June 11, 2010

Comments of the Geologic Sequestration Multi-Stakeholder Discussion Participants on USEPA's Proposed Regulations for Mandatory Reporting of Greenhouse Gases: Injection and Geologic Sequestration of Carbon Dioxide
Docket ID No. EPA–HQ–OAR–2009–0926

EPA Proposal	Recommended Revisions	Explanation
PART 98—[AMENDED] 1. The authority citation for part 98 continues to read as follows: Authority: 42 U.S.C. 7401, et seq.		
Subpart A—[Amended] 2. Section 98.2 is amended by revising paragraph (a) introductory text to read as follows: §98.2 Who must report? (a) The GHG reporting requirements and related monitoring, recordkeeping, and reporting requirements of this part apply to the owners and operators of any facility that is located in the United States *or under or attached to the Outer Continental Shelf (as defined in 43 U.S.C. §1331)* and that meets the requirements of either paragraph (a)(1), (a)(2), or (a)(3) of this section; and any supplier that meets the requirements of paragraph (a)(4) of this section:	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."	EPA needs to add these subparts to its newly-created Tables A-3 and A-4. EPA, Mandatory Reporting of Greenhouse Gases: Minor Harmonizing Changes to the General Provisions, 75 Fed. Reg. 12451, 12456-58 (March 16, 2010). Otherwise the cross-references will be ineffective to trigger application of these provisions.
3. Section 98.6 is amended by adding the following definitions in alphabetical order to read as follows:		No comment

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§98.6 Definitions.		
Outer Continental Shelf means all submerged lands lying seaward and outside of the area of lands beneath navigable waters as defined in 43 U.S.C. §1301, and of which the subsoil and seabed appertain to the United States and are subject to its jurisdiction and control.		No comment
United States means the 50 states, the District of Columbia, the Commonwealth of Puerto Rico, American Samoa, the Virgin Islands, Guam, and any other Commonwealth, territory or possession of the United States, as well as the territorial sea as defined by Presidential Proclamation No. 5928.		No comment
4. Section 98.7 is amended by revising paragraph (e)(39) to read as follows: **§98.7 What standardized methods are incorporated by reference into this part?** (39) ASTM E1747–95 (Reapproved 2005) Standard Guide for Purity of Carbon Dioxide Used in Supercritical Fluid Applications, IBR approved for §98.424(b) and §98.444(a).	4. (a) Section 98.7 is amended by revising paragraph (e)(39) to read as follows: **§98.7 What standardized methods are incorporated by reference into this part?** (39) ASTM E1747–95 (Reapproved 2005) Standard Guide for Purity of Carbon Dioxide Used in Supercritical Fluid Applications, IBR approved for §98.424(b) and §98.444(a).	Under (e) (39) EPA is proposing the use of ASTM E1747–95 (Reapproved 2005) as a standard method for quantifying CO2 from EOR and GS streams for subpart RR. The ASTM method cited by EPA is titled "Standard Guide for Purity of Carbon Dioxide Used in Supercritical Fluid Applications". It is intended for the quantification of impurities in CO_2 used for supercritical fluid extraction (requiring FDA approval) or for supercritical chromatography. Such a method is not

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	(b)Section 98.7 is amended by revising paragraph (f)(2) to read as follows: (2) GPA Standard 2261-00 – "Analysis for Natural Gas and Similar Gaseous Mixtures by Gas Chromatography", IBR approved for § 98.34(a), § 98.164(b), § 98.254(d), ~~and~~ § 98.344(b), and §98.444(a). (c) Section 98.7 is amended by adding paragraph (f)(3) to read as follows: (3) GPA Standard 2177-03 – "Analysis of Natural Gas Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Gas Chromatography", IBR approved for §98.444(a).	appropriate for quantifying CO_2 in EOR or GS streams. ASTM 1747-95 is not always applicable under Part 98 because it is designed to test for impurities of clinical or food quality supercritical CO2. We recommend adoption of the provided GPA standards as examples of the standards that are used in practice in the industry. EPA should amend the citation in 98.7 to add references to more applicable standards as shown. EPA should also specify that, similarly to the citation of other standards, reporters may use more recent versions of published standards in accordance with industry practices and available instrumentation.
5. Part 98 is amended by adding subpart RR to read as follows: Sec. 98.440 Definition of the source category. 98.441 Reporting threshold. 98.442 GHGs to report. 98.443 Calculating CO2 Injection and Sequestration. 98.444 Monitoring and QA/QC		

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requirements. 98.445 Procedures for estimating missing data. 98.446 Data reporting requirements. 98.447 Records that must be retained. 98.448 Geologic Sequestration Monitoring, Reporting, and Verification (MRV) Plan. 98.449 Definitions.		
Subpart RR—Injection and Geologic Sequestration of Carbon Dioxide §98.440 Definition of 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.	**Subpart RR—Injection and Geologic Sequestration of Carbon Dioxide** §98.440 Definition of 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 used for geologic sequestration (GS) or for any other purpose.	The wording in the last sentence should be "wells *used* for geologic sequestration". Carbon dioxide stream means carbon dioxide that has been captured from an emission source (e.g. a power plant or other industrial facility) or extracted from a carbon dioxide production well plus incidental associated substances either derived from the source materials and the capture process or extracted with the carbon dioxide. MRR, 74 Fed. Reg. 56260, 56385 (October 30, 2009).
(b) A facility that is subject to this rule only because of CO2 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	(b) A facility that is subject to this ~~rule~~ part 98 and meets the definition of this subpart only because of CO2 injection wells that do not meet the definition of geologic sequestration facility in paragraph (c) of this section is not required to report	This revision would clarify the meaning of this provision while avoiding the potential ambiguity of "this rule."

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98.	emissions under any other subpart of part 98.	
(c) Geologic sequestration (GS) facility. (1) For the purposes of this source category, a geologic sequestration facility is a facility that injects CO_2 for the long-term containment of a gaseous, liquid, or supercritical CO_2 stream in subsurface geologic formations. 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 submit a monitoring, reporting, and verification (MRV) plan to EPA that is then approved by EPA.	(1) For the purposes of this source category, a geologic sequestration facility is a facility that injects CO2 for the long-term containment ~~of a gaseous, liquid, or supercritical CO2 stream~~ in subsurface geologic formations. A facility that injects CO2 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 CO2 in subsurface geologic formations for long-term containment of a gaseous, liquid, or supercritical CO2 stream and~~ chooses to be a geologic sequestration facility by submitting a monitoring, reporting, and verification (MRV) plan to EPA that is then approved by EPA.	Referencing the specific phases of CO2 is unnecessary and inherently suggests that other references to CO2 without these modifiers is intended to be less inclusive. We recommend deleting the modifiers. Some concurrent storage (long-term containment) always occurs during EOR operations using CO2. Accordingly, the rule should not indicate that this is something to be decided on the basis of intent by using the phrase "also injects . . . for long-term containment". The only real choice being made by the operator is whether to become subject to the subpart RR requirements by submitting and obtaining approval of an MRV plan.
(2) A facility that is not required to report for the purposes of this source category as a geologic sequestration facility, injects CO_2 for the long-term containment of a gaseous, liquid, or supercritical CO2 stream in subsurface geologic formations, and chooses to submit an MRV plan to	~~(2) A facility that is not required to report for the purposes of this source category as a geologic sequestration facility, injects CO2 for the long-term containment of a gaseous, liquid, or supercritical CO2 stream in subsurface geologic formations, and chooses to submit an MRV plan to~~	This part of the definition is confusing and unnecessary in light of the language in (1).. If a facility chooses to submit an MRV, it becomes a GS facility and renders the lead clause of this provision potentially confusing because it then is "required to report for the purposes of this source

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EPA that is then approved by EPA, is a geologic sequestration facility.	~~EPA that is then approved by EPA, is a geologic sequestration facility.~~	category as a geologic sequestration facility." This deletion and the following revision to §98.440(c)(3) – which will become §98.440(c)(2) – would clarify what is intended.
(3) A geologic sequestration facility includes all structures associated with injection located between the points of CO2 transfer onsite and the injection wells.	(2) A geologic sequestration facility includes all injection and monitoring wells, pipelines, compressors, valves and associated equipment and structures from receipt of CO2 to storage field through to ~~associated with injection located between the points of CO2 transfer onsite and~~ the injection wells.	The definition should be revised to address "equipment" as well as "structures" and to provide specific examples for clarification.
(4) A geologic sequestration facility that injects CO_2 to enhance the recovery of oil or natural gas includes all structures associated with production located between the production wells and the separators.	(3) A geologic sequestration facility that injects CO_2 to enhance the recovery of oil or natural gas includes all injection and monitoring wells, pipelines, compressors, valves and associated equipment and structures from receipt of CO2 to the storage field through to the injection wells and all separators, compressors, vent stacks, structures and equipment associated with production ~~located between the production wells and the separators~~.	The definition should be revised to address "equipment" as well as "structures" and to provide specific examples for clarification.
(d) This source category does not include the following: (1) Storage of CO2 above ground. (2) Temporary storage of CO2 below	(d) This source category does not include the following: (1) Storage of CO2 above ground. (2) Temporary storage of CO2 below	The source category should exclude the injection of CO2 or CO2 streams for purposes of conducting testing that will help to identify and characterize

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ground. (3) Transportation or distribution of CO2. (4) Purification, compression, or processing of CO2 at the surface. (5) Capture of CO2. (6) CO2 in cement, precipitated calcium carbonate (PCC), or any other technique that does not involve injection of CO2 into the subsurface.	ground. (3) Injection of CO2 or CO2 streams for subsurface testing and characterization activities. (4) Reinjection of a produced mixed stream that includes CO2, is incidental to oil and gas production, and is reinjected with natural gas or other formation fluids with or without some processing of the stream. (5)Transportation or distribution of CO2. (6) Purification, compression, or processing of CO2 at the surface. (7) Capture of CO2. (8) CO2 in cement, precipitated calcium carbonate (PCC), or any other technique that does not involve injection of CO2 into the subsurface.	appropriate sites for geologic sequestration and/or enhanced recovery of oil or natural gas. These activities will be necessary in many cases to assist with the proper siting of these operations and should be encouraged to be conducted without the potential added expense of reporting all of the information required by this subpart. In MRR, 74 Fed. Reg. 56260, 56385 (October 30, 2009), "carbon dioxide stream" is defined as "carbon dioxide that has been captured from an emission source (e.g. a power plant or other industrial facility) or extracted from a carbon dioxide production well plus incidental associated substances either derived from the source materials and the capture process or extracted with the carbon dioxide." In many situations produced natural gas or other formation fluids, which may have some level of CO2 concentration (typically up to 15%), are reinjected directly into the field, sometimes after minimal treatment such as drying. The reinjection may be done for a number of reasons, some of which may be construed as enhanced recovery. The requirement of Tier 1

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		(EOR-only) reporting for these situations would represent a significant and unintended burden. Although the definition of "carbon dioxide stream" implies that this situation is not intended to be subject to these rules, there is a need to be explicit in this rule that this type of incidental CO2 injection is not subject to Subpart RR. In addition, the preamble discussion of this provision should include a recognition that injection of CO2 into a geologic formation such as a CO2 dome should not result in double counting if the CO2 is subsequently extracted and delivered for some other use. Subpart PP excludes "Storage of CO2 above ground or in geologic formations" from the source category. 40 CFR §98.420(b)(1), 74 Fed. Reg. 56260, 56506 (October 30, 2009). And proposed subpart RR excludes "Temporary storage of CO2 below ground." §98.440(d)(2), 75 Fed. Reg. 18576, 18600 (April 12, 2010).
§98.441 Reporting threshold. (a) You must report under this subpart if your facility is an injection facility that injects CO2 into the subsurface and the	It does not appear that EPA has proposed to amend the tables to add listing for subpart RR. That probably needs to be done. Otherwise this provision is fairly	§ 98.2 Who must report? (a) The GHG reporting requirements and related monitoring, recordkeeping, and reporting requirements of this part apply to

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facility meets requirements of either §98.2(a)(1) or (a)(2).	meaningless. 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." **Is this the right approach?** Perhaps the better alternative is this: §98.441 Reporting threshold. (a) You must report under this subpart if your facility is an injection facility that injects CO2 into the subsurface and the facility meets requirements of either §98.440(b) or (c).	the owners and operators of any facility that is located in the United States and that meets the requirements of either paragraph (a)(1), (a)(2), or (a)(3) of this section; and any supplier that meets the requirements of paragraph (a)(4) of this section: (1) A facility that contains any source category that is listed in Table A–3 of this subpart in any calendar year starting in 2010. For these facilities, the annual GHG report must cover stationary fuel combustion sources (subpart C of this part), miscellaneous use of carbonates (subpart U of this part), and all applicable source categories listed in Table A–3 and Table A–4 of this subpart. (2) A facility that contains any source category that is listed in Table A–4 of this subpart that emits 25,000 metric tons CO2e or more per year in combined emissions from stationary fuel combustion units, miscellaneous uses of carbonate, and all applicable source categories that are listed in Table A–3 and Table A–4 of this subpart. For these facilities, the annual GHG report must cover stationary fuel combustion sources (subpart C of this part), miscellaneous use of carbonates

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		(subpart U of this part), and all applicable source categories listed in Table A–3 and Table A–4 of this subpart.
(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.		§98.2(i) 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.
(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 under the jurisdiction of the Safe Drinking Water Act), a 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	(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	The proposed rule establishes defined terms; the rule should be using this terminology more consistently (e.g., "geologic sequestration facility"). Mixing terms makes it harder to interpret what is meant.

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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 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 this subpart resume operation.	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 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.	
(2) If the CO2 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	(2) (i) If the ~~CO2 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	If the closure standards are essentially the same for the UIC permit and for this subpart RR, the demonstration only should be made one place.

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conducting geologic sequestration may discontinue complying with the remainder of this subpart. The owner or operator of the facility must notify EPA that the CO2 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. The owner or operator must resume reporting for any future calendar year during which any activities that are source categories of this subpart resume operation.	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 ~~CO2 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.	
	(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	We believe there are three problems with the closure standard that the EPA UIC program proposed for section 146.93(b) of the proposed Class VI rule. "Federal Requirements Under the Underground

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	following: (A) the estimated magnitude and extent of the project footprint (CO2 plume and the area of elevated pressure) ; (B) the estimated location of the detectable CO2 plume ; (C) that there is no significant leakage of CO2; (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.	Injection Control (UIC) Program for Carbon Dioxide (CO2) Geologic Sequestration (GS) Wells", 73 Fed. Reg. 43491, 43540-41 (July 25, 2008). First, the presumption that monitoring should continue for 50 years is unnecessary and counterproductive. A straight performance standard is preferable to this or any other fixed time period because it provides a clearer standard and an incentive to maximize the understanding of site and project performance and as such is more protective of USDWs, human health and the environment. Second, the proposal would require a showing that the CO2 plume has "stabilized", which was left undefined. Cessation of plume movement is not necessarily essential to show that a project poses no threat of endangerment to USDWs (or of leakage in the case of this subpart RR rule)—plumes that are still moving may, nonetheless, remain contained. Instead, it is more protective to show that the plume of injected and displaced fluids is not expected to migrate in the future in a manner likely to result in leakage. Third, the required showing that "no additional monitoring is needed" does

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		not provide guidance regarding how an operator is to show that no additional monitoring is needed. Our recommended revision provides specific guidance on what the operator must show. We recommend a standard similar to that which we provided in proposed alternative language for section 146.93(b) of the proposed UIC rule for GS because it sets forth detailed criteria, all of which must be satisfied, to demonstrate that the site does not pose an endangerment to USDWs or a likelihood of leakage. The specific criteria listed in our proposal here will serve to provide UIC Directors and EPA with the requisite information to make the appropriate determination. The advantage of this approach is that it establishes clear criteria that an operator must demonstrate before obtaining site closure and approval to cease reporting based upon particular site characteristics and is, therefore, reasonably applicable to any storage site as opposed to a standard based upon a fixed-duration. Furthermore, it is more stringent than a purely discretionary approach because it establishes specific criteria that

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		must be shown before site closure and approval to cease reporting may be granted.
§98.442 GHGs to report. You must report: (a) Mass of CO_2 received onsite.	§98.442 GHGs to report. You must report: (a) Mass of CO_2 received ~~onsite~~ from sources outside the facility.	These requirements should use the terminology established by the rule to ensure consistency of application and clarity of meaning.
(b) Mass of CO_2 injected into the subsurface.		
(c) Facilities conducting geologic sequestration also report: (1) Mass of CO_2 produced, if any. (2) Mass of CO_2 sequestered in the subsurface geologic formation. (3) Mass of CO_2 emitted from subsurface leaks. (4) Mass of fugitive and vented CO_2 emissions from surface equipment at the facility if not reported under subpart W of this part.	(c) Facilities conducting geologic sequestration also report: (1) Mass of CO_2 produced, if any. (2) Mass of CO_2 sequestered in ~~the~~ subsurface geologic formations. (3) Mass of CO_2 emitted ~~from subsurface leaks~~ by leakage. (4) Mass of fugitive and vented CO_2 emissions from surface equipment at the facility if not reported under subpart W of this part. (5) Cumulative mass of CO2 sequestered in the subsurface geologic formations since the facility became subject to reporting requirements under this Subpart.	The term defined in the proposed rule is "leakage," which is the term that should be used rather than "leak." EPA should add §98.442(5) GHGs to provide for reporting the cumulative mass of CO2 sequestered in the subsurface geologic formations since the project became subject to reporting requirements under this Subpart. Due to the dynamic nature of ER projects, it is possible that, at times, the mass of CO2 sequestered over a period of a year may be negative; that is, CO2 that had previously been injected and counted as stored is now produced, even if injection has stopped. This may happen in the case of CO2 floods or water-alternating-gas (WAG) floods, where it will take time for the CO2 to reach

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		production wells. We are concerned that reporting of negative annual sequestered masses could be incorrectly interpreted as a failure of the storage capabilities of the reservoir. Thus, to reflect the realities of such operations, we recommend reporting the cumulative mass of CO2 sequestered since the GS facility became subject to reporting requirements under Subpart RR.
§98.443 Calculating CO_2 Injection and Sequestration. (a) A facility must calculate and report the annual mass of CO_2 **transferred to the facility from offsite sources** using the procedures in paragraphs (a)(1), (a)(2), and (a)(3) of this section.	§98.443 Calculating CO_2 Injection and Sequestration. (a) A facility must calculate and report the annual mass of CO_2 ~~transferred to the facility~~ received from sources outside the facility ~~offsite sources~~ using the procedures in paragraphs (a)(1), (a)(2), and (a)(3) of this section.	The rule should use consistent and meaningful terminology.
(1) For each transfer point for which flow is measured using a mass flow meter, you must calculate the total annual mass of CO2 in a CO2 stream transferred onsite from offsite sources in metric tons by multiplying the mass flow by the CO2 concentration in the flow, according to Equation RR–1 of this section. You must collect these data quarterly. Mass flow and concentration data measurements must be	(1) For each custody transfer point for which flow is measured using a mass flow meter, you must calculate the total annual mass of CO2 in a CO2 stream transferred onsite from offsite sources in metric tons by multiplying the mass flow by the CO2 concentration in the flow, according to Equation RR–1 of this section. You must collect these data quarterly. Mass flow and concentration data measurements must be	

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made in accordance with § 98.444.	made in accordance with § 98.444.	
(2) For each transfer point for which flow is measured using a volumetric flow meter, you must calculate the total annual mass of CO2 in a CO2 stream transferred onsite from offsite sources in metric tons by multiplying the volumetric flow at standard conditions by the CO2 concentration in the flow and the density of CO2 at standard conditions, according to Equation RR–2 of this section. You must collect these data quarterly. Volumetric flow and concentration data measurements must be made in accordance with § 98.444.	(2) For each custody transfer point for which flow is measured using a volumetric flow meter, you must calculate the total annual mass of CO2 in a CO2 stream transferred onsite from offsite sources in metric tons by multiplying the volumetric flow at standard conditions by the CO2 concentration in the flow and the density of CO2 at standard conditions, according to Equation RR–2 of this section. You must collect these data quarterly. Volumetric flow and concentration data measurements must be made in accordance with § 98.444.	
You must collect these data quarterly.		
Mass flow and concentration data measurements must be made in accordance with §98.444.		
(3) To aggregate transfer data at the facility level, you must sum the mass of all CO2 transferred onsite from offsite sources through all facility transfer points in accordance with the procedure specified in Equation RR-3 of this section.		
(b) A facility must report annually the mass of CO2 **injected** in accordance with the procedures specified in paragraphs	(b) A facility must report annually the mass of CO2 **injected** in accordance with the procedures specified in paragraphs	This approach will allow the operator to propose an alternative approach that addresses EPA's desire for useful

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(b)(1) through (b)(3) of this section.	(b)(1) through (b)(3) of this section or obtain approval for an alternative reporting requirements pursuant to (b)(4) of this section.	information while allowing operators to take any necessary steps to protect sensitive competitive information. We are concerned that the annual reporting of the mass of CO2 injected by ER operations will create a datapoint that may not be easily understood by the general public or general media because it will include recycled CO2 produced with the oil and gas stream. We are acting on this concern by proposing the revision noted here and by seeking the opportunity to work with EPA toward the initiation of a potential study that addresses the use of CO2 from both natural and anthropogenic sources in ER operations as a basis for determining how to design reporting provisions for ER operations that inject CO2 but do not choose to report under the GS facility requirements of this subpart RR.
(1) For each point at which the flow of an injected CO2 stream is measured using a mass flow meter, you must calculate annually the total mass of CO2 in the CO2 stream injected in metric tons by multiplying the mass flow by the CO2		

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concentration in the flow, according to Equation RR–4 of this section. You must collect these data quarterly. Mass flow and concentration data measurements must be made in accordance with § 98.444.		
(2) For each point at which the flow of an injected CO2 stream is measured using a volumetric flow meter, you must calculate annually the total mass of CO2 in the CO2 stream injected in metric tons by multiplying the volumetric flow at standard conditions by the CO2 concentration in the flow and the density of CO2 at standard conditions, according to Equation RR–5 of this section. You must collect these data quarterly. Volumetric flow and concentration data measurements must be made in accordance with § 98.444.		
	(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 CO2 injected during the year, by quantifying the mass of CO2 produced and recycled for ER. The details of the calculations in such a plan may be claimed as confidential	We are very concerned that reporting only the gross mass of CO2 injected for ER operations will create a number that will be too easily misunderstood. Therefore we recommend allowing ER operators to establish procedures that will generate the mass of CO2 injected net of the mass that represents the recycled CO2 without requiring such operators to comply with all

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	business information, but the total mass of CO2 injected must be reported along with the calculated net mass of CO2 injected.	of the reporting requirements for GS facilities. This recommended provision is designed to accomplish that objective by allowing operators to provide additional information on a voluntary basis to improve the contextual interpretation of the reported mass of CO2 injected.
(c) All GS facilities must also report the mass of CO_2 **emitted as fugitive or vented emissions from surface equipment** (if this information is not required to be reported under subpart W of this part), the mass of CO_2 **produced** (if applicable), the mass of CO_2 **emitted from subsurface leakage**, and the mass of CO_2 **geologically sequestered** in accordance with the procedures as specified in paragraphs (c)(1) through (c)(4) of this section.	(c) All GS facilities must also report the mass of CO_2 emitted as fugitive or vented emissions from surface equipment (if this information is not required to be reported under subpart W of this part), the mass of CO_2 produced (if applicable), the mass of CO_2 emitted ~~from subsurface~~ by leakage, and the mass of CO_2 geologically sequestered in accordance with the procedures as specified in paragraphs (c)(1) through (c)(4) of this section.	Should be "the mass of CO2 emitted by leakage" because "leakage" is the defined term.
(1) If you do not report CO2 emitted as fugitive or vented emissions from surface equipment at your facility in the reporting year under subpart W of this part, you must report them under subpart RR of this part in accordance with the procedures specified in subpart W of this part for each type of surface equipment. If you report these emissions under subpart W of this		

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part, you do not need to report these emissions under subpart RR of this part.		
(2) You must calculate the annual mass of CO2 produced from oil or gas production wells (if applicable) at the facility for each separator that sends a stream of gas into a recycle or end use system in accordance with the procedures specified in paragraphs (c)(2)(i) through (c)(2)(iii) of this section.		
(iii) To aggregate production data at the facility level, you must sum the mass of all of the CO2 separated at each gas-liquid separator at the facility in accordance with the procedure specified in Equation RR–9 of this section. You must assume that the total CO2 measured at the separator(s) represents (100–X)% of the total CO2 produced. In order to account for the X% of CO2 produced that is estimated to remain with the produced oil and gas, you must multiply the quarterly mass of CO2 measured at the separator(s) by (100+X)%. The value of X must be estimated using a methodology approved by EPA per your MRV plan.	(iii) To aggregate production data at the facility level, you must sum the mass of all of the CO2 separated at each gas-liquid separator at the facility in accordance with the procedure specified in Equation RR–9 of this section. You must assume that the total CO2 measured at the separator(s) represents (100–X)% of the total CO2 produced. In order to account for the X% of CO2 produced that is estimated to remain with the produced oil and gas, you must multiply the quarterly mass of CO2 measured at the separator(s) by (100+X)%. The value of X must be a ratio, expressed as a percentage, of CO2 that is expected to remain with the produced oil and gas to CO2 separated for recycle or end-use. The value of X ~~must~~ may be estimated using a	X needs to be defined more precisely. As currently proposed, this definition leaves the reference for calculating X ambiguous. The reference, of which X is a percentage, could be interpreted as either the CO2 entering the separator, or the CO2 leaving the separator for recycle or end-use. For Equ. RR-9 to be accurate, the reference must be the CO2 separated for recycle or end-use. We recommend that "X" be defined to avoid this ambiguity.

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	methodology approved by EPA per your MRV plan. :	
(3) You must report the annual mass of CO2 that is **emitted from each leakage pathway identified in your MRV plan**. You must calculate the total annual mass of CO2 emitted from all leakage pathways at the facility in accordance with the procedure specified in Equation RR-10 of this section.	(3) You must report the annual mass of CO2 that is emitted ~~from each~~ by leakage ~~pathway identified~~ in accordance with your MRV plan. You must calculate the total annual mass of CO2 emitted from all leakage pathways at the facility in accordance with the procedure specified in Equation RR-10 of this section.	The language used by EPA is too limiting and appears to presume that leakage pathways will always be discrete items. Leakage pathways are most useful in approaching risk assessments.
(4) You must report the annual mass of CO2 that is sequestered in the subsurface geologic formation in the reporting year in accordance with the procedures specified in paragraphs (c)(4)(i) and (c)(4)(ii) of this section.		
(i) GS facilities that are conducting enhanced recovery operations and that are actively producing oil or natural gas must calculate the annual mass of CO2 that is sequestered in the underground subsurface formation in the reporting year in accordance with the procedure specified in	(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 CO2 that is sequestered in the underground subsurface formation in the reporting year in accordance with the	We recommend this revision to address the circumstances where a GS facility is producing oil or natural gas without truly engaging in business as usual ER. This would include wells falling within our recommended Class II(b)(5) category. See MSD Recommendation of October 9,

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Equation RR-11 of this section.	procedure specified in Equation RR-11 of this section.	2009.
$CO_2 = CO_{2I} - CO_{2P} - CO_{2E} - CO_{2FI} - CO_{2FP}$ (Eq. RR-11) Where: CO_2 = Total annual CO_2 mass sequestered in the subsurface geologic formation (metric tons) at the facility in the reporting year. CO_{2I} = Total annual CO_2 mass injected (metric tons) at the facility in the reporting year. CO_{2P} = Total annual CO_2 mass produced (metric tons) at the facility in the reporting year. CO_{2E} = Total annual CO_2 mass emitted (metric tons) from the subsurface geologic formation in the reporting year. CO_{2FI} = Total annual CO_2 mass emitted (metric tons) as fugitive or vented emissions from equipment located on the surface between the flow meter used to measure injection quantity and the injection wellhead. CO_{2FP} = Total annual CO_2 mass emitted (metric tons) as fugitive or vented	$CO_2 = CO_{2I} - CO_{2P} - CO_{2E} - CO_{2FI} - CO_{2FP}$ (Eq. RR-11) Where: CO_2 = Total annual CO_2 mass sequestered in ~~the~~ subsurface geologic formations (metric tons) at the facility in the reporting year. CO_{2I} = Total annual CO_2 mass injected (metric tons) at the facility in the reporting year. CO_{2P} = Total annual CO_2 mass produced (metric tons) at the facility in the reporting year. CO_{2E} = Total annual CO_2 mass emitted (metric tons) from the subsurface geologic formation in the reporting year. CO_{2FI} = Total annual CO_2 mass emitted (metric tons) as fugitive or vented emissions from equipment located on the surface between the flow meter used to measure injection quantity and the injection wellhead. CO_{2FP} = Total annual CO_2 mass emitted (metric tons) as fugitive or vented	This should be the amount of CO_2 received by the facility less the amount emitted rather than this complicated approach that fails to give credit for the amount bound up in the system. There may be multiple injection zones or intervals at any one GS facility. Equation RR-11 computes the mass of CO2 sequestered annually. There are times in the life of an ER project, however, when the amount of CO2 produced will exceed the amount injected. Mathematically the equation would generate a negative number for the facility during those times even though there is no failure in the containment properties of the reservoir, and no loss of CO2 is occurring. EPA should recognize and discuss this issue in the preamble to the final rule and in any published materials that include data reported by ER facilities.

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emissions from equipment located on the surface between the production wellhead and of the flow meter used to measure production quantity.	emissions from equipment located on the surface between the production wellhead and of the flow meter used to measure production quantity.	
(ii) GS facilities that are not actively producing oil or natural gas must calculate the annual mass of CO_2 that is sequestered in the subsurface geologic formation in the reporting year in accordance with the procedures specified in Equation RR-12 of this section.		
$CO_2 = CO_{2I} - CO_{2E} - CO_{2FI}$ (Eq. RR-12) Where: CO_2 = Total annual CO_2 mass sequestered in the subsurface geologic formation (metric tons) at the facility in the reporting year. CO_{2I} = Total annual CO_2 mass injected (metric tons) at the facility in the reporting year. CO_{2E} = Total annual CO_2 mass emitted (metric tons) from the subsurface geologic formation in the reporting year. CO_{2FI} =Total annual CO_2 mass emitted (metric tons) as fugitive or vented emissions from equipment located on the surface between the flow meter used to measure injection quantity and the		

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injection wellhead.		
	(iii) GS facilities that produce a fluid other than oil or natural gas from the injection zone within the area of review for any purpose must follow the procedures specified in Equations RR-7 through RR-11 with CO_{2P} = Total annual CO_2 mass produced (metric tons) in any produced or extracted fluid stream at the facility in the reporting year.	It is conceivable that GS facilities not engaged in the production of oil and natural gas will find it either desirable or necessary to produce fluids from the injection zone that contain some levels of CO2. However unlikely, such activities might include desalination projects, remedial actions, or pressure adjustments. Adding this provision would serve to capture any data on produced CO2 under such circumstances.
§ 98.444 Monitoring and QA/QC requirements. (a) All reporters must adhere to the requirements and procedures in paragraph (a) in this section if there has been no EPA direction or order specifying a preferred method of measurement.		
(1) You must determine the quantity transferred by following the most appropriate of the following procedures: (i) A reporter can measure quantity at the custody transfer meter installed at the facility boundary prior to any subsequent processing operations at the facility. (ii) If you took ownership of the CO_2 in a commercial transaction, you can use the	(1) You must determine the mass of CO_2 received from sources outside the facility ~~quantity transferred~~ by following the most appropriate of the following procedures: (i) A reporter can measure ~~quantity~~ mass at the custody transfer meter installed at the facility boundary prior to any subsequent processing operations at the facility. (ii) If you took ownership of the CO_2 in a	We recommend use of this consistent terminology to promote better understanding of the requirements.

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quantity data from the sales contract if it is a one-time transaction or from invoices or manifests if it is an ongoing commercial transaction with discrete shipments.	commercial transaction, you can use the ~~quantity~~ mass data from the sales contract if it is a one-time transaction or from invoices or manifests if it is an ongoing commercial transaction with discrete shipments.	
(2) The point of measurement for the quantity injected is specified in paragraphs (a)(2)(i) and (a)(2)(ii) of this section.	(2) The point of measurement for the mass of CO_2 injected into the subsurface ~~quantity injected~~ is specified in paragraphs (a)(2)(i) and (a)(2)(ii) of this section.	We recommend use of this consistent terminology to promote better understanding of the requirements.
(i) For facilities regulated by the Underground Injection Control program, the point of measurement is the flow meter installed at the facility you already use to comply with the flow monitoring and reporting provisions of your Underground Injection Control permit.		No comment
(ii) For facilities not regulated by the Underground Injection Control program because they are outside of Safe Drinking Water Act jurisdiction, the point of measurement is the flow meter installed at the facility you already use to comply with the flow monitoring and reporting provisions of your relevant permit. If no such requirement exists, the point of measurement is the flow meter installed closest to the point of injection at your		No comment

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facility.		
(3) You must determine the quantity injected by using a flow meter or meters.	(3) You must determine the mass of CO_2 injected into the subsurface ~~quantity injected~~ by using a flow meter or meters.	We recommend use of this consistent terminology to promote better understanding of the requirements.
(4) You must operate and calibrate all flow meters used to measure quantities reported in §98.443 according to the following procedure:		No comment
(i) You must use an appropriate standard method published by a consensus-based standards organization if such a method exists. Consensus-based standards organizations include, but are not limited to, the following: ASTM International, the American National Standards Institute (ANSI), the American Gas Association (AGA), the American Society of Mechanical Engineers (ASME), the American Petroleum Institute (API), and the North American Energy Standards Board (NAESB).		No comment
(ii) Where no appropriate standard method developed by a consensus-based standards organization exists, you must follow industry standard practices.		No comment
(iii) You must ensure that any flow meter calibrations performed are NIST traceable.		No comment
(5) You must determine concentration of	(5) You must determine concentration of	Need consistency of terminology to avoid

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the transferred CO_2 stream by following the most appropriate of the following procedures:	the CO_2 streams received from sources outside the facility by ~~following~~ using the most appropriate of the following procedures:	confusion.
(i) A reporter can sample the CO_2 stream at the point of transfer and measure its concentration.		No comment
(ii) If you took ownership of the CO_2 in a commercial transaction for which the sales contract was contingent on CO_2 concentration, and if the supplier of the CO_2 sampled the CO_2 stream and measured its concentration per the sales contract terms, you can use the CO_2 concentration data from the sales contract.		No comment
(6) You must determine the CO_2 concentration of the injected CO_2 stream by measuring immediately downstream of the flow meter as specified in paragraph (a)(2)(i) or (a)(2)(ii) of this section.	(6) You must determine the CO_2 concentration of the CO_2 stream injected into the subsurface by measuring immediately upstream or downstream of the flow meter as specified in paragraph (a)(2)(i) or (a)(2)(ii) of this section.	Operators should be able to make appropriate choices about the point of sampling to determine concentrations of CO2. This is particularly important for EOR operations, where wells are often fed by lines coming from a common manifold in the field. Lines running from a separation unit will carry the CO2 to the location of the manifold. Operators should be able to select an appropriate location for sampling that is between the exit from the separator unit and the injection well. As long as the CO2 remains within a closed

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		distribution system, the measured concentration will remain appropriate for all of the injection wells being fed even though there may be some variation in concentration from well to well. The concentration of the CO2 being delivered to all of the wells will capture the level necessary to determine the mass of CO2 being injected.
(7) If you measure the concentration of any CO_2 quantity for reporting, you must use methods that conform to applicable chemical analytical standards. Acceptable methods include U.S. Food and Drug Administration food-grade specifications for CO_2 (see 21 CFR 184.1240) and ASTM standard E1747-95(Reapproved 2005) Standard Guide for Purity of Carbon Dioxide Used in Supercritical Fluid Applications (incorporated by reference, see §98.7).	(7) If you measure the concentration of any CO_2 quantity for reporting, you must use an appropriate standard method published by a consensus-based standards organization if such a method exists. Such methods include, but are not limited to, the following: U.S. Food and Drug Administration food-grade specifications for CO_2 (see 21 CFR 184.1240); ASTM standard E1747-95(Reapproved 2005) Standard Guide for Purity of Carbon Dioxide Used in Supercritical Fluid Applications (incorporated by reference, see §98.7); 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	We recommend using language similar to 98.444(a)(4)(i) to provide flexibility to use any appropriate consensus-based standards. The ASTM method cited by EPA is titled "Standard Guide for Purity of Carbon Dioxide Used in Supercritical Fluid Applications". It is intended for the quantification of impurities in CO_2 used for supercritical fluid extraction (requiring FDA approval) or for supercritical chromatography. Such a method will not be appropriate for its intended application to many of the industrial uses contemplated under this subpart, i.e. quantifying CO_2 in EOR or GS streams. ASTM E1747-95 should not be required in all cases. The method measures impurities in purified CO2 for compliance with Food and Drug Administration requirements.

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	Dioxide by Gas Chromatography"	The method is not appropriate for most industrial CO2 uses. EPA should amend the citation in 98.7 (39) to remove the reference to ASTM E1747 – 95(2005) and replace it with references to more applicable standards as shown.. EPA should also specify that, similarly to the citation of other standards, reporters may use more recent versions of published standards in accordance with industry practices and available instrumentation.
(8) You must determine the transferred CO_2 concentration and flow quarterly.	(8) You must determine the ~~transferred~~ CO_2 concentration and flow of the CO_2 streams received from sources outside the facility quarterly.	This provision should be revised to adopt consistent terminology.
(9) You must sample the injected CO_2 concentration and calculate the flow quarterly.	(9) You must sample ~~the injected CO_2 concentration~~ and determine the CO_2 concentration of the CO_2 stream injected into the subsurface and calculate the flow quarterly.	There is no indication in the wording of the rule or in the preamble of whether multiple samples taken during a quarter should be averaged to obtain the quarterly CO2 concentration for reporting purposes. We presume that to be the case but ask for confirmation in the response to comments. It makes sense to average multiple data points to arrive at the most representative number. We recommend use of an arithmetic mean.

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(10) You must use the same calculation methodology throughout a reporting period unless you provide a written explanation of why a change in methodology was required.		We understand that this would include the use of averaging as appropriate to arrive at quarterly numbers.
(11) If you measure the flow of the CO_2 transferred or injected with a volumetric flow meter, you shall convert all measured volumes of carbon dioxide to the following standard industry temperature and pressure conditions for use in equations RR-2 and RR-5: standard cubic meters at a temperature of 60 degrees Fahrenheit and at an absolute pressure of 1 atmosphere.	(11) If you measure the flow of the CO_2 ~~transferred~~ received or injected with a volumetric flow meter, you shall convert all measured volumes of carbon dioxide to the following standard industry temperature and pressure conditions for use in equations RR-2 and RR-5: standard cubic meters at a temperature of 60 degrees Fahrenheit and at an absolute pressure of 1 atmosphere.	We support EPA's specification of industry standard conditions in subpart RR and requests that EPA clear up potential confusion with other subparts by re-stating that the same industry standard conditions (60F and 1 atmosphere) should be used for all flow and concentration measurements for all subparts of the MRR, including subpart RR. Such an approach is consistent with industry measurement standards cited by EPA throughout the MRR and it will minimize the burden of recalculation and inadvertent quantification errors. At the same time, EPA needs to understand that, in practice many states specify reporting pressure and temperature standards (see attached IOGCC summary of reporting requirements – Note that, although this document specifically addresses natural gas, it is also applied to CO_2 volumes reported to state regulatory entities). The units are generally in

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		thousands of cubic feet. Consequently, the volume numbers reported to EPA under subpart RR will appear in some cases to disagree with volumes reported to state agencies under the UIC program for the same facilities and time periods. Numbers reported on a mass basis will be the same. Accordingly, EPA should consider carefully whether it makes sense to publish reported volumes along with mass numbers. Whenever volumes are published, EPA should include a qualifier to note that wherever reported volumes appear to be different under different programs, these differences may only represent different standardization requirements that apply under the respective reporting regimes. EPA should address this issue in the preamble to the rule and further recognize that state reporting requirements are linked not only to operations reporting but also to reporting for tax purposes.
(b) GS facilities must additionally submit an MRV plan to EPA, receive approval from EPA, and adhere to the requirements and procedures in paragraph (b) of this		

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section.		
(1) You must adhere to paragraphs (a)(1) through (a)(11) of this section.		
(2) For reporters who are not required to report the quantity of CO_2 emitted as fugitive or vented emissions from surface equipment at the injection site under subpart W of this part, and are thereby required to report fugitive and vented emissions from surface equipment under this subpart, monitoring and QA/QC requirements for these data should be followed in accordance with procedures specified in subpart W of this part.		
(3) The point of measurement for the quantity of CO_2 produced from oil or natural gas production wells at the GS facility is a flow meter directly downstream of each separator that sends a stream of gas into a recycle or end use system.		
(4) The point of measurement for the concentration of the stream of CO_2 produced is directly downstream of each separator that sends a stream of gas into a recycle or end use system.		Sampling for purposes of establishing CO2 concentration levels should occur either upstream between the separator and this meter or downstream of this meter even if individual wells are fitted with separate flow meters. It would be unnecessarily difficult and costly to attempt to obtain

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		concentration levels at individual wells. Obtaining the concentration after the stream exits the separator should be sufficient to be representative if there are no further actions designed to alter that concentration.
(5) You must sample the produced CO_2 concentration and flow quarterly.		We understand the term "produced CO2" to be the CO2 that is separated out of an oil or gas stream for recycle or for an end use as CO2. We do not understand this term to mean the CO2 that may remain in any oil, gas, or other stream sent off site for end use.
(6) A reporter must follow the procedures outlined in the most recent MRV plan submitted to and approved by EPA to determine the quantity of CO_2 emitted from the subsurface geologic formation and the percent of CO_2 that is estimated to remain with the produced oil and natural gas.		
(c) For 2011, a facility that is subject to this rule only because of a CO_2 injection well(s) that does not meet the definition of GS facility in §98.440(c) may follow the provisions of §98.3(d)(1) through (3) for best available monitoring methods rather than follow the monitoring requirements of		

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this section. For purposes of this subpart, any reference to the year 2010 in §98.3(d)(1) through (3) shall mean 2011.		
(d) All flow meters must be operated continuously.	(d) All flow meters must be operated continuously except as necessary for maintenance and calibration.	The rule should recognize the need to allow for responding to failures, maintenance and calibration.
(e) If you measure the flow of the CO_2 produced with a volumetric flow meter, you shall convert all measured volumes of carbon dioxide to the following standard industry temperature and pressure conditions for use in equation RR-8: standard cubic meters at a temperature of 60 degrees Fahrenheit and at an absolute pressure of 1 atmosphere.		We support EPA's specification of industry standard conditions in subpart RR and requests that EPA clear up potential confusion with other subparts by re-stating that the same industry standard conditions (60F and 1 atmosphere) should be used for all flow and concentration measurements for all subparts of the MRR, including subpart RR. Such an approach is consistent with industry measurement standards cited by EPA throughout the MRR and it will minimize the burden of recalculation and inadvertent quantification errors. At the same time, EPA needs to understand that, in practice many states specify reporting pressure and temperature standards (see attached IOGCC summary of reporting requirements – Note that, although this document specifically addresses natural gas, it is also applied to CO_2 volumes reported to state regulatory

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		entities). The units are generally in thousands of cubic feet. Consequently, the volume numbers reported to EPA under subpart RR will appear in some cases to disagree with volumes reported to state agencies under the UIC program for the same facilities and time periods. Numbers reported on a mass basis will be the same. Accordingly, EPA should consider carefully whether it makes sense to publish reported volumes along with mass numbers. Whenever volumes are published, EPA should include a qualifier to note that wherever reported volumes appear to be different under different programs, these differences may only represent different standardization requirements that apply under the respective reporting regimes. EPA should address this issue in the preamble to the rule and further recognize that state reporting requirements are linked not only to operations reporting but also to reporting for tax purposes.
§98.445 Procedures for estimating missing data. (a) A complete record of all measured		The approved MVR plan may deal with any need for tailoring these procedures on a site-specific basis. If you follow the

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parameters used in the GHG quantities calculations is required. Whenever the quality assurance procedures for all facilities covered under this subpart cannot be followed to measure flow and concentration, the most appropriate of the following missing data procedures must be followed if EPA has not specified a preferred procedure: (1) A quarterly quantity of CO2 injected that is missing must be estimated using the quantity of CO2 injected from the nearest previous period of time at a similar injection pressure. (2) A quarterly quantity of new CO2 transferred onto the facility from offsite that is missing must be estimated using the quantity of new CO2 flow based on supplier data or supplier-operated flow meters. (3) A quarterly concentration value that is missing must be estimated using a concentration value from the nearest previous time period. (b) A complete record of all measured parameters used in the GHG quantities calculations is required. Whenever the quality assurance procedures for facilities		approved plan you will cover all the reporting needs and can reach agreement with EPA on appropriate procedures for estimating data.

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conducting GS cannot be followed, the most appropriate of the following missing data procedures must be followed: (1) For any values associated with fugitive or vented CO2 emissions from surface equipment at the facility that are reported in this supbart, missing data estimation procedures should be followed in accordance with those specified in subpart W of this part. (2) The annual quantity of CO2 produced from the subsurface geologic formation that is missing must be estimated according to the following: (i) If an applicable procedure was included in the reporter's MRV plan submitted to EPA, that procedure must be applied. (ii) If the procedure included in the reporter's MRV plan is not applicable, or if the reporter did not include a procedure in the MRV plan, the reporter must estimate annual quantity of CO2 produced by subtracting the annual quantity of CO2 transferred onsite from offsite from the annual quantity of CO2 injected. (3) The annual quantity of CO2 emitted from the subsurface geologic formation must be estimated following the procedure		

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included in the reporter's MRV plan submitted to EPA. (4) All other missing data procedures as outlined in your approved MRV plan must be followed.		
§98.446 Data reporting requirements. In addition to the information required by §98.3(c), report the information listed in this section. Facilities that are subject to this rule only because of CO_2 injection wells and that do not meet the definition of GS facility in §98.440(c) do not report the information in §98.3(c)(4).	§98.446 Data reporting requirements. In addition to the information required by §98.3(c), report the information listed in this section. Facilities that are subject to ~~this rule~~ part 98 only because of CO_2 injection wells and that do not meet the definition of GS facility in §98.440(c) do not report the information in §98.3(c)(4).	§98.3(c)(4) For facilities, report annual emissions of CO2, CH4, N2O, and each fluorinated GHG (as defined in § 98.6) as follows: (i) Annual emissions (excluding biogenic CO2) aggregated for all GHG from all applicable source categories in subparts C through JJ of this part and expressed in metric tons of CO2e calculated using Equation A–1 of this subpart. (ii) Annual emissions of biogenic CO2 aggregated for all applicable source categories in subparts C through JJ of this part. (iii) Annual emissions from each applicable source category in subparts C through JJ of this part, expressed in metric tons of each GHG listed in paragraphs (c)(4)(iii)(A) through (c)(4)(iii)(E) of this section. (A) Biogenic CO2. (B) CO2 (excluding biogenic CO2). (C) CH4.

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		(D) N2O. (E) Each fluorinated GHG (including those not listed in Table A–1 of this subpart). (iv) Emissions and other data for individual units. processes, activities, and operations as specified in the ''Data reporting requirements'' section of each applicable subpart of this part.
(a) For each transfer point flow meter (mass or volumetric), report: (1) **CO_2 quantity transferred onsite** (metric tons or standard cubic meters, as appropriate) in each quarter. (2) **CO_2 concentration** in flow (volume or wt. % CO_2/100) in each quarter. (3) If a volumetric flow meter is used, **volumetric flow rate** at standard conditions (standard cubic meters) in each quarter. (4) If a mass flow meter is used, mass flow rate (metric tons) in each quarter. (5) The standard used to calculate each value in paragraphs (a)(1) through (a)(4) of this section. (6) The number of times in the reporting year for which substitute data procedures were used to calculate values reported in paragraphs (a)(1) through (a)(4) of this	(a) For each custody transfer point flow meter (mass or volumetric) for CO_2 streams received from sources outside the facility, report: (1) CO_2 quantity ~~transferred onsite~~ received (metric tons or standard cubic meters, as appropriate) in each quarter. (2) CO_2 concentration in flow (volume or wt. % CO_2/100) in each quarter. (3) If a volumetric flow meter is used, volumetric flow rate at standard conditions (standard cubic meters) in each quarter. (4) If a mass flow meter is used, mass flow rate (metric tons) in each quarter. (5) The standard used to calculate each value in paragraphs (a)(1) through (a)(4) of this section. (6) The number of times in the reporting year for which substitute data procedures were used to calculate values reported in	Revision to adopt industry standard and consistent terminology. We do not read the requirement in (b)(2) for reporting CO2 concentration as an effort to prescribe the point at which concentration is determined. The concentration reported under this provision will be the concentration determined pursuant to § 98.444(a)(6) or (b)(4). We would appreciate receiving confirmation of this understanding in the response to comments.

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section.	paragraphs (a)(1) through (a)(4) of this section.	
(b) For each **injection** flow meter (mass or volumetric), report: (1) CO2 quantity injected (metric tons or standard cubic meters) in each quarter. (2) CO_2 concentration in flow (volume or wt.% CO_2/100) in each quarter. (3) If a volumetric flow meter is used, volumetric flow rate at standard conditions (standard cubic meters) in each quarter. (4) If a mass flow meter is used, mass flow rate (metric tons) in each quarter. (5) The standard used to calculate each value in paragraphs (b)(1) through (b)(4) of this section. (6) The number of times in the reporting year for which substitute data procedures were used to calculate values reported in paragraphs (b)(1) through (b)(4) of this section.		We do not read the requirement in (b)(2) for reporting CO2 concentration as an effort to prescribe the point at which concentration is determined. The concentration reported under this provision will be the concentration determined pursuant to § 98.444(a)(6) or (b)(4). We would appreciate receiving confirmation of this understanding in the response to comments.
(c) The **source of the supplied CO_2**, if known, according to the following categories: (1) CO_2 production wells. (2) Electric generating unit. (3) Ethanol plant. (4) Pulp and paper mill.	(c) The sources of ~~the supplied~~ each CO_2 stream received from outside the facility, if known, according to the following categories: (1) CO_2 production wells. (2) Electric generating unit. (3) Ethanol plant.	EPA's proposal would allow an operator to list sources of CO2 as ""unknown". Because source accounting will be critical toward estimating the amount and sources of sequestered anthropogenic CO2, we recommend taking steps to resist defaulting to an "unknown" category even

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(5) Natural gas processing. (6) Other anthropogenic source. (7) Unknown.	(4) Pulp and paper mill. (5) Natural gas processing. (6) Gasification operations. (7) Other specified anthropogenic sources. ~~(7) Unknown.~~ (8) Other specified natural sources.	if it becomes necessary to resort to estimating sources for CO2, such as that received through common pipelines. Identification of the anthropogenic and natural sources of CO2 will be critical for accurate accounting of CO2 emissions, emission reductions and sequestration. Therefore, EPA should eliminate the "unknown" category. Cogeneration should be included with electric generating units. For consistency, EPA should also include a category for "other specified natural sources" such as processes under development to capture atmospheric CO2.
(d) The total CO_2 received onsite (metric tons) in the reporting year as calculated in Equation RR-3.	(d) The total CO_2 received from sources outside the facility ~~onsite~~ (metric tons) in the reporting year as calculated in Equation RR-3.	We recommend this revision to provide for consistent terminology.
(e) The **total CO_2 injected** (metric tons) in the reporting year as calculated in Equation RR-6.		
(f) GS facilities must also report the following information: (1) If you do not report under subpart W of this part, report the **annual fugitive and vented CO_2 emissions from surface equipment** (metric tons) located in the GS facility under this subpart.	(f) GS facilities must also report the following information: (1) If you do not report under subpart W of this part, report the **annual fugitive and vented CO_2 emissions from surface equipment** (metric tons) located in the GS facility under this subpart.	We recommend the noted revisions to provide for consistent terminology.

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(2) Annual CO_2 mass emitted (metric tons) as **fugitive or vented emissions from equipment** located on the surface between the flow meter used to measure injection quantity and the injection wellhead. (3) Annual CO_2 mass emitted (metric tons) as **fugitive or vented emissions from equipment** located on the surface between the production wellhead and of the flow meter used to measure production quantity. (4) **For each separator** flow meter (mass or volumetric), report: (i) CO_2 quantity produced (metric tons or standard cubic meters) in each quarter. (ii) CO_2 concentration in flow (volume or wt. % CO_2/100) in each quarter. (5) For each separator volumetric flow meter, volumetric flow rate at standard conditions (standard cubic meters) in each quarter. (6) For each separator mass flow meter, mass flow rate (metric tons) in each quarter. (7) The **standard used to calculate** each value in paragraphs (f)(4) through (f)(6) of this section. (8) The number of times in the reporting year for which substitute data procedures	(2) Annual CO_2 mass emitted (metric tons) as **fugitive or vented emissions from equipment** located on the surface between the flow meter used to measure injection quantity and the injection wellhead. (3) Annual CO_2 mass emitted (metric tons) as **fugitive or vented emissions from equipment** located on the surface between the production wellhead and of the flow meter used to measure production quantity. (4) **For each separator** flow meter (mass or volumetric), report: (i) CO_2 quantity produced (metric tons or standard cubic meters) in each quarter. (ii) CO_2 concentration in flow (volume or wt. % CO_2/100) in each quarter. (5) For each separator volumetric flow meter, volumetric flow rate at standard conditions (standard cubic meters) in each quarter. (6) For each separator mass flow meter, mass flow rate (metric tons) in each quarter. (7) The **standard used to calculate** each value in paragraphs (f)(4) through (f)(6) of this section. (8) The number of times in the reporting year for which substitute data procedures	

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were used to calculate values reported in paragraphs (f)(4) through (f)(6) of this section. (9) The value for X (%) used in Equation RR-9 and as determined in your MRV plan. (10) Annual CO2 produced in the reporting year as calculated in Equation RR-9. (11) For each leakage pathway, report the CO2 (metric tons) emitted through that pathway in the reporting year. (12) Annual CO_2 mass emitted (metric tons) from the subsurface geologic formation at the facility in the reporting year as calculated by Equation RR-10. (13) Annual CO_2 (metric tons) sequestered in the subsurface geologic formation in the reporting year as calculated by Equation RR-11 or RR-12. (14) Cumulative mass of CO_2 reported as sequestered in the subsurface geologic formation in all years since you began reporting. (15) Date that the most recent MRV plan was approved and the MRV plan approval number that was issued by EPA. (16) Whether any of the MRV plan resubmissions scenarios were triggered in	were used to calculate values reported in paragraphs (f)(4) through (f)(6) of this section. (9) The value for X (%) used in Equation RR-9 and as determined in your MRV plan. (10) Annual CO2 produced in the reporting year as calculated in Equation RR-9. (11) For each separately distinguishable leakage pathway, report the CO2 (metric tons) emitted through that pathway in the reporting year. (12) Annual CO_2 mass emitted (metric tons) ~~from the subsurface geologic formation~~ by leakage at the facility in the reporting year as calculated by Equation RR-10. (13) Annual CO_2 (metric tons) sequestered in the subsurface geologic formation in the reporting year as calculated by Equation RR-11 or RR-12. (14) Cumulative mass of CO_2 reported as sequestered in the subsurface geologic formation in all years since you began reporting. (15) Date that the most recent MRV plan was approved and the MRV plan approval number that was issued by EPA.	

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the reporting year such that you must submit a new MRV plan in the following year. (17) If the well is permitted by an Underground Injection Control permitting authority, for each injection well, report: (i) The **well ID number** used for the Underground Injection Control permit. (ii) The Underground Injection Control **permit class.** (18) Any other reporting requirement that is specified in your MRV plan.	(16) Whether any of the MRV plan resubmissions scenarios were triggered in the reporting year such that you must submit a new MRV plan in the following year. (17) If the well is permitted by an Underground Injection Control permitting authority, for each injection well, report: (i) The **well ID number** used for the Underground Injection Control permit. (ii) The Underground Injection Control **permit class.** (18) Any other reporting requirement that is specified in your MRV plan.	
§98.447 Records that must be retained. In addition to the records required by §98.3(g), you must retain the records specified in paragraphs (a) through (c) of this section, as applicable. (a) You must retain quarterly records of injected CO_2 and CO_2 transferred onto the facility from offsite sources, including mass flow or volumetric flow at standard conditions and operating conditions, operating temperature and pressure, and concentration of these streams. (b) GS facilities must retain: (1) Quarterly records of produced CO_2, if		No comment

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applicable, including mass flow or volumetric flow at standard conditions and operating conditions, operating temperature and pressure, and concentration of these streams. (2) Annual records of the emitted CO_2 from subsurface geologic formation leakage pathways. (3) Any other records as outlined for retention in your MRV plan.		
§98.448 Geologic Sequestration Monitoring, Reporting, and Verification (MRV) Plan. (a) A GS facility as defined in §98.440(c) of this subpart must follow the procedures outlined in this section to develop a monitoring, reporting, and verification (MRV) plan, submit it to EPA, receive approval from EPA on the plan, implement the plan, and submit annual report addenda.		No comment
(1) You must develop an MRV plan that contains the following components.		No comment
(i) An assessment of the risk of leakage of CO2 to the surface.	(i) An assessment of the risk of leakage of CO2 ~~to the surface.~~	"Leakage" is defined to include the element of "to the surface".
(ii) A strategy for detecting and quantifying any CO2 leakage to the surface.	(ii) A strategy for detecting and quantifying any CO2 leakage ~~to the surface~~.	"Leakage" is defined to include the element of "to the surface".

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(iii) A strategy for establishing pre-injection environmental baselines.		
(iv) Summary of considerations made to calculate site-specific variables for the **mass balance equation.**		
	(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.	
(2) A facility that injects CO2 to enhance the recovery of oil or natural gas or a facility that is not required to report as a GS facility can voluntarily submit the MRV plan to EPA at any time.		
(3) A GS facility that does not inject CO2 to enhance the recovery of oil or natural gas must submit the MRV plan on the following schedule.		
(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 (or relevant permitting authority in the case of a facility that is not under the jurisdiction	(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	Confirmation of the area of review only comes with final permit approval. The recommended language should be included to clarify that there is no intention to create an additional step that would precede the issuance of a final permit along with

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of the Safe Drinking Water Act) confirms the area of review or (B) by December 31 of the year that that 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) confirms the area of review, whichever date is later. A facility will be allowed to request one extension of up to an additional six months.	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.	responses to comments received on the proposed permit.
(ii) If the GS facility holds an 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) 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 confirmed 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	(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~~ confirming ~~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	Agencies have "jurisdiction"; statutes have applicability. The recommended change would clarify this. In addition, because the area of review will not be finally confirmed until a final permit is issued, the indicated revision should be made to avoid suggesting that some alternative "confirmation" could be issued prior to the issuance of a final permit. If the permitting agency does not approve an area of review as part of its permitting process, then the area of review will be approved as part of the MRV approval process.

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be allowed to request one extension of up to an additional six months.	be allowed to request one extension of up to an additional six months.	
(4) If you are using an Underground Injection Control Class VI permit to demonstrate that MRV plan requirements 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.	(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.	We recommend this revision to recognize that neither UIC permits nor MRV plans incorporated in UIC permits are required to address the leakage considerations set forth in this subpart. Compliance with this subpart should require review of whether an MRV plan is adequate to assure that leakage is not occurring and to quantify whatever leakage does occur. At the same time, we recommend an explicit revision 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. EPA should also recognize in its final rule preamble 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. There should be a recognition that the most effective manner for protecting USDWs will be ensuring that the injected CO2 stream and displaced formation fluids are fully contained within

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		the injection and confining zones and that it is possible that the monitoring methods and procedures adopted under the UIC permit -- along with additional monitoring procedures already being implemented whether or not required for UIC purposes -- could be sufficient to fully satisfy the MRV requirements of this subpart. This determination must be made on a case-by-case basis and MRV plans will need to be modified to demonstrate compliance with the MRV plan requirements of this subpart. We further recommend deleting the reference to Class VI because there may be GS wells permitted in other classes. Indeed, the MSD Recommendations submitted to the EPA UIC Program on December 23, 2008; May 14, 2009; and October 9, 2009 specifically call for GS wells to be permitted under Class II and Class V for GS operations in oil and gas reservoirs (Class II) and in basalts, coal beds, salt caverns or shales (Class V) until EPA decides specifically how GS in those other types of formations should be addressed.

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(5) Upon MRV plan submission, the following approval process will apply.		
(i) On a case-by-case basis, EPA will determine if the submitted MRV plan is complete, and evaluate the MRV plan to ensure that the facility has an appropriate strategy in place to effectively quantify geologically sequestered CO2.		
(ii) You must implement the EPA-approved MRV plan once the plan is final, regardless of the point in the reporting year.		
(6) If adjustments to the MRV plan are made due to new information or altered site conditions or if a leak 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.	(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.	The recommended modifications convert this provision to being exclusively based on leakage, with the provisions of (7) addressing all other bases for updating the MRV.
(i) A description of the leak including all assumptions, methodology, and technologies involved in leakage detection and quantification, if a leak was detected.	(i) A description of the leakage including all assumptions, methodology, and technologies involved in leakage detection and quantification~~, if a leak was detected~~.	Because "leakage" is the defined term, it should be used consistently in this subpart RR.
(ii) A description of how the monitoring strategy was adjusted, if adjustments were made.	(ii) A description of how the monitoring strategy was adjusted, if adjustments were made in response to the leakage.	The recommended revision clarifies the language now that this provision is based solely on leakage.
(7) The MRV plan must be revised and	(7) You must maintain, and update the	The recommended revision is based on the

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resubmitted to EPA by March 31 of the calendar year following any of the following events.	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	MSD recommendations submitted to EPA's UIC program for revision of the proposed GS rules under the SDWA. We recommend imposing a continual obligation on operators to assess whether the AoR itself, the AoR and corrective action plan and all other plans required by the rule should be revised, requiring an annual statement that the operator has reviewed the circumstances (including operating and monitoring data) during the preceding year to determine whether these circumstances warranted a revision of the AoR and any plans, and requiring that revisions be done when required by the director as well as when the operator determines that conditions warrant. To accomplish this, it is useful to break down the concept of "reevaluation" into two ideas – "assessment" of the need to revise the AoR and all plans and the actual process of "revision." We believe that 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. Moreover, a continuous

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		obligation to assess whether revisions are needed, when coupled with an annual statement requirement will create a clear accountability trail for both operator and director in case of disputes. Given this annual review process, we believe it is unnecessary to require a reevaluation on a fixed basis in every case. An annual reporting statement requirement can also be used to enhance the ability of both director and operators to keep track of which plans require updating and whether or not plans that ought to be updated have in fact been revised. Such a shared understanding is essential if there is to be the "ongoing dialogue" between regulators and operators that the RRC anticipates. This is based on MSD Recommendation Letters dated May 14, 2009 and October 9, 2009 (copies attached).
(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).	~~(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).~~	This is too broad and misdirected. Many types of noncompliance with permit requirements can occur that will have no effect on the MRV plan (e.g., failure to have wellhead painted). The recommended revisions to (7)(ii)(A) are

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		sufficient to address any event that would trigger a need to update the MRV plan.
(ii) An EPA audit conducted under the verification procedures of this part determines it to be necessary.	(B) An EPA audit conducted under the verification procedures of this part determines an update of the MRV plan to be necessary.	
(8) An MRV plan may be resubmitted in any reporting year on a reporter's own volition.		No comment
(9) Each MRV plan and annual report addendum must be submitted electronically in a format specified by the Administrator.		No comment
(b) [Reserved]		
§98.449 Definitions. All terms used in this subpart have the same meaning given in the Clean Air Act and subpart A of this part.	§98.449 Definitions. All terms used in this subpart have the same meaning given in the Clean Air Act and subpart A of this part. All terms used in this subpart in connection with the underground injection control program have the same meaning given in the Safe Drinking Water Act and the underground injection control regulations in 40 CFR Parts 144 through 147.	We recommend this revision to provide for proper understanding and application of the UIC program terms. This cross-reference will avoid the need for including in this rule similar definitions of those terms that would need to be updated anytime the same definitions are revised under the UIC program.
	CO2 capture means the initial separation and removal of a CO2 stream from a manufacturing process, flue gas, a fuel source or any other process for purposes of	Taken from § 98.420(a)(1) definition of Subpart PP CO2 supplier category. 74 Fed. Reg. 56260, 56506 (October 30, 2009). Although we read this to indicate

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	supplying CO2 for commercial applications or to maintain custody of a CO2 stream in order to sequester or otherwise inject it underground.	that "any other process" would include flue gas and fuel sources, we recommend including these words in the definition because these are among the most likely sources of CO2 streams, and we think it is important to avoid any questions about applicability.
	CO2 production means using wells to extract or produce a CO2 stream for purposes of supplying CO2 for commercial applications or to extract and maintain custody of a CO2 stream in order to sequester or otherwise inject it underground.	Taken from § 98.420(a)(2) definition of Subpart PP CO2 supplier category. 74 Fed. Reg. 56260, 56506 (October 30, 2009).
Leakage means the movement of CO_2 from the injection zone to the surface, including to the atmosphere, indoor air, oceans or surface water.	*Leakage* means the movement of CO_2 from the injection zone to the surface~~, including~~ and into the atmosphere, indoor air, oceans or surface water.	We recommend this revision to clarify that leakage only occurs where the CO2 is not recaptured before entering the atmosphere, indoor air, oceans or surface water. This is consistent with the preamble statement on page 18591: "For the purposes of this proposed rule, CO2 leakage to the surface includes CO2 emitted to the atmosphere, CO2 emitted to the ocean from the sub-seabed, CO2 emitted to surface water, and CO2 emitted to indoor air environments." 75 Fed. Reg. 18576, 18591 (April 12, 2010).
Research and development means, for the	*Research and development* means, for the	Background: Under § 98.2 "Who must

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purposes of geologic sequestration facility requirements in this subpart, those projects receiving Federal funding 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 that are neither demonstration nor commercial projects.	purposes of geologic sequestration facility requirements in this subpart, ~~those~~ projects ~~receiving Federal~~ injecting a total of less than 25,000 tons of CO2 per year ~~funding~~ 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 that are neither demonstration nor commercial projects. Any research and development project may choose to report in accordance with this subpart to obtain verification of quantities of CO2 sequestered.	report?" (a)(5) Research and development activities are not considered to be part of any source category defined in this part. All large scale projects should be subject to the reporting requirements to allow EPA and others to learn from this reporting. In addition, all research projects injecting a total of less than 25,000 tons of CO2 per year should be exempted because collecting data from these projects will yield little value and will add disproportionately to project costs at a time when research into the methods and potential sites should be encouraged.
Separator means a vessel in which streams of multiple phases are gravity separated into individual streams of single phase.		No comment
	Subsurface testing and characterization activities means the injection of up to 25,000 tons of CO2 or a CO2 stream to assist in identifying, evaluating or characterizing a potential site to be used for geologic sequestration or for enhanced recovery of oil or natural gas. EPA may designate an injection of CO2 that exceeds 25,000 tons of CO2 as subsurface testing and characterization activities upon a site-	The source category should exclude the injection of CO2 or CO2 streams that will help to identify and characterize appropriate sites for geologic sequestration and/or enhanced recovery of oil or natural gas. These activities will be necessary in many cases to assist with the proper siting of these operations and should be encouraged to be conducted without the potential added expense of reporting all of

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	specific demonstration that such activity is necessary, conducted solely for site selection or characterization and will not result in leakage of CO2.	the information required by this subpart. We included a presumptive cutoff of 25,000 total tons injected and a waiver provision to allow for site testing and characterization activities that exceed this mass of CO2 injection with appropriate demonstration that the activities are solely for such purposes and will not cause leakage.
	Underground Injection Control permit means a permit issued EPA or a State pursuant to the applicable Underground Injection Control program as defined in section 1422(d) of the Safe Drinking Water Act, 42 USC §§300h–1.	For clarification purposes, the rule should include definitions of "Underground Injection Control permit" and "Underground Injection Control program."
	Underground Injection Control program means the program established or approved by EPA pursuant to sections 1421 through 1425 of the Safe Drinking Water Act, 42 USC §§300h – 300h-4. The applicable Underground Injection Control program with respect to a State is defined in section 1422(d) of the Safe Drinking Water Act, 42 USC §§300h–1.	For clarification purposes, the rule should include definitions of "Underground Injection Control permit" and "Underground Injection Control program."
		Note that § 98.426(f) already requires suppliers to report quantities supplied to various types of destinations.

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		(f) Report the aggregated annual quantity of CO2 in metric tons that is transferred to each of the following end use applications, if known: (1) Food and beverage. (2) Industrial and municipal water/wastewater treatment. (3) Metal fabrication, including welding and cutting. (4) Greenhouse uses for plant growth. (5) Fumigants (e.g., grain storage) and herbicides. (6) Pulp and paper. (7) Cleaning and solvent use. (8) Fire fighting. (9) Transportation and storage of explosives. (10) Enhanced oil and natural gas recovery. (11) Long-term storage (sequestration). (12) Research and development. (13) Other.
		One question raised during our discussions concerned whether injection of CO2 into a geologic formation such as a CO2 dome for temporary storage would result in double counting if the CO2 is subsequently

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		extracted and delivered for some end use. Subpart PP excludes "Storage of CO2 above ground or in geologic formations" from the source category. 40 CFR §98.420(b)(1), 74 Fed. Reg. 56260, 56506 (October 30, 2009). And proposed subpart RR excludes "Temporary storage of CO2 below ground." §98.440(d)(2), 75 Fed. Reg. 18576, 18600 (April 12, 2010). From these provisions, we concluded that injection of CO2 into a geologic formation such as a CO2 dome for subsequent production and use or for subsequent GS should not be reported under subpart RR in order to avoid double counting. We include this comment here for the specific purpose of obtaining EPA's concurrence in our conclusion in EPA's response to the comments received on this proposed rule.