United States Environmental Protection Agency

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

Geologic Sequestration and Injection of Carbon Dioxide: Subparts RR and UU

Geologic Sequestration and Injection of Carbon Dioxide: Subparts RR and UU

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

FOREWORD

This document provides responses to public comments on the U.S. Environmental Protection Agency's (EPA's) Proposed Mandatory Greenhouse Gas Reporting Rule: Injection and Geologic Sequestration of Carbon Dioxide. EPA published a Notice of Proposed Rulemaking in the Federal Register (FR) on April 12, 2010 (75 FR 18576). EPA received comments on this proposed rule via mail, e-mail, facsimile, and at a public hearing held in Arlington, Virginia on April 19, 2010. 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-2009-0926.

EPA prepared this document in multiple chapters, with each chapter focusing on a different broad category of comments on the rule. In light of the large number of comments received and the significant overlap between many comments, this document does not respond to each comment individually. Rather, EPA summarized and provided a single response to each significant argument, assertion, and question contained within the totality of comments. Within each comment summary, EPA provides in parentheses one or more lists of Docket ID numbers for commenters who raised particular issues; however, these lists are not meant to be exhaustive and EPA does not individually identify each and every commenter who made a certain point in all instances, particularly in cases where multiple commenters expressed essentially identical arguments.

EPA's responses to comments are generally provided immediately following each comment summary. 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.

Comments were assigned to specific chapters of this document based on an assessment of the principal subject of the comment; however, some comments inevitably overlap multiple subject areas. For this reason, EPA encourages the public to read the other chapters of this document relevant to their interests. In addition, Appendix A describes the Sierra Club mass mailer campaign. EPA's responses to the comments submitted by these commenters are found in this document. Appendix B provides an index of commenters.

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ACRONYMS AND ABBREVIATIONS

AAPG	American Association of Petroleum Geologists
AMA	active monitoring area
AoR	Area of Review
BAMM	best available monitoring methods
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CAA	Clean Air Act
CBI	confidential business information
CCS	carbon dioxide capture and geologic sequestration
CEMS	continuous emission monitoring system
CFR	Code of Federal Regulations
CO_2	carbon dioxide
DOE	Department of Energy
EAB	Environmental Appeals Board
EIA	Economic Impact Analysis
EPA	Environmental Protection Agency
ENGO	Environmental Non-Governmental Organization
EO	Executive Order
EOR	enhanced oil recovery
ER	enhanced oil and gas recovery
FR	Federal Register
GHG	greenhouse gas
GS	geologic sequestration
HAP	hazardous air pollutant
IRS	Internal Revenue Service
IOGCC	Interstate Oil and Gas Compact Commission
LDAR	Leak Detection and Repair
MMA	maximum monitoring area
MMS	Minerals Management Service
MRV	monitoring, reporting, and verification
NACCSA	North American Carbon Capture and Storage Association
NESHAP	National Emissions Standards for Hazardous Air Pollutants
OAR	Office of Air and Radiation
OMB	Office of Management and Budget
OW	Office of Water
PEMS	predictive emission monitoring system
QA/QC	quality assurance/quality control
R&D	research and development
RTC	response to comment
SDWA	Safe Drinking Water Act
SPE	Society of Petroleum Engineers
TCEQ	Texas Commission on Environmental Quality
TSD	technical support document
UIC	Underground Injection Control

US	United States
USDW	underground source of drinking water
VEF	Vulnerability Evaluation Framework

1 Legal Authority

Comment 1-a:
One commenter (0811) and a coalition of Environmental Non-Governmental Organizations (ENGOs) (0809) assert that the Environmental Protection Agency (EPA) is within its authority under the Clean Air Act (CAA) to require reporting related to the geologic sequestration (GS) of carbon dioxide (CO_2). In particular, the coalition of ENGOs (0809) asserts that EPA's jurisdiction under the Safe Drinking Water Act (SDWA) does not extend to the monitoring and reporting of airside leakages from GS, and that therefore regulation under the CAA is necessary to address those emissions. This commenter also states that information gathered from enhanced oil and gas recovery (ER) and GS monitoring and reporting can and will inform the degree to which GS can be considered a greenhouse gas (GHG) control technology for CO_2.

Response 1-a:
EPA agrees that it is within its authority to promulgate this rule under CAA Section 114 and that it is appropriate to require reporting related to GS. Please refer to Section I.C and Section II.E of the preamble for a discussion of EPA's legal authority to promulgate this rule and the purposes of this rule.

Comment 1-b:
One commenter (0805) argues that EPA has over-reached its statutory authority, stating that the CAA authorizes the regulation of air emissions, not CO_2 injection or GS.

Response 1-b:
EPA disagrees that it has over-reached its statutory authority in promulgating this reporting rule. EPA is promulgating this reporting rule under its existing CAA authority; specifically, authorities provided in CAA Section 114. Please refer to Section I.C and Section II.E of the preamble for a discussion of EPA's legal authority to promulgate this rule. The rule does not require facilities to conduct CO_2 injection or GS, nor does it establish operational standards or permitting requirements for facilities conducting GS; rather, it requires facilities to report GHG information to EPA if they conduct such activities.

Comment 1-c:
One commenter (0797) questions whether a CAA Section 114 reporting rule should be the legal "trigger" for sequestration, particularly given that GS sites will be aggressively regulated and permitted under a host of other federal and state authorities.

Response 1-c:
This rule is a reporting rule and not a permitting rule. The rule does not authorize the construction or operation of GS sites and does not establish operational criteria. For example, wells that are subject to SDWA will be permitted under the Underground Injection Control (UIC) program. However, EPA has concluded that CAA Section 114 provides EPA with the authority to require the information mandated by subpart RR because such data will inform and

are relevant to EPA's implementation of a wide variety of CAA provisions, as discussed in Section I.C and Section II.E of the preamble. As discussed further in Chapter 11 of this document, this rule and the UIC rule were developed to work together and redundancies have been avoided.

Comment 1-d:

One commenter (0805) states that EPA asserts that information not related to emissions (e.g., movement of CO_2 through commerce) is policy relevant because it may allegedly help the Agency formulate a GHG regulatory program in the future. The commenter states that the cost and effort required to implement upstream reporting requirements only make sense in the context of a "clear regulatory agenda," under which it is reasonably certain that these particular activities may actually be regulated under the CAA. The commenter also suggests that knowing the quantity of CO_2 supplied to emissive and non-emissive uses does not advance the Agency's understanding of which facilities are emitting GHGs and how EPA's authority under the CAA applies to these emitters. Furthermore, the commenter asserts that EPA is exceeding the bounds of its authority under Section 114 of the CAA by seeking precise information on the amount of CO_2 received on site and the amount of CO_2 injected, and believes that this information is not useful in the context of CO_2 emissions. The commenter asserts that EPA must provide greater latitude in the final rule on how data are monitored and reported.

A commenter (0816) states that EPA has over-reached its authority under CAA Section 114 in promulgating the GHG reporting rules, including subpart RR. This commenter asserts that EPA is over-stepping its authority under CAA Section 114 by proposing what the commenter refers to as indefinite and broad monitoring and reporting under this action and that EPA fails to specify any purpose under the CAA provisions for which it needs this particular information and how it will be used. The commenter expresses concern that none of EPA's stated purposes provide adequate justification for the proposed data collection requirements (e.g., frequency of reporting, duration of reporting), imposition of new measurement protocols, or installation of new instrumentation. The commenter points out that EPA is requesting the data "for the purpose of assisting in the development of implementation plans or of emissions standards under CAA Section 111, determining compliance with implementation plans or such standards" (75 FR 18580). However, the commenter states that ER or GS is not currently regulated under specific CAA provisions and EPA has not indicated that it intends to do so in the future. The commenter requests that EPA reevaluate their specific authority to promulgate subpart RR as proposed, and at a minimum, consider limiting its request for data to air emissions.

Response 1-d:

As noted in Mandatory Greenhouse Gas Reporting Rule: EPA's Response to Public Comments, Volume No.: 9, Legal Issues (Docket ID No. EPA-HQ-OAR-2008-0508), Section 114 generally authorizes EPA to gather information from any person who owns or operates an emissions source, who is subject to a requirement of the CAA, who manufacturers control or process equipment, or who the Administrator believes has information necessary for the purposes of Section 114(a). EPA may gather information for purposes of establishing implementation plans or emissions standards, determining compliance, or "carrying out any provision" of the CAA. For these reasons, the Administrator may request that a person, on a one-time, periodic or

continuous basis, establish and maintain records, make reports, install and operate monitoring equipment and, among other things, provide such information the Administrator may reasonably require. This language has been interpreted to grant EPA broad authority. See, e.g., Dow Chemical Co. v. U.S., 467 U.S. 227, 233 (1986) ("Regulatory and enforcement authority generally carries with it all modes of inquiring and investigation traditionally employed or useful to execute the authority granted.").

EPA disagrees that the information obtained under this rule on the amount of CO_2 received and the amount of CO_2 injected is not useful in the context of CO_2 emissions. Information reported under subpart RR on the quantity of CO_2 injected is necessary to perform a mass balance calculation quantifying the amount of CO_2 sequestered, which will enable EPA to evaluate policy options relevant to carbon dioxide capture and geologic sequestration (CCS). Information obtained under this rule on the quantity of CO_2 received can be reconciled with information obtained under subpart PP on the quantity of CO_2 supplied to the economy.

The comprehensive information being collected in this rulemaking from facilities that conduct GS and CO_2 injection will allow EPA to fully evaluate the options before it to address climate change, without having to decide to narrow its options at the outset. The more targeted approach advocated by the commenter would require some level of decision making without the benefit of the information gathered by this rule. In Section I of the preamble to the proposed rule and Section I of the preamble to the final rule, EPA has outlined a variety of purposes for gathering the information required by this rule. These purposes justify the level of accuracy in reporting that the rule strives to achieve, as well as the ongoing annual reporting requirements. For example, subpart RR information will enable EPA to evaluate relevant policy options related to the use of CCS for reducing GHGs. As another example, subpart UU information on CO_2 received will provide EPA with information that can be reconciled with subpart PP information on CO_2 supplied to the economy. Understanding the amount of CO_2 received for injection from CO_2 production wells will provide information on the amount of CO_2 that is available to be displaced with CO_2 captured from production process units. As noted in Mandatory Greenhouse Gas Reporting Rule: EPA's Response to Public Comments, Volume No.: 9, Legal Issues (Docket ID No. EPA-HQ-OAR-2008-0508), if and when EPA does move forward to address GHGs under the CAA from the source categories subject to this rule, it may revise this rule as appropriate.

EPA notes that comments relating to regulatory requirements of CO_2 suppliers under subpart PP are beyond the scope of this rule.

Comment 1-e:

Four commenters (0806, 0807, 0810, 0816) oppose any reporting requirements for CO_2 injection facilities based on their belief that subpart RR is outside the scope of the Mandatory Reporting Rule's enabling statute, the Consolidated Appropriations Act. The commenters states that the requirements for CO_2 injection facilities in subpart RR focus exclusively on the injection of CO_2, not on CO_2 emissions and that EPA acknowledges in the proposal preamble that ER is a "non-emissive end use" of CO_2. These commenters conclude that EPA lacks the authority to require anything more than GHG emissions to be reported. One commenter (0805) argues that the Congressional legislation funding the Mandatory Reporting rule constrains the scope of EPA's

information gathering to GHG emissions, which does not include GS. The commenter also argues that the legislation directs EPA to establish a national GHG emissions inventory, and that this purpose can be entirely served for ER and GS operators if EPA collects data on actual CO_2 emissions under subpart W. One commenter (0789) mentions that the proposed rule was adopted pursuant to an enabling statute seeking to regulate the emission of CO_2 and in this case would regulate the injection of CO_2. The commenter opines that neither ER nor GS involves emissions of CO_2 into the air and that the proposed regulation is beyond the authority granted in the enabling statute.

Response 1-e:
Neither the FY2008, FY2009 nor FY2010 Consolidated Appropriations Act are the statutory basis for this action or the GHG Reporting Program. Please also refer to Mandatory Greenhouse Gas Reporting Rule: EPA's Response to Public Comments, Volume No. 9, Legal Issues (Docket ID No. EPA-HQ-OAR-2008-0508). Rather, EPA is promulgating this rule under its existing CAA authority provided in CAA Section 114. EPA's authority under Section 114 is not tied to, or limited by, the Appropriations Acts. Furthermore, EPA does not agree that the appropriations language constrains EPA's ability to collect the information under this action. Language in the joint explanatory statement of the FY2008 Consolidated Appropriations Act directs EPA to include reporting from "upstream production **and** downstream sources." The language does not say upstream production **or** downstream sources, indicating that Congress recognized that information from both types of sources could be collected "to the extent the Administrator deems it appropriate."

Comment 1-f:
One commenter (0816) asserts that EPA already possesses and collects GHG emissions inventory data in a manner that is sufficient to meet the Agency's stated purposes that underlie the proposed rule.

Response 1-f:
As discussed in Section I.F of the proposal preamble, EPA carefully considered current information and reporting efforts from facilities conducting GS and CO_2 injection, including the Inventory of US (United States) GHG Emissions and Sinks. The Inventory of US GHG Emissions and Sinks is a top-down national assessment of national GHG emissions and the US has submitted this inventory to the United Nations every year since 1993. EPA found that the inventory does not provide facility-specific data that is needed to analyze many potential GHG policies and regulatory programs. However, EPA recognizes that the rule will improve the development of future national inventories and aid in confirming the national statistics and emission estimation methodologies used to develop the top-down inventory.

Comment 1-g:
Two commenters (0794, TRANS-VA-02) assert that subpart RR resembles an attempt at emissions control regulation, rather than an information-gathering exercise or reporting rule. One commenter (TRANS-VA-02) agrees that it is appropriate for EPA to have proposed a separate rule for reporting possible emissions from CCS rather than include it with another source

category, but note that EPA treats CCS differently from other source categories. The commenter argues that EPA is proposing rules that are intended to prevent emissions and that thereby EPA is using this rule to demonstrate the efficacy of long-term storage.

Response 1-g:
EPA disagrees that this is an emissions control regulation or is intended to prevent emissions, because the rule does not require facilities to capture CO_2, to sequester CO_2, or if sequestering CO_2, to ensure that the CO_2 remains sequestered. EPA only requires facilities that conduct GS or other facilities that inject CO_2 underground to report certain information to EPA. EPA acknowledges that this rule will provide information to EPA on leakage to the surface, if any, and quantification of the amount of CO_2 that has been sequestered but the rule does not purport to limit any such leakage. Such information will prove valuable to EPA as it considers the role of CCS in future policy.

Comment 1-h:
One commenter (0808) states that MRV by definition is a technical document and one that seems to go beyond the scope of the air emissions intent of the proposed rule while intruding on core site permitting requirements, and that it is not clear that the monitoring, reporting, and verification (MRV) requirements are appropriate within the context of an emissions reporting rule. One commenter (0815) asserts that the MRV requirements in the proposed rule go beyond air emissions reporting and may be construed as carbon capture requirements, which is more appropriate to the UIC program. In particular, the proposed rule goes beyond simply specifying requirements for reporting of CO_2 emissions by including provisions that act more like regulation of the emissions or potential emissions (i.e. leakage) from GS sites.

Commenter 0813 states that EPA's proposed reporting rule for CO_2 injection and storage is more like an emissions control regulation than a reporting rule. The commenter states that requiring that potential pathways be assessed and monitored to ensure that any leakage to the surface will be detected and that leakage to the surface, should it occur, will be quantified according to a specified methodology, is an emissions control requirement for GS and not a reporting requirement.

One commenter (0800) states that EPA's proposal that MRV plans contain "information certifying that all potential pathways that may result in CO_2 leakage have been identified and characterized and the risk of CO_2 leakage at each pathway has been evaluated" goes beyond air emission reporting. One commenter (0803) states that the proposed MRV requirements for identifying and evaluating leakage pathways goes far beyond air emission reporting. One commenter (0797) asserts that a risk-based evaluation of potential leakage pathways would be expected under an emissions control or permitting program, but not a reporting rule. The commenter suggests that the North American Carbon Capture and Storage Association (NACCSA)/Pew methodology will address project (with "project" defined not on a facility-by-facility basis; instead, a CCS project will include the source-pipeline-sink) leakage in relatively granular detail but through a more-efficient process than assessing pathway leakage, particularly pathways that may be irrelevant to the project boundaries at inception.

One commenter (0808) asserts that the proposed requirement to detect and quantify leakage to the surface differs markedly from the approach used in the Mandatory Reporting Rule, which generally aims to provide methodologies for quantifying emissions to be reported. This RR requirement comes close to an emissions control requirement for GS. The commenter further states that if EPA intends to issue such requirements, EPA should do so in a separate rulemaking and in reliance on CAA authorities.

Response 1-h:

EPA has considered the above comments and has concluded that the MRV plans are appropriate within the context of this reporting rule. EPA disagrees that this rule regulates or controls emissions or leakage; the MRV plan requirements in this rule do not require facilities to capture CO_2 or otherwise minimize or control GHG emissions or leakage. Rather, the MRV plan provides a site-specific approach for quantifying surface leakage should it occur and establishes reporting obligations regarding that information.

EPA agrees with the commenter that the MRV plan will have technical components, but disagrees that MRV plan requirement goes beyond the scope of the rule. The MRV plan is necessary to ensure that all facilities reporting GS under subpart RR have an appropriate strategy in place to effectively quantify geologically sequestered CO_2.

EPA considered the commenter's suggestion that there may be leakage pathways that may not be necessary to monitor at the inception of the project. In light of this and other comments, EPA has added an MRV plan requirement for delineating a maximum monitoring area (MMA) and active monitoring area (AMA). This requirement allows facilities to phase in monitoring over time. Please refer to Section II.B of the preamble for a description of the MMA and AMA delineation and Chapter 6 of this document for EPA's responses to comments regarding this MRV plan requirement. EPA has finalized MRV requirements that include identification of potential surface leakage pathways for CO_2 in the MMA and the likelihood, magnitude, and timing, of surface leakage of CO_2 through these pathways. Please refer to Chapter 6 of this document for EPA's responses to comments regarding this MRV plan requirement. EPA applauds NACCSA and Pew for working together to advance efforts for monitoring and reporting quantities of CO_2 that are geologically sequestered. Please refer to Chapter 13 of this document for EPA's responses to comments regarding this methodology.

EPA recognizes that the geologic and operational characteristics of sites may vary and therefore acknowledges that subpart RR differs in some important ways (e.g. requiring a MRV plan) from other subparts of the GHG Reporting Program. Because the geologic and operational conditions of sites vary and based on public comments, EPA decided to allow sites to choose monitoring technologies that are best suited to the individual site, rather than taking a prescriptive approach. Please refer to Chapter 6 of this document for EPA's responses to comments regarding this MRV plan requirement. Identifying leakage pathways on a site-specific basis and developing an approach for detecting and quantifying surface leakage through these pathways (should leakage occur) will provide a mechanism for facilities to effectively quantify the amount of CO_2 that is sequestered.

Comment 1-i:
Three commenters (0800, 0803, 0813) suggest that data on environmental baselines is more relevant to a leak detection or comparable emissions control rule than a reporting rule. Two commenters (0800, 0813) state that the reporting rule should not pertain to emissions control because such matters will be addressed as part of other regulatory programs, including state-based permitting of GS sites. One commenter (0813) believes that establishing a pre-injection baseline should not be required under the reporting rule. One commenter (0803) states that the proposed MRV requirements for establishing environmental baselines goes far beyond air emission reporting.

Response 1-i:
In response to public comments, EPA revised this requirement so that MRV plans are now required to provide a strategy for establishing the expected baselines. Please refer to Chapter 6 of this document for EPA's responses to comments regarding this MRV plan requirement. EPA agrees with commenters that the rule requires detection of surface leakage, but disagrees that data on expected environmental baselines causes this rule to be an emissions control rule or goes beyond reporting. Rather, data on baselines is used in conjunction with the facility's monitoring strategy in order to detect and quantify surface leakage should it occur. EPA clarifies that this rule does not require facilities to control GHGs.

Comment 1-j:
One commenter (0816) requests that EPA clearly state that the MRV plan constitutes a recordkeeping requirement, but it does not, in and of itself, constitute regulatory monitoring requirements, because the performance of the methods discussed in the MRV plan technical support document (TSD) has not been evaluated for compliance.

Response 1-j:
EPA agrees that the rule contains recordkeeping requirements, but notes that facilities subject to subpart RR are required to implement the EPA approved MRV plan. Facilities that fail to monitor or report data according to the requirements of this rule could potentially be subject to an enforcement action by EPA under the CAA. The monitoring specified in the facility's MRV plan will depend on geologic and other site-specific characteristics, and therefore EPA is not prescribing the use of particular monitoring technologies in this rule. In addition, more generally, EPA may use any credible evidence to determine compliance with applicable requirements under the CAA.

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2 Definition of Reporting Facilities

2.1 Definition of Source Category

Comment 2.1-a:
One commenter (0788) states that EPA is correct to cover both onshore and offshore injection of CO_2 under this action.

Response 2.1-a:
EPA appreciates the commenter's shared view that this rule should cover both onshore and offshore injection of CO_2. In this final rule, we have maintained the coverage as we proposed.

Comment 2.1-b:
One commenter (0798) asserts that the definition of the source category introduces confusion and is restrictive because of inconsistent terminology used ("any" versus "all") and because of the qualifier in the source category definition ("wells for GS or for any other purpose"). The commenter also states that to track CO_2 flow through a system, the purpose of the injection (GS or otherwise) should not be relevant because injection systems are closed systems isolated from the atmosphere. The commenter suggests that the following revision to text 40 Code of Federal Regulations (CFR) part 98.440 and offers that EPA could include illustrative examples in the preamble to indicate what types of operations are included in the source category:

(a) The injection and geologic sequestration of carbon dioxide (CO_2) source category comprises any well or group of wells that inject CO_2 into the subsurface, which includes under a seabed offshore. ~~The source category consists of all wells that inject CO_2 into the subsurface, including wells for geologic sequestration (GS) or for any other purpose.~~

The multi-stakeholder discussion group (0799) suggests that the sentence at hand be modified, rather than removed, to read "The source category consists of all wells that inject CO_2 into the subsurface, including wells [**used]** for geologic sequestration (GS) or for any other purpose."

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

Response 2.1-b:
EPA drafted the proposed text in 40 CFR part 98.444(a) to provide maximum clarity. Upon reviewing these comments, EPA understands that 40 CFR part 98.444(a) in the proposed regulatory text may have instead created confusion. EPA has concluded that the second sentence provides no benefit and is redundant with the first sentence and concurs with the commenter who recommends deleting the sentence. EPA does not concur with the commenter who recommends editing one word in the sentence because EPA has concluded that it creates confusion and redundancy to leave the sentence in the regulatory text. Therefore, in the final regulatory text, EPA has deleted the second sentence. This edit does not change the intent of the paragraph.

Comment 2.1-c:
Three commenters (0792, 0802, 0816) suggest that EPA set a clear distinction between the types of facilities covered under the proposed subpart RR by defining three types of covered operations:

> "(a) CO_2-EOR - as is currently practiced by operators and where CO_2-EOR related pieces of equipment are intermingled with other field operations equipment and for which GHG emissions would be accounted for only under the applicable requirements of subpart W;
>
> (b) CO_2-EOR-GS -where the operator opts into conduct additional reporting under the proposed subpart RR – in addition to subpart W reporting requirements – on specific, discrete portions of the GS aspects of the operation; and
>
> (c) GS only - where the operation is dedicated only to the injection and geological storage of CO_2 in non-EOR geological formations, and where reporting requirements would be spelled out solely under the proposed subpart RR."

One commenter (0802) asserts that it is clear from the proposed subpart RR preamble that EPA expects reporters to fall into one of these three categories, but that this does not align with EPA's use of only two terms, GS and non-GS, and unnecessarily promotes confusion. The commenter finds the language in proposed 40 CFR part 98.440 confusing because it defines all facilities that inject CO_2 for long-term containment as GS facilities, and then attempts to describe a set of facilities that are not GS facilities, but nevertheless also inject CO_2 for long-term containment. Therefore it is not clear to the commenter if GS-only requirements apply to enhanced oil and gas recovery (ER) facilities that have opted to be classified as GS facilities. Another commenter (0816) specifically requests that EPA provide regulatory clarity for these three categories of reporting entities.

One commenter (0816) supports EPA's stated intent to coordinate GS requirements across relevant statutory programs in order to minimize any redundancies and alleviate the reporting burden. The commenter recommends that EPA promulgate a reporting program that sets a clear distinction between routine CO_2-ER operations and those circumstances where the reporter also opts-in to report GS by means that will be specified in the required MRV plan and with consideration of – the yet to be promulgated - UIC wells classification. A fourth commenter (0805) also supports the distinction between routine ER and GS, and provides examples of the difference between these two types of operations, such as differences in pressure build up in the geologic formation.

A coalition of ENGOs (0809) states that for ER opt-in GS facilities, EPA's proposal reasonably requires basing the MRV plan on the same criteria as those developed for GS facilities that do not also produce oil or gas. The coalition of ENGOs highlights that all of the "Tier 2" reporting

requirements for ER facilities that wish to be GS facilities are critical to EPA's development of a clear understanding of the effectiveness of ER/GS as a GHG mitigation technology.

Response 2.1-c:

EPA does not agree that three source categories need to be defined. EPA agrees with the ENGOs that all of the calculation procedures, reporting and MRV plan requirements that EPA promulgates for "CO_2-ER-GS" projects to demonstrate and report GS should be the same as the calculation procedures, reporting requirements, and MRV plan guidelines that EPA promulgates for "GS only" projects because this is technically reasonable and is critical for EPA to understand the efficacy of ER/GS as a GHG mitigation technology. As such, it is more efficient and straightforward for the Agency to cover both of these types of projects under one source category. Therefore, under today's final action, any wells that inject CO_2 streams for long-term containment in subsurface geologic formations are covered by the CO_2 GS source category (subpart RR), whether or not they also conduct ER operations. On the other hand, "CO_2-ER" projects do face different procedures and requirements from those projects conducting GS and therefore do merit their own source category. Therefore, any additional wells that inject CO_2 streams underground are covered by the CO_2 injection source category (subpart UU), whether or not they also conduct ER operations.

EPA agrees that the proposed 40 CFR part 98.440 regulatory text may have been confusing and has updated it in this final action in two ways to improve clarity. First, EPA has separated the regulatory text into two subparts, as described further in Section I.E of the preamble. Second, EPA has streamlined the text in the source category definition sections of both subparts (40 CFR part 98.440 and 98.470). EPA has concluded that the structure in today's final regulatory action creates a clear distinction between ER operations that do not want to report GS and ER operations that do want to submit an MRV plan and report GS, which EPA interpreted to be the main point of these comments.

Comment 2.1-d:

One commenter (0802) feels that the structure of the source category definition section in the proposal ignores the likelihood that ER operations will engage in commercial-scale GS in the immediate future. The commenter presents an example of a CO_2-ER operation that, in a second generation of project activity, injects CO_2 into an underlying saline reservoir for GS using the existing ER wells. The commenter suggests that EPA's current approach to defining "ER and GS" as non-GS, but opting in to GS is inappropriate and will cause confusion as to how such an operation would be categorized, or make it difficult to operate the same well first for ER-based sequestration and then for GS-only sequestration. The commenter recommends EPA instead directly address the case of an ER facility that engages in permanent GS as a part of ER operation, which is different from the situation in which a facility engages in GS by continuing to inject CO_2 for GS purposes (and hence may over-pressurize a reservoir) after CO_2-for-ER operations at the site have ceased.

Response 2.1-d:

EPA recognizes that ER operations are likely to be among the first projects to verify CO_2 GS at a commercial scale as a climate change mitigation technology. EPA has restructured the source

category definition section in today's final action and has concluded that it does not ignore this likelihood and instead provides GS projects at ER operations a clear path to comply with this rule. With regards to second generation projects, EPA notes that today's final action is a first step in defining the MRV requirements for CO_2 injection and GS projects. EPA cannot predict with certainty how the industry will evolve in the future, and EPA may update the requirements in today's final action in the future to adapt to real world industry conditions. At this time, under today's final action, wells that are injecting CO_2 are clearly covered by subpart RR if they meet the source category definition in 40 CFR part 98.440.

Comment 2.1-e:
The multi-stakeholder discussion group (0799) recommends that EPA revise 40 CFR part 98.440(b) to read:

"A facility that is subject to this ~~rule~~ [**part 98 and meets the definition of this subpart]** only because of CO_2 injection wells that do not meet the definition of GS facility in paragraph (c) of this section is not required to report emissions under any other subpart of part 98."

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

This revision would clarify the rule and help to avoid ambiguity of what "this rule" means.

Another commenter (0816) suggests that the text in 40 CFR part 98.440(b) should be revised to read:

"(b) [**CO_2 injection for enhanced oil and gas recovery.]** (1) [**A]** facility that is subject to ~~this rule~~ part 98 [**and meets the definition of this subpart]** only because of CO_2 injection wells that do not meet the definition of geologic sequestration facility in paragraph (c) of this section is not required to report emissions under any other subpart of part 98."

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The commenter finds the original language vague and unclear because the commenter believes that the precise definition of "facility" is unclear. The commenter is concerned that this regulatory text could be misinterpreted.

Response 2.1-e:
EPA agrees that proposed 40 CFR part 98.440(b) may have been confusing. The regulatory text in this final action was reorganized, and the contents of proposed 40 CFR part 98.440(b) have been moved to 40 CFR part 98.470(b) because they were intended to exclude only subpart UU facilities from triggering applicability automatically in other subparts. EPA has concluded that this reorganization carries out the intended purpose more clearly. EPA agrees that the term "this

rule" in the regulatory text is confusing. Therefore, EPA has replaced the term "this rule" with "this part" in today's final action.

Comment 2.1-f:
The multi-stakeholder discussion group (0799) recommends that EPA revise 40 CFR part 98.440(c) by deleting the reference to specific phases of CO_2 (of a gaseous, liquid, or supercritical CO_2 stream) in the definition of the source category. The commenter argues that such text is unnecessary and inherently suggests that other references to CO_2 without these modifiers are intended to be less inclusive.

Response 2.1-f:
EPA agrees with this comment and has made the suggested edit in today's final action.

Comment 2.1-g:
The multi-stakeholder discussion group (0799) recommends that EPA revise 40 CFR part 98.440(c) as follows:

> "A facility that injects CO_2 to enhance the recovery of oil or natural gas is not a geologic sequestration facility for the purposes of this source category unless the facility ~~also injects the CO_2 in subsurface geologic formations for long-term containment of a gaseous, liquid, or supercritical CO_2 stream and~~ chooses [**to be a geologic sequestration facility by]** submit[**ting]** a monitoring, reporting, and verification (MRV) plan to EPA that is then approved by EPA."

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

The commenter states that some long-term containment of CO_2 is unavoidable at all ER operations. A second commenter (0816) also recommends and provides regulatory text to reflect a modification to the definition of source category under this action that emphasizes the choice made by an ER project reporter to submit an MRV plan rather than whether long-term containment is occurring. The multi-stakeholder discussion group (0799) also recommends that EPA delete 40 CFR part 98.440(c)(2) entirely because the commenter finds it confusing and unnecessary.

Response 2.1-g:
EPA drafted the proposed 40 CFR part 98.440(c) in an attempt to be clear. EPA understands from the above comments that the paragraph was instead confusing. Therefore, in this final action, EPA has revised this text and provided the needed clarity. EPA disagrees with the comments suggesting that any portion of the paragraph is unnecessary and should be deleted. While EPA agrees that some CO_2 retention occurs at ER operations, EPA has concluded that this is not the same as "injecting the CO_2 stream for long-term containment." Therefore EPA has retained this qualifying phrase in this final action. EPA understands the point made by the

commenter that an ER operation should be covered by the subpart RR source category based on the reporter's choice to submit an MRV plan. EPA has concluded the language in this final action adequately emphasizes that this choice is a basis for coverage under subpart RR.

Comment 2.1-h:
One commenter (0814) inquires whether their operation, the primary intent of which is to sequester H_2S and not CO_2, would meet the source category definition in 40 CFR part 98.440 since 40 CFR part 98.440(a) identifies that sources that inject CO_2 into the subsurface for any purpose are subject while 40 CFR part 98.440(c)(4) and (d)(5) exempt facilities that simply capture CO_2.

Response 2.1-h:
An operation that injects a stream of H_2S and CO_2 underground is subject to this final rule. As the commenter indicates, EPA specified in the proposed 40 CFR part 98.440(a) that the injection of CO_2 into the subsurface for any purpose met the proposed source category definition because EPA concluded that all data on CO_2 received for injection or sequestration – regardless of the purpose of or use of that CO_2 – would help EPA evaluate future climate change policies. That conclusion applies in this final rule. As explained in Section I.B of the preamble, all facilities that conduct GS of CO_2 are covered under subpart RR and all other facilities that conduct injection of CO_2 are covered under subpart UU.

In today's final action, EPA removed from the regulatory text the list of activities that are not included in the source category (proposed as 40 CFR part 98.440(d)) because we concluded that it created confusion and is not necessary. Please see Section II.E of the preamble for a full discussion of this change.

Comment 2.1-i:
One commenter (0793) disagrees with the EPA's proposed method of aggregating GHG reporting of injection and GS facilities from point of generation to point of injection and sequestration, because this methodology creates inconsistencies between the MRR and Prevention of Significant Deterioration and the Title V Operating Permit programs under the CAA. The commenter argues that the MRR places too much emphasis on "control," rather than on ownership or operation of CCS equipment. The commenter further suggests that this action addresses emissions from CO_2 injection wells, CO_2 leaking components, and venting devices, all of which are outside of the scope of the PSD and Title V Permitting Programs. The commenter also asserts that the proposed rule disregards local agency, state, or national boundaries by requiring emission sources to report emissions aggregated based on geological boundaries, which may require coordination of multiple local, state, and national authorities. The commenter opines that inconsistencies will create confusion within the regulated community and make reporting inconsistent with permits and permitting inventories, and that once EPA's Tailoring Rule takes effect, these violations may trigger further action under EPA's High Priority Violator Guidance.

Response 2.1-i:

In this rule, EPA is not aggregating GHG reporting from point of generation to point of injection and sequestration. Facilities that conduct GS would report information under subpart RR and all other facilities that conduct CO_2 injection would report information under subpart UU. Some facilities that are affected by this final rule are required to report under multiple source categories. Please refer to Table 2 of the preamble for a guide to other subparts recommended for review to determine applicability.

EPA disagrees that this rule places too much emphasis on control, rather than on ownership and operation. This rule uses the same definition of facility that is used in other subparts of the GHG Reporting Program. Facility is defined on the basis of common ownership or common control. EPA determined that changing the definition of facility for subparts RR and UU would confuse reporters, rather than provide clarity. EPA disagrees that this rule will create confusion within the regulated community that will trigger violations in other permitting programs. In developing the GHG Reporting Program, EPA determined that the GHG Reporting Program serves a different purpose than the Prevention of Significant Deterioration and the Title V Operating Permits, and that conforming the definitions of facility was not appropriate. EPA therefore finalized the rule establishing the GHG Reporting Program with a different definition of facility. For more information, please refer to Mandatory Greenhouse Gas Reporting Rule: EPA's Response to Public Comments, Volume No. 14, Subpart A: Definitions, Incorporation by Reference, and Other Subpart A Comments (Docket ID No. EPA-HQ-OAR-2008-0508). Furthermore, EPA disagrees that this rule is inconsistent with the Prevention of Significant Deterioration and the Title V Operating Permits. Analysis of common control is a useful way to address complex ownership arrangements and as an emerging technology, it is unclear how the business model for GS will play out.

EPA is requiring facilities subject to subpart RR to report the mass of CO_2 emitted from surface leakage (should it occur) and fugitive and vented CO_2 emissions to the extent they are a component of the GS mass balance. EPA determined that this information was necessary for a proper accounting of the quantity of CO_2 sequestered. This action is not the forum for debate on the scope of the PSD and Title V Permitting Programs.

This rule does not require facilities to aggregate reporting on the basis of geological boundaries. Rather, reporting is based on the definition of "facility" used by other subparts of the GHG Reporting Program at 40 CFR part 98, subpart A. EPA notes that for facilities conducting GS, EPA is requiring facilities reporting under subpart RR to define a MMA and monitor surface leakage within an AMA. This is analogous to other CAA programs that require a source to model or monitor the impacts of its air emissions on air quality some distance away from the facility.

2.2 Stationary Source vs. Facility

Comment 2.2-a:

Two commenters (0805, 0816) express concern that EPA's proposed definition of a facility under this action establishes a facility definition for GHG reporting purposes that is different from the definition of "stationary source" under the CAA. These commenters suggest that the

proposed definition of facility is problematic because, according to EPA, the primary purpose of the MRR is to gather information that might be used to establish GHG emissions standards under the CAA, and that the information obtained from the MRR will not be useful in developing CAA regulatory programs that are tied to the statutory definition of stationary source. They suggest therefore that the proposed definition of facility is inappropriate and that the basic reporting entity should be referred to as a "stationary source" (as currently defined under the CAA) and that EPA should revise its proposed approach to determining facilities under this action to require information to be reported from GS operations comprising a stationary source. Two commenters (0816, 0805) propose regulatory text edits in 40 CFR part 98.440 to address this issue and suggest reporters reporting on stationary sources be allowed to aggregate multiple GS stationary sources into a single GHG annual report.

One commenter (0793) suggests that the definition of facility in the proposed rule departs from the traditional use of the three-part test to determine a single source. The commenter states that while the MRR does not specifically revise any definition of a stationary source specific to the PSD and Title V Programs, the MRR requires companies to report contractual agreements that in effect control specific equipment or a specific process, which is beyond the typical definition of stationary source tied to direct ownership and direct operation. The commenter suggests that the MRR be revised such that aggregated emissions are consistent with the traditional three-part test for standard stationary source permitting purposes.

Response 2.2-a:

When the GHG Reporting Program was finalized (74 FR 56260, October 30, 2010), "facility" was used instead of "stationary source." That decision was made because "facility" aligned better with the intention to require reporting from facilities that emit the most significant amounts of GHG emissions while minimizing the number of reporters. EPA determined that the Title V definition of facility was not appropriate for this GHG Reporting Program. The GHG Reporting Program serves a different purpose than Title V programs and therefore defines a facility in a way that is more inclusive of all large emitters. At that time, EPA also concluded that to the extent that the definition of stationary source in the GHG Reporting Program is similar to that of other programs, EPA may draw on general principles established under those programs, but EPA will not be bound by precedents of other rules in implementing the GHG Reporting Program. For additional background on facility definition, please refer to Mandatory Greenhouse Gas Reporting Rule: EPA's Response to Public Comments, Volume No. 14, Subpart A: Definitions, Incorporation by Reference, and Other Subpart A Comments (Docket ID No. EPA-HQ-OAR-2008-0508). We did not revisit that decision in this action, so all subparts of the GHG Reporting Program continue to be subject to the definition of facility in 40 CFR part 98.6. EPA has determined that it is important to maximize consistency in facility definition across the GHG Reporting Program to minimize administrative burden. Therefore, EPA does not concur with these comments and has not used the term "stationary source" in this final action.

2.3 Definition of Facility

Comment 2.3-a:

One commenter (0791) asserts that EPA should not change the definition of facility or a CO_2 injection and GS sites.

Response 2.3-a:
EPA interpreted this comment as support for relying on the definition of facility in 40 CFR part 98.6 that the rest of the GHG Reporting Program relies on. EPA agrees with this comment and has clarified in the final regulatory text that the definition of facility in 40 CFR part 98.6 applies by removing the word "facility" from the source category definition.

Comment 2.3-b:
Two commenters (0792, 0816) suggest that EPA adopt a unique facility definition for GS operations. One commenter (0792) opines that the full reporting requirements under proposed subpart RR should be limited only to dedicated GS aspects of the operation, including specific discrete portions of CO_2-ER facilities, as defined by operators that choose to opt-in to GS reporting. The commenters suggest that all ER equipment be part of a subpart W reporting entity and that the cluster of equipment associated solely with GS operations be part of the GS facility. Therefore, GS-only and ER-GS operations should be defined on a project level under the proposed subpart RR within boundaries that contain only equipment dedicated to GS in a certain field or formation. One commenter (0816) states that this would require all GS projects to submit the same level of data under the proposed subpart RR, thereby reducing the disincentive for ER operators to opt in to the proposed subpart RR. This commenter also adds that that no new facility definitions should be developed due to the intermingled nature of field operations.

Several comments refer to or provide a specific list of equipment and structures that should be associated solely with GS operations. Two commenters (0816, 0800) state that the list should only include equipment and structures on the injection side of operations: the injection and monitoring wells, pipelines, compressors, valves, and associated equipment from the point of receipt of the CO_2 to the injection wells. One of the commenters (0816) proposes that the CO_2-ER-GS facility would not include separators, compressors, vent stacks, structures and equipment associated with production operations (and which would be reported under subpart W). The multi-stakeholder discussion group (0799) states that in addition to equipment and structures associated with GS operations, the list should also include the production side of operations, such as the recapture plant, separators, compressors, vent stacks, structures and equipment associated with production operations. Two commenters (0808, 0813) state that in the case of CO_2-ER, CO_2 recapture facilities should be included in the definition of GS facility.

One commenter (0816) recommends that the definition of a GS facility include combustion devices that are critical components of GS operations (such as compressors), and that emissions from such equipment be reported within the GS facility boundaries in order to create a self-contained reporting unit for monitoring and tracking of CO_2. The commenter notes that for CO_2-ER-GS facilities, it is unlikely that GS-related combustion devices will be distinct from CO_2-ER-related operations combustion devices. As such, the commenter recommends retaining the pertinent reporting requirements under subpart W or subpart C for CO_2-ER-GS facilities.

Response 2.3-b:

EPA disagrees with comments that a facility should be defined uniquely by being delineated from onshore petroleum and natural gas production structures. Subpart W is focused on fugitive and vented emissions from surface equipment while subparts UU and RR are focused on quantities of CO_2 received and sequestered. As a result of two edits made to subparts W, UU, and RR since proposal, whether the two groups of source categories are mutually exclusive no longer has any bearing on the reporting efforts of ER project owners and operators. First, facility-wide fugitive and vented emissions are no longer included as reporting requirements in this final rule (see Section II.E of the preamble for a discussion of this decision). For subparts RR and UU, the only structures or equipment on which the source category definition depends are injection wells. Second, under a separate action, EPA has clarified in the subpart W rulemaking that the annual GHG report for a facility that meets the definition in 40 CFR part 98.6 shall not cover onshore petroleum and natural gas production. This means that the annual report containing subpart RR and UU data will not include combustion emissions data for equipment and structures that are part of subpart W[1]. Therefore, there is no need or reason to delineate the two groups of source categories from one another in the GHG Reporting Program.

Instead, EPA is using the definition of facility in 40 CFR part 98.6 for the source categories in today's final action for several reasons. First, EPA has determined that it is important to maximize consistency in facility definition across the GHG Reporting Program to minimize administrative burden. Second, the data will be most useful and meaningful to EPA if it is grouped by a project, which is accomplished with this facility definition. Third, this facility definition can be applied to both subparts UU and RR so that facilities transitioning from UU to RR can do so seamlessly.

EPA notes that even though the subpart RR and UU source categories only depend on injection wells, other equipment and structured are necessary for following calculation procedures. In order to follow the subpart UU calculation procedures and reporting requirements, the facility reporter must measure the quantity of CO_2 received with equipment such as a custody transfer meter. Likewise for subpart RR, in order to follow the subpart RR calculation procedures and reporting requirements, the facility reporter must measure or determine: the quantities of CO_2 received, injected, and produced with equipment such as flow meters; fugitive or vented emissions from equipment located between the injection flow meter and the injection wellhead, if any; fugitive or vented emissions from equipment located between the production flow meter and the production wellhead, if any; and surface leakage, if any, using equipment and/or techniques as outlined in the MRV plan. While a facility determination can only be made by a reporter on a case-by-case basis, EPA has reviewed typical ER and GS project configurations and has concluded that the flow meters, the wellheads, and any equipment in between will almost certainly be on contiguous or adjacent properties, under common ownership or common control, and grouped according to a commonsense definition of facility. Please see the final General TSD for illustrations and descriptions of these configurations. In the unique situation where this is not the case, however, EPA notes a reporter can use measurement equipment located outside of the facility boundary in order to calculate the amount of CO_2 received or sequestered by the facility, as further discussed in Response 2.3-d.

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[1] See 40 CFR part 98.230 for further details on types of non-self-propelled equipment to reported under Subpart W.

Comment 2.3-c:
One commenter (0796) suggests that EPA allow operators to define the "facility" for reporting purposes as narrowly or as broadly as needed for accounting or operational purposes. Two commenters (0792, 0816) believe that it may be necessary for a reporting entity to be defined on a case-by-case basis.

Response 2.3-c:
EPA is using the definition of facility in 40 CFR part 98.6 for the source categories in today's final action for the reasons articulated in Response 2.3-b. While the definition of facility is clear, EPA recognizes that a reporter must apply the definition and determine the facility boundaries on a case by case basis. Please see the final General TSD for illustrations and descriptions of how facility delineations could be made given various likely ER and GS project configurations.

Comment 2.3-d:
Three commenters (0800, 0808, 0813) suggest that EPA's definition of a GS facility is too broad. The commenters are concerned that there is a geographic disconnect between a GS facility and MRV requirements for monitoring over a broad area beyond the fenceline of the GS facility. One commenter (0800) finds that EPA is "unclear if CO_2 recapture facilities are included in the definition of a GS facility". The three commenters (0800, 0808, 0813) state that in addition, the definition of "GS facility" should be limited to the immediate surface spatial extent of the permitted facility and include all surface infrastructure that is involved in CO_2 operations (including recapture plants). Similarly, another commenter (0812) proposes a GS facility definition that is equivalent to a proposed spatial area for monitoring. The commenter suggests defining it as the domain identified by reservoir modeling that is expected to include the injected CO_2 during the injection period plus a buffer zone that would cover the continued migration of the CO_2 until the reservoir pressure stabilizes after injection has ceased.

Response 2.3-d:
EPA is using the definition of facility in 40 CFR part 98.6 for the source categories in today's final action for the reasons articulated in Response 2.3-b. Meanwhile, EPA has considered the comments and concluded that a different area (the MMA) must be defined in today's final action to ensure adequate monitoring for potential surface leakage as limiting monitoring to the area inside the facility boundary would not allow the facility to adequately assess or measure any leaks. EPA recognizes that the facility will likely not be the same spatial extent as the MMA, but a reporter can use measurement equipment located outside of the facility boundary in order to calculate the amount of CO_2 received or sequestered by the facility. Requiring monitoring outside the fenceline of the facility can be standard practice in the CAA. Furthermore, suppliers reporting under 40 CFR part 98 are using equipment located outside of the fenceline to measure product quantities in some cases.

Comment 2.3-e:
One commenter (0810) believes that an adequate definition of a GS site is lacking for EPA CAA and UIC rulemakings. In particular, the proposed subpart RR preamble uses the phrase "spatial

area" and other related EPA rules discuss the GS "site." The site and spatial areas allude to and discuss the plume of CO_2-saturated reservoir or aquifer, but then add in pressure fronts/boundaries to these definitions. Significant operational and legal issues exist related to what definition is promulgated from these various rulemaking processes of what constitutes the GS site.

Response 2.3-e:
EPA is using the definition of facility in 40 CFR part 98.6 for the source categories in today's final action for the reasons articulated in Response 2.3-b. In addition, today's final action defines areas for monitoring geologically sequestered CO_2 under subpart RR. This action has been designed so that a reporter can comply without disrupting operations. It is a reporting program – not a permitting or control program. EPA recognizes that a GS project may face future operational and legal issues, but EPA has determined that those are outside of the scope of today's final action. EPA refers the commenter to the Report of the Interagency Task Force on Carbon Capture and Storage for further discussion of this issue.[2]

Comment 2.3-f:
One commenter (0796) suggests that if the EPA finalizes a rule with a reporting threshold, "facility" should be defined in terms of the facility's UIC permit. A second commenter (TRANS-VA-05) agrees that facility definition should be consistent with requirements under other regulatory programs for similar operations.

The commenter (0796) suggests that for operations not covered by the SDWA, EPA should look to geologic or hydrologic connections to determine whether a group of wells is a single facility. The commenter opines that operators should be able to retain the flexibility to submit reports for as narrow or broad a subset of its wells as desired by the operator for efficiency purposes. The multi-stakeholder discussion group (0799) similarly suggests that it would be appropriate for EPA to allow reliance on sufficient existing facility delineations, particularly for facilities that already inject into reservoirs with defined and understood seals and traps, and should coordinate as appropriate with state regulators.

One commenter (0783) asserts that it may be no less work (i.e., cost) for a facility to report at the well-level and that some companies may even prefer this method. The commenter appreciates the reporting level options currently proposed for proposed subpart RR.

Response 2.3-f:
EPA is using the definition of facility in 40 CFR part 98.6 for the source categories in today's final action for the reasons articulated in Response 2.3-b. EPA considered defining the facility by UIC permit, which is issued at the individual well under the UIC Class VI and Class II programs. EPA decided against this approach because data on CO_2 received and sequestered is not meaningful at the individual well level and because it would be unreasonable for reporters to submit hundreds or thousands of annual reporters under the GHG Reporting Program.

[2] http://www.epa.gov/climatechange/policy/ccs_task_force.html

EPA understands the point made by commenters that wells connected to a single geologic or hydrologic connection/reservoir constitute a single operation, and EPA agrees with the logic. EPA has reviewed typical ER and GS project configurations and has concluded that wells injecting into the same reservoir are generally located on contiguous or adjacent property under common ownership or common control and grouped according to a commonsense definition of facility. As such, the point made by the commenter is addressed by the relying on the definition of facility in 40 CFR part 98.6.

Comment 2.3-g:
In light of concerns regarding uncontrolled migration of CO_2, one commenter (0811) suggests that EPA should define a GS facility as all injection wells within a given sequestration reservoir that are bounded in the horizontal and vertical dimensions. The commenter argues that wells that are not within a bounded reservoir should not be allowed.

Response 2.3-g:
The commenter's request to require injection only in geologic structures that exhibit clear vertical and lateral confinement through subpart RR is out of scope of this reporting rulemaking. Subpart RR requires monitoring and reporting for the purposes of quantifying GS and does not regulate site selection; facilities will have to comply with applicable permitting requirements for site selection. Please see the UIC Program website for further information on GS site permitting.[3] Subpart RR has been designed so that operators can comply without disrupting or delaying operations. The data collected through this program will inform future CAA regulations and policies.

Comment 2.3-h:
Two commenters (0806, 0807) suggest that EPA revise the definition of a CO_2 injection facility (non-GS facility) to be consistent with subpart W by allowing the option to report on a basin-wide or state-wide level. Although they state that they do not oppose the proposed definition of CO_2 injection facility, commenter (0807) specifically states that allowing the option for basin level reporting would increase flexibility to those reporters subject to both subpart RR and W. Both commenters (0806, 0807) note that by allowing ER operators to focus on a single definition of a facility, this change would reduce burden on ER operators and allow for the streamlining of data gathering and reporting under both subpart W and RR. A third commenter (0816) suggests that a GS reporting entity be defined by the equipment within a boundary of a field or formation, and should not be aggregated to the basin level. One commenter (0812) opines that defining GS facility as the geographic boundary of a hydrocarbon basin is inappropriate, and another commenter (0791) agrees that basin level reporting is not appropriate.

One commenter (0811) expresses concern that EPA chose not to group wells in saline formations by "field." The commenter interpreted this decision as a view that grouping wells in saline formations is inappropriate. The commenter states that aggregating the injection wells as part of a GS facility definition is necessary because it provides a comprehensive picture of CO_2 injection

[3] http://water.epa.gov/type/groundwater/uic/wells_sequestration.cfm

into a well defined geologic structure. One commenter (0114) opines that EPA fails to provide any justification for the proposal.

Response 2.3-h:
EPA is using the definition of facility in 40 CFR part 98.6 for the source categories in today's final action for the reasons articulated in Response 2.3-b. EPA considered defining the facility by state or basin but decided against it because data on CO_2 received and sequestered is most useful to EPA at a project level, because some projects span multiple states, and because basins are not applicable to saline aquifers reporting under subpart RR.

EPA recognizes that an ER operation that meets the applicability requirements of subpart W, which was finalized in a separate action from this one, will be required to apply a different definition of facility to onshore petroleum and natural gas production based on basin-level aggregation. Such an ER operation will thus be required to submit multiple annual reports to EPA under the GHG Reporting Program.

EPA agrees with comments that a facility covered by subpart RR should be an aggregation of wells. EPA has concluded and clarifies here that it would be inappropriate to aggregate saline formations wells by "field" because saline formations are not delineated by "fields" as oil and gas reservoirs are.

2.4 Opt-in for ER

Comment 2.4-a:
Three commenters (0805, 0788, TRANS-VA-07) and a coalition of ENGOs (0809/TRANS-VA-01) support EPA's proposed approach for ER facilities to be allowed to choose to be treated as GS facilities by meeting "Tier 2" monitoring and reporting requirements.

One commenter (TRANS-VA-01) notes that the opt-in option for ER facilities recognizes the important role of ER in improving sequestration technologies and that the provision will provide new data leading to a more robust understanding of geological CO_2 retention processes. One commenter (0805) and a coalition of ENGOs (0809) point out that ER facilities that are granted UIC Class II permits may want to add a layer of monitoring and reporting requirements so that they can take advantage of future opportunities for credit or certifications that may come under a Federal GHG policy.

The multi-stakeholder discussion group (0799) commends EPA for its efforts to reduce the reporting burden for ER operations by allowing the option to choose between reporting as either CO_2-ER facilities or CO_2-ER-GS facilities.

Response 2.4-a:
EPA appreciates the commenters' shared view that ER operations should be allowed to choose to submit an MRV plan to EPA and report GS under subpart RR. EPA agrees with the comment that such an approach recognizes the important role of ER in the developing GS industry. EPA has retained the general ER opt-in provision in the final rule.

EPA notes that an update has been made to the source category definition in 40 CFR part 98.440 to align this final action with the UIC Class VI rule, which EPA is finalizing in a separate action. The UIC Class VI rule specifies criteria that an injection well must meet to receive a UIC Class VI permit, and these criteria also clearly relate to a well that injects a CO_2 stream for long-term containment in subsurface geologic formations. Therefore, EPA has concluded that a well permitted as Class VI under the UIC program meets the subpart RR source category definition, and this is stated in 40 CFR part 98.440(b) so that UIC Class VI permit holders can easily and unambiguously determine applicability to the GHG Reporting Program. As fully explained in the UIC Class VI rule, EPA has concluded that some ER wells may meet the UIC Class VI criteria and obtain a Class VI permit. Such UIC Class VI ER operations are not subject to the opt-in provision in this final rule and are required to submit an MRV plan for EPA approval to report GS.

With respect to the comment about future credits and certification, EPA notes that this is a data collection rule under the CAA and no actions regarding credits or certification are outlined or discussed.

Comment 2.4-b:
One commenter (0802) notes that while it is appropriate for EPA to require ER facilities that intend to engage in long term containment to submit MRV plans and obtain EPA's approval of their plans, it is not appropriate to condition their status as GS facilities on EPA's plan approval. The commenter states that no such condition applies to GS-only facilities.

Response 2.4-b:
EPA is clarifying here that in order for any facility to report GS in the GHG Reporting Program, it must receive EPA approval of an MRV plan. This is equally true for "GS-only" facilities and "ER facilities that intend to engage in" GS. EPA disagrees that ER facilities should be able to achieve GS facility status without an EPA approved MRV plan. As further explained in response 2.4-a, EPA is generally allowing ER operators the flexibility to choose for themselves whether to submit an MRV plan for EPA approval in order to report GS.

EPA agrees that the definition of a GS facility may have been confusing in the proposed rule. In today's final action, EPA has revised the subpart RR source category definition and has deleted the word "facility" from the text to increase clarity.

Comment 2.4-c:
One commenter (0805) suggests that if an ER facility opts to become a GS facility under the proposed subpart RR, this decision should not have any implications as to how the affected injection wells are regulated under the UIC Program. The commenter summarizes comments submitted to EPA under the UIC Class VI rulemaking process and requests that EPA address the comments in today's final action, in order to clarify whether unavoidably sequestered CO_2 causes an ER operation to be considered GS even though the ER operator has not opted to be treated as GS under the GHG Reporting Program.

Response 2.4-c:
The UIC Class VI rulemaking is a separate action from today's action. ER injection well regulation under the UIC Program is outside of the scope of today's rulemaking. The commenter should look to the UIC Class VI rulemaking to see the requirements that have been finalized for UIC Class VI wells. As further explained in response 2.4-a, EPA is generally allowing ER operators the flexibility to choose for themselves whether to submit an MRV plan for EPA approval in order to report GS.

2.5 Research and Development (R&D) Definition/Exemption

Comment 2.5-a:
A coalition of ENGOs (0809) notes that the proposed rule is ambiguous about whether all R&D activities are exempt from all reporting and monitoring requirements, or whether the exemption extends only to small bench scale R&D projects. Furthermore, the coalition of ENGOs believes it is unclear whether both "Tier 1" and "Tier 2" requirements are exempted for R&D projects. The coalition of ENGOs suggests that EPA clarify both the definition of R&D, as well as the extent of exemption that is allowed. The coalition of ENGOs (0809) and two commenters (0806, 0810) suggest that, at a minimum, "Tier 1" reporting requirements should be applicable to all R&D projects.

Response 2.5-a:
The R&D exemption and the R&D definition that were proposed in subpart RR were intended to apply to "Tier 2" (now subpart RR) requirements only. After reviewing these comments, EPA understands that the text about the R&D exemption may have been confusing. In today's final action, "Tier 1" requirements and provisions have been moved to subpart UU, and "Tier 2" requirements and provisions remain in subpart RR. See Section II.E of the preamble for a full discussion of the rationale for this restructuring. In today's final action, EPA has retained the GS R&D exemption provisions and definition in subpart RR and has not moved them to subpart UU.

Comment 2.5-b:
Three commenters (0806, TRANS-VA-04, 0810) and a coalition of ENGOs (0809/TRANS-VA-01) disagree with EPA's exclusion of R&D facilities from reporting under the proposed subpart RR and affirm that these projects should be covered. Two of the commenters (0806, 0810) oppose the exclusion on the basis that it is unwarranted and counter-intuitive. The other commenters point out that information from early R&D projects is important for determining the appropriateness and efficacy of surface and subsurface monitoring methods, and that the projects represent an opportunity to test and verify EPA's MRV approach. The commenters also state that the exemption for all R&D is directly contradictory to EPA's stated objective of gaining understanding in the near term about the potential and effectiveness of GS alternatives and airside monitoring techniques because in the near term R&D projects are the only source of such information. Finally, they assert that large R&D projects will provide the most learning about sequestration potential, and failing to ask for information from them would be a lost opportunity for EPA.

Three commenters (0803, 0790, 0807) support EPA's exemption of R&D projects.

Response 2.5-b:
In today's final action, EPA agrees with the commenters that support a mechanism for R&D projects to be exempt from subpart RR monitoring and reporting requirements and is providing one in this final rule. For a full discussion of the R&D project exemption process, please see Section II.B of the preamble. EPA has determined that the exemption of R&D projects is warranted and intuitive because some early R&D projects are focused on testing specific scientific issues or monitoring techniques rather than verifying GS.

As stated in the preamble to the proposal and in the preamble to today's final action, EPA is finalizing this rule to monitor the growth and efficacy of GS and to evaluate relevant policy options. The Agency is mainly focused on evaluating policy options for demonstration and commercial GS projects and has concluded that it would not be as useful to the Agency at this time to evaluate policy options for projects that meet our definition of R&D project – whether the projects are large or small, near term or further in the future. In addition, EPA has concluded that it will be most useful to the Agency to monitor the growth and efficacy of GS at projects focused on verifying GS rather than at projects focused on testing specific scientific issues or monitoring techniques.

EPA disagrees that any projects are needed to test or verify EPA's MRV approach because the Agency has full confidence in the MRV approach finalized in today's action. We have designed the MRV plan provisions to be site-specific, flexible, adaptive to future technology developments, and effective at demonstrating with certainty that the CO_2 injected underground is staying underground.

Comment 2.5-c:
Seven commenters (0803, 0806, 0807, 0808, 0816/TRANS-VA-05, 0810, 0813) and the multi-stakeholder discussion group (0799) suggest that EPA should not limit the definition of R&D to only those that receive federal funding, as the definition is too narrow. One commenter (0816) suggests that a broader definition will encourage research and innovation in the emerging technology field of CCS. This commenter also provides EPA with a modified definition of R&D reflecting this point of view. Two commenters (0806, 0810) disagree with limiting R&D projects to only those that are federally supported because this would be a disincentive to the private sector in pursuing and undertaking valuable R&D GS projects. One commenter (0803) states that some R&D projects could receive state or academic funding. Commenter 0807 suggests that EPA expand the proposed definition of R&D to allow for any R&D projects to be exempt (provided that they meet some yet to be determined criteria).

Several commenters provide examples of scenarios that should be covered by a "federally funded" term. One commenter (0790) suggests that any amount of federal or state funding for CCS research purposes should allow a project to qualify for R&D exemption, including federal grants to monitor groundwater long term for research purposes. One commenter (0790) suggests that EPA maintain the R&D status of projects if federal support has been temporarily

discontinued and the source expects additional federal support to be forthcoming. Requiring R&D facilities to obtain an interim GS status (if funding is temporarily stopped) would create a significant financial disincentive for further participation in federal R&D program and slow down the advancement of needed R&D. Two commenters (0813, 0800) request that EPA clarify whether projects receiving tax credits, low-interest loans, and other incentives would qualify for the exemption as R&D projects.

One commenter (0813/TRANS-VA-02) and a coalition of ENGOs (0809) note that all CCS demonstration plants currently operating today or being planned in the future would be part of the R&D facilities, as defined by EPA in the proposed rule, because they all receive (or will receive) some amount of federal support. A coalition of ENGOs (0809) state that this results in a blanket exemption for all GS projects, which is a significant loophole of the requirements in the proposed action.

One commenter (0788) is unsure that there is a significant benefit or sufficient rationale provided in the proposed rule for excluding R&D projects that are supported by the federal government.

Response 2.5-c:
The Agency agrees with commenters that an R&D exemption should not be limited to projects receiving Federal funding because there are non-Federal funding sources which could fund GS R&D projects. For example, sources of funding that may indicate that a project is conducting GS R&D include Federal, State, and academic sources. Funding from the R&D budget of a private sector entity may also indicate that a project is conducting GS R&D. EPA is not requiring that a GS R&D project be federally funded in order to be exempt from subpart RR. EPA agrees that a GS R&D project may receive funding from states, the private sector, or academia. EPA recognizes that a GS project could be financed through grants, tax credits, and low-interest loans, or it may have a more complex situation (such as federal funding that lapses but is expected to resume) that needs to be considered individually. In order for EPA to have basic information about projects operating under an R&D exemption, EPA is requiring that a project requesting an R&D exemption include information on the source and type of funding of the project in the request. See Section II.E of the preamble for a full discussion on EPA's rationale for excluding R&D projects from subpart RR and for making the decisions that are described in this response.

With respect to the concern that excluding R&D projects creates a loophole in this action, EPA notes that only R&D projects would be exempted from subpart RR. Therefore, EPA does not agree that the R&D exemption process will result in a blanket exemption for all operating and planned projects.

Comment 2.5-d:
Two commenters (0788, 0800) suggest that if federally supported R&D projects have to report under this subpart, then additional federal support should be provided to cover the reporting costs. One of them commenters (0800) believes that EPA should recognize that existing CCS R&D projects with federal funding have established budgets and the funding needed for these reporting activities may not be available.

Response 2.5-d:
Whether federally funded projects get more funding to cover the cost of reporting as the result of this rule is outside of the scope of today's final action. For information on the costs of this action, please see Chapter 10 of this document and the Economic Impact Analysis for this final action.

Comment 2.5-e:
One commenter (0788) notes that by going through the reporting process, federally supported R&D projects could help the private sector to quickly learn what their reporting responsibilities would be once they deploy commercial CCS projects. The commenter notes that the rationale for DOE supported CCS R&D projects is to advance the state-of-the-art with respect to CCS, and that in the commenter's mind, that mandate extends to learning how to comply with all relevant laws and regulations. Two commenters (0806, 0810) opine that projects that are federally funded projects are in the business of gathering data anyway and that they should report under the proposed rule solely because they are getting federal funding. A fourth commenter (0800) believes that R&D projects are very important to the development of CCS as a commercial scale GHG mitigation technology and supports R&D incorporation into the reporting requirements at the demonstration scale as a test bed for MRV plans.

Response 2.5-e:
EPA disagrees that any projects are needed to test or verify EPA's MRV approach because the Agency has full confidence in the MRV approach finalized in today's action. We have designed the MRV plan provisions to be site-specific, flexible, adaptive to future technology developments, and effective at demonstrating with certainty that the CO_2 injected underground is staying underground. EPA has concluded that it is appropriate to allow GS R&D projects to exempt from subpart RR. See Section II.B and II.E of the preamble for a full discussion of the rationale for maintaining a GS R&D exemption process. In general, however, EPA expects that the industry and regulators will continue to gain valuable information from R&D projects.

Comment 2.5-f:
Two commenters (0808, 0813) recommend that EPA define an R&D project as a facility that is engaged in R&D, as opposed to commercial operations. One commenter (0803) suggests defining R&D as a facility that is "engaged in research and development rather than commercial operation to research practices and monitoring techniques that will enable safe and effective long-term containment of a gaseous, liquid, or supercritical CO_2 stream in subsurface geologic formations."

Response 2.5-f:
EPA does not agree that the recommendation offered by the first two commenters is an appropriate definition because it is vague and circular. EPA agrees that the language recommended by the third commenter is true and that projects that are not R&D projects, such as commercial GS operations, are not eligible for the exemption, but has concluded that it is not sufficient because it leaves out important information describing R&D projects. Therefore, no edit was made to today's final rule as a result of these comments.

To the extent that the language proposed by these commenters excludes a Federally funded limitation, EPA agrees that an R&D exemption should not be limited to projects receiving Federal funding. For the rationale on this conclusion, please see Response 2.5-c in this document.

Comment 2.5-g:
Two commenters (0798, 0816), a coalition of ENGOs (0809), and the multi-stakeholder discussion group (0799) suggest that the definition of R&D should be based on a specific quantity threshold in order to reduce the burden on small R&D projects. One commenter (0798) recommends the threshold be set at 200,000 tons per year, which would cover pilot plants that handle the full CO_2 output captured from a typical ethanol facility. Another commenter (0816) recommends a threshold of 100,000 tons of CO_2 per year received from off-site sources. A coalition of ENGOs (0809) and a multi-stakeholder discussion group (0799) recommend an injection threshold of 25,000 metric tons per year. One ENGO recommends an injection threshold of 25,000 metric tons over the lifetime of the project. One commenter (0816) and the multi-stakeholder discussion group (0799) note that collecting data from projects below the recommended threshold will add disproportionately to costs while yielding little value.

Response 2.5-g:
In today's final action, EPA is not basing the R&D definition or the R&D exemption mechanism on a threshold. It would be challenging to define a threshold for GS R&D projects because project size could vary depending on the R&D goals and other factors such as availability and source of CO_2. Therefore, as explained fully in Section II.E of the preamble to this action, EPA is establishing a process through which GS R&D projects can apply for an exemption from subpart RR. This approach allows GS R&D projects to exempt from subpart RR regardless of size. Projects applying for an exemption must submit information on planned annual CO_2 injection volumes, and EPA will take this information into consideration in determining if a project is an R&D project. The exemption for R&D projects and subpart UU cease reporting provisions discussed in Chapter 8 of this document ensure that projects injecting small amounts of CO_2 will not be disproportionately burdened by the reporting requirements.

Comment 2.5-h:
A coalition of ENGOs (0809) suggests that EPA include R&D projects in the source category (above their recommended 25,000 ton threshold) but allow projects to be exempt subject to approval by EPA. This would ensure that most R&D projects are included in the source category, but certain R&D projects can be excluded after an exemption is granted by EPA. Meanwhile, four commenters (0803, 0816, 0800, 0813/TRANS-VA-02) recommend that an R&D project should be excluded from the source category definition unless they choose to opt-in.

Response 2.5-h:
EPA agrees with comments that the most effective and sensible way to design the R&D exemption process is for the default to be that all wells injecting CO_2 underground for long term containment meet the source category definition and only the wells in those projects that EPA

determines are R&D projects be exempt. For a full discussion of the waiver criteria and the Agency's evaluation process, see Section II.B of the preamble.

Comment 2.5-i:
A coalition of ENGOs (0809) recommends that revisions be made to 40 CFR part 98.440 and 40 CFR part 98.441 to address the R&D exemption mechanism.

Response 2.5-i:
EPA agrees with the comment that it would be more clear to amend 40 CFR 98.440 (source category definition) with the provisions for how an R&D facility can apply to be exempt from the definition of the subpart RR source category. EPA has made this edit in today's final rule. EPA does not agree that an amendment is needed in 40 CFR 98.441 (reporting threshold), because the R&D waiver process is not related to a specific threshold. Therefore, EPA has not made an edit to 40 CFR 98.441 in today's final rule.

Comment 2.5-j:
One commenter (0790) suggests that EPA provide a transition time for R&D facilities. Once such facilities are no longer considered R&D facilities, the commenter believes that they should be allowed at least one year to prepare for the monitoring and reporting requirements under the proposed subpart RR.

Response 2.5-j:
EPA agrees that a project should be allowed some time to develop an MRV plan for submission to EPA after it becomes subject to subpart RR. The deadlines outlined in today's final action provide a GS project with up to 360 days from the date it becomes subject to subpart RR to develop and submit an MRV plan. EPA notes, however, that it must continue monitoring the mass of CO_2 received. Facilities that make a submission to EPA in support of an exemption are subject to subpart RR until the exemption decision is made and report basic information on CO_2 received under subpart RR. If the exemption request is denied or when an exemption expires, the facility must submit a proposed MRV plan to EPA within 180 days, and may request one extension of up to an additional 180 days.

Comment 2.5-k:
Two commenters (0816, 0811) and the multi-stakeholder discussion group (0799) recommend that pilot tests, test injection wells for commercial GS projects, and site characterization tests be included in the definition of R&D project because developing a site characterization and realistic models to predict the movement of CO_2 over time would be problematic and burdensome for such tests. One commenter (0811) provides the example of a test that injects a one-time volume of 10,000 tons of CO_2 for the purposes of evaluating reservoir characteristics where it may not be possible to develop an MRV plan for such a well. In this example, the commenter points out that without the information from the test well, it may be impossible to develop the site characterization and realistic models to predict CO_2 movement over time. This commenter suggests that a test injection well could be defined as one that injects a fixed one-time amount

over a defined, limited timeframe as per local considerations. The multi-stakeholder discussion group (0799) also provides the example of a test that injects up to 25,000 tons of CO_2 or a CO_2 stream to assist in identifying, evaluating or characterizing a potential site to be used for GS or for enhanced recovery of oil or natural gas.

Response 2.5-k:
EPA has addressed this comment by including projects for the purpose of investigating injection verification in the definition of R&D project. This includes research and short duration CO_2 injection tests conducted as a precursor to long-term storage. See Section II.B of the preamble for a full discussion of the GS R&D exemption process in today's final action.

2.6 Not Included in the Source Category

Comment 2.6-a:
One commenter (0788) and a coalition of ENGOs (0809) agree with the proposed exclusion of certain cement production processes and other techniques that do not involve subsurface injection of CO_2. The commenters do not support the delay of this rulemaking while research is continued on the other processes. One commenter (0788) states that the research community needs more time to perform rigorous life cycle assessments of these processes to have a firm understanding of the degree to which they permanently isolate CO_2 from the atmosphere.

Response 2.6-a:
EPA appreciates the commenters' shared view that certain cement production processes and other techniques be excluded from this final action. No change has been made to this exclusion in this final action.

Comment 2.6-b:
One commenter (0774) suggests that the captured CO_2 could be used in carbon fiber technologies. One commenter (0479) requests to know EPA's position on carbon capture by algae and further conversion to biofuels. The commenter asserts that the technology is available and well tested for reducing GHG emissions significantly.

Response 2.6-b:
EPA has concluded that CO_2 captured in carbon fiber technologies or by algae are not appropriate for the CO_2 GS source category in today's final action. EPA has concluded that the research community needs more time to perform rigorous life cycle assessments of these end uses to have a firm understanding of the degree to which they permanently isolate CO_2 from the atmosphere. No changes have been made to this final action as a result of these comments.

Comment 2.6-c:
One commenter (0805) asserts that there are fundamental differences between the anthropogenic CO_2 production industry and the natural CO_2 production industry, and that these differences merit unique treatment under EPA's reporting rule. The commenter also asserts that, since the

anthropogenic CO_2 production industry could grow rapidly as GHG emissions become more significantly regulated, it may be useful for EPA to have an annual reporting requirement for only anthropogenic CO_2 source production in order to track the industry's development and help determine when the industry may need to be regulated under the CAA. Conversely, the commenter asserts that the natural CO_2 production industry is quite small and that there is no reason to believe that the industry will experience significant growth in the future, especially once the anthropogenic CO_2 industry starts to grow rapidly. As such, the commenter does not find it reasonable for EPA to impose annual production reporting requirements on the natural CO_2 production industry when such data is likely to remain the same year after year. The commenter believes that if EPA thinks it needs production data from natural CO_2 producers, it should be requested on a one-time basis and EPA should be confident that the data will be accurate for years to come. The commenter also asserts that natural source production data are already available to the public through state reporting.

Another commenter (0788) asserts that it is appropriate for the EPA to require that CO_2 injected for ER be reported regardless of whether the CO_2 comes from an anthropogenic source or a natural CO_2 dome. The commenter suggests that GS using naturally sourced CO_2 should not qualify as a GHG mitigation action.

Response 2.6-c:

The CO_2 production source category is defined under subpart PP of the GHG Reporting Program at 40 CFR part 98.420(a), and whether the natural CO_2 production industry is covered by subpart PP is outside of the scope of today's action.

EPA agrees with the comment that both naturally sourced CO_2 and anthropogenic CO_2 should be covered and reported under subparts RR and UU. EPA has concluded that it needs data on CO_2 from both types of sources because they are both GHGs that will play a role in CCS and that EPA needs to consider when evaluating options to address climate change. Therefore, naturally sources CO_2 continues to be covered in this final rule, and no change was made as a result of these comments.

Comment 2.6-d:

The multi-stakeholder discussion group (0799) asserts that the source category should exclude natural gas or other formation fluids, which are often re-injected back into the field and may contain some CO_2. The commenter advises that this type of incidental CO_2 injection should not be subject to this action as it is not covered under the definition of "carbon dioxide stream." The commenter recommends that the reinjection of such a stream be included in the list proposed in 40 CFR part 98.440(d). Another commenter (0816) explains that in many situations produced natural gas or other formation fluids, which may have some level of CO_2 concentration (typically 15%) are directly, or after minimal treatment, reinjected into the field. They state that the "Tier 1" reporting requirements for these situations would represent an unintended expansion in the scope of the reporting rule and pose a significant burden. The commenter therefore proposes this language to be added to 40 CFR part 98.440(d): "(8) Injection of CO_2 that is incidental to production and reinjection of natural gas or other formation fluids."

Response 2.6-d:
EPA interprets the above comment as recommending that EPA should only collect data under subparts UU and RR on CO_2 that was also reported under subpart PP in order to assemble the complete picture of the CCS system. EPA agrees with this principle and therefore uses the term "CO_2 stream" in the source category definitions of subparts RR and UU. The term "CO_2 stream" is defined in 40 CFR part 98.6 and is used in the source category definition of subpart PP. As such, an owner or operator of an injection well who can trace the injected CO_2 with certainty to a source that is not subject to the reporting requirements of subpart PP can conclude that the injection well is not injecting a "CO_2 stream" and therefore does not meet the definition of the source category in subpart UU or RR.

For example, if a reporter produces natural gas from a natural gas production well and re-injects some of that produced natural gas without processing it first to pressurize the reservoir, the injection well would not be covered by subparts UU or RR even if the gas contains some CO_2. This is because the natural gas production well is not covered under subpart PP and does not produce a "CO_2 stream." In such a situation, the reporter should keep records that trace the injected CO_2 to its source. However, EPA notes that natural gas processing facilities that separate CO_2 and other contaminants from natural gas are subject to the reporting requirements of subpart PP and do produce a "CO_2 stream." Therefore, in the current example, the injection well meets the definition of the source category in subpart UU or RR if the produced natural gas is processed and separated from CO_2 and the resulting "CO_2 stream" is injected. EPA also notes that the reporter of any well that injects CO_2 underground must assume that the CO_2 meets the definition of a "CO_2 stream" unless the reporter can trace the injected CO_2 with certainty to a source other than a "CO_2 stream" as specified in 40 CFR part 98.444(a)(5) and 98.474(a)(4) of this final action.

In today's final action, EPA removed from the regulatory text the list of activities that are not included in the source category (proposed as 40 CFR part 98.440(d)) because we concluded that it created confusion and is not necessary. Please see Section II.E of the preamble for a full discussion of this change. Therefore, the commenter's recommendation to explicitly exclude reinjected natural gas or other formation fluids from the source category was not implemented in this final rule. EPA has concluded that the fact that reinjected natural gas or other formation fluids are excluded from the source category definitions in some cases is clear from the use of the term "CO_2 stream" in 40 CFR part 98.440(a) and 40 CFR part 98.474(a) and is further clarified in this response to comments.

Comment 2.6-e:
One commenter (0803) asks EPA to change "precipitated calcium carbonate" to "precipitated carbonates" in section 40 CFR part 98.440(d)(6) because other cations, such as magnesium, can form precipitated carbonates that can sequester CO_2.

Response 2.6-e:
In today's final action, EPA removed from the regulatory text the list of activities that are not included in the source category (proposed as 40 CFR part 98.440(d)) because we concluded that it created confusion and is not necessary. Please see Section II.E of the preamble for a full

discussion of this change. Therefore, the commenter's recommendation to amend an activity in that list was not implemented in this final rule. EPA notes, however, that it is clear from 40 CFR part 98.440(a) and 98.470(a) that precipitated carbonates do not meet the source category definitions in this rule because they are not involved in the injection of CO_2 underground.

2.7 Other Definitions Used in Subpart RR

Comment 2.7-a:
The multi-stakeholder discussion group (0799) suggests that EPA define CO_2 capture as "the initial separation and removal of a CO_2 stream from a manufacturing process, flue gas, a fuel source or any other process for purposes of supplying CO_2 for commercial applications or to maintain custody of a CO_2 stream in order to sequester or otherwise inject it underground." The commenter took this definition from 40 CFR part 98.420(a)(1), definition of subpart PP CO_2 supplier category. (74 FR 56260, 56506 (October 30, 2009)).

Response 2.7-a:
EPA has concluded that the term "CO_2 capture" does not need to be defined in subpart RR or subpart UU. Subparts RR and UU focus on GS and the injection of CO_2, and do not use the term "CO_2 capture." No change was made to this final action as a result of this comment.

Comment 2.7-b:
The multi-stakeholder discussion group (0799) suggests that EPA define CO_2 production as "using wells to extract or produce a CO_2 stream for purposes of supplying CO_2 for commercial applications or to extract and maintain custody of a CO_2 stream in order to sequester or otherwise inject it underground," as defined in 40 CFR part 98.420(a)(2) definition of subpart PP CO_2 supplier category. (74 FR 56260, 56506 (October 30, 2009)).

Response 2.7-b:
EPA has concluded that the term "CO_2 production" does not need to be defined in subpart RR or subpart UU. Subparts RR and UU focus on GS and the injection of CO_2, and do not use the term "CO_2 production." No change was made to this final action as a result of this comment.

Comment 2.7-c:
The multi-stakeholder discussion group (0799) suggests that the rule include definitions of "Underground Injection Control permit" and "Underground Injection Control program."

The commenter suggests that UIC permit should be defined as a permit issued EPA or a State pursuant to the applicable UIC program as defined in Section 1422(d) of the SDWA, 42 USC §§300h–1.

The commenter suggests that UIC program should be defined as "the program established or approved by EPA pursuant to Sections 1421 through 1425 of the SDWA, 42 USC §§300h –

300h-4. The applicable UIC program with respect to a State is defined in Section 1422(d) of the SDWA, 42 USC §§300h–1."

Response 2.7-c:
EPA agrees that UIC permit and the UIC program should be defined in subpart RR, and EPA has included definitions of these terms in today's final action. EPA used definitions for these terms that were developed by the Office of Water (OW) rather than those suggested in the comment, in order to maintain consistency across the Agency and the rules.

Comment 2.7-d:
One commenter (0810) requests that in the definition for source category for subpart RR, EPA should define the phrase "long-term containment" in terms of a duration threshold (i.e., number of years that would be considered "long-term containment").

Response 2.7-d:
EPA does not agree that the term "long-term containment" needs a definition because it is commonly understood to mean the indefinite future. No change was made to this final action as a result of this comment.

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3 Reporting Threshold

3.1 Thresholds for "Tier 1" Reporting

Comment 3.1-a:
Six commenters (0788, 0790, 0042, 0067, 0186, 0403) and a coalition of ENGOs (0809) support the 'all-in' reporting requirement that would require all entities that inject CO_2 to report "Tier 1" data. The Sierra Club mass mailers (0023) state that the rule should cover all facilities. One commenter (0790) notes that "Tier 1" requirements pose a minimal burden and therefore all-in reporting is reasonable. The coalition of ENGOs (0809) suggests that the all-in requirement is necessary because there is currently no workable way to establish a sensible threshold reporting level. Furthermore, the commenter asserts that the amount of CO_2 injected in any ER site could vary over time and operators could cross in and out of the reporting threshold, which could result in higher compliance and enforcement costs, lowered data quality, and loss of significant learning opportunities. They state that because CO_2 injection for ER is substantially expanding, capturing new ER projects is important both because they are likely to grow and in order to accurately map the flow of GHGs within this expanding industry. Likewise, capturing aging projects will allow the development of a robust data set tracking the lifecycle of ER sites. The coalition of ENGOs states that comprehensive reporting is also necessary to complement information collected under subpart PP. They state that if EPA were to exempt sites injecting less than 100,000 tons annually, a significant disconnect would arise between subpart PP data and "Tier 1" data.

Four commenters (0791, 0806, 0807, 0810) oppose the all-in reporting requirement for "Tier 1" data.

Response 3.1-a:
EPA agrees that "Tier 1" reporters (now known as subpart UU reporters) should report at no threshold because it will result in the most comprehensive data tracking and reporting at a minimal cost to reporters. Please see Section II.E of the preamble in today's final action for a full discussion of EPA's rationale for this decision. EPA agrees that information on CO_2 received by ER projects will provide useful information to inform future EPA policies and that a disconnect would arise between subpart PP UU data if subpart UU were subject to a threshold.

Comment 3.1-b:
Four commenters (0806, 0807, 0810) recommend a threshold of 100,000 tons of CO_2 injected per year for reporters "Tier 1" data rather than no threshold, as was proposed. The commenters note that Table 3 of the Preamble shows that nearly 100% of the injected CO_2 will be reported while covering nearly 50% fewer facilities.

Response 3.1-b:
EPA notes that reporting of CO_2 injected is not required under subpart UU (reporters of "Tier 1" data) of today's final action, so a threshold on injected CO_2 would not be practical. Nonetheless, EPA understands the point of these comments that the threshold analysis conducted for the proposal suggests that 97.4 percent of CO_2 received would be reported at a threshold of 100,000

tons of CO_2 received per year while covering 60 percent of facilities. The remaining 40 percent of facilities are mostly characterized in the threshold analysis data as pilot projects, projects that have just started, or projects nearing completion. EPA has concluded that despite this analysis, subpart UU reporters should report at no threshold. Please see Section II.E of the preamble in today's final action for a full discussion of EPA's rationale for this decision.

However, given these comments, EPA is allowing subpart UU reporters to cease reporting in today's final action, further reducing the need for a threshold under subpart UU. Analogous to the majority of reporters under Part 98, a subpart UU reporter can stop reporting after three years if the facility receives less than 15,000 tons of CO_2 per year for three consecutive years or after five years if the facility receives less than 25,000 tons of CO_2 per year for five consecutive years. This is different from the proposed rule, which allowed reporting to cease only once the well was plugged. EPA has concluded that this adjustment will allow projects, especially those that buy less CO_2 as they near completion, to cease reporting after only a few years.

3.2 Thresholds for "Tier 2" Reporting

Comment 3.2-a:
Six commenters (0042, 0067, 0186, 0403, TRANS-VA-04, 0788) and a coalition of ENGOs (0809) support the all-in approach for GS facility reporting without any thresholds. Four commenters (0808, 0790, 0791, 0816) oppose the all-in reporting and recommend a threshold for GS facility reporting. One of these commenters (0790) opines that "Tier 2" data from small GS operations will be relatively insignificant and have no practical bearing on the overall CO_2 mass reported, and that "Tier 2" data will only be of consequence for very large GS projects.

Response 3.2-a:
EPA agrees with comments that GS "Tier 2" reporters (now known as subpart RR reporters) should report at no threshold because it will result in the most comprehensive data tracking and reporting and because there is no one obvious sensible threshold. Furthermore, EPA has concluded that because of the GS R&D exemption process in this final rule, projects injecting small amounts of CO_2 will not be disproportionately burdened by the reporting requirements. Please see Section II.E of the preamble in today's final action for a full discussion of EPA's rationale on reporting thresholds and a GS R&D exemption.

Comment 3.2-b:
Two commenters (0808, 0787) suggest that reporting of air emissions to the atmosphere should be based on amount actually emitted rather than on size of operation and that the threshold should be set at emissions of 25,000 tons per year in order to be consistent with other subparts of 40 CFR part 98. They note that storage sites are not expected to result in air emissions if the GS facilities are properly sited and regulated. One commenter (0787) opines that MRV plan requirements would be applied to an activity that is unlikely to even trigger the minimum GHG threshold for reporting in other sectors. The commenter states that atmospheric releases are more likely to indicate a regulatory failure, an operational failure and/or faulty site selection than any type of business as usual outcome. The commenter states that costs of the site-specific MRV plan

will be largely spent on measuring very low CO_2 emissions, perhaps not even detectable above background levels, that are not likely to occur at all.

One commenter (0808) states that while reporting the amount of CO_2 injected will meet the goal of determining the efficiency of GS, reporting on emissions to the atmosphere should be based on the amount actually emitted. The commenter argues that i) experts agree that well-selected and well-managed sites are not expected to result in atmospheric emissions, ii) data from existing sites show no leakage, and iii) the proposal is an air emissions reporting rule under the CAA, it may not be appropriate to depart from an "emissions based" approach. The commenter states that smaller sites are unlikely to ever handle sufficient quantities of CO_2 that could result in a scenario under which a significant CO_2 atmospheric release would occur and should not be subject to the same level of permitting scrutiny as the large sites.

One commenter (0787) notes that under an unlikely, worst-case scenario due to regulatory failure, operational failure and/or faulty site selection, a GS facility could have a 1% leakage rate over 100 years. Based on an example from EPA's June 2008 document, "Geologic CO_2 Sequestration Technology and Cost Analysis: Technical Support Document," the maximum worst case leakage would be under 4,000 tons per year for a project that injects 1.84 MMT CO_2 per year over 20 years. Based on the worst case scenario, the threshold of 25,000 tons per year would be reached only for a project that injects over 12 MMT CO_2 per year.

Response 3.2-b:

EPA disagrees that an emissions threshold would be appropriate for subpart RR for three reasons. First, basing subpart RR reporting on emissions would be in opposition to EPA's stated objectives for subpart RR, to provide public information on quantities of CO_2 sequestered and to reconcile information obtained from this rule with subpart PP data. Since the vast majority of well-selected sites and well-managed GS projects are expected to emit below 25,000 tons of CO_2 per year, the GHG Reporting Program would provide a very misleading picture of the level of GS in the U.S. under a subpart RR emissions threshold. Second, the data would significantly overvalue the CO_2 supply in the CCS system that is emitted to the atmosphere. Second, in order for GS projects to evaluate whether emission levels are above or below a 25,000 threshold, the GS projects would need to implement monitoring for CO_2 surface leakage and quantify any leakage detected. Such a threshold applicability determination would defeat the purpose of a threshold in the first place. Third, EPA concluded that an emissions-based threshold would be problematic because of the lack of data on the incidence and scale of surface emissions and leakage from injection and GS facilities

With regard to the suggestion that an emissions threshold of 25,000 tons per year is a standard across the GHG Reporting Program, please see Section II.E.5 of the preamble in today's final action under the heading "Reporting Threshold" for a discussion of other subparts in 40 CFR part 98 with all-in requirements.

Comment 3.2-c:

One commenter (0816) recommends a threshold of 100,000 tons per year of CO_2 delivered from off-site sources to in order to reduce the burden for small or temporary R&D projects. This

commenter suggests that the calculation of whether a new GS operation meets the threshold can be calculated from process simulation, reservoir assessment and/or information for injection wells under UIC program, while CO_2-ER projects that opt in to be GS could use available process data such as amount of new CO_2 brought on site. The commenter suggests that this threshold would exempt small operators, research or temporary installations from the excessive burden of reporting under subpart RR, including the need to prepare and execute a detailed MRV plan. Another commenter (0790) suggests an injection threshold of 2 or 3 million tons/year to reduce the burden of "Tier 2" data reporting requirements on small facilities, such as recent federally funded industrial demonstration projects that are designed to sequester between 1 and 4.5 million tons of CO_2 per year.

Response 3.2-c:

EPA disagrees that a threshold on CO_2 injected or delivered would be appropriate for GS "Tier 2" reporters (now known as subpart RR reporters). Please see Section II.E of the preamble for a full discussion of EPA's rationale for this decision.

EPA understands the commenter's suggestion that small, temporary R&D projects should not be required to face the reporting and monitoring burden of subpart RR. In today's final action, to address this point, R&D projects will receive an exemption from subpart RR. Please see Section II.E of the preamble for a full discussion of EPA's rationale for this decision. EPA notes that a threshold would not be relevant for CO_2-ER projects that opt in to be GS because they can choose to report under subpart RR independently (unless they hold a UIC Class VI permit, in which case they are required to report under subpart RR). In making a determination of whether a project meets the definition of R&D project, EPA will take into account any information submitted demonstrating that the planned annual CO_2 injection volumes during the duration of the project are consistent with the purpose of the R&D project.

Comment 3.2-d:

One commenter (0813) recommends that EPA should adopt a de minimis threshold of 100 tons per year for emissions from surface equipment.

Response 3.2-d:

EPA disagrees that a de minimis threshold would be appropriate. As explained in the preamble to the final GHG Reporting Program rulemaking, (74 FR 56260, October 30, 2010) de minimis provisions are included in some reporting programs to avoid potentially unreasonable reporting burdens. EPA concluded that such provisions were not necessary for that rulemaking because the rule already avoided burdensome reporting requirements for small emissions sources. The same argument can be applied to today's rulemaking because fugitive and vented emissions from surface equipment can be calculated using simplified emissions calculation methods, such as engineering estimates and emission factors. Furthermore, as a result of changes to today's rule from proposal, fugitive and vented emissions from surface equipment need not be measured for compliance with subpart RR where they are not related to the GS mass balance. See Section 5.3 of this Response to Comments document for more information on fugitive and vented emissions reporting requirements under today's final action.

3.3 Comments on EPA's Methodology for Determining Reporting Threshold

Comment 3.3-a:
One commenter (0812) addressed the issue that the Threshold Analysis methodology is based on the concept that higher oil production is a function of higher CO_2 injection volumes. The commenter states that the relationship between CO_2 injection and oil production varies significantly by field and basin, and hence, the use of a constant proportionality between these quantities is inappropriate for all basins. Therefore, higher oil production is not always a function of higher injected volumes of CO_2.

Response 3.3-a:
The commenter is correct that the relationship between CO_2 injection and oil production rates varies significantly by field and basin. EPA agrees that it is inappropriate to use a constant ratio of proportionality between these quantities across all basins. EPA did not do this in the threshold analysis. In the threshold analysis; as described in Chapter 2 of the final General TSD, EPA calculated net CO_2 utilization by basin so the relationship between purchased CO_2 and incremental production rate is not compared across basins.

Comment 3.3-b:
A coalition of ENGOs (0809) suggests that EPA update their findings on the percent of ER and GS facilities that inject CO_2 below different levels based on the April 2010 Oil and Gas Journal's Enhanced Oil Recovery (EOR) Survey that was released after the proposed rule.

Response 3.3-b:
EPA used Oil and Gas Journal data together with US GHG Inventory data to conduct the threshold analysis because no one data source contained all of the information we needed. Even though the Oil and Gas Journal data was updated in 2010 to reflect data through 2009, the US GHG Inventory does not yet reflect 2009 data. EPA has concluded that both sets of data must be from the same year in order for the threshold calculations to be accurate and for the analysis to be meaningful. Therefore, though EPA reviewed the April 2010 survey while preparing today's final action, we did not update the threshold analysis to reflect this new data and we continued to use 2007 data from both data sources. Please see Chapter 2 of the final General TSD for an explanation of the threshold analysis and a comparison of the data in the 2010 survey and the 2008 survey.

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4 Monitoring and Sampling Requirements

4.1 Location Requirements for Measurement

Comment 4.1-a:

Three commenters (0816, 0812, 0795) assert that CO_2 injection should not need to be measured at each individual injection well. Two of the commenters (0816, 0795) argue that existing monitoring at custody transfer points would provide a higher degree of measurement accuracy and would serve as a more efficient point for data collection when compared to measurement at injection wells. Commenter (0795) notes that measurement at injection wells may require costly capital upgrades while adding no additional accuracy. The commenter recommends adopting requirements focused on CO_2 received onsite, and that for ER GS operations, custody transfer information in combination with fugitive emissions monitoring under subpart W, is the most accurate and cost-effective approach for validating the GS mass balance equation. According to one commenter (0816), custody transfer meters meet rigorous metering requirements, track composition, temperature and pressure, are very well calibrated, and are used for CO_2 measurements. Three commenters (0795, 0812, 0816) explain that expensive capital upgrades would be required at in-field flow meters if injection data were required to be collected there; the commenter (0816) further explains that such meters are currently not calibrated with the same rigor as custody transfer meters, are not used for CO_2 measurements as the measured rates and volumes vary widely, and do not necessarily have the capability to provide temperature and pressure data. Commenter 0816 suggests specific regulatory text changes that accomplish that goal. A fourth commenter (0805) agrees generally that EPA should provide greater flexibility for how injection must be monitored.

One commenter (0812) advises that flow and CO_2 concentrations should be measured at the header upstream of the group of injection wells rather than at each well because testing CO_2 concentrations at each wellhead is burdensome and unnecessary. The commenter suggests that this approach will maintain data accuracy while reducing the costs associated with requiring several hundred flow meters.

Response 4.1-a:

EPA proposed that CO_2 injection be measured at individual injection wells because EPA wanted to minimize burden for reporters by requiring the use of meters already in place for compliance with the UIC program. As a result of these comments, EPA understands that adequate data on injection of a CO_2 stream can be collected through fewer flow meters in locations other than the location proposed. EPA further understands that the most efficient way to collect data on injection of a CO_2 stream will depend on site configuration. Therefore, in this final rule, EPA is promulgating quality assurance/quality control (QA/QC) requirements that allow for measurement of CO_2 injected at a location or at locations other than an in-field flow meter as long as all measured flows are additively representative of the flow being injected (i.e., the mixture of "new" CO_2 received and recycled CO_2). These QA/QC requirements are general and do not list every specific location where measurements could be taken, so EPA is clarifying here that the flow of injected CO_2 can be measured at a common header, as requested by one of the commenters, as long as it is representative of the flow being injected.

Comment 4.1-b:
The multi-stakeholder discussion group (0799) suggests that sampling the produced gas stream for purposes of establishing CO_2 concentration levels should occur either upstream of the meter, between the separator and the meter, or downstream of the meter. The commenter suggests that it would be unnecessarily difficult and costly to attempt to obtain concentration levels at individual wells if there are no further actions designed to alter that concentration, and obtaining the concentration after the stream exits the separator should be sufficiently representative.

Response 4.1-b:
EPA proposed that produced gas be sampled and a flow meter be placed directly downstream of each separator so that the location for data samples is consistent with the location for volume measurement. As a result of this comment, EPA has reconsidered this approach. EPA agrees that sampling of the produced gas stream can be done effectively either directly downstream of the flow meter (i.e. between the separator and the flow meter) or directly upstream of the flow meter (i.e., between the flow meter and the recycle or end use system). Therefore, EPA has revised the monitoring and QA/QC requirements for sampling the produced gas so that the location can be either upstream or downstream of the flow meter used to measure flow.

EPA agrees that sampling at each individual well could be very costly. For this reason, EPA proposed to require measurement and sampling of the gas flow after the oil-gas separator. As a result of this comment, EPA has maintained this provision in the final rule.

Comment 4.1-c:
One commenter (0803) notes that non-ER GS facilities do not recycle CO_2 from the same operation and requests that EPA remove the requirement for GS facilities in the proposed 40 CFR part 98.442(a) that the mass of CO_2 received onsite must be reported, particularly because the amount of CO_2 being sequestered is already required to be metered at the subsurface injection point per proposed 40 CFR part 98.442(b). The commenter states that this would avoid redundant flow metering.

The commenter also asserts that EPA should allow the flow to be monitored by a flow meter that is not on the GS facility site, provided that the flow meter meets the criteria and is located on an un-branched line.

Response 4.1-c:
EPA agrees that some GS facilities inject the same flow of CO_2 that they receive but notes that some GS facilities (those also conducting ER) do not. Therefore, EPA does not agree that the requirement in the proposed paragraph (a) in 40 CFR part 98.442 should be deleted. In today's final action EPA continues to require all facilities conducting GS to report CO_2 received and CO_2 injected under subpart RR. EPA agrees that burden should be minimized for reporters who receive and inject the same CO_2 stream. Therefore, in paragraph (a)(4) of 40 CFR part 98.444 of today's final action, EPA allows a reporter to use the CO_2 injected mass as the CO_2 received mass if the flow is wholly injected and not mixed with any other flow(s). EPA has concluded that

this revision adequately addresses the commenter's point and minimizes burden while maintaining a uniform regulatory and reporting structure.

EPA clarifies that a flow meter located outside of the facility may be used to measure flow, and that data may be reported by the reporter in the annual GHG report. In such a situation, the reporter must ascertain and report the appropriate consensus-based standard or industry standard practice followed to operate the measurement equipment as specified in today's final action and must ensure that the equipment calibration requirements as specified in 40 CFR part 98.3(i) are met. The reporter is responsible for retaining records to support quantities reported to EPA under this subpart. As specified in 40 CFR part 98.3(g), records must be kept in an electronic or hard-copy format (as appropriate) and may be retained off site if they are readily available for expeditious inspection and review.

Comment 4.1-d:

One commenter (0790) suggests that measuring CO_2 concentration at the flow meter could present a safety hazard for operators collecting manual bag samples for analysis because the flow meter will typically be downstream of the compressors and a sampling port located at the flow meter would be at very high pressure. The commenter suggests that the sample be collected at a low-pressure point in the system if the CO_2 stream is not commingled with any other streams downstream of the sample collection port. The commenter recommends that concentration be reported on a dry basis, to provide comparable results regardless of the moisture content at the sampling location versus the flow meter location.

The multi-stakeholder discussion group (0799) similarly suggests that operators be able to select a location to sample the CO_2 stream(s) that is either immediately upstream or downstream of the flow meter to accommodate site-specific operational configurations. The multi-stakeholder discussion group provides specific edits to regulatory text in proposed 40 CFR part 98.444(a)(6) to reflect this suggestion. The multi-stakeholder discussion group further explains that operators should be able to select an appropriate location for sampling that is anywhere between the exit from the separator unit and the injection well.

Three commenters (0806, 0807, 0810) suggest that EPA provide flexibility to ER reporters and CO_2 injection facilities on where CO_2 concentration, pressure and temperature may be measured rather than limit the location to where the flow meters are installed. One commenter (0806) believes that requiring the same temperature, pressure and concentration readings at each of its nearly 300 CO_2 injection wells would be a step backwards, as the data would be much lower quality than data from the central control facilities, and the cost would be significantly greater. A fourth commenter (0805) proposed that if flow meters are used at individual wellheads, the operator should be able to obtain a representative value for concentration, pressure, and temperature at an upstream point on a common supply header.

Response 4.1-d:

In the proposed rule, EPA required that CO_2 concentration be measured immediately downstream of the flow meter used to measure the flow of the CO_2 stream. EPA concluded that it was necessary for the concentration and flow measurements to occur at the same location in

order to maintain data integrity, consistency, and accuracy. A low pressure point may a great distance from the flow meter, and losses may occur or streams may be added (though not at the site described by the commenter) between these two points. Furthermore, the compressor between these two points may remove constituents from the CO_2 stream other than water. After consideration of the comment received on this issue, EPA's original conclusion stands in this final rule. EPA notes that flow meters are available on the market that sample the CO_2 stream and measure concentration as part of the flow meter. EPA also notes that procedures for manually sampling the CO_2 stream safely are outlined in the Chapter 3 of the final General TSD.

As the result of these comments, however, EPA understands that reporters should be allowed as much flexibility as possible with respect to measurement location, as long as data accuracy is maintained. Therefore, EPA has amended the requirement for the location of CO_2 concentration measurement in today's final rule so that reporters can take measurements either immediately downstream or upstream of the flow meter rather than just immediately downstream. In this context, the word "immediately" means in advance of any of the following: other equipment on the line (such as a compressor), an intersection with another line, or a branching of the line. If, for the purposes of subpart UU or RR, a reporter uses a flow meter on a line between the separator unit and the injection well, the sample can be taken immediately downstream or immediately upstream from that flow meter. EPA notes that we have also amended the requirements for the flow meter location in this final rule as the result of other comments received and that this amendment provides even more flexibility on the location of the CO_2 concentration measurement.

In the proposed rule, EPA required that all measured volumes of CO_2 be converted to the standard industry temperature and pressure conditions outlined in the regulatory text. EPA did not specify a requirement that flow pressure and flow temperature be determined at the same location as flow. As the result of this comment, EPA has retained this flexibility on pressure and temperature determination in this rule. EPA expects reporters to measure the operating pressure and temperature that are representative of the CO_2 stream being injected.

Comment 4.1-e:
The multi-stakeholder discussion group (0799) suggests that the term "injected CO_2 stream" be replaced with the term "CO_2 stream injected into the subsurface" in proposed 40 CFR part 98.444. Another commenter (0817) provided the same regulatory text suggestion.

Response 4.1-e:
In today's final action, EPA did not make the edit provided by the commenter to the term "injected CO_2 stream". The commenter did not provide a reason for this edit, and EPA has concluded that the original text is clear.

Comment 4.1-f:
One commenter (0797) asserts that the NACCSA/Pew methodology is likely to contain specific recommendations on the location of meters for mass or volumetric flow determination. The

commenter suggests that subpart RR accommodate the scenarios suggested by NACCSA and Pew.

Response 4.1-f:
EPA applauds NACCSA and Pew for working together to advance efforts for monitoring and reporting quantities of CO_2 that are geologically sequestered. Please refer to Chapter 13 of this document for EPA's responses to comments regarding this methodology.

Comment 4.1-g:
In regards to EPA's request for comment on potential methodologies to estimate the concentration of the flow injected, such as apportioning the concentration of CO_2 transferred onsite and the concentration of recycled CO_2 to the quantities from each source, one commenter (0816) stated that there is no need for apportionment of concentration. The commenter states that industry practice tracks volumes/mass of streams separately and adds them together rather than homogenizing (or apportioning) them. This commenter recommends that EPA not prescribe how reporters should provide volumes or mass data of CO_2. The commenter believes that standard industry practices tailored to the specific project configuration can provide sufficient data.

Response 4.1-g:
EPA disagrees with this comment. For quality assurance and to ensure consistency in data from all reporters, EPA has concluded that calculation and monitoring requirements are a necessary and important part of today's final action; please see Response 4.2-a for a further discussion of this conclusion. EPA did not make changes to this final action as a result of this comment.

Comment 4.1-h:
A coalition of ENGOs (0809) agrees with EPA that volumetric flow meters, where present, can be used for monitoring and reporting.

Response 4.1-h:
EPA appreciates the commenter's shared view that volumetric flow meters can be used for monitoring and reporting. In this final rule, EPA has maintained this provision.

Comment 4.1-i:
One commenter (0812) asserts that in Equations RR-2, RR-5, and RR-8, the CO_2 concentration measurement should be in volume (or molar) % CO_2 instead of wt. % CO_2.

Response 4.1-i:
EPA agrees that in Equations RR-2, RR-5, and RR-8, the units for quarterly CO_2 concentration measurement should be in volume percent CO_2. It was an EPA oversight to specify the units for that parameter in the proposed rule as weight percent CO_2. EPA has corrected the units to volume percent CO_2 in this final rule.

4.2 Converting to Standard Conditions

Comment 4.2-a:
Four commenters (0805, 0806, 0807, 0810) argue that, because mass measuring equipment is costly and burdensome, EPA should allow reporting on a volumetric basis at operating conditions without requiring conversion to standard conditions. The commenters suggest that reporting on a volumetric basis would be far less burdensome and still provide the information EPA seeks in proposed subpart RR.

One commenter (0805) states that this flexibility would allow ER operators to use volumetric data already required under the existing UIC Class II injection well permits, and that such volumetric data could provide EPA with additional useful information that could be used to better understand site operations (such as relative proportion of CO_2 injected in a particular well or group of wells).

Two commenters (0806, 0810) note that installing CO_2 temperature and measuring equipment is costly and burdensome and they recommend that EPA not require reporting of CO_2 temperature.

Response 4.2-a:
EPA does not agree with comments that reporters should not be required to convert all CO_2 volumes from operating temperature and pressure to standard temperature and pressure in order to determine mass. EPA has concluded that all quantities reported in subparts UU and RR must be reported in the same units and under the same conditions so that they can be compared across the industry and added together for a picture of the whole industry. All quantities must also be comparable to data reported under subpart PP, which is required to be reported in metric tons (mass). Therefore, no changes were made to this final rule as the result of these comments.

EPA notes that a reporter can use the volumetric data collected under an existing UIC permit along with data on temperature, pressure, and CO_2 concentration to calculate mass of CO_2 injected under subpart RR. One of EPA's priorities when developing and finalizing this rule was to minimize redundancy between the UIC Program and GHG Reporting Program and to build the reporting requirements in this final rule on top of requirements for UIC permits. Please also refer to Chapter 11 of this document for a discussion of the relationship of UIC permit requirements and this rule.

In response to the comment that temperature monitoring may not take place at the injection flow meters required for the proposed rule, EPA has amended the requirements for the flow meter location in this final rule as the result of comments received so that reporters have more flexibility on the location of the flow meter and hence on the location of temperature measurements. The requirement to measure CO_2 temperature is considered an important component of today's final action and has been maintained. Please see Response 4.1-d for a discussion of these amendments.

Comment 4.2-b:

The multi-stakeholder discussion group (0799) submitted a copy of a document about regulatory standards. The document states that many state reporting standards require state-specific standard pressure base and temperature and contains a table of state-specific standards. The document also states that many companies pay royalties to the Minerals Management Service (MMS), Bureau of Land Management (BLM), and Bureau of Indian Affairs (BIA) for gas produced on federal and Indian-owned lands, which require 14.73 psia and 60 degrees F as standard conditions. The document states that differences between state and federal standards may require an additional volume pressure base conversion after state reporting, before reporting to the MMS and BIA. The document also includes a Standard Pressure Base Table for Oil and Gas Producing State, which is found in the Summary of State Statutes and Regulations for Oil and Gas Production, Interstate Oil and Gas Compact Commission (IOGCC), 2007 edition and MMS Minerals Production Reporter Handbook.

Response 4.2-b:
EPA has reviewed the submitted information on the standard conditions required for reporting to states and other agencies. EPA notes that the standard conditions in today's final action are the same as the standard conditions required by the federal agencies listed in this comment. No change was made to this final action as a result of this comment.

Comment 4.2-c:
One commenter (0816) and the multi-stakeholder discussion group (0799) support EPA's specification of industry standard conditions in this action and to avoid confusion with other subparts, they request that EPA clarify that the same industry standard conditions (60 F and 1 atmosphere) should be used for all flow and concentration measurements for all subparts of the MRR. The commenter opines that such an approach will minimize the burden of recalculation and inadvertent quantification errors.

Response 4.2-c:
EPA appreciates the commenters' shared view that all volume measurements should be converted to mass by converting operating conditions to the standard conditions of 60 degrees F and 1 atmosphere. EPA has maintained these conditions in today's final rule. Other subparts in the 40 CFR part 98 may require conversion to different standard conditions, and revising them is outside of the scope of this rulemaking.

Comment 4.2-d:
One commenter (0798) argues that data errors and inconsistencies will likely occur because volumetric quantities will be initially measured and reported to state and UIC authorities under regulation-specific pressure base standards and that data conversion inherently results in some data error. The commenter notes that flow meters are accurate within a range (such as +/- 1%), which is generally accepted by industry. The commenter states that EPA should not expect the data measurements to achieve actuarial perfection and suggests that the rule should recognize these underlying measurement realities since its objective is to encourage injection of captured CO_2. The commenter recommends that EPA explicitly recognize in the Final Rule a variety of metering errors, tolerance bands, and other good faith data errors that may arise.

Response 4.2-d:
EPA recognizes these underlying measurement realities and understands that the data reported may not be perfect. In the proposed rule, EPA did not specify the operating conditions at which CO_2 stream volume must be measured; rather, EPA required that the CO_2 volume be converted to the standard conditions specified in the proposed rule so that the volume can be further converted to metric tons (mass). These requirements stand in today's final rule. Therefore, a reporter that measures CO_2 stream volume at state-specific pressure base standards that vary from the standard conditions in this rule can comply with today's final action.

EPA understands that measurement equipment is inherently accurate to within a range. The General Provisions of the GHG Reporting Program apply to subparts RR and UU unless otherwise specified in the regulatory text, so reporters are required to calibrate all flow meters to within the accuracy range specified in 40 CFR part 98.3(i), which is 5 percent in most situations.

Comment 4.2-e:
The multi-stakeholder discussion group (0799) suggests that EPA consider publishing both reported volume and mass numbers in order to allow for cross-comparison of the EPA reported volumes with similar reported volumes for state agencies. Different states have their own standardization requirements, and hence the reported volumes to state agencies could be different than the volumes reported to EPA. The multi-stakeholder discussion group recommends that EPA address this issue in the preamble to the rule, with the recognition that state reporting requirements are also linked to reporting for tax purposes.

Response 4.2-e:
In today's final action, EPA requires that any volume measurements be reported in the annual GHG report in standard conditions specified in the rule. When that volume data is converted to mass, the mass must be reported in the annual GHG report as well. EPA plans to publish all collected data that is not determined to be confidential as a result of the confidential business information (CBI) rulemaking.

EPA considered also requiring that operating pressure, operating temperature, and volume in operating conditions be reported so that volumes reported to EPA could be compared with volumes reported to states as recommended by the multi-stakeholder discussion group. Such data reporting requirements would also allow EPA to conduct electronic verification on the conversion of volume from operating to standard conditions. EPA determined that there was no logical outgrowth from the proposal to add such requirements. Therefore, EPA does not require reporting of any data in operating conditions in this final rule. However, EPA continues to require under today's final action that records on operating conditions be retained.

4.3 Measuring (Sampling) Composition and Flow Quarterly

Comment 4.3-a:

Three commenters (0791, 0806, 0807) suggest that collecting concentration and some types of flow data on a quarterly basis is unreasonable. One commenter (0791) suggests that data collection and record keeping should be done on an annual basis if there are no significant changes in the source or process. One commenter (0812) argues that quarterly measurements of CO_2 concentration is reasonable and adequate, as ER operators have strict requirements on the quality of CO_2 transferred on-site and the amount of CO_2 recycled is also consistent.

Two commenters (0806, 0807) state that they already measure CO_2 concentration and pressure on a quarterly basis but argue that taking quarterly CO_2 temperature measurements at each injection well flow meter will impose a substantial burden on facilities.

Response 4.3-a:
EPA agrees with comments that quarterly data collection on the flow and CO_2 concentration of each CO_2 stream is reasonable because it is necessary for data accuracy and quality control. The concentration of CO_2 in the CO_2 stream can fluctuate throughout the year, and quarterly sampling and testing compared to annual sampling and testing improves EPA's understanding of these fluctuations and makes the data more representative of actual conditions. Therefore, quarterly data collection continues to be required in this final rule.

EPA notes that today's final rule does not specify a frequency at which operating pressure and temperature must be measured, although quarterly volume data must be reported in standard conditions. EPA also notes that we have amended the requirements for the flow meter location in this final rule as the result of comments received so that reporters have more flexibility on the location of the flow meter.

Comment 4.3-b:
One commenter (0797) notes that the NACCSA/Pew methodology will include potential methods to estimate the concentration of the injected CO_2 flow if the flow is measured elsewhere, such as apportioning the concentration of CO_2 transferred onsite and the concentration of recycled CO_2 to the quantities from each source.

Response 4.3-b:
EPA applauds NACCSA and Pew for working together to advance efforts for monitoring and reporting quantities of CO_2 that are geologically sequestered. Please refer to Chapter 13 of this document for EPA's responses to comments regarding this methodology.

Comment 4.3-c:
The multi-stakeholder discussion group (0799) suggests that, rather than writing in the proposed 40 CFR part 98.443 that data must be collected quarterly, EPA should write that data measurements must be made in accordance with 40 CFR part 98.444.

Response 4.3-c:
No rationale was provided by the multi-stakeholder discussion group for altering this language, and EPA has concluded that the existing language is adequate.

4.4 Best Available Monitoring Methods (BAMM)

Comment 4.4-a:
Five commenters (0805, 0806, 0807, 0810, 0816) supported the use of BAMM for a CO_2 injection facility's first tier reporting requirements. All of these commenters expressed concern over the lack of sufficient time between when the proposed subpart RR would be finalized and the date by which facilities must begin to measure data. In order to avoid having to purchase and install the equipment needed to accurately measure CO_2 in a small window of time, the commenters support using BAMM during the first reporting year.

Response 4.4-a:
EPA appreciates the commenters' shared view that BAMM be made available to reporters for "Tier 1" data through 2011. EPA is maintaining the provision in today's final action that reporters under subparts RR and UU may use BAMM for determining the mass of CO_2 received where it is not reasonably feasible to acquire, install, and operate a required piece of monitoring equipment during January 1, 2011 through March 31, 2011. Reporters may submit a request to the Administrator to use one or more BAMMs beyond March 31, 2011 but not beyond December, 31, 2011.

Comment 4.4-b:
One commenter (0816) recommends that the final rule also specify that the use of BAMM would be available beyond 2011 if the metering equipment can only be installed safely during a full process unit shutdown that may not occur before 2011.

Response 4.4-b:
When EPA established the GHG Reporting Program, EPA determined one year was a sufficient amount of time to allow BAMM to be used. This time period addresses concerns that monitoring equipment cannot be installed by January 1, 2011, while also ensuring the timely submission of more consistent and verifiable data than the alternatives. For additional background on rationale for providing a one-year BAMM period, please refer to 74 FR 56273, Section G: Summary of Comments and Responses on Initial Reporting Year and Best Available Monitoring Methods. EPA has concluded that this rationale is the same for today's final rule and that one year is adequate for reporters to meet subparts UU and RR monitoring requirements and procedures. No changes have been made in today's final action as a result of this comment.

Comment 4.4-c:
One commenter (0783) notes that facilities may not currently be monitoring the flow, temperature and pressure for all of the proposed parameters. The commenter inquires whether engineering estimates and mass balances will be acceptable in cases where the facility is not currently monitoring the flow, temperature, and pressure for all parameters, or whether facilities

may provide the best available data beyond the currently proposed BAMM timeframe of calendar year 2011.

Response 4.4-c:
Engineering estimates and mass balances are two good examples of procedures that would qualify as BAMM under subparts RR and UU for 2011. In today's final rule, BAMM will not be available to reporters after 2011. Beginning in 2012, all reporters under subparts RR and UU must follow the calculation procedures and other requirements of this rule. No changes have been made in today's final action as a result of this comment.

4.5 Standardized Methods Incorporated into the MRR

Comment 4.5-a:
One commenter (0798) supports EPA's approach of incorporating by reference a list of non-exclusive specific methods for testing CO_2 concentration while allowing any appropriate standard method to be used. This commenter advised EPA to finalize this provision as proposed.

Two commenters (0798, 0816) and the multi-stakeholder discussion group (0799) request that the EPA amend citations in 40 CFR part 98.7 paragraph (e)(39) and provide references to other standards such as GPA Standard 2261-00 – "Analysis for Natural Gas and Similar Gaseous Mixtures by Gas Chromatography" and GPA Standard 2177-03 – "Analysis of Natural Gas Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Gas Chromatography." These additional citations are applicable for ER or GS streams, and these standards are used in practice in the industry. They note that the sole standard incorporated by reference in the proposed rule (ASTM E1747-95, 2005) is only intended for quantification of impurities in CO_2 stream used for clinical or food quality supercritical fluids and is not applicable to ER or GS streams. The ASTM methodology is mostly used for compliance with FDA requirements. These three commenters also request that EPA specify that reporting entities can use more recent versions of published standards in accordance with accepted industry practices and available instrumentations and methodologies.

The multi-stakeholder discussion group (0799) recommends that the term "methods that conform to applicable chemical analytical standards" be replaced with "an appropriate standard method published by a consensus-based standards organization if such a method exists." This language is consistent with the requirements for measurement devise operation in the proposed rule.

Response 4.5-a:
EPA realizes that by citing two methods in the proposed regulatory text and incorporating one of them by reference, commenters may have been confused about the monitoring procedures and requirements for sampling and testing flow for CO_2 concentration in the proposal. In the proposal and in today's final action, the regulatory text allows for any method to be used to sample and test flow for CO_2 concentration. To relieve the source of confusion, EPA has deleted the reference to the two methods and has not incorporated either of them by reference in today's final action. Instead, the two methods along with the other methods raised in comments are outlined in the final General TSD as a useful reference for reporters. Any of these methods can

be used, as can more recent versions of these methods or any other method that meets the QA/QC requirements in today's final rule.

EPA agrees that the wording provided by the commenter is clearer than the phrase "applicable chemical analytical standards" and allows for consistency across the two subparts in this final action. Therefore, EPA has accepted the commenter's suggestion and edited the QA/QC requirements for CO_2 concentration determination so that they are identical to the other QA/QC requirements across subparts RR and UU: If you measure the concentration of any CO_2 quantity for reporting, you must measure according to one of the following. You may use an appropriate standard method published by a consensus-based standards organization if such a method exists or an industry standard practice.

4.6 Calibration of Instrumentation

Comment 4.6-a:
One commenter (0798) recommends that reporting entities should use the same calibration for preparing the calculations for this action as is used for reporting required under the applicable UIC permit.

Response 4.6-a:
The calibration requirements in today's rule are very broad and flexible. EPA has concluded that the equipment calibration requirements are consistent with standard industry practices for quality assurance and that reporters can meet the calibration requirements in today's final rule without duplicating or contradicting any effort with respect to requirements in the applicable UIC permit. EPA also notes that UIC regulations do not specifically identify methods by which or how often instruments are to be calibrated. No changes have been made in today's final action as a result of this comment.

4.7 Other - Monitoring and Sampling Requirements

Comment 4.7-a:
One commenter (0785) suggests the use of predictive emission monitoring systems (PEMS) as an alternative to continuous emission monitoring systems (CEMS). Commenter asserts that PEMS are a very cost effective and robust alternative to a CEMS and has proven itself in many 40 CFR part 60 and 40 CFR part 75 applications. The commenter requests that PEMS be written in the rule as an alternative wherever CEMS are required and provides information on the commenter's PEMS products.

Response 4.7-a:
EPA has concluded that the commenter has misunderstood the scope of this action. CEMS and PEMS are not relevant to today's final action. No changes have been made in today's final action as a result of this comment.

Comment 4.7-b:
In a section of the comment submission about flow measurement requirements, One commenter (0807) urges the EPA not to overly focus on excessive precision or measurement for the monitoring and sampling requirements. Greater precision and measurements come at high cost and is difficult to do in diverse operating conditions. The commenter requests EPA to focus mainly on ensuring that the injected volume of CO_2 remains in geological sinks for GS and remains within the 'closed system' in ER.

Response 4.7-b:
EPA has considered the information provided in this comment carefully. EPA has concluded that the monitoring and sampling requirements for flow measurement in this final action are not excessive and do not require perfect precision. Please see response 4.2-d for a more thorough discussion of this point. Today's final action is a data collection effort – not a permitting or regulatory program. EPA is therefore focused on collecting data to inform future climate change policy. EPA has designed this rule so that facilities can comply with the reporting requirements without disrupting or delaying normal operations.

Comment 4.7-c:
The multi-stakeholder discussion group (0799) requests clarification about whether the CO_2 concentration in flow that needs to be reported for an injection flow meter (see the proposed 40 CFR part 98.446(b)(2)) is an effort to prescribe the point at which the concentration is determined. The commenter requests that the concentration reported in proposed 40 CFR part 98.446(b)(2) be the concentration determined pursuant to proposed 40 CFR part 98.444(a)(6) or (b)(4).

Response 4.7-c:
EPA confirms that the data proposed for reporting under 40 CFR part 98.446(b)(2) and finalized for reporting under 40 CFR part 98.446(c)(2) must be determined pursuant to the location requirements in proposed 40 CFR part 98.444(a)(6) and 40 CFR part 98.444(b)(3). No changes have been made in today's final action as a result of this comment.

Comment 4.7-d:
The multi-stakeholder discussion group (0799) understands the term "produced CO_2" to be the CO_2 that is separated out of an oil or gas stream for recycle or for an end use as CO_2. The commenter does not understand this term to mean the CO_2 that may remain in any oil, gas, or other stream sent off site for end use.

Response 4.7-d:
The term "CO_2 produced" means the quantity of CO_2 that is produced from oil or gas production wells or from other fluid production wells. This includes the CO_2 that is separated from the fluid with gas and the CO_2 that remains with the fluid after separation. Please see the final General TSD for more background on this. Equations RR-7 through RR-9 should be used to calculate this quantity. No changes have been made in today's final action as a result of this comment.

Comment 4.7-e:
Two commenters (0803, 0805) and the multi-stakeholder discussion group (0799) suggest that the regulatory text in 40 CFR part 98.444(d), "All flow meters must be operated continuously," be modified. The commenters argue that the rule should recognize the need to allow for malfunctions, maintenance and calibration, if no flow is occurring, and if the flow meter is primary and a redundant flow meter is still operating or if the flow meter is redundant and the primary meter is still operating.

The multi-stakeholder discussion group (0799) suggests the requirement be modified to read, "All flow meters must be operated continuously except as necessary for maintenance and calibration." Another commenter (0803) suggests the requirement be modified to read, "Flow must be measured continuously."

Response 4.7-e:
EPA concurs that flow meters that are designed for continuous operation do not always run continuously because of maintenance, calibration, or malfunctions. In today's final rule, EPA has accepted the commenter's recommendation and requires that all flow meters must be operated continuously except as necessary for maintenance and calibration.

Comment 4.7-f:
The multi-stakeholder discussion group (0799) and one commenter (0817-2) emphasizes the importance of providing consistent terminology throughout this action in order to avoid confusion. To accomplish this, the group provided specific edits to regulatory text in 40 CFR part 98.443, 444, and 446, and the other commenter provided specific edits to regulatory text in 40 CFR part 98.442, 443, 444, 445, and 446.

First, the commenters have the same recommendation for two issues. Both the group and the other commenter recommend that the terms "transferred," "transferred to the facility from offsite sources," and "received onsite" be replaced with "received from sources outside the facility." Furthermore, both recommended that the term "quantity injected" be replaced with the term "mass of CO_2 injected into the subsurface" and that "quantity" be replaced with "mass."

Second, the two commenters have different recommendations for one issue. Both the group and the other commenter recommend that the terms "point of transfer" and "transfer point" be edited for clarity, but the group recommends the term "custody transfer point" while the other commenter recommends "the point of receipt."

Third, the multi-stakeholder discussion group alone also recommends the following: replace the term "by following" with "by using;" and replace "sample the injected CO_2 concentration" with "sample and determine the CO_2 concentration of the CO_2 stream injected into the subsurface."

Response 4.7-f:

EPA agrees that the rule should use consistent and meaningful terminology. First, EPA agrees that the language used in the proposed action to refer to "new" CO_2 received by a well or group of wells injecting CO_2 underground may have been confusing. In today's final action, EPA has defined a term "CO_2 received" in 40 CFR part 98.449 and 40 CFR part 98.478 which clearly explains the CO_2 stream, to which this language was meant to refer. This defined term is the only term used throughout the two subparts in today's final action to refer to the CO_2 stream, and terms such as "transferred to the facility," from offsite sources," and "onsite" have been deleted. EPA has concluded that these revisions meet the main purpose of the recommended regulatory text edits on this issue. Second, EPA is using the word "mass" in the regulatory text as appropriate but is retaining the word "quantity" when it is necessary to refer to both mass and volume, for example when referencing flow meters that could be either mass or volumetric flow meters.

Furthermore, EPA agrees with the commenter that the term "custody transfer meter" provides more clarity than "point of transfer" or "transfer point." EPA has concluded that "custody transfer meter" is clearer than "point of receipt" because it is consistent with terminology already used commonly in industry. In today's final action, the term "custody transfer meter" is used, and a reporter that receives CO_2 through a custody transfer meter may measure flow rate of CO_2 received at that meter.

Finally, the multi-stakeholder discussion group did not provide any reason that the term "by using" is preferable to "by following," so EPA did not make a change in this final rule as a result of that comment. Also, EPA understands from the multi-stakeholder discussion group's comment on sampling injectate that the proposed text was not grammatically correct because CO_2 concentration cannot be sampled. In today's final rule, EPA corrected the grammatical error in all appropriate paragraphs.

Comment 4.7-g:

One commenter (0814) notes that 40 CFR part 98.433(a)(1) requires the use of a mass flow meter at each transfer point, but acid gas emissions are calculated, rather than directly measured, using a mass-balance approach, a method which has been accepted with regulatory agencies. The commenter points out that acid gas is high in H_2S, which is highly corrosive and that flow meters for acid gas have a high rate of failure and are highly unreliable due to the corrosive environment. The commenter proposes the use of an additional monitoring methodology to calculate acid gas using the "mass-balance" approach, rather than direct measurement.

Response 4.7-g:

In today's final action, an acid gas operation can report the mass of CO_2 received under subpart UU by using the mass of CO_2 supply that it reports under subpart PP, following the subpart PP methods and requirements. Subpart PP requires reporting at no threshold, and acid gas separation and injection meets the source category definition in subpart PP, so all acid gas operations will already be using subpart PP methods to calculate and report CO_2 supply. Therefore, EPA concludes that such methods would not be necessary in subpart UU. No changes have been made in today's final action as a result of this comment.

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5 Calculation and Reporting Requirements

5.1 General "Tier 1" Reporting Requirements

Comment 5.1-a:
One commenter (0786) notes that EPA proposes that for all wells permitted by a UIC permitting authority, the well ID number used for the permit and UIC permit class number be reported. The commenter recommends that for wells that are permitted under a permitting authority other than a UIC permitting authority, the well ID number and the permit ID number be reported.

Response 5.1-a:
EPA agrees with this comment and has added the suggested reporting requirement in both subparts UU and RR in today's final action.

Comment 5.1-b:
Three commenters (0792, 0805, 0816/TRANS-VA-05) recommend that routine CO_2-ER operations report only under subpart W and not under the proposed subpart RR. Specifically, one commenter (0805) advises that EPA should not require reporting of CO_2 received under this action, as subpart W requires reporting of actual CO_2 emissions from ER and GS operations. A second commenter (0816) also requests EPA to limit reporting under subpart RR only to GS facilities and to the GS portions of those facilities that opt into CO_2-ER-GS status, while routine CO_2-ER operations should report only under the applicable subpart W provisions. One commenter (0805) asserts that reporting the amount of CO_2 received on-site would not be useful in determining how much CO_2 is emitted from ER operations (as the majority of such CO_2 is retained in the subsurface formation) or in developing a complete GHG emissions inventory. One commenter (0792) states that CO_2-ER is an enhanced oil and gas production technique in the same vein as water injection or thermal enhancement, and that emissions, if any, should be reported in association with subpart W. The commenter states that such an approach will minimize confusion since CO_2-ER is a production tool used in many basins and, when used, all field operations equipment are intermingled on site. The commenter also states that CO_2-ER-GS equipment reported under subpart W should continue to be reported only under subpart W and should not also be required to be reported under subpart RR.

Response 5.1-b:
EPA disagrees that "Tier 1" projects should not be required to report any data under this action. In today's final action, any well that injects a CO_2 stream underground must report at least the quantity of CO_2 received. EPA notes that Section 114 of the CAA allows EPA to collect data beyond direct emissions, such as quantities of GHGs. EPA is requiring reporting on quantities of CO_2 received from any well that injects a CO_2 stream underground in order to enable EPA to reconcile this information with data obtained from subpart PP of the GHG Reporting Program on CO_2 supplied to the economy. See Section 1 of this response to comments document for more detailed responses to questions of legal authority.

EPA does not agree that this source category should be defined and included in subpart W rather than in the proposed subpart RR and subpart UU. As discussed further in Response 2.3-b in this

document, the subpart RR and UU data will be most useful and meaningful to EPA if it is subject to the 40 CFR part 98.6 facility definition, which is different than the onshore petroleum and natural gas production definition in subpart W. Furthermore, although subpart W refers to the oil and gas industry, the purpose, scope, provisions, and requirements of subpart W are very different than subparts RR and UU. EPA had concluded that it is appropriate to retain subpart RR and UU and has done so in this final action.

Comment 5.1-c:

Three commenters (0805, 0792, 0816/TRANS-VA-05) oppose the requirement to report the amount of CO_2 injected. Two of the commenters (0792, 0816) assert that focusing on the amount of CO_2 injected in this action would distort the view of the CO_2 material balance within ER operations, as it is impossible to distinguish between new and recycled CO_2 after injection. The two commenters suggest that this will consequently distort emissions reporting. One commenter (0816) claims that this distorted view of CO_2 emissions will not inform proper policy decisions. Specifically, two commenters (0816, 0792) request that EPA reconsider its request for mass balance information, as the commenters are concerned about how collection of the detailed information could lead to a misunderstanding of CO_2-ER operations. The commenters request that if EPA insists on collecting injection information from CO_2-ER facilities, EPA should limit the requirement (beyond those in subpart W) for CO_2-ER projects to the amounts of CO_2 received on-site from off-site sources. One of these commenters (0816) suggests specific regulatory text changes that reflect this view. The commenter states that when determining the quantity of CO_2 that is retained in the formation as a result of the ER process, the newly sourced amount of CO_2, rather than the injection amount of CO_2, is directly related to the amount permanently trapped in the formation as a result of the ER process. The commenter states the amount of CO_2 injected is not directly related to air emissions or leakage and that information on CO_2 received is readily available to operators and could approximate the amount of CO_2 being retained in the oil and gas formation when analyzed in conjunction with subpart W emissions information. Another commenter (0805) claims that the proposed injection reporting requirements are unnecessarily and unreasonably prescriptive, especially for ER operations, as a significant amount of the injected CO_2 will later be produced, separated, and reinjected. The commenter argues that EPA should instead collect data on the amount of CO_2 received. One commenter (0792) describes the CO_2-ER process and mentions that the amount of CO_2 injected is a function of the reservoir properties and the stage of the project, and is not directly related to air emissions or leakage.

Three commenters (0806, 0807, 0810) do not support any additional "Tier 1" reporting requirements aside from those already proposed (CO_2 injected, CO_2 transferred on-site, and supply source of CO_2), and believe that these three requirements provide EPA with sufficient information to meet the stated purpose of this action. The commenters claim that additional reporting requirements would not yield useful data to EPA, and would be a burden upon the sector that could discourage development of ER and/or GS facilities.

A coalition of ENGOs (0809) agree that EPA acts reasonably in requiring all injectors to submit information sufficient to allow the Agency to comprehensively track the fate of all CO_2 supply. The coalition states that the Agency correctly recognizes that in order to determine whether or

not supplied CO_2 has been or will be released to the atmosphere, it must monitor injection points. The coalition asserts that the proposed "Tier 1" monitoring and reporting requirements allow, for the first time, the compilation and evaluation of quantitative data on the volume of CO_2 injected for ER operations. Furthermore, the coalition states that EPA presented background documents that show that this type of data acquisition effort is cost-effective and consistent with good business practices. However, the coalition claims that the "Tier 1" reporting requirements as currently proposed do not allow for sufficient and complete data collection from ER facilities since they do not require reporting of data on CO_2 at the separators. The coalition recommends that EPA retain the proposed "Tier 1" reporting requirements and add the mass/volume of CO_2 at the separators as part of the "Tier 1" reporting requirements in order to construct a more complete mass balance. The coalition claims that, in some states (where re-injected volumes are already reported by ER facilities, e.g., Texas and New Mexico), such a requirement would not pose much of an additional burden on facilities to report the net CO_2 injected based on reinjected volumes measured at the manifold.

Response 5.1-c:
In today's final action, EPA is requiring reporting under subpart UU (previously referred to as "Tier 1" facilities) of basic information on CO_2 received (a term which EPA is defining in this final action for what commenters described as "new" CO_2). EPA is not requiring reporting on total CO_2 injection or on recycled CO_2 under subpart UU. Reporting on the mass of CO_2 injected and the mass of CO_2 produced is required under subpart RR for facilities conducting GS (previously referred to as "Tier 2" facilities). Please see Section II.E of the preamble for a discussion of EPA's rationale for these decisions.

Comment 5.1-d:
One commenter (0798) requests that in the final rule, EPA clarify that once CO_2 has been taken into an ER-based operation, the process of isolating the CO_2 emissions from the atmosphere (i.e., sequestration) has commenced. The commenter asserts that once a CO_2 molecule is within an ER-based system, it will remain sequestered (even if it is repeatedly recycled within that field or at another ER site) unless there is a leak from the equipment (to be reported under subpart W), a sale to an emissive end-use (to be reported by end-use emitter), or a leak from the subsurface formation into which it had been injected. The commenter believes that this interpretation was intended as part of the various reporting rules (i.e., subpart PP, subpart C, subpart W, and this action). A second commenter (0805) similarly asserts that the vast majority CO_2 received on site at an ER site ultimately is retained in the geologic formation. A third commenter (0810) emphasizes that CO_2 injected for ER or GS is 100% sequestered and does not leak and that at ER sites, all gas volumes are in a closed system.

Two commenters (0792, 0816/TRANS-VA-05) state that they agree with EPA's statement in the preamble that CO_2-ER operations are a "closed-system" and non-emissive. One of these commenters (0792) states that EPA has acknowledged that CO_2-ER operations are closed systems and non-emissive. The commenters assert that CO_2-ER is an oil and gas production technique that falls in the same category as water injection or thermal enhancement. The other commenter (0816) suggests that CO_2-ER be viewed for what it is and its emissions (if any) be

reported in association with oil and gas production. Both commenters state that collecting this information will not provide any emissions data.

Response 5.1-d:
EPA recognizes that the geology of an oil and gas reservoir can create a good barrier to trap CO_2 underground and that many projects in the ER industry could successfully verify and report GS with an EPA-approved MRV plan. EPA does not agree that all ER is inevitably a closed system or that the isolation of CO_2 inevitably commences when CO_2 is received by an ER operation. In order for EPA to determine that ER is a closed system that isolates CO_2 for a particular facility, that facility must demonstrate GS by following the monitoring and reporting requirements of subpart RR.

EPA notes that the only use of the term "closed-system" in the proposed package was in reference to comments received to the proposed GHG Reporting Program rulemaking in 2009. EPA did not make a statement in the preamble that we acknowledge CO_2-ER operations are a "closed-system" and non-emissive.

EPA notes that the data collected under subpart UU on CO_2 received does not represent the amount of CO_2 emitted to the atmosphere, but it does provide EPA with information on the amount of CO_2 handled by the facility and thus the amount that could be emitted to the atmosphere by the facility in the reporting year.

Comment 5.1-e:
The multi-stakeholder discussion group (0799) recommends that EPA use the phrase "part 98" instead of "this rule" in 40 CFR part 98.446.

Response 5.1-e:
EPA agrees with this comment and has replaced the term "this rule" with "this part."

Comment 5.1-f:
The multi-stakeholder discussion group (0799) recommends the following revision and insertion of new text into 40 CFR part 98.443(b):

40 CFR part 98.443(b)

> (b) A facility must report annually the mass of CO_2 injected in accordance with the procedures specified in paragraphs (b)(1) through (b)(3) of this section [**or obtain approval for an alternative reporting requirements pursuant to (b)(4) of this section**.]

40 CFR part 98.443(b)(4)

> [**(4) A facility that is required to report pursuant to this subpart but is not a GS facility may submit to EPA and obtain approval of alternative**

reporting provisions designed to provide the net mass of CO_2 injected during the year, by quantifying the mass of CO_2 produced and recycled for ER. The details of the calculations in such a plan may be claimed as confidential business information, but the total mass of CO_2 injected must be reported along with the calculated net mass of CO_2 injected.]

[NOTE: Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

The multi-stakeholder discussion group asserts that this revision would give operators the opportunity to propose an alternative approach that meets EPA's request for useful information while also allowing them to take necessary steps to protect company sensitive information. Additionally, the multi-stakeholder discussion group raises concern that the annual reporting of mass of CO_2 injected by ER operations may create a data-point that is not easily understood by the general public/media, as it will include recycled CO_2 produced with the oil and gas stream. As such, the multi-stakeholder discussion group recommends allowing ER operators to establish procedures for generating the mass of CO_2 injected (minus the mass that represents the recycled CO_2) without requiring these operators to comply with all of the reporting elements that are required for GS facilities. The multi-stakeholder discussion group suggests the above revisions that are designed to allow operators to provide additional information voluntarily, in order to improve the "contextual interpretation" of the reported mass of injected CO_2.

Response 5.1-f:
EPA is not requiring reporting in subpart UU of today's action the mass of CO_2 injected. Therefore, the commenter's concerns about the reporting provisions for providing CO_2 injection and the business confidentiality of such data are not applicable. Please see response 5.1-c for a discussion of EPA's decision on this reporting requirement.

In generally, EPA does not agree that facilities reporting under subpart UU should be allowed to obtain approval for and follow alternative reporting provisions. All of the requirements in today's final action must be followed as written by applicable facilities. EPA has determined that all reporters must follow the same procedures specified in the regulatory text so that the data can be compared across facilities. For responses to comments on CBI, please see Chapter 9.3 of this document.

Comment 5.1-g:
The multi-stakeholder discussion group (0799) seeks the opportunity to work with EPA toward the initiation of a potential study that would address use of CO_2 in ER operations from both natural and anthropogenic sources in order to determine how to design reporting provisions for ER operations that inject CO_2 but have not chosen to opt-into GS facility reporting requirements under this action. A coalition of ENGOs (0809) supports such a study but cannot support it taking the place of or being used to delay the start of "Tier 1" reporting requirements beginning in 2011.

Response 5.1-g:

EPA commends the commenter for its transparency and willingness to work cooperatively with the Agency to improve understanding of ER operations. EPA greatly values such cooperation. Whether EPA works with the commenter on a study is outside of the scope of this rulemaking and will be addressed after this rulemaking is finalized. EPA confirms that the start of today's final action will not be affected by such a study.

Comment 5.1-h:
Two commenters (0808, 0813) do not believe the EPA is justified in requiring quarterly reporting. One commenter (0808) suggests that EPA require facilities to report the mass of CO_2 transferred onsite from offsite once a year, as part of each facility's annual reporting. The commenter suggests that the facilities should have the ability to decide upon the best way to make that determination. The commenter asserts that the reporting rule should not require reporting beyond that which is currently required under source contracts and that it is not clear what purpose quarterly reporting serves. One commenter (0813) asserts that EPA has not provided a regulatory justification for requiring quarterly reporting for the purposes of the reporting rule, particularly when the proposed UIC rule would require that such data be included in semiannual reports. The commenter suggests that EPA make every effort to harmonize requirements across the UIC and reporting rules.

Response 5.1-h:
In the proposed rule, EPA did not require quarterly reporting. In the proposed rule and in today's final action, EPA requires that the collection of data be conducted quarterly and that all data be calculated and submitted annually, once a year. For a response to comments on harmonizing efforts between the UIC Class VI rule and this rule, please see Chapter 11 of this document.

Comment 5.1-i:
The multi-stakeholder discussion group (0799) suggests that EPA add two categories to the list from which a facility must report the source of the CO_2 received: "other specified natural sources" for processes under development such as capture of atmospheric CO_2; and "gasification operations."

Response 5.1-i:
In today's final rule, EPA added a category for "gasification operations" to the list from which a facility must report the source of the CO_2 received. EPA agrees with the commenter that this could be a source of CO_2. EPA did not add a category for "other specified natural sources" because EPA concluded that CO_2 captured from the atmosphere is not yet a demonstrated or developed process. EPA notes that this list can be updated in future rulemakings to address developments in technology.

Comment 5.1-j:
The multi-stakeholder discussion group (0799) notes that 40 CFR part 98.426(f) already requires suppliers to report quantities supplied to various types of destinations.

Response 5.1-j:
EPA will use data collected under today's final action in combination with data collected under subpart PP of the GHG Reporting Program (40 CFR part 98.420 through 40 CFR part 98.428 for suppliers of CO_2). Information reported by injection wells on the source of the CO_2 stream will be used in combination with information reported by CO_2 suppliers on the destinations of the CO_2 stream to better understand the quantity of CO_2 supplied to emissive and potentially non-emissive end-uses, to better monitor the growth of GS (and therefore CCS) as a GHG mitigation technology over time, and to conduct electronic verification. No changes were made to this final rule as a result of this comment.

Comment 5.1-k:
Two commenters (0788, 0805), a coalition of ENGOs (0809), and the multi-stakeholder discussion group (0799) argue that facilities should be required to report CO_2 source. A coalition of ENGOs (0809) and a multi-stakeholder discussion group (0799) assert that because source accounting is critical for accurate estimation of the amount and sources of sequestered anthropogenic CO_2, EPA should take steps to resist defaulting to an "unknown" supply category and eliminate the "unknown" category from 40 CFR part 98.446(c). The multi-stakeholder discussion group (0799) further suggests that EPA should amend the "other anthropogenic sources" category to "other specified anthropogenic sources." For cases in which it would be difficult for the injector to know the source of the CO_2 stream injected, such as when the purchased CO_2 is a mix of anthropogenic and natural CO_2 sources, a coalition of ENGOs (0809) recommends that EPA require pipelines to report so that the original source of the CO_2 can be ascertained. Another commenter (0805) asserts that simple and detailed source information ought to be available to ER operators from communication with the supplier, such as monthly invoices, and from knowledge about the pipeline that makes physical connection to their facility. As such, asking facilities to report the name of the source facility would be reasonable. One commenter (0788) opines that having reporters detail the source of injected CO_2 would allow regulators, the scientific community and the public to better understand real world CO_2 injection facility operations and that knowledge of the source could give some indication of the composition of the injectate that could be used to validate data. The commenter suggests that EPA should only allow the reporter to report "unknown" as the source of CO_2 if the reporter seeks and is granted an exemption to this requirement.

Four commenters (0812, 0816, 0808, 0813) assert that ascertaining the source of the CO_2 brought on-site should be optional and reported only if known. Two commenters (0808, 0813) emphasize that storage sites are likely to contract with pipeline companies as opposed to individual industrial sources, and thus the original CO_2 sources will be difficult to ascertain. One commenter (0812) notes that in the future, some CO_2 ER operators may purchase CO_2 from anthropogenic sources, and this CO_2 will then be delivered into a common carrier pipeline and become commingled with CO_2 sourced from underground natural sources. The CO_2 ER operator will be able to report the amount of CO_2 received but will not be able to verify its source. The commenter agrees with the proposed reporting requirements, which will be able to accommodate this issue of commingled CO_2 sourced from both anthropogenic and natural sources.

One commenter (0790) supports the inclusion of cogeneration, noting that cogeneration is more efficient than separate generation of electricity and thermal energy, and that collecting information on cogeneration can be useful for the future development of GHG emissions data and mitigation policies.

Response 5.1-k:

In today's final action, EPA is allowing reporters to report "unknown" as the source of CO_2 if they do not know the source because EPA agrees with commenters that it may be impossible for an end-user of CO_2 to identify the origin of each CO_2 molecule used. EPA notes that if a reporter is aware of the source, due to the transfer arrangement or payment contract for example, the reporter must choose from the other categories in the list of sources in order to comply with this final rule. Likewise, EPA is allowing reporters to report under the category "other anthropogenic sources" because it may be impossible for an end-user of CO_2 to identify the origin of each CO_2 molecule used. EPA will provide space in the data system for this category for reporters to write the type of anthropogenic source if it is known. Furthermore, today's final action is not an accounting protocol meant to track each molecule of CO_2 from source to end-use. EPA included this reporting requirement in the proposed action and in subpart PP to better understand which industries receive CO_2 supply and generally how much in order to track industry trends and inform future industry-specific climate policy.

EPA disagrees with the comment that pipelines should be added as reporters in today's final action. EPA will propose new rulemakings in the future to add new source categories, such as pipelines, when and if EPA determines that such source categories are necessary to inform potential climate change policy. See Section 14 of this document for a comment response on reporting from pipelines.

Comment 5.1-l:

One commenter (0788) observes that the assumption that a CO_2 injection well would not know the source of CO_2 is reflective of an implicit view of how CCS will be deployed on a commercial basis in the US. More specifically, the commenter observes that some phrases in the proposed action suggest that EPA is basing its expectations of how CCS will deploy on CO_2 ER practices in West Texas, and that it is not clear that this particular system architecture will be replicated for CCS.

Response 5.1-l:

Today's final action has been written so that it can be applied to projects in operation today. EPA notes that reporters of some injection wells today do not know the source of every molecule of CO_2 received. As a result, in today's final action, EPA continued to allow reporters to report "unknown" as the source of CO_2 if they do not know the source. EPA is prepared to amend the features and provisions of this final action to adapt to industry developments in the future as needed.

5.2 General "Tier 2" Reporting Requirements (Subpart RR)

Comment 5.2-a:
The multi-stakeholder discussion group (0799) suggests that in proposed 40 CFR part 98.442(c) and 40 CFR part 98.446(f), the language used by EPA should refer to 'leakage' rather than 'leaks' to be consistent with the definitions provided in the rule (i.e., 40 CFR part 98.449). The multi-stakeholder discussion group further suggests that the term "subsurface geologic formation" be pluralized and that the term "leakage pathways" be amended to mean those that are "separately distinguishable."

Response 5.2-a:
EPA agrees that terms defined in 40 CFR part 98.449 and 40 CFR part 98.478 should be used throughout the regulatory language for consistency and clarity. In today's final action, EPA has defined the term "surface leakage" in 40 CFR part 98.449 and has used the term throughout subpart RR. EPA has implemented the suggestion in today's final rule to pluralized "subsurface geologic formation" in the regulatory text where appropriate. EPA has not used the term "separately distinguishable leakage pathways" because it is clear that the leakage pathways distinguished in the MRV plan are the ones for which data must be reported.

Comment 5.2-b:
Two commenters (0798, 0816) and the multi-stakeholder discussion group (0799) assert that with ER projects there are times when the amount of CO_2 produced is larger than the amount of CO_2 injected. This situation may happen in cases when CO_2 that is injected at one time is produced at a later time (longer than a year) when there is no injection. Therefore, Equation RR-11 (the mass-balance equation to calculate GS) would result in a negative number even though there is no real loss of CO_2 or emissions from the facility. One commenter (0798) further opines that Equation RR-11 does not accurately account for the sale and transfer of CO_2 from one ER site to another and that the amount of CO_2 reported as sequestered in that year by the second ER project will be over-counted. One commenter (0798) and the multi-stakeholder discussion group (0799) requests EPA to consider this possibility and address this issue in the preamble and in any published material that includes data by ER facilities. Because of the dynamic nature of ER projects and their concern over reporting negative annual mass sequestered, the multi-stakeholder discussion group (0799) provides specific regulatory text to add to 40 CFR part 98.442 so that the cumulative mass of CO_2 sequestered is listed as a GHG to report. The third commenter (0816) expresses concern that reporting of negative annual sequestered masses could be incorrectly interpreted as a failure of the storage capabilities of the reservoir and therefore also suggests that EPA request the reporting of cumulative mass of CO_2 sequestered in ER projects after they become subject to reporting under the proposed subpart RR. EPA is not including a discussion of this in the preamble to today's action because it is sufficient to provide the requested clarity in this response to comments document and in data publication.

Response 5.2-b:
EPA agrees that the snapshot of data in the annual report may not be reflective of the activity conducted over the lifetime of the project. EPA acknowledges that the quantity of CO_2 reported as geologically sequestered under subpart RR in one year may be negative in some cases and agrees with comments that this does not always indicate project failure or leakage. EPA also acknowledges that the quantity of CO_2 reported as sequestered in one year may not reflect the

total amount of CO_2 sequestered over the life of the project if most of that CO_2 is produced and transferred to another site in the following year. EPA contends that the summation of the quantities of CO_2 reported as sequestered in all years will ultimately be an accurate reflection of the total CO_2 actually sequestered even under situations of CO_2 sale and transfer. EPA is therefore including a reporting requirement in today's rule on cumulative mass of CO_2 sequestration and is committing to publish and distribute all GS data carefully and accurately.

In the proposed rule, EPA included cumulative mass of CO_2 sequestered as a reporting requirement under 40 CFR part 98.446 but worded it slightly differently than recommended by the commenter. EPA made an oversight and did not also include cumulative mass of CO_2 sequestered under 40 CFR part 98.442. In today's final action, EPA has remedied the oversight and added the item as worded in the commenter's recommendation to the list of GHGs to report under 40 CFR part 98.442. EPA is retaining the reporting requirement in 40 CFR part 98.446 but has reworded it as recommended by the commenter so that it is clear and consistent across the rule.

Comment 5.2-c:
The multi-stakeholder discussion group (0799) suggests a revision to 40 CFR part 98.443(c)(4)(i) to include circumstances where a GS facility is producing oil or natural gas incidentally without engaging in the business of ER. The multi-stakeholder discussion group mentions that such wells would fall under the category of UIC Class II(b)(5) that was recommended in comments submitted to EPA under the UIC Class VI proposal.[4]

> (i) GS facilities that are conducting enhanced recovery operations and [**GS facilities**] that are actively producing oil or natural gas must calculate the annual mass of CO_2 that is sequestered in the underground subsurface formation in the reporting year in accordance with the procedure specified in Equation RR-11 of this section.

[NOTE: Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

Response 5.2-c:
In today's final action, EPA has deleted the words "that are conducting ER operations and" from the explanation to equation RR-11 rather than add the phrase "GS facilities" as recommended by the commenter. EPA has concluded that this averts any possible confusion or ambiguity which was the main concern of the comment.

Comment 5.2-d
One commenter (0788) is not aware of there being much literature on the amount of CO_2 that might remain in the oil produced from CO_2-based ER. The commenter recommends that EPA investigate further whether there are robust industrial best practices that would rigorously account for CO_2 produced with oil and gas from CO_2-based enhanced recovery methods. The

[4] Multi-stakeholder discussion group comments can be found under docket ID EPA-HQ-OAR-2009-0926-0799.

commenter provides a reference that might be of interest in this regard: "Greenhouse Gas Emission Reduction Verification for Anadarko's Monell Enhanced Oil Recovery (EOR) Project." FINAL REPORT Audit Date: March 3, 2009. Report prepared by: Duncan Rotherham, Nathan Muegge, P.Eng., Zachary Schaffer ICF International 277 Wellington St. West, Suite 808,Toronto, Ontario. M5V 3E4.

Response 5.2-d:

EPA has reviewed the reference provided by the commenter. The referenced document identifies that after the fluid separation stage, some incremental amount of CO_2 may be entrained in the produced oil and produced gas. In the document, the project owner proposes to analyze a sample of the finished oil and produced gas to quantify the amount of entrained CO_2, but no specific method for analysis is referenced. EPA has provided a discussion in the final General TSD on calculation of the amount of CO_2 that remains in the oil or fluid produced. EPA has concluded that the requirements for accounting for CO_2 produced with oil and gas in today's final rule are sufficiently rigorous. No changes have been made to this final action as the result of this comment.

Comment 5.2-e:

Two commenters (0798, 0816) and the multi-stakeholder discussion group (0799) assert that the definition of the term 'X' in Equation RR-9 is unclear; one commenter (0798) specifically concurs with the comments of the multi-stakeholder discussion group (0799). They suggest that EPA further clarify the definition of 'X," because as currently written, 'X' may be interpreted as either the CO_2 that is entering the separator or CO_2 that is exiting the separator. One commenter (0798) requests that the clarification of 'X' be made either in the preambular language or in the regulatory text. The commenters suggest that Equation RR-9 may or may not produce an accurate result depending on how 'X' is defined. One of the commenters (0798) suggests that the X be defined as the entrained volume of CO_2 in the produced (Oil and/or Gas) divided by the volume of CO_2 exiting the separator. The other commenter (0816) suggests that X be defined as "Percent of CO_2 that is expected to remain with the produced oil and gas when referenced to the CO_2 separated for recycle or end-use." The multi-stakeholder discussion group (0799) recommends adding the following language to 40 CFR part 98.443(c)(2)(iii) to define X: "The value of X must be a ratio, expressed as a percentage, of CO_2 that is expected to remain with the produced oil and gas to CO_2 separated for recycle or end-use." The group proposes a further edit to this regulatory paragraph so that a reporter may (rather than must) use a methodology in the EPA-approved MRV plan to estimate the value of X.

Response 5.2-e:

EPA understands the comments that the input "X" to equation RR-9 should be more clearly defined. In today's final action EPA has used suggestions from both commenters to define "X" as "entrained CO_2 volume or mass in produced oil or other fluid divided by the CO_2 separated through all separators in the reporting year (weight percent CO_2, expressed as a decimal fraction)." Furthermore, EPA has retained the requirement that a reporter use a methodology in the EPA-approved MRV plan to estimate X. The commenter provided no rationale for replacing the word "must" with "may." In the proposal, EPA concluded that the quantity of CO_2 that remains in the produced fluid would be appropriate for a reporter to determine on a site by site

basis given potential variability across the industry, for example with oil and gas processing infrastructure configurations. EPA further concluded in the proposal that it would be best for quality assurance for such a site by site approach to be reviewed and approved by EPA as part of the MRV plan. Those conclusions hold for today's final action.

Comment 5.2-f:
The multi-stakeholder discussion group (0799) asserts that the language used by EPA for reporting the annual mass of CO_2 emitted from each leakage pathway is too limiting because leakage pathways are not discrete. The commenter suggests that proposed 40 CFR part 98.443(c)(3) be revised as follows:

> (3) You must report the annual mass of CO_2 that is emitted ~~from each~~ [**by**] leakage ~~pathway identified~~ in [**accordance with**] your MRV plan. You must calculate the total annual mass of CO_2 emitted from all leakage pathways at the facility in accordance with the procedure specified in Equation RR-10 of this section.

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

Response 5.2-f:
EPA has adopted the edit recommended by this comment in 40 CFR part 98.443(e) of today's final action. However, EPA retains the requirement that the reporter must identify and evaluate all potential leakage pathways to inform the development of a site-specific leakage detection and quantification strategy. Please refer to Chapter 6 for responses to comments on MRV plan requirements.

Comment 5.2-g:
One commenter (0788) asserts that the use of the pronoun "you" is confusing in the reporting requirement listed in proposed 40 CFR part 98.446(f)(14) because "you" is subject to interpretation. Such language might limit the reporting to only the current operator of the field, but the commenter believes that the data should be aggregated across all operators of the field over its history. The commenter recommends that EPA edit the language and provide a more explicit definition of the reporting period.

Response 5.2-g:
EPA understands the comment that the pronoun "you" may be confusing in this particular context. In today's final rule, EPA has clarified that to comply with the reporting requirement listed in 40 CFR part 98.446(e)(10) (the same paragraph as proposed 40 CFR part 98.446(f)(14)), the cumulative mass of CO_2 sequestered must be reported for all years since the well or group of wells became subject to reporting requirements under subpart RR. As a result, if CO_2 is reported by a group of wells as sequestered under subpart RR, the quantity should be accounted for in the cumulative total of CO_2 sequestered even if the group of wells changes ownership.

5.3 Vented and Fugitive Emissions and Mass-Balance Equation for GS

Comment 5.3-a:

One commenter (0811) believes that the accounting of CO_2 on a mass-balance basis is appropriate. One commenter (0805) states that a mass balance equation in which fugitive and vented emissions are subtracted from the quantity of CO_2 received is appropriate for calculating, or at least, validating GS. Four commenters (0797, 0808, 0813, 0800) state that approximating the amount of CO_2 sequestered based on the amount injected is a more valid approach to reporting emissions from storage facilities than what was proposed. One of these commenters (0800) states that a formulaic-based approach accounting for CO_2 injected and stored may not be appropriate. The other three (0797, 0808, 0813) suggest that facilities should report tons sequestered based on existing data, and one commenter (0797) offers two reasons: (i) there should be no potential leakage of CO_2 from the subsurface, and (ii) emissions from subsurface equipment should be minimal and not germane to GS as a mitigation technique.

The three commenters suggest EPA should impose an additional requirement that facilities report excess CO_2 air emissions from surface facilities above a threshold. They believe this threshold would only be triggered in the case of process upset or malfunction, rather than in the ordinary course of business. One commenter (0797) advocates including fugitive emissions in the mass balance if the emissions are from sources that affect the mass balance equations. The commenter further suggests that if subpart RR is focused on emissions from surface facilities at GS sites, then it should be renamed to reflect that focus.

Two commenters (0808, 0813) state that a mass balance approach is more appropriate than a formulaic based approach for CCS reporting, to the extent that it suggests a molecule by molecule standard of perfection that is simply not appropriate for CCS. One of these commenters (0808) further states that the "Tier 2" data elements are too prescriptive to the extent that the rule is intended to flesh out reporting on air emissions of CO_2 and of CO_2 sequestered at GS facilities. The commenter suggests only requiring reporting on those two elements and not requiring monitoring and reporting of inconsequential leakage from the injection system.

The rejection of the proposed mass balance equation by these commenters is based in some part on the perspective that a well-sited, well-managed GS project will not result in emissions from subsurface leakage and should not include an input in its GS mass balance equation for emissions from surface leakage. Two commenters (0813, 0815) elaborate that EPA does not treat projects with this perspective, resulting in an imbalance between the value of reporting de minimis emissions and the burden of monitoring, collecting, and reporting this data. According to one commenter (0813), EPA has not designed a reporting system that advances public acceptance of CCS as a climate mitigation technology and that is grounded in the minimal actual risk of air emissions from GS projects, and EPA has missed the opportunity to recognize that de minimis emissions do not undercut the efficacy of GS and ultimately is treating GS projects like an anticipated major source of emissions. One commenter (0797) echoes this concern about public confidence, stating that "it would be unfortunate if public confidence in CCS were undermined because a GS site reported CO_2 emissions to the atmosphere of 100 pounds in Year 1 due to a leaking valve seal at a surface recycle facility when that same facility in Year 1

successfully injected and securely stored 10 million tons of CO_2." A third commenter (0811) takes the opposite view, stating that public trust will not be sustainable over the long term without comprehensive and transparent reporting such as the approach proposed by EPA.

Response 5.3-a:
In today's final action, a facility subject to subpart RR must calculate the quantity of CO_2 geologically sequestered using a mass balance equation that takes into account CO_2 injected, CO_2 emitted from subsurface leakage (if any), CO_2 produced (if any), and fugitive or vented emissions from surface equipment (if any) located between the flow meter(s) and the wellhead(s). EPA has concluded that a full mass balance is required to calculate and verify the quantity of CO_2 geologically sequestered. The quantity of CO_2 received is not adequate to calculate this number.

EPA agrees that well-sited, well-operated GS projects with effective trapping mechanisms are at a low risk of having CO_2 emitted by surface leakage. EPA has concluded that today's final action will strengthen public confidence in CCS by providing data transparency, availability, and uniformity and by allowing GS project reporters to demonstrate the degree of monitoring that is in place to keep the public and the environment safe. EPA has concluded that emissions from surface equipment and any surface leakage must be accounted for in the GS mass balance equation for accuracy and completeness. This rule allows reporters to report information to EPA and to the public in a transparent and credible way.

Comment 5.3-b:
One commenter (0802) suggests that for ER projects in which the EPA requires reporting of "produced CO_2," EPA should require reporting of the volume of CO_2 that is separated from produced oil and gas and then recycled by the facility separately from reporting of the releases of CO_2 to the atmosphere (equipment leaks, venting, and subsurface leaks) and from reporting of CO_2 in products (CO_2 remaining entrained or dissolved in oil and gas produced from the site). The commenter is concerned about the distinction between CO_2 separated from produced oil and gas and recycled by the facility because there are a number of existing financial incentives for CO_2 or GHG capture and sequestration that require a minimum level of CO_2 containment, and future legislation or regulations may also define sequestration by referencing the effectiveness of GS.

Response 5.3-b:
EPA understands the commenter's assertion that it may be desirable for users of this data to evaluate these components of the GS mass balance equation separately. In today's final action, EPA has required that these components be reported separately.

Comment 5.3-c:
One commenter (0802) suggests that EPA's approach to "produced CO_2" is an appropriate correction to the calculation of how much new CO_2 is sequestered at a facility in a given year. A coalition of ENGOs (0809) believes that the requirement to report the quantity of CO_2 produced with oil or gas, and the amount of CO_2 that remains in the oil or gas after separation will help

EPA to develop a better understanding of the amount of CO_2 that remains sequestered in ER projects.

One commenter (0802) believes it would give a misleading impression of the effectiveness of sequestration at that facility. The commenter (0802) notes that the fate of re-injected CO_2 that remains sequestered after re-injection is no different from that of CO_2 that is injected and never comes to the surface in the first instance. The ability to sequester a large percentage of CO_2 via an ER operation depends on the physical and geological fact that a high and fairly constant fraction of injected CO_2 – and re-injected CO_2 – ultimately remains sequestered underground. The commenter is concerned because EPA proposed calculation would not reveal this fact.

Response 5.3-c:
EPA agrees with comments that the quantity of CO_2 produced with oil and gas or with other fluids, including the CO_2 that remains in the oil or fluid after separation, is a critical component of the mass balance equation to calculate geologically sequestered CO_2. EPA agrees with the commenter that produced CO_2 is usually re-injected into the formation and can be retained in the subsurface. EPA has concluded that the approach to calculating GS in today's final action properly accounts for such a situation.

Comment 5.3-d:
A coalition of ENGOs (0809) and the multi-stakeholder discussion group (0799) state that in developing the "Tier 2" reporting requirements contained in 40 CFR part 98.443(c)(4)(ii) for GS facilities in saline formations that are not actively producing oil or natural gas, EPA has inadvertently overlooked the situation that might result when such injectors are producing fluids from the injection zone, in order to manage the extent of the plume or create more efficient storage. The multi-stakeholder discussion group (0799) recommends adding a paragraph to 40 CFR part 98.443(c)(4)(iii) to capture any data on produced CO_2 under such circumstances. A coalition of ENGOs (0809) suggests that Equations RR-7 through RR-11 apply rather than Equation RR-12.

Response 5.3-d:
EPA agrees with the comments that CO_2 from any produced fluids must be accounted for in the GS mass balance equation. As a result of these comments, EPA is requiring a GS facility in saline formations that is not actively producing oil or natural gas but is producing fluids (e.g. brine) to use Equation RR-11 rather than RR-12 so that CO_2 produced with fluids is accounted for.

Comment 5.3-e:
Five commenters (0790, 0797, 0803, 0808, 0813) generally disagree with requiring reporting of the mass of fugitive and vented CO_2 emissions from surface equipment and think that EPA should scale back or eliminate such proposed requirements in subpart RR. The commenters argue that emissions from surface equipment will be minute, inconsequential, and statistically meaningless. For two commenters in particular (0808, 0813), it is not clear why EPA needs "granular level" data on fugitive emissions from GS facilities. Three commenters (0808, 0803,

0813) believe that detecting minute levels of emissions from surface equipment will be difficult if not impossible, and two of these commenters (0808, 0813) cite background CO_2 levels. The third commenter (0803) states that any measurement or calculation of immaterial emission sources upstream of the injection pump is unnecessary. Three commenters (0808, 0797, 0813) disagree with EPA's proposed rationale that fugitive and vented emissions from surface equipment are an indicator of the effectiveness of GS as a GHG mitigation technology, and two of them (0797, 0813) believe that the public release of such data would not be good public policy. Two commenters (0813, 0808) state that only minute levels of CO_2 emissions from surface facilities are likely to occur from a well-selected and well-managed site. One commenter (0794) asserts that the risks of major air emissions from CCS projects are slight and suggests that EPA should approach this action with the assumption that any de minimis emissions that occur would be outweighed by the hundreds of millions of tons of CO_2 that commercial-sized CCS projects would sequester each year. One commenter (0797) asserts that EPA's motivation for fugitive and vented emissions reporting provision appears to be premised on information that it will be "helpful to have." The commenter opposes this motivation, arguing that emissions reporting should be required when non-trivial levels of emissions are expected and they are concerned that the public acceptance of CCS may be undermined by the occasional failure of equipment that leads to fugitive emissions. One commenter (0813) argues that EPA should recognize that minimal fugitive emissions do not undercut the value or efficiency of storage as a climate mitigation tool.

One commenter (0808) argues that while flange level leak reporting is proposed for natural gas storage facilities under the separate subpart W proposal, the natural gas and CCS industries are different. The commenter describes that natural gas storage is temporary, it has relatively high volumes of seasonal-based inflows and outflows, it typically occurs in shallower geologic formations, methane is easier to monitor than CO_2, and it poses greater environmental hazards than CO_2 as it is a more potent GHG.

On the other end of the spectrum, a coalition of ENGOs (0809) asserts that if an ER project wishes to be considered as GS and potentially gain credit for permanent sequestration of CO_2 under a future regulatory program, it is appropriate that the facility must also report fugitive and vented CO_2 emissions from surface components.

Response 5.3-e:

In today's final action, EPA is requiring reporting under subpart RR of fugitive and vented emissions with respect to equipment located on the surface between the flow meter used to measure injection quantity and the injection wellhead and between the production wellhead and the flow meter used to measure production quantity. EPA has eliminated from this final rule the proposed provision that all GS projects report facility level vented and fugitive CO_2 emissions from surface equipment irrespective of the GS mass balance equation. EPA notes that a GS project with no fluid or gas production and with a flow meter at the injection wellhead(s) need not include any fugitive or vented CO_2 emissions from surface equipment in its GS mass balance equation or in its annual GHG report (for subpart RR).

EPA agrees with comments that fugitive and vented emissions from surface equipment do not provide adequate indication of the efficacy of a subsurface geologic formation to permanently

sequester CO_2 and mitigate climate change. Furthermore, EPA emphasizes that an objective for collecting data under subpart RR is to collect data on the quantity of CO_2 geologically sequestered and recognizes that facility-wide data on fugitive and vented emissions do not contribute towards meeting this objective. For these reasons, and as a result of comments received, EPA has eliminated from this final rule the proposed provision that all GS projects report facility level vented and fugitive CO_2 emissions from surface equipment irrespective of the GS mass balance equation.

After careful consideration of all comments received, EPA has concluded that the GS mass balance equation must account for fugitive and vented emissions from surface equipment where necessary to ensure data uniformity, accuracy, and completeness of the GS mass balance equation. To accomplish this, EPA could have required that all flow meters measuring injection be placed on the injection wellhead(s), but EPA decided against this in order to provide flexibility to reporters and as a result of numerous public comments on the issue of flow meter placement (see Section 4.1). In today's final action, a reporter has flexibility in the placement of injection-side flow meter(s) but must account for any fugitive or vented emissions from surface equipment between the flow meter(s) and the wellhead(s) in the GS mass balance equation if applicable so that all reporters are reporting the same data. The Agency considered the burden and the feasibility of determining such emissions when we proposed this reporting requirement. We concluded that the burden would be very low because subpart W provides methods that rely on simply engineering estimates or equipment count times emission factor for almost all potential equipment. Only vented emissions from reciprocating compressor rods and packing and centrifugal compressor wet seals would need to be measured directly at the vent stack once a year. (EPA has included a discussion of these components and of the methods to determine their fugitive and vented emissions in the final General TSD.) Given the straightforward nature of these methods and the extensive guidance on them offered in subpart W material, EPA does not consider the requirements in the final rule to be difficult to meet. By limiting the requirement to report fugitive and vented emission only where this input affects the GS mass balance equation, we have addressed the comment that the collection of such data would be meaningless. Again, EPA notes that a GS project with no fluid or gas production and with a flow meter at the injection wellhead(s) need not include any fugitive or vented CO_2 emissions from surface equipment in its GS mass balance equation or in its annual GHG report (for subpart RR).

Comment 5.3-f:

Three commenters (0790, 0797, 0813) oppose EPA's proposed reporting requirement of fugitive and vented CO_2 based on the argument that the CO_2 molecule is not a hazardous air pollutant (HAP), and that requiring such flange-level leak reporting would unwarrantedly shift the CO_2 molecule into a HAP-like category. In particular, one commenter (0790) opines that a fugitive CO_2 monitoring system would require a program modeled after the Part 60 National Emissions Standards for Hazardous Air Pollutants (NESHAP) Leak Detection and Repair (LDAR) regulations, but that the lack of toxicity of CO_2 – barring the safety issue of asphyxiation – makes an LDAR-style monitoring program unwarranted. The commenter notes that fugitive CO_2 monitoring is unnecessarily burdensome when leak rates from fugitive leaks (on the order of tens of pounds per hour) are compared to injection rates (hundreds of thousands of pounds per hour). Furthermore, one commenter (0813) asserts that shifting the CO_2 molecule into a HAP-like

category would be unwarranted as a matter of public health and safety, and that such a shift could mislead the public by undermining the environmental and public health benefits that CCS is intended to provide.

Response 5.3-f:
EPA disagrees with comments that the requirements in this rule shift the CO_2 molecule into a HAP-like category. In order for reporters to comply with the fugitive and vented emissions monitoring and reporting requirements in this rule, reporters will need to follow straightforward methods provided in subpart W regulatory text and explained in the final General TSD to this rule and in similar subpart W materials. These methods rely on engineering estimates or equipment count times emission factor for almost all potential equipment; only vented emissions from reciprocating compressor rods and packing and centrifugal compressor wet seals would need to be measured directly at the vent stack once a year. EPA notes that a GS project with no fluid or gas production and with a flow meter at the injection wellhead(s) need not include any fugitive or vented CO_2 emissions from surface equipment in its GS mass balance equation or in its annual GHG report (for subpart RR). Furthermore, EPA also notes that the GHG Reporting Program does not prescribe emissions standards or repair regulations; the Agency is collecting data under this action as part of the GHG Reporting Program to inform potential future climate change policy. Finally, EPA has concluded that today's final action will strengthen public confidence in CCS by providing data transparency, availability, and uniformity.

Comment 5.3-g:
One commenter (0810) asserts that in the context of 40 CFR part 98.442(c)(4), the phrase "if not reported under subpart W" is not meaningful since GS is not a covered source under subpart W.

Response 5.3-g:
A GS project that produces oil or natural gas is covered by subpart W if it meets the subpart W threshold. Subparts W and RR are not mutually exclusive. Subpart W has been finalized in a different action from this one, so please refer to that rulemaking for further information on applicability to subpart W.

The phrase to which the commenter refers was part of the facility-wide fugitive and vented emissions reporting requirement proposed under this action. EPA has eliminated this facility-wide reporting requirement from today's final action and has deleted the specific phrase from the regulatory text since it no longer has any context. See Section II.E of the preamble for a full discussion of the rationale for eliminating this reporting requirement.

Comment 5.3-h:
The multi-stakeholder discussion group (0799) recommends revising the 40 CFR part 98.443(c) to read "the mass of CO_2 emitted by leakage" rather than "the mass of CO_2 emitted from subsurface leakage," since "leakage" is the defined term.

Response 5.3-h:

The paragraph to which this comment refers has been deleted in today's final action. EPA has applied the term "CO_2 emitted by surface leakage" consistently throughout the regulatory text to maximize clarity.

Comment 5.3-i:
Three commenters (0806, 0807, 0810) support EPA's proposal not to require CO_2 injection facilities to report fugitive and vented emissions under this action, claiming that such a requirement would increase the burden on CO_2-ER facilities and result in double-counting of emissions (and diluting the accuracy) of the data reported under EPA's GHG reporting program. One commenter (0816) requests that EPA set a clear differentiation between reporting of vented and fugitive emissions from component leaks at GS and non-GS facilities, and recommends that, for CO_2-ER operations, EPA state that fugitive emissions would be reported under subpart W provisions with no additional reporting requirements applicable for non-GS facilities.

One commenter (0788) asserts that it is acceptable to exempt "Tier 1" facilities from reporting fugitive emissions and vented CO_2 if there is an underlying assumption that all CO_2 that is injected that is not within the articulated reporting requirements for GS is assumed to be vented. The commenter suggests that EPA clarify that this difference between "Tier 1" and "Tier 2" reporting requirements and other such differences mean that a group of injection wells cannot retroactively account for previous years of injection as GS under the GHG Reporting Program.

Response 5.3-i:
In today's final action, subpart UU does not contain any emissions reporting requirements. EPA agrees with comments that it would not be meaningful or valuable for EPA to collect data on fugitive or vented CO_2 emissions under subpart UU given EPA's rationale behind subpart UU. As further explained in Section II.B of the preamble in today's final action, EPA is making clear in this action that the quantity of CO_2 geologically sequestered can only be verified and reported to EPA by developing and implementing an EPA-approved MRV plan and reporting GS under subpart RR.

5.4 Other

Comment 5.4-a:
One commenter (0788) encourages EPA to require a reporter to include in the MRV plan a monitoring strategy to detect and quantify potential CH_4 leakage. The commenter asserts that if there is reason to believe that an important GHG (such as methane) could leak as a result of GS, monitoring requirements for those emissions should be mandatory.

One commenter (0816) supports EPA's approach of focusing efforts on quantifying and reporting CO_2 only under this action. Additionally, the commenter notes that for GS facilities that show no evidence of CO_2 leakage, it should similarly be presumed that there is no leakage of methane.

Response 5.4-a:

In today's final action, facilities covered by subpart RR are not required to monitor for CH_4 emissions from surface leakage. EPA agrees with the comment that the Agency should focus subpart RR efforts on quantifying and reporting the mass of CO_2 that is geologically sequestered. EPA notes that MRV plan requirements can be updated in future rulemakings if and when EPA determines that CH_4 emissions from surface leakage should be added as subpart RR requirements.

Comment 5.4-b:

One commenter (0791) and a coalition of ENGOs (0809) mention the schedule for data collection and reporting. One commenter (0791) mentions that the proposed submission deadline conflicts with other reporting requirements (e.g. SARA Title III, Title II reports) and requests EPA change the reporting date from March 31 to July 1 to allow industry (especially small businesses) time to adequately address all their reporting requirements. The commenter also recommends that the data collection begin no earlier than 2012, with the first reports due in 2013, because of the burdensome and costly proposed requirements. On the other hand, a coalition of ENGOs (0809) supports the January 2011 start date for ER and GS facility monitoring and reporting requirements because information will help inform the degree to which GS can be considered a GHG control.

Response 5.4-b:

When EPA established the GHG Reporting Program in 2009 (74 CFR 56260, October 30, 2009), it was determined that the reporting deadline of March 31 allows a sufficient amount of time for compiling, reviewing, certifying, and submitting annual GHG reports. The March deadline will ensure timely collection of the data necessary to inform decisions regarding future GHG policy and program development. EPA did not revisit that decision in this action, and EPA concluded that, in order to maintain consistency, it is important for subpart RR to be subject to the same reporting standards as the rest of the rule. Therefore, EPA does not concur with these comments and has not revised the annual submissions deadline in this final action.

In regards to the initial reporting year, EPA carefully reviewed input from all commenters with the goal of balancing the urgent need for data against the legitimate concerns raised regarding timing, and determined that data collection for calendar year 2011 is a priority. Today's final action will take effect on December 31, 2011, and facilities covered by subpart RR or UU must begin monitoring and collecting data on CO_2 received for their annual GHG reports on January 1, 2011. EPA notes that facilities covered by subpart RR and that were issued a final UIC permit authorizing the injection of CO_2 into the subsurface on or before December 31, 2010 must submit a proposed MRV plan or R&D exemption information to EPA by June 30, 2011 (plus up to an additional 180 days extension if requested). EPA has concluded that this timeline is reasonable because the initial data element to be monitored and collected (CO_2 received) is already being monitored and collected by most facilities with injection wells. Furthermore, EPA agrees with the comment that it will be useful for EPA to receive and publish data as soon as possible to help inform climate change policy.

Comment 5.4-c:

One commenter (0788) commends the EPA for allowing the use of electronic reporting and states that it will ease the burden associated with mandatory reporting and help reduce redundancies. The commenter encourages EPA to explore best practices for electronic reporting and analysis tools that might allow key pieces of information to be used to meet multiple regulatory needs. The commenter explains that the use of electronic reporting tools under this rule and the UIC Class VI rule is an important way to reduce redundancies and lessen the reporting burden.

Response 5.4-c:

When EPA established the GHG Reporting Program in 2009, EPA determined that data should be provided to EPA electronically to reduce the burden on the reporters and EPA, and to increase the accuracy of the reported emissions. EPA plans to follow well-known design practices within the constraints of security, accessibility and Agency design requirements, and the electronic data reporting system will be designed to be "user friendly" and allow data reporters to be able to confirm that their data were accepted by the system and to compare the data in the system to the data that they reported to ensure it was accurately incorporated into the database. For additional background on the electronic data reporting system, please see the Preamble of the Final Rule for Mandatory Reporting of Greenhouse Gases (October 2009). EPA did not revisit that decision in this action, so all subparts of the GHG Reporting Program continue to be subject to the electronic data submittal system addressed in Section V.B.3 of the preamble to the final part 98 rule establishing the GHG Reporting Program (74 FR 56358, October 30, 2009). EPA has concluded that it is important for consistency that subparts RR is subject to the same electronic reporting standards as the rest of the rule. Therefore, EPA does not concur with the commenter and has not revised the use of electronic reporting in this final action.

Comment 5.4-d:

A coalition of ENGOs (0809) argues that quarterly data collection and annual reporting from GS projects does not allow for immediate reporting of leakage. The coalition of ENGOs notes that airside leakage signals a serious problem with geologic containment, and it is critical that leakage be detected and communicated as early as possible. The commenter suggests that this would be difficult if the balance between injected, sequestered, fugitive and vented emissions is not reported for months after the leakage incident begins. The coalition of ENGOs suggests that EPA require more frequent reporting, such as quarterly, along with an annual summary.

Response 5.4-d:

In today's final action, EPA continues to require facilities subject to subpart RR to submit the GHG report annually, by March 31 of every year. EPA notes that the requirements in today's action are for reporting only and do not trigger any remediation actions. EPA has designed an annual reporting cycle for the GHG Reporting Program that balances the value of data publication with the administrative burden of data submission, processing, and verification. EPA has concluded that facilities covered under subpart RR should be consistent with the rest of the GHG Reporting Program in this approach. EPA notes that the final UIC Class VI rulemaking requires that the Director be notified if the reporter obtains evidence that the injected CO_2 stream may cause an endangerment to an underground source of drinking water (USDW). This may

include evidence of leakage. Please see the final UIC Class VI rulemaking for more information on this topic.[5]

Comment 5.4-e:
Multi-stakeholder discussion group (0799) states that they interpret 40 CFR part 98.444(a)(10), which states that "you must use the same calculated methodology through a reporting period unless you provide a written explanation of why a change in methodology was required," to include the use of "averaging" as appropriate to arrive at quarterly numbers.

Response 5.4-e:
EPA has deleted the proposed paragraph 40 CFR part 98.444(a)(10) from this final rule because this requirement is already contained in the General Provisions (subpart A) of Part 98 at 40 CFR part 98.3(e). It was an EPA oversight to repeat the same requirement twice, and therefore EPA deleted this text from subparts UU and RR so that it only appears in subpart A.

EPA interprets the main point of the comment to be that a reporter should be able to sample a flow more than once a quarter, test the multiple flow samples for CO_2 concentration, and average the results in order to calculate the quarterly CO_2 concentration value. EPA agrees with this comment and has concluded that multiple samples per quarter should be allowed if this approach results in a more representative value for the quarter and if they reporter chooses to take on this additional sampling and testing. To implement this suggestion, EPA has amended the monitoring requirements for determining CO_2 concentration of all flows in subparts UU and RR of this final rule so that samples must be taken at least once per quarter.

It is unclear from the written comment whether the commenter is also stating that the reporter should be able to average the flow value to calculate a quarterly value. EPA notes that it is not appropriate or correct to average a measured flow value at any point because the measurements would be continuous.

Comment 5.4-f:
One commenter (0798) suggests that the language describing the reporting equations in 40 CFR part 98.443 be reworked and simplified. The commenter asserts that each paragraph explaining an equation contains certain provisions that are identical to paragraphs explaining other equations (although the commenter notes this is only apparent after reading/comparing each equation). The commenter suggests that these equations be grouped together according to the five activities they measure (e.g., RR-1 through RR-3 are transfer point equations; RR-4 through RR-6 are injection equations; RR-7 through RR-9 are production/recycling equations; RR-10 is a leakage pathway equation; and RR-11 through RR-12 are sequestration equations).

The commenter also suggests that it may ease compliance with 40 CFR part 98.443 if the provisions that apply to all equations are listed in one set of paragraphs rather than duplicated throughout the section. The commenter believes that this approach would allow differences

[5] Please refer to the following Web Site for UIC program information: http://water.epa.gov/type/groundwater/uic/wells_sequestration.cfm

between the equations to be seen more readily. The commenter provides an alternative organization of the regulatory text at 40 CFR part 98.443. In the alternative organization, one paragraph is assigned to each of the five activities, plus a sixth paragraph for fugitive and vented emissions from surface equipment for which the equations appear in 40 CFR part 98.233. Within each paragraph, subparagraphs outline in prose each step of the activity. At the end of the section, the commenter proposes that a table list all equations so that they are displayed only once in the section, together in one place.

Response 5.4-f:

EPA agrees that grouping equations and organizing paragraphs by activity may provide further clarity for reporters. In this final rule, EPA is making two edits to implement these organization recommendations. First, EPA is amending the introductory paragraph at 40 CFR part 98.443 to describe the five activity groups to which the equations belong. Second, EPA is assigning each activity a paragraph so that CO_2 received by pipeline is contained in 40 CFR part 98.443(a), CO_2 received by container in 40 CFR part 98.443(b), CO_2 injected in 40 CFR part 98.443(c), CO_2 produced in 40 CFR part 98.443(d), CO_2 emitted by surface leakage in 40 CFR part 98.443(e), and CO_2 sequestration in 40 CFR part 98.443(f). A paragraph is not necessary for fugitive and vented emissions from surface components because facility-wide reporting on such emissions as proposed is no longer required in this final rule.

EPA does not agree with the commenter that it would be clearer to put all equations into a table at the end of 40 CFR part 98.443 rather than throughout the section. EPA has concluded that it is clearer for the equations to be located throughout the section because each equation can be accompanied by the text that describes how to use it and by definitions and units of its terms. Furthermore, this organization is consistent with the organization of all other subparts in 40 CFR part 98 so that the GHG Reporting Program has a consistent reporting structure, allowing facilities and suppliers to navigate from one subpart to another more easily and build a comfort with the regulatory text more quickly. Therefore, EPA did not move the equations to a table at the end of 40 CFR part 98.443 in this final rule.

Comment 5.4-g:

One commenter (0816) raises concern that the proposed subpart RR requires data to be reported in metric units (e.g., metric tons of CO2). In particular, the commenter states that this may increase the burden on reporting entities since all commercial transactions of bringing CO2 on-site and measurement of flows (e.g., instrument calibration, standard operating procedures) are developed in "common engineering units" that are not metric. As such, the commenter recommends that all the equations in subpart RR be revised to include English units, with conversions to metric units only as the final step of the calculation prior to summarizing the data for reporting purposes.

Response 5.4-g:

EPA does not agree with the commenter's suggestion to specify all equations in English units and then convert to metric units as a final step. As stated in the October 2009 preamble (74 FR 56356), to maintain consistency with existing State-level and Federal-level GHG programs in the U.S. and internationally, all emission measurements must be reported in the SI, also referred to

as metric units. EPA has concluded that this rationale is true for today's final rule. Therefore, EPA is continuing to require reporting of all data in metric units and has not made a change to today's rule as a result of this comment.

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6 MRV Plan Requirements

6.1 Site-specific MRV Plan Approach

Comment 6.1-a:
A number of commenters (0788, 0795, 0797, 0798, 0800, 0802, 0803, 0808, 0812, 0813/TRANS-VA-02, 0816), and a coalition of ENGOs (0809/TRANS-VA-01), support EPA's site-specific MRV plan approach.

One commenter (0798) states that, given the wide range of site-specific variables, changes in conditions through time during the life of the project, and the evolution of technology, the site-specific approach is essential. A coalition of ENGOs (0809, TRANS-VA-01) states that without meaningful plans for monitoring and verification of CO_2 injection at GS facilities, EPA's GS monitoring system will not be effective. They agree with EPA that the plans should be developed on a case by case basis to reflect the unique character of the local geology and other conditions at the GS site.

The multi-stakeholder discussion group (0799) finds that monitoring requirements should be tailored to each and project and should reflect and understanding of what is required and implemented (even if not required) under both the UIC program and subpart RR. One commenter (0797) supports EPA's site-specific approach, but is concerned that it could and would overlap with other state and federal permitting regimes. Another commenter (0800) supports EPA's decision for MRV plan that are site-specific, but finds that the proposed scope of the MRV plan is too broad. This commenter believes that a site-specific approach to regulation of GS is appropriate given that site-specific characteristics such as geology and surface topography will differ from project to project.

Response 6.1-a:
EPA agrees with commenters that support the Agency's approach for allowing site-specific MRV plans due to the wide range of site-specific geologies and conditions, to allow for leveraging monitoring required by other authorities, and to be adaptive to evolving GS technologies, and has therefore retained this approach in the final rule. See Section II.E of the preamble for further discussion on site-specific MRV plans. In response to concerns about overlap with other state and federal permitting regimes, please see Chapter 13 of this document. In response to the concerns that the proposed scope of the MRV plan is too broad, please see Chapter 6.2 of this document.

Comment 6.1-b:
One commenter (0813/TRANS-VA-02) recommends that lower risk sites should be rewarded with appropriately tailored regulatory requirements. Two commenters (0803, 0813) note that the requirements are too extensive in light of the acknowledgement by EPA in the proposed rulemaking and in the UIC Class VI proposed rulemaking that well managed sites are not expected to leak.

Response 6.1-b:
Regarding the suggestion that EPA tailor regulatory requirements for lower risk sites, this site-specific approach for developing MRV plans allows facilities to structure their monitoring strategies commensurate with the risk of leakage of CO_2 to the surface.

Comment 6.1-c:
A commenter (0805) affirms that it is correct for EPA to require a broader suite of monitoring requirements to be applicable to GS facilities to account for CO_2 emissions that might result from long term sequestration of CO_2 at an ER site. One commenter (0812) argues against a pre-determined check list of monitoring technologies that would have to be employed for each GS site. One commenter (TRANS-VA-01) suggests that EPA reserve the right to prescribe certain universal MRV methods (e.g., above injection zone monitoring).

Response 6.1-c:
EPA agrees with the commenter that stated that a broad suite of monitoring requirements should be applicable at all facilities conducting GS, including ER projects that choose to opt in the subpart RR requirements. EPA decided to retain the site-specific MRV approach instead of prescribing a checklist of required monitoring technologies because of the variability in geology, conditions, and operations at facilities conducting GS. EPA may revisit the requirements in the future once more experience with GS is gained to ascertain whether certain monitoring should be applicable to all facilities conducting GS,

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Comment 6.1-d:
One commenter (0798) states that GS is being researched by the Department of Energy (DOE) and other entities and the purpose of the DOE projects is to evaluate and test approaches to monitoring and verification in various settings. Based on this, the commenter states that it would be premature to require the use of specific monitoring approaches, technologies or techniques.

Response 6.1-d:
EPA considered research by DOE and other organizations while developing the MRV requirements and determined that there is a suite of technologies that are currently available for facilities to design an effective MRV plan according to subpart RR requirements. Instead of prescribing monitoring approaches or technologies, the site-specific MRV approach taken in subpart RR allows facilities to design their monitoring strategies based on what technologies or techniques were most suitable to the site's geology and conditions. EPA will continue to track research on monitoring approaches and technologies.

6.2 General MRV Plan Requirements

Comment 6.2-a:
Some commenters (0800, 0808, 0810) assert that the proposed subpart RR MRV requirements are too extensive, are generally unnecessary, and will likely be a disincentive to new GS projects. Commenter 0808 states that well selected and well managed sites will not have the types of

leakage pathways that EPA seems to assume would exist. One commenter (TRANS-VA-07) suggests that the MRV reporting is somewhat prescriptive and may not leave room for other approaches (e.g., standards and protocols developed through consensus-based procedures that industry may have already done or may be conducting in the future).

One commenter (0815) implores the EPA to ensure that the regulatory burden imposed by the monitoring and reporting requirements for leakage should not be so excessive as to discourage the development of this technology. One commenter (0795) states that a tailored and phased plan will help to avoid regulatory and cost burdens that create disincentives to ER and GS project development and delay the advancement of beneficial CO_2 injection and GS technologies.

Response 6.2-a:
EPA disagrees with the suggestions that the MRV requirements are too extensive, prescriptive, and unnecessary, and maintains that the requirements allow reporters to tailor MRV plans based on site-specific features (such as potential leakage pathways) and conditions, allows reporters to use methods developed by other entities, and ensures accurate accounting of sequestered CO_2. See Chapter 6.1 of this document and Section II.E. of the preamble for further discussion of EPA's site specific MRV plan approach. See the Chapter 13 of this document for a discussion of EPA's consideration of existing MRV protocols.

Providing regulatory certainty on MRV requirements for facilities conducting GS is important to the development and deployment of CCS technology. EPA concluded allowing a site-specific MRV plan approach that can be tailored to each facility actually minimizes disincentives to new GS projects.

Comment 6.2-b:
One commenter (0798) states that, although they strongly support site specific MRV rules, the impact of the rules will not be clear until the MRV plans are acted upon some time in the future. The commenter also asserts that if ER operations are subject to the full range of monitoring technologies that are currently being tested in pilot projects, then the end result may be that ER is not be a viable option for GS of anthropogenic sources. The commenter is confident that with proper site selection and site-based MRV plans, the cost of monitoring and verification will prove to be reasonable, and ER will have a major impact on GS. However, the commenter urges the EPA to bear in mind that if its assessment turns out to be wrong, the costs of unnecessary monitoring tools or unduly burdensome procedures could readily erect an insurmountable regulatory barrier to deployment of carbon capture and storage technology.

Response 6.2-b:
EPA appreciates the support for the site-specific MRV approach. EPA agrees with the commenter that with proper site selection and site-based MRV plans, the cost of monitoring and verification will prove to be reasonable. The site-specific MRV approach taken in subpart RR allows facilities to design their monitoring strategies based on what technologies or techniques are most cost effective and suitable to the site's geology and conditions. The commenter asserts that if ER is subject to the "full range" of monitoring technologies being tested at pilot projects the end result would be that ER might not be a viable option for GS, but the commenter does not

provide any detail about the types of technologies in question, and why a given technology could not be applied to ER.

Comment 6.2-c:
Two commenters (0796, TRANS-VA-04) and a coalition of ENGOs (0809/TRANS-VA-01) assert that clearer guidelines are needed from EPA on which technologies would be considered adequate to meet the MRV requirements under subpart RR. One commenter (TRANS-VA-04) expresses concern that the rule may not provide sufficient guidance to guarantee a consistent level of quality across plans or to ensure that reports from different facilities are readily comparable. The commenter suggests that EPA provide further structure to the case by case plan requirement by: i) identifying baseline accuracy and provision standards that all plans must meet, ii) ranking preferred monitoring technologies that may be used in many instances, and iii) providing regulatory standards charting out in some detail, elements all plans must contain and questions all plans must consider. These suggestions would ensure that regional variations do not inadvertently diminish the rigor of the overall reporting structure. One commenter (0796) urges EPA to carefully consider the regulatory burden and uncertainty it may be creating by failing to provide clear guidance on acceptable MRV methodologies. The commenter notes that high regulatory burdens will delay and discourage development and deployment of CCS. Another commenter (0802) is concerned that the flexibility would disappear if EPA were to incorporate the sort of detailed expectations set out in the preamble into the final regulations. The commenter (0802) states that EPA should remain open to facility's site-specific leak detection strategies.

Response 6.2-c:
EPA agrees that providing greater clarity on the regulatory requirements and evaluation criteria may improve the rigor of the reporting program. Therefore, EPA has refined the regulatory requirements to provide more clarity on the minimum required elements of an MRV plan, has expanded the preamble discussion, and has revised the final General TSD to provide further detail on the technical evaluation of MRV plans. The final General TSD provides illustrative examples describing aspects of MRV plan development. This includes delineating the monitoring area, both the maximum monitoring area over the life of the project and how monitoring can be phased in over this area; selecting a leakage detection system that is suitable for the site; detecting and quantifying a CO_2 leak; and identifying baseline conditions. EPA disagrees with the commenter (0802) that the details in the proposal preamble would preclude site-specific flexibility. Rather, EPA asserts that the details provide reporters with more clarity regarding the requirements of MRV plans.

Comment 6.2-d:
The multi-stakeholder discussion group (0799) suggests a two-stage approach for the monitoring process: 1) the first stage includes a process for addressing changes in fluid migration or pressure front that extend beyond the area of review (AoR) but do not result in leakage and would require review and potential reevaluation and revision of the AoR (i.e., the project envelope) and/or the MRV plan; unanticipated fluid movement could also trigger additional monitoring steps; and 2) the second stage would be triggered by actual leakage and would i) determine and implement appropriate response pursuant to the UIC emergency and remedial response plan, and ii) quantify

that release for subpart RR emission reporting purposes. "Additional monitoring and measurement steps and MRV plan revisions would be taken on a fit for purpose basis as necessary to locate and/or address the type of release involved."

Response 6.2-d:
EPA recognizes that the monitoring strategy will likely have at least two stages, as the commenter describes above, and asserts that the subpart RR MRV requirements allow for monitoring to be implemented in this manner. The reporter is required to outline strategies for assessing the likelihood, magnitude, and timing, of surface leakage of CO_2 through identified leakage pathways, for establishing expected baselines, and for detecting and quantifying surface leakage. EPA refers the reader to Chapter 6.5 of this document for a discussion on EPA's revisions to the monitoring area for subpart RR in response to the commenter's suggestion on monitoring outside of the UIC AoR. EPA agrees that further monitoring may be triggered by detected leakage and that the reporter must quantify any surface leakage, but requiring emergency or remedial response plan is outside the scope of this rulemaking.

Comment 6.2-e:
A coalition of ENGOs (0809) recommends the following two-stage MRV strategy to safeguard the integrity of the plans and also lend greater clarity to the project owners/operators: 1) cost-effective MRV subsurface methods (and surface methods if vulnerabilities are identified) affirming that the CO_2 plume and pressure front is conforming to the reservoir model, and 2) second stage/level pre-planned rigorous subsurface review and comprehensive surface MRV that would be implemented only if a threshold established in the MRV plan is crossed. The commenter recommends that EPA amend the proposed 40 CFR part 98.448 (a) (1) to add this two-stage approach and overall make the criteria for acceptable MRV plans more robust. The following changes were recommended:

> Amend 40 CFR part 98.448 (a)(1) to read:
> "(1) You must develop an MRV plan that contains the following components.
>
> a. A two stage strategy including a rigorous site assessment and risk evaluation as part of a first stage monitoring and verification strategy including methods for tracking the CO_2 plume and pressure front relative to the reservoir model and the geologic seal(s), and that addresses identified vulnerabilities and establishes thresholds for revision. The first stage strategy must include:
>
> (1) Identification of potential leakage pathways as well as a risk assessment of leakage of the CO_2 from the subsurface through these pathways;
>
> (2) A strategy for establishing pre-injection environmental baselines sufficient to allow assessment of any material or relevant change in CO_2 that would amount to leakage. For oil and gas applications, baselines should be established adjacent to but outside ER fields and compared with parallel data within the field to identify any existing adverse CO_2 fluxes.

(3) A plan for periodic re-measurement of baseline CO_2 flux conditions as established in (2) to ensure there are no significant changes.

(4) Identified monitoring techniques and technologies that enable the timely and reliable detection and immediate reporting to EPA and to the permit issuing authority for the GS facility of any leakage of CO_2 through the identified pathways.

(5) Predictive modeling for comparison with actual collected data to validate the accuracy of any assumptions about leakage on an ongoing basis, to allow periodic assessment of the MRV plan.

(6) Identification of thresholds and identified events which would trigger a revision of the MRV plan, an increase in the frequency of reporting and data retention, and the requirement to communicate with the permit issuing authority so that action can be taken to mitigate leakage.

(7) The requirement for sufficient continuous data acquisition to enable event reconstruction and modeling for the purposes of quantification with sufficient precision and accuracy in the event of leakage.

(8) A cross reference to the monitoring and reporting plan proposed or approved as part of the GS facility's injection permit (if any), and procedures for immediate notification to the permitting authority if leakage is detected.

b. a second stage, modeling and verification strategy that is triggered if the thresholds established in (a)(6) are exceeded, and any other monitoring or verification methods EPA deems necessary on a case-by-case basis, in the event of a monitored leakage, in order to establish the exact nature of the leakage and its pathway(s), quantify it with sufficient accuracy, and examine whether any other pathways are resulting in leakage.

The commenter states that these changes will significantly clarify for both the prospective GS reporter, and the public, what the minimum criteria are for an approvable MRV plan.

Response 6.2-e:

EPA notes that the MRV requirements in the final rule do not limit a reporter's ability to design a leakage detection and quantification strategy that reflects the commenter's suggested two stage approach. For example, the first stage would consist of monitoring to track the location of the plume and to detect any potential leakages, using subsurface or surface technologies. The second stage, quantifying the surface leakage, would be triggered if a leak is detected and verified. See Response 6.2-d for further discussion of the two stage approach.

EPA did not take all of the regulatory text suggested in (a) and (b). Below is a step-by-step explanation of EPA's actions.

> *Amend 40 CFR part 98.448 (a)(1) to read:*
> *(1) You must develop an MRV plan that contains the following components.*
>
> *a. A two stage strategy including a rigorous site assessment and risk evaluation as part of a first stage monitoring and verification strategy including methods for tracking the CO_2 plume and pressure front relative to the reservoir model and the geologic seal(s), and that addresses identified vulnerabilities and establishes thresholds for revision. The first stage strategy must include:*
>
> *(1) Identification of potential leakage pathways as well as a risk assessment of leakage of the CO_2 from the subsurface through these pathways;*

EPA retained in the final rule the requirement to include in the MRV plan the identification of potential surface leakage pathways for CO_2 in the MMA (see Chapter 6.4) and the likelihood, magnitude, and timing, of surface leakage of CO_2 through these pathways.

> *(2) A strategy for establishing pre-injection environmental baselines sufficient to allow assessment of any material or relevant change in CO_2 that would amount to leakage. For oil and gas applications, baselines should be established adjacent to but outside ER fields and compared with parallel data within the field to identify any existing adverse CO_2 fluxes.*

EPA retained the requirement for the MRV plan to include the strategy for establishing expected baselines (see Chapter 6.7). EPA decided not to specify the approach for establishing the baseline at an operating injection site to retain the flexibility for reporters to propose other methods. Please see the final General TSD for more information on establishing baselines.

> *(3) A plan for periodic re-measurement of baseline CO_2 flux conditions as established in (2) to ensure there are no significant changes.*

EPA did not include this specific regulatory text in the final rule as it is reflected in the revised provisions related to re-submission of the MRV plan for EPA approval (see Chapter 7).

> *(4) Identified monitoring techniques and technologies that enable the timely and reliable detection and immediate reporting to EPA and to the permit issuing authority for the GS facility of any leakage of CO_2 through the identified pathways.*

EPA retained in the final rule the requirement for the MRV plan to include a strategy for detecting surface leakage. EPA did not add in a provision to provide notification of surface leakage to EPA and a permitting authority as that is out of scope of this GHG reporting rulemaking. However, EPA notes that there are provisions for emergency notification in UIC

regulations (see Chapter 11). In addition, CAA section 307(d) includes provisions for emergency notification.

> *(5) Predictive modeling for comparison with actual collected data to validate the accuracy of any assumptions about leakage on an ongoing basis, to allow periodic assessment of the MRV plan.*

EPA did not include this specific regulatory text in the final rule as it is reflected in the revised provisions related to re-submission of the MRV plan for EPA approval (see Chapter 7).

> *(6) Identification of thresholds and identified events which would trigger a revision of the MRV plan, an increase in the frequency of reporting and data retention, and the requirement to communicate with the permit issuing authority so that action can be taken to mitigate leakage.*

EPA revised the requirements for re-submission of MRV plans to include events that would trigger re-submission (see Chapter 7). EPA decided not to increase the frequency of reporting as data on quantity of CO_2 sequestered does not need to be reported more than yearly for GHG reporting purposes. As noted above, EPA did not add a requirement to communicate with the permitting authority.

> *(7) The requirement for sufficient continuous data acquisition to enable event reconstruction and modeling for the purposes of quantification with sufficient precision and accuracy in the event of leakage.*

EPA retained the requirement for the MRV plan to include a strategy for quantifying any surface leakage. EPA is not prescribing continuous monitoring for surface leakage so therefore did not adopt the suggested regulatory text.

> *(8) A cross reference to the monitoring and reporting plan proposed or approved as part of the GS facility's injection permit (if any), and procedures for immediate notification to the permitting authority if leakage is detected.*

As noted above, EPA did not add a requirement to communicate with the permitting authority as this is out of scope of this GHG reporting rulemaking.

> *b. a second stage, modeling and verification strategy that is triggered if the thresholds established in (a)(6) are exceeded, and any other monitoring or verification methods EPA deems necessary on a case-by-case basis, in the event of a monitored leakage, in order to establish the exact nature of the leakage and its pathway(s), quantify it with sufficient accuracy, and examine whether any other pathways are resulting in leakage.*

EPA retained the requirement that surface leakage must be quantified and that the MRV plan must include a strategy describing the methodologies. Please see the final General TSD for more information on the MRV plan requirements.

Comment 6.2-f:
A commenter (0800) recommends that the MRV plan should be designed as a contingency strategy and deployed to quantify leakage to the atmosphere if there is CO_2 movement from the permitted target formation that suggests undetected leakage to the atmosphere or if the monitoring plan as required by the UIC permit detects other direct evidence (e.g., natural resource damage).

Response 6.2-f:
EPA agrees that the MRV plan must include a contingency strategy to quantify any leakage to the atmosphere if it occurs, but emphasizes that the plan must also identify methods for detecting leakage. The leakage detection strategy may take advantage of monitoring required by a facility's UIC permit, including CO_2 plume tracking and groundwater monitoring.

Comment 6.2-g:
A coalition of ENGOs (0809) asserts that there is the potential for some sequestration facilities to evade the MRV requirements and hence, linking the MRV plan requirement to the UIC permitting process may be unhelpful. This may occur where there is no USDW present and therefore no UIC Class VI permit. Although the rule does provide that the MRV plan requirement can be triggered if another "relevant permitting authority in the case of a facility that is not under the jurisdiction of the [SDWA]" confirms an AoR, but it does not specify what these other "relevant" authorities might be. The coalition of ENGOs mentions that EPA does not confirm that these other authorities will necessarily identify an "AoR," or when they may do so. The coalition of ENGOs suggests that EPA:

- 'Confirm what minimum permit and monitoring and reporting requirements must be in place for GS facilities located in areas that lack USDWs.'
- 'Confirm that the suite of monitoring and reporting that is needed to track the location and fate of the underground CO_2 plume, as well as an airside MRV plan, will be in place for such facilities prior to injection commencing.'
- 'Estimate, in the preamble and support documents for any final rule, what the potential is for any future GS facility to fall outside the UIC program because of the absence of USDWs, and if so, whether there are any "relevant" permitting programs that would govern. This exercise will help clarify whether, and when, programs outside the UIC system are needed. The results of this investigation should inform the design of the final MRV timing provisions, by ensuring that the entire population of GS facilities will be covered by the MRV system.'
- 'Add clear backstop language clarifying that all new GS facilities not only must submit an MRV plan but must have an approved plan before injection commences. No GS facility should be able to begin injecting CO_2 without an MRV plan sufficient to ensure that the operator, regulators, and the public can determine whether injection and

The coalition of ENGOs states that 'EPA has authority pursuant to CAA Section 114 to impose such requirements in order to safeguard emissions baseline data, insofar as the Agency may "require any person" to "establish and maintain such records," "install, use, and maintain such monitoring equipment," and "sample such emissions . . . as the Administrator shall prescribe." 42 U.S.C. § 7414(a). Simply put, if proper monitoring is not in place prior to injection, EPA's emissions data monitoring will be inherently uncertain, as the EPA recognizes in the preamble to the proposed rule. If EPA fails to use its Section 114 authority in this way, or wishes to supplement its authority, it still has useful ways of ensuring that MRV plans are in place before injection commences: EPA could, for instance, include an air-side MRV plan requirement in its UIC regulations, cross-referencing its CAA authority under Section 114. Monitoring for airside leakage will help determine and demonstrate to the public that injected CO_2 remains sequestered as predicted, neither damaging USDWs or escaping to atmospheric release.'

Response 6.2-g:
In response to the comment that the potential exists for GS sites to evade MRV requirements, all facilities that are covered by the source category for subpart RR, including offshore facilities that are not under the jurisdiction of SDWA, must comply with the regulations. Please refer to the Report of the Interagency Task Force on Carbon Capture and Storage for a discussion of selected environmental laws that may be applicable to onshore and offshore GS.[6]

In addition, the requirements for a proposed MRV plan are the same regardless of the type of permit that a facility holds. Therefore, if a facility does not hold a UIC permit, they will still need to address all of the MRV requirements, including the delineation of the monitoring area, and a strategy for detecting and quantifying surface leakage. This leakage detection strategy may include subsurface monitoring.

Please see Chapter 7.3 of this document for EPA's response to the comment on requiring airside monitoring to be in place prior to the commencement of injection. Please refer to Section I.D. of the preamble for a discussion of the relationship of subpart RR to UIC requirements.

6.3 Definition of Leakage

Comment 6.3-a:
One commenter (0816) and the multi-stakeholder discussion group (0799) recommend that the definition of CO_2 leakage be modified to state that leakage only occurs when CO_2 moves to the surface and is not subsequently captured for re-use, as it is in CO_2-ER operations. The commenters recommend this revision to clarify that leakage only occurs when the CO_2 is not recaptured before entering the atmosphere, indoor air, oceans or surface water. The multi-stakeholder discussion group mentions that this clarification is consistent with the preamble that

[6] http://www.epa.gov/climatechange/policy/ccs_task_force.html

states, “For the purposes of this proposed rule, CO_2 leakage to the surface includes CO_2 emitted to the atmosphere, CO_2 emitted to the ocean from the sub-seabed, CO_2 emitted to surface water, and CO_2 emitted to indoor air environments.”

Recommended Revisions to 40 CFR part 98.449:
Leakage means the movement of CO_2 from the injection zone to the surface, ~~including~~ [**and in**]to the atmosphere, indoor air, oceans or surface water.

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

Response 6.3-a:
EPA accepts the recommended revision to 40 CFR part 98.499 and has modified the definition of leakage in the final rule.

Comment 6.3-b:
The multi-stakeholder discussion group (0799) recommends that the regulatory language be modified to not mention “to the surface” as “leakage,” since it is defined to include the element “to the surface.” In particular, the commenter recommends that the following text for 40 CFR part 98.448(a)(1)(ii):

> (i) An assessment of the risk of leakage of CO_2 ~~to the surface~~.
> (ii) A strategy for detecting and quantifying any CO_2 leakage ~~to the surface~~.

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

The multi-stakeholder discussion group (0799) also suggests modifying 40 CFR part 98.448 (a)(6)(i) to use the term leakage as it is a defined term.

> A description of the leak[**age**] including all assumptions, methodology, and technologies involved in leakage detection and quantification, ~~if a leak was detected~~.

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

Response 6.3-b:
EPA revised the final rule to include a definition for ‘surface leakage’ and uses the term consistently throughout the regulatory text.

6.4 MRV Plan Requirement to Assess Risk of Leakage to the Surface

Comment 6.4-a:
Three commenters (0808, 0810, 0813) assert that it is unreasonable for EPA to require the identification and risk assessment of all potential leakage pathways. A commenter (0808) believes that identifying all possible potential leakage pathways over the lifetime of a project is unreasonable and infeasible and that well-selected and well-managed CCS sites will not leak. The commenter indicates that at a minimum, phased characterization of potential leakage pathways should be allowed, and highlighted that EPA proposed a phased corrective action approach for the UIC Class VI rule.

One commenter (0800) agrees with the idea of phased characterization and believes the that storage operators should only be required to perform any additional characterization of leakage pathways, as needed based on evidence of plume movement.

Another commenter (0810) states that currently available technology precludes identification and characterization, with reasonable certainty, of all possible leakage pathways within the spatial area. The commenter points out limitations to seismic monitoring, wellbore logging, and computational modeling.

One commenter (0813) also believes that the requirement is divorced from the way in which commercial CCS sites will be permitted and operated in practice. The commenter states that the requirement is also inconsistent with the way that the CO_2 plume is expected to move within the target geologic formation: slowly and, depending upon the geologic characteristics of the target formation, over a potentially very large area. The commenter notes that EPA is effectively asking storage operators to characterize leakage pathways over an extensive area that may not be affected by the injection for decades, if ever. The commenter asserts that EPA has provided no justification as to how this requirement will improve the quality of the emissions data reported by GS operators.

Response 6.4-a:
EPA concluded that it is necessary for the reporter to identify and evaluate all potential leakage pathways over the lifetime of the project in the MRV plan. EPA determined that this information is reasonable to request because it influences how the monitoring areas are delineated (see Section 6.5) and also is the basis for designing an appropriately risk-based, site-specific monitoring program. EPA agrees that the risk of surface leakage is minimized at sites that are well-selected and well-managed.

EPA determined that currently available technology will allow reporters to identify and assess potential CO_2 leakage pathways at GS sites. Please see the final General TSD for more information on MRV plan requirements, including identification and assessment of leakage pathways.

EPA disagrees with the commenter (0813) that the identification and evaluation of leakage pathways requirement is divorced from the way commercial sites will be permitted and operated in practice. All GS sites that are subject to the Safe Drinking Water Act will be regulated under

the UIC program, and the UIC requirements, including those tailored for GS (in the UIC Class VI rule), require owners or operators to gather information to appropriately characterize the entire AoR including information on geologic structure (e.g., faults and fractures) and the location of artificial penetrations within the AoR. The UIC Class VI requirements allow the use of phased corrective action -- meaning the use of UIC Director-approved methods to ensure that wells within the AoR do not serve as conduits for the movement of fluids into USDWs -- if the UIC Director determines such methods are appropriate and protective of USDWs. EPA notes that the MRV plan requirements in subpart RR have been revised in the final rule to redefine the monitoring areas and to allow phased deployment of the monitoring strategy (see Chapter 6.5 of this document).

Comment 6.4-b:
One commenter (0800) suggests that the risk assessment be limited and focused, and it include the analysis of site-specific exposure pathways that are probable leakage mechanisms, such as active and abandoned deep wells or fractures and faults with surface expression.

Response 6.4-b:
EPA acknowledges that the risk assessment and the monitoring strategy should focus on likely leakage pathways at the site. EPA disagrees that the focus of the risk assessment should be on exposure pathways because this rule does not require the reporter to report impacts of CO_2 leakage to the surface, but rather the reporter must quantify and report any CO_2 leakage to the surface. While the nature of individual GS systems can be expected to differ with respect to site-specific geologic attributes, potential leakage pathways that may exist at GS sites include:

- Wells,
- Fractures, faults, and partings along bedding planes,
- Pathways dependent on competency, extent and dip of the confining system.

EPA requires the information about the leakage pathways in the MRV plan to determine if the chosen monitoring program will be effective at detecting and quantifying CO_2 leakage.

6.5 MRV Plan Requirements for Monitoring Area

Comment 6.5-a:
One commenter (0786) recommends that the spatial area of monitoring take the most conservative approach, which is to characterize and model beyond the pressure front boundary. This commenter notes that though the pressure front is not chemically affected by the CO_2 plume, physical effects are possible, including fracturing of the caprock.

One commenter (0816) supports the proposal that the spatial area of evaluation be delineated by the CO_2 plume plus pressure front or that it should be equal to the UIC Class VI AoR. The commenter recommends that the pressure front boundary be defined as threshold pressure change because some small pressure changes may present no risk. The commenter recommends

that EPA adopt for subpart RR the definition that the commenter proposed for the UIC Class VI proposed rule:

"Pressure front means the zone of elevated pressure that is created by the injection of the carbon dioxide stream into the subsurface, where there is a pressure differential sufficient to cause movement of the carbon dioxide stream or formation fluids from the injection zone into a USDW."

Three commenters (0810, 0812, 0811) recommend that the spatial area of evaluation be restricted to the CO_2 plume. One commenter (0810) believes the definition of GS site should be restricted to only the "plume" of CO_2 saturation, but recognizes a need for MRV beyond this area. This commenter suggests that when evaluating the spatial area of analysis, EPA should avoid subjective terms such as "sufficient" and "reasonable," as they are concerned with who will make these determinations and the result may be potentially costly to the operator. The commenter gives an example of how different pressure differentials in a definition can make a very large difference in the spatial area under consideration. The commenter believes that requiring that the spatial area include the pressure front would raise issues with property rights, costs, and project siting. Another commenter (0812) suggests that the spatial area to be monitored should be determined by the reservoir modeling submitted by the facility operator and that it should include the area that will cover the CO_2 migration during the injection phase and post injection periods until pressure front stabilization. The commenter suggests that it may be appropriate to include a buffer zone of approximately one mile past the spatial area to take into account conduits for leakage outside of the spatial area identified in the reservoir model. One commenter (0811) states that EPA should require monitoring of the entire area over which the CO_2 plume may migrate and that EPA should take the potential for lateral plume migration due to irregularities in the cap rock and other factors seriously. For example, a slight upward angle in the cap rock in one direction may bias CO_2 migration in that direction. High permeability channels between the confining and reservoir layers can also affect migration. The commenter states that the MRV plan should cover the entire area over which the plume may migrate.

Response 6.5-a:

EPA disagrees with the commenter that suggested that the monitoring area should be as large as possible to monitor for effects such as fracturing of the confining zone. In this rule, EPA is primarily concerned with the area that could be impacted by CO_2 leakage to the surface, and not with monitoring for physical effects of injection (see the UIC Class VI rulemaking for requirements for injection well site characterization, construction, and operation).

Based on comments, EPA also re-evaluated the proposed monitoring area which was proposed based on the CO_2 plume plus pressure front (consistent with the concept of the AoR in the UIC Class VI proposed rule). EPA determined that the monitoring area should be focused on where the CO_2 plume is and will migrate over the lifetime of the project until it has stabilized based on site characterization, monitoring and reservoir modeling (please refer to Chapter 8 of this document for responses to comments on cease reporting provisions). The monitoring area need not include the entire pressure front (as the UIC Class VI AoR does). Therefore, in today's final rule, EPA defined a MMA based on the area of the free phase CO_2 plume plus a buffer zone (to take into account conduits for leakage outside of the area identified in the reservoir model but

that may act as a leakage pathway), and defined an AMA to allow for monitoring to be phased in over time based on CO_2 plume movement. These two concepts replace the proposed "spatial area of evaluation" and are described in more detail in Section II.B of the preamble. The new monitoring area definitions in the final rule improve the clarity of what is required of reporters for this element of the MRV plan.

Comment 6.5-b:

Three commenters (0800, 0808, 0813) recommended that EPA allow a phased approach for the identification of leakage pathways throughout the monitoring area, and in particular, highlighted the relationship to the UIC AoR. One commenter (0808) suggests that the scope of EPA's proposal duplicates the site information necessary to site and permit the injection wells, and the commenter recommends that EPA coordinate with the OW when addressing the AoR re-evaluation over the course of a project, using computational modeling techniques, as opposed to requiring the permittee to do an initial evaluation of the potential largest extent of the AoR over the lifetime of a project. The commenter mentions that EPA noted in the proposed UIC rule, that a phased approach "can prevent the unnecessary burden of performing corrective action in areas far from the injection zone that may never be impacted." At a minimum, the commenter recommends that EPA allow sequestration sites to propose phased characterization of possible leakage pathways in the MRV plans under the proposed subpart RR.

Two commenters (0800, 0813) recommend that EPA should be consistent with UIC permitting and only require leakage assessment within the AoR at the time the MRV plan is submitted. The commenters suggests that storage operators should then only be required to perform any additional characterization of leakage pathways, if needed, based on evidence of plume movement (including appropriate computational modeling) and any subsequent expansion of the AoR as required by the UIC program. The commenter (0800) states that EPA should not require leakage pathway characterization outside of the AoR unless plume movement has made such leakage a potential risk. One commenter (0795) asserts that because sites used for ER are well characterized and already permitted under the UIC program, it is not necessary to increase the AoR delineation and monitoring requirements for these sites.

Response 6.5-b:

EPA agrees with the commenters that suggested a phased monitoring approach and this is reflected in the final rule in the definition of the AMA. The AMA is the area that will be monitored over a specified time interval chosen by the reporter that is greater than one year. The first time interval will begin from the date determined in your MRV plan through the date at which the MRV plan calls for the first expansion of the AMA. The boundary of the AMA is established by overlaying two areas. The first is the area projected to contain the free phase CO_2 plume at the end of the specified time interval plus an all around buffer zone of at least one-half mile or greater if known leakage pathways extend laterally more than one-half mile. The second is the area projected to contain the free phase CO_2 plume five years beyond the specified time interval.

EPA has also considered commenters' concerns about the relationship to the UIC AoR in the design of the final requirements related to the area in which leakage pathways must be

characterized and where active monitoring must take place. EPA determined that for UIC Class VI sites, the AoR will be a larger area than will be necessary for monitoring under subpart RR. This is because the UIC program is concerned with not only CO_2 plume movement, but also with pressure effects of the injection operation. Therefore, since subpart RR is concerned with potential CO_2 leakage to the surface, the monitoring area can be targeted to where the actual CO_2 plume is migrating. This is reflected in the final regulatory requirements at 40 CFR part 98.448.

Comment 6.5-c:
One commenter (0786) recommends that the spatial area of evaluation be re-evaluated and remodeled every five years rather than every ten years, due to the heterogeneity of geological systems and limited experience with GS in the US. One commenter (0811) supports the proposed requirement that a "GS facility would be required to re-evaluate and re-model the spatial area of evaluation at least every ten years." The commenter believes that such re-evaluation should require updated plume migration modeling based upon data of actual migration to date. In particular, the re-evaluation must incorporate data acquired during the monitoring process to test the original plume projections under the original MRV Plan.

Response 6.5-c:
The purpose of requiring a minimum frequency of re-evaluation of the monitoring area is to ensure that the monitoring is targeted at potential leakage pathways in the area where the actual CO_2 plume is. EPA determined that a more effective solution than requiring a minimum frequency for re-evaluating the spatial area was to have the reporter certify annually that the MMA and the AMA have not changed from the approved MRV plan. If either monitoring area does change in a way that requires revision of the MRV plan, the reporter will need to re-submit the MRV plan for approval, including submittal of updated plume migration modeling, as specifically called out by this commenter. Please refer to Chapter 7 of this document for more information on MRV plan re-submission**.**

Comment 6.5-d:
One commenter (0786) recommends that actual data be submitted when the MRV plan is initially submitted and whenever a GS facility is required to re-evaluate the spatial area of monitoring. The commenter emphasizes that this data will provide the EPA the opportunity to establish a baseline for each GS project, and better understand subsurface CO_2 movement, the efficacy of computational models, and the behavior of reservoir formations and confining layers, and subsurface CO_2 monitoring technologies in different geologic settings. The commenter believes that a narrative description of geologic formations, simple stratigraphic descriptions, maps of the modeled spatial area of evaluation, and an overview of methods used to characterize the site, in the absence of actual data, are of limited use to the worldwide scientific community for increasing our understanding of GS in various geological settings.

Response 6.5-d:
For the purposes of subpart RR, actual data need not be submitted unless it is part of the demonstration that the reporter has met the MRV plan requirements, both in the first submittal and in monitoring reports submitted after the plan is implemented (please refer to Chapter 7 of

this document). One of the purposes of gathering data under subpart RR is to verify the amount of CO_2 that is geologically sequestered at a facility conducting GS, and the information gathered will additionally provide EPA and the public with a better understanding of GS in various settings,.

Comment 6.5-e:

One commenter (0810) asserts that use of the pressure front in defining the spatial area could be very problematic in several respects. The commenter suggests that this definition would include a very large surface area and may raise the expectations of lease owners to be paid for pore space, even if the leased region is far removed from the injection site. They state that it would be impossible to obtain GS rights from the owners of a very large leasehold position. The commenter suggests that requiring such payments could make a sequestration project cost-prohibitive. In addition, it would likely result in spatial area overlap of two or more projects, providing disincentives to subsequent projects. The commenter also notes that, under such definitions of spatial area, a proposed subsequent new capture facility that may have considered GS in this spatial overlap area with an initial facility may decide to sequester CO_2 at a different site that is not in an overlap area. Thus, this second operator would be required to pipe its CO_2 over long distances to reach an exclusive sequestration site, affecting project economics. The commenter notes that if a leak were to develop in an area of spatial overlap of two or more injection sites, the offending party could not necessarily be determined. This may be a disincentive to a second operator establishing a GS site within a spatial overlap area. The commenter provides an example to illustrate their comments.

Response 6.5-e:

After consideration of this and related comments, EPA has redefined the spatial area for monitoring so that it is not defined by the pressure front, but rather is defined by the extent of the CO_2 plume. See Response 6.5-a and 6.5-b for a description of the MMA and AMAs. This rulemaking does not address property rights. Please refer to the Report of the Interagency Task Force on Carbon Capture and Storage for a discussion of property rights issues and CCS.[7]

Comment 6.5-f:

One commenter (0811) suggests that monitoring CO_2 injected into geologic structures which lack lateral confinement is inherently a far more difficult and error-prone process than is monitoring CO_2 injected into structures with lateral confinement. The commenter believes that the injection of CO_2 for sequestration should only be allowed in geologic structures that exhibit clear vertical and lateral confinement to minimize the risk of leakage and ground water contamination. The commenter mentions that the UIC rules address confinement zones. The commenter recommends a clear project boundary be defined prior to operations, both horizontally and vertically. The project boundary would establish the real limit for which CO_2 will migrate in the subsurface during and after the injection. As such, monitoring plans should address lateral constraints on migration. The commenter suggests that public confidence in the performance of GS will be greatly strengthened if EPA only authorizes CO_2 injection into

[7] http://www.epa.gov/climatechange/policy/ccs_task_force.html

geologic formations that will result in complete confinement of CO_2 within a specified and defined geologic reservoir area. The proposed rule implies that CO_2 could be injected into a geologic formation that is capped in the vertical dimension (i.e., above the injection formation), and allowed to freely migrate in the lateral dimension within that formation. The commenter suggests that the lack of a horizontal constraint dramatically increases the risks of a sequestration project as an unconstrained CO_2 plume could encounter more potential escape pathways (e.g., outcrops, faults, old wells). The commenter believes that the Proposed Rule (as well as the UIC rules) would be greatly enhanced by requiring extremely high hurdles for any CO_2 injection for sequestration into any reservoirs that do not clearly confine the CO_2, both horizontally and vertically.

Response 6.5-f:
The commenter's request to require injection only in geologic structures that exhibit clear vertical and lateral confinement to minimize the risk of leakage and ground water contamination through subpart RR is out of scope of this reporting rulemaking. Subpart RR requires monitoring and reporting for the purposes of quantifying GS and does not regulate site selection; facilities will have to comply with applicable permitting requirements for site selection. Please see the UIC Class VI rulemaking for further information on GS site permitting.

6.6 MRV Plan Requirements for Detection and Quantification of Surface Leakage

Comment 6.6-a:
A commenter (0795) states that monitoring of potential leakage pathways should be conducted only as appropriate based on identified risks and in accordance with subpart RR MRV plans. The commenter states that such plans should be reviewed annually against monitoring data and revised as needed.

Response 6.6-a:
EPA acknowledges that the monitoring strategy presented in the MRV plan should be focused on detecting and quantifying surface leakage, and therefore should focus on likely leakage pathways at the site. While the nature of individual GS systems can be expected to differ with respect to site-specific geologic attributes, potential leakage pathways that may exist at GS sites include:

- Wells,
- Fractures, faults, and partings along bedding planes,
- Pathways dependent on competency, extent and dip of the confining system.

EPA agrees that the monitoring strategy should be reviewed annually against monitoring data to verify that the strategy is working appropriately and has added a provision in 40 CFR part 98.446 outlining this requirement.

Comment 6.6-b:

One commenter (0810) mentions that 40 CFR part 98.442(c)(3) of the proposal requires reporting of the mass of CO_2 emitted from subsurface leaks, however, they believe that no reliable scientific method exists to actually measure subsurface leak events except after a long time (years) when the reservoir pressure changes enough to calculate a pressure/volume relationship. The commenter asserts that leakage detection and quantification has never been done on a commercial scale, and the ability to detect a potential leakage pathway is almost impossible unless reservoir failure occurs.

One commenter (0800) is concerned with overall MRV costs, and asserts that the ultimate MRV approach will include surface monitoring technologies that are unproven, including soil gas, soil flux, tracers, and atmospheric monitoring. The commenter believes that these technologies can result in false positives and a lack of stakeholder confidence in GS, by implying that the UIC permit does not adequately protect from a release to the surface. The multi-stakeholder discussion group (0799) suggests EPA mention in the preamble of the final rule that the need to meet the additional MRV plan requirements under this subpart does not necessarily require the use of atmospheric or soil monitoring methods.

Response 6.6-b:
EPA disagrees with the comment that no reliable methods exist to detect and quantify surface leakage. EPA has included information in the final General TSD to provide reporters with more information on MRV plan requirements, including quantification of surface leakage and applicable monitoring technologies. EPA is not prescribing monitoring technologies that must be deployed at every GS site but rather is finalizing MRV plan requirements that give reporters the flexibility to design an MRV strategy that is site-specific and cost-effective. See Chapter 10.1 of this document for a discussion of MRV costs. Please see the final General TSD for more information.

Comment 6.6-c:
One commenter (0816) responds to EPA request for comment on the proposed approach for reporting CO_2 leakage based on site-specific monitoring, and the two alternatives that were considered: (i) assuming all injected CO_2 remains sequestered, and (ii) assuming that a proportion of injected CO_2 remains sequestered. The commenter recommends that EPA should adopt a working assumption that all injected CO_2 remains sequestered unless site-specific monitoring, as defined in the MRV plan, detects leakage. They also assert that given the high dependence on site specific characteristics and the variety of methods of leakage, use of rule-of-thumb assumptions for leakage may not be valid in all circumstances.

Response 6.6-c:
Although EPA acknowledges that a well characterized, selected and managed GS site minimizes the potential for surface leakage, the amount of CO_2 injected is not necessarily equal to the amount of CO_2 ultimately sequestered. Subpart RR uses a mass balance approach for calculating the total annual CO_2 sequestered. Variables to subtract from the amount of CO_2 injected include surface leakage, if any, CO_2 produced, fugitive and vented emissions between flow meters and injection or production wells, and CO_2 remaining in produced fluids. Please refer to Chapter 5.3 of this document for a discussion of quantifying CO_2 based on the mass balance. EPA agrees

that rule-of-thumb assumptions for quantifying leakage may not be applicable at every site due to variability in geology, conditions, and operations. Therefore EPA retains that the reporter must determine the appropriate methodologies for quantifying surface leakage in the MRV plan according to specific site characteristics.

Comment 6.6-d:

One commenter (0800) states that subsurface CO_2 plume movement is expected, and therefore has no bearing on the risk of possible air emissions from GS. Another commenter (0808) asserts that reporting of the "movement of CO_2 in the subsurface and near-surface" should not be included in the final rule. The commenter notes that EPA concedes that subsurface movement data "does not necessarily mean that CO_2 will eventually leak to the surface." Three commenters (0800, 0808, 0813) assert that data related to subsurface plume movement of CO_2 that are unrelated to air emissions are apt to be misunderstood by the public and potentially mischaracterized by regulators, and that this type of reporting could potentially undermine the objectives of the reporting rule, which focuses on air emissions.

Response 6.6-d:

EPA disagrees that subsurface plume movement has no bearing on the air emissions at GS sites. Predicting and tracking the location of the CO_2 plume is critical for determining targeted monitoring of potential leakage of CO_2. The leakage of CO_2 to the surface will be dependent on site specific factors, and EPA acknowledges that a well characterized, selected and managed GS site minimizes the potential for leakage. See Chapter 1 of this document for further discussion of EPA's legal authority to require monitoring under subpart RR.

EPA also disagrees with commenters that this information will be misunderstood by the public and mischaracterized by regulators. EPA has concluded that today's final action will strengthen public confidence in CCS by providing data transparency, availability, and uniformity and by allowing GS project reporters to demonstrate the degree of monitoring that is in place to keep the public and the environment safe.

Comment 6.6-e:

One commenter (0810) asserts that seismic technology has very significant limitations, and because the resolution of seismic is no better than 40 feet, a large movement of CO_2 could go undetected and that it has limitations in identifying leakage pathways. The commenter's and their members' experience indicates that this technology has only been successful half of the time. It is uncertain that this technology will work and it is very expensive. The commenter suggests that the best approach for leakage detection is to employ strategic placement of monitoring wells, especially at geological spill points or across faults. The commenter requests that EPA limit monitoring for leaks to such key points in the system, and within a limited area intended to monitor only the "plume" of CO_2. The commenter also states that seismic methods cannot always be relied upon to evaluate leakage pathways.

Response 6.6-e:

EPA is aware that seismic monitoring has limitations on resolution and in some cases it may be difficult to use surface seismic for plume tracking. This is one reason why the MRV plan must be developed on a site specific basis and that EPA is not prescribing monitoring technologies that must be used at every site. In a setting where seismic may not be useful, the plan may use other approaches and technologies such as monitoring wells in the injection zone.

Comment 6.6-f:
One commenter (0816) asserts that EPA should allow estimation in quantifying leakage, because direct measurement is unlikely to be accurate or cost effective. This commenter also suggests that alternative methods, including reasonable estimates of leak duration, should be accepted in lieu of subsurface monitoring.

Response 6.6-f:
EPA has clarified in the final rule that leakage quantification can be a combination of estimation and direct measurement. EPA acknowledges that reasonable estimates of leak duration may be acceptable as long as the methodologies that the reporter is following to estimate leak duration are presented in the MRV plan that is submitted to EPA for review and EPA approves the MRV plan.

Comment 6.6-g:
One commenter (0813) asserts that EPA should not require a GS operator to monitor potential leakage pathways outside of the AoR unless and until evidence exists that plume movement has made leakage from those pathways a possible risk. The commenter believes that if no CO_2 is in the vicinity of a potential leakage pathway, monitoring would provide no useful emissions data to EPA and would not be an efficient use of resources.

Response 6.6-g:
EPA agrees with the commenter that monitoring should be focused on those areas with a risk of surface leakage. See Chapter 6.5 of this document for a discussion of the monitoring area.

6.7 MRV Plan Requirement for Establishing Baselines

Comment 6.7-a:
A coalition of ENGOs (0809) states that EPA is correct in requiring reporters to include baseline monitoring in all MRV plans, which will allow the Agency to discern whether detected CO_2 is attributable to leakage or other pre-existing sources. Another commenter (0788) is in favor of developing an atmospheric baseline of CO_2 concentration, but questions whether EPA is adequately considering potential variations through time in the baseline due to such factors as changes in land cover, nearby development, changes in surface use at the GS site, and other factors. The commenter states that EPA should clarify whether they expect a one time, static baseline from initial conditions, or a baseline that can evolve over time to account for these changes that are unrelated to leakage. One commenter (0816) suggests that pre-injection

baselines be considered on a case-by-case basis to account for different site characteristic and previous knowledge.

Response 6.7-a:
EPA agrees that requiring baseline setting is a critical aspect of monitoring and leakage detection and quantification and should be established based on the site specific characteristics. In order to account for potential variations through time in the baseline, the final rule includes provisions for the reporter to re-submit the MRV plan in the case that material changes to baselines occur.

Comment 6.7-b:
Six commenters (0803, 0808, 0810, 0813/TRANS-VA-02, 0800, 0802) questioned the feasibility and utility of establishing atmospheric environmental baselines. Four commenters (0803, 0808, 0810, 0813) assert that the establishment of environmental baseline data should not be required because such data cannot be reliably collected and therefore the approach is not useful in quantifying emissions. Commenters (0803, 0810) state that ambient local CO_2 concentrations can be highly variable due to many environmental factors, and can vary temporally from year to year. They state that the potential result of using such a baseline as an indicator is to establish leak criteria that may not be accurate when compared to future conditions. One commenter (0813) states that EPA has not made clear how such variable baselines could be used to quantify leakage and suggests that EPA not require establishment of a pre-injection environmental baseline without a justification for how this information will improve the quality of emissions data collected and reported. A commenter (0800) states that atmospheric baseline data cannot be reliably determined. One commenter (0815) questions the value of establishing pre-injection environmental baselines as required in 40 CFR part 98.448(a)(1)(iii) given that atmospheric background concentrations of CO_2 would be expected to be constant across the injection site and surrounding area prior to injection, and that levels above background after injection begins would be indicative of fugitive or vented emissions.

Another commenter (0802) asserts that EPA's focus on CO_2 concentration in the atmosphere could lead to a large number of "false positive" leak determinations and possible disputes over mass balance calculations.

One commenter (0810) asserts that the only environmental baseline that "makes sense for a GS project would be for the water pathway which could be reasonably monitored at specific locations prior to initiating the project."

Response 6.7-b:
The establishment of baselines is a critical aspect of monitoring for leakage detection and of quantifying surface leakage and will allow the Agency to discern whether detected CO_2 is attributable to leakage or other pre-existing sources. EPA revised the term from 'pre-injection environmental baseline', to 'expected baselines' because the establishment of a baseline may in some cases occur after the initial injection (as in existing CO_2-ER projects reporting under subpart RR) and may include environmental baselines such as surface CO_2 concentrations and fluxes, subsurface pressures and geochemistry, other monitored environmental parameters, and/or operational baselines associated with the injection operation (e.g. injection pressure).

EPA acknowledges the difficulty of establishing an atmospheric CO_2 baseline in particular, due to expected natural seasonal and diurnal variation of CO_2 concentration, and other natural variations due to weather conditions. In addition, EPA acknowledges that the natural concentration of CO_2 in the atmosphere near a GS site can vary through time for reasons unrelated to the injection. However, baseline conditions can be established through various existing and appropriate methods. For example, subsurface pressure and geochemistry baselines can be established through well testing and sampling. Atmospheric CO_2 baselines can be developed through statistical analysis of seasonal, diurnal, and weather effects on CO_2 concentration. These effects can be modeled to establish an expected atmospheric CO_2 baseline in many instances. EPA also acknowledges the potential for false positives in monitoring for leakage detection. See the final General TSD for more information on establishing baselines for the MRV plan, including considerations for determining whether a monitoring anomaly is actual leakage or a false positive.

Comment 6.7-c:

Two commenters (0802, 0812) assert that EPA should be open to leak determination methods other than those relying upon atmospheric baselines. Other methods could include the use of injected tracers and CO_2 isotope analysis. One commenter (0802) states that these approaches would be much more precise and useful than ambient CO_2 monitoring of the atmosphere. Three commenters (0802, 0812, 0816) are against the use of real-time "upwind" monitoring as a point of comparison to "downwind" ambient CO_2 concentrations as the approach would be both more expensive and unreliable. A commenter (0816) states that atmospheric CO_2 measurements are currently of very limited use and that beyond the difficulty in estimating reliable atmospheric baselines, the determination of where to measure baselines upwind of potential leakage is difficult and bound to be highly inaccurate. They state that given the wide variation of leakage pathways and unpredictability of wind, pursuit of such an estimate is likely to be extremely costly and very ineffective.

Response 6.7-c:

EPA retains the requirement in the final rule for including a strategy for establishing baselines in the MRV plan. However, EPA is not prescribing how these baselines are determined and recognizes that there are appropriate and effective approaches toward establishing baselines that may not involve relying upon atmospheric measurements. See other comments in this Chapter for discussion of establishing atmospheric CO_2 baselines.

Comment 6.7-d:

One commenter (0812) notes that the selection of a surrogate site to develop pre-injection baselines would be a challenge since finding an appropriate site that would be representative of the injection site in terms of diurnal and seasonal variations in ambient conditions and vegetation growth and decay would be difficult. The commenter suggests that since the objective of the pre-injection baseline monitoring is to identify leakage from the GS site to determine net CO_2 sequestered, it may be more accurate and cost effective to monitor for the presence of natural or introduced tracers at the surface of the reservoir as an indicator of leakage. The commenter

suggests that if leakage is detected then an appropriate CO_2 flux monitoring technique could be implemented to measure leakage.

Response 6.7-d:
EPA agrees with the commenter that there may be site specific characteristics that would favor one baseline setting approach over another and that an approach using tracers may be the most effective and accurate method for some sites. EPA does not require specific monitoring technologies or specify methods for baseline setting for that reason, and allows the reporter to outline the approach best suited to the site.

6.8 General Comments on Monitoring

Comment 6.8-a:
One commenter (0057) states that a simple monitoring system around the perimeter of the GS site would be sufficient to detect leakage.

Response 6.8-a:
EPA disagrees that monitoring around the perimeter of a GS site would be sufficient to detect leakage. Rather, the MRV plan should include a strategy for monitoring the area where surface leakage of CO_2 may occur. See Chapter 6.5 of this document for further discussion of the requirements for the monitoring area under subpart RR.

Comment 6.8-b:
One commenter (0186) states that in addition to monitoring gases on a real-time basis, EPA should review seismic data that may indicate that the injected CO_2 is re-activating faults and fractures that could allow seepage, either at the injection site or some distance away. Both geophysical and geochemical monitoring are needed.

Response 6.8-b:
EPA does not prescribe monitoring technologies in subpart RR (as discussed in Chapter 1 of this document), but agrees with the commenter that geophysical and geochemical monitoring techniques, including seismic monitoring, may be included in an MRV plan. As a reporting program, the purpose of monitoring under subpart RR is not to monitor the safety of GS, but EPA notes that permitting requirements exist under the purview of the UIC program. Please refer to the UIC Web site at http://water.epa.gov/type/groundwater/uic/wells_sequestration.cfm for more information on the UIC program.

Comment 6.8-c:
One commenter (0801) states that Departments of Building and Safety and of Planning[8] are not trained for MRV tasks and that state, regional, and local agencies have no requirements to address or include MRV plans.

[8] The organization is not indicated.

Response 6.8-c:
EPA is responsible for reviewing or enforcing MRV plans, and is not delegating the program to Departments of Building and Safety and of Planning.

Comment 6.8-d:
A coalition of ENGOs (0809) applauds the EPA's guidance provided in the draft Monitoring Plan TSD.

Response 6.8-d:
EPA developed the Monitoring Plan TSD in conjunction with the proposal to provide a broad overview of monitoring at GS sites. We are glad that the commenter found it useful and informative.

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7 MRV Plan Submission and Approval

7.1 Review Process for MRV Plans

Comment 7.1-a:
One commenter (0786) expresses confidence in EPA's ability to evaluate proposed MRV plans in onshore areas. However, in the case of offshore sub-seabed GS sites, the commenter recommends that MRV plans be submitted to the Department of Interior – Minerals Management Service Bureau of Safety and Environmental Enforcement for approval. Alternately, such plans could be submitted both to EPA and the Department of Interior for joint approval.

A coalition of ENGOs (0809/TRANS-VA-01) assert that it will be important for EPA to reach out to state UIC permitting agencies, especially in the area of developing site-specific MRV plans, as these state agencies are likely to have available the best information on the geology, injection control history and local atmospheric monitoring that must serve as the foundation for case by case MRV plans. Communication between EPA and permitting authorities will be key to safeguarding the local environment. The commenters suggest that sufficient resources will be needed both at EPA and at the state agencies to devote staff and time to data sharing and coordinated development of MRV and reporting plans. See preamble Section II.A. for a discussion of offshore jurisdiction.

Response 7.1-a:
The GHG Reporting Program, including subpart RR, is implemented by EPA and approval of MRV plans is not delegated to another Agency, such as the Department of the Interior. The Agency has significant expertise on GS and acknowledges that MRV plan approval will require the involvement of quality trained staff. EPA also values the technical expertise of other federal and state agencies.

Comment 7.1-b:
One commenter (0802) states that the proposed rule should include the substantive criteria that EPA will use to evaluate submitted MRV plans. The commenter mentions that 40 CFR part 98.488(a)(5)(i) of the proposed rule provides only that EPA will evaluate the MRV plan to ensure that the facility has an appropriate strategy in place to effectively quantify geologically sequestered CO_2, which the commenter argues is entirely subjective. The commenter suggests that, while EPA should retain substantial flexibility, the discretion should not be unfettered, and EPA's MRV approval criteria should at least reference the MRV plan elements set forth in 40 CFR part 98.488 (a)(1).

Three commenters (0813/TRANS-VA-02, 0800, 0815) assert that the proposed MRV approval process appears to have no objective standards by which EPA will accept or reject plans. One commenter (0813) mentions that EPA's goal should be to ensure a streamlined approach for approval so that projects can move forward without delay. They suggest that EPA provide clear standards by which monitoring plans will be assessed and accept permit requirements adopted by other permitting agencies, particularly in the UIC context. A coalition of ENGOs (0809) mentions that the proposed rule does not establish standards by which EPA or the Environmental

Appeals Board (EAB) can assess the MRV plans and that EPA should establish criteria against which the MRV plans will be evaluated.

Response 7.1-b:
EPA disagrees with comments that the MRV plan approval process is subjective and that no standards are provided by which to judge submitted MRV plans. EPA outlines the requirements of an MRV plan in 40 CFR part 98.448 and further discusses them in the preamble to the final rule and in the final General TSD. Refer to Chapter 6.1 of this document for further discussion on allowing for site-specific MRV plan flexibility. Refer to Chapter 11 of this document for a discussion of the role of the UIC permit in subpart RR. See Section II.B of the final preamble for a discussion of the EAB public appeals process and ability for the public to challenge MRV plans.

Comment 7.1-c:
One commenter (0815) asserts that the regulatory review of an MRV plan under a CAA regulation goes beyond the scope of a regulatory review that the commenter would expect to be performed by a state or federal air quality regulatory agency. The commenter does not expect the EPA Office of Air and Radiation (OAR) to have the expertise to evaluate the effectiveness of GS MRV plans. The commenter is also concerned about potential approval delays, due to the lack of defined criteria or timelines for EPA approval (e.g. requiring approval within 180 days following submittal).

Response 7.1-c:
With regard to the commenter's suggestion that MRV plan approval is outside the scope of the CAA, EPA disagrees with the commenter and asserts that approval of MRV plans is within EPA's authority under the CAA (see Chapter 1 of this document). The Agency has significant expertise on GS and acknowledges that MRV plan approval will require the involvement of additional trained staff. EPA has designed this rule so that facilities can comply with the reporting requirements without disrupting or delaying normal operations. That said, EPA has outlined specific timelines for the approval process in the preamble to the final rule (see Chapter 7.3 of this document).

Comment 7.1-d:
A coalition of ENGOs (0809) asserts that EPA should be provided adequate resources to implement the regulatory program for GS both under the SDWA and these CAA rules. The commenter states that it will be important for EPA to develop additional in-house experience with GS. The commenter supports the ongoing efforts of EPA to coordinate the proposed rule with the UIC rule for GS and ER facilities, as this may lead to a new section of EPA that is dedicated to CO_2 sequestration. The commenter generally supports additional funding to EPA for implementation.

Response 7.1-d:
MRV plan approval will require the involvement of quality trained staff and though EPA has significant expertise on GS, the Agency agrees that it will be important to continue to develop in-

house experience with GS. EPA is also committed to continue to coordinate between programs to ensure a comprehensive regulatory framework for GS.

Comment 7.1-e:

One commenter (0800) does not agree with EPA's proposed approach for the approval of MRV plans. Two commenters (0800, 0813) believe that subjecting MRV plans for reporting to a heightened level of scrutiny or a significantly more complex process for obtaining regulatory approval than UIC permitting is not appropriate or necessary. The commenter proposes that any review for reporting purposes should not involve a reopening of any element in an EPA (or a state that has primacy) approved permit or reporting plan. If additional information is required, the comment proposes that EPA approval be limited to a review for completeness that must be completed within 180 days of submission or the permit will be deemed complete and approved.

Two commenters (0813, 0815) also state that an MRV plan under an air emissions rule is not the appropriate means for evaluating or re-evaluating a GS site's monitoring plan on a site by site basis.

One commenter (0808) asserts that EPA should deemphasize the proposal's MRV requirements and leave that to site permitting authorities. To the extent that a modest amount of MRV is deemed necessary for air emissions reporting, the commenter suggests that EPA's evaluation of the MRV plan be subject to a completion check only and a deadline for approval.

Response 7.1-e:

EPA disagrees with the commenter that the MRV plan review process is more complex than the UIC permitting process. EPA has determined that the MRV review process is necessary to ensure that geologically sequestered CO_2 is accurately reported. The reporter will be responsible for submitting the information required by EPA in the MRV plan, including relevant information and data from the facility's UIC permit. The first step of the review process will be a check that the submitted MRV plan contains all of the required components. The MRV plan must include the following components:

- Delineation of the MMA and AMA;
- Identification of the potential surface leakage pathways and an assessment of the likelihood, magnitude and timing, of surface leakage of CO_2 through these pathways ;
- Strategy for detection and quantification of surface leakage;
- Approach for establishing expected baselines; and
- Considerations made to calculate site-specific variables for the mass balance equation.

EPA does not agree with the commenters that the review of the MRV plan should be limited to a completeness check. Without the capability to review the technical information provided in the MRV plans, the Agency would not be able to ensure accurate reporting. After the MRV plan is determined to be complete, EPA will commence a thorough technical review and if requested, the reporter will be expected to provide EPA with additional information. See Section I.D. of the preamble for a discussion of the relationship between subpart RR and regulations under the UIC program.

Comment 7.1-f:
One commenter (0594) asserts that someone from outside the GS operations should review the monitoring reports.

Response 7.1-f:
EPA agrees with the commenter and will review MRV plans and annual reports submitted by reporters.

7.2 Public Involvement and MRV Plans

Comment 7.2-a:
A coalition of ENGOs (0809) asserts that numerous reports stress that public acceptance will be critical to the success of CCS, and the need to gain public acceptance will be especially important for the early projects. The commenter stresses that information should be made available to the public throughout the life of the GS project. The commenter states that "the International Risk Governance Council recommends that regulatory frameworks must include effective risk communication to engage and educate the public, involve all stakeholders in risk-related decisions, and build confidence in the institutions governing CCS." They also assert that both Congress's original request for a reporting rule and Section 114 of the CAA recognizes the public's vital interest in emissions data and that the proposed rule lacks some of this transparency.

Two commenters (0140, 0213) assert that the results of all monitoring should be made public. One commenter (0811) asserts that it is important to enhance transparency to the public in reporting and monitoring wherever possible. One commenter (TRANS-VA-06) encourages EPA to bring the same transparency to the MVR process as they have brought to the rest of the final reporting rule. The commenter believes that this will allow for public participation in the MVR process and will ensure public awareness of monitoring and verification.

One commenter (0811) asserts that a provision should be applied to the Proposed Rule to the effect that the results of any publicly required monitoring should be forwarded to the EPA and made available to the public. These publicly required monitoring data may be either those that are required by EPA or the state permitting agency, or may be at the state level or via qualification for federal emissions reduction incentives. If publicly required performance information is generated, the commenter suggests that the information be available to the public via a central agency, of which EPA is the natural lead.

Response 7.2-a:
EPA agrees with commenters and views transparency as key to encouraging public education and acceptance of this technology. EPA will post final MRV plans to a publicly accessible Web site subject to any limitations or requirements resulting in its CBI determination (see Section I.B of this preamble). Any reporter, or interested person, objecting to EPA's final decision, may appeal it to EPA's Environmental Appeals Board. In addition, EPA will publish reports

containing data that reporters submit yearly (the contents of the public report are also dependent on the outcome of the CBI determination). See Section I.B. of the final preamble for a discussion of the CBI rulemaking.

Comment 7.2-b:

A coalition of ENGOs (0809) mentions that EPA is proposing that MRV plans can be developed without public involvement or review. The commenter believes that this lack of public involvement is a major oversight and proposes that the final MRV plans are offered for public comment. The commenter suggests that the public will be particularly interested in, and also have information on potential leakage pathways.

The commenter proposes that i) EPA direct the project participants to initiate outreach to local communities as part of the MRV planning process; ii) EPA inform the local community when the Agency begins working with a plan, and make the application materials public and easily accessible online; iii) EPA and the permit applicant should hold public information sessions in the affected community and work to address public concerns; iv) the final rule include at least a 60-day public comment period on a proposed MRV plan once it is developed; v) as part of outreach, the EPA compile and maintain a list of interested persons for each proposed/completed project and inform this list of every new application change, hearing, comment period, annual report, and post these materials on the internet; and vi) EPA continue to make information about the permit and the MRV plan available throughout the life of the project, including monitoring and leakage addendums, re-evaluation of plans, and annual reports.

One commenter (TRANS-VA-04) asserts that both Congress's original Request for Reporting Rule and Section 114 of the CAA on which the rule is based, recognize the public's vital interest in emissions data. The commenter asserts that the preamble to the proposed rule posits that CCS operators may be able to challenge inappropriate plans before the EAB, but does not discuss public challenges and lacks transparency. The commenter recommends that the final rule ensure that MRV plans are offered for public comment and that the public and CCS operators have parallel rights to challenge plans. The commenter believes that allowing only operator challenges to MRV plans would bias the review process. Another commenter (TRANS-VA-01) encourages EPA to consider public participation by incorporating notice and comment in the MRV development process.

One commenter (0140) states that there must be provision for public review and input of monitoring plans and their implementation as well as a process for the public to challenge in a neutral forum adequacy of plans and the effectiveness of their implementation. One commenter (0801) states that the public is not made abreast of the MRV tasks because no law exists for the process to be circulated for public comment.

The Sierra Club mass mailers (0023) support a strong rule which ensures that the public has a strong voice in reviewing monitoring plans and challenging them if they're inadequate.

Response 7.2-b:

EPA agrees with commenters that there should be a process for public involvement. See Response 7.2-a for a discussion on providing reported information to the public. In response to comments on providing a public comment and notice period for MRV plans, EPA has decided not to finalize with such a process as this is a reporting rule, and not a CO_2 emissions control rule. Though there is no formal public comment process prior to approval of individual MRV plans in today's rule, EPA believes the administrative appeals process provides an opportunity for involvement by any member of the public who is concerned about the provisions of an approved plan. Further, if future GS policies or programs are promulgated as a result of the data collected through today's rule for which a formal public notice and comment period would be appropriate, EPA will establish a public notice and comment period for such a policy or program at that time. See Section II.B and the response to comments on public involvement in Section II.E of the final preamble for a discussion of the EAB public appeals process and ability for the public to challenge MRV plans.

Comment 7.2-c:
One commenter (0801) states that EPA fails to state the options for the public in all categories for private ownership of the facilities.

Response 7.2-c:
Regulatory requirements regarding private ownership of facilities is beyond the scope of this rulemaking.

7.3 Schedule for MRV Plan Submission to EPA

Comment 7.3-a:
The multi-stakeholder discussion group (0799) asserts that confirmation of the AoR only comes with final permit approval. The multi-stakeholder discussion group provides recommended language to clarify that there is no intention to create an additional step that would precede the issuance of a final permit along with responses to comments received on the proposed permit. The multi-stakeholder discussion group proposes the following edits to 40 CFR part 98.448(a)(3)(i):

> (i) A GS facility must submit the MRV plan to EPA (A) within six months from the time the facility's Underground Injection Control ~~permitting authority~~ [**program Director**] (or relevant permitting authority in the case of a facility that is not [**subject to**] ~~under the jurisdiction of~~ the Safe Drinking Water Act) [**issues a final permit confirming**] the area of review or (B) by December 31 of the year ~~that that~~ [**in which**] the Underground Injection Control permitting authority (or relevant permitting authority in the case of a facility that is not [**subject to**] ~~under the jurisdiction~~ [**of**] the Safe Drinking Water Act) [**issues a final permit confirming**] the area of review, whichever date is later. A facility will be allowed to request one extension of up to an additional six months.

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

Response 7.3-a:
EPA concurs with the comment that confirmation of the UIC AoR only occurs with the final issuance of the UIC permit and the Agency does not intend to add a step to the UIC permit process. Therefore, EPA revised the final rule to reflect that the submission date is linked to the issuance of a final permit.

Comment 7.3-b:
The multi-stakeholder discussion group (0799) asserts that agencies have "jurisdiction" and statutes have applicability. Also, because the AoR will not be finally confirmed until a final permit is issued, the commenter recommends a text revision to avoid suggesting that some alternate "confirmation" could be issued prior to the issuance of a final permit. The commenter proposes the following edits to 40 CFR part 98.448(a)(3)(ii):

> (ii) If the GS facility holds an Underground Injection Control permit (or relevant permit in the case of a facility that is not [**subject to**] ~~under the jurisdiction of the Safe Drinking Water Act) as of the date of publication of this subpart or if the Underground Injection Control permitting authority (or relevant permitting authority in the case of a facility that is not under the jurisdiction of the Safe Drinking Water Act) has~~ confirm[**ing**]~~ed~~ the area of review as of the date of publication of this subpart, such facility must submit the MRV plan to EPA within six months of the date of publication of this subpart. A facility will be allowed to request one extension of up to an additional six months.

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

Response 7.3-b:
EPA concurs with the comments and revised the final rule to reflect the text changes regarding 'jurisdiction' in order to accurately reflect that Agencies have jurisdiction and statutes have applicability. See Response 7.3-a on the decision to link the submission date to the issuance of a final permit.

Comment 7.3-c:
One commenter (0800) notes that EPA proposes that each facility must submit an MRV plan within six months of the publication of this subpart. The commenter encourages EPA to allow a facility to request one extension of up to six months.

Response 7.3-c:

EPA agrees with the commenter and retained the six month extension for submissions of the MRV plan in the final rule to accommodate cases in which the reporter may need additional time to develop their MRV plan.

Comment 7.3-d:

A coalition of ENGOs (0809) expresses concern that the proposed rule may allow some operators to begin injecting without an approved MRV plan in place. The coalition of ENGOs states that MRV plans should be in place prior to injection at GS facilities and as soon as possible at an ER facility that elects to convert to GS. The coalition of ENGOs suggests that this is a loophole and proposes that it be closed. The provision in question is 40 CFR part 98.448(a)(3). Under this provision, GS facilities would be required to submit the MRV plan after the permitting authority confirms the AoR. Once the permitting authority confirms the AoR, the operator has either six months or until December 31 of that year, whichever is later to submit MRV plans. Consequently, under the proposed rule, GS facilities can take up to a year and a half to submit their MRV plans after the AoR is confirmed. The coalition of ENGOs mentions that the rule does not provide any rational justification for such an extension, or standards by which such requests will be judged and believes that this relaxed approach is inconsistent with the comprehensive reporting rule's efforts to prevent facilities from reporting using substandard methods (i.e., this schedule gives facilities too long to develop and implement MRV plans and risks losing important data).

The coalition of ENGOs states that the GS facilities would be allowed to begin injection without baseline monitoring. The coalition of ENGOs is concerned that 40 CFR part 98.448(a)(5)(ii) allows operators to being injection without an approved MRV as the section reads 'You must implement the EPA-approved MRV plan once the plan is final, regardless of the point in the reporting year'. The coalition of ENGOs recommends that EPA correct this section. The coalition of ENGOs also asserts that the rule does not establish minimum reporting requirements for the period between when an MRV plan is submitted and when it is approved, in the event that injection has begun. The net result is that a facility could wait over a year before submitting its plan and then spend months waiting on EPA approval. The coalition of ENGOs asserts that this outcome is not acceptable, in particular, as new GS sites do not need six months to a year and a half to submit MRV plans. The coalition of ENGOs believes that any responsible operator will have MRV plans in place prior to beginning operations. The coalition of ENGOs recommends that the reporting calendar should be tightened and integration of the reporting rule with the UIC requirements be improved.

The coalition of ENGOs suggests that EPA should establish strong defaults that would be applicable if an MRV plan is not in place. As an example, the commenter states that it is not clear that companies can wait until their AOR is confirmed to submit a draft MRV plan. EPA could consider requiring draft MRV plans be submitted as part of the UIC permit application. As operators will already be developing monitoring systems, they should be able to simultaneously develop MRV plans. The coalition of ENGOs also suggests that EPA structure the reporting rule itself to create very strong incentives to put MRV plans in place prior to injection by establishing strong default rules rewarding responsible operators. The coalition of ENGOs states that 'these defaults, applicable if an MRV plan is not yet approved, could be set very conservatively,

assuming maximum emissions in the absence of an air-side monitoring plan. These defaults could, for instance, set the ambient baseline level of CO_2 at zero for all measurement purposes, subject only to rebuttal via direct measurements, until an MRV plan is in place. Setting such conservative default values is plainly within EPA's broad authority to specify the "procedures" and "methods" by which emissions are to be measured under Section 114. 42 U.S.C. § 7414(a)(1)(D).'

Regarding timing and comprehensiveness, the commenter (TRANS-VA-04) suggests that CCS operations only go forward if monitoring and reporting procedures are in place before injection, and monitoring and reporting should continue well after injection has finished. The commenter notes that the proposed rule allows facilities to delay finalizing their MRV permits for as much as one year after they receive an injection permit. The commenter believes that this schedule is unacceptable because MRV plans are required to include baseline information of pre-injection conditions. Monitoring should be in place before the final UIC permit is issued.

The Sierra Club mass mailers (0023) support careful and comprehensive monitoring starting before injection can begin.

Response 7.3-d:

EPA allows early submittal of an MRV plan to enable the monitoring and reporting procedures to be in place before injection begins. However, EPA does not consider it appropriate to condition operation of a GS facility on compliance with the MRV plan given the scope of the Agency's authority under Section 114. The purpose of the reporting rule is to gather information and is not intended to condition or restrict the operation of sources. See other responses in this chapter for discussions on the schedule for submitting MRV plans to EPA. A facility that does not have an implemented MRV plan (per the date determined in the MRV plan) will not be able to report CO_2 sequestered to EPA under the GHG Reporting Program. The reporter will only be allowed to report GS to the GHG Reporting Program data system based on the timeline outlined in their approved MRV plan.

Comment 7.3-e:

One commenter (0816, 0816) asserts that since the timeline for the proposed rule is expected to be similar to that of the first round of the MMR in 2009, the anticipated time interval between the subpart RR promulgation and data collection is expected to be extremely short and does not allow reporters sufficient time to properly develop their MRV and obtain EPA approval and prepare for data collection. The commenter requests that EPA recognize the practical difficulties with the suggested timeline and allow operators engaging in GS to prepare for monitoring and develop an adequate MRV plan in 2011, then start collecting data no earlier than January 1, 2012 and make initial reports due no earlier than July 1, 2013. They recommend that for facilities that are either GS only, or currently operate CO_2-ER and opt to define themselves as CO_2-ER-GS a different timeline should be established. They suggest that EPA should also allow more time for filing facility reports, which should be due no earlier than July 1st following the calendar year for which they report, starting with July 1, 2013. The commenter (0816) also recommends that EPA stagger reporting to require subpart RR reports to be filed by June 30th of the following

year, allowing reporters to first focus on GHG emissions reporting under subpart C and W prior to summarizing the data for GS operations under subpart RR.

Response 7.3-e:
EPA disagrees with the comment that facilities will not have sufficient time to properly develop their MRV plans, obtain EPA approval, and prepare for data collection. For existing facilities conducting GS, MRV plans are due by June 30, 2011, and such facilities are allowed to request one extension of up to an additional 180 days. New facilities conducting GS are required to submit their MRV plan to EPA within 180 days of authorization of receiving a final UIC permit, or within 180 days of receiving authorization to begin GS of CO_2 for an offshore facility not subject to SDWA. Facilities are also allowed to request one extension of up to an additional 180 days. This is reasonable because facilities that are required to submit MRV plans will already have a strong foundation for building their MRV plan from their existing UIC permit. Facilities conducting ER and that are not permitted as UIC Class VI under the UIC program, may choose to submit an MRV plan any time. EPA retains the March 31 reporting date, consistent with the rest of the GHG Reporting Program. See Chapter 5.4 of this document for more information on this issue.

Comment 7.3-f:
A commenter (0816) mentions that EPA is proposing that i) the GS site begin implementing the MRV plan within thirty days of EPA approval, even if the operator disagrees with the approved plan; and ii) if the operator chooses to appeal, EPA is proposing to require the operator to begin implementing the plan until the appeals process is complete. The commenter (0816) supports delayed implementation of the MRV plan, or at least those aspects of the plan under dispute, until the appeals process is complete. The comment asserts that requiring GS operators to implement the plan during the appeals process would force the operators to spend significant resources for a plan that may not even be implemented. The commenter recommends a policy under which the GS operator would be responsible for implementing the MRV plan that has been proposed by the operator, while postponing implementation of those portions of the plan that are subject to dispute during the pendency of an appeal.

A coalition of ENGOs (0809) states that the implementation of the MRV plan must not be stayed pending review of the Administrator's decision. They mention that it is preferable for an incomplete set of monitoring and reporting requirements to be in place during the period when CO_2 is being injected at the GS facility, rather than for injection to continue without any airside monitoring and reporting.

Response 7.3-f:
EPA agrees with the commenter (0816) that requiring GS operators to implement the plan during the appeals process would force the operators to spend resources for implementing a plan that may be subject to change due to the appeals process. In order to maintain the most accurate data collection possible, EPA will not accept partial implementation of an MRV plan, and therefore if an MRV plan is not final or is under appeal, the reporter would only collect and report data on CO_2 received. EPA has clarified in the final rule that once the MRV plan is final and no longer

subject to administrative appeal, the reporter must implement the plan starting on the day after the day on which the plan becomes final and is no longer subject to appeal.

7.4 MRV Appeal Process

Comment 7.4-a:
One commenter (0816) and a coalition of ENGOs (0809) state that because of the technical nature of the decision to approve or disapprove an MRV plan, appeals should take place before the EAB prior to being subject to judicial review. Commenter 0816 believes that, in some instances, review of the approved MRV plan could benefit from the opportunity for the GS operator and EPA to adduce evidence and develop a more robust administrative record than may exist at the time the review is conducted. They believe that bypassing the potentially useful step of administrative review and only allowing direct appeal to a federal appellate court could in some cases work to the detriment of the review. Two commenters (0800, 0813) assert that such judicial review could lead to years of administrative and judicial process for each MRV plan. Two commenters (0800, 0813) also point out that UIC permits are not subject to evidentiary hearings and judicial review though they would require monitoring plans that are equally if not more complex than those required for the proposed reporting rule.

One commenter (0808) asserts that the approval approach for MRV plans appears to give the Agency an unfettered discretion to act upon plan submissions and that it is not clear that it is appropriate in the context of an air emissions rule. They state that so elaborate is the anticipated MRV process that EPA is considering mechanisms such as formal administrative reviews, possibly including formal evidentiary hearings, and judicial review thereafter. They state that while judicial review is a check on Agency action, the approach set forth by EPA could lead to years of administrative and judicial process for each MRV plan submitted for approval.

Response 7.4-a:
EPA agrees with the commenters that an administrative appeals process is appropriate for subpart RR. Therefore, under today's final rule, final decisions of the Administrator under 40 CFR part 98, subpart RR are appealable to EPA's EAB under the regulations that are set forth in 40 CFR part 78. 40 CFR part 78 is revised to accommodate such appeals. Refer to Section II.B and Section II.E of the final preamble for a discussion of the EAB public appeals process and ability for the public to challenge MRV plans. Regarding the commenter who stated that the administrative review could take years, EPA concludes that without an administrative appeals process, the reporters' and the publics' only option becomes litigation, which EPA believes would be more disruptive, costly, and delay implementation of MRV plans further.

Comment 7.4-b:
A coalition of ENGOs (0809) suggests that the proposed rule does not discuss whether the appeals process will be available to members of the public who do not agree that the Agency's approved plan is sufficient. The commenter argues that the final rule should grant people affected by subpart RR the ability to challenge approved plans.

Response 7.4-b:

EPA agrees with the commenter that the public should be allowed to appeal MRV plans and has included a process for public appeal in the final rule. Refer to Section II.B and Section II.E of the final preamble for a discussion of the EAB public appeals process and ability for the public to challenge MRV plans.

7.5 MRV Plan Implementation

Comment 7.5-a:

The multi-stakeholder discussion group (0799) suggests text modifications to convert a provision to being exclusively based upon leakage, with the provisions of (7) addressing all other bases for updating the MRV. The commenter proposes the following edits to 40 CFR part 98.448(a)(6):

> (6) If ~~adjustments to the MRV plan are made due to new information or altered site conditions or if a leak~~ [**leakage**] is detected in a calendar year, you must submit an addendum at the same time as the next annual report (March 31 of the subsequent calendar year) that includes the following components.

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

Specifically, the multi-stakeholder discussion group (0799) recommends the following revision to 40 CFR part 98.448 (a)(6)(ii) because the commenter believes that this revision would clarify that the provision is based solely on leakage:

40 CFR part 98.448 (a)(6)(ii):

> (ii) A description of how the monitoring strategy was adjusted, if adjustments were made in [**response to the leakage**].

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

The multi-stakeholder discussion group (0799) also suggests revisions to 40 CFR part 98.448(a)(7) of the proposed rule. The recommended revision is based upon the MSD revisions submitted to EPA's UIC program for revision of the proposed GS rules under the SDWA. The commenter recommends imposing a continual obligation on operators to assess whether the AoR itself or plans be revised. The commenter recommends that it is useful to break down the term "reevaluation" into two concepts: "assessment" and "revision." The commenter believes that i) these suggestions will result in increased accuracy and reliability in the site performance data while avoiding work that is not warranted by the site data and site performance; and ii) a continuous obligation to assess whether revisions are needed, coupled with an annual statement requirement will create a clear accountability for operator and Director in the case of disputes. It

is unnecessary to require a reevaluation of the AOR on a fixed basis in every case. The commenter proposes the following edits to 40 CFR part 98.448(a)(7):

> (7) [**You must maintain, and update the MRV plan in accordance with the provisions of this section.**
> **(i) You must submit with the annual report a statement, signed by an appropriate company official, confirming that you have:**
> **(A) reviewed the monitoring and operational data that are relevant to a decision on whether to reevaluate the area of review or the MRV plan; and**
> **(B) determined whether any updates were warranted by material change in the monitoring and operational data or in your evaluation of the monitoring and operational data.**
> **(ii) The MRV plan must be revised and resubmitted to EPA by March 31 of the calendar year following any year in which:**
> **(A) You determine an update of the MRV plan to be warranted pursuant to subparagraph (i) of this paragraph; or**]

[NOTE: Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

Response 7.5-a:

EPA agrees with the commenter's recommendation to require a continual obligation on operators to assess whether the monitoring areas or MRV plan needs to be revised as this will provide EPA assurance that the strategies for monitoring in the MRV plan are based on the latest monitoring and modeling results. Therefore EPA revised the final rule to include a provision for an annual monitoring report that describes the monitoring efforts conducted over the previous calendar year, any changes to the monitoring program that you concluded were not material changes warranting submission of a revised MRV plan under paragraph, any monitoring anomalies that were detected in the previous calendar year and how they were investigated and resolved, and surface leakages of CO_2.

Facilities must re-submit the MRV plan for EPA approval if a material change was made to monitoring and/or operational parameters that was not anticipated in the original MRV plan, if the facility's UIC permit class changes, or if an EPA review of the annual report determines that it is necessary. Examples of material changes include but are not limited to large changes in the volume of CO_2 injected; the construction of new injection wells not identified in the MRV plan; failures of the monitoring system including monitoring system sensitivity, performance, location, or baseline; changes to surface land use that affects baseline or operational conditions; observed plume location that differs significantly from the predicted plume area used for developing the MRV plan; a change in the maximum monitoring area or active monitoring area; or a change in monitoring technology that would result in coverage or detection capability different from the MRV plan.

Comment 7.5-b:

The multi-stakeholder discussion group (0799) asserts that the language of 40 CFR part 98.448(a)(7)(i) is overly broad and misdirected, and should be deleted. The commenter claims that there are many types of noncompliance regarding permit requirements that will not have an impact on MRV plans, such as failure to have the wellhead painted. The specific deletion in 40 CFR part 98.448 (a)(7)(i) suggested by the commenter is shown below:

40 CFR part 98.448 (a)(7)(i):

> ~~(i) The reporter is out of compliance with its Underground Injection Control permit (or relevant permit in the case of a facility that is not under the jurisdiction of the Safe Drinking Water Act).~~

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document.]

Response 7.5-b:
EPA agrees with the commenter and has deleted this provision. See Response 7.5-a for a description of the MRV plan re-submission requirements.

Comment 7.5-c:
The multi-stakeholder discussion group (0799) suggests the following revision to 40 CFR part 98.448 (a)(7)(ii) for greater clarity:

40 CFR part 98.448 (a)(7)(ii):

> (ii) An EPA audit conducted under the verification procedures of this part determines ~~it~~ [**an update of the MRV plan**] to be necessary.

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

Response 7.5-c:
EPA has revised this regulatory text to clarify that the MRV plan must be revised if EPA notifies the reporter of substantive errors in the MRV plan or monitoring report. See 40 CFR part 98.448 for the specific regulatory text.

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8 Cease Reporting

8.1 Cease Reporting Provisions

Comment 8.1-a:
One commenter (0816) had difficulty ascertaining the regulatory intent of proposed 40 CFR part 98.441. In particular, the commenter perceived a conflict between the statement that 40 CFR part 98.2(i) does not apply to this subpart and the cease reporting provisions outlined in 40 CFR part 98.441(b). The commenter also asserts that terms are mixed and confusing. The commenter proposed specific regulatory text changes to 40 CFR part 98.441(b)(1) to specify that reporters must resume reporting if the facility resumes operations "by transferring CO_2 from off-site sources in excess of the appropriate volume threshold for the purpose of injecting CO_2 into the subsurface."

Response 8.1-a:
EPA agrees that the wording of 40 CFR part 98.441 may have been confusing in the proposed action. In today's final action, EPA has made a number of clarifying edits to make the regulatory text clear. EPA is retaining procedures and requirements for facilities conducting GS ("Tier 2") in subpart RR and is moving all procedures and requirements for all other facilities conducting CO_2 injection ("Tier 1") into a new subpart UU. EPA has concluded that this organizational change allows for two source category definitions while clearly distinguishing the two sets of provisions and procedures. The cease reporting provisions proposed for facilities conducting GS have remained in subpart RR of today's final action and are different from the provisions in 40 CFR part 98.2(i). The cease reporting provisions proposed for other wells that inject CO_2 have been moved to subpart UU in today's final action. In response to public comment, in today's final action EPA adopted the cease reporting provisions in 40 CFR part 98.2(i) for subpart UU.

Comment 8.1-b:
A commenter (0817) and the multi-stakeholder discussion group (0799) recommend similar changes to the cease reporting provisions in 40 CFR part 98.441(b)(2). The commenter (0817) mentions that the recommendations are consistent with those made to EPA by Texas Commission on Environmental Quality's (TCEQ's) Executive Director, the Ground Water Protection Council, and other commenters on post-injection site care and closure requirements of the proposed UIC Class VI rule (73 FR 43492 (July 25, 2008)). The specific regulatory text that each of these commenters recommends is at the end of this comment summary.

The commenter (0817) suggests that the specifications of 40 CFR part 98.441(b)(2) be based on those to be adopted for the UIC Class VI well rules in order to enable cessation of GHG reporting when the state or EPA-administered UIC program verifies the performance of post-injection site care and project closure (i.e., cessation of post-injection site care (which includes monitoring) and GHG reporting should be allowed upon demonstration to the UIC program that the injected CO_2 plume and pressure front pose no future endangerment to underground sources of drinking water). Similarly, the multi-stakeholder discussion group (0799) advocates that if the GS facility has been closed in compliance with the facility's UIC permit requirements (or relevant permit requirements, if any, in the case of a facility that is not subject to the SDWA), a

facility conducting GS may discontinue complying with the remainder of the proposed subpart RR.

The commenter (0817) recommends that EPA adopt the specific recommendations made by the Ground Water Protection Council (of which TCEQ is a member) and the December 23, 2008, letter from a multi-stakeholder group of companies and environmental organizations to Cynthia C. Dougherty, Director, Office of Ground Water and Drinking Water, concerning the proposed UIC Class VI well rules, noting particularly their recommended criteria (A) through (F).

The multi-stakeholder discussion group (0799) also provides these specific criteria that they suggest will provide UIC Directors and EPA with the requisite information to make the appropriate determination for ceasing of reporting. The criteria are the same that the commenter provided in response to the proposed UIC Class VI rule (73 FR 43491 (July 25, 2008)). The commenter suggests that their recommendation for changes to the regulatory language establish clear criteria that an operator must demonstrate before obtaining site closure and approval to cease reporting based upon particular site characteristics and the criteria are reasonably applicable to any storage site as opposed to a standard based upon a fixed-duration. The commenter also suggests that the criteria are more stringent than a purely discretionary approach because it establishes specific criteria that must be shown before site closure and approval to cease reporting may be granted.

The multi-stakeholder discussion group (0799) also referred to their comments on the proposed UIC Class VI rule and recommends that their comments on UIC Class II(b)(5) wells be incorporated into the subpart RR requirements to assure that UIC Class II(b)(4) operations that opt to report as GS facilities under this rule will also meet the same closure requirements. However, the commenter warns that closure of a UIC Class II(b)(4) operation without conversion to UIC Class II(b)(5) will involve a different risk profile and that therefore UIC Class II(b)(4) operators may more readily be able to satisfy the closure requirements than UIC Class II(b)(5) operators.

A commenter (0817) recommends the following changes to the proposed language:

> 40 CFR part 98.441(b)(2) **[(i)]** If the ~~CO_2 plume and pressure front have stabilized and the~~ GS facility has been closed in compliance with the facility's Underground Injection Control permit requirements (or relevant permit requirements, if any, in the case of a facility that is not under the jurisdiction of the Safe Drinking Water Act), a facility conducting GS may discontinue complying with the remainder of this subpart [**by meeting the GS closure requirements of its Underground Injection Control permit or, if the permit does not include GS closure requirements, by demonstrating to EPA, based on monitoring, other site-specific data, and modeling that is reasonably consistent with site performance, that no additional monitoring is needed to assure that the geologic sequestration project does not pose an endangerment to Underground Sources of Drinking Water. The EPA shall approve discontinuation of reporting if the owner or operator demonstrates, based on the current understanding of the site, including monitoring data and/or modeling, all of the following:**]

[(A)the estimated magnitude and extent of the project footprint (CO_2 plume and the area of elevated pressure);
(B)the estimated location of the detectable CO_2 plume;
(C)that there is no significant leakage of CO_2;
(D)that the injected or displaced fluids are not expected to migrate in the future in a manner that encounters a potential leakage pathway;
(E)that the injection wells at the site completed into or through the injection zone or confining zone are plugged and abandoned in accordance with applicable requirements; and
(F)any remaining project monitoring wells at the site are being used and managed pursuant to a plan approved by the Underground Injection Control program Director.]

(ii)The owner or operator of the facility must notify EPA that the ~~CO_2 plume and pressure front have stabilized and the~~ GS facility has been closed in compliance with the facility's Underground Injection Control permit requirements (or relevant permit requirements, if any, in the case of a facility that is not under the jurisdiction of the Safe Drinking Water Act), and such notification must be certified as accurate by the owner or operator of the facility.

(iii)The owner or operator must resume reporting for any future calendar year during which any ~~activities that are source categories of~~ [facility subject] to this subpart resumes operation **[by injecting CO_2 into the subsurface].**

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

The multi-stakeholder group (0799) recommends the following changes to the proposed language:
40 CFR part 98.441(b)(2)

[(i)] If the ~~CO_2 plume and pressure front have stabilized and the~~ GS facility has been closed in compliance with the facility's Underground Injection Control permit requirements (or relevant permit requirements, if any, in the case of a facility that is not [**subject to**] ~~under the jurisdiction of~~ the Safe Drinking Water Act) [and has met the GS closure requirements of subsection (3)], a facility conducting geologic sequestration may discontinue complying with the remainder of this subpart.

(ii) The owner or operator of the facility must notify EPA that the ~~CO_2 plume and pressure front have stabilized and the~~ GS facility has been closed in compliance with the facility's Underground Injection Control permit requirements (or relevant permit requirements, if any, in the case of a facility that is not [**subject to**] ~~under the jurisdiction of~~ the Safe Drinking Water Act),

and such notification must be certified as accurate by the owner or operator of the facility.

(iii) The owner or operator must resume reporting for any future calendar year during which any ~~activities that are source categories of~~ [**facility subject to**] this subpart resumes operation [**by injecting CO_2 into the subsurface**].

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

40 CFR part 98.441(b)**(3)**
[(3) EPA shall approve discontinuation of reporting if the owner or operator has demonstrated, based on the current understanding of the site, including monitoring data and/or modeling, all of the following:

(A) the estimated magnitude and extent of the project footprint (CO_2 plume and the area of elevated pressure);
(B) the estimated location of the detectable CO_2 plume;
(C) that there is no significant leakage of CO_2;
(D) that the injected or displaced fluids are not expected to migrate in the future in a manner likely to result in leakage;
(E) that the injection wells at the site completed into or through the injection zone or confining zone are plugged and abandoned in accordance with applicable requirements; and
(F) any remaining project monitoring wells at the site are being used and managed pursuant to a plan approved by the applicable Underground Injection Control program Director.]

[NOTE: Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

Response 8.1-b:
Per these comments EPA has added the additional criteria in (D) to ensure that the reporter may only discontinue reporting when they can demonstrate through monitoring and modeling that the injected CO_2 is not expected to migrate in the future in a manner likely to result in surface leakage. EPA did not take the criteria in (E) or (F) as these are comments germane to UIC requirements for plugging and closing injection and monitoring wells. EPA did not take the criteria provided in (A) and (B) because if the CO_2 plume is in a location that is significantly different than was not predicted by the reporter, they will have to re-submit their MRV plan. If the CO_2 plume location is as predicted, that does not mean that it has necessarily stabilized at that time. EPA did not take the criteria in (C) because EPA has not set a minimum detectable leakage value under subpart RR.

EPA agrees with the commenter that the reporter can discontinue reporting if the facility has been closed pursuant to its UIC Class VI permit and has clarified the final regulatory text to state

that EPA will accept a UIC Class VI Director's authorization of site closure in lieu of a separate CO_2 plume stabilization demonstration. EPA agrees that a UIC Class VI site closure demonstration will be evidence to ensure to EPA that there is no risk of CO2 leakage to the surface. Comments on UIC well classification are out of scope of this rulemaking. EPA proposed and considered comments on the UIC Class VI regulation through a separate notice and comment process. Please see the subpart RR docket for the multi-stakeholder discussion group's UIC comments (docket ID EPA-HQ-OAR-2009-0926-0799) and refer to the final UIC Class VI regulation for a discussion the UIC Class II to UIC Class VI transition.

Comment 8.1-c:

One commenter (TRANS-VA-04) notes that carbon capture and sequestration is useful only if it permanently sequesters GHGs, therefore the EPA needs to be able to determine whether leaks continue or commence long after injection ceases. Instead of the proposed cease reporting provision, the commenter recommends that the EPA consider a low cost long-term leakage monitoring requirement that would be permanently applicable to all facilities. Four commenters (0042, 0067, 0186, 0403) emphasize that ideally monitoring would be carried out through the life of the project or for a long time. The Sierra Club mass mailers (0023) state that monitoring should continue for long-term leakage.

Response 8.1-c:

EPA clarified in the final rule that for non-UIC Class VI wells and as an alternative for UIC Class VI wells, the reporter must demonstrate that current monitoring and model(s) show that the injected CO_2 stream is not expected to migrate in the future in a manner likely to result in surface leakage. After injection ceases, the risks of leakage will decrease over time as the CO_2 is trapped in the subsurface through a variety of trapping mechanisms.[9] Based on this demonstration, EPA will issue a final decision on the request to discontinue reporting.

Comment 8.1-d:

One commenter (0788) noted it is not in the public's best interest to cease all reporting under the MRR once all CO_2 injection wells have been plugged, because there exists no published literature indicating that the risk of leakage goes to zero immediately after the wells are plugged. The commenter suggests that EPA consider a de minimis level of monitoring and reporting that extends into the post-closure period of CO_2 injection and GS wells. The commenter provides several references that address the risk of leakage beginning to diminish once injection has ceased:

- Benson SM, 2008. Multi-Phase Flow and Trapping of CO_2 in Saline Aquifers. (Paper No. OTC 19244). Published in the Proceedings of 2008 Offshore Technology Conference held in Houston, TX, USA, May 5–8, 2008.
- Intergovernmental Panel on Climate Change. (IPCC 2005). Special Report on Carbon Dioxide Capture and Storage. IPCC,2005 - Bert Metz, Ogunlade Davidson, Heleen de Coninck, Manuela Loos and Leo Meyer (Eds.). Cambridge University Press,UK. pp 431.

[9] See the Vulnerability Evaluation Framework (VEF) for a description of trapping mechanisms (docket ID EPA-HQ-OAR-2009-0926)

- Dooley JJ, C Trabucchi, and L Patton . 2010. "Design Considerations for Financing a National Trust to Advance the Deployment of Geologic CO_2 Storage and Motivate Best Practices." International Journal of Greenhouse Gas Control 4(2):381-387.

Response 8.1-d:
EPA has reviewed the suggested references and agrees with the commenter that the risk of leakage does not immediately go to zero after the wells are plugged. Based on this and other comments, EPA revised the rule so that the reporter must demonstrate to EPA that the injected CO_2 stream is not expected to migrate in the future in a manner likely to result in surface leakage. Alternatively, if the site is permitted under UIC Class VI, the reporter may provide the Director's authorization of site closure to discontinue reporting. EPA agrees with the commenter that if the risk of leakage has decreased after wells are plugged, then the reporter may re-submit their MRV plan to EPA for approval of a monitoring strategy that is commensurate with the risk of leakage at the site.

Comment 8.1-e:
One commenter (0816) recommends that GS facilities reporting under this action be able to cease reporting either when the amount of CO_2 delivered to the site per year falls below the reporting threshold for three consecutive years, or when the facility is being closed in accordance with the applicable UIC permits.

Response 8.1-e:
EPA agrees with the commenter that the reporter can discontinue reporting if the facility has been closed pursuant to its UIC Class VI permit. In accordance with EPA's intent to maximize coordination between this and the UIC Class VI rule, EPA has clarified the final regulatory text to state that EPA will accept a UIC Class VI Director's authorization of site closure. EPA disagrees that GS sites would be able to discontinue reporting if the amount of CO_2 received falls below a reporting threshold for 3 years because the reporter must demonstrate to EPA that the injected CO_2 is not expected to leak to the surface. In addition, EPA retained no reporting threshold in the final rule.

Comment 8.1-f:
A coalition of ENGOs (0809) recommends that monitoring on the airside should be subject to the same timeframes as the requirement to continue post-injection monitoring under the UIC permit. The coalition of ENGOs mentions that some comments on the UIC Class VI proposed rule (73 FR 43492, July 25, 2008) suggest that the reporter must continue to monitor the GS facility in accordance with the monitoring and reporting plan under the UIC permit, following the cessation of injection until closure is authorized, unless the reporter can demonstrate that monitoring and reporting should be revised to reduce the frequency of reporting during the post-injection, pre-closure period. In addition, these comments on the UIC Class VI proposed rule suggest that no GS facility closure could be authorized until the reporter demonstrates (based on monitoring data) that no additional monitoring is necessary to prevent endangerment to a USDW. The coalition of ENGOs suggests that the same or a parallel formulation be included in the final rule on the airside.

One commenter (0811) recommends that post-injection monitoring must continue until the CO_2 plume has stabilized, due to various continuing risks. The commenter recommends that the notion of plume stability should be strengthened by EPA to include a criterion that the plume has ceased to migrate detectably for a period of 7 years. The multi-stakeholder discussion group (0799) recommends text changes for the proposed rule in 40 CFR part 98.448(a)(1).

> [(v) **A strategy for demonstrating at closure, based on monitoring, other site-specific data, and modeling that is reasonably consistent with site performance that no additional monitoring is needed to assure that the geologic sequestration project does not pose an endangerment to USDWs and is not likely to cause leakage**].

[NOTE: Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

Response 8.1-f:

EPA agrees with the commenters that post-injection monitoring is necessary but that if the risk of leakage has decreased after wells are plugged, then the reporter may reflect this in the MRV plan through a lower level of monitoring that is commensurate with the risk of leakage at the site. Based on this and other comments, EPA also revised the rule so that rather than demonstration of stabilization of the CO_2 plume, the reporter must demonstrate to EPA that the injected CO_2 stream is not expected to migrate in the future in a manner likely to result in surface leakage. In accordance with EPA's intent to maximize coordination between this and the UIC Class VI rule, EPA has clarified the final regulatory text to state that EPA will accept a UIC Class VI Director's authorization of site closure.

Comment 8.1-g:

The multi-stakeholder discussion group (0799) provides a specific change to the regulatory text to 40 CFR part 98.441(b)(1) in order to make the terminology more consistent:

40 CFR part 98.441(b)(1)

> (1) If the injection well or wells constituting the facility are plugged in compliance with the facility's Underground Injection Control permit requirements (or relevant permit requirements, if any, in the case of a facility that is not [**subject to**] ~~under the jurisdiction of~~ the Safe Drinking Water Act), a [**geologic sequestration**] facility ~~conducting geologic~~ sequestration subject to the requirements of this subpart may discontinue complying with §98.442(a) and §98.442(b) and all other facilities subject to the requirements of this subpart may discontinue complying with this subpart. The owner or operator of the facility must notify EPA that the injection well or wells constituting the facility have been plugged in compliance with the facility's Underground Injection Control permit requirements (or relevant permit requirements, if any, in the case of a facility that is not facility that is not [**subject to**] ~~under the jurisdiction of~~ the Safe Drinking Water Act), and such notification must be certified as

accurate by the owner or operator of the facility. The owner or operator must resume reporting for any future calendar year during which any ~~activities that are source categories of~~ [**facility subject to**] this subpart resumes operation [**by injecting CO_2 into the subsurface**.]

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

Response 8.1-g:
EPA has clarified these provisions in the final regulatory text at 40 CFR part 98.441(b)(1) and (2).

Comment 8.1-h:
One commenter (0791) recommends that facilities be allowed to cease reporting below a defined threshold or when wells are plugged.

Response 8.1-h:
For facilities conducting GS (covered by subpart RR), EPA revised the rule so that rather than demonstration of stabilization of the CO_2 plume, the reporter must demonstrate to EPA that the injected CO_2 stream is not expected to migrate in the future in a manner likely to result in surface leakage. For all other facilities injecting CO_2 (covered by subpart UU), and in response to public comment, EPA has adopted the cease reporting provisions in 40 CFR part 98.2(i).

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9 Missing Data Procedures, Record Retention, and Confidential Business Information

9.1 Missing Data Procedures

Comment 9.1-a:
The multi-stakeholder discussion group (0799) suggests missing data procedures should be tailored on a site specific basis in each facility's proposed MRV plan. The multi-stakeholder discussion group suggests that if the MRV plan is approved by the EPA, all the reporting needs and appropriate procedures for estimating missing data would be covered.

Response 9.1-a:
In the final rule, EPA has retained missing data procedures for a number of subpart RR and UU provisions. See 40 CFR part 98.445 and 40 CFR part 98.475 for regulatory text that specifies these procedures. EPA agrees with the commenter and did not specify missing data procedures for elements of the MRV plan because each MRV plan will be designed differently, however, the Agency specifies in the regulatory text that these procedures must be included in the MRV plan if they are to be used.

Comment 9.1-b:
One commenter (0816) states that the proposed procedures for estimating missing data are highly site-specific and there is not enough experience with collecting such data to ascertain whether the procedures specified by EPA could be implemented in practice. The commenter suggests that the rule should be amended and simplified to allow tailoring of these procedures on a site-specific basis, as part of the MRV plan. Such an approach would prevent over-specifying missing data procedures when the data collection methods are not specified yet.

Response 9.1-b:
In the final rule, EPA has retained missing data procedures for a number of subpart RR and UU provisions. See 40 CFR part 98.445 and 40 CFR part 98.475 for regulatory text that specifies these procedures. These provisions will ensure that the reported data is as accurate and defensible as possible but provides flexibility to the reporter in the case of equipment maintenance or failure.

9.2 Record Retention Requirements

Comment 9.2-a:
One commenter (0801) asserts that the EPA does not state a timeline for the retention of records.

Response 9.2-a:
Reporters must retain all required records for at least three years. For further detail, EPA refers the commenter to the general provisions for record retention in 40 CFR part 98.3.

Comment 9.2-b:

A coalition of ENGOs (0809) states that EPA's proposed rule in 40 CFR part 98.447 is insufficient, in that it does not require data retention beyond the three year period described by the comprehensive monitoring and reporting rule. Since GS facilities have a long-term purpose, a coalition of ENGOs recommends that the data be retained at least through the full period when CO_2 is being injected in the reservoir, and annual reports should be retained even after this period, until the facility is closed, pursuant to UIC requirements for closure. The coalition of ENGOs notes that some have suggested to the Agency that UIC monitoring and reporting activity should continue post injection, either for some specified (and rebuttable) period, or until the reporter demonstrates to the Administrator's satisfaction that the sequestered CO_2 no longer poses a threat to USDWs. The coalition of ENGOs proposes that the same requirement be in place for airside record retention, and at the very least, airside records be retained in some form that they can be reviewed at the time of a GS facility closure determination. A coalition of ENGOs (0809) believes that without a robust data set, reported regularly, and retained during the period of injection, and beyond, demonstrating that CO_2 injected remains sequestered over the very long time periods contemplated by using this technology to mitigate climate change will not be possible.

Response 9.2-b:
EPA disagrees with the commenter and retains the record retention provision of three years in the final rule. The MRV plan and the yearly monitoring reports submitted by the reporter will provide EPA with a record of monitoring activities for facilities conducting GS. Please refer to Chapter 8 of this document regarding cease reporting provisions..

9.3 Confidential Business Information Issues

Comment 9.3-a:
One commenter (0816) requests the EPA to treat the reporting of amounts of CO_2 injected and produced for CO_2-ER and CO_2-ER-GS facilities as CBI. The commenter (0816) asserts that if CO_2-ER operations include GS, there should be an optional approach that allows reporters to provide EPA with useful information while protecting their proprietary data as CBI. As such, the commenter proposes specific changes in the regulatory language in section 40 CFR part 98.443(b) and adds a new section 40 CFR part 98.443(b)(4):

> (b) A GS facility must report annually the mass of CO_2 injected in accordance with the procedures specified in paragraphs (b)(1) through (b)(3) of this section [**or obtain approval for an alternative reporting procedure pursuant to (b)(4) of this section.**
> **…**
> **(4) A facility that is required to report pursuant to this subpart but is not a GS facility may submit to EPA and obtain approval of alternative reporting requirements that will be designed to provide for the net quantity of CO_2 injected during the year, but excluding the amounts produced and recycled for EOR, where the details of the calculations may be claimed as confidential business information.]**

[NOTE: Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

The commenter provides the following reasons arguing for such confidential treatment of the information requested under this action:

- Information requested in this action, in particular the CO_2 injection data, is extremely sensitive to industry and therefore the industry can assert confidential treatment of the data. In particular, the injection data is protected under EPA's regulations governing the confidentiality of business information. (Business information is entitled to confidential treatment if: (a) "[t]he business has asserted a business confidentiality claim which has not expired by its terms, nor been waived nor withdrawn;" (b) "[t]he business has satisfactorily shown that it has taken reasonable measures to protect the confidentiality of the information, and that it intends to continue to take such measures; (c) "[t]he information is not, and has not been, reasonably obtainable without the business's consent;" (d) "[n]o statute specifically requires disclosure of the information; and (e) either the business shows that disclosure of the information "is likely to cause substantial harm to the business's competitive position" or, if the information is voluntarily submitted, "its disclosure would be likely to impair the Government's ability to obtain necessary information in the future." 40 CFR part 2.208. See 40 CFR part 2.208, 40 CFR part 2.301(e)). The industry has historically protected CO_2 injection information and taken reasonable measures to ensure its continued protection.

- The information cannot be reasonably obtained by EPA without industry consent, nor is it required by statute. Further, the commenter notes that cost or difficulty associated with obtaining information is an important consideration in assessing whether it is "reasonably obtainable." The commenter notes that EPA has not asserted that the requested information is required by statute. The commenter also notes that injection volumes reported from ER operations under the UIC program for Class II wells are not equivalent to what EPA proposes to collect under this action. In particular, under the UIC program, EPA collects annual "injection volumes" from ER facilities. When more than one fluid is injected, the volumes of each are summed and reported as a single number. For example, water and CO_2 are frequently injected in the same well over the course of a year and the volume is reported collectively. The determination of the amount of CO_2 injected in each well based on this information is not apparent.

- Publishing and public reporting of the information would substantially harm the competitive position of the industry as the data about the relative amounts of CO_2 transferred on-site, recycled, and injected can indicate information about the reservoir and project. This information would be valuable to competitors as they can learn about the essential terms of the contracts between injection facilities and CO_2 suppliers. Public disclosure would substantially harm facilities' competitive position in the marketplace by eroding the proprietary vale of the injection facilities' contractual relationships and ongoing business activity with suppliers of CO_2. In addition, public access to data requested under this action would discourage CO_2-ER operators from opting-in to report as a CO_2-ER-GS facility due to the resulting competitive disadvantage.

- "CO_2 injection information is not "emission data," and therefore is eligible for confidential treatment under EPA regulations. "Emission data" is only information necessary to determine characteristics related to past actual emissions from the emission source itself. See, e.g., 40 CFR part 2.301(a)(2)(i) (defining emission data, in part, as "Information necessary to determine the identity, amount, frequency, concentration, or other characteristics . . . of any emission which has been emitted by the source . . ."). In contrast, the requested information bears no relationship to past actual emissions from any of the sources providing such data. The requested information is not "emission data" because the term "emission" unambiguously means material that is actually discharged into the air. See, e.g., NRDC v. Leavitt, Civ. No. 04-01295, 2006 WL 667327, at *3 (D.D.C. March 14, 2006) (citing 40 CFR part 2.301(a)(2)(i)(A) & (B)) (holding that "'emissions data' is defined narrowly to focus on information obtained from a source of emissions, not a producer of materials that will later contribute to emissions"). As such, information related to CO_2 injection, including quantities of CO_2 transferred onsite, the source of CO_2, and the amount of CO_2 injected at CO_2-ER-GS facilities, by no means meets the regulatory definition of "emission data" and, therefore, that information is still eligible for CBI protection."[10]

- "The information does not qualify as emission data because it is not "necessary to determine" the characteristics of any emissions. See 40 CFR part 2.301(a)(2)(i). Importantly, before concluding that the requested information is "necessary" to determine emissions or source, EPA must consider all relevant factors, "including available alternatives, so that release of information claimed to be proprietary could be avoided unless required by statute." RSR Corp. v. EPA, 588 F. Supp. 1251, 1256 (D.C. Tex. 1984) (remanding to EPA to determine if information was "necessary to determine" emissions). A "strict interpretation of the 'necessary to determine' requirement is warranted in order to ensure that the exception does not swallow the rule." NRDC, 2006 WL 667327, at *4. The quantities of CO_2 transferred onsite, the source of CO_2, and the amounts of CO_2 injected are wholly unrelated to and unnecessary to determine future emissions from the CO_2-ER-GS facility. As explained above, the plain unambiguous meaning of the term "emissions" is material that is actually discharged into the air. For these reasons, the CO_2 injection data warrants confidential treatment and should be protected as such under any final rulemaking."[11]

Thus, the commenter notes that data about CO_2 injection is eligible for confidential treatment.

Response 9.3-a:

Today's final rule does not address whether data reported under subparts RR or UU will be released to the public or will be treated as CBI. See Section I.B. of the preamble for a discussion of the CBI rulemaking. For a discussion on EPA's authority to collect injection data under this rulemaking, see Chapter 1 of this RTC.

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[10] Verbatim text from comment letter, hence in quotes.
[11] Verbatim text from comment letter, hence in quotes.

10 Economic Impact Analysis (EIA) and Executive Orders (EOs)

10.1 Comments on the EIA

Comment 10.1-a:
A coalition of ENGOs (0809) agrees with EPA that the total national cost of reporting under this action (barely over $332,000) and the average per facility cost ($4,500) are very reasonable for the benefits of such comprehensive all-in reporting. These commenters agree with EPA that the reporting burden for ER operators to report CO_2 received onsite and injected would be small, given the equipment and data collection efforts already in place at ER projects. One commenter (0783) raises concern that the estimated annual cost of $4,000 for ER facilities that is shown in Table 8 of the preamble to the proposed subpart RR is an unrealistic cost estimate. The commenter asserts that labor costs will be significantly higher and facilities will need to hire additional personnel in order to adequately capture and maintain the data.

Response 10.1-a:
EPA cost estimates for ER facilities (no GS) included labor cost estimates associated with monitoring, recordkeeping and reporting. EPA has reviewed the labor cost assumptions and continues to view them as reasonable estimates. Labor rates were obtained from the US Bureau of Labor Statistics and from surveys of oil and gas professional performed by the American Association of Petroleum Geologists (AAPG) and the Society of Petroleum Engineers (SPE). The Agency's economic analyses considered a variety of alternative ER opt-in scenarios that included low, reference, and high cost scenarios. The reporting costs for ER facilities and other non-GS facilities are covered by subpart UU. Section 4 of the EIA for this rule covers unit costs, including labor rates, as well as reporting cost estimates for facilities covered by the rule.

Comment 10.1-b:
One commenter (0806) states that only volumetric flow meters are used for operating approximately 300 of their CO_2 injection wells for their ER operation, and, consequently, they would need to convert volumetric flows recorded by these meters to mass for reporting under proposed subpart RR. Each of their injection wells are presently setup to CO_2 concentration and pressure, however, they do not measure CO_2 temperature. In order to measure CO_2 temperature at each well, the commenter asserts that they would need to purchase, install, calibrate, and test temperature measuring equipment on each of their approximately 300 CO_2 injection wells. The commenter estimates that it would cost approximately $1,500,000 and 7,500 man-hours for installation alone, and that additional costs would be incurred for calibrating and maintaining the equipment. The commenter believes that the rule would impose a significant burden and cost on them.

Response 10.1-b:
Under subpart UU of the final rule, ER operators are subject to the reporting provisions outlined in subpart UU and must only report CO_2 received on-site. Therefore, there is no need for volumetric flow meters or CO_2 temperature measurement. Section 5.2 of the EIA for this rule outlines the national cost estimates for subpart UU.

Comment 10.1-c:
Three commenters (0813, 0815, 0787, TRANS-VA-03) raise concern about the total costs that the MRV requirements will impose on the GS industry. Two commenters (0813, 0787) opine that the estimated cost of around $300,000 per year for each GS facility is significantly higher than the cost for most other sources to comply with the GHG Reporting Program, One commenter (0815) mentions that such costs are excessive and believes that these costs could dissuade developers and investors from pursuing CCS technologies due to high regulatory risk and regulatory burden. One commenter (0789) claims that the proposed rule would create an unnecessarily expensive regulatory program.

One commenter (TRANS-VA-03, 0787) claims that assuming a per-project cost of $300,000 per year, the costs of the program could exceed $100 million annually for a large-scale commercial saline GS industry comprised of over several hundred sites (assuming a national rate of one billion tons per year and an average injection rate per site of two to three million tons per year). The commenter mentions that this cost would more than double the entire private sector cost of EPA's reporting program, without possibly not increasing the total amount of emissions reported. The commenter asserts that EPA did not include commercial saline GS projects in the economic analysis and that the EIA focused on ER and R&D project costs rather than commercial GS sites.

Four commenters (0794, 0789, 0815, 798) claim that such high compliance costs may discourage investment in and development of CCS technologies due to high regulatory burden. One commenter (0789) opines that the rule would reduce the benefits to the public from injection for ER and sequestration purposes. One commenter (0798) mentions that the potential cost of imposing unnecessary, duplicative or inapplicable requirements could discourage ER operators from making use of anthropogenic CO_2, which in turn could delay the deployment of carbon capture technology among power plant and other industrial CO_2 emitters. The commenter suggests that the proposed 40 CFR part 98.448 requirements avoid this risk, and recommends that the EPA avoid changes to this section in the final rule that increase significantly the risks or costs of ER operators opting to document and report sequestration quantities through approval of the additional MRV plan provided for here or that would result in duplicative compliance requirement to those that will apply under the UIC program.

One commenter (0794) questions why a duplicative layer of monitoring is required and believes that regulated sources should be able to satisfy EPA's needs by reporting to the agency under other CCS or ER permitting requirements and other federal emissions reporting regimes, some of which were identified by EPA. The commenter argues that in order for meaningful investment in CCS technologies to occur, there need to be clear regulatory programs in place that encourage robust CCS project development and help to eliminate liability risk for early investments. The commenter states that the misalignment of risk and regulatory burden has negative consequences by subjecting storage operators to unnecessarily burdensome and expensive recordkeeping and reporting for very limited emissions.

Response 10.1-c:
The economic analysis discusses the MRV cost estimates in detail and reports the costs of the developing a MRV plan in Tables 4-13 and 4-14. The final rule was analyzed against a projected

project baseline assuming current regulations. There is no current market or legal driver for large scale CCS. However, EPA's economic analysis considered two additional scenarios for the number of CO_2 injection facilities that choose to report as GS facilities (Section 5.2.1 of the EIA). In the medium scenario, all Anthropogenic CO_2 projects (16) choose to report as GS facilities (ER opt in)(subpart RR). In the high scenario, all Anthropogenic CO_2 projects (16) and fifty percent of other CO_2 projects (32) choose to report as GS facilities (ER opt in)(subpart RR). The national cost estimate is $35 million under the medium ER opt in outcome (first year) and $33 million in subsequent years. The national cost estimate is $103 million under the high ER opt in outcome (first year) and $97 million in subsequent years. In addition to scenarios around the number of facilities that choose to report as GS facilities, EPA also conducted another scenario analysis around alternative baseline CCS deployment levels (Section 5.2.2 of the EIA). Assuming deployment levels consistent with economic modeling of possible climate legislation, the first year national cost estimate would increase by $17.2 million. The economic analysis also presents cost-to-sales ratios for ER projects that choose GS (Table 5-9) and noted they exceed 3 percent of baseline revenues.

Comment 10.1-d:

Three commenters (0813, 0815, 0787, TRANS-VA-03) raise concern about the cost per ton associated with compliance with the proposed rule. Three commenters (0815, 0787, 0813, TRANS-VA-03) assert that the EPA's expected cost of reporting for each GS facility will be significantly higher on a tonnage basis than the cost for other sources to comply with the MRR, because GS sites are expected to be very small emitters of CO_2. One commenter (0787, TRANS-VA-03) asserts that the reporting costs per ton for GS facilities are at least 10 times that of other facilities under EPA's GHG reporting program.

One commenter (0787) states that a compelling explanation is needed as to why potential CO_2 emissions from GS facilities face higher reporting costs than other likely small-volume GHG sources. This commenter insists that the estimated costs of MRV activities should be weighed against the estimated marginal benefits of reporting tons of CO_2 emitted (which the commenter argues will be minimal compared to most other facilities required to report under the GHG Reporting Program). This commenter notes that the MRV rules are being proposed under an EPA reporting program, rather than an air quality regulatory program. The commenter suggests that the criteria for economic effectiveness should be comparable to the criteria used on the other subparts for GHG reporting. The commenter mentions that EPA concluded that a 25,000 metric threshold suited the needs of reporting program promulgated in October 2009. This commenter claims that it is appropriate for EPA to consider the cost of compliance with the MRV requirements versus the benefit of additional tons reported. This commenter believes that the framework established for the rest of the GHG reporting program seems appropriate for making such a comparison, but claims that if this action had been made concurrently with the other subparts it is highly likely that its economic analysis would have been included in the economic analysis for the larger program.

One commenter (0787) points out that the reporting cost for GS facilities based on the proposed rule is very high—over $10/ton, which is at least 10 times more than the marginal cost for reporting under the rest of the GHG reporting program. The commenter notes that if the leakage rate is only 4000 tons per year, then the reporting cost would be $70/ton. In contrast, the

commenter opines that EPA considered that a marginal cost of $1/ton of CO_2 reported was too high for the rest of the GHG reporting program. The marginal cost was calculated by the commenter based on the Regulatory Impact Analysis for the GHG reporting program. The commenter mentions that in selecting the threshold of 25,000 tons per year, EPA estimated that the average reporting cost for GHG reporting would be $0.03 per ton, whereas the reporting cost for GS is $10/ton in the worst case leakage and even higher if leakage rates are smaller.

Response 10.1-d:
EPA acknowledges certain sectors face different reporting costs per ton. EPA estimates the average reporting cost for subparts RR/UU is $0.02 per ton. If a higher number of injection facilities voluntarily choose GS, average costs increase to $2.00 per ton. While the cost per ton provides a comparison to other subpart in the mandatory reporting rule, the values are uncertain since actual injection values may be higher or lower than those used in the pro forma projects. While in some cases the per ton reporting costs are higher than other subparts, the overall goal of the GHG reporting is to provide a comprehensive and accurate reporting system. The cost effectiveness metric of cost per ton reported may not be the most appropriate means to evaluate the economic impact of the rule, and is just one means of doing so. Another metric presented in the EIA is cost-to-sales ratios, which evaluates the compliance cost against average receipts for like facilities. EPA found sales test ratios are between 3.1 to 4.0 percent for facilities conducting GS (subpart RR). In contrast, facilities conducting CO_2 injection (no GS, which includes UIC Class II ER operations) sales test ratios are below 0.01 percent.

Comment 10.1-e:
One commenter (0787) raises concern that none of the 89 projects used by EPA to calculate estimated compliance costs in the March 2010 draft EIA for the proposed subpart RR are commercial scale GS facilities. Therefore, the commenter claims that these facilities referenced in the economic analysis are only subject to basic and relatively inexpensive reporting requirements (such as amount of CO_2 received on-site and the amount injected) rather than the far more expensive second Tier requirements associated with developing an MRV plan and reporting the amount of CO_2 sequestered using a mass balance approach.

Response 10.1-e:
Subpart UU covers ER facilities that can voluntarily opt-in to the GS reporting program. Under subpart UU, facilities will incur minimal reporting costs for CO_2 transferred onsite. EPA's baseline considers the number and makeup of projects that will be injecting in 2012. There are 9 GS R&D and 1 commercial saline. In the core scenario, the remaining 83 ER injectors are assumed to not choose GS and report under subpart UU. EPA's economic analysis also considers two alternative scenarios where ER injectors voluntarily choose GS (16 and 48 injectors). The economic analysis also presents cost-to-sales ratios for ER projects that choose GS.

Comment 10.1-f:
One commenter (0787) summarizes EPA's comparison between the MRV requirements of the proposed subpart RR and those of the UIC Class VI proposal in an effort to identify which MRV activities associated with the proposed subpart RR are incremental to the UIC Class VI proposal.

Using Table 4-9 (Assumptions for Application of Technologies by Regulatory Alternative) from EPA's EIA for the proposed subpart RR, the commenter compares the assumptions of applicability of MRV requirements under the proposed UIC Class VI regulations for commercial saline GS facilities to the assumed level of applicability under the lowest, middle, and highest level alternatives for the proposed subpart RR. Based on this comparison, the commenter asserts that there are no incremental requirements for the lowest level the proposed subpart RR alternative for commercial saline GS facilities. However, the commenter concludes that six MRV activities are more stringent for the middle level proposed subpart RR alternative, and seven MRV activities are more stringent for the highest level proposed subpart RR alternative, including:

- Estimation of Fugitive Emission from Surface Facilities,
- Periodic Digital Color Infrared Ortho-Imagery and Hyper-Spectral Imaging,
- Periodic Airborne Survey,
- Soil Zone Monitoring with Accumulation Chamber,
- Vadose Zone Monitoring,
- Monitoring Wells for Water Table Sampling, and
- Eddy Covariance (incremental for the highest level proposed subpart RR alternative but not for the middle level).

Furthermore, the commenter summarizes EPA's incremental costs associated with the above activities. The commenter notes that the bulk of costs for EPA's middle alternative of $289,000 are associated with periodic digital color infrared ortho-imagery and hyper-spectral imaging to detect changes in vegetation, periodic airborne surveys to detect surface leaks, and monitoring wells for water table sampling. The incremental cost estimate associated with the highest level proposed subpart RR alternative amounted to $470,000 above the UIC Class VI proposal or $181,000 above the middle alternative, with the bulk of the costs associated with the addition of eddy covariance measurement, quarterly rather than annual reporting for soil zone monitoring, vadose zone monitoring, and monitoring wells for water table sampling.[12] The commenter asserts that the MRV costs per site for saline GS storage are significant at hundreds of thousands of dollars annually.

Response 10.1-f:
The calculations of the incremental costs made the commenter are generally consistent (within $5,000 per year per GS project) with the cost computed by EPA.

Comment 10.1-g:
One commenter (0787) states that the MRV requirements fail to recognize the high reporting costs that could be imposed on a full scale commercial GS industry. The commenter claims that the reporting costs per ton associated with the proposed subpart RR would be at least ten times higher than the rest of the GHG reporting program, and that total reporting costs for the proposed subpart RR alone could exceed the cost of the rest of the GHG reporting program combined.

[12] For specific incremental cost estimates, please see Twenty-First Strategies, EPA-HW-OAR-2009-0926-0787, Re: Mandatory GHG Reporting Docket ID No. EPA-HQ-OAR-2009-0926, June 11, 2010, Table 4-7.

The commenter also suggests that as an EPA reporting program and not an air quality regulatory program, the criteria for economic effectiveness should be comparable to the criteria used on other subparts for GHG reporting. The commenter mentions that EPA concluded that a 25,000 metric threshold suited the needs of reporting program promulgated in October 2009. The commenter suggests that EPA weigh the estimated costs of MRV activities to the estimate benefits of additional tons reported. The commenter believes that the framework established for the rest of the GHG reporting program is appropriate for this task.

Response 10.1-g:

EPA's economic analysis considered two additional scenarios for the number of CO_2 injection facilities that choose to report as GS facilities. In one scenario, all Anthropogenic CO_2 projects (16) choose to report as GS facilities (ER opt in)(subpart RR). In another scenario, all Anthropogenic CO_2 projects (16) and fifty percent of other CO_2 projects (32) choose to report as GS facilities (ER opt in)(subpart RR). The national cost estimate is $39 million under the medium ER opt in outcome (first year) and $37 million in subsequent years. The national cost estimate is $104 million under the high ER opt in outcome (first year) and $98 million in subsequent years.

EPA also considered three additional scenarios of the number of large scale saline aquifer GS (commercial saline) project deployment by 2050: low (5 projects), medium (9 projects), and high (54 projects). The low scenario is based on the low end of the range of deployment targeted by the Interagency Task Force on Carbon Capture and Storage.[13] The medium scenario is based on large scale saline project deployment projected in the cost analysis prepared for the UIC Class VI final rule. The high scenario is based on EPA modeling of the projected deployment of CCS under proposed climate legislation. The first year national l cost estimates increase by $1.6 million under the low outcome; $2.9 million under the medium outcome, and $17.2 million under the high outcome.

Comment 10.1-h:

One commenter (0787) raises concern that EPA's economic analysis did not include saline GS facilities. The commenter claims that if a large-scale commercial GS industry becomes a reality, commercial saline GS facilities are likely to become the most predominate type of facility, far more than the 0, 3, 6, or 9 facilities contemplated in the EIA.

Response 10.1-h:

EPA's economic analysis includes pro-forma costs for commercial saline projects. Of the 13 baseline projects included in the analysis, there is one commercial saline facility (Archer Daniels Midland Co.'s Decatur, Ill project at its ethanol plant). Section 4 of the EIA discusses commercial saline costs (Table 4-10 through Table 4-14).

Comment 10.1-i:

[13] http://www.epa.gov/climatechange/policy/ccs_task_force.html

One commenter (0810) believes that the cost of installing and operating a monitoring system has been vastly underestimated by EPA. As stated in Table 6 of the preamble, developing strategies for establishing a pre-injection environmental baseline at the surface and for detecting and quantifying CO_2 leakage to surface are not required under the UIC Class VI proposal. The commenter mentions that establishing the baseline and conducting ongoing ambient CO_2 monitoring would be an additional cost beyond what is proposed by UIC permitting. In addition, setting up, operating, and reporting for an ambient CO_2 monitoring network comprised of multiple locations could easily exceed $1,000,000 annually. This estimate is substantially higher cost than the $300,000 per year that EPA estimated. Given this high cost and technical issues, the commenter suggests that EPA remove reference to ambient air monitoring of CO_2 as a means for establishing pre-injection environmental baselines. One commenter (0783) opines that a significant portion of wells are stripper wells and is concerned that it may not be cost effective to operate these wells and that the impact to small businesses will be significantly negative.

Response 10.1-i:
EPA determined that establishment of baselines is a critical aspect of monitoring for leakage detection and quantification. EPA does not prescribe monitoring technologies or methodologies for establishing expected baselines due to the site specific nature of MRV plans. Therefore, the example system described by the commenter may not be representative of sites that may employ near-surface monitoring for leak detection. In any case, the rule does not require near-surface leak detection monitoring when subsurface monitoring under a UIC Class VI permit can be shown to be adequate.

10.2 Scenarios Regarding Future Deployment of CCS

Comment 10.2-a:
One commenter (0787, TRANS-VA-03) notes that EPA states that EPA provided a scenario assumption of no GS facilities for the reference case, and one commenter (0787, TRANS-VA-03) raises concern that the scenarios presented in EPA's economic analysis for subpart RR did not include commercial saline projects. The commenter (TRANS-VA-03) suggests that commercial saline projects were not included in the scenarios possibly because there was no way of reasonably estimating how many such projects exist and notes that EPA recognized that its economic analysis excluded commercial saline facilities by including a brief side analysis in Section 5.2.2 of its EIA for subpart RR.

Response 10.2-a:
EPA's economic analysis considered two additional scenarios for the number of CO_2 injection facilities that choose to report as GS facilities. In the medium scenario, all Anthropogenic CO_2 projects (16) choose to report as GS facilities (ER opt in)(subpart RR). In the high scenario, all Anthropogenic CO_2 projects (16) and fifty percent of other CO_2 projects (32) choose to report as GS facilities (ER opt in)(subpart RR). The national cost estimate is $35 million under the medium ER opt in outcome (first year) and $33 million in subsequent years. The national cost estimate is $103 million under the high ER opt in outcome (first year) and $97 million in subsequent years.

EPA's economic analysis includes pro-forma costs for commercial saline projects. Of the13 baseline projects included in the analysis, there is one commercial saline facility (Archer Daniels Midland Co.'s Decatur, Ill project at its ethanol plant). EPA considered three additional scenarios of the number of large scale saline aquifer GS (commercial saline) project deployment by 2050: low (5 projects), medium (9 projects), and high (54 projects). The low scenario is based on the low end of the range of deployment targeted by the Interagency Task Force on Carbon Capture and Storage.[14] The medium scenario is based on large scale saline project deployment projected in the cost analysis prepared for the UIC Class VI final rule. The high scenario is based on EPA modeling of the projected deployment of CCS under the American Power Act. The national first year annual cost estimates increase by $1.6 million under the low outcome; $2.9 million under the medium outcome, and $17.2 million under the high outcome.

Comment 10.2-b:
One commenter (0787), regarding the costs associated with ER operations opting-in to report as GS operations, claims that two of the most important tables in EPA's economic analysis (Table 5-2 and Table 5-3) did not include commercial saline GS facilities.

Response 10.2-b:
The EIA considers commercial saline facilities. Table 5-1 includes 1 commercial saline facility. The second row of Table 5-3 reports the national annualized mandatory reporting costs estimates for the 1 commercial saline facility in subpart RR. The second row of Table 5-4 reports the low and high national annualized mandatory reporting costs estimates for 1 commercial saline facility estimated to be injecting by 2012.

Comment 10.2-c:
One commenter (TRANS-VA-03) asserts that in order to think about national costs, it is reasonable to consider how large a commercial [GS] program could become. The commenter (TRANS-VA-03, 0787) claims that given the large-scale effort to reduce national GHG emissions, billions of tons of CO_2 emissions could potentially need to be reduced annually in order to meet long term reduction targets; and as such, the commenter claims it is reasonable and foreseeable to hypothesize that a commercial sequestration program could reach a storage rate of one billion tons per year. Assuming the annual injection rate of EPA's UIC proposal (1.84 $MMTCO_2$ per year), one commenter (0787) calculates that over 500 storage sites would be needed. As another analogy, the commenter (TRANS-VA-03) similarly claims that if an average site stores two or three million tons per year, that could potentially equate to several hundred sites nationally. Additionally, one commenter (0787) asserts that it is quite possible that a large number of commercial saline GS sites will be deployed in the future, and that commercial saline facilities have the potential to become the most important and numerous type of CCS site. Furthermore, this commenter (0787) claims that a large commercial saline GS industry (e.g., consisting of several hundred sites) would "dwarf" the industry size used in EPA's economic analysis, which was comprised of 89 projects total (9 R&D and 80 CO_2 injection facilities, but no commercial saline GS facilities).

[14] http://www.epa.gov/climatechange/policy/ccs_task_force.html

Response 10.2-c:
Given the potential for future deployment of CCS technologies, EPA considered two additional scenarios of the number of large scale saline aquifer GS (commercial saline) project deployment by 2050: low (5 projects), medium (9 projects), and high (54 projects). The low scenario is based on the low end of the range of deployment targeted by the Interagency Task Force on Carbon Capture and Storage.[15] The medium scenario is based on large scale saline project deployment projected in the cost analysis prepared for the UIC Class VI final rule. The high scenario is based on EPA modeling of the projected deployment of CCS under proposed climate legislation. The national first year annual cost estimates increase by $1.6 million under the low outcome; $2.9 million under the medium outcome, and $17.2 million under the high outcome.

10.3 Statutory and Executive Order Reviews

Comment 10.3-a:
One commenter (0114) suggests that EPA did not bother to determine the cost/benefit analysis and contends that EPA is trying to avoid the issue by stating that, "Under Section 3(f)(1) of EO 12866 (58 FR 51735, October 4, 1993), this proposed action is not by itself an 'economically significant regulatory action' because it is unlikely to have an annual economic effect of less than $100 million" (75 FR 18597, April 12, 2010).

Response 10.3-a:
EPA prepared an economic analysis the costs associated with the regulatory action [Docket ID EPA-HQ-OAR-2009-0926]. EPA has also qualitatively considered the benefits in Section 5.5 of the EIA. With the statement, EPA intended to address the requirements of EO 12866. EPA has made the following determination: Under EO 12866 (58 FR 51735, October 4, 1993), this action is a "significant regulatory action" because it may raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the EO. Accordingly, EPA submitted this action to the OMB for review under EO 12866 and any changes made in response to OMB recommendations have been documented in the docket for this action. While it is a significant regulatory action, it is not an economically significant action because it is likely to have an annual economic effect of less than $100 million.

EPA has addressed the requirements of EO 12866. In doing so, EPA has made the following determination: Under EO 12866 (58 FR 51735, October 4, 1993), this action is a "significant regulatory action" because it may raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the EO. Accordingly, EPA submitted this action to the Office of Management and Budget (OMB) for review under EO 12866 and any changes made in response to OMB recommendations have been documented in the docket for this action. While it is a significant regulatory action, it is not an economically significant action because it is likely to have an annual economic effect of less than $100 million. To make the determination that the action is not economically significant, EPA prepared an EIA, which can be found in the docket for this rule.

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[15] http://www.epa.gov/climatechange/policy/ccs_task_force.html

11 Relationship to the Underground Injection Control Program

Comment 11-a:
Seven commenters (0798, 0804, 0811, 0815, 0816, TRANS-VA-02, TRANS-VA-07) support harmonizing the reporting requirements between the UIC Program and the proposed subpart RR whenever possible in order to minimize overlap and avoid duplicative and/or conflicting requirements. One commenter (0816) suggests that any additional reporting for GS facilities (beyond the three requirements required of all CO_2 injection facilities: CO_2 transferred on site, source of CO_2, if known and CO_2 injected) should be consistent with those required for permit conditions under the UIC program. The commenter (0816) believes that streamlining the GS requirements and harmonizing them with other reporting requirements, such as under the UIC rules, will encourage the use of CCS technology. Another commenter (0815) believes that such streamlining will help facilitate development and deployment of CCS technology and it will help ensure public acceptance of GS.

One commenter (0804) is concerned that the proposed subpart RR rule has major reporting requirement differences when compared to other source categories, and claims that the reporting requirements covering a monitoring program should be part of the UIC GS rule, and not part of the proposed rule.

Another commenter (0798) suggests that EPA should avoid changes to 40 CFR part 98.448 in the Final Rule that increase significantly the risks or costs of ER operators opting to the document and report sequestration quantities through approval of the additional MRV plan provided for here which would result in duplicative compliance requirements to those in the UIC program.

Response 11-a:
EPA agrees with the commenters that supported harmonizing reporting requirements between the UIC program and this rule. EPA coordinated requirements in this rule with UIC requirements in order to minimize overlap, avoid, duplicative and/or conflicting requirements, and ensure consistency with the UIC program. Although this rule does not require facilities to undertake GS, EPA agrees that regulatory clarity is important for enabling the development of CCS technologies. EPA also agrees that clear regulatory requirements are important for effective public engagement.

Comment 11-b:
One commenter (0810) finds subpart RR's reference to the proposed UIC Class VI permit to be problematic since the UIC Class VI regulation has not yet been finalized. To remedy the issue, this commenter (0810) suggests EPA either remove the references to the proposed UIC Class VI permit or delay implementation of proposed subpart RR until the UIC Class VI regulation is finalized. Another commenter (0816) finds subpart RR's reference to the proposed UIC Class VI permit to be premature since the UIC Class VI regulation has not yet been finalized but that in principle they support allowing requirements for permits for the proposed classes of injection wells to be sufficient for the injection aspects of the MRV plan. One commenter (0798) urged

EPA not to prejudge the outcome of the pending UIC rule. The commenter (0798) believes that 40 CFR part 98.448(a)(4) should refer more generally to a MRV plan under a UIC permit that allows for non-ER based geological sequestration, rather than referencing the UIC Class VI proposal. Furthermore, one commenter (0816) claims that harmonizing proposed subpart RR with the UIC program is especially important since the UIC Class VI proposal has not yet been promulgated. One commenter (0798) believes that the proposed rule builds appropriately on what is anticipated to be the final outcome of the pending UIC rulemaking.

Response 11-b:
EPA is finalizing the UIC Class VI rule concurrently with this rule. Please refer to Section I.D of the preamble for a comparison of reporting requirements under subpart RR with the UIC Class VI rule.

Comment 11-c:
Regarding the CO_2 injection reporting requirements, one commenter (0813/TRANS-VA-02) support EPA's decision to allow storage sites to use their UIC permit to demonstrate compliance with certain portions of the proposed rule. One commenter (0808) supports EPA's suggestion that facilities subject to the UIC program would be able to satisfy the CO_2 injection reporting requirement using flow meters installed for the UIC program. One commenter (0813) suggests that EPA's final rule should codify that facilities subject to the GS UIC program would be able to satisfy the requirement to report the mass of CO_2 injected by using the flow meters installed for the UIC program and the data captured and recorded.

Response 11-c:
With respect to the reporting under subpart RR of CO_2 injected by facilities conducting GS, facilities may use as the point of measurement the location of the flow meter used to comply with the flow monitoring and reporting provisions in their UIC permit. EPA notes that for all other facilities injecting CO_2 underground (subpart UU), EPA has removed the requirement that facilities report the amount of CO_2 injected.

Comment 11-d:
One commenter (0798) suggests that EPA should allow reporting entities to use the same standards for reporting used under a UIC permit for the purposes of reporting under proposed subpart RR. The commenter finds that while the CAA does not have a "primacy" provision, it would be appropriate for EPA to allow reporting on the same basis as required by various State agencies under the UIC permit program and other state regulatory requirements. In particular, the commenter notes that under the proposed rule, 40 CFR part 98.444 (a) (11) requires quantities that are measured by a volumetric flow meter to be converted to mass flow using an absolute pressure of 1 atmosphere. The commenter claims that this is inconsistent with reporting required under the UIC Program, and suggests that EPA modify the provision so that the same figures reported under the UIC program can be used for reporting under the proposed subpart RR in order to avoid confusion, data inconsistencies, and unnecessary and duplicative compliance costs.

The multi-stakeholder discussion group (0799) notes that many states utilize established standards for gas volume reporting, and most gas sales contracts define the standard pressure base and temperature, which can differ from the state-established standard base. The commenter notes that additional conversions may be necessary for the gas accounting system under this action.

Response 11-d:
EPA considered allowing reporters to use the same conversion standards as used for their UIC permits and gas volume reporting (both of which may vary from state to state), but ultimately decided that all reporting entities should use the same conversion standards for purposes of reporting under this rule. This rule has been designed to collect data based on consistent reporting methods. EPA selected requirements that were appropriate to serve the objectives of a national reporting rule. To serve this purpose, EPA is requiring all facilities that use volumetric flow meters convert measured volumes using the same standard industry temperature and pressure conditions of 60 degrees Fahrenheit and one atmosphere. If facilities used different standard temperature and pressure conditions in order to convert measured volumes that were reported to EPA, EPA would not be able to compare data across facilities using a consistent metric. EPA notes that facilities may use the flow meter installed at the facility that is already being used to comply with flow monitoring and reporting provisions of the facility's UIC permit for reporting the quantity of CO_2 injected. EPA also notes that a reporter can use the volumetric data collected under an existing UIC permit along with data on temperature, pressure, and CO_2 concentration to calculate mass of CO_2 injected under subpart RR. One of EPA's priorities when developing and finalizing this rule was to minimize redundancy between the UIC Program and GHG Reporting Program and to build the reporting requirements in this final rule on top of requirements for UIC permits. Please refer to Chapter 4.2 of this document for comments on converting to standard conditions.

Comment 11-e:
Two commenters (0812, 0816) suggest that EPA should allow a single form or report to be used to sufficiently meet the requirements of both the UIC and MRR programs. One commenter (0816) recommends that EPA allow companies to submit the same annual report submitted to meet UIC permit requirements, in order to reduce reporting burdens.

Response 11-e:
EPA considered allowing a single form or report to be used for reporting requirements under both the UIC and GHG Reporting Programs, but ultimately concluded that a single form or report would not be practical. Facilities may report GS under subpart RR regardless of the class of UIC permit that they hold. Although the UIC Class VI rule requires that reporters submit data to EPA in an electronic format, data reporting for other UIC permit classes may be reported to states (rather than directly to EPA) and the data collected and reported may vary depending on state requirements. Therefore, because reporting under the GHG Reporting Program is neutral with respect to UIC well class, EPA determined that a single form or annual report that meets both the requirements of the UIC and GHG Reporting Programs for purposes of this rule would not feasible.

EPA disagrees that no additional measurements should be required unless specifically included in the MRV plan. The MRV plan relates to the detection and quantification of surface leakage. However, there are other measurements that are necessary in order to quantify the amount of CO_2 that is sequestered using a mass balance approach, such as measuring the mass of CO_2 injected. Data collection requirements are set forth in the subpart RR regulatory text at 40 CFR part 98.443.

Comment 11-f:
The multi-stakeholder discussion group (0799) recommends that EPA revise the definitions in 40 CFR part 98.449 to allow for proper understanding and application of UIC program terms in the proposed subpart RR.

Response 11-f:
EPA found that commenters were confused by the definition of GS facility in the proposed regulatory text and therefore deleted this definition in the final rule in order to make clear that this rule relies on the definition of facility located at 40 CFR part 98.6. Please refer to Section II.E of the preamble for further discussion regarding this change in the regulatory text. EPA notes that this rule is UIC class neutral and that any facility that conducts GS may report under subpart RR regardless of the class of UIC permit that the facility holds.

EPA agrees with the commenter that regulatory clarity is important. As a result of the comment, EPA reviewed the definitions at 40 CFR part 98.449. EPA added definitions for the terms "Underground Injection Control permit" and "Underground Injection Control program" in order to provide proper understanding and application of UIC program terms in the rule.

Comment 11-g:
One commenter (0794) argues that much of the monitoring and reporting proposed under subpart RR is the same as that required for the UIC program, and the EPA's approach to reporting from GS and CO_2 injection facilities is overly heavy-handed.

Response 11-g:
EPA notes that the reporting requirements in this rule are not the same as UIC requirements. Please refer to Section I.D of the preamble for a discussion on the relationship of the UIC program to this rule, as well as a comparison of reporting requirements under subpart RR with the UIC Class VI rule.

EPA disagrees that its approach to reporting from facilities conducting GS and other facilities conducting CO_2 injection is overly heavy-handed. With respect to reporting requirements under subpart UU, EPA is requiring facilities to report basic information on the amount of CO_2 received. This is information which facilities already collect as part of their ordinary course of business. With respect to reporting requirements under subpart RR, EPA is providing for a site-specific approach to monitoring. As a result, facilities may utilize monitoring that is best suited for the particular conditions of their site, including where applicable monitoring used for a facility's UIC permit requirements.

Comment 11-h:

Four commenters (0794, 0797, 0810, 0813) argue that properly sited and well-managed CO_2 storage sites are not at high risk of sudden releases of air emissions. The commenters suggest that the EPA revise the proposal's assumption that GS sites will leak CO_2 into the atmosphere, and instead should approach the reporting rules for CCS from the assumption that leakage is unlikely, especially because the UIC program ensures that storage sites will be properly sited and monitored. One commenter (TRANS-VA-02) notes that the UIC program ensures storage sites will be properly sited and monitored and that EPA should recognize this in the context of possible air emissions.

Two commenters (0790, 0797) assert that the leakage of CO_2 from the reservoir to the surface is unlikely in a properly permitted UIC injection scheme, and any such leaks are insignificant as compared to the mass of CO_2 injected. Hence, they recommend that EPA not have any requirement to detect, quantify, or report reservoir-to-surface leaks that are not detected by UIC permit requirements. A commenter (0797) opines that GS sites are expected to report a null set for such kind of air emissions, as would be confirmed by MMV that will be required under federal or state-based CCS permitting programs. The commenter opines that requiring detection and quantification of leaks not captured by UIC permit requirements imposes an unnecessary burden.

Commenter (0813) believes that the inclusion of reporting on the "movement of CO_2" in the subsurface and near surface is inappropriate and the information required under the UIC program should be sufficient for purposes of the MRV plan. The commenter suggests that EPA be required to accept without additional review the subsurface monitoring plan included in a project's UIC permit. The commenter notes that subsurface plume position must be monitored and must be included in the semi annual reports that EPA has proposed to require from UIC permit holders as proposed in 40 C.F.R. §§ 146.90(g) and 146.91.

Response 11-h:

EPA agrees with commenters that the risk of leakage to the surface is minimized at properly sited and well-managed sites and that the UIC program provides the foundation for the safe sequestration of CO_2 by ensuring that injected fluids remain isolated in the subsurface and do not endanger underground sources of drinking water. EPA does not make the assumption that injected CO_2 will leak to the atmosphere at GS sites. Subpart RR does, however, require monitoring to ensure that if leakage occurs, it will be detected and properly quantified and reported.

EPA considered the relationship of requirements under this rule and UIC permit requirements, and concluded that additional monitoring and reporting requirements were necessary for a proper mass balance of GS. The UIC program does not provide for quantification of the amount sequestered or the amount of surface leakage, if any. Therefore, EPA disagrees that it should not have any requirements to detect, quantify, or report surface leakage that is not detected by UIC permit requirements.

Please refer to Section I.D of the preamble for a comparison of reporting requirements under subpart RR with the UIC Class VI rule.

Comment 11-i:
One commenter (0804) asserts that the requirements of proposed subpart RR include increased reporting over that in the UIC rule and a provision requiring reporting of fugitive and vented CO_2 emissions from surface components. As such, the commenter expresses concern that that the proposed rule is treating sequestration as a major source of emissions, which will undermine public confidence in CCS technology.

Response 11-i:
EPA agrees that UIC permitted facilities would be required to collect additional data under this rule in order to quantify the amount of CO_2 that is sequestered. However, EPA disagrees that this rule predetermines the extent of emissions of facilities conducting GS. Rather, this rule will provide information on the effectiveness of GS over time in order to inform future policies relating to CCS for GHG reductions. EPA also disagrees that this rule will undermine public confidence in CCS technology. By providing a transparent framework for monitoring and reporting the quantities of CO_2 sequestered, information obtained under this rule could build public confidence in CCS.

Comment 11-j:
One commenter (0797) questions the utility of collecting data on CO_2 surface emissions under subpart RR. In addition, the commenter suggests that the monitoring under the UIC program will detect air emissions. In particular, the commenter interprets the proposed UIC CCS rule as a fairly expansive MMV program to verify the location of the injected fluids and the location of the pressure front, and to demonstrate that injected fluids are confined to intended storage zones. The commenter mentions that 'by definition, air emissions from a GS site would mean that the injected fluids were not confined to the intended storage zones, and thus would have been detected by monitoring under the UIC program.' The commenter notes that 'even in the unlikely event that MMV reporting under the UIC program suggested that injected fluids were not behaving in complete accordance with modeling, such an event would not necessarily mean that air emissions would result. Even in that scenario, air emissions from the storage site would be highly unlikely because, for example, operational steps (to include, if necessary, cessation of injections to diminish reservoir pressures) could be taken well before the passage of the years or decades that would be required for the CO_2 from such an anomaly to reach the surface.'

Response 11-j:
EPA disagrees that collecting data on surface leakage from facilities that conduct GS lacks utility. Quantification of surface leakage, should it occur, is an important for quantifying GS. EPA agrees that the UIC program provides a robust monitoring program for ensuring that USDWs are protected from endangerment. EPA also agrees that monitoring under a facility's UIC permit could be utilized for purposes of monitoring requirements under subpart RR. However, as discussed in Section I.D of the preamble, data collected under the UIC program does not provide all of the data elements necessary to conduct a proper mass balance for

quantifying the amount of CO_2 sequestered. Please refer to Section I.D of the preamble for a comparison of reporting requirements under subpart RR with the UIC Class VI rule. EPA agrees that injected fluids not behaving in accordance with modeling does not necessarily mean that there is surface leakage. With respect to remediation, EPA notes that this rule is a reporting rule and does not require facilities to control GHGs.

Comment 11-k:
One commenter (TRANS-VA-04) claims that the airside protocols of subpart RR that focus on detecting and reporting atmospheric leaks from CCS facilities are necessary supplements to the UIC Program's rules that focus on protecting underground sources of drinking water. The commenter asserts that, while the regulatory framework to ensure that CCS is properly controlled is incomplete, it should ultimately cover subsurface injection practices under SDWA, airside monitoring under the CAA, and also present a detailed liability and enforcement system. Furthermore, the commenter recommends that EPA consider how both the SDWA and CAA would interact with/support a liability and enforcement system.

Response 11-k:
EPA agrees with the commenter that subpart RR supplements UIC requirements by providing a mechanism to quantify the amount of CO_2 that is sequestered. EPA notes that this rule is a reporting rule and does not require the control of GHGs. Therefore, there is no liability under this rule associated with surface leakage. However, compliance with subpart RR requirements is mandatory for facilities that meet the source category definition, subject to penalties of the CAA.

Comment 11-l:
One commenter (0815) mentions that their organization is participating in a pilot project in Michigan and has conducted monitoring, verification, and assessment after completing each of two injection tests: i) 10,000 tons of CO_2; and ii) 50,000 tons of CO_2. They state that monitoring, verification, and assessment were performed after each test to validate the effectiveness of sequestration.

Response 11-l:
EPA notes that R&D projects may receive an exemption from subpart RR. Please refer to Section II.B of the preamble and Chapter 2.5 of this document for further information on obtaining an R&D exemption.

Comment 11-m:
Four commenters (0151, 0266, 0277, 0309) are concerned about the effects of CCS operations on underground sources of drinking water. Commenter 0226 particularly emphasizes the importance of verifying that the system is not leaking, testing the pH of groundwater to ensure that it does not change, and ensuring the stability of underground rock formations after CO_2 injections. One commenter (0578) particularly emphasized a need for the legislation to protect groundwater.

Response 11-m:
Although the protection of underground sources of drinking water is beyond the scope of this rule, concurrently with this rule EPA is finalizing requirements under the UIC program that establish a new class of GS injection well. Please refer to Section I.D of the preamble for further information.

Comment 11-n:
One commenter (0797) suggests that the EPA should clarify that MRV reporting is not related to site permitting. The commenter specifically wishes to ensure that the MRV plan mechanism under the proposed subpart RR may not be used as a means to challenge GS site permits issued under other federal or state programs, including the UIC Program.

Response 11-n:
EPA agrees with the commenter that this is a reporting rule and not a permitting rule. However, please refer to Section I.D of the preamble for further information on the relationship of MRV requirements under this rule to the UIC Class VI rule.

Comment 11-o:
Two commenters (0788, 0786) and a coalition of ENGOs (0809) stated that the UIC requirements are not sufficient for complying with the proposed subpart RR MRV requirements. One commenter (0788) suggests that EPA avoid implying that the UIC Class VI permit will be all that is needed to satisfy the requirements as situations will differ. The commenter suggests that EPA continue to find ways that will allow reporters to make maximal use of data collected for a UIC Class VI permit in order to complete the MRV for the reporting rule but for EPA to avoid implying that the data and methodologies required for monitoring by a UIC Class VI permit is always and everywhere equivalent to what is need for an MRV for the reporting rule.

A coalition of ENGOs (0809) believes that UIC monitoring and reporting is essential, and indeed likely to be the first source of information suggesting that there is the risk of lost containment, and eventual leakage; however, the data collected and reported under the UIC monitoring and reporting plan is not sufficient to demonstrate that no airside leakage has occurred. The commenter suggests EPA clarify the ability of the use of a UIC Class VI permit to demonstrate that the MRV requirements have been satisfied.

One commenter (0786) believes that allowing the use of a UIC Class VI permit would not be sufficient. The commenter notes that advances in horizontal drilling may give rise to a case in which a GS facility's injection site is onshore but the geological repository is offshore. In this situation, reliance on a UIC Class VI permit to fulfill the MRV leakage risk assessment would not be sufficient. The injection well would fall under the jurisdiction of the SDWA, and would require a UIC Class VI permit, however, the repository would fall outside of SDWA jurisdiction (i.e., requirements for site characterization and assessment of leakage pathways for sub-seabed repositories will be governed under a permitting authority other than the SDWA).

One commenter (TRANS-VA-04) claims that the airside protocols of subpart RR that focus on detecting and reporting atmospheric leaks from CCS facilities are necessary supplements to the UIC Program's rules that focus on protecting underground sources of drinking water. The commenter asserts that, while the regulatory framework to ensure that CCS is properly controlled is incomplete, it should ultimately cover subsurface injection practices under SDWA, airside monitoring under the CAA, and also present a detailed liability and enforcement system. Furthermore, the commenter recommends that EPA consider how both the SDWA and CAA would interact with/support a liability and enforcement system.

Response 11-o:

EPA agrees with commenters that the UIC monitoring is essential at GS sites, but that data collected and reported under the UIC program is not sufficient to quantify total CO_2 sequestered. Furthermore, EPA agrees that subpart RR supplements UIC requirements by providing a mechanism to quantify the amount of CO_2 that is sequestered. EPA clarifies in the final rule that a facility's UIC permit may be used to demonstrate that certain MRV plan requirements have been fulfilled. This approach allows the reporter to leverage the site characterization, risk assessment, and/or monitoring required by other authorities as the foundation for demonstrating compliance with the MRV plan requirements of subpart RR. However, provisions are needed that go beyond what is required of UIC permits in order quantify GS. See Section I.D of the preamble for a more detailed discussion of subpart RR and UIC Class VI requirements.

EPA notes that this rule is a reporting rule and does not require the control of GHGs. Therefore, there is no liability under this rule associated with surface leakage. However, compliance with subpart RR requirements is mandatory for facilities that meet the source category definition, subject to penalties of the CAA.

Comment 11-p:

Several commenters (0797, 0804, 0800, 0803, 0815) are concerned that there is overlap between the proposed MRV plan and the UIC rule. One commenter (0797) suggests that the final subpart RR rule acknowledge that the forthcoming UIC CCS rule alone may provide sufficient monitoring and reporting to meet EPA's needs under subpart RR. The commenter believes that most, if not all, of subpart RR's MRV plan requirements could be addressed under the UIC program. The commenter (0797) notes that EPA suggests that possible data gaps in the UIC program that will be filled by the subpart RR MRV are the UIC program's failure to "verify [] the amount of CO_2 sequestered and collecting data on CO_2 surface emission." Id. The commenter (0797) concurs with the EPA that it could be construed as a data gap, but suggest that rather than using subpart RR, the gap should be filled by defining tons sequestered as tons injected and monitored in compliance with all applicable federal and state GS-based requirements, including the UIC program.

Another commenter (0804) proposes that requirements for MRV of potential CO_2 leakage (i.e., an assessment of risk of leakage, detection and quantification of leakage to the surface, strategy for establishing pre-injection environmental baselines, and development of a mass balance equation) be part of the monitoring program required for a permit under the UIC rule not the subpart RR rule.

A commenter (0800) supports not overlapping with the requirements proposed for the UIC Class VI program, but drawing upon data obtained from UIC Class VI program requirements. The commenter believes that information certifying that 'all potential pathways that may result in CO_2 leakage have been identified and characterized and the risk of CO_2 leakage at each pathway has been evaluated'" (75 FR 18589) bears upon requirements that will be addressed under the proposed UIC permitting program and separate state permitting processes. This commenter notes that extensive geological characterization will go into the UIC site selection process and the UIC sites will be well managed for compliance.

One commenter (0803) states that the MRV plan requirements appear to be redundant with the UIC Class VI proposed requirements. They assert that leakage risk assessment is part of the site approval process under the UIC rule in which well-selected and well-managed sites are not anticipated to have potential leakage pathways. This commenter requests that EPA remove the risk assessment requirement from subpart RR as well as any provisions that are redundant to the UIC Class VI rules. This commenter suggests that EPA refer to UIC Class VI rule by reference with respect to MRV and address any of the provisions not specified under the UIC Class VI rule.

One commenter (0815) believes that the requirements of 40 CFR part 98.448(a)(1) are assessments and strategies for evaluating the effectiveness of GS sites and are potentially important components of the long term effectiveness of a GS site, but these requirements do not belong in a GHG monitoring plan. The commenter mentions that the effectiveness of and strategy for evaluating leakage to the surface is a complex geological evaluation and recommends that these requirements be included in the UIC permit or similar regulatory instrument, that regulates the injection of CO_2 through a permitted well. As potential leakage pathways develop and change over time (i.e., as the CO_2 plume expands in the subsurface), the characterization of potential leakage pathways may be required to be re-evaluated as part of the permit compliance program. The MRV should only be required to use the results of this evaluation to estimate CO_2 emissions, not to prescribe how this geologic evaluation should be conducted.

Response 11-p:

EPA designed subpart RR so that a facility's UIC permit may be used to demonstrate that certain MRV plan requirements have been fulfilled. This approach allows the owner or operator to leverage the site characterization, risk assessment, and/or monitoring required by other authorities as the foundation for demonstrating compliance with the MRV plan requirements of subpart RR. The UIC program provides the foundation for the safe sequestration of CO_2 by helping to ensure that injected fluids remain isolated in the subsurface and away from underground sources of drinking water, thereby serving to reduce the risk of CO_2 leakage to the atmosphere. However, provisions are needed that go beyond what is required of UIC permits in order to quantify CO_2 sequestered. MRV requirements of subpart RR were designed so that accurate data on the quantity of CO_2 sequestered is reported to EPA, regardless of the type of permit the facility holds. In addition, quantification of surface leakage and CO_2 sequestered does not fall under the authority of SDWA.

See Section I.D of the preamble for a more detailed discussion of subpart RR and UIC Class VI requirements. See Section 6.2 for a discussion of the necessity for the MRV requirements in this final rule and Section 6.4 for a defense of the requirement for assessing the risk of leakage of CO_2 to the surface.

Comment 11-q:

One commenter (0794) gives several reasons why they think EPA's approach in subpart RR is 'heavy handed'. One reason mentioned was that much of the proposed monitoring and reporting requirements are duplicative of requirements for CCS and ER projects under other regulations such as the SDWA UIC Program and voluntary and regulatory requirements implemented by other government agencies, such as DOE and Internal Revenue Service (IRS). Another commenter (0798) states that GS is being researched by DOE and other entities and the purpose of the DOE projects is to evaluate and test approaches to monitoring and verification in various settings. This commenter states that these kinds of site-specific considerations are already addressing in UIC permitting and will be modified in the final UIC Class VI rule.

Response 11-q:

EPA coordinated requirements in this rule with UIC requirements in order to minimize overlap, avoid duplicative and/or conflicting requirements, and ensure consistency with the UIC program. See Chapter 13 for a discussion of the relationship of this final rule with other voluntary and regulatory requirements. See Chapter 6.1 for a discussion of the relationship of this rule to DOE research.

Comment 11-r:

A commenter (0795) and the multi-stakeholder discussion group (0799) state that a very effective manner for protecting USDWs will be ensuring that the injected CO_2 stream and displaced formation fluids are fully contained within the injection and confining zones, as is done under the UIC permit. One commenter (0795) suggests that EPA clarify in the final rule preamble that the use of UIC permits and monitoring plans can satisfy the majority of the proposed subpart RR MRV plan requirements. In particular, for UIC Class II (b)(4) wells, the current monitoring practices of ER operators should meet most of the same requirements. The commenter mentions that, based on experience, the most effective manner for protecting underground sources of drinking water (USDWs) is accomplished by ensuring that the injected CO_2 stream and displaced formation fluids are contained within the injection and confining zones. The commenter believes that protection of USDWs adequately assures protection against releases to the atmosphere. The multi-stakeholder discussion group (0799) notes that wells meeting criteria for their proposed classification II(b)(4) have a risk profile that reflects more than 35 years of experience with the safe and effective injection of CO_2 for ER, 75 FR at 18579, and EPA's final subpart RR rule should allow implementation of the requirements to reflect that reality.

The multi-stakeholder discussion group (0799) states that sites have been carefully selected to meet applicable siting requirements (i.e., criteria that mandate sites capable of accepting and containing the injected fluids), and, therefore the monitoring requirements should also be tailored to each site. The multi-stakeholder discussion group (0799) opines for clarification about the

applicability of UIC Class II requirements where GS occurs with ER activities. The monitoring methods and procedures adopted under the UIC permit and additional monitoring procedures that are already being implemented could be sufficient to fully satisfy the MRV requirements of this subpart and if not, monitoring plans will need to be modified to demonstrate compliance with the MRV plan requirements of this subpart. The commenter suggests that the determination for the need for modifications be made on a case-by-case basis.

Response 11-r:
EPA agrees with commenters that the UIC monitoring is essential at GS sites, but that data collected and reported under the UIC program is not sufficient to quantify total CO_2 sequestered annually. EPA clarifies in the final rule that a facility's UIC permit may be used to demonstrate that certain MRV plan requirements have been fulfilled. This approach allows the owner or operator to leverage the site characterization, risk assessment, and/or monitoring required by other authorities as the foundation for demonstrating compliance with the MRV plan requirements of subpart RR. However, provisions are needed that go beyond what is required of UIC permits in order quantify GS. See Section I.D of the preamble for a more detailed discussion of subpart RR and UIC Class VI requirements.

Comment 11-s:
The multi-stakeholder discussion group (0799) suggests modifications to the regulatory text regarding use of UIC Class VI permit in demonstrating that the MRV plan requirements have been satisfied. The commenter suggested that reference to UIC Class VI be eliminated as GS wells may be permitted in other classes (e.g., recommendations have been submitted to EPA for GS wells to be permitted under UIC Class II for GS operations in oil and gas reservoirs and under UIC Class V for GS operations and in basalts, coal beds, salt caverns or shales). This commenter also suggests an explicit revision to the regulatory language by inserting the word 'help' to recognize that MRV plans associated with UIC permits can be helpful even if not sufficient in demonstrating compliance with the MRV requirements of this subpart:

> (4) If you are using a MRV plan incorporated in an Underground Injection Control [[Class VI]] permit to [help] demonstrate that the MRV plan requirements of this subpart have been satisfied and the Underground Injection Control [[Class VI]] permit has not been approved, you must submit the identification number associated with the Underground Injection Control [[Class VI]] permit application and notify EPA when the Underground Injection Control [[Class VI]] permit has been approved. [NOTE: Text appearing inside [[ ]] above appears as strikethrough tracked change text in original document; Text appearing inside [ ] above appears as inserted tracked change text in original document]

One commenter (0802) suggests that EPA consider accepting a facility's UIC Class II permit to satisfy this same element of MRV requirements. In particular, the injection wells at ER sites are likely to be UIC Class II wells, not UIC Class VI wells. To obtain a UIC Class II well, the applicant also must evaluate the potential for leakage resulting from well injection.

One commenter (0816, 0816) proposes that EPA accept an MRV plan that would be applicable to all classes of wells, including UIC Class II and Class VI wells, if the plan is appropriate for GS activities with or without CO_2-ER operations. The commenter suggests that for GS facilities, any additional reporting requirements should be consistent with those required by permit conditions under the UIC program.

Response 11-s:
EPA agrees with the commenter that any UIC permit can be used to demonstrate that certain MRV plan requirements have been fulfilled and has clarified this in the final rule and has deleted the reference to UIC Class VI in this section of the regulatory text. EPA has also revised the regulatory text in this section to refer to well identification numbers rather than UIC permit application numbers, as this will enable EPA to coordinate more efficiently across programs.

Comment 11-t:
A few commenters (0795, TRANS-VA-01, 0767) encourage coordination and communication across EPA and other programs on GS regulations and implementation, particularly between the UIC and GHG Reporting program. One commenter (0795) emphasizes the importance for EPA to coordinate GS requirements across relevant statutory or regulatory programs, especially with respect to the UIC program requirements for delineation of the AoR for GS facilities, development and implementation of MRV plans, review and updating of AoR plans and closure. One commenter (TRANS-VA-01) mentions that a UIC Rule finalized in parallel with the Mandatory Reporting Rule is critical to ensure integrated water and airside environmental health protections. The commenter suggests that EPA's rules harmonize the development and approval of airside and UIC monitoring strategies because permitting will largely be overseen by the states and airside monitoring tools are largely the same as those for ground water protection under the UIC program.

One commenter (TRANS-VA-01) suggests that all information collected by the MRV program be reported to the UIC permitting authorities in a timely manner. The commenter mentions that immediate reporting will be particularly important where evidence of leakage or pressure front migration exists such that the shutdown triggers and airside mitigation measures in the permits can be put in place by the state agencies in addition to the revision of the MVR plan that's required under the proposal.

One commenter (0767) suggests that subpart RR be restructured to provide that 'in the event that monitoring under the UIC CCS rule indicated that air emissions were resulting from the GS site, such air emissions would have to be quantified and separately reported under subpart RR.

The multi-stakeholder discussion group (0799) mentioned that coordination is critical between program offices and EPA regional offices, and between EPA and state agencies involved in administering the UIC and air programs. This coordination includes support for development, implementation, and review of MRV plans.

Response 11-t:

EPA believes that the requirements of the UIC Class VI rule and subpart RR complement one another by concurrently ensuring USDW protection, as appropriate, and requiring reporting of CO_2 surface emissions under subpart RR. For example, for those UIC Class VI sites where a UIC Director uses his/her discretion to include surface air or soil gas monitoring as required by the facilities MRV plan, that monitoring will be incorporated by reference into the UIC permit. Please refer to http://water.epa.gov/type/groundwater/uic/wells_sequestration.cfm for information on regulatory requirements for GS under the UIC program. EPA is also committed to working closely within the agency to coordinate implementation of the UIC and GHG Reporting programs, reduce burden on reporters, provide timely access to verified emissions data, establish mechanisms to efficiently share data, and harmonize data systems to the extent possible. Pending CBI determination, information reported to EPA under subpart RR will be publicly available and accessible by any State and permitting authorities.

Comment 11-u:

A coalition of ENGOs (0809) notes that there is no requirement in the proposed rule that a plan must be outlined for communication with the UIC permitting authority in the event of an adverse CO_2 plume or pressure front migration, or any airside leakage.

The coalition suggests that the MRV plan required by EPA reflect the synergies between UIC monitoring and reporting and the need for airside monitoring and reporting, by including additional requirements that are triggered at the point when a potential problem is observed through the UIC monitoring program or under the MRV, and well before any documented actual airside "leakage." Detection of “leakage” – defined in proposed 40 CFR part 98.449 as “the movement of CO_2 from the injection zone to the surface” – means that one of the underground mechanical or geologic barriers to CO_2 release has been severely compromised. As such, detection of leakage is significant, and should trigger immediate remedial action by the permit issuing authority – which, under the system of permits and monitoring that EPA is developing for GS facilities, will be a state or perhaps EPA under the SDWA UIC Program’s system of delegated permit authority. A leakage should trigger a remedial response.

The coalition believes that EPA has the authority to build into the MRV plan the requirement to communicate information about a leakage sufficient to trigger a remedial response. The communication should include explicit directions about required communication between i) EPA and the UIC permitting authority in the event of detection of leakage; and ii) between the UIC permitting authority and EPA at the first evidence of potentially lost containment. They assert that EPA should provide directions on the required communication between EPA and the UIC permitting agency, especially when there is evidence of leakage.

The commenters suggests where there is no UIC permit, the MRV plan must include subsurface monitoring and reporting requirements similar to those in place for a UIC Class VI well, under the UIC program, or demonstrate that some other monitoring and reporting protocol is appropriate and will provide sufficient early warning of potential loss of containment/leakage.

Another commenter (0811) also recommended that EPA establish mechanisms to link the reporting under this proposed rule to the UIC program to ensure that, in the unlikely event of

significant deviations from the original plume projections, communication with the UIC authorities is required.

Response 11-u:
EPA concluded that remedial action is beyond the scope of the reporting requirements of subpart RR and determined that all reporting must be to EPA directly. In the case of a UIC permit holder, the owner or operator is responsible for reporting to the UIC Director, any evidence that CO_2 has migrated from the intended injection zone and has triggered a remedial response. Additionally, information on surface leakage reported to EPA as required by subpart RR is intended to be public, subject to any limitations or requirements in its CBI determination (see Section I.B of the preamble).

Comment 11-v:
A coalition of ENGOs (0809) mentions that the four required components for a MRV plan in 40 CFR part 98.448 (a) (1) do not require the inclusion or reference the monitoring and reporting requirements for a UIC permit.

Response 11-v:
Although the MRV requirements at 40 CFR part 98.448 (a) do not explicitly include or reference the UIC permit, any UIC permit can be used to demonstrate that certain MRV plan requirements have been fulfilled.

Comment 11-w:
Two commenters (0808, 0813) suggest that the rule and any MRV requirement begin with the understanding that sites will be heavily regulated and permitted at the federal and state levels, and that monitoring will separately be required as part of the UIC program. These commenters are pleased that EPA is considering ways to minimize overlap between the reporting rule and the UIC rule and suggest that EPA allows regulated sources to report to EPA the monitoring that they are conducting as part of separate CCS permitting requirements. Commenter 0808 also states that utilizing a material balance approach for reporting CO_2 sequestered and the fugitive emissions emitted will allow the MRV plan utilized when permitting the well to be utilized.

Response 11-w:
EPA acknowledges the commenter's input and shared view of the desire to minimize overlap between the GHG Reporting Program and UIC requirements. Therefore, EPA clarifies in the final rule that a facility's UIC permit may be used to demonstrate that certain MRV plan requirements have been fulfilled. This approach allows the owner or operator to leverage the site characterization, risk assessment, and/or monitoring required by other authorities as the foundation for demonstrating compliance with the MRV plan requirements of subpart RR. Refer to Chapter 13 of this document for a discussion on the relationship of this final rule to federal and state permitting. Also, please refer to Section I.D of the preamble and for a discussion of how this rule relates to the UIC program.

Comment 11-x:
One commenter (0800) suggests that EPA assure that the MRV plan is not used as an extension of the UIC Class VI rules to confirm or qualify target reservoir containment or migration.

Response 11-x:
The purpose of the MRV requirements of subpart RR is for the reporting the quantity of CO_2 sequestered, and not to confirm reservoir containment. However, if a facility can confirm that the CO_2 has not migrated our of the injection zone, this information can be used towards demonstrating no surface leakage.

Comment 11-y:
One commenter (0798) claims that while the proposed subpart RR addresses reporting and monitoring only, the MRV plans to be adopted under the UIC program will include requirements for sealing leaks in the confining systems.

Response 11-y:
EPA agrees that subpart RR addresses reporting and monitoring only. Please refer to Section I.D of the preamble for a discussion of how this rule relates to the UIC program.

Comment 11-z:
A commenter (0807) supports EPA's declaration to continue to regulate wells used for injection for ER of oil and gas using the existing Class II UIC Program. The commenter states that the added economic burden related to construction and MRV requirements being considered for the proposed UIC Class VI Wells may discourage certain operators from developing much needed US oil reserves, that are unlikely to be recovered without the employment of CO_2-ER.

Response 11-z:
The commenter is referring to the proposal preamble discussion on the relationship between the UIC Class VI rulemaking and the subpart RR rulemaking. The discussion refers to the UIC proposal and did not discuss any final decisions in the UIC Class VI rulemaking related to UIC Class II wells. Please see the final UIC rulemaking for UIC Class VI injection well requirements.

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12 Relationship to Other Subparts of the GHG Reporting Program

Comment 12-a:
The multi-stakeholder discussion group (0799) suggests that the preamble mention that injection of CO_2 into a geologic formation such as a CO_2 dome should not result in double counting if the CO_2 is subsequently extracted and delivered for some other use. In particular, subpart PP excludes the 'Storage of CO_2 above ground or in geologic formations' (40 CFR part 98.420(b)(1) and proposed subpart RR excludes 'Temporary Storage of CO_2 below ground' (40 CFR part 98.440(d)(2) 75 FR 18600, April 12, 2010).

Response 12-a:
EPA considered the hypothetical described by the multi-stakeholder discussion group and concluded that the hypothetical would not result in double counting and is not necessary to be included in the preamble. The subpart PP source category includes facilities with CO_2 production wells that extract a CO_2 stream for the purpose of supplying CO_2 for commercial applications. A CO_2 production well is any hole drilled in the earth for the primary purpose of extracting CO_2 from a geologic formation or group of formations which contain deposits of CO_2. The subpart UU source category includes any well or group of wells that injects a CO_2 stream into the subsurface. Since the CO_2 stream is not being injected for long-term containment in subsurface geologic formations, it would not be subject to subpart RR. The facility would report basic information on the amount of CO_2 received under subpart UU. If the facility also included a CO_2 production well extracting the CO_2 stream for the purpose of supplying CO_2 for commercial applications, the facility would separately report information on the amount of CO_2 supplied under subpart PP.

Comment 12-b:
One commenter (0805) references the section of the proposal that explains that EPA is proposing to collect information on whether the CO_2 was contracted from a natural sources or an industrial source as EPA sees value in being able to "track the movement of CO_2 through a CCS system and any shift toward anthropogenic CO_2 supply sources." The commenter argues that reporting CO_2 production and supply information bears no relationship to the amount of CO_2 that is eventually actually emitted, and that it makes little sense for the EPA to track a potential "shift toward anthropogenic CO_2 supply sources," because full-scale GS systems will be built primarily to sequester anthropogenic CO_2, and there will be no economic incentive to purchase natural CO_2 to re-sequester in a GS facility.

Additionally the commenter references the section of the preamble that mentions that EPA will use the proposed subpart RR data in combination with subpart PP data to better understand the quantity of CO_2 supplied to emissive and non-emissive end uses. The commenter suggests that the objectives to track the shift to anthropogenic CO_2 and to improve understanding of sources of CO_2 supplied are not in keeping with Congress's direction that EPA establishes a national GHG emissions inventory. The commenter mentions that EPA has not provided justification for the

reporting of CO_2 production and supply information and its relationship to the amount of CO_2 that is eventually emitted.

Response 12-b:
This rule requires reporting by facilities that conduct GS (subpart RR) and all other facilities that inject CO_2 underground (subpart UU). The comment regarding the reporting of CO_2 production and supply is beyond the scope of this rule and relates to the reporting by suppliers of CO_2 under subpart PP of the GHG Reporting Program. EPA disagrees that it does not make sense for EPA to track the sources of CO_2 received for injection and GS. EPA noted in the preamble to the proposed rule (75 FR 18586) that the source of CO_2 currently injected underground is predominantly CO_2 produced from natural CO_2 domes. EPA further notes that facilities may report under subpart RR irrespective of the source of CO_2. Because facilities that report under subpart RR may receive naturally sourced CO_2 or anthropogenic CO_2, EPA concluded that there is value in understanding the source of CO_2 received. EPA also notes that it is possible that GS using naturally sourced CO_2 may not qualify as a GHG mitigation action in future policies because the purpose of GS is to isolate CO_2 that would otherwise have been emitted to the atmosphere.

EPA is issuing this rule under its authority in CAA Section 114. While EPA is not citing prior Appropriations Acts as authority for this rule, this rule is consistent with Congress's direction to EPA for establishing the GHG Reporting Program. Please refer to Chapter 1 of this document regarding EPA's legal authority to promulgate this rule.

Comment 12-c:
One commenter (0805) disagrees with EPA's methods of tracking CO_2 movements, as proposed in subparts PP and RR. The commenter notes that EPA aims to determine the amounts of non-emissive CO_2 used in ER by comparing natural source production to emissions. However, the commenter argues that this approach cannot be achieved under the proposed rules, because if the natural CO_2 producer does not own the entire interest in the source field, the operator will report 100% of the production volumes under subpart PP. The commenter states that "The source operator may use CO_2 in its own ER projects and sell the balance of its entitled production to other ER operators. If all of the source operator's customers correctly identify the source operator and its source facility as the source, the source operator's entitled source production would be offset by non-emissive uses. However, if the source operator's co-working interest owners sell their entitled production to emissive or non-emissive customers, and those customers do not identify the source operator as the source (as opposed to the co-working interest owner who sold and delivered the CO_2 to them), then there will be a gap in tracking the source production."

Response 12-c:
The hypothetical situation posed by the commenter would not be problematic. EPA is requiring facilities that conduct GS or facilities that inject CO_2 underground to report, if known, the general category from which the CO_2 is being received, such as an electric generating unit. The reporter is not required to identify the particular source operator and source facility.

Comment 12-d:
One commenter (0805) suggests that CO_2 suppliers differ significantly from other upstream suppliers that EPA regulates under the MRR. The commenter argues that, unlike upstream GHG emitters such as motor fuels, there is no exact correlation between the amount of CO_2 supplied to CCS facilities for injection and the amount that is accidentally emitted to the atmosphere. The commenter asserts that there is no justification for requiring upstream reporting of CO_2 production.

Response 12-d:
This comment is beyond the scope of this rule because it relates to reporting by CO_2 suppliers under subpart PP and does not relate to reporting by facilities that conduct GS (subpart RR) or other facilities that inject CO_2 underground (subpart UU).

Comment 12-e:
One commenter (0814) requests clarification on how subparts W, PP, and proposed subpart RR will work in concert with minimum overlap. The commenter notes that acid gas injection activities are being reported both under 40 CFR part 98 subpart PP and 40 CFR part 98.440(a) of the proposed subpart RR for the same activity. The commenter also mentioned that the two subparts require the reporting of fugitive and vented emissions. The commenter is seeking clarification on how subparts W, PP and proposed subpart RR work in concert and how a facility is to comply with the three subparts concurrently.

Response 12-e:
EPA agrees that some owners and operators are required to report on their operations under multiple source categories, such as subparts W or PP. Please refer to Table 2 of this preamble, which provides a guide to the subparts that reporters may need to consider in their facility applicability determination, and/or include in their reporting. In general, subpart PP focused on CO_2 supplied, subpart UU focused on CO_2 received, subpart RR focuses on CO_2 sequestered underground, and subpart W focuses on fugitive and vented emissions from surface equipment.

With respect to the hypothetical posed by the commenter, the reporter would comply with the subparts concurrently as follows. Subparts PP, UU, and RR rely on the same definition of facility in 40 CFR part 98.6 and require reporting at no threshold, so a subpart UU or RR reporter should first establish the facility parameters. EPA has reviewed the typical configurations of projects that inject CO_2 streams underground and has illustrated and described these project configurations with respect to the 40 CFR part 98.6 definition of facility in the final General TSD. The reporter should next assess whether the facility contains a production process unit that captures a CO_2 stream[16] for purposes of supplying CO_2 for commercial applications or injecting it underground. If so, then the reporter must submit one annual GHG report for that facility with subpart PP data as well as subpart RR or UU data. EPA notes that subpart PP does not require reporting of acid gas injection; rather, the facility must report under subpart PP if it is capturing

[16] See 40 CFR part 98.6 for the definition of CO_2 stream.

acid gas that contained CO_2 from an emission source. A facility that injects acid gas containing CO_2 underground must report basic information on CO_2 received at the facility under subpart UU.

Onshore petroleum and natural gas production in subpart W, which was finalized in a separate action from this one, relies on a different definition of facility, and subpart W is subject to a threshold. Therefore, an owner/operator must determine separately whether any of its operations are covered under subpart W according to the applicability determination outlined in that action. EPA recognizes that an ER operation that meets the applicability requirements of subpart W will be required to submit multiple annual reports to EPA under the GHG Reporting Program. Please see Response 2.3-b in today's final action for an explanation of why EPA is using the definition of facility in 40 CFR part 98.6 and not the definition for onshore petroleum and natural gas production in subpart W.

Comment 12-f:

A coalition of ENGOs (0809) and the multi-stakeholder discussion group (0799) assert that EPA needs to amend 40 CFR part 98.2 to include proposed subpart RR facilities in the new Tables A-3 and A-4 (Mandatory Reporting of Greenhouse Gases: Minor Harmonizing Changes to the General Provisions, 75 FR 12451, 12456-58 (March 16, 2010)). Specifically, the multi-stakeholder discussion group (0799) recommends inserting the following new text into 40 CFR part 98.2:

> 40 CFR part 98.2
>
> **[Subpart A, Table A-3 is amended by adding "Injection and Geologic Sequestration of Carbon Dioxide (Subpart RR) under the heading "Additional Source Categories 1 Applicable in 2011 and Future Years."**
>
> **Subpart A, Table A-4 is amended by adding "Petroleum and Natural Gas Systems (Subpart W) under the heading "Additional Source Categories 1 Applicable in 2011 and Future Years."]**

[NOTE: Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

However, as an alternative, the multi-stakeholder discussion group (0799) suggests making the following revision to 40 CFR part 98.441(a):

> 40 CFR part 98.441(a)
>
> (a)You must report under this subpart if your facility is an injection facility that injects CO_2 into the subsurface and the facility meets requirements of either ~~§98.2(a)(1) or (a)(2)~~ [**§98.440(b) or (c)**.]

[NOTE: Text appearing as strikethrough above appears as strikethrough tracked change text in original document; Text appearing in [**bold**] above appears as inserted tracked change text in original document.]

The multi-stakeholder discussion group (0799) further asserts that once a facility is subject to the requirements of 40 CFR part 98.2, they must continue to comply with the requirements even if the facility does not meet the applicability requirements in future years.

A coalition of ENGOs (0809) mentions that the reference to 40 CFR part 98.2(a)(2) should be removed from the final rule as this section references a table of source categories in which only sources emitting 25,000 tons per year or more must report. The coalition of ENGOs also suggests that EPA clarify that the proposed subpart RR facilities must begin reporting in January 2011.

Response 12-f:
EPA has amended Table A-3 of subpart A to include the source categories covered by subpart RR and subpart UU. Please note that comments on subpart W are being addressed in a separate rulemaking (see Docket ID No. EPA-HQ-OAR-2009-0923). Please refer to Chapter 8 of this document for a discussion of when facilities may cease reporting under this rule.

Comment 12-g:
The multi-stakeholder discussion group (0799) provides a comparison of the language of 40 CFR part 98.441(b) in relation to 40 CFR part 98.2(i) however, the commenter provides no recommended revisions. The comment reiterates the sections from the proposed rule as indicated below.

> 40 CFR part 98.441(b)
> The requirements of §98.2(i) do not apply to this subpart. Once a facility is subject to the requirements of this subpart, the owner or operator must continue for each year thereafter to comply with all requirements of this subpart, including the requirement to submit annual GHG reports, even if the facility does not meet the applicability requirements in paragraph (a) of §98.2(a) of this part in a future year, unless paragraphs (b)(1) or (b)(2) of this section apply.
>
> 40 CFR part 98.2(i)
> "(b) Except as provided in this paragraph, once a facility or supplier is subject to the requirements of this part, the owner or operator must continue for each year thereafter to comply with all requirements of this part, including the requirement to submit annual GHG reports, even if the facility or supplier does not meet the applicability requirements in paragraph (a) of this section in a future year."

Response 12-g:
EPA notes that the commenter does specify what, if any changes, it would recommend making to the above cited text in 40 CFR part 98.441(b) or 40 CFR part 98.2(i). However, please refer to

Chapter 8 of this document for EPA's responses to comments regarding when a facility may discontinue reporting under this rule.

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13 Relationship to Other Information Collection and Reporting Efforts

Comment 13-a:
One commenter (0797) suggests that subpart RR should acknowledge that some states, including Kansas, Louisiana, Montana, North Dakota, and Texas, are adopting comprehensive permitting regimes for GS sites that should complement the forthcoming UIC CCS rule. The commenter finds that the relationship between EPA's proposed subpart RR MRV requirements and these state-based permitting programs is unclear. The commenter advises that the final subpart RR rule acknowledge that it is not intended to supplant state or federal permit-based MMV requirements that already address air emissions reporting for GS sites.

Response 13-a:
EPA affirms that States can collect additional data under State rules and GHG programs, and that this rule does not preempt or replace State reporting programs. Please also refer to Section II.O of the preamble to the rule establishing the GHG Reporting Program (74 FR 56283, Oct. 30, 2009) for a discussion on the role of states.

Comment 13-b:
One commenter (0797) emphasizes that GS sites will be aggressively regulated and permitted under many other state and federal authorities which may overlap with the proposed reporting requirements under the proposed subpart RR. The commenter supports EPA's site-specific approach; however, the commenter expects state and federal CCS permitting regimes will impose separate MMR/MRV requirements that could overlap with subpart RR requirements.

One commenter (0794) asserts that CCS and ER sites are already subject to extensive regulatory oversight and monitoring at both the federal and state levels. The commenter opines that regulated sources should be able to satisfy EPA's needs by reporting to the Agency on the monitoring they are required to do under other CCS or ER permitting requirements and a variety of other federal emissions reporting regimes.

Response 13-b:
This is a reporting rule and not a permitting rule. EPA recognizes that facilities will be regulated and permitted under other state and federal authorities. Please refer to Section I.D of the preamble and Section 11 of this document for a discussion of how this rule relates to the UIC program.

In developing this rule, EPA carefully analyzed other information collection and reporting efforts, including state and federal programs. EPA applauds the efforts that other authorities are taking to ensure that CO_2 is being sequestered safely and securely. However, EPA found that this rule is necessary in order to provide a nationally consistent framework for determining the amount of CO_2 that is received for injection and quantifying the amount of CO_2 that is sequestered.

Comment 13-c:
One commenter (0788) opines that the proposed rule makes clear that its approach is consistent with CO_2 storage regulatory requirements around the world and why lesser standards such as those in the 1605b program and the IRS Section 45Q tax credit are not appropriate.

Response 13-c:
EPA agrees with the commenter that this rule goes beyond other information collection and reporting efforts and the approach taken by this rule is consistent with regulatory requirements around the world.

Comment 13-d:
One commenter (0801) emphasizes that the connections to state and local laws and regulations are not included in the MRV plans. The commenter asserts that states do not have the protocols established at the local level for safe control and basic level budgetary decisions. The commenter emphasizes that there exists no state certification for CCS personnel, nor is there a "state clearinghouse" for the scientific information necessary for site-specific MRV.

Response 13-d:
EPA agrees that, for purposes of this reporting rule, MRV plans will be used to report information to EPA and that facilities will need to obtain relevant permits from federal, state and local permitting authorities. This rule does not require any facilities to inject CO_2 underground or conduct GS. Similarly, state certification of CCS personnel and state clearinghouses of information are beyond the scope of this rule. State and local agencies have no obligations under this rule to assist EPA with rule implementation or enforcement. It is possible, however, that the information to be made publicly available and accessible after finalization of this rule will be of use to State and local entities.

Comment 13-e:
One commenter (0786) notes that the New Jersey Department of Environmental Protection (NJDEP) recently began an assessment of potential CCS sites in New Jersey and adjacent offshore regions. This initial assessment is designed to build a basis for future decisions about CCS in New Jersey. The NJDEP highlights the importance of identifying areas that are unsuitable for GS as well as those areas that warrant further research.

Response 13-e:
EPA thanks the commenter for this information.

Comment 13-f:
One commenter (0797) mentions that, the proposed subpart RR could be read to suggest that a party cannot claim the Section 45Q CCS tax credit until EPA approves the relevant MRV plan. The commenter believes that this result would be unfortunate.

Response 13-f:
Please refer to Section I.F of the preamble for a discussion of how this rule relates to the Internal Revenue Code Section 45Q credit for CO_2 sequestration.

Comment 13-g:
Two commenters (0792, 0797) assert that the MRV requirements of the proposed subpart RR should allow the use of third-party protocols or methodologies. One commenter (TRANS-VA-07) states that industry has developed consensus-based procedures for MRV that should be considered by EPA.

One commenter (0797) notes that NACCSA and the Pew Center on Global Climate Change are currently developing the first comprehensive CCS protocol for use in the US, to be finished by the end of 2010. The commenter emphasizes that the NACCSA/Pew methodology is being conducted through an open, science-based review process, with a broader external stakeholder consultation process that will incorporate the comments of industry entities, NGOs, governmental agencies and other stakeholders, and a period for public comment. The commenter encourages the EPA to allow use of third-party methodologies such as this protocol in the MRV components of the proposed subpart RR. The commenter describes the NACCSA and Pew Center methodology, and how this methodology will mirror the EPA's approach to the MRV plans. The commenter expects that the upcoming NACCSA/Pew methodology will satisfy most of the specific MRV plan criteria proposed for the proposed subpart RR and will assist in succinctly identifying the best practice guidance into a comprehensive methodology for application to many North American projects. The commenter suggests that the EPA's proposed MRV requirements effectively propose a government-mandated CCS methodology, as topics such as monitoring, leak detection, and use of mass balance equations are typical attributes of CCS methodologies. The commenter notes that the NACCSA/Pew methodology plans to include detailed procedures for establishing baseline scenarios for projects. The commenter asserts that EPA's proposal to use a mass balance approach to calculate the amount of CO_2 sequestered is precisely the purpose of the methodology currently being developed by NACCSA/Pew. This methodology will likely impose a material balance on the captured CO_2 stream, and will directly measure the volume of CO_2 captured and injected, accounting for losses during compression, transportation, injection and recycling. The commenter suggests that the NACCSA/Pew protocol for CCS may address the issue of quantifying leakage through various means, including project-based monitoring and monitoring that is intended to ensure the permanence of the injected CO_2. One commenter (0792) also describes the NACCSA/Pew methodology and encourages EPA to ensure that this rule allow the use of protocols such as those being developed by NACCSA/Pew.

Response 13-g:
In developing this rule, EPA considered allowing the use of third-party protocols and standards. EPA applauds NACCSA and Pew for working together to advance efforts for monitoring and reporting quantities of CO_2 that are geologically sequestered. EPA is allowing measurement devices to be operated according to an appropriate standard method published by a consensus-based standards organization if such a method exists; or an industry standard practice. With respect to MRV plan requirements, EPA notes that it is allowing a site-specific approach for the development of MRV plans and that a facility may incorporate those techniques that are best

suited for their geological operational conditions. EPA agrees that a facility could choose to use a third party protocol in developing its MRV plan so long as the plan meets the requirements of subpart RR.

Comment 13-h:

One commenter (0797) asserts that a variety of documents have been developed for the quantification of GHG emission reductions from CCS projects. The commenter states that they have used these documents have been part of the foundation for their monitoring methodology:

- Alberta Offset System. Quantification Protocol for EOR Projects.
- Alberta Offset System. Draft GHG Quantification Methodology for Carbon Capture and Storage Projects
- American Carbon Registry. Merit Energy, PetroSource, Sandridge Pikes Peak, Anadarko Monell, and Salt Creek ER Projects.
- American Petroleum Institute- International Petroleum Industry Environmental Conservation Association. Oil and Natural Gas Industry Guidelines for Greenhouse Gas Reduction Projects. Part II: Carbon Capture and Geological Storage Emission Reduction Family.
- Clean Development Mechanism. NM0167: Recovery of Anthropogenic CO_2 from Large Industrial GHG Emission Sources and Storage in an Oil Reservoir.
- Clean Development Mechanism. NM0168: The Capture of CO_2 from Natural Gas Processing Plants and Liquefied Natural Gas Plants and its Storage in Underground Aquifers or Abandoned Oil/Gas Reservoirs.
- Clean Development Mechanism. Capture of CO_2 from the Front-End of Integrated Gas-to-Liquid Plants, Transport via Pipeline and Long-Term Containment in Appropriately Selected and Well-Managed Geological Storage Complexes.
- Canadian Standards Association GHG Reductions Registry. Anadarko Monell, Salt Creek and Hays ER Projects; MEGlobal Prentiss 1&2 ER Projects, PetroSource ER Project, and Denbury Resources ER Project.

Response 13-h:

EPA reviewed CO_2 injection and GS information collection and reporting efforts, such as those referenced in Section I.F of the preamble to the proposed rule and the documents referenced by the commenter. The documents referenced by the commenter outline various approaches for MRV and quantification. Some of the documents provided general methodologies while others were specific to a given project. In general, these documents support the need for a nationally consistent methodology for quantifying the amount of CO_2 that is sequestered.

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14 General Comments

14.1 General Comments on the Rule

Comment 14.1-a:
Thirteen commenters (0074, 0163, 0340, 0428, 0435, 0463, 0512, 0525, 0569, 0764, 0788, 0798, TRANS-VA-06), the Sierra Club mass mailers (0023) and a coalition of ENGOs (0809/TRANS-VA-01), support the reporting requirements outlined in the proposed subpart RR, and emphasize the importance of requiring GS operations to monitor their operations and GHG emissions.

One commenter (TRANS-VA-08) appreciates that there is recognition of CO_2-based ER as highly likely path forward towards the application of CCS technologies and practices and believes that it is an important aspect of the EPA's proposed rule. The commenter (TRANS-VA-08) thinks that the broad structure of the proposed rule is reasonable and sensible.

Another commenter (TRANS-VA-07) thanks EPA for its work to date on CCS, and appreciates EPA's recognition of the important role that CCS can play in future carbon management schemes. The commenter (TRANS-VA-07) notes that this reporting proposal is EPA's latest effort to clarify this topic.

One commenter (0788) commends EPA for realizing that reporting of GHG emissions needs to be done at the federal level. The commenter believes that while aspects of UIC implementation can be delegated to states, a rigorous accounting of the nation's GHG emissions is a federal responsibility.

Response 14.1-a:
EPA agrees with commenters supporting the monitoring and reporting requirements in this rule.

Comment 14.1-b:
Nineteen commenters (0020, 0021, 0074, 0217, 0403, 0434, 0435, 0569, 0721, 0786, 0796, 0797, 0799, 0800, 0811, 0813, 0815, TRANS-VA-01, TRANS-VA-06), the Sierra Club mass mailers (0023), and the multi-stakeholder discussion group (0799) support the EPA's effort to develop and establish a comprehensive regulatory program for the development of CCS in the US.

One commenter (TRANS-VA-07) notes that the establishment of a stable, predictable, and workable regulatory framework for CCS that encourages the development of CCS industry to manage missions and maximize energy recovery is very important. This commenter (TRANS-VA-07 stated that including reporting on CCS within the scope of the existing GHG reporting rule is a prudent next step in reassuring regulators and the public that GS in well-sited and well-managed formations results in sequestration.

A coalition of ENGOs (0809) states that this rule, and the concurrent EPA Class VI rulemaking, when final, will represent a significant step forward for ensuring the reliability of GS.

Response 14.1-b:
EPA agrees with commenters supporting a comprehensive regulatory approach to CCS.

Comment 14.1-c:
Two commenters (TRANS-VA-06, TRANS-VA-07) note that the data from the EPA's proposed rule will provide transparency on the amount of CO_2 injected and geologically sequestered in the US, and will allow EPA to track the flow of CO_2 across the CCS system.

Response 14.1-c:
EPA agrees that the rule will provide transparency regarding of reported information and that this rule will allow EPA to track information reported by facilities conducting GS and all other facilities that inject CO_2 underground.

Comment 14.1-d:
Seven commenters (0074, 0340, 0512, 0525, 0569, 0788, TRANS-VA-01), the Sierra Club mass mailers (0023), and the multi-stakeholder discussion group (0799) emphasize the importance of monitoring CCS operations in order to discover leaks in the system. A coalition of ENGOs (0809) emphasizes the need for airside monitoring, and for an appropriate framework to monitor and report any leakages, which the commenter believes is imperative to ensure that GS is secure and permanent.

Response 14.1-d:
EPA agrees with commenters supporting monitoring requirements to detect and quantify surface leakage, should it occur.

Comment 14.1-e:
Twenty-seven commenters (0035, 0039, 0043, 0044, 0058, 0099, 0114, 0164, 0192, 0298, 0317, 0341, 0342, 0345, 0364, 0388, 0398, 0403, 0404, 0429, 0492, 0508, 0530, 0539, 0585, 0612, 0620, 0707, 0720, 0726) express concern and skepticism about the effectiveness of CCS technology. Twenty commenters (0041, 0060, 0073, 0106, 0165, 0214, 0294, 0337, 0403, 0418, 0428, 0463, 0493, 0539, 0567, 0588, 0605, 0687, 0749, 0754, 0771, TRANS-VA-06**)** were skeptical about using CCS technology, but agreed that if the technology is used it must be stringently monitored. The commenters emphasize the importance of effective emissions reporting program, and the need for careful, long-term monitoring of emissions by CCS facilities, and the government. Five commenters (0042, 0044, 0081, 0342, 0403, 0428) requested that all facilities be included in the regulatory requirements.

Four commenters (0690, 0712, 0734, 0737) assert that CCS should not be attempted, and requests that EPA not purse this technology. Two commenters (0492, 0505) were hopeful about the prospect of CCS, but wanted to ensure that it would work. Another commenter (0574) believed that CCS was a great step forward, but that it was necessary to ensure the system was

safe, which would improve the perception of CCS and guarantee that future similar systems are held to high standards.

One commenter (0449) notes that if CCS operations leak large amounts of CO_2, it will be a waste of money, materials, public trust, and time. Another commenter (0114) mentions a potential problem of sequestering CO_2 in a closed reservoir and opines that the data requested by EPA is of no value for injection into a closed reservoir because producing wells will remove oil and gas as reservoirs fill with CO_2. One commenter (0044) calls for research in productive uses for the carbon in CO_2.

Response 14.1-e:
The report of the Interagency Task Force on Carbon Capture and Storage notes that CCS could play an important role in achieving national and global GHG reduction goals. This rule does not require that facilities conduct GS; rather, it requires that facilities that conduct GS develop and implement an EPA-approved MRV plan and report the quantity of CO_2 sequestered. For further information on CCS, please refer to the report of the Interagency Task Force on Carbon Capture and Storage.[17]

Also, this rule does not require facilities to undertake CCS. Rather it requires facilities that conduct GS to implement an EPA-approved MRV plan and quantify the amount of CO_2 that is sequestered. EPA agrees that through monitoring of GS projects, EPA will be able to better understand the effectiveness of GS over time.

Comment 14.1-f:
Thirty-one commenters opine (0052, 0078, 0099, 0100, 0104, 0108, 0111, 0158, 0160, 0216, 0218, 0310, 0330, 0337, 0342, 0357, 0374, 0441, 0444, 0478, 0486, 0503, 0520, 0546, 0682, 0685, 0693, 0727, 0736, 0771) that industry should be regulated and monitored to ensure compliance.

One commenter (0588) suggests that not only should companies be required to follow strict regulations and continuously monitor their GHG emissions under government oversight, but citizens' groups should also be allowed to monitor emissions independently and receive monetary rewards if they find that companies have not reported significant CO_2 leaks. Five commenters (0025, 0330, 0337, 0354, 0526, 0728) would like companies undertaking CCS to have independent monitoring and verification. Three commenters (0337, 0403, 0583) request a role for the public access to data and two commenters (0337, 0403) cited the need for public review and challenge of monitoring plans if inadequate.

Two commenters (0358, 0569) implore the EPA to give the legislation "teeth." One commenter (0569) reminds EPA to fund this program and to hold CCS companies accountable for their actions and emissions.

Response 14.1-f:

[17] http://www.epa.gov/climatechange/policy/ccs_task_force.html

EPA is requiring facilities to implement an MRV plan to detect and quantify surface leakage, if any, but continuous air monitoring or mitigation is not required by this rule. Because this rule is being promulgated pursuant to CAA Section 114, facilities that fail to monitor or report data according to the requirements of this rule could potentially be subject to an enforcement action under the CAA. In developing the rule establishing the GHG Reporting Program, EPA received comments such as the one provided by this commenter stating that they should be able to petition EPA to enforce against violators where they have evidence of or suspect violations. Please refer to Section VI of the preamble to the rule establishing the GHG Reporting Program (74 FR 56359) for a response to this comment, as well as other information regarding compliance and enforcement. Please refer to Chapter 7.2 of this document for responses to comments on public involvement in the MRV plan process.

Comment 14.1-g:

One commenter (0709) emphasizes the importance of emissions monitoring and reporting requirements for ER facilities. In particular, the commenter mentions active ER operations in Wyoming that have been publicized as a way to transition to potential to permanent sequestration. However, because the formations were used for oil production through numerous wells and chosen because of the presence of hydrocarbons, not because of their geologic characteristics for sequestration of CO_2, there is a risk of leak of injected CO_2. The commenter is interested in this issue and learning more about the effectiveness of these formations to permanently store CO_2.

Response 14.1-g:

EPA is requiring that all projects that report GS under subpart RR, including ER projects that report under subpart RR, identify potential surface leakage pathways for CO_2 in the MMA and the likelihood, magnitude, and timing, of surface leakage of CO_2 through these pathways, and develop a strategy for detecting and quantifying any surface leakage of CO_2.

Comment 14.1-h:

One commenter (0813) supports the development of clear and appropriately tailored regulatory regimes that will facilitate the deployment of CCS, and applauds the Agency for taking this additional step toward establishing such a regime for GS. This commenter suggests that reporting should serve to advance public acceptance of CCS as an emissions management technology. In order to accomplish this, the commenter suggests that EPA's approach to this proposed reporting rule assume the minimal actual risk of air emissions from GS projects, and should strive to balance the value of reporting de minimis emissions with the burdens of monitoring and reporting this data.

Response 14.1-h:

Please refer to Chapter 3 of this document regarding de minimis reporting. EPA agrees that information collected under this rule will provide information to EPA and the public regarding the effectiveness of GS over time.

Comment 14.1-i:
Two commenters (0789, 0791) express concern that the proposed rule will negatively impact both CO_2 injection for ER and GS activities. They believe that the proposed subpart RR appears to be excessively burdensome and will most likely either inhibit or prevent GS activities from continuing or new facilities from beginning operations in the future. One commenter (0805) emphasizes that regulations such as the Mandatory Reporting Rule should not unfairly burden the natural gas industry or hinder its continued growth. One commenter (0795) opines that the rule should reflect the commenter's and the petroleum industry's extensive experience with ER and not impose costs or other burdens on domestic ER operations beyond what is necessary to fulfill EPA's mandate to collect data on GHG emissions. One commenter (0789) requests that the proposed rule be revised to minimize the regulatory burden on ER and sequestration operations. One commenter (0794) notes that ER presents a meaningful opportunity to utilize CO_2 in a way that is beneficial to the global environment and to our nation's economy and energy security. The commenter agrees with having an organized way to evaluate the effectiveness of EOR and CCS as CO_2 mitigation tools.

One commenter states that the IPCC Special Report on CCS concludes that the fraction of CO_2 retained in appropriate selected and managed geological reservoirs is very likely to exceed 99% over 100 years and is likely to exceed 99% over 1000 years, that DOE's CCS projects will retain 99% of CO_2 and that there is over 30 cumulative years of operating experience at 5 major CCS projects worldwide that has indicated no leakage to date.

Response 14.1-i:
EPA disagrees that this rule will negatively impact ER and GS activities. EPA also disagrees that this rule would unfairly burden the natural gas industry or hinder its continued growth. Information on CO_2 received that is reported by ER projects under subpart UU is already collected by such projects and is readily available. With respect to facilities conducting GS and reporting under subpart RR, these facilities would not be expected to shut down or delay operations in order to develop, gain approval of, and implement an MRV plan. EPA developed the reporting requirements with consideration for business-as-usual operations in order to minimize burden.

Comment 14.1-j:
One commenter (0810) suggests that subpart RR should be designed to encourage companies to engage in sequestration, and suggests that the rule should be simplified to provide meaningful encouragement, rather than complex, expensive regulation that has unintended disincentives.

Response 14.1-j:
EPA agrees with the commenter that simplified monitoring and reporting mechanisms are important. Therefore EPA is not prescribing specific monitoring technologies, but rather is allowing facilities subject to subpart RR to develop and implement an MRV plan that is best suited to the site. The rule neither encourages nor discourages facilities to undertake GS. Rather, subpart RR provides monitoring and reporting mechanisms for facilities that conduct GS. Please refer to the EIA located in the docket, Section III of the preamble, and Chapter 10 of this document for a discussion of the economic impacts of this rule.

Comment 14.1-k:
One commenter (0783) is concerned about the negative public perception related to reporting CO_2 injection from ER as part of emissions reporting, and that it may be confusing or concerning to the public to see the quantity of CO_2 injected included with the data regarding emissions. One commenter (0794) notes that EPA's actions set the tone for how the public perceives CCS and that the rule undermines public confidence in CO_2 injection and CCS projects by sending inaccurate signals about the environmental implications.

Response 14.1-k:
Please refer to Section II.E. of the preamble and Section 5.1 of this document. For facilities conducting GS (subpart RR), reporting the amount of CO_2 injected is necessary to calculate the amount of CO_2 being sequestered using a mass balance approach. For all other facilities injecting CO_2 underground (subpart UU), EPA has removed the requirement that facilities report the amount of CO_2 injected, but retained requirements that facilities subject to subpart UU report the amount of CO_2 received and the source of CO_2. This change in the reporting requirements addresses the commenters concern that reporting of the amount of CO_2 injected could be misconstrued as emissions.

Comment 14.1-l:
One commenter (0801) advises that First Responders including fire, police, emergency services, bomb squads, park and school personnel and Homeland Security personnel have not been and need to be considered in the proposal. The commenter notes that migrating explosive gas is an issue in the city of Los Angeles.

Response 14.1-l:
This rule does not require facilities to control GHGs. Rather, it requires facilities that conduct GS to monitor and report certain information. Therefore, the role of first responders is beyond the scope of this rule. EPA also notes that CO_2 is neither explosive nor combustible.

Comment 14.1-m:
One commenter (0798) cautioned that it is important to not lose sight of the ultimate objective in adopting emissions reporting rules, which is to set the stage for reducing atmospheric emissions of CO_2. The commenter emphasized that the reporting rules and the review of the MRV plans must be technologically and economically reasonable in order to remove barriers to the deployment of CCS.

Response 14.1-m:
EPA carefully analyzed the monitoring and reporting requirements in this rule and found that the requirements are both technologically and economically reasonable. Please refer to the final General TSD for further information regarding monitoring technologies and the EIA for EPA's analysis of the costs of this rule.

Comment 14.1-n:
One commenter (0784) requests additional information on consequences for organizations that produce high levels of GHGs.

Response 14.1-n:
This rule does not require facilities to control GHGs.

Comment 14.1-o:
One commenter (0794) opines that EPA's MRR is intended to build off of the CAA Acid Rain Program and that makes sense as a general point of reference. The commenter appreciates EPA's initial overall approach, which endeavored to strike a balance between the need to develop accurate pictures of various sectors' GHG footprints and the cost and resources for individual facilities within sectors to compile and report data.

Response 14.1-o:
Please refer to Section II.N of the preamble to the rule establishing the GHG Reporting Program (74 FR 56282, Oct. 30, 2009) regarding the approach of the GHG Reporting Program as compared to the Acid Rain Program. EPA agrees with the commenter about the need to balance the need for a complete dataset with the cost and resources for reporting. Please refer to the EIA located in the docket, Section III of the preamble, and Chapter 10 of this document for a discussion of the economic impacts of this rule.

14.2 General Comments on CCS and Climate Change

Comment 14.2-a:
One commenter (0412) does not believe that anthropogenic CO_2 is causing climate change, and opines that CCS should be used in addition to other methods to clean up CO_2 pollution caused by the burning of fossil fuels.

Five commenters (0091, 0116, 0402, 0465, 0794) emphasize the importance of CCS as a key climate change mitigation technology, and these commenters voice their support for the current R&D projects underway to facilitate CCS projects. One commenter (0402) notes that sequestration projects have been active in ER since the 1970s, and that CCS is an acceptable method of storing CO_2. Commenter (0465) believes that that CCS systems should be located in every town with a coal-fired power plant. Commenter (0790) believes that encouraging CCS development is a crucial component of the nation's efforts to achieve sustainable domestic energy security and reduce the GHG footprint in the US. One commenter (0331) wanted the EPA to combat climate change by continuing to test underground storage systems of carbon. One commenter (0789) opines that ER is important to the commenter's members and the general public because it allows for the recovery of oil and gas which would otherwise not be produced from subsurface reservoirs. The commenter notes that GS may present a practical long-term solution for reducing the amount of CO_2 emitted to the atmosphere. One commenter (0794) opines that CCS and ER programs require resolution of a broad range of technical, policy and

legal questions, most of which are beyond the scope of this rulemaking. The commenter notes that strong and early investment in CCS and ER technologies and related infrastructure is a necessary foundation for any viable climate change regulatory regime, and urges EPA to align its regulatory policies with its stated objectives: promotion of CCS and ER as key climate change mitigation technologies.

Response 14.2-a:
For background information about GHGs and climate change science, please see EPA's climate change Web site at: www.epa.gov/climatechange.

The report of the Interagency Task Force on Carbon Capture and Storage notes that CCS could play an important role in achieving national and global GHG reduction goals. This rule does not require that facilities conduct GS; rather, it requires that facilities that conduct GS develop and implement an EPA-approved MRV plan and report the quantity of CO_2 sequestered. For further information on CCS, please refer to the report of the Interagency Task Force on Carbon Capture and Storage.[18]

Comment 14.2-b:
Three commenters (0218, 0754, 0777) emphasize the need for strong regulations for CCS. Commenter (0777) suggests that site picking should not be left up to state decision makers, and instead suggests that EPA should establish a body to choose and monitor sequestration sites, in order to avoid political corruption and provide for better environmental protection. Twenty-five commenters (0081, 0099, 0188, 0192, 0218, 0222, 0231, 0241, 0244, 0252, 0261, 0295, 0303, 0310, 0326, 0342, 0367, 0374, 0386, 0460, 0467, 0473, 0478, 0485, 0502, 0514, 0517, 0520, 0541, 0546, 0584, 0600, 0606, 0679, 0682, 0727, 0732, 0736, 0765) opined that large corporate entities cannot be trusted to do honest and transparent reporting of their operations. As a result, the commenters (0099, 0218, 0467) emphasizes the need for strong continual oversight and strong regulatory practices of CCS operations and emissions. Two commenters (0274, 0289) noted that there are a number of examples of industry not following self-regulation.

Response 14.2-b:
This rule requires reporting by facilities that conduct GS, and does not require facilities to undertake GS. However, EPA agrees with the commenter that regulations are necessary to address the safety, efficacy, and environmental soundness of injecting and sequestering CO_2 underground. Concurrently with this rule EPA is finalizing requirements under the UIC program that establish a new class of GS injection well and addresses issues such as site selection; please refer to Section I.D of the preamble for further information.

Comment 14.2-c:
Two commenters (0554, 0560) emphasize the importance of choosing trained, independent scientists to monitor carbon sequestration. The commenters recommended that these scientists must be "fair, honest, and free of outside influences."

[18] http://www.epa.gov/climatechange/policy/ccs_task_force.html

Response 14.2-c:
EPA agrees with the commenter about the importance of having qualified and unbiased individuals review MRV plans.

Comment 14.2-d:
Two commenters (0720, TRANS-VA-04) favor strategies that primarily emphasize efficiency, renewable power and shifts to lower carbon fossil fuel sources. If large-scale CCS is to be implemented, the commenter believes this technology will be most useful for lower carbon gas power plants rather than for coal facilities.

Response 14.2-d:
Although EPA agrees that CCS could play an important role in achieving national and global GHG reduction goals, the use of and investment in these technologies is outside the scope of the this rulemaking.

Comment 14.2-e:
One commenter (0585) emphasizes the need to monitor the effectiveness of CCS at its current initial stages, so that any problems will be resolved before the technology becomes more widely used. The commenter stresses that if problems are not discovered in the initial stages, the future cost of resolving technology issues will cost the companies, the shareholders, and the environment significantly more than if CCS is not used.

Response 14.2-e:
EPA agrees that monitoring the effectiveness of CCS is important and that such information can inform future CAA policies.

Comment 14.2-f:
Eleven commenters (0073, 0099, 0250, 0266, 0429, 0464, 0555, 0562, 0608, 0613, 0687) argue that storing CO_2 in the ground is not a solution to climate change, and instead is a short-term solution that merely delays addressing the larger problem of fossil fuel dependency.

Response 14.2-f:
The report of the Interagency Task Force on Carbon Capture and Storage notes that CCS could play an important role in achieving national and global GHG reduction goals. This rule does not require that facilities conduct GS; rather, it requires that facilities that conduct GS develop and implement an EPA-approved MRV plan and report the quantity of CO_2 sequestered.

Comment 14.2-g:
Seven commenters (0162, 0175, 0337, 0341, 0342, 0539, 0604) assert that CCS technologies are excessively expensive, and not economically practical. Commenter (0175) argues that the cost of power will greatly increase with the use of CCS. Commenters (0162, 0341, 0604) emphasize that

CCS is economically unjustified, and that the money to be invested in this technology is better spent pursuing alternative forms of energy.

Response 14.2-g:
This rule does not require that facilities conduct GS or the control of GHGs. The cost of CCS technologies relative to other technologies for mitigating GHG emissions is beyond the scope of this rule. Please refer to the EIA located in the docket, Section III of the preamble, and Chapter 10 of this document for a discussion of the economic impacts of this rule.

Comment 14.2-h:
Three commenters (0463, 0530, 0612, 0773) want EPA to consider the impact that earthquakes and tectonic plate movement could have on the safety and effectiveness of CCS. Two commenters (0319, 0324) argue that there are serious geological (such as the presence of existing faults and thermodynamic considerations that must be taken into account with CCS operations. One commenter (0319) is concerned with the presence of large faults in CCS project areas. They note that fault gouge is often more permeable to underground gases than the hot rock cut by the faults. They find that promoters of CCS avoid dialogue about faults. Ten commenters (0114, 0226, 0266, 0277, 0283, 0309, 0336, 0688, 0712, 0734) express serious concerns about the engineering and safety issues associated with CCS. Commenter (0336) argues that CCS technologies should not be implemented without extensive testing and safeguards. Commenters (0035, 0754) argue that there is not enough space underground to adequately and safely store CO_2 waste.

Response 14.2-h:
This rule requires facilities that conduct GS to identify potential surface leakage pathways for CO_2 in the MMA and the likelihood, magnitude, and timing, of surface leakage of CO_2 through these pathways. If faults were identified as causing a potential surface leakage pathway, the facility would be required to identify such pathways as part of the development of the MRV plan.

Comment 14.2-i:
Seven commenters (0020, 0046, 0064, 0230, 0255, 0275, 0276, 0155, 0179, 0330, 0409, 0533, 0572, 0578, 0679) emphasize the importance of protecting the nation's natural resources. Four commenters (0151, 0155, 0277, 0578) specifically note that water resources need to be protected from CO_2 which will be injected underground. One commenter (0276) asserts that stronger environmental enforcement is necessary to protect resources. One commenter (0418) called for protection of the storage site to prevent natural and man-made disasters.

Response 14.2-i:
EPA agrees with commenters supporting the protection of the nation's natural resources and the need for proper enforcement. With respect to protection of water resources, please refer to Section I.D of the preamble and Chapter 11 of this document for a discussion of the relationship of this rule to the UIC Program.

Comment 14.2-j:
One commenter (0572) implores the EPA to ensure that the proposed rules apply to coal power plants on Native American lands.

Response 14.2-j:
This rule applies to facilities in the US that conduct GS (subpart RR) and all other facilities that inject CO_2 underground (subpart UU). This rule would only apply to facilities with coal power plants if they conduct GS or inject CO_2 underground. EPA did not find that this rule would have Tribal impacts. Please refer to Section IV.F of the preamble for a discussion of this analysis.

Comment 14.2-k:
A coalition of ENGOs (0809) states that the EPA should require CO_2 pipeline companies to report the amounts of CO_2 that they receive and the amounts that they transfer to injection facilities. The coalition of ENGOs notes that pipelines are not currently required to report under the GHG monitoring and reporting rule, which makes it that much more difficult for the Agency to ascertain how much of the total CO_2 produced remains un-sequestered.

Response 14.2-k:
This rule applies to facilities in the US that conduct GS (subpart RR) and all other facilities that inject CO_2 underground (subpart UU). GHG reporting from pipelines is beyond the scope of this rule. However, EPA will obtain information on CO_2 received and will be able to reconcile this information with data obtained from subpart PP on CO_2 supplied.

Comment 14.2-l:
One commenter (0019) asserts that the proposed rule should require full control of GHGs. Along the same lines, another commenter (0784) believes that the proposed rule is a step in the right direction, but that more steps should be taken to decrease GHG emissions. Another commenter (0788) notes that the GHG Reporting Program does not include enforcement mechanisms to require CO_2 that is leaking from a storage reservoir to be remediated, but that EPA should state that existing authorities could be implemented to stop leakage. The commenter believes that these mechanisms should be included in this action.

Response 14.2-l:
Consistent with other subparts of the GHG Reporting Program, this rule does not require facilities to control GHGs. However, information obtained under this rule will inform future CAA policies. EPA notes that facilities should comply with relevant permitting requirements. Please refer to Section I.D of the preamble for further information on the relationship between this rule and the UIC program.

Comment 14.2-m:
One commenter (0077) believes that a carbon tax should be implemented, for which revenues can be used to fund renewable energy and efficient transportation.

Response 14.2-m:
The implementation of a carbon tax is beyond the scope of this reporting rule.

Comment 14.2-n:
Two commenters (0345, 0477) believe that the rule should strongly follow the precautionary principle in order to adequately monitor the projects. Three commenters (0151, 0277, 0578) mention support for EPA action to safeguard human health and the environment for both current and future generations. One commenter (0477) recommends that this rule regulate the coal industry.

Response 14.2-n:
This rule applies to facilities in the US that conduct GS (subpart RR) and all other facilities that inject CO_2 underground (subpart UU). The commenter does not provide any detail with regard to what, if any, changes should be made to the rule.

Comment 14.2-o:
Twenty-four commenters (0024, 0030, 0037, 0090, 0143, 0169, 0177, 0185, 0188, 0192, 0232, 0293, 0386, 0430, 0444, 0449, 0460, 0466, 0467, 0473, 0485, 0494, 0502, 0541, 0569, 0586, 0600, 0707, 0732, 0734) reference historical or recent mining disasters, such as the April 2010 coal mine explosion in West Virginia, as examples of the current lack of safeguards and accountability in the coal mining industry. Given the lack of trust, several commenters mention the need for regulatory oversight. One commenter (0576) asserts that mountain top removal mining should be banned.

Response 14.2-o:
Regulation of coal mining is beyond the scope of this rule.

Comment 14.2-p:

Nineteen commenters (0111, 0119, 0162, 0179, 0231, 0270, 0277, 0330, 0388, 0521, 0544, 0563, 0587, 0592, 0605, 0688, 0752) express concern for health effects of coal and CCS. Four commenters (0155, 0183, 0338, 0409) particularly emphasized the need to protect America's water resources.

One commenter (0688) notes that current CCS projects do not seem to be reducing the net amount of CO_2 over time.

Two commenters (0489, 0688) advocate EPA to take action on climate change because we are running out of time and need to make a decision.

Response 14.2-p:

Regulation governing the health effects of coal, and the protection of water resources are beyond the scope of this rule. For background information about GHGs, climate change science, and EPA activities, please see EPA's climate change Web site at: www.epa.gov/climatechange.

Comment 14.2-q:
One commenter (0333) requests that EPA ensure that fossil fuel-dependent projects, such as the South Fraser Freeway in Canada, will be stopped in favor of transit transportation solutions that would reduce GHG emissions.

Response 14.2-q:
The development of the South Fraser Freeway in Canada is beyond the scope of this rule.

Comment 14.2-r:
Seven commenters (0154, 0236, 0243, 0321, 0369, 0477, 0713) express general support for holding polluters accountable for their GHG emissions. Seven commenters (0019, 0408, 0412, 0455, 0544, 0591, 0744) note the need to mitigate the release of pollutants and GHGs from coal burning power plants. One commenter (0796) believes that the proposed "Tier 2" monitoring methodologies may become the generally accepted monitoring framework for the purposes of certifying carbon offsets and carbon emissions reductions.

Response 14.2-r:
Because this rule is a reporting rule, it does not require the control of GHGs. However information obtained by this rule will inform future CAA policies related to reducing GHG emissions.

Comment 14.2-s:
Twenty commenters (0124, 0278, 0334, 0336, 0352, 0359, 0368, 0395, 0415, 0432, 0435, 0559, 0567, 0570, 0585, 0627, 0679, 0697, 0738, 0757) emphasize the importance of comprehensive testing to ensure efficiency and safety of CCS technology and placement of proper safeguards before any activity begins.

Response 14.2-s:
Although the permitting of GS projects is beyond the scope of this rule, please refer to Section I.D of the preamble for a description of EPA's UIC Program.

Comment 14.2-t:
Seventy-five commenters (0028, 0054, 0081, 0082, 0094, 0098, 0115, 0118, 0129, 0137, 0140, 0142, 0147, 0148, 0149, 0152, 0155, 0163, 0166, 0173, 0174, 0175, 0179, 0194, 0201, 0202, 0227, 0228, 0244, 0251, 0255, 0257, 0300, 0301, 0307, 0313, 0314, 0326, 0330, 0338, 0347, 0350, 0358, 0387, 0395, 0403, 0420, 0434, 0447, 0472, 0477, 0478, 0482, 0483, 0493, 0500, 0503, 0505, 0522, 0526, 0538, 0542, 0577, 0583, 0585, 0603, 0679, 0682, 0684, 0693, 0698,

0750, 0769, 0811, TRANS-VA-04) and a coalition of ENGOs (0809) strongly support careful monitoring and regulation of CCS operations. Reasons for support include monitoring will provide safeguards for trying an unproven technology, proof of the need to identify the resource and contain the leak (0082), early warning system regarding whether system is working (0115), verification that GS operations are being managed successfully (0173), and transparency of untested activities.

In addition to the commenters mentioned above, twelve commenters (0086, 0110, 0257, 0286, 0296, 0359, 0441, 0615, 0685, 0713, 0718, 0736) opined about their support for regulating the monitoring and reporting of GHG emissions and resulting leakage from CCS operations. Commenters mention several reasons for their support: the need for stakeholders to know if the system in leaking, the need for good monitoring to ensure that the system does not leak, need to measure so that stakeholders can control releases, need for information to assist public policy decision makers make informed decisions on energy and pollution policy, need to identify whether CCS is successful in avoiding leakage of GHGs, reporting will help in controlling mines and their associated pollution, concern about CCS going unchecked and discovering later harm that could have been prevented, and public concern in industry voluntarily disclosing leaks.

One commenter (0709) supports monitoring and reporting requirements related to ER. A coalition of ENGOs (0809) states that GHG monitoring and reporting from CO_2 injection and GS facilities is critical to gaining the detailed understanding about the potential for GS as a climate mitigation tool, and for information national GHG policy. The multi-stakeholder discussion group (0799) emphasizes their support of EPA's effort to minimize the reporting burden for both ER operators who do and do not choose to report as GS facilities. Ten additional commenters (0068, 0092, 0097, 0182, 0361, 0374, 0397, 0528, 0740, 0770) supported EPA in monitoring and reporting and emphasize the importance of discovering and correcting gaps for facility level reporting (i.e., potential missing of major polluters, avoiding grandfathering of facilities and loopholes) in the proposed rule.

Two commenters (0115, 0118) mention the importance of monitoring a risky venture to prevent unforeseen problems. One commenter (0391, 0736) highlights the importance of transparency in monitoring for untested CCS activities.

Response 14.2-t:
EPA agrees with commenters supporting the promulgation of this rule. EPA also agrees with commenters that a critical component of CCS is monitoring for both environmental protection and GHG accounting purposes. The report of the Interagency Task Force on Carbon Capture and Storage emphasizes that appropriate monitoring, oversight, and accountability for CCS activities will be essential to ensure the integrity of CCS operations, enable a sustainable CCS industry, and provide a strong foundation for public confidence. See Section I.B. of the preamble for a discussion of the purpose and importance of collecting data on GS.

Comment 14.2-u:
Fourteen commenters (0028, 0064, 0081, 0086, 0134, 0141, 163, 0225, 0255, 0281, 0344, 0337, 0402, 0570, 0620, 0679, 0688, 0691, 0723, 0736) express general concern for global warming

and climate change. Two commenters (0236, 0401) note the need for the government to protect citizens.

One commenter (0114) opposes the rule and believes that EPA failed to support the need for the rule as EPA did not provide peer reviewed citations that the earth's temperature is rising. The commenter opines that EPA shows a lack of interest in demonstrating anthropogenic climate change is occurring and looking at scientific papers. One commenter (0164) argues that CCS is unnecessary because "CO_2 has not been shown scientifically to cause any harm… [and] global warming is not understood well enough to link it to a particular remediation effort." One commenter (0022) expresses skepticism about manmade global warming and contends that CO_2 is not a dangerous GHG.

Response 14.2-u:
This rule does not require GS, only the monitoring and reporting from facilities that conduct GS. For background information about GHGs and climate change science, please see EPA's climate change Web site at: www.epa.gov/climatechange.

Comment 14.2-v:
Forty-five commenters (0034, 0037, 0072, 0073, 0080, 0090, 0103, 0109, 0125, 0140, 0161, 0181, 0185, 0189, 0190, 0200, 0204, 0211, 0227, 0229, 0232, 0239, 0279, 0282, 0285, 0292, 0295, 0299, 0304, 0323, 0326, 0329, 0385, 0405, 0420, 0433, 0450, 0465, 0491, 0493, 0545, 0681, 0731, 0733, 0757) opine that there is no such thing as "clean coal." One commenter (0319) is concerned about the application of "clean coal." One commenter (0187) requested EPA to show them a piece of coal.

Forty-five commenters (0027, 0032, 0064, 0073, 0088, 0095, 0125, 0141, 0143, 0167, 0180, 0181, 0185, 0189, 0205, 0223, 0225, 0238, 0266, 0284, 0285, 0295, 0311, 0404, 0429, 0450, 0454, 0465, 0488, 0493, 0495, 0501, 0518, 0555, 0562, 0592, 0602, 0696, 0714, 0716, 0720, 0727, 0729, 0733, 0746) opine that dependence on coal needs to end. Four commenters (0180, 0225, 0456, TRANS-VA-04) request EPA to reduce emissions with improved energy efficiency.

Several commenters suggest alternatives such as transitioning to renewable energy sources (e.g., solar, geothermal, and wind power). Sixteen commenters (0180, 0412, 0604, 0141, 0143, 0190, 0205, 0225, 0238, 0450, 0465, 0714, 0720, 0727, 0123, 0355) are in favor of funding more solar energy projects and thirteen commenters (0180, 0412, 0604, 0141, 0143, 0190, 0205, 0225, 0465, 0714, 0727) suggest wind power as a viable alternative to coal. Four commenters (0205, 0225, 0450, 0555) emphasize the potential of geothermal sources of power. One commenter (0205) suggests EPA explore wave power as an alternative to coal. One commenter (0225) suggests EPA use fuel cells as an alternative to coal. One commenter (0450) suggests EPA consider using steam power generation as an alternative to coal. Eleven commenters (0180, 0284, 0501, 0613, 0206, TRANS-VA-04, 0077, 0088, 0125, 0185, 0189) express general support for moving away from coal and renewable energy.

Response 14.2-v:

GS is one technology in a portfolio of options that could be deployed to reduce CO_2 emissions. However, the use of and investment in these technologies is outside the scope of this rulemaking.

Comment 14.2-w:
One commenter (0249) emphasizes that new coal plants should be built only if they employ the newest pollution reduction technologies. Two commenters (0033, 0598) suggest increasing the efficiency of power plants in order to decrease the amount of carbon that needs to be sequestered.

Response 14.2-w:
This rule does not require the capture and sequestration of CO_2, only the monitoring and reporting of GHGs from facilities that conduct GS and all other facilities that inject CO_2 underground.

Comment 14.2-x:
Six commenters (0044, 0055, 0463, 0479, 0740, 0774) proposed alternative uses of CO_2. Two commenters (0774) support utilizing CO_2 in carbon fiber technologies. Commenter (0044) advises that there are other ways to utilize carbon emissions. The commenter specifically suggests using carbon in carbon fiber, nanotubes, biochar, and embedded in building materials such as cement. Four commenters (0055, 0463, 0479, 0740) suggested the use of CO_2 for algae-based products such as biofuels and animal feed.

Response 14.2-x:
EPA acknowledges that there are alternative end uses of CO_2 to ER and GS. For further information on CO_2 reuse, please refer to the report of the Interagency Task Force on Carbon Capture and Storage, which is available at http://www.epa.gov/climatechange/policy/ccs_task_force.html.

Comment 14.2-y:
One commenter (0140) asserts that monitoring should encompass the entire system from fuel acquisition and combustion to CO_2 capture to storage.

Response 14.2-y:
This rule is focused on monitoring and reporting GHGs from facilities that conduct GS and all other facilities that inject CO_2 underground. Monitoring from other types of facilities is beyond the scope of this rule. However, EPA notes that the GHG Reporting Program requires reporting of GHG emissions and other relevant information from certain source categories in the US. For more detailed background information on the GHG Reporting Program, see the preamble to the final Part 98 rule establishing that program (74 FR 56260, October 30, 2009).

Comment 14.2-z:

One commenter (0053) asserts that all waste should be recycled and research should be underway to biologically recycle all of the waste created.

Response 14.2-z:
Biological recycling of waste is beyond the scope of this rule.

Comment 14.2-aa:
One commenter (0601) suggests that EPA look into the results of recent CCS testing in other countries, such as Norway.

Response 14.2-aa:
The commenter did not mention specific projects in Norway, but EPA noted in the notice of proposed rulemaking (75 FR 18579, April 12, 2010) that the Sleipner and Snohvit projects as providing experience on CCS. EPA examined the experiences of projects such as these in developing the final rule.

Comment 14.2-bb:
One commenter (0025) asserts that leakage of even a fraction of one percent of CO_2 at a GS site is enough to negate the long-term benefits of a future national CCS system.

Response 14.2-bb:
Through this rulemaking EPA will gain information necessary to form the basis for future policy decisions. See Section I.B. of the preamble for further discussion on the importance of collecting this data. The performance of GS sites is out of scope of this rulemaking as EPA is not regulating GS as a control option through this action. EPA is not changing the verification approach from the proposal and is requiring self-certification with EPA emissions verification. Please refer to Section II.N of the preamble to the rule establishing the GHG Reporting Program (74 FR 56282, Oct. 30, 2009) for a further discussion on the verification approach of the program.

Comment 14.2-cc:
One commenter (0038) asserts that monitoring facilities at a GS site must be secure and accessible only by EPA officials.

Response 14.2-cc:
EPA's view is that the reporter, and not EPA officials, is the most appropriate party to implement the regulations set forth by subpart RR.

Comment 14.2-dd:
One commenter (0318) believes that it would be helpful for the U.S. Government to end its suppression of energy inventions, and asks that the U.S. Patent Office stop protection the oil and gas industry and declassify 5000 classified secret energy patents.

Response 14.2-dd:
Patent classification is beyond the scope of this rule.

APPENDIX A: SIERRA CLUB MASS MAILER CAMPAIGN

Approximately 15,000 comment letters were submitted in response to EPA's April 12, 2010 request for comments on the proposed subpart RR of the Mandatory Greenhouse Gas Reporting Rule: Injection and Geologic Sequestration of Carbon Dioxide (75 FR 18576) that were either identical to or substantively the same as the form letter prepared by the Sierra Club. Approximately 650 additional comment letters were submitted that were unique versions of the Sierra Club form letter (i.e., versions that contained additional text that was not represented in the standard Sierra Club form letter). EPA's responses to the Sierra Club form letter (0023) and to the unique versions of the letter can be found throughout this document. Appendix B to this document identifies the commenters whose submissions were unique and where EPA's responses to the comments can be found in this document.

Text of Sierra Club Form Letter (0023):

"Dear Administrator Jackson,

EPA took a big step forward when it finalized a national reporting system for the biggest sources of global warming pollution last year. Now it's time to finish the job. I strongly support your decision to fill the gaps in the rule by including big polluters missed in the first round. In particular, I applaud your decision to require carbon capture and sequestration operations to carefully monitor their operations.

Carbon capture and sequestration is touted as a way of allowing power plants to pump their emissions underground and keep them there. It's expensive, and largely untested. But if someone tries it, it's vital that we know whether or not the system is leaking. I support a strong rule requiring careful and comprehensive monitoring of these projects, starting before injection can begin, and which ensures that the public has a strong voice in reviewing monitoring plans and challenging them if they're inadequate. The rule should cover all facilities, and make sure monitoring continues for long-term leakage. Global warming is too dangerous to just trust that these systems work. Thank you for including them in the reporting system."

APPENDIX B: INDEX OF COMMENTERS

Submission Number	Commenter	Chapter Number	Sierra Club Mass Mailer
0019	J. Public	14.2	
0020	Anonymous	14.1,14.2	
0021	Anonymous	14.1	
0022	Anonymous	14.2	
0023	Sierra Club	3.1, 7.2, 7.3, 8.1, 14.1	X
0024	E. Salmon	14.2	X
0025	R. Brecha	14.1, 14.2	X
0027	J. Zeigler	14.2	X
0028	M. Dickerson	14.2	X
0030	M. Stewart	14.2	X
0032	N. Godoy	14.2	X
0033	S. Hebert	14.2	X
0034	W. Root	14.2	
0035	A.E. Coates	14.1, 14.2	X
0037	A. Jones	14.2	X
0038	E. Blumensaadt	6.8, 14.2	X
0039	S. Rudnick	14.1	X
0041	J. Marx	14.1	X
0042	G. Vanderwerker	3.1, 3.2, 8.1, 14.1	X
0043	J. Unruh	14.1	X
0044	J. Caldwell	14.1, 14.2	X
0046	J. Kambeitz	14.2	X
0052	J. Spragens	14.1	X
0053	L. Schumacher	14.2	X
0054	S. Smith	14.2	X
0055	C. Wilson	14.2	X
0057	S. Alexander-Larkin	6.8	X
0058	M. Wenzel	14.1	X
0060	T. Kane	14.1	X
0064	F.J. Santiago-Avila	14.2	X
0067	C. Schreter	3.1, 3.2, 8.1	X
0068	K. Harper	14.2	X
0072	B. Brenneman	14.2	X
0073	M. Woelfel	14.1, 14.2	X
0074	C. Flum	14.1	X
0077	P. Richards	14.2	X
0078	D. Barnett	14.1	X
0080	J. and W. MacDonald	14.2	X
0081	T. Henize	14.1, 14.2	X
0082	W. Taylor	14.2	X
0086	P.B. Popinchalk	14.2	X
0088	S. Skal	14.2	X
0090	S. Cates	14.2	X
0091	D. McCarley	14.2	X

Submission Number	Commenter	Chapter Number	Sierra Club Mass Mailer
0092	R. Marra	14.2	X
0094	B. Hughes	14.2	X
0095	R. Rudy	14.2	X
0097	R. Byrnes	14.2	X
0098	L. Bowles-Goldstein	14.2	X
0099	J. Mac Queen	14.1, 14.2	X
0100	S. M. Bushberg	14.1	X
0103	J. Lenting	14.2	X
0104	R. Dell	14.1	X
0106	A. and J. Aurelio	14.1	X
0108	K. Stone	14.1	X
0109	L. Smith	14.2	X
0110	L. Clark	14.2	X
0111	D. Miller-Boyle	14.1, 14.2	X
0114	Holliday Environmental Services, Inc.	2.3, 10.3, 14.1, 14.2	
0115	J. Butera	14.2	X
0116	L. and V. Pearson	14.2	X
0118	J. Butera	14.2	X
0119	N. Tatlock	14.2	X
0123	C. Fletcher	14.2	X
0124	A. Adams	14.2	X
0125	E. Tylenda	14.2	X
0129	M. Johnson	14.2	X
0134	M. Olsen	14.2	X
0137	E. Koopman	14.2	X
0140	C. Yoder	7.2, 14.2	
0141	C. Yount	14.2	X
0142	G. Washburn	14.2	X
0143	J. Shepherd	14.2	X
0147	N. McKay	14.2	X
0148	S. Mursu	14.2	X
0149	L. Youngman	14.2	
0151	J. Pellaton	11, 14.2	X
0152	S. Leuty	14.2	X
0154	E. and R. Nordstrom	14.2	X
0155	D. Koss	14.2	X
0158	S. Andersen	14.1	X
0160	F. Harriman	14.1	X
0161	D. Shearer	14.2	X
0162	K. Mills	14.2	X
0163	O. Balaguer	14.2	
0164	J. Barker	14.2	X
0165	M. Porubcan	14.1	X
0166	E. Lee	14.2	X
0167	D. Corigliano	14.2	X

Submission Number	Commenter	Chapter Number	Sierra Club Mass Mailer
0169	N. Cary	14.2	X
0173	M. Adams	14.2	X
0174	T. Sedlmeyer	14.2	X
0175	N. Dawley	14.2	X
0177	R. Von Ehrenkrook	14.2	X
0179	J. Meehan	14.2	X
0180	D. Foster	14.2	X
0181	J. Hayes	14.2	X
0182	J. Dolwick	14.2	X
0183	H. Niese	14.2	X
0185	J. Denoo	14.2	X
0186	C. Rowe	3.1, 3.2, 6.8, 8.1	X
0187	D. Bridgeman	14.2	X
0188	H. Schulze	14.2	X
0189	G. Chamberlain	14.2	X
0190	J. Lindner	14.2	X
0192	J. Batchelor	14.1, 14.2	X
0194	G. Munroe	14.2	X
0200	R. Kranzdorf	14.2	X
0201	T. Galvin	14.2	X
0202	R. Middleton	14.2	X
0204	D. Depauw	14.2	X
0205	D. Arnason	14.2	X
0206	K. Bagwell	14.2	X
0211	G. Stafford	14.2	X
0213	S. Cross	7.2	X
0214	D. Hitt	14.1	
0216	E. Wedlock	14.1	X
0217	G. and F. Alderson	14.1	X
0218	R. Cooper	14.1, 14.2	
0222	A. Ohen	14.2	X
0223	L. Gill	14.2	X
0225	E. Law	14.2	X
0226	D. Underwood	11, 14.2	X
0227	B. Williams-Pemberton	14.2	X
0228	M. Defoe	14.2	X
0229	J. Lynch	14.2	
0230	S. Glover	14.2	X
0231	D. and J. Nash	14.2	X
0232	S. Cates	14.2	X
0236	T. Barnes	14.2	X
0238	T. Davenport	14.2	X
0239	M. Southwell	14.2	X
0241	E. Levinson	14.2	X
0243	C. Denney	14.2	X
0244	M. Hubbert	14.2	X

Submission Number	Commenter	Chapter Number	Sierra Club Mass Mailer
0249	M. Willis	14.2	X
0250	B. Birdsong	14.2	X
0251	S. Booher	14.2	X
0252	J. Cooper	14.2	X
0255	G. Casey	14.2	X
0257	L. Heath	14.2	X
0261	L. Bower	14.2	X
0266	J. Reefe	11, 14.2	X
0270	J. Scharnberg	14.2	X
0274	S. Drucker	14.2	X
0275	J. Schauffler-Vircsik	14.2	X
0276	K. Hoffman	14.2	X
0277	M. Rice	11, 14.2	X
0278	J. Marini	14.2	X
0279	J. Oneal	14.2	X
0281	R. Sain	14.2	X
0282	K. Lux	14.2	X
0283	S. Ross	14.2	X
0284	R. Lord	14.2	X
0285	W. Robinson	14.2	X
0286	P. Stickney	14.2	X
0289	B. Wolf	14.2	X
0292	B. Wilson	14.2	X
0293	P. Alexander	14.2	X
0294	D. Johnson	14.1	X
0295	C.E. Murphy	14.2	X
0296	D. Flair	14.2	X
0298	B. White	14.1	X
0299	P. Heisel	14.2	X
0300	J. Maury	14.2	X
0301	S. Armstrong	14.2	X
0303	J.K. Burden	14.2	X
0304	A. Gaylord	14.2	X
0307	S. Teaford	14.2	X
0309	B. Dudley	11, 14.2	X
0310	J. Durham	14.1, 14.2	X
0311	R. Venable	14.2	X
0313	S. Teisher	14.2	X
0314	M. Pace	14.2	X
0317	R. Boyce	14.1	X
0318	G. Vesperman	14.2	X
0319	J. and L. Lillegraven	14.2	X
0321	J. Verry	14.2	X
0323	R. Kelly	14.2	X
0324	H. Bennett	14.2	X
0326	J. Naples	14.2	

Submission Number	Commenter	Chapter Number	Sierra Club Mass Mailer
0329	E. Root	14.2	X
0330	M. Hyde	14.1, 14.2	X
0331	B. Shepherd	14.2	X
0333	B. Keenan	14.2	X
0334	S. Couche	14.2	X
0336	K. Ely	14.2	X
0337	R. Sanders	14.1, 14.2	X
0338	C. Negaard	14.2	X
0340	A. Kidder	14.1	X
0341	M. Maynard	14.1, 14.2	X
0342	K. Allen	14.1, 14.2	X
0344	N. Worontzoff	14.2	X
0345	T. Huey	14.1, 14.2	X
0347	T. Riggs	14.2	X
0350	D. Woods	14.2	X
0352	J. Kmansky	14.2	X
0354	D. Duncan	14.1	X
0355	D. Brandy-Condon	14.2	X
0357	K. Gupton	14.1	X
0358	F. Gravois	14.1, 14.2	X
0359	K. Hugenschmidt	14.2	X
0361	R. Kriel	14.2	X
0364	R. Skaar	14.1	X
0367	A. Schaffer	14.2	X
0368	L. Blanchard	14.2	X
0369	J. Smith	14.2	X
0374	M. Strom	14.1, 14.2	X
0385	J. Clark	14.2	X
0386	D. and H. Marion	14.2	X
0387	R. Narkevicius	14.2	X
0388	M.L. Crimmins	14.1, 14.2	X
0391	M. Min	14.2	X
0395	D. Vines-Sharp	14.2	X
0397	K. Webb	14.2	X
0398	J. Draper	14.1	
0401	E. Riebschlaeger	14.2	X
0402	D. Koch	14.2	X
0403	C. Mead	3.1, 3.2, 8.1, 14.1, 14.2	
0404	S. Nienkark	14.1, 14.2	X
0405	D. Valenza	14.2	X
0408	K. Moore	14.2	X
0409	D. Thatcher	14.2	X
0412	Anonymous	14.2	X
0415	H. Christofersen	14.2	X
0418	J. Pence	14.1, 14.2	X
0420	P. Gardiner	14.2	X

Submission Number	Commenter	Chapter Number	Sierra Club Mass Mailer
0428	L. Kauffman	14.1	X
0429	R. Karaffa	14.1, 14.2	X
0430	B. Deckman	14.2	X
0432	G. Kedzior	14.2	X
0433	J. Thacker	14.2	X
0434	D. Palmieri	14.1, 14.2	X
0435	M. Schulz	14.1, 14.2	X
0441	P. Waterworth	14.1, 14.2	X
0444	R. Pilato	14.1, 14.2	X
0447	H. Powers	14.2	X
0449	A.B. Butterfield	14.1, 14.2	X
0450	A. Forgione	14.2	X
0454	M. Lusch	14.2	X
0455	K. Moore	14.2	X
0456	K. Lange	14.2	X
0460	M. Damero	14.2	X
0463	V. Nguyen	14.1, 14.2	X
0464	M. V	14.2	X
0465	R. Hoekstra	14.2	X
0466	B. Bryant	14.2	X
0467	T. Poychronis	14.2	X
0472	M. Scott	14.2	X
0473	K. Cothern	14.2	X
0477	E. Swanson	14.2	X
0478	A. Queen	14.1, 14.2	X
0479	J. Gilbert	2.6, 14.2	X
0482	S. Stanfield	14.2	X
0483	N. Bartol	14.2	X
0485	A. Butterfield	14.2	X
0486	M. Briton	14.1	X
0488	D. Steele	14.2	X
0489	D. Deremus	14.2	X
0491	J. Whittington	14.2	X
0492	E. Moore	14.1	X
0493	J. Sconyers	14.1, 14.2	X
0494	K. Tripp	14.2	X
0495	J. Skolte	14.2	X
0500	B. Berger	14.2	
0501	D. Shimek	14.2	X
0502	J. Tighe	14.2	X
0503	C. Carpenter	14.1, 14.2	X
0505	H. Gray	14.1, 14.2	X
0508	T. Hildebrandt	14.1	X
0512	P. Phillips	14.1	X
0514	A. Dahl	14.2	X
0517	P. Coutre	14.2	X

Submission Number	Commenter	Chapter Number	Sierra Club Mass Mailer
0518	K. Marx	14.2	X
0520	C. Bowser	14.1, 14.2	X
0521	A. Hanscom	14.2	X
0522	S. Box	14.2	X
0525	J. Wright	14.1	X
0526	M. Devernoe	14.1, 14.2	X
0528	T. Mac Krell	14.2	X
0530	R. Herbener	14.1, 14.2	X
0533	G. McLaird	14.2	
0538	P. Mcculley	14.2	X
0539	T. Passarella	14.1, 14.2	
0541	S. Young	14.2	X
0542	R. Bruner	14.2	
0544	C. Hansen	14.2	X
0545	C. and M. Forgone	14.2	X
0546	S. Davis	14.1, 14.2	X
0554	J. Baldwin	14.2	X
0555	M. Parks	14.2	X
0559	D. Klinke	14.2	X
0560	L. Wilson	14.2	X
0562	N. Rogers	14.2	X
0563	T. and C. Johnson	14.2	X
0567	T. Anderson	14.1, 14.2	X
0569	L. Griffin	14.1, 14.2	X
0570	S. Kim	14.2	X
0572	W. Vandergriff	14.2	X
0574	A. Salmon	14.1	X
0576	S. Koch	14.2	X
0577	H. Peterson	14.2	X
0578	M. Plotnick	11, 14.2	X
0583	D. and S. Giffen	14.1, 14.2	X
0584	M. Hessman	14.2	X
0585	D. Friedman	14.1, 14.2	
0586	K. Hemmingsen	14.2	X
0587	C. Shoupe	14.2	X
0588	K. Pomeroy	14.1	X
0591	J. Strong	14.2	X
0592	Y. Neal	14.2	X
0594	E. Hoffman	7.1	
0598	J. Doubleday	14.2	X
0600	D. Brower	14.2	X
0601	W. Thomas	14.2	X
0602	M. Verano	14.2	
0603	K. Sanders	14.2	X
0604	C. Bradley	14.2	X
0605	P. Deleon	14.1, 14.2	X

Submission Number	Commenter	Chapter Number	Sierra Club Mass Mailer
0606	C. Boyington	14.2	X
0608	J. ODonnell	14.2	X
0612	W. White	14.1, 14.2	X
0613	J. Varner	14.2	X
0615	P. Waterworth	14.2	X
0620	M. Neal	14.1, 14.2	X
0627	M. Verano	14.2	
0679	R. Nichols	14.2	X
0681	T. Woods	14.2	X
0682	E. Borie	14.1, 14.2	X
0684	B. Measelle	14.2	X
0685	G. Epailly	14.1, 14.2	X
0687	S. Ritchie	14.1, 14.2	X
0688	A. Tucker	14.2	X
0690	T. Davin	14.1	X
0691	S. Bogard	14.2	X
0693	K. Lynn	14.1, 14.2	X
0696	P. Wilkey	14.2	X
0697	P. Lefebvre	14.2	X
0698	M. Roglaski	14.2	X
0707	W. Leist	14.1, 14.2	X
0709	Powder River Basin Resource Council	14.1, 14.2	
0712	J. Witte	14.1, 14.2	
0713	D. Hamblin	14.2	X
0714	L. Zimmerman	14.2	X
0716	B. Jones	14.2	X
0718	D. Dobranchin	14.2	X
0720	B. Dale	14.1, 14.2	X
0721	C. Calvo	14.1	X
0723	J. Schimpff	14.2	X
0726	B. Koch	14.1	X
0727	A. Bell	14.1, 14.2	X
0728	P. Gollon	14.1	X
0729	L. Gorsuch	14.2	X
0731	E. Lapinsky	14.2	X
0732	T. Schram	14.2	X
0733	W. Ware	14.2	X
0734	N. MacKinnon	14.1, 14.2	X
0736	E. Kappos	14.1, 14.2	X
0737	W. Krupnick	14.1	X
0738	J. Kelly	14.2	X
0740	N. Refes	14.2	X
0744	J. Cassidy	14.2	X
0746	R. Sales	14.2	X
0749	A. and L. McClaine	14.1	X

Submission Number	Commenter	Chapter Number	Sierra Club Mass Mailer
0750	R. Levy	14.2	X
0752	J. Quetua	14.2	X
0754	R. Dunaway	14.1, 14.2	X
0757	T. McIntosh	14.2	X
0764	J. Ehrlich	14.1	
0765	R. Lewis	14.2	X
0767	B. Luecke	11	
0769	W. Crane	14.2	X
0770	BJ M. Leven	14.2	X
0771	D. Grommon	14.1	X
0773	T. Langford	14.2	X
0774	J. Farina	2.6, 14.2	X
0777	Anonymous	14.2	
0783	Cardinal Engineering, Inc.	2.3, 4.4, 10.1, 14.1	
0784	Matthew M. McDonnell	14.1, 14.2	
0785	CMC Solutions and CMC Support	4.7	
0786	New Jersey Department of Environmental Protection	5.1, 6.5, 7.1, 11, 13, 14.1	
0787	Twenty-First Strategies	3.2, 10.1, 10.2	
0788	Joint Global Change Research Institute, Pacific Northwest National Laboratory	2.1, 2.4, 2.5, 2.6, 3.1, 3.2, 5.1, 5.2, 5.3, 5.4, 6.1, 6.7, 8.1, 11, 13, 14.1, 14.2	
0789	Michigan Oil And Gas Association	1, 10.1, 14.1, 14.2	
0790	Archer Daniels Midland Company	2.5, 3.1, 3.2, 4.1, 5.1, 5.3, 11, 14.2	
0791	Oklahoma Independent Petroleum Association	2.3, 3.1, 3.2, 4.3, 5.4, 8.1, 14.1	
0792	Anadarko Petroleum Corporation	2.1, 2.3, 5.1, 13	
0793	Colorado Department of Public Health and Environment	2.1, 2.2	
0794	Western Business Roundtable	1, 5.3, 10.1, 11, 13, 14.1, 14.2	
0795	Occidental Petroleum Corporation	4.1, 6.1, 6.2, 6.5, 6.6, 11, 14.1	
0796	Clean Coal Technology Foundation of Texas	2.3, 6.2, 14.1, 14.2	
0797	North American Carbon Capture and Storage Association	1, 4.1, 4.3, 5.3, 6.1, 11, 13, 14.1	
0798	Denbury Resources, Inc.	2.1, 2.5, 4.2, 4.5, 4.6, 5.1, 5.2, 5.4, 6.1, 6.2, 10.1, 11, 14.1	
0799	Multi-stakeholder Discussion Group	2.1, 2.3, 2.4, 2.5, 2.6, 2.7, 4.1, 4.2, 4.3, 4.5, 4.7, 5.1, 5.2, 5.3, 5.4, 6.1, 6.2, 6.3, 6.6, 7.3, 7.5, 8.1, 9.1, 11, 12,14.1, 14.2	

Submission Number	Commenter	Chapter Number	Sierra Club Mass Mailer
0800	Southern Company	1, 2.3, 2.5, 5.3, 6.1, 6.2, 6.4, 6.5, 6.6, 6.7, 7.1, 7.3, 7.4, 11, 14.1	
0801	Joyce Dillard	6.8, 7.2, 9.2, 13, 14.1	
0802	Summit Texas Clean Energy	2.1, 2.4, 5.3, 6.1, 6.2, 6.7, 7.1, 11	
0803	Dominion Resources Service, Inc.	1, 2.5, 2.6, 4.1, 4.7, 5.3, 6.1, 6.7, 11	
0804	Xcel Energy Inc.	11	
0805	Kinder Morgan Energy Partners, L.P.	1, 2.1, 2.2, 2.4, 2.6, 4.1, 4.2, 4.4, 4.7, 5.1, 5.3, 6.1, 12, 14.1	
0806	Resolute Energy Corporation	1, 2.3, 2.5, 3.1, 4.1, 4.2, 4.3, 4.4, 5.1, 5.3, 10.1	
0807	Core Energy, LLC	1, 2.3, 2.5, 3.1, 4.1, 4.2, 4.3, 4.4, 4.7, 5.1, 5.3, 11	
0808	American Electric Power	1, 2.3, 2.5, 3.2, 5.1, 5.3, 6.1, 6.2, 6.4, 6.5, 6.6, 6.7, 7.1, 7.4, 11	
0809	Clean Air Task Force, Environmental Defense Fund, Natural Resources Defense Council, and Sierra Club	1, 2.1, 2.4, 2.5, 2.6, 3.1, 3.2, 3.3, 4.1, 5.1, 5.3, 5.4, 6.1, 6.2, 6.7, 6.8, 7.1, 7.2, 7.3, 7.4, 8.1, 9.2, 10.1, 11, 12, 14.1, 14.2	
0810	The Independent Petroleum Association of Mountain States	1, 2.3, 2.5, 2.7, 3.1, 4.1, 4.2, 4.4, 5.1, 5.3, 6.2, 6.4, 6.5, 6.6, 6.7, 10.1, 11, 14.1	
0811	C12 Energy	1, 2.3, 2.5, 5.3, 6.5, 7.2, 8.1, 11, 14.1, 14.2	
0812	Blue Strategies, LLC	2.3, 3.3, 4.1, 4.3, 5.1, 6.1, 6.5, 6.7, 11	
0813	Edison Electric Institute	1, 2.3, 2.5, 3.2, 5.1, 5.3, 6.1, 6.4, 6.5, 6.6, 6.7, 7.1, 7.4, 10.1, 11, 14.1	
0814	Yates Petroleum Corporation	2.1, 4.7, 12	
0815	DTE Energy	1, 5.3, 6.2, 6.7, 7.1, 10.1, 11, 14.1	
0816	American Petroleum Institute	1, 2.1, 2.2, 2.3, 2.5, 2.6, 3.2, 4.1, 4.2, 4.4, 4.5, 5.1, 5.2, 5.3, 5.4, 6.1, 6.3, 6.5, 6.6, 6.7, 7.3, 7.4, 8.1, 9.1, 9.3, 11	
0817	Texas Commission on Environmental Quality	4.1, 4.7, 8.1	
TRANS-VA-01	Clean Air Task Force	2.4, 2.5, 6.1, 6.2, 7.1, 7.2, 11, 14.1	
TRANS-VA-02	Edison Electric Institute	1, 2.5, 6.1, 6.7, 7.1, 11	
TRANS-VA-03	21st Strategies	10.1, 10.2	
TRANS-VA-04	Sierra Club	2.5, 3.2, 6.2, 7.2, 7.3, 8.1, 11, 14.2	
TRANS-VA-05	American Petroleum Institute	2.3, 2.5, 5.1	
TRANS-VA-06	Environmental Defense Fund	7.2, 14.1	
TRANS-VA-07	North American Carbon Capture and Storage Association	2.4, 6.2, 11, 13, 14.1	
TRANS-VA-08	Marston Law	14.1	

Note: In Sierra Club Mass Mailer column, X indicates Sierra Club Mass Mailers and blanks indicate non-Sierra Club Mass Mailers.