should not be subject to reporting requirements unless and until they actually exist and exceed the 25,000 tons per year threshold.

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

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**Commenter Name:** See Table 3

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-1021.1

**Comment Excerpt Number:** 21

**Comment:** EEI is a strong proponent of carbon capture and storage (CCS) as a critical component in the suite of technologies and measures needed to reduce GHG emissions while ensuring that electric service to customers remains affordable and reliable. As a general matter, while EPA currently does not propose to require fugitive emissions reporting from GS and EOR, if and when EPA does address CCS, it should be considered separately from suppliers of CO<sub>2</sub>. EPA's proposed reporting protocol for suppliers of CO<sub>2</sub> implies that CO<sub>2</sub> used in most industrial applications eventually would be released to the atmosphere. However, CCS is a qualitatively different enterprise: The goal is to avoid releases to the atmosphere. While more research is needed and is ongoing, available data indicate that appropriately sited and monitored GS will not result in emissions to the air or other environmental media. If EPA later determines that CCS, and, in particular, GS, should be subject to the proposed reporting rule, any reporting obligation should be consistent with the risk of CO<sub>2</sub> emissions throughout the CCS chain. It is appropriate that EPA not include CCS in the proposed reporting rule. However, in the preamble, EPA notes that "obtaining robust data on fugitive CO<sub>2</sub> emissions from the entire carbon capture and storage chain would provide a more complete understanding of the efficacy of carbon capture and storage technologies as an option for mitigating CO<sub>2</sub> emissions." While such information will be important to the development and deployment of this critical climate change mitigation technology and would be useful, the instant rule, which is focused on emissions reporting, is not the appropriate place for crafting rules to address the efficacy of CCS, particularly GS. A separate rule focused on CCS would be a more appropriate approach for addressing the potential for emissions throughout the CCS chain and would not run the risk of subjecting CCS to reporting burdens that are not commensurate with the risk of emissions, as discussed above. If appropriate, a separate CCS rule could address emissions monitoring for possible fugitive emissions from the capture and transportation of CO<sub>2</sub> and accounting methodologies and monitoring techniques for any fugitive emissions from storage sites to ensure containment, among other issues. This rule also could address issues related to EOR operations, which also may store CO<sub>2</sub>, particularly in the near term. In addition, a separate rule also would allow EPA to develop the CCS-specific emissions accounting protocols that will be needed to facilitate any future cap-and-trade program's recognition of CCS (and, as appropriate, EOR) as a way to avoid emissions and the related allocation of legal rights and obligations through the CCS chain. EPA should avoid piecemeal regulation of CCS by addressing these CCS issues in a single rulemaking that would complement the Underground Injection Control rule for CO<sub>2</sub> sequestration injection wells proposed last year (see 73 Fed. Reg. 43492 (2008)) that addressed subsurface containment issues. EEI would welcome the opportunity to work with EPA in crafting a rule that appropriately addresses CCS.

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

It is EPA's strong intention to harmonize CCS requirements across relevant statutory or other programs in order to minimize any redundancy and any burden on reporters. See the Preamble, Section III.PP for a discussion of harmonizing efforts in *Definition of Source Category*.

**Commenter Name:** John M. Batt  
**Commenter Affiliation:** Airgas, Inc.  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0408.1  
**Comment Excerpt Number:** 30

**Comment:** Definition of the reporting facility (Preamble, FR page 16585): Airgas supports the view of monitoring and reporting the mass of CO<sub>2</sub> extracted and transferred from natural wells by single owners or operators within a given Dome. In essence, this amounts to corporate level reporting for this small collection of sources. This reduces complexity and reporting burdens for companies pulling CO<sub>2</sub> from multiple locations. This strikes a balance between cost of compliance and the accuracy of data reported.

**Response:** EPA concurs with this comment and has included provisions for corporate reporting in Subpart PP.

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**Commenter Name:** See Table 2  
**Commenter Affiliation:**  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0679.1  
**Comment Excerpt Number:** 249

**Comment:** EPA seeks “comment on alternative methods for defining the reporting facility (e.g., reporting at the level of an individual well).” (p. 16585) API comments: EPA has correctly noted that defining the reporting facility as an individual well results in “complex reporting requirements” which “are difficult to implement” (74 FR 68 16531). Consistency with other EPA rulemakings efforts should be followed here by allowing the combining of individual units or components which are under common control, dependent upon and directly adjacent to the facility (i.e., CO<sub>2</sub> production well). This should be allowed to simplify reporting to the extent practical.

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0408.1, excerpt 30.

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**Commenter Name:** John M. Batt  
**Commenter Affiliation:** Airgas, Inc.  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0408.1  
**Comment Excerpt Number:** 31

**Comment:** We ask for clarification regarding the definition contained in §98.420(a)(1). It is possible to interpret that companies such as Airgas own and operate “production process units that capture a CO<sub>2</sub> stream for purposes of supplying CO<sub>2</sub> for commercial applications”. However in section 98.420 (b) our purification, compression, and processing activities are expressly excluded. This leads to ambiguity. We have also referred to page 4 of the “Technical Support Document for CO<sub>2</sub> Supply”, but the definition still remains unclear. Referring to the steps below, we believe it is very clear which entities are producing or releasing the CO<sub>2</sub> molecules. Whether released from a natural well or released as a waste product from an ammonia facility, defining step 1 is clear. Likewise step 3 is also very clearly defined and in fact these activities comprise the carbon dioxide business of Airgas. It is the ambiguity around step 2 in the diagram below where we seek to clarify the “owner” of the capture process. “Step” 1: Generation or Production of the CO Molecule “Step” 2: Capture for purpose of supplying commercial

applications “Step” 3: Compression, purification, and liquefaction of CO<sub>2</sub> for supply to market. We respectfully request confirmation that each of the following activities are not covered by the Proposed Rule and will not trigger a reporting requirement. 1. Taking ownership of a CO<sub>2</sub> stream that has been separated and removed from, as just one example, an ammonia production facility. (It is assumed that this CO<sub>2</sub> stream has been reported from the requirements of subpart G Ammonia, section 98.72 (c). If our activity of taking ownership of this stream for further processing also triggers a reporting requirement, then the EPA will be dealing with double reporting for this specific application). 2. Compressing, purifying and liquefying the stream in item 1. 3. Storing the liquid created in item 2. 4. Transporting (by any means) and selling the CO<sub>2</sub> in item 3 to end users of CO<sub>2</sub>. In addition, Airgas respectfully requests further definition of the following terms: 1. “Capture” (as defined in (98.420 (a)(1)). We are seeking clarity on the definition of the word capture, within the context of the industrial production process. If an industrial process (like ammonia or ethylene oxide) separates CO<sub>2</sub> for its own use or for sale to the industrial gas industry, does this constitute “capture”? Does a CO<sub>2</sub> purification and liquefaction plant (industrial gas company owned) that takes separated CO<sub>2</sub> from an ammonia supplier also “capture” the CO<sub>2</sub>? What if the industrial gas company owns and operates (in addition to the CO<sub>2</sub> liquefaction plant) the separation unit operation that does the CO<sub>2</sub> initial separation from the manufacturing process of the supplier, but the supplier still sells raw CO<sub>2</sub> to the industrial gas company? Would the industrial gas company action of operating the separation operation constitute “capture”? 2. Production Process unit (as used in (9 8.420 (a)( 1)). Is the “production process unit that captures a CO<sub>2</sub> stream for purposes of supplying CO<sub>2</sub> for commercial applications” the separation unit operation of the manufacturing facility (like ammonia or ethylene oxide) or is the “production process unit” the CO<sub>2</sub> purification and liquefaction plant? As a result of our comments above, Airgas requests that the term “producers of CO<sub>2</sub>” in section 98.2 (a)(4)(vi)(A), be more clearly defined. Also we respectfully submit that the definition of “Suppliers of Carbon Dioxide” (Subpart PP) be expanded and clarified to include the party responsible for the manufacture, creator, or liberator of the CO<sub>2</sub> molecule. This would include the owners of natural wells, which is clearly the intent of the EPA. Alternatively, the term “producer” might be more appropriate than “supplier”.

**Response:** EPA has provided clarification of the definition of "production process unit" under 40 CFR 98.6 and 40 CFR 98.420(a)(1) and clarification of Subpart PP reporting requirements in the Preamble Section III.PP.3. The entity that "captures" the CO<sub>2</sub> from the production process (e.g., an ammonia manufacturing process) is required to report the amount of CO<sub>2</sub> captured. Under Subpart PP the "producer" of the CO<sub>2</sub> is the process (e.g., an ammonia manufacturing process) at which the CO<sub>2</sub> is captured and the "production process unit" is the equipment used to capture the CO<sub>2</sub> from that production process. "Production Process Unit" does not include any equipment used to subsequently purify, process, or compress the CO<sub>2</sub> after the CO<sub>2</sub> is captured from the process. Production process units that capture a CO<sub>2</sub> stream for purposes of supplying CO<sub>2</sub> for commercial applications are required to report the percentage of that stream that is biogenic during the reporting year ( if any).

EPA has provided clarification of the definition of "capture" and clarification of Subpart PP reporting requirements with this comment response. CO<sub>2</sub> separated by an entity for its own use is not "CO<sub>2</sub> capture" and is not required to be reported under Subpart PP. Only CO<sub>2</sub> captured that is "entered into commerce" or that is injected underground is required to be reported under Subpart PP. So in the example provided by the commenter, the industrial process entity that captured the CO<sub>2</sub> (e.g., the ammonia plant or the ethylene oxide plant), and not the CO<sub>2</sub> liquefaction plant entity, would be required to report the amount of CO<sub>2</sub> captured. Only the amount of CO<sub>2</sub> captured by the industrial process entity AND transferred to another entity or

injected underground would be required to be reported. The amount of CO<sub>2</sub> captured by the industrial process entity and used onsite at the same entity would not be required to be reported.

In the final rule, we have expanded and clarified the definition of Supplier of Carbon Dioxide to be more specific and precise. However, we did not use the definition of facility suggested by this comment (“the party responsible for the manufacture, creator, or liberator”) because we concluded that this definition could be misunderstood or misapplied.

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**Commenter Name:** Marc J. Meteyer

**Commenter Affiliation:** Compressed Gas Association (CGA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0981.1

**Comment Excerpt Number:** 68

**Comment:** In addition, the CGA respectfully requests further definition of the following terms: 1. Capture” (as defined in (98.420 (a)(1 )). We are seeking clarity on the definition of the word capture, within the context of the industrial production process. If an industrial process (like ammonia or ethylene oxide) separates CO<sub>2</sub> for its own use or for sale to the industrial gas industry, does this constitute “capture”? Does a CO<sub>2</sub> purification and liquefaction plant (industrial gas company owned) that takes separated CO<sub>2</sub> from an ammonia supplier also “capture” the CO<sub>2</sub>? What if the industrial gas company owns and operates (in addition to the CO<sub>2</sub> liquefaction plant) the separation unit operation that does the CO<sub>2</sub> initial separation from the manufacturing process of the supplier, but the supplier still sells raw CO<sub>2</sub> to the industrial gas company? Would the industrial gas company action of operating the separation operation constitute “capture”? 2. Production Process unit (as used in (98.420 (a)(1 )). Is the “production process unit that captures a CO<sub>2</sub> stream for purposes of supplying CO<sub>2</sub> for commercial applications” the separation unit operation of the manufacturing facility (like ammonia or ethylene oxide) or is the “production process unit” the CO<sub>2</sub> purification and liquefaction plant?

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0408.1, excerpt 31.

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**Commenter Name:** Rich Raiders

**Commenter Affiliation:** Arkema Inc.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0511.1

**Comment Excerpt Number:** 67

**Comment:** EPA should clarify that the word “capture” in proposed 40 CFR 98.420(a)(1) means the removal of CO<sub>2</sub> from a process system for the express purpose of placement into the marketplace. Arkema operates a process unit including a CO<sub>2</sub> separation plant and a contract (not owned by the company) CO<sub>2</sub> compression station that removes CO<sub>2</sub> from a process stream to meet customer demand. The customer then compresses the CO<sub>2</sub> into its liquefied form, meters the product, and transports the product to their location for further management. As we do not control the fate of the produced CO<sub>2</sub>, we appreciate EPA limiting § 98.426(a)(2) fate reporting requirements to only those markets where the CO<sub>2</sub> producer has reasonable knowledge concerning the disposition of the produced liquefied gas.

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0408.1, excerpt 31.

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**Commenter Name:** Marc J. Meteyer  
**Commenter Affiliation:** Compressed Gas Association (CGA)  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0981.1  
**Comment Excerpt Number:** 67

**Comment:** The CGA member companies respectfully offer the following comments and suggestions: §98.420 (a) We are seeking clarification about the definition contained in 98.420 (a) (1). It is possible to interpret that our member companies own and operate “production process units that capture a CO<sub>2</sub> stream for purposes of supplying CO<sub>2</sub> for commercial applications”. However in section 98.420 (b) many of our member company activities are expressly excluded. This leads to ambiguity. We have also referred to page 4 of the “Technical support document for CO<sub>2</sub> Supply”, but the definition remains unclear. Referring to the diagram below, the CGA member companies believe it is very clear which entities are producing or releasing the CO<sub>2</sub> molecules. Whether released from a natural well or released as a waste product from an ammonia facility, defining step 1 in the diagram below is clear. Likewise step 3 is also very clearly defined and in fact these activities comprise the business of many of our CGA members. It is the ambiguity around step 2 in the diagram below where the CGA seeks to clarify the “owner” of the capture process. 1. Generation or Production of CO<sub>2</sub> Molecule 2. Capture for purpose of supplying commercial applications 3. Compression, purification and liquefaction of CO<sub>2</sub> for supply to market We respectfully request confirmation that each of the following CGA member company activities are not covered by the rule and will not trigger a reporting requirement. 1. Taking ownership of a CO<sub>2</sub> stream that has been separated and removed from, as just one example, an ammonia production facility. (CGA assumes that this CO<sub>2</sub> stream has been reported from the requirements of subpart G Ammonia, section 98.72 (c). If our activity of taking ownership of this stream for further processing also triggers a reporting requirement, then the EPA will be dealing with double reporting for this specific application). 2. Compressing, purifying and liquefying the stream in item 1. 3. Storing the liquid created in item 2. 4. Transporting (by any means) and selling the CO<sub>2</sub> in item 3 to end users of CO<sub>2</sub>.

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0408.1, excerpt 31.

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**Commenter Name:** Marc J. Meteyer  
**Commenter Affiliation:** Compressed Gas Association (CGA)  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0981.1  
**Comment Excerpt Number:** 66

**Comment:** Subpart PP – Suppliers of CO<sub>2</sub> CGA member companies supply CO<sub>2</sub> to a variety of value-added applications such as food chilling/freezing, “green” refrigeration and beverage carbonation. However in the vast majority of cases, our member companies (as defined under subpart PP) do not create, manufacture or liberate the CO<sub>2</sub>. Our member companies purify, compress and liquefy CO<sub>2</sub>, and then deliver it to the end user. Where our member companies further process this CO<sub>2</sub> for commercial sale, we in effect “reclaim” CO<sub>2</sub> that would have been immediately vented into the atmosphere, delaying the release of CO<sub>2</sub> until the point of use. After careful review, it is the interpretation of the CGA member companies that our activities with respect to capturing CO<sub>2</sub> from production process units are excluded from the reporting requirement as outlined in Subpart PP. (We acknowledge that other activities, such as importing/exporting, Hydrogen production and CO<sub>2</sub> production from wells will be covered by this and other Subparts).

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0408.1, excerpt 31.

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**Commenter Name:** John M. Batt

**Commenter Affiliation:** Airgas, Inc.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0408.1

**Comment Excerpt Number:** 29

**Comment:** Monitoring and reporting of fugitive emissions (Preamble, FR page 16583) Airgas supports the view of excluding the monitoring and reporting of fugitive emissions under the regulations. The reporting thresholds that have been selected are expected to cover approximately 85-90% of all national emissions and represent an excellent balance between accuracy of data reported and cost for compliance. We believe that inclusion of fugitive emissions will require significant extra cost for compliance with little upside benefit.

**Response:** EPA concurs with this comment in excluding fugitive CO<sub>2</sub> emissions from CO<sub>2</sub> capture facilities from reporting requirements under Subpart PP.

Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration and will address leakage in that proposal. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. EPA will consider this comment in developing the new proposal.

As stated in Section III.W of this preamble, EPA plans to take additional time to consider alternatives to data collection procedures and methodologies in the proposed 40 CFR part 98, subpart W and will consider inclusion of GHG reporting from other sectors of the oil and gas industry besides those proposed for reporting in proposed 40 CFR Part 98, subpart W. Fugitive emissions from EOR surface facility operations may be part of those considerations.

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**Commenter Name:** Paul R. Pike

**Commenter Affiliation:** Ameren Corporation

**Document Control Number:** EPA-HQ-OAR-2008-0508-0487.1

**Comment Excerpt Number:** 22

**Comment:** Ameren recognizes that carbon capture and storage ("CCS") is a component in the suite of technologies and methods needed to reduce GHG emissions while ensuring that electric service to customers remains affordable and reliable. In proposed subpart PP, EPA lays out the reporting requirements for suppliers of carbon dioxide (CO<sub>2</sub>), which includes production process units that capture CO<sub>2</sub> for commercial applications, but not geologic sequestration (GS) of CO<sub>2</sub> – the storage component of CCS – or enhanced oil or gas recovery (collectively, EOR), which also may serve a storage function. See proposed § 98.420, 74 Fed. Reg. 16725. EPA proposes to exclude reporting of possible fugitive emissions from CCS operations because "[m]uch of the CO<sub>2</sub> that could ultimately be released as fugitive emissions during transportation, injection and storage [] would be accounted for" in the emissions calculation methodologies for CO<sub>2</sub> supply proposed in the rule. However, EPA notes that "there could be merit in requiring reporting of fugitive emissions from geologic sequestration of CO<sub>2</sub>, in particular." 74 Fed. Reg. 16583. As a general matter, while EPA currently does not propose to require fugitive emissions reporting from GS and EOR, when and if EPA does address CCS, it should be considered separately from suppliers of CO<sub>2</sub>. EPA's proposed reporting protocol for suppliers of CO<sub>2</sub> implies that CO<sub>2</sub> used

in most industrial applications eventually would be released to the atmosphere. 74 Fed. Reg.16584. CCS, however, is a qualitatively different enterprise: The goal is to avoid releases to the atmosphere. While more research is needed and is ongoing, available data indicates that appropriately sited and monitored geologic storage will not result in emissions to the air or to other environmental media. If EPA later determines that CCS, and, in particular, GS, should be subject to the proposed reporting rule, any reporting obligation should be consistent with the risk of CO<sub>2</sub> emissions throughout the CCS chain.

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. However, given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

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**Commenter Name:** Thomas Siegrist

**Commenter Affiliation:** Koch Nitrogen Company LLC

**Document Control Number:** EPA-HQ-OAR-2008-0508-0351.1

**Comment Excerpt Number:** 10

**Comment:** KNC supports EPA's decision to exclude fugitive CO<sub>2</sub> emissions from the reporting requirements for ammonia production facilities, due to the low levels of fugitive emissions from these sources and the practical difficulty of estimating these emissions. EPA requested comments on its decision to exclude the reporting of fugitive carbon dioxide ("CO<sub>2</sub>") emissions from the carbon capture and storage chain. 68 Fed. Reg. at 16583. As EPA states in the Preamble, less than 2 percent of the total supply of CO<sub>2</sub> from industrial facilities and CO<sub>2</sub> production wells comes from ammonia production facilities. *Id.* Thus, attempting to estimate fugitive CO<sub>2</sub> emissions from such a small portion of the carbon capture and storage chain would not significantly enhance the accuracy of GHG emissions estimates. Moreover, certification as to the accuracy of an estimate of such low levels of fugitive emissions would be problematic for reporting entities. Therefore, KNC agrees with EPA's decision to exclude the reporting of fugitive CO<sub>2</sub> emissions from this sector and recommends that this exclusion be retained in the final rule.

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0408.1, excerpt 29.

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**Commenter Name:** See Table 2

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0679.1

**Comment Excerpt Number:** 247

**Comment:** EPA seeks "comment on the decision to exclude the reporting of fugitive CO<sub>2</sub> emissions from the carbon capture and storage chain [...] there could be merit in requiring the reporting of fugitive emissions from geological sequestration of CO<sub>2</sub>, in particular." (p. 16583) API comments: API supports the decision to exclude the reporting of fugitive CO<sub>2</sub> emissions from the CCS chain broadly and specifically does not believe there is merit in requiring the reporting of fugitive emissions from geologic sequestration of CO<sub>2</sub> or EOR operations that utilize CO<sub>2</sub>. API is concerned however that EPA does not appear to have a clear understanding



of the behavior of CO<sub>2</sub> when it is injected (usually in a supercritical state) into a geologic formation. EPA's discussion of the merits of reporting fugitive emissions from geologic sequestration suggests that EPA equates "retention rates" with only the volume of CO<sub>2</sub> that is locked in the geologic formation due to capillary trapping forces and that the remainder of the CO<sub>2</sub>, the mobile portion, constitutes the potential fugitive emission. [footnote: In particular, EPA states (74 FR 68 16584) "This report could provide information on the amount of CO<sub>2</sub> sequestered based on the amount of CO<sub>2</sub> injected minus any fugitive emissions".] This is incorrect. Retention rate or storage rate should refer to the amount of CO<sub>2</sub> placed in a secure underground storage formation or that is used in an active EOR project at a given point in time. The CO<sub>2</sub> produced with the oil is recycled through the system; it is not lost to the atmosphere. Importantly, each time the CO<sub>2</sub> is cycled through the reservoir, additional CO<sub>2</sub> is added to supplement the recycled CO<sub>2</sub> to offset CO<sub>2</sub> trapped in the formation due to capillary forces and to replace displaced reservoir fluids, thus maintaining a constant injection volume at the EOR project. The "retention rate" EPA refers to in the Preamble does not adequately capture the fact that EOR is a "closed system." In fact, the report that EPA cites in their discussion of retention rates recognizes this fact and states that, regarding a reservoir with 38% retention, "Essentially 100% of the purchased CO<sub>2</sub> is still in the system. At the end essentially 100% of the fluid will be stored in a reservoir." Additionally, evidence suggests that CO<sub>2</sub> injected via EOR wells in compliance with the UIC regulations does not leak into the surrounding groundwater (Smyth et al, 2008; Wilson and Monea, 2004) let alone the atmosphere (Klusman, 2003; Wilson and Monea, 2004). References: Smyth et al. (2008) Update on Studies on Risk to Aquifers from CO<sub>2</sub> Sequestration Gulf Coast Carbon Center, Bureau of Economic Geology. [SACROC EOR project] Klusman, (2003) A geochemical perspective and assessment of leakage potential for a mature carbon dioxide-enhanced oil recovery project and as a prototype for carbon dioxide sequestration: Rangely field, Colorado. American Association of Petroleum Geologists Bulletin, 87(9), 1485-1507 [Rangely EOR project] Wilson and Monea (editors) (2004) IEA GHG Weyburn CO<sub>2</sub> Monitoring and Storage Project Summary Report 2000-2004 Petroleum Technology Research Center, Regina SK, Canada. [Weyburn EOR project]

**Response:** In the proposed Subpart PP preamble, EPA cited a study about the term "retention rate". EPA understands from commenters that "retention rate" is defined as the amount of CO<sub>2</sub> that is injected into the underground formation (oil field), while the EOR site is operating and producing oil, and that is not recovered with the oil, and has to do with the efficiency of the CO<sub>2</sub> recycling process at an operating EOR site. EPA did not intend to suggest that "retention" equates to the amount of CO<sub>2</sub> sequestered in an underground formation. While EPA understands that some amount of CO<sub>2</sub> injected into oil and gas reservoirs for EOR purposes will be trapped in the subsurface, EPA concludes that site-specific elements beyond geophysical trapping parameters influence the amount of CO<sub>2</sub> securely sequestered. See the Preamble, Section III.PP for a discussion of such elements in *Definition of Source Category*.

Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration and will address leakage in that proposal. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. EPA will consider this comment in developing the new proposal.

As stated in Section III.W of this preamble, EPA plans to take additional time to consider alternatives to data collection procedures and methodologies in the proposed 40 CFR part 98, subpart W and will consider inclusion of GHG reporting from other sectors of the oil and gas industry besides those proposed for reporting in proposed 40 CFR Part 98, subpart W. Fugitive emissions from EOR surface facility operations may be part of those considerations.

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**Commenter Name:** See Table 2

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0679.1

**Comment Excerpt Number:** 19

**Comment:** EPA is addressing a few issues related to Carbon Capture and Storage (CCS) in the preamble to Subpart PP. EPA states: “We seek comment on the decision to exclude the reporting of fugitive CO<sub>2</sub> emissions from the CCS chain. We have concluded that there could be merit in requiring the reporting of fugitive emissions from geologic sequestration of CO<sub>2</sub>”. (74 FR 68 16583) API Comments API supports the decision to exclude the reporting of fugitive CO<sub>2</sub> emissions from the CCS chain broadly and specifically does not believe there is merit in requiring the reporting of fugitive emissions from geologic sequestration of CO<sub>2</sub>. API is concerned however that EPA does not appear to have a clear understanding of the behavior of CO<sub>2</sub> when it is injected (usually in a supercritical state) into a geologic formation. EPA’s discussion of the merits of reporting fugitive emissions from geologic sequestration suggests that EPA equates “retention rates” with the volume of CO<sub>2</sub> that is trapped in the geologic formation due to capillary trapping forces and that the remainder of the CO<sub>2</sub>, the mobile portion, constitutes the potential fugitive emission. This is incorrect. Retention rate or storage rate should refer to the amount of CO<sub>2</sub> placed in a secure underground storage formation or that is used in and active EOR project at a given point in time. The CO<sub>2</sub> not trapped in the formation is produced with the oil and recycled through the system; it is not lost to the atmosphere. Importantly, each time the CO<sub>2</sub> is cycled through the field, additional CO<sub>2</sub> is trapped in the formation and new CO<sub>2</sub> is constantly needed to supplement the recycled CO<sub>2</sub> and maintain a constant injection volume at the EOR project. In other words, of the amount of CO<sub>2</sub> initially injected in year zero, an increasing percentage will be retained in the formation with each cycling. The “retention rate” EPA refers to in the Preamble does not adequately capture this reality because new CO<sub>2</sub> is always being added to supplement that which is trapped in the formation. Additionally, evidence suggests that CO<sub>2</sub> injected via EOR wells in compliance with the UIC regulations does not leak into the surrounding groundwater (Smyth et al, 2008; Wilson and Monea, 2004) let alone the atmosphere (Klusman, 2003; Wilson and Monea, 2004). [See Exhibit 2 of DCN//DCN:EPA-HQ-OAR-2008-0508-0679.1 for full citations].

**Response:** See response to the comment directly above, comment EPA-HQ-OAR-2008-0508-0679.1, excerpt 247.

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**Commenter Name:** Kim Dang

**Commenter Affiliation:** Kinder Morgan Energy Partners, L.P.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0370.1

**Comment Excerpt Number:** 10

**Comment:** The Proposed Rule excludes fugitive emissions from CO<sub>2</sub> transportation, injection and storage. EPA states that although fugitive emissions are excluded under the current rule, EPA believes that it would be useful to obtain such data in order to evaluate the effectiveness of CCS as an emission mitigation option. As described above, Kinder Morgan believes reporting requirements should focus on actual emissions above 25,000 tons per year at a facility.

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0370.1, excerpt 8.

See response to comment EPA-HQ-OAR-2008-0508-0408.1, excerpt 29.

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**Commenter Name:** William C. Herz

**Commenter Affiliation:** The Fertilizer Institute (TFI)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0952.1

**Comment Excerpt Number:** 30

**Comment:** In the Preamble, EPA seeks comment on the decision to exclude the reporting of fugitive CO<sub>2</sub> emissions from the carbon capture and supply chain. 74 Fed. Reg. at 16583. Both the carbon used in stationary combustion sources and in the ammonia processing facility are accounted for in feedstock measurements. Downstream fugitive emissions of the same carbon would represent double counting of GHGs, especially for an ammonia manufacturing facility. TFI supports EPA's position not to require ammonia manufacturing facilities to report on fugitive emissions of carbon dioxide.

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0408.1, excerpt 29.

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**Commenter Name:** Ronald T. Evans

**Commenter Affiliation:** Denbury Resources, Inc.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0484.1

**Comment Excerpt Number:** 1

**Comment:** The proposed reports are unnecessary because they duplicate in substance (although not necessarily in format) reports that are already required by the oil and gas regulators of the various states in which such CO<sub>2</sub> is produced. Because the CO<sub>2</sub> production information is already readily available to the EPA, there is no need to require a duplicative report to the EPA. Denbury recommends that such a reporting requirement should only be imposed on CO<sub>2</sub> suppliers in those states (if any) that do not already require CO<sub>2</sub> producers to submit the information to state regulators. For example, in the state of Mississippi, the Mississippi Oil and Gas Board requires a monthly report from producers of CO<sub>2</sub>. [Footnote: Carbon dioxide is included in the definition of "gas" under the relevant Mississippi statute and rules. See Section 53-1-3 (d) of the Mississippi Code (defining the term "Gas" as including all natural gas "whether hydrocarbon or nonhydrocarbon" and specifically including carbon-dioxide).] The report requires monthly production quantity information on all CO<sub>2</sub> production wells in the state that the EPA could readily use in place of the proposed report. Similar reporting requirements apply to CO<sub>2</sub> production wells in the other states in which CO<sub>2</sub> is currently produced (e.g. Colorado and New Mexico). These monthly reports of CO<sub>2</sub> production should be adequate to satisfy the agency's objective of gathering data on the production quantities of naturally-occurring CO<sub>2</sub>. This revision could be accomplished by including the following revision in Section 98.42 1 of the final rule that provides that the reporting of CO<sub>2</sub> production from facilities with CO<sub>2</sub> production wells does not apply where CO<sub>2</sub> production data from such wells is required to be filed with the applicable state oil and gas regulator. § 98.421 Reporting threshold: Any supplier of CO<sub>2</sub> who meets the requirements of § 98.2 (a) (4) must report GHG emissions, except that no report from facilities with CO<sub>2</sub> production wells where the total annual production quantity and the weighted average composition of the CO<sub>2</sub> production stream is required to be reported to a state oil and gas regulatory agency.

**Response:** This final rule continues to require direct reporting on CO<sub>2</sub> supplied to the economy under Subpart PP. EPA has not implemented the revision suggested in this comment to use state-level data in place of data reported directly to EPA because EPA has concluded that we need this data reported directly to us. Please see Preamble sections I.E., II.O, V and volume 6 of the response to comment for more information about the relationship of this rule to other programs, including state-level data collection programs.

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**Commenter Name:** Lorraine Krupa Gershman

**Commenter Affiliation:** American Chemistry Council (ACC)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0423.2

**Comment Excerpt Number:** 176

**Comment:** EPA should revise the subpart PP applicability at §98.420(a) to clarify that suppliers of CO<sub>2</sub> are those entities intending to isolate CO<sub>2</sub> to place the product into commerce. Member companies may separate CO<sub>2</sub> as part of a chemical manufacturing process that is not 'manufactured' to supply downstream customers, which does not meet EPA's intent of identifying the CO<sub>2</sub> placed onto the market and potentially emitted downstream of the manufacturing facility.

**Response:** EPA has provided clarification of the definition of "CO<sub>2</sub> supplier" and clarification of Subpart PP reporting requirements with this comment response. EPA did not intend for CO<sub>2</sub> that is not "placed into commerce" or injected underground be reported under Subpart PP. CO<sub>2</sub> produced and used by the same reporting entity and that is not "placed into commerce" or injected is not required to be reported under Subpart PP.

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**Commenter Name:** Susan Amodeo Cathey

**Commenter Affiliation:** Air Liquide USA, LLC

**Document Control Number:** EPA-HQ-OAR-2008-0508-0464.1

**Comment Excerpt Number:** 10

**Comment:** Applicability language in proposed rule lacks clarity on who must report CO<sub>2</sub> emissions. EPA should draw clear distinction between sources that obtain CO<sub>2</sub> directly from production wells versus purchase of CO<sub>2</sub> streams from production companies or industrial processes. Those that obtain CO<sub>2</sub> from wells (or import/export CO<sub>2</sub>) would be subject to rule and would be required to report; those that only purify, compress or liquefy CO<sub>2</sub> streams generated (or liberated) elsewhere would not be subject to the rule. As illustrated below, the current definitions may lead to ambiguity in determining the "supplier" of CO<sub>2</sub>. [SEE PDF FOR DIAGRAM] The equipment contained within the battery limits could be described as a "production process unit that captures a CO<sub>2</sub> stream for the purpose of supplying CO<sub>2</sub> for commercial applications." Additionally, companies that operate such equipment are commonly referred to as "CO<sub>2</sub> suppliers". Clear distinction should be drawn between companies that produce CO<sub>2</sub>, either through a production process or extraction from a well source, and those companies that process a CO<sub>2</sub> stream for commercial applications. Only companies in the former case would meet the definition of a CO<sub>2</sub> supplier source category.

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0423.2, excerpt 176.

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**Commenter Name:** Marc J. Meteyer  
**Commenter Affiliation:** Compressed Gas Association (CGA)  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0981.1  
**Comment Excerpt Number:** 69

**Comment:** §98.2 (a)(4)(vi)(A) The CGA respectfully requests that the term “producers of CO<sub>2</sub>” in section 98.2 (a)(4)(vi)(A), be more clearly defined. Also we respectfully submit that the definition of “Suppliers of Carbon Dioxide” (Subpart PP) be expanded and clarified to include the party responsible for the manufacture, creator or liberator of the CO<sub>2</sub> molecule. This would include the owners of natural wells, which is clearly the intent of the EPA. Alternatively the term “producer” might be more appropriate than “supplier”.

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0423.2, excerpt 176.

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**Commenter Name:** Kim Dang  
**Commenter Affiliation:** Kinder Morgan Energy Partners, L.P.  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0370.1  
**Comment Excerpt Number:** 12

**Comment:** Kinder Morgan also maintains that there is no justifiable reason for treating CO<sub>2</sub> differently from other upstream energy sources, especially since CO<sub>2</sub> is not burned; rather, it is used as a product in EOR. For example, production of natural gas and oil are excluded on the basis that downstream reporting will provide adequate data for EPA’s purposes.

**Response:** EPA does not concur with this comment. Natural gas and oil are required to be reported at the upstream level in this final rule. Natural gas and natural gas liquids must be reported by natural gas local distribution companies and by fractionators under Subpart NN; oil and other petroleum products must be reported by refineries, importers, and exporters under Subpart MM. For the proposed rule, EPA decided to require reporting at these points because reporting at natural gas and oil production wells would have been too burdensome and would have resulted in too many reporting facilities, with no improvement in data accuracy. In the case of CO<sub>2</sub> production, the number of wells and companies producing CO<sub>2</sub> is sufficiently small and the data are already being collected. Therefore, EPA concluded that reporting by CO<sub>2</sub> suppliers is not too burdensome and does not lead to too many reporting facilities. The rationale applies for the selection of covered facility in this final rule.

The Administrator believes that upstream suppliers have information that is necessary for purposes of carrying out an evaluation of how to use the CAA to address GHG emissions and climate change. Emissions data are not limited to information regarding the actual level of emissions from a smokestack. See the Preamble, Section 3 for a discussion of EPA’s legal authority under the heading *Clean Air Act*.

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**Commenter Name:** Bob Dinneen  
**Commenter Affiliation:** Renewable Fuels Association (RFA)  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0494.1  
**Comment Excerpt Number:** 23

**Comment:** Because of the relative purity of the CO<sub>2</sub>, some ethanol plants capture CO<sub>2</sub> from the fermentation process for sale in other industries. A 2007 survey showed over 23% of facilities reporting captured CO<sub>2</sub> emissions. These CO<sub>2</sub> emissions are generally sold for use in dry ice production and carbonated beverage bottling. For example, a facility in Milton, Wisconsin was reported to plan on capturing CO<sub>2</sub> from the fermentation process for sale to more than 50 customers in southern Wisconsin and northern Illinois who use CO<sub>2</sub> for “a hundred different applications” in the chemical, food-processing and beverage industries. Because biogenic sources of emissions are generally excluded from reporting, EPA should also exclude these captured emissions from reporting under Proposed Section 98.420(b). Moreover, these sales avoid additional new production of CO<sub>2</sub>. At a minimum, EPA should clarify how these captured emissions, which are biogenic, should be reported.

**Response:** EPA has determined that information from all types of source categories that meet the reporting criteria in Subpart PP – including ethanol facilities – will be useful under this final rulemaking. As a result, this final rule requires the reporting of data on capture of biogenic CO<sub>2</sub>. See the Preamble, Section III.PP for our response to a comment on exempting captured biogenic CO<sub>2</sub> in *Definition of Source Category*.

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**Commenter Name:** Traylor Champion  
**Commenter Affiliation:** Georgia-Pacific, LLC (GP)  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0380.1  
**Comment Excerpt Number:** 40

**Comment:** Based on the analysis of this source category described in the preamble and the definition of the source category given under the rule as well as the discussion in the pulp and paper technical support document, GP believes that pulp and paper mills piping an exhaust stream, most likely from lime kilns or calciners, to an adjacent PCC plant for use as a raw material are not considered “Suppliers of Carbon Dioxide.” CO<sub>2</sub> is not separated and removed from a manufacturing process as described in the definition of the source category in §98.420(a)(1). However, for clarification, GP requests EPA categorically exempt pulp and paper mills exporting an exhaust stream to a PCC plant under §98.420(b).

**Response:** EPA does not agree that pulp and paper mills are not “Suppliers of Carbon Dioxide”. CO<sub>2</sub> “captured” at pulp and paper mills and transferred to another entity for downstream processing for the purposes of producing a commercial product must be reported under Subpart PP. EPA is requiring entities that produce or capture CO<sub>2</sub> to report the amount of CO<sub>2</sub> supply regardless of the ultimate use of the CO<sub>2</sub>. See Preamble Section III.PP.3 for rationale on this decision.

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**Commenter Name:** Bill Grygar  
**Commenter Affiliation:** Anadarko Petroleum Corporation  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0459.1  
**Comment Excerpt Number:** 24

**Comment:** EPA should not require reporting under Subpart PP for CO<sub>2</sub> used for enhanced oil recovery (“EOR”). Anadarko operates one of the largest EOR/geologic sequestration projects in the world in Wyoming. EOR operations are “closed systems” in that the CO<sub>2</sub> never is intentionally released into the environment. It is unclear, and EPA offers no explanation, of how

collecting information on CO<sub>2</sub> production will “assist EPA and others in developing future climate policy” (74 Fed. Reg. 68, page 16456).

**Response:** In this final rule, EPA is requiring entities that produce or capture CO<sub>2</sub> to report the amount of CO<sub>2</sub> supply regardless of the ultimate use of the CO<sub>2</sub>. EPA did not intend to characterize all CO<sub>2</sub> supplied to the economy as emissions and recognizes that there are a variety of applications for CO<sub>2</sub>, both emissive and non-emissive. However, the Administrator believes that upstream suppliers have information that is necessary for purposes of carrying out an evaluation of how to use the CAA to address GHG emissions and climate change. Emissions data are not limited to information regarding the actual level of emissions from a smokestack. See the Preamble, Section 3 for a discussion of EPA’s legal authority under the heading *Clean Air Act*.

Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*.

For our response to comments on how CO<sub>2</sub> supply data will assist EPA in developing future climate policy, please see the Preamble, Section III.PP under the heading *Definition of Source Category*.

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**Commenter Name:** Angela Burckhalter

**Commenter Affiliation:** Oklahoma Independent Petroleum Association (OIPA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0386.1

**Comment Excerpt Number:** 33

**Comment:** EPA proposes to exclude the reporting of CO<sub>2</sub> fugitive emissions from CO<sub>2</sub> supplies at industrial facilities or process units, CO<sub>2</sub> production wells, as well as from CO<sub>2</sub> pipelines, injection wells and storage sites. We think requiring the reporting of emissions from enhanced oil recovery (EOR) applications using CO<sub>2</sub> will deter operators from using CO<sub>2</sub> in this application which ultimately sequesters some CO<sub>2</sub> in the process. We think it is unnecessarily burdensome for those operators of CO<sub>2</sub> EOR projects and we agree that EPA should exclude them from the reporting requirements.

**Response:** For a response on excluding fugitive emissions from Subpart PP, see an earlier response to comment in this document, comment EPA-HQ-OAR-2008-0508-0459.1, excerpt 29.

This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

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**Commenter Name:** See Table 2

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0679.1

**Comment Excerpt Number:** 250

**Comment:** EPA has concluded that reporting the volume of the CO<sub>2</sub> streams from CO<sub>2</sub> production wells is important given the large fraction of CO<sub>2</sub> supplied from CO<sub>2</sub> production wells. Further, EPA concludes that there is minimal burden associated with these requirements, as all necessary monitoring equipment should already be installed to support current operating practice. API comments: EPA is correct that a large portion of CO<sub>2</sub> supplied comes from CO<sub>2</sub> production wells. However, according to EPA's Inventory of US GHG Emissions and Sinks: 1990-2006, only 5% of produced CO<sub>2</sub> was used in non-EOR applications and possibly released. The rest was used in EOR and is not emitted to the atmosphere (as recognized by EPA's methodology – "The naturally-occurring CO<sub>2</sub> used in EOR operations is assumed to be fully sequestered." Box 3-3). Additionally, whether or not equipment is installed is not a reasonable basis for imposing reporting requirements. The basis for reporting GHG under this rule should be the potential for release to the atmosphere. Given these two realities, reporting the volume of CO<sub>2</sub> from production wells should not be required.

**Response:** EPA does not concur with the comment that CO<sub>2</sub> volumes from production wells should be excluded from Subpart PP reporting requirements.

EPA's Inventory of US GHG Emissions and Sinks: 1990-2006 assumes that CO<sub>2</sub> used in EOR operations is fully sequestered. However, In the Subpart PP TSD, EPA reflected a newer provisional accounting convention, based on the 2006 IPCC Guidelines Reporting Convention suggested approach, that counts a potential CO<sub>2</sub> source as emitted until nationally accepted protocols are developed for measurement, verification and reporting.

EPA did not intend to characterize all CO<sub>2</sub> supplied to the economy as emissions and recognizes that there are a variety of applications for CO<sub>2</sub>, both emissive and non-emissive. However, the Administrator believes that upstream suppliers have information that is necessary for purposes of carrying out an evaluation of how to use the CAA to address GHG emissions and climate change. Emissions data are not limited to information regarding the actual level of emissions from a smokestack. See the Preamble, Section 3 for a discussion of EPA's legal authority under the heading *Clean Air Act*.

Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

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**Commenter Name:** Rhea Hale

**Commenter Affiliation:** American Forest & Paper Association (AF&PA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0909.1

**Comment Excerpt Number:** 22

**Comment:** Based on the definition of "Suppliers of CO<sub>2</sub>" in the rule, it appears that pulp and paper mills that export CO<sub>2</sub> to precipitated calcium carbonate (PCC) plants are required to report these exports. However, Section 6.3 (p.25) of the Technical Support Document states that "these exports of CO<sub>2</sub> should not be included in the estimates of GHG emissions because they are not emitted by the mill." As explained in the TSD, the CO<sub>2</sub> used by PCC plants is made into limestone to be used as a filler in paper products. Unlike in other commercial uses of CO<sub>2</sub> where



the CO<sub>2</sub> is ultimately released into the atmosphere, limestone is inherently stable and the CO<sub>2</sub> is never emitted back into the atmosphere during subsequent use and disposal. For this reason, we contend that pulp and paper mills exporting CO<sub>2</sub> to PCC plants be categorically exempted from reporting requirements as “Suppliers of CO<sub>2</sub>”.

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0380.1, excerpt 40.

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**Commenter Name:** See Table 2

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0679.1

**Comment Excerpt Number:** 253

**Comment:** §98.420 Definition of the source category. a)(1) Production process units that capture a CO<sub>2</sub> stream for purposes of supplying CO<sub>2</sub> for commercial applications. (a)(2) Facilities with CO<sub>2</sub> production wells. API Comment: EPA should not require reporting for either of these categories if the CO<sub>2</sub> is used for EOR operations, which are “closed systems”. It is unclear – and EPA offers no explanation – of how collecting information on CO<sub>2</sub> production will “assist EPA and others in developing future climate policy” (74 FR 68, page 16456). The captured or produced CO<sub>2</sub> utilized in EOR operations is transported to an oil field where it is injected into a hydrocarbon reservoir. A significant fraction (about 1/3) of the CO<sub>2</sub> will be trapped in the hydrocarbon formation due to capillary forces. The remainder moves through the reservoir, mixing with and mobilizing the oil. The CO<sub>2</sub> produced with the hydrocarbons is separated, recovered, compressed, and re-injected into the hydrocarbon formation. EPA’s own methodology recognizes that the CO<sub>2</sub> is managed within a closed system and therefore not released into the atmosphere – “The naturally-occurring CO<sub>2</sub> used in EOR operations is assumed to be fully sequestered.” Box 3-3 of EPA’s Inventory of US GHG Emissions and Sinks: 1990-2006).

**Response:** EPA did not intend to characterize all CO<sub>2</sub> supplied to the economy as emissions and recognizes that there are a variety of applications for CO<sub>2</sub>, both emissive and non-emissive. However, the Administrator believes that upstream suppliers have information that is necessary for purposes of carrying out an evaluation of how to use the CAA to address GHG emissions and climate change. Emissions data are not limited to information regarding the actual level of emissions from a smokestack. See the Preamble, Section 3 for a discussion of EPA’s legal authority under the heading *Clean Air Act*.

While EPA understands that some amount of CO<sub>2</sub> injected into oil and gas reservoirs for EOR purposes will be trapped in the subsurface, EPA concludes that site-specific elements beyond geophysical trapping parameters influence the amount of CO<sub>2</sub> securely sequestered. See the Preamble, Section III.PP for a discussion of such elements in *Definition of Source Category*.

EPA’s Inventory of US GHG Emissions and Sinks: 1990-2006 assumes that CO<sub>2</sub> used in EOR operations is fully sequestered. However, In the Subpart PP TSD, EPA reflected a newer provisional accounting convention, based on the 2006 IPCC Guidelines Reporting Convention suggested approach, that counts a potential CO<sub>2</sub> source as emitted until nationally accepted protocols are developed for measurement, verification and reporting. EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on

the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

For information on how CO<sub>2</sub> supply will assist EPA in developing future climate policy, please see the Preamble in *Definition of Source Category*.

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**Commenter Name:** See Table 4

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0635

**Comment Excerpt Number:** 85

**Comment:** Although the draft rule and preamble generally group projects types as “sources” that either extract or capture CO<sub>2</sub>, we point out that not all of the CO<sub>2</sub> that would be reported from those sources is necessarily an “emission” into the atmosphere. As the rule preamble correctly points out, some of it is used in industrial applications that eventually lead to its release (such as carbonated beverages), while the largest part is injected underground for enhanced oil recovery (EOR) operations for the primary purpose of maximizing oil production. 346 Therefore, it is important for the proposed rule to provide a mechanism for suppliers of CO<sub>2</sub> or other operators to demonstrate which pathway the produced or captured CO<sub>2</sub> follows: to the atmosphere or to the subsurface. As currently written, the proposed rule does not do this, and should be modified.

**Response:** EPA did not intend to characterize all CO<sub>2</sub> supplied to the economy as emissions and recognizes that there are a variety of applications for CO<sub>2</sub>, both emissive and non-emissive. In this final rule, EPA is requiring reporting on the end-use of the CO<sub>2</sub> supplied, if known.

While EPA understands that some amount of CO<sub>2</sub> injected into oil and gas reservoirs for EOR purposes will be trapped in the subsurface, EPA concludes that site-specific elements beyond geophysical trapping parameters influence the amount of CO<sub>2</sub> securely sequestered. See the Preamble, Section III.PP for a discussion of such elements in *Definition of Source Category*.

EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

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**Commenter Name:** Tiffany Rau

**Commenter Affiliation:** Hydrogen Energy International LLC (HEI)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0517.1

**Comment Excerpt Number:** 5

**Comment:** EPA proposes to require reporting from facilities that produce a CO<sub>2</sub> stream from CO<sub>2</sub> production wells. (Proposed Rule § 98.420(2); 74 FR 16584.) HEI interprets this to apply to production facilities of naturally-occurring CO<sub>2</sub> accumulations. HEI kindly requests that EPA confirm this interpretation.

**Response:** EPA concurs that Subpart PP is intended to apply to production of naturally occurring CO<sub>2</sub> from CO<sub>2</sub> production wells.

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**Commenter Name:** Karen St. John  
**Commenter Affiliation:** BP America Inc. (BP)  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0631.1  
**Comment Excerpt Number:** 110

**Comment:** EPA proposes to require reporting from facilities that produce a CO<sub>2</sub> stream from CO<sub>2</sub> production wells. (Proposed Rule § 98.420(2); 74 FR 16584.) BP interprets this to apply to production facilities of naturally-occurring CO<sub>2</sub> accumulations. BP requests that EPA confirm this interpretation.

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0517.1, excerpt 5.

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**Commenter Name:** Ronald T. Evans  
**Commenter Affiliation:** Denbury Resources, Inc.  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0484.1  
**Comment Excerpt Number:** 2

**Comment:** The erroneous statement in the Technical Supporting Document that “assumes” the emission of CO<sub>2</sub> injected for EOR operations should be corrected. The Technical Support Document for CO<sub>2</sub> suppliers states that it “assumes” that CO<sub>2</sub> that is captured from anthropogenic facilities sources or extracted from naturally-occurring formations is emitted to the atmosphere from the downstream systems in which the CO<sub>2</sub> is used.[Footnote: Subpart PP, “Technical Support Document For CO<sub>2</sub> Supply: Proposed Rule For Mandatory Reporting Of Greenhouse Gases”, at 7 (noting that “it is assumed that the entire amount of the captured or extracted CO<sub>2</sub> that is transferred off site is assumed to be emitted to the atmosphere from downstream systems in which the CO<sub>2</sub> is used”).] This statement appears to have been intended to reflect a provisional accounting convention (i.e. based on the IPCC’s suggested approach for counting a potential CO<sub>2</sub> source as emitted until nationally accepted protocols are developed for measurement, verification and reporting). As a factual matter, however, the statement is inaccurate, as indeed is recognized in other EPA documents (including the preamble to the proposed rule here), and in multiple scientific and industry studies and reports. We would accordingly urge the EPA to correct this misstatement because the failure to do so could create public confusion regarding incidental storage of CO<sub>2</sub> that is injected in enhanced oil recovery operations.

As the EPA is well aware, the production, transportation, injection and recycling of naturally-occurring CO<sub>2</sub> for EOR purposes is a “closed system” in which the CO<sub>2</sub> is never intentionally emitted to the atmosphere. Rather, the CO<sub>2</sub> is produced and then transported in a closed pipeline system to the injection points and injected underground, following which a portion returns to the surface with the produced oil where it is separated, re-compressed and recycled into the reservoir. The process continues for as long as oil production is economical at which point all of the CO<sub>2</sub> that is in the depleted oil formation remains stored underground (unless it is subsequently produced and transported for injection and subsequent recycling in another EOR field).[Footnote: For more detail, please see Comments of Denbury Resources, Inc. filed December 22, 2008 in Docket ID No. EPA-HQ-OW-2008-0390 (proposed rule on Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO<sub>2</sub>) Geologic Sequestration (GS) Wells) (<http://www.regulations.gov/fdmspublic/component/main?main=DocumentDetail&o=09000064>)

807e8f80).] While EPA is reviewing proposed rule changes in its UIC program to create standards for geologic sequestration sites, those requirements are largely aimed at confirming that the injected CO<sub>2</sub> does not in fact migrate into underground sources of drinking water or to the surface and at site maintenance and monitoring long after CO<sub>2</sub> injections have ceased. There appears to be confusion over the term “retention rate” of CO<sub>2</sub> in EOR operations.

The proposed rule says that “some” amount of CO<sub>2</sub> could ultimately be sequestered in EOR operations. 74 Fed. Reg. at 16583-16584. The NOPR cites to a study of retention rates ranging from 38 to 100 percent, but concludes that many of those projects were not mature enough to predict final retention. *Id.* at 16584. The NOPR appears to confuse the efficiency of CO<sub>2</sub> recycling in a given field with the ultimate disposition of the CO<sub>2</sub> that is underground at the time oil production operations are completed. The more efficient the CO<sub>2</sub> EOR operations in a given field, the fewer units of incremental CO<sub>2</sub> are required to recover a given number of barrels of oil. A highly efficient CO<sub>2</sub> EOR operation means that the “retention rate” will be lower in the sense that a lesser amount of new CO<sub>2</sub> is required to be added to the field because the CO<sub>2</sub> is more efficient at recovering oil and thus less CO<sub>2</sub> is actually recycled over time. In water alternating gas CO<sub>2</sub> EOR operations (“WAG” EOR), generally equal quantities of water are injected and thus the apparent “retention factor” is less than if an operator only injects CO<sub>2</sub> with no water. Although each project is different, the range of CO<sub>2</sub> injected (required external CO<sub>2</sub>, not including recycled CO<sub>2</sub>) to produce a barrel of oil ranges between four to 12 thousand cubic feet (Mcf). [Footnote: See Statement of Gareth Roberts on behalf of Denbury Resources, Inc. before the Joint Meeting on Carbon Issues of the House Committee on Energy Resources and the House Committee on Environmental Regulation of the Texas Legislature (March 11, 2009), at 4.] Thus the “retention rate” of the CO<sub>2</sub> EOR project also ranges from four to 12 Mcf per barrel and essentially 100% of the injected CO<sub>2</sub> is ultimately sequestered. The only CO<sub>2</sub> that is not permanently sequestered would be those volumes that may be released due to equipment failure.

Historically these volumes are very minimal. Nevertheless, even where the retention rate is relatively low, however, virtually 100 percent of the CO<sub>2</sub> that is injected in a field at the time production operations come to a close remains stored underground. This is why it is accurate to say that CO<sub>2</sub> is incidentally and indefinitely stored or sequestered in the context of EOR operations. The exception would be if the original CO<sub>2</sub> injection (or oil production) wells were subsequently re-entered in order to try to produce CO<sub>2</sub> from the storage formation for reinjection in yet another field. Because of the various physical and chemical trapping mechanisms that occur over time, however, the longer a field remains fallow, the less likely that the previously-injected CO<sub>2</sub> could be recovered economically. [Footnote: Intergovernmental Panel On Climate Change, Special Report On Carbon Dioxide Capture And Storage, (Bert Metz, ed., Cambridge University Press 2005), at 206-210 (available at <http://www.ipcc.ch/ipccreports/special-reports.htm> (“IPCC Special Report on CCS”).]

This incidental storage of CO<sub>2</sub> has been conducted for nearly four decades in the context of EOR operations by many thousands of existing CO<sub>2</sub> injection and production wells. It is a process that is well understood and documented and the some 13,000 or so CO<sub>2</sub> wells are regulated by the state oil and gas conservation commission or environmental regulator where such EOR operations take place. The activity is also subject to various other regulatory statutes administered by the EPA for the protection of underground sources of drinking water, etc. [Footnote: Meyer, “Summary of Carbon Dioxide Enhanced Oil Recovery (CO<sub>2</sub> EOR) Injection Well Technology,” (EPA Document Identification: EPAHQ-OW-2008-0390-001 8), prepared for the American Petroleum Institute (published by API September 18, 2007), at vi (EPA Document Identification: EPA-HQ-OW2008-0390-0018) (available from Ground Water

Protection Council website at:

[http://www.gwpc.org/elibrary/documents/CO<sub>2</sub>/API%20CO<sub>2</sub>%20Report.pdf](http://www.gwpc.org/elibrary/documents/CO2/API%20CO2%20Report.pdf)). See also John A. Veil and Markus G. Puder, “Evaluation of State and Regional Resource Needs to Manage Carbon Sequestration through Injection” (June 2007) (EPA Document Identification EPA-HQ-OW-2008-0390-0084.pdf) (available also from the Ground Water Protection Council’s website at:

[http://www.gwpc.org/elibrary/documents/general/Argonne%20Report%20CO<sub>2</sub>%20Resources.pdf](http://www.gwpc.org/elibrary/documents/general/Argonne%20Report%20CO2%20Resources.pdf) (visited June 9, 2009) at 8 (Table 3) (listing CO<sub>2</sub> injection wells by state and by UIC well class)). The number of active CO<sub>2</sub> injection wells is also published in the Annual Production Report, Oil & Gas Journal, vol. 106, (Apr. 21, 2008).] The IPCC’s Special Report on CCS has noted that the fraction of CO<sub>2</sub> retained in properly selected and managed geologic reservoirs is very likely to exceed 99% over 100 years and is likely to exceed 99 % over 1000 years.

[Footnote: d., at 34 (“ the fraction retained in appropriately selected and managed reservoirs is very likely to exceed 99% over 100 years, and is likely to exceed 99% over 1000 years”)

(footnote omitted) risk of leakage “is expected to decrease over time as other mechanisms provide additional trapping”). See generally Chapter 5 of the IPCC Special Report on CCS.] Hence, there is simply no basis for “assuming” in the Technical Support Document that CO<sub>2</sub> produced for EOR operations will be emitted to the atmosphere following capture or extraction. Reflecting this, EPA’s own accounting methodology for greenhouse gas inventories correctly distinguishes between CO<sub>2</sub> that is used in non-EOR operations (which is assumed to be emitted to the atmosphere during industrial uses in food processing, chemical production and the like) and CO<sub>2</sub> that is used in EOR operations, which EPA assumes to be “fully sequestered”.

[Footnote: EPA, “Inventory Of U.S. Greenhouse Gas Emissions And Sinks: 1990-2007” (April 2009), at page 3-46 (Box 3-3) (available at

<http://epa.gov/climatechange/emissions/downloads09/Energy.pdf> (separate link to chapter 3 “Energy”)). The April 2009 inventory report also includes an accounting estimate (in effect a kind of “placeholder” estimate) of CO<sub>2</sub> injections for EOR, pending EPA’s development of site-specific monitoring and reporting data for CO<sub>2</sub> injection sites (i.e., EOR operations). This entry (in Tables 3-43 and 3-44) appears to assume for accounting purposes that all CO<sub>2</sub> injected for EOR is emitted, pending the development of additional monitoring and reporting rules. In effect, this merely means that the United States Government has not yet developed nationally recognized standards and protocols consistent with the IPCC Guidelines, not that the injected CO<sub>2</sub> is in fact emitted to the atmosphere.] Similarly, the IPCC’s 2006 Guidelines for National Greenhouse Gas Inventories notes that there is “no evidence” of leakage or escape of injected CO<sub>2</sub> at the fully monitored sites discussed there and a potential but minimal (less than 0.02 percent) leakage at another site. [Footnote: IPCC, Guidelines for National Greenhouse Gas Inventories (2006) (ed. Eggleston, Buendia, Miwa, Ngara and Tanabe), at 5.17. There was a reported emission of less than 0.02 percent (less than two-hundredths of one percent) at one site, which was “likely” due in part if not entirely to methane releases, was possibly due in part to the CO<sub>2</sub> injections. Id.] Accordingly, we would urge the EPA in the preamble to its final rule here to be very clear in stating that it does not assume that that CO<sub>2</sub> produced, transported and injected in geologic formations during EOR operations is emitted to the atmosphere.

**Response:** For a response to comment about using IPCC accounting convention and about plans for a new proposal on sequestration, see response to comment EPA-HQ-OAR-2008-0508-0679.1, excerpt 253.

In the proposed Subpart PP preamble, EPA cited a study about the term “retention rate”. EPA understands from commenters that “retention rate” is defined as the amount of CO<sub>2</sub> that is injected into the underground formation (oil field), while the EOR site is operating and

producing oil, and that is not recovered with the oil, and has to do with the efficiency of the CO<sub>2</sub> recycling process at an operating EOR site. EPA did not intend to suggest that “retention” equates to the amount of CO<sub>2</sub> sequestered in an underground formation. While EPA understands that some amount of CO<sub>2</sub> injected into oil and gas reservoirs for EOR purposes will be trapped in the subsurface, EPA concludes that site-specific elements beyond geophysical trapping parameters influence the amount of CO<sub>2</sub> securely sequestered. See the Preamble, Section III.PP for a discussion of such elements in *Definition of Source Category*.

In response to comments about the objectives of the UIC program, that issue is outside the scope of this rulemaking. It is EPA’s strong intention to harmonize CCS requirements across relevant statutory or other programs in order to minimize any redundancy and any burden on reporters. See the Preamble, Section III.PP for a discussion of harmonizing efforts in *Definition of Source Category*.

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**Commenter Name:** Philip Marston

**Commenter Affiliation:** Denbury Resources

**Document Control Number:** EPA-HQ-OAR-2008-0508-0212.1e

**Comment Excerpt Number:** 1

**Comment:** The very narrow issue that I just wanted to flag for you today is in the technical support document at page 7, it says that all of the entire amount of CO<sub>2</sub> that is produced from a naturally occurring formation and is transferred off site is assumed to be emitted into the atmosphere, and that is not the way the system works. I understand that that may perhaps be sort of a counting convention, but I am concerned that the public record reflect the underlying facts. We are dealing with a closed system. That doesn't mean that there can't be leaks in the system, and I am sure that when the time for written comments come, there will be some comments on the details of how you measure here and the like. Those are details, but the fundamental point is the CO<sub>2</sub> is produced from underground, brought to the surface. It is in a continuous pipeline. It is compressed to a super critical phase, which has the characteristics of both gas and liquid. It is carried in the pipeline, and then it is injected underground into the oil and formations. The CO<sub>2</sub> causes the oil droplets to expand. It reduces the surface tension that holds the oil to the lock and allows the sweep of the oil to then come back to the oil-producing well, comes up to the surface with the CO<sub>2</sub>. The CO<sub>2</sub> is separated from the oil. The oil is then taken to market. The CO<sub>2</sub> that you have spent a lot of time and effort to acquire is then recycled. So the object of the exercise is since the CO<sub>2</sub> is a scarce resource and a commodity, you want to reuse it as often as you can. So you want to recycle the CO<sub>2</sub> back down into the formation, or you may take it to another formation that may be 50 or 100 miles away. You put it back in your pipeline system. It may stay underground for a period of time. Then you may take it back out and take it to another formation. But in all of that, it is a closed system, and at the end of the day, the CO<sub>2</sub> that is injected, but for leaks that may occur, there may be pipeline ruptures, et cetera, the system is basically a closed system. So the consequences of dealing with that were ramified through the comments, but I just wanted to make it real clear that it is a closed system.

**Response:** See response to the comment directly above, comment EPA-HQ-OAR-2008-0508-0484.1, excerpt 2.

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**Commenter Name:** William C. Herz

**Commenter Affiliation:** The Fertilizer Institute (TFI)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0952.1

**Comment Excerpt Number:** 28

**Comment:** Subpart PP of the NPRM requires “mass flow meters” to be installed to measure the CO<sub>2</sub> quantity. 74 Fed. Reg. at 16,725. TFI contends that this requirement should be eliminated for an ammonia manufacturing facility with on-site urea manufacturing because the quantity of CO<sub>2</sub> being consumed can easily be quantified through estimation methods based on the urea manufacturing process. Existing volumetric flow monitors are sufficient to determine the quantity of CO<sub>2</sub> being consumed in urea plants.

**Response:** EPA concurs with this comment. See the Preamble, Section III.PP for the response to comment on *Monitoring and QA/QC Requirements*.

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**Commenter Name:** William A. Collins, Jr

**Commenter Affiliation:** Occidental Petroleum Corporation

**Document Control Number:** EPA-HQ-OAR-2008-0508-0452

**Comment Excerpt Number:** 7

**Comment:** EPA’s proposal to require reporting of the entire mass of CO<sub>2</sub> from CO<sub>2</sub> suppliers as “emissions” is factually and legally inappropriate. The rationale provided in EPA’s preamble to Subpart PP, as supported by the stated assumption in the TSD, cannot be reconciled with EPA’s acknowledgement that up to 100 percent of CO<sub>2</sub> used in EOR operations in the Permian Basin is retained in the geologic formation and not emitted to the atmosphere. All of the CO<sub>2</sub> produced from Occidental’s interests in the CO<sub>2</sub> domes cited in the preamble is used for Occidental’s EOR operations in the Permian Basin, and, as EPA notes, essentially all of that amount is ultimately retained in the geologic formation into which it is injected. It would be factually incorrect to require that these significant volumes of supplied CO<sub>2</sub> be reported as emissions to the atmosphere. Moreover, the rule would require Occidental’s designated representative to certify under penalty of law, including fine or imprisonment, that these volumes of CO<sub>2</sub> are emissions, when Occidental’s representative is aware that the volumes are in fact not emissions. EPA’s proposed Subpart PP creates a “catch-22” situation where fulfillment of the reporting obligation becomes impossible, exposing the company to enforcement action and Occidental’s management to personal liability. Occidental agrees with EPA’s desire to measure the volumes of CO<sub>2</sub> supplied by such facilities for the purpose of providing valuable information on fugitive and related emissions associated with CO<sub>2</sub>EOR and future CCS activities. However, the mass of CO<sub>2</sub> generated by suppliers should not be reported as emissions, and this Mandatory Reporting Rule is not the appropriate vehicle for gathering such data. Occidental recommends that EPA either propose Subpart PP as a non-certified demonstration reporting measure of captured volumes (as opposed to emissions), or propose a separate voluntary reporting protocol for CO<sub>2</sub> suppliers. Occidental does not believe the exclusion of supplied volumes from this rulemaking will hamper EPA’s GHG reporting objectives, as EPA’s proposed rule can or will require reporting by parties purchasing or using supplied CO<sub>2</sub> volumes.

**Response:** EPA did not intend to characterize all CO<sub>2</sub> supplied to the economy as emissions and recognizes that there are a variety of applications for CO<sub>2</sub>, both emissive and non-emissive. However, the Administrator believes that upstream suppliers have information that is necessary for purposes of carrying out an evaluation of how to use the CAA to address GHG emissions and climate change. Emissions data are not limited to information regarding the actual level of

emissions from a smokestack. See the Preamble, Section 3 for a discussion of EPA's legal authority under the heading *Clean Air Act*.

In Subpart PP of the proposed rule, EPA considered many points within the CO<sub>2</sub> supply chain for reporting. EPA decided to require reporting from production process units and from facilities with CO<sub>2</sub> production at the point of capture and prior to any subsequent purification, processing, or compressing in order to collect accurate data on the amount of CO<sub>2</sub> captured prior to any downstream losses. In addition, selecting this coverage maximizes accuracy and completeness and minimizes the number of sources required to report and the overall reporting burden. This rationale applies to the final rule.

While EPA understands that some amount of CO<sub>2</sub> injected into oil and gas reservoirs for EOR purposes will be trapped in the subsurface, EPA concludes that site-specific elements beyond geophysical trapping parameters influence the amount of CO<sub>2</sub> securely sequestered. See the Preamble, Section III.PP for a discussion of such elements in *Definition of Source Category*.

EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

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**Commenter Name:** Rich Raiders

**Commenter Affiliation:** Arkema Inc.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0511.1

**Comment Excerpt Number:** 69

**Comment:** EPA should remove the § 98.420(b)(6) exclusion that allows importers of equipment containing CO<sub>2</sub> from reporting in the proposed system. Domestic manufacturers of such equipment are at a competitive disadvantage if CO<sub>2</sub> is reported by importers with whom they compete are excluded from reporting. Such a system unfairly rewards leakage of CO<sub>2</sub> generation outside the United States.

**Response:** EPA proposed that importers of equipment containing CO<sub>2</sub> would be excluded as covered entities under Subpart PP. In the proposed rule, EPA did a careful evaluation of all suppliers of CO<sub>2</sub> and selected reporters in order to strike a balance between coverage and burden. EPA selected production process units and facilities with CO<sub>2</sub> production wells because together they account for the vast majority of CO<sub>2</sub> supplied to the economy and used downstream by end-users. Furthermore, EPA concluded that all production process units identified for the proposed rule would be required to report as downstream sources under another Subpart of this rule anyway given their downstream emissions. EPA decided to exclude importers of equipment containing CO<sub>2</sub> because the amount of CO<sub>2</sub> supply is not significant enough to warrant the additional reporting burden that it would have imposed on a potentially large number of sources. This rationale applies to the final rule.

Domestic manufacturers of equipment containing CO<sub>2</sub> are not required to report under Subpart PP of the final rule; the supplier of the CO<sub>2</sub> contained in such equipment is required to report.

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## 2. REPORTING THRESHOLD

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**Commenter Name:** See Table 2

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0679.1

**Comment Excerpt Number:** 252

**Comment:** EPA concluded that “all facilities capturing CO<sub>2</sub> would likely already exceed the reporting thresholds under other subparts of proposed 40 CFR part 98 for their downstream emissions. Therefore, a proposed threshold of ‘All In’ for reporting CO<sub>2</sub> supply from industrial facilities or process units would not bring in additional facilities not already triggering other subparts of the proposed rule.” API Comment: API disagrees with the assertion that all facilities capturing CO<sub>2</sub> would exceed the reporting threshold of 25,000 tonnes emissions. For example, a small gas plant with mostly electric compression would likely not exceed 25,000 tonnes and easily could be a supplier of CO<sub>2</sub>.

**Response:** For Subpart PP of the proposed rule, EPA did a careful evaluation of all suppliers of CO<sub>2</sub> in operation and selected reporters in order to strike a balance between coverage and burden. EPA selected production process units and facilities with CO<sub>2</sub> production wells because together they account for the vast majority of CO<sub>2</sub> supplied to the economy and used downstream by end-users. Furthermore, EPA concluded that all production process units identified for the proposed rule as operating would be required to report as downstream sources under another Subpart of this rule anyway given their downstream emissions. For the final rule, EPA has considered the comment that some small gas plants with mostly electric compression would likely not exceed the Subpart C threshold of 25,000 mtCO<sub>2</sub>e. EPA has concluded, however, that such facilities must still report under Subpart PP and that Subpart PP must continue to be an “all in” Subpart because it is necessary for our accounting to be as comprehensive as possible. We seek as full an understanding of CO<sub>2</sub> supply as possible to better understand the quantity of CO<sub>2</sub> that enters the economy for commercial applications.

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**Commenter Name:** See Table 1

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0509.1

**Comment Excerpt Number:** 6

**Comment:** Likewise, requiring reporting by “all producers of carbon dioxide,” regardless of the amount of carbon dioxide produced (see proposed 40 C.F.R. § 98.2(a)(4)(vi)), could impose a substantial regulatory burden without any significant benefit. There is no good reason for not including a threshold for reporting from that category.

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0679.1, excerpt 252.

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**Commenter Name:** See Table 4

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0635

**Comment Excerpt Number:** 90

**Comment:** Add to proposed section 98.421 a new paragraph at the end to read: “and any geologic sequestration operation and any enhanced hydrocarbon recovery operation shall report amounts of CO<sub>2</sub> (and incidental other material, if included in the injectate) injected and amounts of CO<sub>2</sub> extracted.”

**Response:** See the response to the comment directly below, comment EPA-HQ-OAR-2008-0508-0635, excerpt 91.

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### 3. GHGS TO REPORT

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**Commenter Name:** See Table 4

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0635

**Comment Excerpt Number:** 91

**Comment:** Add to the end of proposed paragraph 98.422 the following language: “For geologic sequestration and enhanced hydrocarbon recovery operations, you must report the amount of CO<sub>2</sub> (and incidental other material, if included in the injectate) injected and amounts of CO<sub>2</sub> extracted.”

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

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**Commenter Name:** Marc J. Meteyer

**Commenter Affiliation:** Compressed Gas Association (CGA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0981.1

**Comment Excerpt Number:** 77

**Comment:** The CGA member companies support the view of excluding the monitoring and reporting of fugitive emissions under the regulations. The reporting thresholds that have been selected are expected to cover approximately 85-90% of all national emissions and represent an excellent balance between accuracy of data reported and cost for compliance. We believe that inclusion of fugitive emissions will require significant extra cost for compliance with little upside benefit.

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0408.1, excerpt 29.

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#### 4. SELECTION OF PROPOSED GHG EMISSIONS CALCULATION AND MONITORING METHODS

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**Commenter Name:** Dan F. Hunter  
**Commenter Affiliation:** ConocoPhillips Company  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0515.1  
**Comment Excerpt Number:** 69

**Comment:** In addition to mass flow measurement, ConocoPhillips recommends that a volumetric flow meter also be allowed to measure flow stream.

**Response:** EPA concurs with this comment. See the Preamble, Section III.PP for the response to comment on *Monitoring and QA/QC Requirements*.

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**Commenter Name:** Thomas Siegrist  
**Commenter Affiliation:** Koch Nitrogen Company LLC  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0351.1  
**Comment Excerpt Number:** 11

**Comment:** The Proposed Rule should allow carbon dioxide suppliers to use volumetric flow meters already installed at their facilities in lieu of the mass flow meters specified in the Proposed Rule. The Proposed Rule would require carbon dioxide suppliers to utilize mass flow meters to quantify the amount of captured CO<sub>2</sub>. Id. at 16725 (proposed § 98.424(a)). But facilities like KNC s in the fertilizer industry typically use volumetric flow meters to quantify CO<sub>2</sub> gas movement. Purchase and installation of mass flow meters would be costly and would require production downtime for installation, while providing no significant improvement in measurement accuracy over the existing volumetric flow meters. KNC therefore requests that the Proposed Rule be revised to offer carbon dioxide suppliers a choice of using either mass or volumetric flow meters to quantify CO<sub>2</sub> gas movement.

**Response:** EPA concurs with this comment. See the Preamble, Section III.PP for the response to comment on *Monitoring and QA/QC Requirements*.

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**Commenter Name:** Edward N. Saccoccia  
**Commenter Affiliation:** Praxair Inc.  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0977.1  
**Comment Excerpt Number:** 16

**Comment:** Subpart PP does not recognize that most CO<sub>2</sub> imported and exported is pure, liquid product. EPA should allow the use of normal commercial weigh bills for pure product imports and exports since this will be the most accurate measurement.

**Response:** EPA concurs with this comment. See the Preamble, Section III.PP for the response to comment on *Monitoring and QA/QC Requirements*.

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**Commenter Name:** John M. Batt  
**Commenter Affiliation:** Airgas, Inc.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0408.1

**Comment Excerpt Number:** 32

**Comment:** Subpart PP does not recognize that most CO<sub>2</sub> imported and exported is pure liquid product. We respectfully submit that sections 98.423(c) and 98.424(c) of Subpart PP should allow the use of normal commercial weigh bills for pure product imports and exports since this will be the most accurate measurement.

**Response:** EPA concurs with this comment. See the Preamble, Section III.PP for the response to comment on *Monitoring and QA/QC Requirements*.

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**Commenter Name:** Edward N. Saccoccia

**Commenter Affiliation:** Praxair Inc.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0977.1

**Comment Excerpt Number:** 17

**Comment:** EPA should allow the use of finished CO<sub>2</sub> product sold by the downstream processor in lieu of mass flow measurement. Where this is allowed, any sampling of the CO<sub>2</sub> would be unnecessary since the finished product is pure CO<sub>2</sub> (typically 99.99% or greater purity). EPA should allow an exemption from the quarterly sampling requirements for those cases where finished product CO<sub>2</sub> is used as the measure. EPA may wish to establish a minimum product purity requirement for the exemption.

**Response:** EPA does not concur with this comment. Under Subpart PP entities that produce or capture CO<sub>2</sub> are required to report the amount of CO<sub>2</sub> captured "prior to any subsequent purification, processing, or compressing". In Subpart PP of the proposed rule, EPA considered many points within the CO<sub>2</sub> supply chain for reporting. EPA decided to require reporting from production process units and from facilities with CO<sub>2</sub> production at the point of capture and prior to any subsequent purification, processing, or compressing in order to collect accurate data on the amount of CO<sub>2</sub> captured prior to any downstream losses. In addition, selecting this coverage maximizes accuracy and completeness and minimizes the number of sources required to report and the overall reporting burden. This rationale applies to the final rule. If the CO<sub>2</sub> Supply were measured at the point of sale in many cases a different entity would be required to report than the entity that captured the CO<sub>2</sub>, which is the entity required to report under Subpart PP. Therefore, measurement of the CO<sub>2</sub> Supply at downstream entities is not consistent with EPA's rationale for Subpart PP.

See the Preamble, Section III.PP for the response to comment on *Monitoring and QA/QC Requirements*.

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**Commenter Name:** Edward N. Saccoccia

**Commenter Affiliation:** Praxair Inc.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0977.1

**Comment Excerpt Number:** 15

**Comment:** CO<sub>2</sub> streams captured from production processes are typically water saturated, low pressure (less than 15 psig) and relatively high in volumetric flow. Water content will vary significantly with ambient conditions. Accurate measurement of such streams is difficult and

expensive. For these reasons, the amount of CO<sub>2</sub> flowing from the capture point to the commercial user(s) is not typically measured. Further, some of this CO<sub>2</sub> is emitted to the atmosphere during downstream processing prior to it being available for distribution and sale to end users. This loss can be 10-15%. Therefore, the measurement of the captured CO<sub>2</sub> at or just downstream of the capture point is not an accurate basis for determining the amount going to end users. Contracts for the sale of captured CO<sub>2</sub> to downstream processors (such as CO<sub>2</sub> liquefaction processes) are typically based on finished CO<sub>2</sub> product sold by the downstream processor. These sold amounts are highly accurate as they are pure CO<sub>2</sub> (typically 99.99% or greater purity) measured in accordance with commercial weights and measures regulations. These amounts more accurately reflect the quantity of CO<sub>2</sub> going to end uses as they are measured downstream of CO<sub>2</sub> processing losses. EPA should allow the use of the contracted sales of captured CO<sub>2</sub> to downstream entities in lieu of mass flow measurement when available. We understand that EPA may need to require the mass flow measurement of CO<sub>2</sub> extracted from CO<sub>2</sub> production wells in Subpart PP since such CO<sub>2</sub> is not reported in other subparts of the rule. Since CO<sub>2</sub> extracted from wells is typically not water saturated, accurate flow measurement is likely to be more practical.

**Response:** See the response to comment EPA-HQ-OAR-2008-0508-0977.1, excerpt 17.

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**Commenter Name:** William A. Collins, Jr

**Commenter Affiliation:** Occidental Petroleum Corporation

**Document Control Number:** EPA-HQ-OAR-2008-0508-0452

**Comment Excerpt Number:** 6

**Comment:** Subpart PP would require reporting of “the mass of carbon dioxide captured from production process units, the mass of carbon dioxide extracted from carbon dioxide production wells, and the mass of carbon dioxide imported and exported regardless of the degree of impurities in the carbon dioxide stream” (section 98.422). On pages 16585 of the preamble, EPA states that “all CO<sub>2</sub> production wells owned by a single owner or operator in a given Dome report the mass of CO<sub>2</sub> extracted and/or transferred off site. ... We propose to require reporting on the volume of the CO<sub>2</sub> stream at the point of capture, extraction, import and export because this would provide information on the total quantity of CO<sub>2</sub> available for sale. Measuring at this initial point could provide additional information in the future on fugitive CO<sub>2</sub> emissions from onsite purification, processing, and compression of the gas.” EPA’s “Technical Support Document (TSD) for CO<sub>2</sub> Supply” notes that EPA assumes “that the entire amount of the captured or extracted CO<sub>2</sub> that is transferred off site is assumed to be emitted to the atmosphere from downstream systems in which the CO<sub>2</sub> is used.”

**Response:** Thank you for your comment.

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**Commenter Name:** Kim Dang

**Commenter Affiliation:** Kinder Morgan Energy Partners, L.P.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0370.1

**Comment Excerpt Number:** 7

**Comment:** As noted in the Preamble to the Proposed Rule, CO<sub>2</sub> used in most industrial applications will eventually be released into the atmosphere. In contrast, the vast majority of CO<sub>2</sub> that is produced from natural sources and used for EOR is not emitted. [Footnote: Around

98% of the CO<sub>2</sub> Kinder Morgan produces is used in domestic EOR operations. The remaining 2% is currently sold to distributors who resell the product to oil field service companies that use it primarily in hydraulic fracturing/well stimulation and small EOR pilot projects (delivered to their customers by tank trucks, typically).]

During the EOR operation, the CO<sub>2</sub> is recycled, with minimal losses resulting from facility events such as maintenance blowdowns and upset conditions. EOR is a closed loop system and when the EOR project is no longer economic to operate, wells and equipment are shut in leaving the CO<sub>2</sub> permanently in the formation (i.e., geologically sequestered). In our experience there have been rare occasions where CO<sub>2</sub> from a retired EOR project may be produced and delivered to an adjacent or nearby EOR project, but again the end point remains the same, in the ground.

Accordingly, CO<sub>2</sub> source production is not and should not be presumed to be emitted. Kinder Morgan understands that EPA relied on the Intergovernmental Panel on Climate Change (IPCC) protocol/reporting convention to justify its reporting requirement for CO<sub>2</sub> production. Under that protocol, it is assumed that everything produced is emitted if there is a lack of reliable downstream information. Kinder Morgan maintains that EPA does not need to rely on this default rule in the case of CO<sub>2</sub>/EOR operations, because there is reliable evidence that less than 1/2 of 1% of CO<sub>2</sub> from production wells is ultimately emitted during the entire process of extraction, compression, pipeline transportation, and delivery to EOR injection wells. In addition, after an extensive review of available data, the IPCC concluded that “observations from engineered and natural analogues as well as models suggest that the fraction (of CO<sub>2</sub>) retained in appropriately selected and managed geological reservoirs is very likely to exceed 99% over 100 years and is likely to exceed 99% over 1000 years. For well-selected, designed and managed geological storage sites, the vast majority of the CO<sub>2</sub> will gradually be immobilized by various trapping mechanisms and, in that case, could be retained for up to millions of years.”]Footnote: INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CARBON DIOXIDE CAPTURE AND STORAGE 14 (Bert Metz et al. eds., 2005).] As explained in more detail below, by their very nature, EOR fields are well-selected, designed, and managed such that CO<sub>2</sub> is reliably retained in the given geologic formation both during active operation of the EOR field and after EOR operations have ceased. It is for these reasons that Kinder Morgan disagrees with EPA’s interpretation of retention rate at EOR sites.

In the Preamble of the Proposed Rule, EPA referenced a study of CO<sub>2</sub> retention rates at EOR operations in the Permian Basin, and noted that reported retention rates ranged from 38 to 100%, with an average of 71%. It is important to understand that most of the “retention rates” being reported in this study were from ongoing EOR operations. During an EOR operation, the amount of CO<sub>2</sub> “retained” by a reservoir, as the term is used by petroleum engineers, is the amount of CO<sub>2</sub> that is not recovered with the oil for recycling and reuse for further oil extraction. This quantity has no relationship to the amount of CO<sub>2</sub> that will be retained by the geologic formation once the EOR operation is concluded and the reservoir is capped. The study notes that the amount retained “is the estimated total amount of CO<sub>2</sub> that does not return to the surface once injected, thus is not recycled. Essentially 100% of the purchased CO<sub>2</sub> is still in the system. Practically, 100% of the fluid will be stored in the reservoir unless a reservoir blowdown is instigated.”]Footnote: Reid Grigg, Long-Term CO<sub>2</sub> Storage: Using Petroleum Industry Experience, in 2 CARBON DIOXIDE CAPTURE FOR STORAGE IN DEEP GEOLOGIC FORMATIONS 853, 860 (D.C. Thomas & S.M. Benson, eds. 2005)] This analysis is consistent with the IPCC conclusions discussed above. Therefore, KM believes that EPA should instead collect data on actual CO<sub>2</sub> emissions above the 25,000 tons CO<sub>2</sub>-e per year threshold at facilities if and where they occur, rather than assume CO<sub>2</sub> that is produced from a source well is

eventually emitted somewhere else. Recommendation: EPA should monitor emissions, not production of CO<sub>2</sub>. Because most or all of the CO<sub>2</sub> produced from a natural source for purposes of EOR is geologically sequestered, the amount of CO<sub>2</sub> produced for this purpose does not provide EPA with useful information about actual emissions. In such situations—when the use of a product does not generally result in emissions—upstream emissions estimates based upon production are unhelpful, and do not fit within EPA’s mandate from Congress to measure upstream emissions only as appropriate. Kinder Morgan therefore suggests that EPA change the definition of the Suppliers of Carbon Dioxide source category to exclude CO<sub>2</sub> produced from natural sources for the purpose of EOR, except for those facilities where actual emissions to the atmosphere exceed the 25,000 ton per year reporting threshold. If EPA is not willing to exclude CO<sub>2</sub> produced for use in EOR from reporting requirements, Kinder Morgan urges EPA to make it abundantly clear in the Final Rule that CO<sub>2</sub> reported as produced is not an emission, because most or all of this CO<sub>2</sub> will never be emitted to the atmosphere.

**Response:** EPA did not intend to characterize all CO<sub>2</sub> supplied to the economy as emissions and recognizes that there are a variety of applications for CO<sub>2</sub>, both emissive and non-emissive. However, the Administrator believes that upstream suppliers have information that is necessary for purposes of carrying out an evaluation of how to use the CAA to address GHG emissions and climate change. Emissions data are not limited to information regarding the actual level of emissions from a smokestack. See the Preamble, Section 3 for a discussion of EPA’s legal authority under the heading *Clean Air Act*. For information on how CO<sub>2</sub> supply will assist EPA in developing future climate policy, please see the Preamble in *Definition of Source Category*.

In the proposed Subpart PP preamble, EPA cited a study about the term “retention rate”. EPA understands from commenters that “retention rate” is defined as the amount of CO<sub>2</sub> that is injected into the underground formation (oil field), while the EOR site is operating and producing oil, and that is not recovered with the oil, and has to do with the efficiency of the CO<sub>2</sub> recycling process at an operating EOR site. EPA did not intend to suggest that “retention” equates to the amount of CO<sub>2</sub> sequestered in an underground formation. While EPA understands that some amount of CO<sub>2</sub> injected into oil and gas reservoirs for EOR purposes will be trapped in the subsurface, EPA concludes that site-specific elements beyond geophysical trapping parameters influence the amount of CO<sub>2</sub> securely sequestered. See the Preamble, Section III.PP for a discussion of such elements in *Definition of Source Category*.

EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

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**Commenter Name:** Karen St. John  
**Commenter Affiliation:** BP America Inc. (BP)  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0631.1  
**Comment Excerpt Number:** 107

**Comment:** With respect to “Suppliers of Carbon Dioxide (CO<sub>2</sub>)”, EPA is proposing inclusion of facilities and production wells producing CO<sub>2</sub> in its proposed rulemaking. This proposed source category applies to suppliers of CO<sub>2</sub> including industrial facilities or process units that capture CO<sub>2</sub> (i.e. at power plants, hydrogen production plants, and other combustion and industrial process sources) and deliver them to different end users for commercial application (i.e.,

chemical production or EOR). See 74 FR at 16583; 16725. The proposed rule applies specifically to (1) “production process units” that capture a CO<sub>2</sub> stream, meaning the separation and removal of CO<sub>2</sub> from a manufacturing process or fuel combustion source, for example; and (2) facilities with “CO<sub>2</sub> production wells.” Id. at 16725. The proposed rule excludes from this CO<sub>2</sub> Supplier category the carbon capture and storage chain of activities starting with the “purification, compression, or processing of CO<sub>2</sub>” through transportation, injection and use of CO<sub>2</sub> for EOR and geologic sequestration. EPA has invited comment on the exclusion of fugitive emissions from the carbon capture and storage chain from the rule. EPA has also invited comment on the merits of requiring reporting of fugitive emissions from geologic sequestration of CO<sub>2</sub> in order to demonstrate the effectiveness of enhanced oil recovery (EOR) projects that “ultimately intend to store the CO<sub>2</sub> for long periods of time.” BP applauds EPA’s decision to exclude the carbon capture and storage chain from the source category of CO<sub>2</sub> Suppliers in the proposed rule. The purpose of the rule is to quantify and understand significant emission GHG emission sources to the atmosphere and not to understand mitigation technologies. As EPA has stated in the Preamble to the proposed rule, the primary purpose of EPA’s proposed rule is to gather comprehensive and accurate data to improve the government’s understanding of GHG emissions from industrial sources. The fundamental objective of this data and information gathering is to guide and inform the U.S. government’s future policy options and regulations with respect to climate change. 74 FR at 16456. Carbon capture and storage, on the other hand, is an important climate change mitigation technology and has been recognized as such by the Intergovernmental Panel on Climate Change (IPCC), governmental authorities, environmental NGOs, scientists and international bodies.[Footnote: In 2005, the IPCC released a report, Carbon Dioxide Capture and Storage (the “IPCC CCS Report”), which was written by 125 contributing authors, and was extensively reviewed by over 200 others, including technical experts and government representatives from around the world. The IPCC CCS Report carefully weighs the technologies and the potential risk and concludes that, with appropriately selected and managed sites, CO<sub>2</sub> may be permanently sequestered in subsurface formations. The IPCC CCS Report notes that the early commercial scale geologic sequestration projects will probably employ CO<sub>2</sub> sequestration with EOR.] Accordingly, a rule that aims to quantify and understand sources and trends of industrial GHG emissions to the atmosphere should not extend beyond its scope and attempt to assess the effectiveness of carbon capture and storage as an option for mitigating climate change or the amount of CO<sub>2</sub> sequestered in a geologic formation. Simply stated, a geologic sequestration site is not an “emission source.”

Importantly, understanding and quantifying the effectiveness of geologic sequestration in the subsurface requires a set of procedures and monitoring efforts specifically designed for a particular geologic sequestration site, which is beyond the scope of this proposed rule and beyond the statutory authority cited by EPA for this proposed rule. Consequently, EPA should exclude reporting from the carbon capture and storage chain from its final rule. BP strongly supports EPA’s decision to exclude reporting of “fugitive emissions” from the carbon capture and storage chain and discourages EPA from imposing such a requirement in the future with respect to geologic sequestration sites.[Footnote: With respect to fugitive emissions from surface facilities, BP references its comments above as equally applicable to the carbon capture and storage chain.]

The proposed rule defines “fugitive emissions” as follows: [U]nintentional equipment emissions of methane and/or carbon dioxide containing natural gas or hydrocarbon gas (not including combustion flue gas) from emissions sources including, but not limited to, open ended lines, equipment connections or seals to the atmosphere.



Fugitive emissions also mean CO<sub>2</sub> emissions resulting from combustion of natural gas in flares. See 74 FR at 16621. The Preamble to the proposed rule defines “fugitive emissions” as “emissions that cannot reasonably pass through a stack, chimney, vent or other functionally equivalent opening.” Id. at 16456. As is inherent in both of the foregoing definitions, fugitive emissions are generally defining unintentional and minor emissions from surface facilities. The concept of “fugitive emissions” simply should not apply and is a misconception when referencing a geologic sequestration site – rather, the appropriate analysis and focus should be and is potential leakage from a geologic sequestration site.[Footnote: To the extent, EPA means “fugitive emissions” as only those that are “co-produced with oil/gas” (see 74 FR at 16584), as explained below, these are not emitted to the atmosphere in a CO<sub>2</sub> EOR and Sequestration project.]

In addition to the reasons discussed above, EPA should not require reporting “fugitive emissions” from the geologic sequestration site because such information is impractical to measure, overly costly and burdensome, and will not lead to reliable and accurate data. For instance, the concept of “fugitive emissions” escaping from potentially transmissive faults and/or fractures is inappropriate given the diffuse nature of the potential flux, which would prove difficult to identify, locate and/or measure and would, in sum, be inconsequential. Any reporting data regarding the “fugitive emissions” from a geologic sequestration site would not have any meaningful relevance to the effectiveness of the overall geologic sequestration project. Finally, the concept of storage effectiveness should not be addressed by a GHG emissions reporting requirement, but rather should be and is being addressed by an on-going EPA Safe Drinking Water program underground injection control (UIC) rulemaking and other legislative and regulatory proceedings.

**Response:** EPA did not intend to characterize all CO<sub>2</sub> supplied to the economy as emissions and recognizes that there are a variety of applications for CO<sub>2</sub>, both emissive and non-emissive. However, the Administrator believes that upstream suppliers have information that is necessary for purposes of carrying out an evaluation of how to use the CAA to address GHG emissions and climate change. Emissions data are not limited to information regarding the actual level of emissions from a smokestack. See the Preamble, Section 3 for a discussion of EPA’s legal authority under the heading *Clean Air Act*.

The “carbon capture and storage chain” is not excluded from the source category of CO<sub>2</sub> suppliers. Carbon capture facilities are included in Subpart PP; facilities that capture CO<sub>2</sub> are required to report the amount of CO<sub>2</sub> captured and facilities that extract CO<sub>2</sub> from wells are required to report the amount of CO<sub>2</sub> extracted; downstream processing, transport, injection, and storage facilities are not included in Subpart PP. For information on how CO<sub>2</sub> supply will assist EPA in developing future climate policy, please see the Preamble in *Definition of Source Category*.

EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

It is EPA’s strong intention to harmonize CCS requirements across relevant statutory or other programs in order to minimize any redundancy and any burden on reporters. See the Preamble, Section III.PP for a discussion of harmonizing efforts in *Definition of Source Category*.

EPA concurs that the term “leakage” rather than the term “fugitive emissions” best applies to emissions originating from the subsurface at geologic sequestration sites. EPA will address this under the new proposal. As stated in Section III.W of this preamble, EPA plans to take additional time to consider alternatives to data collection procedures and methodologies in the proposed 40 CFR part 98, subpart W and will consider inclusion of GHG reporting from other sectors of the oil and gas industry besides those proposed for reporting in proposed 40 CFR Part 98, subpart W. Fugitive emissions from EOR surface facility operations may be part of those considerations.

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**Commenter Name:** Carol E. Whitman

**Commenter Affiliation:** National Rural Electric Cooperative Association (NRECA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0483.1

**Comment Excerpt Number:** 16

**Comment:** Remove an Incorrect Cross-Reference Regarding the Treatment of Importing and Exporting of CO<sub>2</sub>. The second paragraph of Section V.PP.1 of the preamble states: Importers and exporters of CO<sub>2</sub> are discussed under suppliers of industrial GHGs (see Section V.OO of this preamble) . . . . However, that section only addresses fluorinated GHGs and N<sub>2</sub>O. Since import and export of CO<sub>2</sub> is not mentioned in either section V.OO of the preamble or in Subpart OO of the rule, this reference should be deleted.

**Response:** EPA decided to have a single threshold applicable for bulk importers and exporters of industrial gases and CO<sub>2</sub> because many importers and exporters handle multiple industrial gases together, including CO<sub>2</sub>. Therefore, the cost estimate and threshold analysis for CO<sub>2</sub> importers and exporters to comply with Subpart PP is discussed under Subpart OO. For those companies that meet the threshold, the reporting requirements for CO<sub>2</sub> imports and exports are covered under Subpart PP.

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## 5. DETAILED GHG EMISSION CALCULATION PROCEDURES/EQUATIONS IN THE RULE

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**Commenter Name:** See Table 4

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0635

**Comment Excerpt Number:** 92

**Comment:** Add to proposed paragraph 98.423 the following new subparagraph: “(d) Report quarterly the total amount of CO<sub>2</sub> (and incidental other material, if included in the injectate) injected, and the total amount of CO<sub>2</sub> extracted, based on flow metering at the injection and/or production site.”

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

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**Commenter Name:** Rhea Hale

**Commenter Affiliation:** American Forest & Paper Association (AF&PA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0909.1

**Comment Excerpt Number:** 23

**Comment:** Explained in EPA's TSD for the Pulp and Paper Sector, for pulp and paper facility's exporting CO<sub>2</sub>, CO<sub>2</sub> emission calculation results should be adjusted to reflect that not all of the fuel-derived CO<sub>2</sub> is emitted to the atmosphere. EPA reporting program requirements should provide guidance on adjusting these emissions (total actual emissions equals emissions calculated based on mass balance minus CO<sub>2</sub> captured rather than emitted). EPA should also recognize that the most common source of CO<sub>2</sub> capture is from kraft lime kiln vent which includes both fossil derived CO<sub>2</sub> and biogenic CO<sub>2</sub>, and the guidance on adjusting calculated emissions to account for CO<sub>2</sub> capture should reflect this practice.

**Response:** EPA did not intend to characterize all CO<sub>2</sub> supplied to the economy as emissions and recognizes that there are a variety of applications for CO<sub>2</sub>, both emissive and non-emissive. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. EPA will consider this comment in developing the new proposal.

This final rule requires the reporting of data on capture of biogenic CO<sub>2</sub>. See the Preamble, Section III.PP for our response to a comment on exempting captured biogenic CO<sub>2</sub> in *Definition of Source Category*.

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## 6. MONITORING AND QA/QC REQUIREMENTS

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**Commenter Name:** Marc J. Meteyer

**Commenter Affiliation:** Compressed Gas Association (CGA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0981.1

**Comment Excerpt Number:** 71

**Comment:** §98.424 The industrial gas industry does not typically use mass flowmeters anywhere in a CO<sub>2</sub> liquefaction and purification plant. CO<sub>2</sub> streams captured from production processes are typically water saturated, low pressure (less than 15 psig) and relatively high in volumetric flow. Water content will vary significantly with ambient conditions. Accurate measurement of such streams is difficult and expensive. The CGA respectfully requests that the EPA not mandate that reporting entities be required to install flowmeters and bear the extra cost for the instrumentation, installation and maintenance. For CGA member company activities that include compression, purification and liquefaction, it is an industry standard practice not to use flowmeters on our liquefaction plants. Considering more than 100 member company installations, installation of these meters to comply with the monitoring and reporting guideline would cost our membership millions of dollars. Because of the difficulty in measuring the water saturated stream and because of focus on finished product quality (see below), the amount of CO<sub>2</sub> flowing from the capture point to the commercial user(s) is not typically measured. It is an industry standard practice to monitor the incoming gas purity only on an annual basis. Although

each stream is unique, in general the average purity of raw CO<sub>2</sub> feedgas is on the order of 95-99% pure CO<sub>2</sub> (dry basis).

**Response:** EPA understands from this comment that most intermediate processors that purify, compress and liquefy CO<sub>2</sub> do not use mass flow meters and that requiring such facilities to install mass flow meters would be burdensome under the scope of this final rule. Under Subpart PP of this final rule, such facilities are not required to report. Entities that produce or capture CO<sub>2</sub> are required to report the amount of CO<sub>2</sub> captured "prior to any subsequent purification, processing, or compressing" using a mass or volumetric flow meter.

See the Preamble, Section III.PP for the response to comment on *Definition of Source Category*.

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**Commenter Name:** John M. Batt

**Commenter Affiliation:** Airgas, Inc.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0408.1

**Comment Excerpt Number:** 33

**Comment:** The industrial gas industry does not typically use mass flow meters anywhere in a CO<sub>2</sub> liquefaction and purification plant. CO<sub>2</sub> streams captured from production processes are typically water saturated, low pressure (less than 15 psig) and relatively high in volumetric flow. Water content will vary significantly with ambient conditions. Accurate measurement of such streams is difficult and expensive. Because of the difficulty in measuring the water saturated stream and because of focus on finished product quality (see below), the amount of CO<sub>2</sub> flowing from the capture point to the commercial user(s) is not typically measured. It is an industry standard practice to monitor the incoming gas purity only on an annual basis. Although each stream is unique, in general the average purity of raw CO<sub>2</sub> feed gas is on the order of 95-99% pure CO<sub>2</sub> (dry basis).

**Response:** See the response to the comment directly above, comment EPA-HQ-OAR-2008-0508-0981.1, excerpt 71.

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**Commenter Name:** John M. Batt

**Commenter Affiliation:** Airgas, Inc.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0408.1

**Comment Excerpt Number:** 35

**Comment:** Regarding the requirement for quarterly composition analysis, the initial CO<sub>2</sub> stream concentration is currently only measured on an annual basis in many installations. Companies such as Airgas purify to beverage grade specifications and rigorously test every truckload of finished liquid CO<sub>2</sub> product for compliance to exacting customer and industry standards. In addition, product-to-storage batches are continually analyzed and results recorded. It has become an industry standard to measure the finished liquid product rather than the incoming gas purity as the intense focus on quality is on the finished product side, not the incoming gas. In addition, focusing on inlet gas quality could possibly miss quality impacts due to plant upsets downstream. We request that EPA allow composition analysis of raw CO<sub>2</sub> feed gas on an annual basis.

**Response:** EPA understands from this comment that most intermediate processors that purify CO<sub>2</sub> measure the initial CO<sub>2</sub> stream concentration on an annual basis. Subpart PP of his final

rule does not cover facilities that take ownership of a CO<sub>2</sub> stream that has already been separated and removed from a manufacturing process or that has already been extracted from CO<sub>2</sub> production wells. Under Subpart PP of this final rule, covered facilities include facilities with production process units that capture and supply CO<sub>2</sub> for commercial applications or that capture and maintain custody of a CO<sub>2</sub> stream in order to sequester or otherwise inject it underground; and facilities with CO<sub>2</sub> production wells that extract a CO<sub>2</sub> stream for the purpose of supplying CO<sub>2</sub> for commercial applications. See the Preamble, Section III.PP.3 for our response to comment on *Definition of Source Category*.

Covered facilities are required to measure quarterly mass or volume using a flow meter and quarterly CO<sub>2</sub> concentration of the flow. EPA requires quarterly monitoring because EPA has concluded that the CO<sub>2</sub> concentration of the stream varies throughout the year, and a quarterly concentration number multiplied by a quarterly mass or volume will generate more accurate calculation of CO<sub>2</sub> supply than annual measurements. EPA requires these quarterly numbers to be reported so that EPA can electronically verify the calculations.

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**Commenter Name:** Lorraine Krupa Gershman  
**Commenter Affiliation:** American Chemistry Council (ACC)  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0423.2  
**Comment Excerpt Number:** 177

**Comment:** EPA should require CO<sub>2</sub> metering at the point where the material enters the stream of commerce, not where it is separated out of the manufacturing process. Liquefied CO<sub>2</sub> is easier to measure than raw CO<sub>2</sub>. Some member companies manufacture CO<sub>2</sub>, transfer it to a company for processing, liquefaction, and marketing to downstream users. Manufacturers should be able to use production data from the entity liquefying the CO<sub>2</sub>, regardless if the liquefaction step is conducted by the reporter or by a downstream entity engaged in arms-length sale of the CO<sub>2</sub>.

**Response:** See the response to comment EPA-HQ-OAR-2008-0508-0977.1, excerpt 17.

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**Commenter Name:** William C. Herz  
**Commenter Affiliation:** The Fertilizer Institute (TFI)  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0952.1  
**Comment Excerpt Number:** 29

**Comment:** Subpart PP of the NPRM provides a reference to a “mass flow meter” to measure the mass flow of the captured CO<sub>2</sub> stream. Many facilities use volumetric meters for such measurements. TFI members have indicated that they are aware of any CO<sub>2</sub> suppliers that rely on “mass flow meters.” The “mass flow meters” referenced in the NPRM represent a relatively new technology, the implementation of which would come at great cost to facilities already relying on volumetric flow meters, without any improvement in the accuracy of the measurements. Facilities under proposed Subpart PP should have the option to continue to rely on volumetric flow meters.

**Response:** EPA concurs with this comment. See the Preamble, Section III.PP for the response to comment on *Monitoring and QA/QC Requirements*.

**Commenter Name:** Marc J. Meteyer  
**Commenter Affiliation:** Compressed Gas Association (CGA)  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0981.1  
**Comment Excerpt Number:** 76

**Comment:** General Request – Definition of Mass Flow Meter The CGA respectfully requests further definition of the following term: Mass Flow meter. As the EPA has specified that mass flow meter calibrations must be NIST traceable, what is the definition of the term Mass Flow meter?

**Response:** As a result of comments, EPA added two equations to the methodology section of Subpart PP in this final rule in order to allow a reporter that measures CO<sub>2</sub> in a stream using a volumetric flow meter to use this volumetric flow meter to determine quantity rather than having to purchase and install a mass flow meter. Therefore, the calibration requirements in Subpart PP have been updated so that any flow meter calibrations performed must be NIST traceable – whether for mass or volumetric flow meters. In this final rule, a definition of flowmeter is provided in Part 98.6, Subpart A.

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**Commenter Name:** Tiffany Rau  
**Commenter Affiliation:** Hydrogen Energy International LLC (HEI)  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0517.1  
**Comment Excerpt Number:** 6

**Comment:** In section 98.424, paragraphs (a) and (b) of the proposed rule, EPA requires facilities with production process units and production wells that capture a CO<sub>2</sub> stream use a mass flow meter to measure the mass flow of the CO<sub>2</sub> stream captured on a quarterly basis. HEI strongly discourages EPA from adopting a strict requirement to install mass flow meters when new metering is required because this may not be feasible. Approximately one year ago, the availability of mass flow meters of greater than 3” diameter capable of dense-phase CO<sub>2</sub> measurement (i.e., large meters that might be required for the measurements anticipated by EPA) was researched. While the technology appears to be emerging, such mass flow meters are not yet available. Consistent with the API position, HEI recommends allowing flexibility as to what meters should be installed. For example, CO<sub>2</sub> Suppliers should be able to use volumetric measurements converted to mass (a long-standing practice in the oil and gas industry) or other suitable measurement devices. Such an approach would allow for the adoption of mass flow meters once the technology has been proven. HEI strongly disagrees with the requirement of a single methodology because this limits technology development and favors certain technologies to the exclusion of others without any reasonable basis.

**Response:** EPA concurs with this comment. See the Preamble, Section III.PP for the response to comment on *Monitoring and QA/QC Requirements*.

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**Commenter Name:** Jennifer Reed-Harry  
**Commenter Affiliation:** PennAg Industries Association  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0948.1  
**Comment Excerpt Number:** 7

**Comment:** Subpart PP of the NPRM provides a reference to a "mass flow meter" to measure the mass flow of the captured CO<sub>2</sub> stream. Many facilities use volumetric meters for such measurements. The "mass flow meters" referenced in the NPRM represent a relatively new technology, the implementation of which would come at great cost to facilities already relying on volumetric flow meters without any improvement in the accuracy of the measurements. Facilities under proposed Section PP should have the option to continue to rely on volumetric flow meters.

**Response:** EPA concurs with this comment. See the Preamble, Section III.PP for the response to comment on *Monitoring and QA/QC Requirements*.

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**Commenter Name:** See Table 2

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0679.1

**Comment Excerpt Number:** 254

**Comment:** §98.424 Monitoring and QA/QC requirements (a) Facilities with production process units that capture CO<sub>2</sub> stream must measure on a quarterly basis using a mass flow meter.... (b) CO<sub>2</sub> production well facilities must measure on a quarterly basis... using a mass flow meter.... API comments: Mass flow meters of greater than 3" diameter capable of dense-phase CO<sub>2</sub> measurement (i.e., large meters that might be required for the measurements anticipated by EPA) are not yet available. Indeed, the technology appears only to be emergent and is by no means proven. Contrary to EPA's assertion that "these sites likely already have the necessary flow meters installed to monitor the CO<sub>2</sub> stream" (74 FR 68 16585), volumetric measurements converted to mass flow rates have been used for over 30 years for custody transfers between parties. Accordingly, CO<sub>2</sub> suppliers should be offered the flexibility to utilize any suitable measurement device (which would allow for the adoption of mass flow meters when the technology has been proven).

**Response:** EPA concurs with this comment. See the Preamble, Section III.PP for the response to comment on *Monitoring and QA/QC Requirements*.

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**Commenter Name:** Ronald T. Evans

**Commenter Affiliation:** Denbury Resources, Inc.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0484.1

**Comment Excerpt Number:** 4

**Comment:** Methodological issues: the final rule should allow use of existing industry-standard orifice meters with conversion to mass based on chemical composition sampling, and should not require use of mass flow meters. The proposed rule would require production well facilities to use mass flow meters to measure the mass flow rate of all CO<sub>2</sub> that is being metered. [Footnote: Proposed § 98.424, "Monitoring and QA/QC requirements" reads as follows: (b) Carbon dioxide production well facilities must measure on a quarterly basis the mass flow of the CO<sub>2</sub> stream extracted using a mass flow meter. If the CO<sub>2</sub> production wells do not have mass flow meters installed to measure the mass flow of the CO<sub>2</sub> stream extracted, measurements shall be based on mass flow of gas transferred off site using a mass flow meter. In either case, sampling must be conducted on at least a quarterly basis to determine the composition of the extracted or transferred carbon dioxide. See also proposed § 98.423 (b) which requires CO<sub>2</sub> production well facilities inter alia to use the mass flow measurements of proposed § 98.424 in performing total

mass calculations.] The preamble indicates that EPA believes that there would be only a “minimal” incremental burden to this measurement requirement for CO<sub>2</sub> suppliers (including CO<sub>2</sub> production wells) because these sites “likely” already have the necessary flow meters installed, at least at the point of CO<sub>2</sub> transfer offsite. 74 Fed. Reg. at 16585. This is not at all accurate. At the present time there are very few if any mass flow meters used in custody transfers of CO<sub>2</sub> between parties. The overwhelming majority of CO<sub>2</sub> measured at custody transfer points is measured on a volumetric basis by means of an orifice meter and then converted to mass volumes based on the chemical composition of the CO<sub>2</sub> stream. See, e.g. Marsden and Wolter, “Pipeline measurement of supercritical carbon dioxide” in Pipeline Rules of Thumb Handbook (at pp. 485-491). [Footnote: Marsden and Wolter, “Pipeline measurement of supercritical carbon dioxide” in Pipeline Rules of Thumb Handbook (ed. E. W. McAllister) (6th ed. 2005) (Gulf Professional Publishing).] The accuracy of these existing orifice meters which measure volumetric flow rates have proven to be accurate within 1% for many years. *Id.*, at 487 (Table 2). Indeed, the orifice plate has a long record of widespread use and has been termed the “key to the success” of the pipeline measurement system. *Id.* at 487. While research and testing of mass flow meters is currently being conducted and may eventually be proven useful, the overwhelming number of CO<sub>2</sub> wells, CO<sub>2</sub> EOR injection wells and facilities are currently equipped with the volumetric flow meters. Hence, the EPA’s statement that there would be only a minimal burden in requiring mass flow meters for measurement and reporting under the proposed rule is not accurate. Rather, the cost associated with changing all of the existing meters and replacing them with mass flow meters is not justified and will provide no additional benefits. This could be done by revising proposed Section 98.424 (b) by added the text as shown below: Section 98.424 b) Carbon dioxide production well facilities must measure on a quarterly basis the mass flow of the CO<sub>2</sub> stream extracted using a mass flow meter or existing orifice meter with volumetric quantities converted to mass volumes based on the chemical composition of the CO<sub>2</sub> stream. If the CO<sub>2</sub> production wells do not have mass flow meters installed to measure the mass flow of the CO<sub>2</sub> stream extracted, measurements shall be based on mass flow of gas transferred off site using a mass flow meter or existing orifice meter with volumetric quantities converted to mass volumes based on the chemical composition of the CO<sub>2</sub> stream. In either case, sampling must be conducted on at least a quarterly basis to determine the composition of the extracted or transferred carbon dioxide.

**Response:** EPA concurs with this comment. See the Preamble, Section III.PP for the response to comment on *Monitoring and QA/QC Requirements*.

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**Commenter Name:** Karen St. John

**Commenter Affiliation:** BP America Inc. (BP)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0631.1

**Comment Excerpt Number:** 111

**Comment:** In Subpart PP Section 98.424, paragraphs (a) and (b) of the proposed rule, EPA requires facilities with production process units and production wells that capture a CO<sub>2</sub> stream use a mass flow meter to measure the mass flow of the CO<sub>2</sub> stream captured on a quarterly basis. BP strongly discourages EPA from adopting a strict requirement to install mass flow meters when new metering is required because this may not be feasible. Approximately one year ago, BP researched the availability of mass flow meters of greater than 3” diameter capable of dense-phase CO<sub>2</sub> measurement (i.e., large meters that might be required for the measurements anticipated by EPA). While the technology appears to be emerging, such mass flow meters are not yet available. Consistent with the API position, BP recommends allowing flexibility as to



what meters should be installed. For example, CO<sub>2</sub> Suppliers should be able to use volumetric measurements converted to mass (a long-standing practice in the oil and gas industry) or other suitable measurement devices. Such an approach would allow for the adoption of mass flow meters once the technology has been proven. BP strongly disagrees with the requirement of a single methodology because this limits technology development and favors certain technologies to the exclusion of others without any reasonable basis.

**Response:** EPA concurs with this comment. See the Preamble, Section III.PP for the response to comment on *Monitoring and QA/QC Requirements*.

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**Commenter Name:** H. Allen Faulkner

**Commenter Affiliation:** Ascend Performance Materials, LLC, Decatur Plant

**Document Control Number:** EPA-HQ-OAR-2008-0508-1578

**Comment Excerpt Number:** 8

**Comment:** 98.424(d) requires that mass flow meter calibrations must be NIST traceable; however the requirement does not state a frequency. Typically, Coriolis-based mass flow meters are factory calibrated to NIST traceable standards and not recalibrated in the field. The current rule is unclear on whether the NIST traceable initial calibration is sufficient to meet the QAJQC requirement.

**Response:** In Subpart PP of this final rule, all flow meters, scales, and load cells used to measure quantities that are reported in §98.423 must be operated and calibrated according to an appropriate standard method published by a consensus-based standards organization if such a method exists. Where no appropriate standard method developed by a consensus-based standards organization exists, the reporter must calibrate by following industry standard practices. The reporter must ensure that any flow meter calibrations performed are NIST traceable. A Subpart PP reporter should follow these instructions when determining the frequency of calibration. If the standard method or industry standard practice being applied requires initial calibration, then it is sufficient for the purposes of Subpart PP.

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**Commenter Name:** William A. Collins, Jr

**Commenter Affiliation:** Occidental Petroleum Corporation

**Document Control Number:** EPA-HQ-OAR-2008-0508-0452

**Comment Excerpt Number:** 9

**Comment:** Occidental believes that CO<sub>2</sub> production well facilities should only be required to measure on an annual, not quarterly basis using a mass flow calculation (volumetric flow rate multiplied by concentration), which is consistent with typical equipment in use today. The use of a mass flow meter should be identified as an optional, alternative method. If reporting is on an annual basis, it seems consistent to only require measuring annually as well.

**Response:** EPA concurs with this comment in regards to using a mass flow calculation (volumetric flow rate by concentration). See the Preamble, Section III.PP for the response to comment on *Monitoring and QA/QC Requirements*.

EPA does not agree that measurement should be conducted on an annual basis. Subpart PP requires measurement on a quarterly basis using either a mass flow meter or a volumetric flow meter. Even though reporting is done annually, measurement is required quarterly to account for any variation in CO<sub>2</sub> concentration that may occur throughout the calendar year.

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**Commenter Name:** Marc J. Meteyer

**Commenter Affiliation:** Compressed Gas Association (CGA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0981.1

**Comment Excerpt Number:** 72

**Comment:** Our above comments on CBI notwithstanding, if EPA must collect data on CO<sub>2</sub> going to end uses, CGA suggests that EPA allow the use of finished product CO<sub>2</sub> scale or weighbridge readings to provide the EPA with the data it requires, as long as this CBI is protected. Contracts for the sale of captured CO<sub>2</sub> to downstream processors (such as CO<sub>2</sub> liquefaction processors) are typically based on finished CO<sub>2</sub> product sold by the downstream processor. These sold amounts are highly accurate as they are measured in accordance with commercial weights and measures regulations. This would give the EPA the most accurate measure of the mass of CO<sub>2</sub> transferred off of industrial gas sites. This data is readily available to CO<sub>2</sub> producers who capture CO<sub>2</sub> and transfer it to downstream entities.

**Response:** See the preamble for the response on CBI. Please see Preamble section II.R for more information about CBI. For a response on the point of measurement comment, see the response to comment EPA-HQ-OAR-2008-0508-0977.1, excerpt 17.

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**Commenter Name:** Marc J. Meteyer

**Commenter Affiliation:** Compressed Gas Association (CGA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0981.1

**Comment Excerpt Number:** 74

**Comment:** Regarding the requirement for quarterly composition analysis, our member companies that purify to beverage grade specifications, rigorously test every truckload of finished liquid CO<sub>2</sub> product for compliance to exacting customer and industry standards. In addition, product to storage batches are continually analyzed and results recorded. It has become an industry standard to measure the finished liquid product rather than the incoming gas purity as the intense focus on quality is on the finished product side, not the incoming gas. In addition, focusing on inlet gas quality could possibly miss quality impacts due to plant upsets downstream. We understand that the EPA's intent of purity measurement is to capture information on the initial stream concentration, but this is only measured on an annual basis in many installations. If the EPA insists on initial stream purity information being measured quarterly, our costs will rise dramatically. So as not to impose an undue penalty on our member companies and our industry, the CGA respectfully requests that the EPA allow composition analysis of raw CO<sub>2</sub> feedgas on an annual basis, assuming that our member companies are required to report.

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0981.1, excerpt 71.

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**Commenter Name:** Rich Raiders  
**Commenter Affiliation:** Arkema Inc.  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0511.1  
**Comment Excerpt Number:** 68

**Comment:** As the customer liquefies and measures Arkema's merchant CO<sub>2</sub>, we have no reliable method to measure the CO<sub>2</sub> entering the customer's system. We solicited recommendations from a preeminent flow instrument manufacturer to determine how we would measure a mixed-phase CO<sub>2</sub> process stream, containing both gas-phase materials and water mist, and were told that this stream could not be measured to the accuracy criteria that EPA proposed at § 98.424. EPA should require that § 98.424 measurements be conducted of liquefied CO<sub>2</sub>, where the instrumentation exists for accurate measurements. Producers who rely on customer CO<sub>2</sub> shipment data should be authorized to use the CO<sub>2</sub> processor's receipt data for Part 98 reporting. Another measurement factor that has arisen during the comment process is that the existing mass flow instrumentation is not readily able to distinguish between CO<sub>2</sub> and carbon monoxide ("CO") in some services.

**Response:** Please see Preamble section II.R for more information about CBI. For a response to the rest of the comment, see the response to comment EPA-HQ-OAR-2008-0508-0977.1, excerpt 17.

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**Commenter Name:** Marc J. Meteyer  
**Commenter Affiliation:** Compressed Gas Association (CGA)  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0981.1  
**Comment Excerpt Number:** 75

**Comment:** §98.423(c) and 98.424(c) Subpart PP does not recognize that most CO<sub>2</sub> imported and exported is pure liquid product. CGA respectfully submits that sections 98.423(c) and 98.424(c) of Subpart PP should allow the use of normal commercial weigh bills for pure product imports and exports since this will be the most accurate measurement.

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0977.1, excerpt 16.

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**Commenter Name:** Rich Raiders  
**Commenter Affiliation:** Arkema Inc.  
**Document Control Number:** EPA-HQ-OAR-2008-0508-0511.1  
**Comment Excerpt Number:** 70

**Comment:** EPA proscriptively requires specific Food and Drug Administration ("FDA") or ASTM methods for CO<sub>2</sub> analyses that may or may not be appropriate over time. As we discuss above, EPA should not proscribe analytical methods, but should set criteria for facilities to evaluate CO<sub>2</sub> concentrations and allow the reporters to select the best method.

**Response:** EPA proposed a limited list of methods in Subpart PP in order to ensure consistency across reporters and accuracy in data collected. For the final rule, EPA did not identify any other standards used commonly by industry to measure concentration nor were any proposed.

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**Commenter Name:** Marc J. Meteyer

**Commenter Affiliation:** Compressed Gas Association (CGA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0981.1

**Comment Excerpt Number:** 73

**Comment:** CGA understands and appreciates that EPA must continue to require the mass flow measurement of CO<sub>2</sub> extracted from CO<sub>2</sub> production wells in Subpart PP since such CO<sub>2</sub> is not reported in other subparts of the rule. Since CO<sub>2</sub> extracted from wells is typically not water saturated, accurate measurement is likely to be more practical.

**Response:** EPA thanks Compressed Gas Association for its understanding and appreciation. In Subpart PP of this final rule, a reporter that measures CO<sub>2</sub> in a stream using a volumetric flow meter may use this volumetric flow meter to determine quantity rather than having to purchase and install a mass flow meter. See the Preamble, Section III.PP for the response to comment on *Monitoring and QA/QC Requirements*.

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**Commenter Name:** See Table 4

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0635

**Comment Excerpt Number:** 93

**Comment:** Add new paragraph (f) to proposed subsection 98.424, to read as follows: “(f) Geologic sequestration and enhanced hydrocarbon recovery operations shall meet the monitoring requirements of the Safe Drinking Water Act Underground Injection Control (UIC) program well classification regulations under which they are permitted. In addition, geologic sequestration operations shall meet detailed atmospheric monitoring, accounting and reporting protocols when developed and adopted by the Administrator through in a formal rule making.

**Response:** This final rule does not require CO<sub>2</sub> transport, injection, or storage facilities to report under Subpart PP. Given the comments received on the Subpart PP proposal, EPA plans to issue a new proposal on geologic sequestration. See the Preamble, Section III.PP for a discussion of this planned new proposal in *Definition of Source Category*. Thus, EPA is not taking a position on the statements in the comment regarding geologic sequestration at this time and will consider this comment in developing the new proposal.

It is EPA’s strong intention to harmonize CCS requirements across relevant statutory or other programs in order to minimize any redundancy and any burden on reporters. See the Preamble, Section III.PP for a discussion of harmonizing efforts in *Definition of Source Category*.

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## **7. PROCEDURES FOR ESTIMATING MISSING DATA**

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**Commenter Name:** See Table 2

**Commenter Affiliation:**

**Document Control Number:** EPA-HQ-OAR-2008-0508-0679.1

**Comment Excerpt Number:** 255

**Comment:** §98.425: The rule proposes that facilities with missing data on the composition of the CO<sub>2</sub> stream captured, extracted, imported, and exported “should use the quarterly or average value for the parameter from the past calendar year”. Every facility’s fuel measurement is unique based upon equipment configuration and type. Missing data should be addressed in the QAPP, not prescribed in the rule.

**Response:** In Subpart PP of the final rule, EPA expanded §98.425 to include multiple approaches for generating acceptable missing data. EPA has concluded that it must prescribe missing data procedures in each Subpart, rather than allow a facility to select their own missing data procedures and document them in their QAPP, to ensure consistency between reporters and to data accuracy. EPA has concluded that the missing data procedures provided in Subpart PP of the final rule are sufficiently flexible for industry to follow.

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## **8. DATA REPORTING REQUIREMENTS**

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**Commenter Name:** Marc J. Meteyer

**Commenter Affiliation:** Compressed Gas Association (CGA)

**Document Control Number:** EPA-HQ-OAR-2008-0508-0981.1

**Comment Excerpt Number:** 70

**Comment:** §98.426 We appreciate the fact the EPA has recognized that some CO<sub>2</sub> will be chemically changed or sequestered, hence not emitted to the atmosphere, and that some CO<sub>2</sub> will be emitted to the atmosphere (preamble page 717). The CO<sub>2</sub> captured from a production process and reported under Subpart PP, has already been reported under other subparts of the rule. The inclusion of captured CO<sub>2</sub> in Subpart PP appears to be for purposes of determining the total amounts going to the end use applications listed in 98.426. However, the CGA respectfully submits that companies which produce and capture CO<sub>2</sub> do not have access to the data on CO<sub>2</sub> transferred to end use applications. This end use information is impossible to know at the point of “capture ... for purposes of supplying CO<sub>2</sub> for commercial applications”. The CGA respectfully submits that this information is also impossible to collect at a liquefaction facility level as CO<sub>2</sub> would be shipped via a variety of means (cylinder, trucks, railcars, depots for further distribution) and some would be supplied to other companies who either would not be privy to end use data, or would not share that end use data with their own supplier. Also, there would be multiple liquefaction plants feeding into CO<sub>2</sub> depots, so providing the level of molecule traceability to end use applications, at the emission source or on a facility level, is virtually impossible. Subpart PP, section 98.426 requires the reporting of quantities sold to several listed end use categories. Since CO<sub>2</sub> producers (those that own or operate a production process where CO<sub>2</sub> is captured) and owners of CO<sub>2</sub> production wells must report this data, and since they are often not the entity that processes the captured CO<sub>2</sub> and sells it to end users, this section of the rule will require downstream CO<sub>2</sub> processors (CGA member companies) to divulge their sales data, by market segment, to the CO<sub>2</sub> producers and CO<sub>2</sub> production well owners. The CGA considers this information to be CBI. Also, where a CO<sub>2</sub> producer or an owner of a CO<sub>2</sub> production well sells captured CO<sub>2</sub> to multiple downstream CO<sub>2</sub> processors, the potential for confidential business information of a processor to be passed on to a competitor is significant. Since the plant throughput (i.e., flowmeter data) or sales data (see alternative suggestion below) of CGA member companies would pass through third parties for submittal to EPA, the confidentiality of that information cannot be controlled. Therefore, the CGA membership strenuously objects to any section of the rule which requires the reporting of our CBI by CO<sub>2</sub> producers/captors. CGA would be willing to work with the EPA to determine the best means of generating the information requested without breaching company confidentiality.

**Response:** Subpart PP of this final rule does not require reporting from facilities that liquefy or purify CO<sub>2</sub> that has already been separated or removed from a manufacturing process or already extracted from production wells. See the Preamble, Section III.PP for a discussion of covered entities in *Definition of Source Category*.

Subpart PP of this final rule required that covered entities report the aggregated annual quantity of CO<sub>2</sub> that is transferred to each of 13 end use applications, if known. Since the data is to be reported aggregated and by end-use application rather than by customer, and since reporting is required only if the information is known, EPA has concluded that this is a reasonable reporting requirement. Please see Preamble section II.R for more information about CBI.

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**Commenter Name:** Kim Dang

**Commenter Affiliation:** Kinder Morgan Energy Partners, L.P.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0370.1

**Comment Excerpt Number:** 9

**Comment:** EPA has proposed requiring facilities producing CO<sub>2</sub> from production wells to report CO<sub>2</sub> production quantities at the corporate level rather than for each individual well.<sup>18</sup> While Kinder Morgan does not support the reporting of CO<sub>2</sub> production, Kinder Morgan agrees with the proposed owner level framework because domes or groups of wells are generally under the control of a single operator.

**Response:** See response to comment EPA-HQ-OAR-2008-0508-0408.1, excerpt 30.

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**Commenter Name:** John M. Batt

**Commenter Affiliation:** Airgas, Inc.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0408.1

**Comment Excerpt Number:** 36

**Comment:** We appreciate the fact the EPA has recognized that some CO<sub>2</sub> will be chemically changed or sequestered, hence not emitted to the atmosphere, and that some CO<sub>2</sub> will be emitted to the atmosphere (Preamble, FR page 16586). The CO<sub>2</sub> captured from a production process and reported under Subpart PP, has already been reported under other subparts of the rule. The inclusion of captured CO<sub>2</sub> in Subpart PP appears to be for purposes of determining the total amounts going to the end use applications listed in 98.426. However, we respectfully submit that companies which produce and capture CO<sub>2</sub> do not have access to the data on CO<sub>2</sub> transferred to end use applications. This end use information is impossible to know at the point of “capture ... for purposes of supplying CO<sub>2</sub> for commercial applications”. We submit that this information is also impossible to collect at a liquefaction facility level as CO<sub>2</sub> would be shipped via a variety of means (cylinder, trucks, railcars, depots for further distribution) and some would be supplied to other companies who either would not be privy to end use data, or would not share that end use data with their own supplier. Also, there would be multiple liquefaction plants feeding into CO<sub>2</sub> depots, so providing the level of molecule traceability to end use applications, at the emission source or on a facility level, is virtually impossible.

**Response:** See the response to comment EPA-HQ-OAR-2008-0508-0981.1, excerpt 70.

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**Commenter Name:** Susan Amodeo Cathey

**Commenter Affiliation:** Air Liquide USA, LLC

**Document Control Number:** EPA-HQ-OAR-2008-0508-0464.1

**Comment Excerpt Number:** 11

**Comment:** Proposed rule is seeking information from CO<sub>2</sub> production process units, production wells and importers/exporters on the quantities of gases sent to various end users including food and beverage, enhanced oil recovery, sequestration, greenhouses, fire fighting, etc. Producers and importers/exporters of CO<sub>2</sub> do not have this information. Entities such as the industrial gases companies may have some of this data but it is not complete and could be considered confidential business information.

**Response:** Please see Preamble section II.R for more information about CBI.

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## 9. COST DATA

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**Commenter Name:** John M. Batt

**Commenter Affiliation:** Airgas, Inc.

**Document Control Number:** EPA-HQ-OAR-2008-0508-0408.1

**Comment Excerpt Number:** 34

**Comment:** Our above comments on CBI notwithstanding, if EPA must collect data on CO<sub>2</sub> going to end uses, we suggest that EPA allow the use of finished product CO<sub>2</sub> scale or weighbridge readings to provide the EPA with the data it requires, as long as this CBI is protected. Contracts for the sale of captured CO<sub>2</sub> to downstream processors (such as CO<sub>2</sub> liquefaction processors) are typically based on finished CO<sub>2</sub> product sold by the downstream processor. These sold amounts are highly accurate as they are measured in accordance with commercial weights and measures regulations. This would give the EPA the most accurate measure of the mass of CO<sub>2</sub> transferred off of industrial gas sites. This data is readily available to CO<sub>2</sub> producers who capture CO<sub>2</sub> and transfer it to downstream entities. Airgas respectfully requests that the EPA not mandate that reporting entities be required to install mass flow meters and bear the extra cost for the instrumentation, installation and maintenance. For activities that include compression, purification and liquefaction, it is an industry standard practice not to use flow meters on our liquefaction plants. Considering more than 100 industry installations, installation of these meters to comply with the monitoring and reporting guideline could cost millions of dollars. We understand and appreciate that EPA may continue to require the mass flow measurement of CO<sub>2</sub> extracted from CO<sub>2</sub> production wells in Subpart PP since such CO<sub>2</sub> is not reported in other subparts of the rule. Since CO<sub>2</sub> extracted from wells is typically not water saturated, and more accurate measurement is likely to be more practical.

**Response:** Please see Preamble section II.R for more information about CBI. See the response to comment EPA-HQ-OAR-2008-0508-0977.1, excerpt 17.

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Table 1

COMMENTS	AFFILIATE	DCN
Michel R. Benoit	Cement Kiln Recycling Coalition (CKRC)	EPA-HQ-OAR-2008-0508-0467
Andrew T. O'Hare	Portland Cement Association (PCA)	EPA-HQ-OAR-2008-0508-0509.1

Table 2

COMMENTS	AFFILIATE	DCN
Karin Ritter	American Petroleum Institute (API)	EPA-HQ-OAR-2008-0508-0679.1
James Greenwood	Valero Energy Corporation	EPA-HQ-OAR-2008-0508-0571.1
William W. Grygar II	Anadarko Petroleum Corporation	EPA-HQ-OAR-2008-0508-0459.1

Table 3

COMMENTS	AFFILIATE	DCN
Chris Hobson	The Southern Company	EPA-HQ-OAR-2008-0508-1645.1
Quinlan J. Shea, III	Edison Electric Institute (EEI)	EPA-HQ-OAR-2008-0508-1021.1

Table 4

COMMENTS	AFFILIATE	DCN
Craig Holt Segall	Sierra Club	EPA-HQ-OAR-2008-0508-0635.1
Melissa Thrailkill	Center for Biological Diversity	EPA-HQ-OAR-2008-0508-0430.1