



Underground Injection Control (UIC) Class VI Program

Summary of EPA's Responses to Public Comments Received on the Class VI Well Project Plan Development Guidance

May 2012

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Comments were made on various sections of the Guidance. The table below summarizes the types of comments received.

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Please note that this document is intended to be a summary of the comments presented; while attempts were made to capture all commenter arguments and suggestions which require a response by EPA, every individual comment may not be included in this condensed document.

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General Comments on Guidance

#	Commenter	Comment	EPA Response
1	NGOs	<p>1. EPA should include specific discussions and guidance, where appropriate, for cases where sequestration is taking place in hydrocarbon reservoirs or in conjunction with Enhanced Oil Recovery.</p> <p>Sequestration in hydrocarbon reservoirs or in conjunction with Enhanced Oil Recovery is underrepresented or missing in the draft guidances. EPA should anticipate and discuss the special circumstances present in these fields and include guidance text accordingly. Areas where those reservoirs merit special discussion include, for example:</p> <ul style="list-style-type: none"> • Draft Site Characterization and Planning guidance: Where substantial information already exists on the subsurface reservoir and area of review (AOR), EPA should discuss methods to undertake appropriate reservoir characterization. Conversely, in some EOR fields, more work may be needed relative to saline reservoirs to determine the mechanical condition of the reservoir and geological seal(s) following many years of water or gas flooding. In oil and gas fields emphasis should focus on identifying old recorded and unrecorded wellbores that may be inadequately plugged and abandoned could lead to leakage without corrective action. Withdrawal of hydrocarbons or previous enhanced recovery techniques such as water or CO2 flooding may have adversely impacted the geochemical and mechanical characteristics of the injection site as a repository for CO2. 	<p>EPA agrees with the need for specific guidance in instances where sequestration takes place in hydrocarbon reservoirs or in conjunction with EOR. Section 2.1.5 “How corrective action will be conducted” of the Guidance clarifies that older/well-developed oil and gas fields may have a significant number of wells to be addressed. Further, EPA is developing a guidance specifically to address wells transitioning from Class II to Class VI.</p>
2	API	<p>The Guidance is ambiguous regarding how an operator would add a procedure that was not in one of the original plans.</p>	<p>EPA clarifies that addition of new procedures would be part of the plan update process.</p> <p>To address this comment, EPA added specific recommendations to the sections about amending the plans (2.3, 3.3, etc.) that any new procedures should be described and, if necessary, approved.</p>
3	NGOs	<p>We support the recommendation to revise or adjust portions of the project plans as additional data become available during the site characterization process. We also support the recommendation that the owner or operator revisit and revise the operational-phase plans (e.g., the AoR and Corrective Action Plan, Testing and Monitoring Plan, and Emergency and Remedial Response Plan) as necessary once the AoR modeling has been completed. We also agree with the notion that exceeding the rule’s minimum</p>	<p>EPA acknowledges the comments on the Guidance provided by the group of NGOs. See EPA’s responses to specific comments below.</p>

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		<p>requirements may facilitate safer, cheaper and faster administration and project operation in the future. However, we offer the following technical comments (referencing Sections – appendices should also be amended accordingly):</p>	
4	C12	<p>p. ix lines 5-9 Permit Modification should be required only if the Area of Review changes. The Area of Review (AoR) drives all aspects of the Class VI regulatory process. The AoR encompasses the “region surrounding the geologic sequestration project where USDWs may be endangered by the injection activity.”¹⁰ The AoR establishes the area in which:</p> <ul style="list-style-type: none"> • Leakage pathways must be identified and corrected; • Geologic formations and geochemical data must be analyzed; and • Monitoring must be carried out. <p>As explained in C12 Energy’s comments on the Area of Review Guidance: USDWs will not be adequately protected, unless the [Area of Review Guidance] specifies that:</p> <p>a) AoR reevaluation is required when site operations, monitoring results, and/or site characterization data, as incorporated into the ongoing flow models for the project, indicate that the MESPOP differs from that in the original permit application.</p> <p>If ongoing modeling incorporating the information gleaned once injection commences suggests that the initial MESPOP, which defines the boundary of the AoR, has changed, the AoR would be required to be re-evaluated. By doing so, the Guidance will emphasize the importance of getting the boundary right at the start, and will ensure that the AoR is reevaluated when monitoring and operational conditions warrant. Such a clear-cut requirement also greatly reduces the ambiguity in the Area of Review Guidance as currently drafted. It is far from clear what is meant by “significant changes in site operations,” “monitoring results ... differ significantly from model predictions,” and “new site characterization data ... significantly change[s] model predictions” as set forth in the draft version of the Guidance. However, the determination of whether a MESPOP has changed is clear, and ensures that the AoR is reevaluated at appropriate times. ¹¹In other words, the AoR should include the MESPOP (Maximum Extent of the Separate-Phase Plume Or Pressure Front), which is defined as:</p>	<p>EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period. EPA will address this comment in detail in responses to comments on “Class VI Well Area of Review Evaluation & Corrective Action Guidance for Owners & Operators.”</p>

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		<p>The area encompassing the pressure front, and the maximum extent of the CO2 plume determined by modeling plume migration to the point in time when all CO2 is either buoyantly trapped, residually trapped, dissolved, or mineralized. 12If the MESPOP changes (i.e., if the CO2 plume or the pressure front is project to migrate to an area where it was not previously forecast to go), then the AoR must be amended. And if that occurs, all other plans must likewise be amended to address any issues raised by the amended AoR.</p> <p>By following this approach, EPA would incent parties to ‘get the AoR right’ the first time, and thereby provide the greatest protection to USDWs. As noted in our comments on the Area of Review Guidance, “unless we know the potential plume area into the foreseeable future, there is no way to guarantee that the plume will not encounter a leakage pathway at some point in the future for, once the CO2 is in the subsurface, there is no stopping its migration.” 13 It would also greatly reduce regulatory uncertainty as a CO2 operator would have confidence that the Class VI permit would remain in place as long as the AoR did not change. Such certainty would encourage good site selection and careful analysis at the outset of a project – activities that are absolutely critical to ensuring the safety of CO2 storage projects – while minimizing the transaction costs associated with Class VI permits. Such an approach would not interfere with the periodic 5-year review requirement as set forth in the UIC Rules.</p> <p>11 See C12 Comments on Area of Review Guidance, Section 2.1. 12 See C12 Comments on Area of Review Guidance, Section 2.1.2(a). 13 See C12 Comments on Area of Review Guidance, Section 1.</p>	
5	AEP	<p>AEP recommends that EPA consider an approach to consolidate permits for individual wells permitted within the same storage facility. A well by well approval process may lead to costly and duplicative efforts for no apparent benefit for wells within a similar geologic structure and formation. EPA should consider guidance for an approval process for "area wells."</p>	<p>Area permits are not allowed for Class VI wells, as specified in the Class VI Rule at 40 CFR 144.33(a)(5). EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period.</p> <p>To address this comment, EPA added language to Section 1.1 of the Guidance on how owners or operators can realize efficiencies where certain aspects of multiple wells/projects are common (e.g., identical construction).</p>
6	C12	<p>To ensure consistency across the guidance documents and thus efficiency in permitting:</p>	<p>EPA believes that, given the newness of the requirements for project-specific plans, a separate guidance that</p>

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		<p>a) Project Plan Guidance should be deleted.</p> <p>The Project Plan Guidance offers very little new information not otherwise addressed in the other guidance documents, while creating the potential – as illustrated above – for inconsistency among the guidance documents. The limited new information provided in the Project Plan Guidance could easily be incorporated into the other guidance documents, thus eliminating the potential for conflicts among the guidance documents and reducing the regulatory burden on permit writers and CO2 storage operators by reducing the number of documents to be reviewed.</p>	<p>addresses all of the plans together will be useful to owners or operators.</p> <p>To address this comment, EPA added language to the introductory paragraph of section 1.3 “Other Relevant Guidances” to clarify that this guidance does not attempt to discuss technical details at the level of the associated guidance documents.</p>
7	C12	<p>Alternatively, the Project Plan Guidance should be carefully scrutinized to remove any potential conflict with the other guidance documents.</p> <p>If EPA determines to keep the Project Plan Guidance, it should carefully review and revise it to ensure no conflict with other guidance documents. As currently drafted, the guidance documents present different requirements for the same activity (e.g., AoR reevaluation), which only creates confusion.¹⁹ Permit writers and CO2 storage operators should not face internally inconsistent guidance as this only leads to inefficiency in the Class VI permitting process.</p> <p>¹⁹ The problem of contradictory, or simply differing, requirements from the other guidance documents is endemic throughout the Project Plan Guidance, and warrant serious review and revision if EPA decides to retain the Project Plan Guidance.</p>	<p>To address this comment, EPA added language to the introductory paragraph of Section 1.3 “Other Relevant Guidances” to clarify that this guidance does not attempt to discuss technical details at the level of the associated guidance documents.</p>

Comments on Guidance Definitions

#	Commenter	Comment	EPA Response
1	C12	<p>pp. ix-x. The Project Plan Guidance includes a set of definitions that are inconsistent with the definitions in the other guidance documents. For example, the Project Plan Guidance includes a definition of “Corrective Action” when the Area of Review Guidance does not. In addition, the definitions are sometimes insufficient or incomplete and should be revised to ensure adequate protection of USDWs.</p> <p>All the guidance documents should be revised to have one set of consistent definitions used throughout. It is nonsensical to have different definitions in the different guidance documents.</p>	<p>EPA acknowledges C12’s concerns, and agrees that, to the degree appropriate, all guidance documents should use consistent definitions.</p> <p>To address this comment, EPA standardized the definition lists to the degree that is appropriate, and sourced them as being from the regulations or developed for the Guidance.</p>
2	CSC	<p>p. ix lines 5-9 Discussion: The definition of “area of review” as published in the final rule is confusing because it appears to define the AoR as an area outside of and “surrounding” the “geologic sequestration project” which itself is defined to encompass the entire AoR. This problem is at least tacitly recognized in the Draft Underground Injection Control (UIC) Program Class VI Well Area of Review Evaluation and Corrective Action Guidance for Owners and Operators (March 2011). In at least one place in the Executive Summary (page <i>ii</i>), that draft uses alternative terms to explain the meaning of “area of review” describing the area of review as the “region surrounding the proposed well” rather than the “region surrounding the geologic sequestration project”. This alternative language would eliminate one concern recently expressed in the MSD Letter to EPA (May 20, 2011). The same change needs to be made in the first sentence of 40 CFR 146.84(a), although we would recommend simply deleting that sentence as an unnecessary duplication. We also think it unnecessary to include the second sentence of the AoR definition, which already appears in section 146.84(a). Using the same language both places runs the risk that a future revision will lead to discordance.</p>	<p>EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period. The definition of the “area of review” is from the Class VI Rule.</p> <p>To address this comment, EPA standardized the definition lists to the degree that is appropriate, and sourced them as being from the regulations or developed for the Guidance.</p>
3	CSC	<p>p. ix lines 28-32. Discussion: The proposed definition of confining zone in §146.81(d) requires that the formation act as “a barrier” to fluid movement, which may be unnecessarily strict. The definition also fails to recognize that it is movement through and beyond the confining zone that needs to be limited. We recommend using the current UIC program definition of confining zone as preferable to the proposed definition with one revision to address the possibility that a confining zone for a particular project may be beneath the injection zone if a depth waiver is obtained. We recognize that this revision would require a change to the rule language. In the absence of</p>	<p>EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period. The definition of the “confining zone” is from the Class VI Rule.</p> <p>To address this comment, EPA standardized the definition lists to the degree that is appropriate, and sourced them as being from the regulations or developed for the Guidance.</p>

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		such a change, the Guidance should clarify the intended application of this term.	
4	C12	p. ix lines 34-36. The definition of “corrective action” should be revised as follows: Corrective action: UIC Program Director-approved methods to ensure that wells or other potential leakage pathways within the area of review do not serve as conduits for the movement of fluids into underground sources of drinking water. Limiting corrective action to “wells” would not be sufficient to protect USDWs, as faults or other pathways could provide conduits for migration between the injection zone and a USDW.	EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period. The definition of the “corrective action” is from the Class VI Rule. To address this comment, EPA standardized the definition lists to the degree that is appropriate, and sourced them as being from the regulations or developed for the Guidance.
5	CSC	p. ix lines 42-46 Discussion: The current definition [of GS project] creates some confusion as not all wells that are used to emplace a carbon dioxide stream beneath the lowermost formation containing a USDW will necessarily be geologic sequestration wells. Wells injecting a carbon dioxide stream captured from an anthropogenic source may be doing so for enhanced oil recovery through Class II wells, and such wells may be injecting beneath the lowermost USDW. To avoid this confusion, EPA should use the word “exclusively”. Moreover, we think the definition could be simplified without changing the substance. We recognize that this revision would require a change to the rule language. In the absence of such a change, the Guidance should clarify the more limited applicability of this term.	EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period. The definition for GS projects is from the Class VI Rule. To address this comment, EPA standardized the definition lists to the degree that is appropriate, and sourced them as being from the regulations or developed for the Guidance.
6	CSC	p. x lines 8-10 Discussion: Mechanical Integrity is defined as “the absence of significant leakage within the injection tubing, casing, or packer... or outside of the casing.” The Guidance should note that significant leakage is a parameter that can be further defined in the plans for the GS project.	EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period. The definition of “mechanical integrity” is from UIC regulations. Comments on what is “significant leakage” were addressed in EPA’s response to comments on the proposed rule. To address this comment, EPA standardized the definition lists to the degree that is appropriate, and sourced them as being from the regulations or developed for the Guidance.
7	AEP	p. x lines 8-10. Mechanical Integrity is defined as “the absence of significant leakage within the injection tubing, casing, or packer... or outside of the casing.” While such a definition seems instructive, use of the term, “significant” without a similar definition, can be problematic. For example, AEP recently experienced an incident at its Mountaineer AEP-2 CO2 injection well that resulted in an automatic shutdown of CO2 injection. An investigation of the system indicated no loss of mechanical integrity and	EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period. The definition of “mechanical integrity” is from UIC regulations. Comments on what is “significant leakage” were addressed in EPA’s response to comments on the proposed rule.

		<p>injection operations resumed. However, the UIC permit required that the WVDEP be notified within 24 hours if the well appeared to be lacking mechanical integrity. Mechanical integrity is defined in the permit as "no significant leak in the casing, tubing or packer." The agency was not notified because, based on an interpretation of the permit and on operating experience, it was not believed that a loss of mechanical integrity had occurred. However, due to this event and on our ongoing development of this technology, AEP requested that the WVDEP confirm our interpretation and clarify how it would define a "significant" leak in the casing, tubing or packer so that, in the event of a future occurrence, the appropriate notifications could be made.</p> <p>As it turns out, the agency agreed with our handling of the situation, but it never did clarify what it considered to be a "significant" leak. While AEP agrees that the release of minimal or de minimis amounts of CO2 should not be classified as significant and require agency notification, it would be helpful to agree on a definition of the term.</p>	<p>To address this comment, EPA standardized the definition lists to the degree that is appropriate, and sourced them as being from the regulations or developed for the Guidance.</p>
8	C12	<p>p. x lines 8-10 The definition of “mechanical integrity” should be revised to elaborate on the meaning of “significant” leakage. Mechanical integrity is currently defined as: The absence of significant leakage within the injection tubing, casing, or packer (known as internal mechanical integrity), or outside of the casing (known as external mechanical integrity).²⁴ “Significant leakage” is a subjective term that bears further definition to provide meaningful guidance.</p> <p>24 Project Plan Guidance, p. x (emphasis added).</p>	<p>EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period. The definition of “mechanical integrity” is from UIC regulations. Comments on what is “significant leakage” were addressed in EPA’s response to comments on the proposed rule.</p> <p>To address this comment, EPA standardized the definition lists to the degree that is appropriate, and sourced them as being from the regulations or developed for the Guidance.</p>
9	C12	<p>p. x lines 35-39. The definition of “site closure” should be revised to ensure protection of USDWs as follows: Site Closure: The point/time, as determined by the UIC Program Director following the requirements under §146.93, at the end of the PISC, following a demonstration that fluid movement is constrained to within the eventual MESPOP and pressures have decline to the point that there is no longer a risk of endangerment to USDWs from carbon dioxide injection activities. at which The owner or operator of a GS site is released from post-injection site care responsibilities <u>at Site Closure.</u> The current definition is not sufficient to ensure protection of USDWs.</p>	<p>EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period. The definition of “site closure” is from the Class VI Rule.</p> <p>To address this comment, EPA standardized the definition lists to the degree that is appropriate, and sourced them as being from the regulations or developed for the Guidance.</p>

Comments on Section 1

#	Commenter	Comment	EPA Response
1. Introduction			
1	CSC	p. 1 lines 9-10 Recommended Revision: submitting them to the appropriate permitting authority’s UIC Program UIC Program Director (UIC Program Director) for approval. Discussion: There is no need to use the expression “UIC Program UIC Program Director” which appears a number of times in the document. This is probably the result of a global revision gone amuck.	EPA corrected the typographical error in the Guidance.
2	CSC	p. 1 lines 36-39 Recommended Revision: Post-Injection Site Care (PISC) and Site Closure Plan. This plan describes how the owner or operator intends to monitor the site after injection has ceased, in order to ensure that the carbon dioxide plume and pressure front are moving as predicted and USDWs are not endangered. PISC monitoring results from plugged Class VI injection wells must be reported until it can be demonstrated that the site poses no further endangerment to USDWs. <u>the injected CO2 is not expected to migrate in the future in a manner likely to result in endangerment to USDWs.</u> Discussion: The use of “no further endangerment to USDWs” suggests that prior operations endangered USDWs when a project that would endanger USDWs could not be permitted. The first sentence of this statement is more appropriate, and the use of the proposed language would clarify what is intended.	EPA acknowledges comments on the Guidance from the CCS Alliance. The description of the post-injection site care plan referenced in the comment is consistent with the requirements for the end of post-injection site care at 40 CFR 146.93(b). EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period.
1.1 Overview and Need for GS Project Plans			
3	EEI	This draft Guidance emphasizes that owner/operators of Class VI wells must develop, gain approval for, and implement five project-specific plans: i) an AOR and corrective action plan; ii) a testing and monitoring plan; iii) an injection well plugging plan; iv) a post-injection site care and site closure plan; and v) an emergency and remedial response plan. <i>See</i> Project Plan Guidance at iii. Because area permits are not allowed, owners/operators must presumably provide five such plans for each well. For a site with five injection wells and three monitoring wells, the owner/operator would have to provide 40 separate plans. This would be a recipe for ensuring that Class VI wells are never used – at least not commercially. ³ ³ Existing injection demonstration projects, permitted under either Class I or Class V, have been allowed to include multiple wells in the same plans. If EPA’s intent is not to require five separate plans for each proposed well, the Guidance should be revised to make this clear.	EPA acknowledges the commenter’s concern about the work involved in developing separate plans for individual wells. EPA reemphasizes, however, that the rule prohibits area permits, and that comments on the rule are beyond the scope and intent of this Guidance comment period. Further, EPA clarifies that each of the five plans will need to be submitted for each individual injection well (i.e., permit). To address this comment, EPA added language to Section 1.1 of the Guidance on how owners or operators can realize efficiencies where certain aspects of multiple wells/projects are common (e.g., identical construction).
4	CSC	A major concern we have is with the suggestion, or at least implication, that	EPA acknowledges the commenter’s concern about the

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		<p>operators will be expected to provide five different plans – (1) an AoR and corrective action plan; (2) a testing and monitoring plan; (3) an injection well plugging plan; (4) a post-injection site care and site closure plan; and (5) an emergency and remedial response plan – for each individual well in a multi-well GS project. Since area permits are not allowed, the presumption is that owners/operators must provide five such plans for each well. Under this approach, if a site has five injection wells, the operator would be required to provide 25 plans. Not only would that be cumbersome for both the operator and the permit application reviewer, it would also be counterproductive in the ultimate effort to protect USDWs because of the potential for inconsistencies and overly narrowly focused plans. Accordingly, the Guidance should not only recognize the potential for plans to be developed on a project-wide basis, it should provide the strongest possible encouragement for Directors to use that approach.</p>	<p>work involved in developing separate plans for individual wells. EPA reemphasizes, however, that the rule prohibits area permits, and that comments on the rule are beyond the scope and intent of this Guidance comment period. Further, EPA clarifies that each of the five plans will need to be submitted for each individual injection well (i.e., permit).</p> <p>To address this comment, EPA added language to Section 1.1 of the Guidance on how owners or operators can realize efficiencies where certain aspects of multiple wells/projects are common (e.g., identical construction).</p>
5	CSC	<p>With respect to area permits, we are perplexed by the prohibition in the final rule. In its notice of proposed rulemaking, EPA stated that “[b]ecause GS projects would likely use multiple injection wells per project, the Agency anticipates that most owners or operators would seek area permits for their injection wells.” 73 Fed. Reg. at 43523 (July 25, 2008). We agreed with this observation and find it difficult to understand why EPA would then expressly state in promulgating the final rule that it has decided to prohibit the use of area permits for GS projects. (Interestingly, the actual wording of the revision to section 144.33(a) is so ambiguous that it may not do even what was intended.) Some states have chosen to use area permits under other classes while other states have chosen not to do that. We believe that state primacy agencies should have more say in whether or not area permits can be used more effectively than the procedures that EPA intends to propose as an alternative to area permits. We do not understand how the Agency thinks that states –already expected to undertake substantial additional administrative responsibilities for Class VI – can achieve the “efficiencies and administrative benefits offered by area permits” while being required to use the full and perhaps unnecessarily burdensome administrative permitting process for each additional identical well. Moreover, we do not think the draft Guidance has achieved that objective. If area permits are to be prohibited, this Guidance needs to explain comprehensively how the same efficiencies can be achieved.</p>	<p>EPA acknowledges the commenter’s concern about the work involved in developing separate plans for individual wells. EPA reemphasizes, however, that the rule prohibits area permits, and that comments on the rule are beyond the scope and intent of this Guidance comment period. Further, EPA clarifies that each of the five plans will need to be submitted for each individual injection well (i.e., permit).</p> <p>To address this comment, EPA added language to Section 1.1 of the Guidance on how owners or operators can realize efficiencies where certain aspects of multiple wells/projects are common (e.g., identical construction).</p>
6	C12	<p>[Provides background, e.g., reference to Comprehensive Federal Strategy on Carbon Capture and Storage and statements from Project plan guidance]. p.1 lines 14-43. According the approach outlined in the Project Plan Guidance,</p>	<p>EPA acknowledges the commenter’s concern regarding regulatory uncertainty. EPA anticipates that the plans/Class VI permit would only be updated following</p>

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		<p>the Class VI permit includes the project plans, and if these plans are revised in a way that does not constitute a “minor modification,” then the permitting process, including the public participation requirements, is reopened. 7Consequently, the Class VI permit is almost always in flux. Such regulatory uncertainty creates significant project risk. For example, under the Safe Drinking Water Act, a petition for review may be filed in a federal circuit court within 45-days of “any other final agency action,” which includes the issuance or modification of a permit. 8 Consequently, under the approach articulated in the Project Plan Guidance, a legal challenge to the permit could be filed in federal appellate court each time a project plan was amended. Even if a lawsuit were not filed, under the approach articulated in the Project Plan Guidance, any change to a project plan that was not considered minor would trigger the public participation requirements, including the requirement to notify the public of the modification and hold a hearing in which anyone may submit oral or written statements and data.9This approach creates a system of “institutionalized uncertainty” without increasing protection for USDWs. It creates a high transaction cost dynamic in which it will be very difficult for commercial operators to function, yet provides no corresponding benefit to the environment. The Project Plan Guidance Approach is not required under the UIC Rules, and must be amended.</p> <p>7 Minor modifications are restricted, under 40 C.F.R. §144.41, to the following subset of changes:</p> <ul style="list-style-type: none"> • Correct typographical errors; • Require more monitoring; • Minor changes to compliance schedules; • Changes in ownership; • Changes in quantities and types of fluids injected; • Changes in construction requirements; • Changes in project plans that result only in clarifications or corrections to the plans. <p>8 42 U.S.C. §300j-7(a). 9 40 C.F.R. §124.12.</p>	<p>AoR reevaluations and plan updates (as required in the rule) or if there is reason to believe the project is operating in a manner that endangers USDWs.</p> <p>EPA believes that the iterative process by which the required plans are reviewed throughout the life of a project will promote an ongoing dialogue between owners or operators and the UIC Program Director. Further, EPA believes that a public process is necessary to ensure that the public is aware of any substantial changes to the project that may affect them.</p>
7	AEP	<p>p. 1 line 14. 1.1 Overview and Need for Project Plans. For the current Mountaineer project in New Haven, WV, AEP submitted a testing and monitoring plan and a post-injection site care plan to the WVDEP. During implementation of the testing and monitoring plan. AEP encountered problems with testing procedures and technologies, which often forced a</p>	<p>The Class VI Rule requires that all of the plans be enforceable permit conditions. EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period.</p>

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		<p>change in the monitoring schedule. Since the WV agency views these documents as "guidance." AEP has never had any compliance issues. However, according to the proposed Class VI guidance, the associated plans will now become an "enforceable" part of Class VI permits (see 1.1 Overview and Need for GS Project Plans, first paragraph, second sentence, page 1). This statement is in contradiction to the preceding introductory paragraph that states that the guidance is to "present recommendations . . . in developing project plans required . . ." in the rules. If these plans are to be as specific as those that are currently on file with the WVDEP, and AEP has no reason to believe that they wouldn't be. AEP feels quite certain that compliance problems will be encountered. The technology simply isn't "ready for prime time." In addition, if any of these plans need to be "significantly" revised, a permit modification will be required. During such a permit modification, the permit must be opened to the arduous public comment process, which may or may not go well for projects of this nature. Based on the developmental stage of this technology, it appears that frequent permit modifications will be necessary. For example, during the construction of injection well AEP-1 at the AEP MT PVF, logging of the cement sheath surrounding the long-string casing suggested the existence of potential uncertainties in the quality and/or continuity of the cement above a certain depth. To address the issue, AEP proposed, that, in addition to the annual external mechanical integrity testing (MIT) specified in the testing and monitoring plan (temperature log and /or radioactive tracer survey), an interim external MIT would be done within three months after the start of CO2 injection.</p> <p>The radioactive tracer (RAT) test was originally scheduled for the week of December 2009, however, due to the interruption of injection operations, the test was delayed until January 2010, during which problems were again encountered. During the first test attempt, a small quantity of tracer was leaking from the tool and smeared on the inside of the tubing. At that time, it was indicated that the tool would require repair and that injection into the well overnight would be required to flush the tracer out of the well. This was performed and a spare tool was put into service on the following day. However, the second tool also began to leak tracer material and had to be removed from the well. After the failure of the first two tools, a third tool was used with the same tracer (1-131) and a similar injection mechanism, but with an end-check-valve addition. This check valve prevented the migration of CO2 into the tracer reservoir at depths and a mechanism was added that contained the tracer in a glass vial. The vial was remotely broken</p>	<p>EPA anticipates that the plans/Class VI permit would only be updated following AoR reevaluations and plan updates (as required in the rule) or if there is reason to believe the project is operating in a manner that endangers USDWs.</p> <p>EPA believes that the iterative process by which the required plans are reviewed throughout the life of a project will promote an ongoing dialogue between owners or operators and the UIC Program Director. Further, EPA believes that a public process is necessary to ensure that the public is aware of any substantial changes to the project that may affect them.</p> <p>To address this comment, EPA added a discussion to Section 1.2 of the Guidance that describes how operators planning to deploy certain technologies several years into the life of the injection project (e.g., bringing additional monitoring wells online) may consider building the deployment schedule into the project plan so that adding or modifying techniques would not necessitate a permit modification.</p>

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		<p>releasing the tracer at the desired location. Following a successful restart of the capture system, these changes allowed the successful completion of the RAT test; however, AEP could not meet the monitoring schedule described in the testing and monitoring plan. Had this plan been an enforceable part of the UIC permit, AEP would have been in violation. Had the WVDEP determined that the original permit and associated testing and monitoring plan were too restrictive, a permit modification would have been necessary to rectify the problem.</p> <p>However, since the WVDEP views the current testing and monitoring plan as "guidance," it was not necessary to modify the testing and monitoring plan or the UIC permit and AEP was able to complete the testing (which indicated no problems with the concrete). Therefore, this first paragraph should be modified to reflect that certain information is required to permit a well and deviations from the plan that are based on guidance recommendations are not considered to be "violations."</p>	
8	CSC	<p>p. 2 lines 9-10. Recommended Revision: Thus, unlike <u>some</u> other injection well classes regulated under the UIC Program, there is no periodic reapplication for, or reissuance of, a Class VI permit. Discussion: This statement should say: "unlike some other injection well classes" because Class VI is not the only class that does not require reapplication or renewal of permits.</p>	<p>EPA acknowledges CSC's suggested edits to the Guidance section in question. EPA agrees that the edits will add clarity.</p> <p>EPA incorporated the suggested edit.</p>
1.2 Interaction of GS Project Plans			
9	NACSSA	<p>p. 2-3 lines 45-12. The iterative nature of plan development will frustrate permitting and hinder project finance. The guidance envisions a repeating process of plan revisions, some of which may have to be well-by-well instead of for the geologic sequestration project (EPA D-016-012 pp. 2-3) (emphasis added):</p> <p>EPA recommends that owners or operators consider revising or adjusting portions of the project plans <u>as additional data become available</u> during the site characterization process. All five of the project plans must be submitted with the Class VI permit application (i.e., prior to operation of the injection well or drilling of any test wells). Therefore, the owner or operator <u>will need to develop the plans prior to the formal modeling of the AoR</u>. While certain preliminary information would be available at that time, e.g., the estimated extent of the AoR based on initial geologic data and planned injection volumes, EPA recommends that the owner or operator <u>revisit and revise the operational-phase plans (e.g., the AoR and Corrective Action Plan, Testing and Monitoring Plan, and Emergency and Remedial Response Plan)</u> as</p>	<p>EPA acknowledges the commenter's request to clarify the iterative nature of project planning.</p> <p>EPA clarifies that the intent of this discussion is to encourage an iterative process as information becomes available during site characterization. It would be to the owner's or operator's advantage to have a general agreement, prior to well drilling, about the contents of the plans, and the Guidance acknowledges that not all needed information will be available until the well is drilled. EPA anticipates that finalizing the plans would not necessarily involve substantive changes to the draft plans unless the site characterization/ pre-injection testing identified information about the site that is significantly different than the data on which the plans were based. However, the monitoring well, as part of the testing and monitoring plan, must be approvable by the</p>

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		<p>necessary once the AoR modeling has been completed. This would for example, help ensure that the AoR and Corrective Action Plan addresses all improperly abandoned artificial penetrations throughout the delineated AoR, that planned testing and monitoring is thorough, or that the Emergency and Remedial Response Plan addresses all <u>potential</u> resources and infrastructure that may be impacted by the project.</p> <p>It is difficult to discern from the above precisely how the planning process is to work, but one interpretation follows: (1) five plans (perhaps per well too, so if geologic sequestration project involved three wells, fifteen plans could in theory be required) are submitted before the owner/operator has drilled a test well; (2) each of the plans is revisited and revised during the site characterization process; and (3) finally once the computational model is finished, each of the plans is further revised “as necessary.”[FN 27] Some of the plans must also address “all potential resources and infrastructure.” [FN 27]</p> <p>If our interpretation is correct, the project planning process is a recipe for regulatory gridlock. Putting aside the issues of time and resources required by the owner/operator and regulator to prepare and review each plan, the plan revision process appears to have no end as any plan may be required to be further revised “as necessary.” “As necessary” is not a regulatory standard; it’s a criterion for arbitrary decision-making. The process will retard, not advance, commercial projects.</p> <p>27 EPA makes clear that a change in one plan may necessitate a change to the others: "The five as project plans are interrelated. Changes to (or information acquired through the implementation of) one plan may necessitate a review of, or possibly a change to, some or all of the other plans" (EPA 816-D-1 0-0 12, p. 4).</p> <p>28 The Class VI program is intended to protect USDWs, not "potential resources," whatever they may be.</p>	<p>Class VI permitting authority.</p> <p>To address this comment, EPA added language to Section 1 to clarify the iterative process by which plans are developed and finalized.</p>
10	NACCSA	<p>p. 2-3 lines 45-12. We offer two better approaches. First, pull back the guidance and wait until regulators and the regulated community have experience with the final Class VI rule.</p>	<p>EPA acknowledges the comment from NACCSA.</p> <p>EPA believes that, given the newness of the requirements for project-specific plans, a separate guidance that addresses all of the plans together will be of use to owners or operators.</p>

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11	NACSSA	p. 2-3 lines 45-12. Or, in the alternative, (i) plans should be required for geologic sequestration projects, not per well. (ii) individual plans should be prepared once initially - after site characterization and the computational model are complete; and (iii) an individual plan is only required to be “updated” if there is an event that otherwise triggers a reevaluation of the AoR (as modified by our comments above pertaining to the reevaluation of the AoR).	<p>EPA acknowledges the comment from NACSSA.</p> <p>EPA emphasizes that area permits are not allowed for Class VI wells, as specified in the Class VI Rule at 40 CFR 144.33(a)(5). Further, EPA clarifies that each of the five plans will need to be submitted for each individual injection well (i.e., each permit).</p> <p>EPA added language to Section 1.1 of the Guidance on how owners or operators can realize efficiencies where certain aspects of multiple wells/projects are common (e.g., identical construction).</p>
12	AEP	p. 3 lines 1-2. The guidance does not appear to allow the drilling of any test wells prior to the submission of the UIC permit application or any of the five project plans (See parenthetical at the top of page 3). While some preliminary information would be available, EPA recommends that the operational-phase plans (AoR and Corrective Action Plan, Testing and Monitoring Plan, and Emergency and Remedial Response Plan) be revised after the AoR modeling has been completed. This appears to be a very inefficient process. Why not allow the plans to be developed concurrently with the AoR modeling so that follow-up revisions are not necessary? It is also not realistic to assume that a valid UIC permit application could be submitted without the geological data that would be acquired from a test well.	<p>EPA acknowledges the commenter’s request to clarify the allowance of test wells prior to the submission of the UIC permit. Further, EPA anticipates that finalizing the plans would not necessarily involve substantive changes to the draft plans unless the site characterization/ pre-injection testing identified information about the site that is significantly different than the data on which the plans were based. However, the monitoring well, as part of the testing and monitoring plan, must be approvable by the Class VI permitting authority.</p> <p>To address this comment, EPA added language to Section 1 of the Guidance to clarify that if the owner or operator wishes to drill a test well that is not an injection well, they would not need to apply for a Class VI permit. However, if a test well is planned as a prelude to a GS project, EPA recommends early discussion between the owner or operator and Director to ensure that all planned activities associated with the test well would support an approvable Class VI permit application.</p>
13	CCS	Pages: 2-3. Discussion: The guidance does not appear to allow the drilling of any test wells prior to the submission of the UIC permit application or any of the five project plans While some preliminary information would be available, EPA recommends that the operational-phase plans (AoR and Corrective Action Plan, Testing and Monitoring Plan, and Emergency and Remedial Response Plan) be revised after the AoR modeling has been	<p>EPA acknowledges the commenter’s request to clarify the allowance of test wells prior to the submission of the UIC permit. Further, EPA anticipates that finalizing the plans would not necessarily involve substantive changes to the draft plans unless the site characterization/ pre-injection testing identified information about the site that</p>

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		<p>completed. This would be a very inefficient process. EPA should allow the plans to be developed concurrently with the AoR modeling so that followup revisions are not necessary, and the guidance documents should describe how this can be done.</p>	<p>is significantly different than the data on which the plans were based. However, the monitoring well, as part of the testing and monitoring plan, must be approvable by the Class VI permitting authority.</p> <p>To address this comment, EPA added language to the Section 1 of the Guidance to clarify that if the owner or operator wishes to drill a test well that is not an injection well, they would not need to apply for a Class VI permit. However, if a test well is planned as a prelude to a GS project, EPA recommends early discussion between the owner or operator and Director to ensure that all planned activities associated with the test well would support an approvable Class VI permit application.</p>
14	NACCSA	<p>p. 3 lines 14-21. <u>The guidance suggests that compliance with the Class VI rule is “not enough.”</u> We were taken aback by the following statement in the guidance(EPA D-016-012 p. 3) (emphasis added): In their discussion of the plans, EPA recommends that the owner or operator and UIC Program Director <u>consider the advantages</u> of tailoring activities to project conditions, <u>and not necessarily performing only the minimum activities required by the GS Rule.</u> For example, <u>increasing the number of monitoring locations or the frequency of AoR reevaluations</u> may help ensure that future reviews of the project plans <u>will not necessitate amendments or permit modifications.</u> This type <u>of proactive planning</u> early in the process may help ensure that the owner or operator and the UIC Program Director have considered both the current and possible future conditions at the proposed Class VI injection well site based on all available site-specific information.”</p> <p>This statement is problematic on several levels. For starters it advances a perjorative view of the motives of owners/operators that is inaccurate and prejudicial. It suggests that compliance with the final Class VI Rule is “not enough” – and if that’s the case, EPA should amend the rule. It erroneously suggests that the rule sets minimum standards, when in fact it appropriately imposes rigorous performance based criteria.</p> <p>Further, the statement oddly suggests without basis that the number of wells be increased – and in doing so fails to consider issues such as: (i) each penetration of the injection zone potentially increases site risks; (ii) each monitoring well will have to be individually permitted (with perhaps five additional plans each); (iii) drilling unnecessary wells will frustrate project finance and unnecessarily increase project costs. [FN 29]</p>	<p>EPA clarifies that its intent was not to say that compliance with the rule is not enough. The final requirements strike a balance between protectiveness and cost/burden. EPA notes that there are opportunities to conduct additional monitoring, for example, by adding monitoring wells. However, EPA also acknowledges that owners or operators need to balance potential benefits from additional data with potential additional risk. Section 3.1.4 of the Guidance contains a discussion of this balance.</p> <p>EPA believes that the subject paragraph (referenced by the commenter) merely offers some potential permitting scenarios. In the end, all Director-approved plans must ensure that USDWs will be protected. The rule does set minimum standards.</p> <p>To address this comment, EPA added language to Section 3.1.4 of the Guidance to clarify that a monitoring well may need a state drilling permit; however, a monitoring well is not a Class VI injection well and does not need to have all of the project plans that are required for Class VI wells.</p>

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		29 Inclusion of this recommendation further suggests that EPA wants Class VI to be a research, not commercial, program.	
15	EEI	p. 2 The draft Guidance similarly envisions an iterative process to plan development. EPA provides that, before the first permit may be issued, owners/operators must prepare and submit the five plans. <i>See id.</i> at 2. This construct sounds good hypothetically, but would be impracticable from a commercial point of view. It could take years and substantial funds to prepare the required plans at the level of required detail in advance of a project. It would be impossible to obtain financing for the preparation of five pre-project plans when lenders and investors have no assurance that a project will at least advance along the regulatory path. Here, the regulatory path is a substantial set of obstacles, not a path forward. Moreover, the type of information that is needed for the five plans will come from the first well, but that well cannot be drilled without a permit, and to obtain the permit, the applicant must submit the plans. Again, this system would ensure that Class VI wells are never used commercially	<p>Area permits are not allowed for Class VI wells, as specified in the Class VI Rule at 40 CFR 144.33(a)(5). Comments on the rule are beyond the scope and intent of this Guidance comment period. Further, EPA clarifies that each of the five plans will need to be submitted for each individual injection well (i.e. each permit).</p> <p>EPA anticipates that finalizing the plans would not necessarily involve substantive changes to the draft plans unless the site characterization/ pre-injection testing identified information about the site that is significantly different than the data on which the plans were based. However, the monitoring well, as part of the testing and monitoring plan, must be approvable by the Class VI permitting authority.</p>
16	EEI	p. 2 EPA should provide for the submission of plans based upon best-available data. If the data pass muster, a site-wide permit should be granted. As data are generated from the initial wells, plans are modified, but never reset back to square one, unless data indicate that a site cannot meet the regulations, endangering USDW.	<p>EPA notes that area permits are not allowed for Class VI wells, as specified in the Class VI Rule at 40 CFR 144.33(a)(5). Comments on the rule are beyond the scope and intent of this Guidance comment period.</p> <p>EPA expects that the plans/Class VI permit would be updated following AoR reevaluations and plan updates (as required in the rule) or if there is reason to believe the project is operating in a manner that endangers USDWs.</p> <p>EPA believes that the iterative process by which the required plans are reviewed throughout the life of a project will promote an ongoing dialogue between owners or operators and the UIC Program Director. Further, EPA believes that a public process is necessary to ensure that the public is aware of any substantial changes to the project that may affect them.</p> <p>To address this comment, EPA added language to Section 1.1 of the Guidance on how owners or operators</p>

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			can realize efficiencies where certain aspects of multiple wells/projects are common (e.g., identical construction).
17	CSC	<p>We are very concerned that the desired iterative process for developing, maintaining, reviewing and revising plans is overly rigid and potentially unworkable under the final GS rule and the draft Guidance. Through participation in the Multi-Stakeholder Discussion (MSD) process, we helped to fashion a recommended process that was designed to provide for the adaptability of GS project permits and plans and to foster the most effective use of monitoring data and operational experience through a dynamic iterative review and revision process. Although EPA has indicated its desire in the final rule and preamble to follow an iterative approach of the type described by the MSD recommendations, we are concerned that the approach adopted will hinder rather than facilitate the adaptability of these plans and the responsiveness of GS project operators to current and future monitoring and operational information. Specifically, we are concerned that the reevaluation and revision of all project plans is tied too closely to reevaluation of the area of review. (Some of these plans may need to be revised regardless of the need for area of review revisions). Moreover, the requirement for reevaluation of the area of review delineation on the basis of a “minimum fixed frequency, not to exceed five years,” could serve to constrain the proper timing of reevaluations, which should probably occur with greater frequency early in a GS project and less frequency in later years. Where reevaluations and updates have been performed recently in response to material changes in the monitoring and operating information – or in response to improved understandings of that information – there should be no need to mechanically conduct a rigidly scheduled reevaluation just because a five-year period has run. We encourage the agency to again review the suggestions contained in the MSD recommendation letter dated May 14, 2009 (copy attached) and consider whether it is possible to be more flexible.</p>	<p>EPA acknowledges the CSC’s concern about the timing of the updates to the project plans and reevaluation of the AoR. First, while it is possible that fewer unanticipated events would occur in the out-years of injection, EPA notes that owners or operators must reevaluate the AoR and determine whether updates to the plans are needed at least every 5 years, as required at 40 CFR 146.84(e). Comments on the rule are beyond the scope and intent of this Guidance comment period.</p> <p>Second, EPA clarifies that while the AoR reevaluation is the primary driver for updating the project plans, it is not the only one. Owners or operators may have to review the plans outside of the AoR reevaluation cycle.</p> <p>To address this comment, EPA has made the following updates to the Guidance:</p> <ol style="list-style-type: none"> 1. EPA added text to Section 1.2 of the Guidance to explain that owners or operators may consider planning for more frequent reevaluations early in the project life, when unexpected results are most likely to arise. 2. EPA has revised the recommendations regarding updating the plans, e.g., in Sections 2.3, 3.3, and 6.3, to reflect that owners or operators may have to review project plans outside of the AoR reevaluation cycle.
18	CSC	<p>p. 2 line 36 Recommended Revision: In its notice of proposed rulemaking, EPA stated that “[b]ecause GS projects would likely use multiple injection wells per project, the Agency anticipates that most owners or operators would seek area permits for their injection wells.” 73 Fed. Reg. at 43523 (July 25, 2008). We agree with this observation and find it difficult to understand why EPA would then expressly state in promulgating the final rule that it has decided to prohibit the use of area permits for GS projects. Moreover, we are concerned that the actual wording of the revision to section 144.33(a) is ambiguous and may not do even what was intended.</p>	<p>EPA notes that area permits are prohibited by the rule. Comments on the rule are beyond the scope and intent of this Guidance comment period.</p> <p>EPA anticipates that the plans/Class VI permit would only be updated following AoR reevaluations and plan updates (as required in the rule) or if there is reason to believe the project is operating in a manner that endangers USDWs.</p>

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		<p>Some states have chosen to use area permits under other classes while other states have chosen not to do that. We would appreciate the opportunity to understand better how the Agency thinks that states – already expected to undertake substantial additional administrative responsibilities for Class VI – can achieve the “efficiencies and administrative benefits offered by area permits” while being required to use the full and perhaps unnecessarily burdensome administrative permitting process for each additional identical well. We believe that state primacy agencies should have more say in whether or not area permits can be used more effectively than the procedures that EPA intends to propose as an alternative to area permits. Discussion: The guidance emphasizes that owner/operators of Class VI wells must develop, gain approval for, and implement five project-specific plans: 1) an AoR and corrective action plan; 2) a testing and monitoring plan; 3) an injection well plugging plan; 4) a postinjection site care and site closure plan; and 5) an emergency and remedial response plan. Since area permits are not allowed, owners/operators must presumably provide five such plans for each well. Thus, if a site has five injection wells, the owner/operator must provide 25 plans. This is burdensome for an operator and discourages commercial-scale operations. Plan development should be streamlined to make this process less burdensome of projects owners.</p>	<p>EPA believes that the iterative process by which the required plans are reviewed throughout the life of a project will promote an ongoing dialogue between owners or operators and the UIC Program Director. Further, EPA believes that a public process is necessary to ensure that the public is aware of any substantial changes to the project that may affect them.</p> <p>To address this comment, EPA added language to the Guidance on how owners or operators can realize efficiencies where certain aspects of multiple wells/projects are common (e.g., identical construction).</p>
19	CSC	<p>p. 3 Recommended Revision: Exhibit 1. Missing important steps here: permit issued borehole drilled well constructed completion authorization to inject injection commences Discussion: Exhibit 1 is over simplified because there are a number of additional steps in the process between permit issuance and the commencement of injection.</p>	<p>EPA notes that the exhibit is not intended to show every action in the life of a project; instead, it demonstrates the iterative nature of developing plans, operating the site/collecting data, and updating the plans if needed.</p> <p>To address this comment, EPA revised the exhibit to be clearer and to add some of the steps the commenter mentions. EPA also added a note explaining that the exhibit is a general, conceptual overview only.</p>
20	CSC	<p>p. 3 Recommended Revision: Exhibit 1. “If no amendment is needed, <u>make required demonstrations and proceed to next cycle</u>”</p> <p>Discussion: The use of “continue injecting” in the Exhibit appears to suggest that injection must always cease if plan revisions are needed. That should not be the case. This also makes the process seem much simpler than it is because, even when plan revisions are not needed, the permittee must “demonstrate to the Director through monitoring data and modeling results that no amendment to the area of review and corrective action plan is</p>	<p>EPA clarifies that the graphic does not suggest that owners or operators must stop injection if an amendment is needed.</p>

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		needed” which requires a significant effort and paperwork. It would be better to say “If no amendment is needed, make required demonstrations and proceed to next cycle”.	
21	CSC	<p>p. 4-7. Discussion: Although EPA has indicated its desire in the final rule and preamble to follow an iterative approach of the type described by the MSD participants in our recommendations, we are concerned that the final regulatory language has established a potentially rigid and cumbersome set of revision requirements that will hinder rather than facilitate the adaptability of these plans and the responsiveness of GS project operators to current and future monitoring and operational information. Specifically, we are concerned that the reevaluation and revision of all project plans is tied too closely to reevaluation of the area of review (some of these plans may need to be revised regardless of the need for area of review revisions). Moreover, the requirement for reevaluation of the area of review delineation on the basis of a “minimum fixed frequency, not to exceed five years,” will serve to constrain the proper timing of reevaluations, which should probably occur with greater frequency early in a GS project and less frequency in later years. Where reevaluations and updates have been performed recently in response to material changes in the monitoring and operating information – or in response to improved understandings of that information – there should be no need to mechanically conduct a complete reevaluation just because the five-year period has run. We encourage the agency to again review the suggestions contained in the MSD recommendation letter dated May 14, 2009 (copy attached) and consider whether it is desirable to be more flexible in this regard provided that operators are required to keep the agency informed on an annual basis of material changes in project performance that would warrant a change in the area of review or other operational plans.</p>	<p>EPA acknowledges the CSC’s concern about the timing of the updates to the project plans and reevaluation of the AoR. First, while it is possible that fewer unanticipated events would occur in the out-years of injection, EPA notes that owners or operators must reevaluate the AoR and determine whether updates to the plans are needed at least every 5 years, as required at 40 CFR 146.84(e). Comments on the rule are beyond the scope and intent of this Guidance comment period.</p> <p>Second, EPA clarifies that while the AoR reevaluation is the primary driver for updating the project plans, it is not the only one. Owners or operators may have to review the plans outside of the AoR reevaluation cycle.</p> <p>To address this comment, EPA has made the following updates to the Guidance:</p> <ol style="list-style-type: none"> 1. EPA added text to Section 1.2 of the Guidance to explain that owners or operators may consider planning for more frequent reevaluations early in the project life, when unexpected results are most likely to arise. 2. EPA has revised the recommendations regarding updating the plans, e.g., in Sections 2.3, 3.3, and 6.3, to reflect that owners or operators may have to review project plans outside of the AoR reevaluation cycle.
22	CSC	<p>p. 4 lines 24-25. Discussion: The guidance should do a much better job of reducing the apparent administrative complexity and burden of the reevaluation and revision process for updating plans. A cumbersome process will serve both to delay and as a disincentive to timely revisions.</p>	<p>EPA acknowledges CSC’s concern, and clarifies that the guidance states in each section about updates (e.g., 2.3, 3.3, etc.) that the plan must only be revised if needed based on operational and monitoring data.</p>
23	NGOs	<p>p. 5 Table 1. EPA should amend Table 1 to include the possibility of new monitoring methods following a revision of the AoR and Corrective Action Plan. A revision of the AoR and Corrective Action Plan may not only necessitate adding monitoring locations to the Testing and Monitoring Plan, but may also necessitate new monitoring methods. If the revised AoR</p>	<p>EPA acknowledges the NGOs’ concern that the Guidance should accommodate new monitoring technology.</p> <p>To address this comment, EPA added language to</p>

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		includes new geology or features like faults or wells, operators should consider implementing new monitoring methods that might be better suited to detecting CO2 migration or leakage, in addition to designating new monitoring locations.	Section 3.3 of the Guidance to include the availability of new, more site-suitable, monitoring methods among the considerations for determining whether updating the testing and monitoring plan is necessary.
1.3 Other Relevant Guidance			
24	NACCSA	<u>The guidance makes reference to documents that have not yet been published, frustrating one’s ability to provide thoughtful comments.</u> EPA refers the reader to the following forthcoming documents and manual for more information: (i) testing and monitoring guidance; (ii) well plugging, post injection site care guidance; (iii) the “interim final Class VI primary application and implementation manual; (iv) recordkeeping, reporting, and data management guidance (EPA D-016-012 pp. 6-7). EPA also notes that the following additional documents will be forthcoming: (i) injection depth waivers; (ii) transitioning from Class II to Class V; and (iii) options for Class V experimental technology wells. We cannot opine on documents that do not exist.	EPA acknowledges NACCSA’s comment. EPA will provide opportunities for public input on all of the Guidances as drafts are developed.
25	C12	pp. 11-12 lines 36-21 The Project Plan Guidance summarizes the other Class VI Guidance documents, and includes sections on: <ul style="list-style-type: none"> • Area of Review and Corrective Action Plan; • Testing and Monitoring Plan; • Injection Well Plugging Plan; • Post Injection Site Care (PISC) and Site Closure Plan; and • Emergency and Remedial Response Plan. <p>As noted in <i>Section 1.3 Other Relevant Guidance</i> of the Project Plan Guidance, each of these areas – save the Emergency and Remedial Response Plan – is covered by separate guidance documents. Consequently, the Project Plan simply summarizes these Guidance documents without adding new information.</p>	EPA believes that, given the newness of the requirements for project-specific plans, a separate guidance that addresses all of the plans together will be of use to owners or operators.
1.4 Reporting Requirements for the Information Collected			
27		No comments on this section.	
1.5 Organization of this Document			
28		No comments on this section.	

Comments on Chapter 2

#	Commenter	Comment	EPA Response
2. Area of Review and Corrective Action Plan			
1		No comments on this section.	
2.1 Developing the AoR and Corrective Action Plan			
2	NACCSA	This guidance largely repeats what it is the other guidance documents, creating grounds for potential confusion. For example, the guidance covers AoR and corrective action – a topic that is covered in separate guidance document (EPA D-016-012 p.8 et seq.). We were unable to confirm that the discussion of AoR/corrective action is identical in both.	EPA believes that, given the newness of the requirements for project-specific plans, a separate guidance that addresses all of the plans together will be of use to owners or operators.
2.1.1 The method for delineating the AoR			
3	CCS	p. 10 lines 10-15. For the AOR and Corrective Action Plan, the permittee is required to, "predict movement of the plume and pressure front, given the particular geologic conditions at the site." (pg 10, second full paragraph) How is the permittee supposed to determine the particular conditions of the site without being allowed to drill a test well first?	EPA notes that Section 1 of the Guidance describes an iterative process of project plan development. A draft plan is important before the well is drilled so parties agree on the approach, but the plan will need to be adjusted as information is gathered during drilling and pre-operational testing. To address this comment, EPA added language to Section 1 of the Guidance to clarify this point and explain the importance of the iterative process of plan development.
4	AEP	p. 10 lines 10-15. For the AOR and Corrective Action Plan, the permittee is required to, "predict movement of the plume and pressure front, given the particular geologic conditions at the site." (pg 10, second full paragraph) How is the permittee supposed to determine the particular conditions of the site without being allowed to drill a test well first (see above comment)?	EPA notes that Section 1 of the Guidance describes an iterative process of project plan development. A draft plan is important before the well is drilled so parties agree on the approach, but the plan will need to be adjusted as information is gathered during drilling and pre-operational testing. To address this comment, EPA added language to Section 1 of the Guidance to clarify this point and explain the importance of the iterative process of plan development.
5	CCS	p. 11 lines 4-6. The guidance states that, “the type and number of subsurface formations from the surface to the injection zone, as determined by borehole sampling and logging, geophysical, and others tests or methods,” (top of page 11) must be included in the AoR delineation. How is this information to be obtained if the permittee is not permitted to drill a test well?	EPA notes that Section 1 of the Guidance describes an iterative process of project plan development. A draft plan is important before the well is drilled so parties agree on the approach, but the plan will need to be adjusted as information is gathered during drilling and

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#	Commenter	Comment	EPA Response
			<p>pre-operational testing.</p> <p>To address this comment, EPA added language to Section 1 of the Guidance to clarify this point and explain the importance of the iterative process of plan development.</p>
6	AEP	<p>p. 11 lines 4-6. In addition, the guidance states that, "the type and number of subsurface formations from the surface to the injection zone, as determined by borehole sampling and logging, geophysical, and others tests or methods." (top of page 11) must be included in the AoR delineation. How is this information to be obtained if the permittee is not permitted to drill a test well?</p>	<p>EPA notes that Section 1 of the Guidance describes an iterative process of project plan development. A draft plan is important before the well is drilled so parties agree on the approach, but the plan will need to be adjusted as information is gathered during drilling and pre-operational testing.</p> <p>To address this comment, EPA added language to Section 1 of the Guidance to clarify this point and explain the importance of the iterative process of plan development.</p>
7	EEI	<p>p. 11 line 13. Finally, the draft Guidance introduces and defines terms, such as "multiphase flow parameters," that are not defined in the final Class VI UIC rule. <i>See id.</i> at x. The guidance should incorporate by reference the definitions that exist in the Final UIC Class VI Rule.</p>	<p>EPA acknowledges EEI's concerns, and agrees that the Guidance should, to the extent possible, reference definitions that exist in the Final UIC Class VI Rule.</p> <p>To address this comment, EPA standardized the definition lists to the degree that is appropriate, and sourced them as being from the regulations or developed for the Guidance.</p>
8	C12	<p>The Project Plan Guidance creates the potential for contradiction with the other guidance documents. For example, the Project Plan Guidance states that: EPA recommends that the AoR and Corrective Action Plan describe how these factors were considered in determining the AoR reevaluation frequency.</p> <ul style="list-style-type: none"> • The presence of multiple injection wells or planned additional injections: a reevaluation may be warranted once all of the injection wells come on-line, or after a threshold volume of carbon dioxide has been injected; • The pace of population growth and development or land use changes in the region: rapid growth may indicate that additional public and private wells have been drilled or that ground water supplies within the AoR are being developed for use; 	<p>EPA clarifies that the focus of the Plans Guidance is how to develop the plan (i.e., the factors to consider and the process for updating). The AoR Evaluation and Corrective Action Guidance focuses more on the technical aspects of delineating the AoR and performing corrective action on wells.</p> <p>EPA believes that, given the newness of the requirements for project-specific plans, a separate guidance that addresses all of the plans together will be of use to owners or operators.</p>

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#	Commenter	Comment	EPA Response
		<ul style="list-style-type: none"> • Planned phased corrective action (see Section 2.1.5): an AoR reevaluation may be warranted following commencement of injection and after a significant number of wells are plugged; • Confidence in the modeling assumptions or the amount and quality of site characterization data that will be used for AoR delineation or the general modeling approach: significant uncertainties in site characterization data and the AoR delineation modeling may be addressed by more frequent reevaluation and comparison to monitoring data, particularly early in the project; • Injection volumes and rates: UIC Program Directors may consider that higher volume projects warrant more frequent reviews, particularly early in the injection phase; • Planned changes in operation: these changes may include the addition of injection wells, changes to injection or production rates (e.g., associated with enhanced oil recovery operations or dewatering/depressurization), or a change in the source of the carbon dioxide; and • Public acceptance: if the public expresses concerns about the project (e.g., about safety or environmental justice considerations) or if the public opposes the proposed siting of a Class VI injection well, the publication of GS project monitoring.¹⁷ <p>The Area of Review Guidance contains no such list of factors to be considered in determining the AoR reevaluation frequency. Similarly, the Project Plan Guidance lists “conditions that would warrant an early AoR reevaluation,” while the Area of Review Guidance contains no such list.¹⁸</p> <p>¹⁷ Project Plan Guidance, pp. 11-12. ¹⁸ Project Plan Guidance, p. 12.</p>	
2.1.2 The minimum fixed frequency to reevaluate the AoR			
9	API	<p>This section requires that the AoR be reevaluated at least every five years unless triggered earlier by unexpected site conditions or operational changes. The Guidance is silent on the timing in which such a discovery is to be reported to EPA. Additionally, it is unclear whether work must stop completely in between corrective actions, AoR reevaluation and plan approval in the event that one of the stated conditions requiring a less than five year assessment occurs.</p>	<p>First, EPA notes that Section 2.1.3 of the Guidance provides examples of such changes and that the Reporting and Recordkeeping Guidance will further clarify the timing of emergency notifications.</p> <p>Second, assuming “corrective action” as referenced in this comment refers to emergency-type events that trigger remedial actions, EPA clarifies that response to specific events would be in consultation with the UIC Program Director per 40 CFR 146.94.</p>
2.1.3 Conditions that would warrant an early AoR reevaluation			

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#	Commenter	Comment	EPA Response
10	CSC	p. 12 lines 25-26. As noted, the plan will describe what monitoring or operational conditions may warrant a reevaluation of the AoR prior to the next scheduled reevaluation and [sic] should also describe the process through which such conditions will be evaluated and reported to the Director at the outset of the reevaluation. Similarly, the plan should describe the process through which any required additional corrective actions will be taken and reported.	EPA notes that responses to specific events would be in consultation with the UIC Program Director per 40 CFR 146.94 and that the Reporting and Recordkeeping Guidance will further clarify the timing of emergency notifications.
2.1.4 How monitoring and operational data will inform AoR reevaluations			
11	NGOs	p. 13 lines 9-13. EPA should include a description of possible conditions which would warrant not revising the site computational model when re-evaluating the AoR (p. 13). The guidance document covers a comprehensive list of parameters that should be considered when an AoR re-evaluation also calls for the revision of the site computational model. However, it is important for EPA to list valid and justified conditions which may not warrant a model modification. This should be done both in order to list minimum recommended criteria and thresholds that would prevent unacceptable shortcuts being taken by operators, and also to provide clarity to operators as to when they can expect not to have to revise their model.	The Guidance discusses conditions that may not warrant revising the computational model in the sections of the Guidance on determining whether an update to the plan is needed (e.g., 2.3, 2.3, etc.), e.g., if the site is performing as expected and the monitoring data confirm/track closely with modeled predictions. EPA disagrees that a set of criteria or conditions that do not warrant a model modification is appropriate. The UIC Program Director will determine whether model modification is necessary on a site-specific basis.
12	Texas RRC	p. 13 line 16. The RRC recommends the following revision: “In the event that the owner or operator determines that revisions to the model are necessary, the plan must discuss how the newly available data will be used to revise the model and AoR delineation (§146.xx).”	EPA acknowledges the comment from the Texas RRC, and agrees that referencing pertinent sections of the rule will provide additional clarity. To address this comment, EPA added “40 CFR 146.84(b)(2)(iii)” to reference the relevant section of the rule.
13	CSC	p. 13 lines 8-13. This statement provides an important recognition and is very well stated in the draft Guidance. We commend its inclusion.	EPA acknowledges the comment.
14	CSC	p. 13 lines 26-28. This is an excellent point and an important consideration. The plans should be used as the means for defining what is “significant” for testing, monitoring and data comparisons and for other purposes.	EPA acknowledges the comment.
2.1.5 How corrective action will be conducted			
15	CSC	p. 14 lines 5-7. Recommended Revision: All improperly plugged artificial penetrations within the AoR must be plugged using materials that can withstand the potentially corrosive environment that results when <u>the</u> carbon dioxide <u>stream</u> mixes with water <u>the formation fluid</u> [§146.84(d)]. Discussion: The Draft Guidance provides a very important clarification – almost appearing to depart from the language of the rule. The rule appears to	EPA acknowledges CSC’s suggested edits to the Guidance section in question. EPA agrees that the edits will add clarity. EPA incorporated the suggested edits.

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#	Commenter	Comment	EPA Response
		require that any plugging of improperly plugged wells be done as if the wells would be coming into direct contact with the injected CO2 stream rather than with the CO2 stream mixed with formation fluid. But the language should go one step further to be clear that it is not “water” but the formation fluid with which the CO2 stream will mix.	
16	CSC	p. 14 lines 31-33. The Guidance should also note that some corrective actions may need to be conducted on an emergency basis and perhaps using procedures not previously approved in the plan. The Guidance should anticipate this need and recommend development of procedures for implementing emergency corrective and for coordination of those actions with the Director.	EPA acknowledges CSC’s comment and agrees emergency and remedial actions may result in the need for procedures not approved in the rule. To address this comment, EPA added clarification in Section 2.1.5 and in the Emergency and Remedial Response Plan section.
17	CSC	p. 15 lines 3-7. Recommended Revision: • The composition of the carbon dioxide stream which can affect the appropriate cement needed to plug the well; <u>the</u> formation fluid geochemistry and the presence of other corrosive native fluids (e.g., hydrogen sulfide), which can <u>interact to</u> impact the potential formation of carbonic acid that could react with or degrade well materials or cements; Discussion: The guidance should focus more clearly on the fact that the most important consideration is the mixtures of CO2 stream and formation fluid that would potentially be contacting any previously plugged well.	EPA acknowledges CSC’s suggested edits to the Guidance section in question. EPA agrees that the edits will add clarity. EPA incorporated the suggested edits.
18	Texas RRC	p. 15 line 16. Specific dates would not be known when such plans are drafted. This wording is not realistic, as field operations and subcontractor availability are not predictable. The RRC recommends the following revisions: “However, for improperly plugged wells that will need corrective action prior to injection, and whenever practical, EPA recommends that the AoR and Corrective Action Plan include <u>approximate timeframes and commitment to appropriate notification [specific dates]</u> for performing corrective action, in order to give the UIC Program Director an opportunity to witness the corrective plugging activities.”	EPA acknowledges the Texas RRC’s suggested edits to the Guidance section in question. EPA agrees that the edits will add clarity. EPA incorporated the suggested edits. The final Guidance also recommends that the dates be as specific as possible.
19	API	The Guidance is also silent regarding the handling of corrective actions conducted in an emergency that may not have been previously approved in the plan.	Assuming “corrective action” refers to emergency-type events that trigger remedial actions, EPA clarifies that response to specific events would be in consultation with the UIC Program Director per 40 CFR 146.94.
20	AEP	p. 16 lines 10-13. "Guaranteeing" that surface access can be obtained to perform corrective action is not realistic, especially if the permittee does not own the wells. The permittee can provide a plan for obtaining surface access rights to perform corrective action and this should be all that is required or	EPA clarifies that the intent of the requirement is that if an owner or operator cannot guarantee they can access a well at a later date, then phased corrective action is not appropriate, and they need to perform corrective action

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		recommended by the guidance. The UIC rule does not require a "guarantee."	at the outset.
2.2 UIC Program Director's Evaluation of the AoR and Corrective Action Plan			
21		No comments on this section.	
2.3 Amending the AoR and Corrective Action Plan			
22	CSC	<p>p. 20 lines 28-34. Recommended Revision: If this review indicates that an amendment to the AoR and Corrective Action Plan is needed, it is important that the owner or operator begin revising the plan as soon as possible practical and coordinate that revision with review of the testing and monitoring plan and the emergency and remedial response plan, so that the one (1) year deadline for amending this plan (along with any necessary amendments to the other related project plans) those plans can be met.</p> <p>Discussion: Section 146.84 does not specify a one-year deadline for submission of the amended AoR and Corrective Action Plan as suggested by this statement. Section 146.90(j) applies to amended testing and monitoring plans and provides that such plans must be submitted within one year of an area of review reevaluation. Likewise, section 146.94(d) applies to amended emergency and remedial response plans. As with other timing considerations, the AoR and Corrective Action Plan should describe the timing and process for revised AoR delineation and plan revision following reevaluation.</p>	<p>EPA acknowledges CSC's suggested edits to the Guidance section in question. EPA agrees that the edits will add clarity.</p> <p>EPA incorporated the suggested edits.</p>
23	CSC	<p>p. 21 lines 10-16. Recommended Revision: The GS Rule requires that the owner or operator submit the amended AoR and Corrective Action Plan to the UIC Program Director for approval following an AoR reevaluation or any other event that triggers an AoR and Corrective Action Plan Review [§146.84(e)]. EPA recommends that owners or operators submit the revised AoR and Corrective Action Plan along with revisions to the Testing and Monitoring Plan and the Emergency and Remedial Response Plan, both of which are due within one year of an AoR reevaluation, or within one (1) year of after any other event that triggers an AoR reevaluation a revision of those plans.</p> <p>Discussion: The language of the guidance document should be revised to conform with the actual requirements of the regulations. Any reevaluation following triggering conditions as provided in the plan will be conducted pursuant to the plan itself. There is not a separate process for reevaluation within "(1) year of any other event that triggers an AoR reevaluation" as suggested by this statement.</p>	<p>EPA acknowledges CSC's suggested edits to the Guidance section in question. EPA agrees that the edits will add clarity.</p> <p>EPA incorporated the suggested edits.</p>
24	CSC	p. 21 lines 18-23. This is likely to be a cumbersome administrative process.	EPA clarifies that revising the plans is required by the

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#	Commenter	Comment	EPA Response
		<p>The guidance should indicate ways in which the Director and permittee can work together to use the process effectively and efficiently while still assuring appropriate opportunities for public participation. In particular, the plans themselves should provide for the types of changes considered “significant”. Any changes that do not require a redrawing of the boundaries of the AoR should not be considered significant enough to trigger a permit modification.</p>	<p>rule. EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period.</p> <p>EPA agrees that, by working together, the UIC Program Director and the owner or operator can make the process more efficient, and the Guidance suggests communication to facilitate the process.</p>
25	CSC	<p>p. 21 lines 24-26. The plans should be able to indicate the types of changes that will be deemed minor.</p>	<p>EPA clarifies that determination of minor changes would be based on 40 CFR 144.41 and the UIC Program Director's discretion.</p>

Comments on Chapter 3

#	Commenter	Comment	EPA Response
3. Testing and Monitoring Plan			
1		No comments on this section.	
3.1 Developing the Testing and Monitoring Plan			
2	Texas RRC	P 22. Line 29. In accordance with the guidance disclaimer, the RRC recommends the addition of a citation: “Some of the elements of the Testing and Monitoring Plan are highly site-specific (e.g., monitoring well placement) and will require detailed descriptions of how these specific factors were identified and considered in developing the plan (§146.xx).”	EPA notes that there is not a specific regulatory citation for this guidance section, and emphasizes that the word “must” is not in the sentence. Instead, the sentence explains what Testing and Monitoring Plans will need to include in order to satisfy the UIC Program Director that the testing and monitoring is adequate to protect USDWs. The guidance stresses the need for plans to be based on site-specific data.
3	NACCSA	<p>p. 22 lines 13-18. The guidance has the following to say about testing and monitoring (EPA D-016-012 p.22) (emphasis added and in original) Guidance presenting recommended approaches to performing the activities under the approved Testing and Monitoring Plan (e.g., how to select appropriate testing equipment, monitoring techniques, locations, and frequencies) <u>can be found</u> in the forthcoming <i>Draft UIC Program Class VI Well Testing and Monitoring Guidance</i> posted on EPA’s website, when available for the public,... Exhibit 3 presents highlights of the information presented in that guidance. [FN 30]</p> <p>FN 30: There is no Exhibit 3. We assume EPA meant Appendix C, which provides a "Sample Template of an Injection Well Plugging Plan."</p> <p>The referenced testing and monitoring guidance does not exist, so we could not ascertain if the discussion of testing and monitoring in this guidance conforms to what EPA will say about the same topic in that future guidance. We also cannot comment on appendix C for that same reason. We reserve the right comment on the testing and monitoring portions of this guidance when EPA has completed issuing all guidance on this topic. [FN 31]</p> <p>FN 31: The same situation applies with respect to the guidance's discussion of the injection well plugging plan and post-injection site care/site closure, two topics which we understand will be covered separately in forthcoming guidance EPA 816-0-10-012, pp. 36, 40). As above, we reserve the right to revisit these topics when the relevant guidance documents are issued.</p>	Exhibit 3 is on page 23 of the draft Project Plans Guidance that was posted for public comment.

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#	Commenter	Comment	EPA Response
4	API	The additional detail that is recommended in the Guidance is tantamount to increased project costs and schedules. Considering the level of detail required by these Plans, the land surrounding GS projects will be some of the most analyzed parcels in the country.	<p>EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period.</p> <p>EPA believes that the level of detail required by the rule and additional detail recommended in the Guidance are necessary to ensure robust testing and monitoring to protect USDWs.</p>
3.1.1 Analysis of the carbon dioxide stream			
5	C12	<p>p. 23 lines 13-19. Project Plans are to be incorporated into the permit, and thus create enforceable obligations.¹⁴ Accordingly, the plans should contain appropriate levels of detail to ensure the necessary activities are carried out, without being overly prescriptive and thus creating undue regulatory burdens. In other words, since a permit holder is obligated to do everything that is in the plan, the plan should not contain an unnecessary amount of detail as to what is required. Similarly, as currently drafted, the Project Plan Guidance suggests that plan revisions may trigger permit modifications, which would provide a disincentive for CO₂ operators to update their plans with the latest information. By removing requirements for unnecessary detail, the Project Plan Guidance would minimize the regulatory burden while incenting CO₂ operators to use up-to-date information and techniques.¹⁵ Unfortunately, the Project Plan Guidance appears to require unnecessarily prescriptive plans. For example, the Project Plan Guidance states that:</p> <p>EPA recommends that the Class VI Testing and Monitoring Plan describes parameters and frequencies at which they are to be tested, and that the Plan specifies, for each analyte/parameter, sampling methods; the analytical technique to be used; whether the testing will be done in-house or at a laboratory; and quality assurance and surveillance measures. To demonstrate that the proposed analysis will be performed at an appropriate frequency, the schedule may include testing dates as appropriate (e.g., the first day of each quarter or month), and describe how the test results are to be recorded and reported to the UIC Program Director. ¹⁶</p> <p>It is not necessary to protect USDWs, not to mention simply not appropriate from a regulatory efficiency perspective, to create a binding legal obligation to carry out a certain type of sampling method, at a certain place, on a certain day as required under the Project Plan Guidance.</p> <p>¹⁴ See, e.g., 40 CFR §146.90 (“The requirement to maintain and implement an approved [testing and monitoring] plan is directly enforceable regardless</p>	<p>EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period.</p> <p>EPA believes that the level of detail required by the rule and additional detail recommended in the Guidance are necessary to ensure robust testing and monitoring to protect USDWs.</p>

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		of whether the requirement is a condition of the permit”). 15 See Project Plan Guidance, p. 34. 16 Project Plan Guidance, p. 23.	
3.1.2 Installation and use of continuous recording devices			
6	C12	Section 3.1.2 specify the allowable accuracy limits of continuous recording devices. To be meaningful, recording devices need to be accurate within a reasonable range. The Guidance should specify the acceptable accuracy range.	EPA notes that the Testing and Monitoring Guidance discusses acceptable accuracy ranges.
3.1.3 Corrosion monitoring			
7		No comments on this section.	
3.1.4 Ground water quality monitoring			
8	Texas RRC	P 25. Line 28. In accordance with the guidance disclaimer, the RRC recommends the following revisions: “See the <i>Draft UIC Program Class VI Well Site Characterization Guidance</i> for <u>suggestion</u> [details] about what information must be generated as part of the baseline data collection required under §146.82(a).”	EPA acknowledges the Texas RRC’s suggested edit to the Guidance section in question. EPA agrees that the edit will add clarity. EPA incorporated the suggested edit.
9	CSC	p. 26 lines 13-22. Under the Testing and Monitoring Plan section, the agency is recommending that a permittee "consider the installation and operation of more than a minimally acceptable number of monitoring wells." The recommended number of wells described in the preamble to the Class VI rule is already so high as to make commercial scale application of CCS economically unrealistic. The rule introduces a new, intermediate type of monitoring well, which was not required for the existing AEP Mountaineer PVF. The current project includes three deep monitoring wells and no intermediate wells for each injection well, while the new rule requires the installation of both deep and intermediate wells to monitor the CO2 and underground sources of drinking water (USDWs). The number and location of these wells are subject to the Director’s discretion, but it is safe to assume that many intermediate wells, at a cost of \$2M each, and many new deep wells, at a cost of \$6M each, will be required for a commercial scale project. It is estimated that the new requirements will have a minimum \$18M impact on the project cost estimate for each injection well, which is based on the current flexibility allowed by the WVDEP for the existing Mountaineer project. If the Director requires the maximum number of monitoring wells implied by the rule preamble, the cost impact could approach \$70M per Class VI injection well. Without technical justification, agency promotion of the installation of unnecessary deep and intermediate wells could make many CCS projects economically nonviable. We agree with the approach taken in the following paragraph in which the agency recommends that	EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period. EPA clarifies that the installation of more than a minimally acceptable number of monitoring wells is only a recommendation; the appropriate number and placement of wells will be site-specific and determined in consultation between the owner or operator and Director.

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#	Commenter	Comment	EPA Response
		owners/operators consider the trade-offs between an extensive monitoring program with one that is based on a site-specific approach considering subsurface geology and closely tracing the CO2 plume.	
10	AEP	<p>p. 26 lines 13-22. Under the Testing and Monitoring Plan section, the agency is recommending that a permittee "consider the installation and operation of more than a minimally acceptable number of monitoring wells." The recommended number of wells described in the preamble to the Class VI rule is already so high as to make commercial scale application of CCS economically unrealistic. The rule introduces a new, intermediate type of monitoring well, which was not required for the existing AEP Mountaineer PVF. The current project includes three deep monitoring wells and no intermediate wells for each injection well, while the new rule requires the installation of both deep and intermediate wells to monitor the CCB and underground sources of drinking water (USDWs). The number and location of these wells are subject to the Director's discretion, but it is safe to assume that many intermediate wells, at a cost of \$2M each, and many new deep wells, at a cost of \$6M each, will be required for a commercial scale project. It is estimated that the new requirements will have a minimum \$ 18M impact on the project cost estimate for each injection well, which is based on the current flexibility allowed by the WVDEP for the existing Mountaineer project. If the Director requires the maximum number of monitoring wells implied by the rule pre-amble, the cost impact could approach \$70M per injection well. Without technical justification, agency promotion of additional monitoring wells is arbitrary and does not support the development of this technology. In fact, the installation of unnecessary deep and intermediate wells could make many CCS projects economically nonviable. We agree with the approach taken in the following paragraph in which the agency recommends that owners/operators consider the trade-offs between an extensive monitoring program with one that is based on a site-specific approach considering subsurface geology and closely tracing the CO2 plume.</p>	<p>EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period.</p> <p>EPA clarifies that the installation of more than a minimally acceptable number of monitoring wells is only a recommendation; the appropriate number and placement of wells will be site-specific and determined in consultation between the owner or operator and Director.</p>
11	CSC	<p>p. 26 lines 30-33. Whether or not this proves to be feasible in very many cases, this statement is exemplary and helps to highlight the types of flexibility and adaptability intended for plan development and implementation.</p>	<p>EPA acknowledges the comment on the Guidance from the CSC and agrees that such decisions will be site-specific.</p>
12	Texas RRC	<p>p. 27 lines 7-15. In accord with the guidance disclaimer, the RRC recommends that EPA add the appropriate citations as follows: The Testing and Monitoring Plan must describe how the following information has been considered in determining appropriate monitoring well placement:</p>	<p>EPA acknowledges the Texas RRC's suggested edits to the Guidance section in question. EPA agrees that the edits will add clarity.</p>

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#	Commenter	Comment	EPA Response
		<ul style="list-style-type: none"> • The depth, thickness, and permeability of the injection and confining zones, USDWs, and any relevant additional zones (§146.xx); • The size and shape of the AoR, based on the current delineation (§146.90 (g)); • The presence of artificial penetrations (§146.90 (d)(1)); and • The planned injection rates and volumes (§146.90 (d)(1)). <p>Also, RRC recommends the addition of a rule citation for the first bullet under §146.90 wherein the Testing and Monitoring Plan are described under rule.</p>	EPA incorporated the suggested edits.
13	CSC	<p>p. 27 lines 23-24. Double use of “UIC Program” is unnecessary. This may have resulted from a previous global revision and should be corrected.</p>	<p>EPA acknowledges the CSC’s suggested edits to the Guidance section in question. EPA agrees that the edits will add clarity.</p> <p>EPA incorporated the suggested edits.</p>
14	CSC	<p>p. 28 lines 15-16. The Class VI Testing and Monitoring Plan must <u>could</u> describe the specific parameters to be monitored and <u>could</u> detail any additional factors that were considered in designing the list of monitoring parameters.</p> <p>This is not an explicit requirement of the rules.</p>	<p>EPA acknowledges the CSC’s suggested edits. EPA agrees that the Guidance section in question needs additional clarity.</p> <p>To address this comment, EPA made the following clarification: “To satisfy the UIC Program Director that the plan is approvable, the Testing and Monitoring Plan should describe the specific parameters to be monitored and detail any additional factors that were considered in developing the list of monitoring parameters.”</p>
3.1.5 A demonstration of external mechanical integrity			
15	Texas RRC	<p>p. 29 lines 16-19. In accord with the guidance disclaimer, the RRC recommends that EPA add the citation as follows: “However, because a request for using alternative methods other than those currently approved by EPA requires an additional EPA approval process to become acceptable and the eventual publication of the alternative method approval in the <i>Federal Register</i> (§146.89 (e)),.....”</p>	<p>EPA acknowledges the Texas RRC’s suggested edits to the Guidance section in question. EPA agrees that the edits will add clarity.</p> <p>EPA incorporated the suggested edits.</p>
16	CSC	<p>p. 29 lines 42-46. The guidance states that external mechanical integrity tests (MITs) must be performed at least once per year. However, the permittee may, “set the testing schedule to coincide with regularly scheduled well workovers or other routine well maintenance” (page 29, last paragraph). This type of flexibility is very helpful and will allow the operators of CCS projects to accomplish the required testing in an effective and affordable manner. Many of the stipulated tests (pressure fall-off testing, etc.) require extensive preparation and it is not efficient to require injection operations to</p>	EPA acknowledges the comment from the CSC.

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#	Commenter	Comment	EPA Response
		be repeatedly interrupted in order to allow the well testing to be conducted.	
17	AEP	<p>p. 29 lines 42-46. The guidance states that external mechanical integrity tests (MITs) must be performed at least once per year. However, the permittee may. "set the testing schedule to coincide with regularly scheduled well workovers or other routine well maintenance" (page 29, last paragraph). This type of flexibility is very helpful and will allow the operators of CCS projects to accomplish the required testing in an effective and affordable manner. Many of the stipulated tests (pressure fall-off testing, etc.) require extensive preparation and it is not efficient to require injection operations to be repeatedly interrupted in order to allow the well testing to be conducted.</p>	EPA acknowledges the comment from the AEP.
3.1.6 A pressure fall-off test			
18	CSC	<p>p. 30 lines 4-8. Again, this type of flexibility is very helpful and should be encouraged.</p>	EPA acknowledges the CSC's comment.
3.1.7 Carbon dioxide plume and pressure front tracking			
19	CSC	<p>p. 30 lines 30-31. Recommended Revision: All owners or operators must use direct methods to monitor for the presence or absence of carbon dioxide and pressure changes in the injection zone in the injection zone to track the extent of the carbon dioxide plume and the presence or absence of elevated pressure.</p> <p>Discussion: The current statement in the draft Guidance document is not an accurate description of the requirement. As written, the statement appears to require that direct methods be used to monitor for the presence of carbon dioxide, which is not the case. The statement should be revised to track the actual requirement of the regulation.</p>	EPA disagrees that the guidance does not reflect the Class VI Rule, and has not revised the subject sentence.
20	C12	<p>p. 30 lines 30-36. CO2 Plume and Pressure Front Tracking. Section 3.1.7 should not require direct measurements of geochemistry and pressure in the injection zone. For the reasons articulated in our comments on the Area of Review Guidance and Site Characterization Guidance, direct geochemical and pressure measurements should not be required within the injection zone, except for at the injection well itself.</p>	EPA acknowledges the comments on the Guidance from C12. However, the rule requires direct measurements of geochemistry and pressure in the injection zone. EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period.
21	CSC	<p>p. 31 lines 8-9. Recommended Revision: The Class VI Testing and Monitoring Plan must describe which direct and indirect tracking methods will be used how the owner or operator will meet the testing and monitoring requirements.</p> <p>Discussion: There is no explicit requirement to describe which methods will be used. The strategy adopted could rely on a variable combination of</p>	The guidance as written aims to recommend approaches for developing an approvable plan. EPA believes that specificity is warranted in this section, because Directors will need to see the specific monitoring technologies planned to assess whether the planned testing and monitoring is sufficient to protect USDWs.

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		<p>methods following a decision tree approach. With the plans incorporated as permit requirements, permittees need to be careful how the plans are written so as to avoid precluding sensible, flexible and adaptive approaches.</p>	
22	NGOs	<p>pp. 31-32 lines 30-2. EPA should include a discussion of potential reasons which would render the use of indirect plume tracking methods infeasible (p. 30-31). EPA should list a number of legitimate and justified potential reasons which would constitute valid grounds for the Director waiving the requirement for indirect plume tracking methods. This should be done in order to avoid invalid claims of infeasibility, and in order to inform a Director’s decision with specific scientific and technical criteria.</p>	<p>EPA notes that the Testing and Monitoring Guidance discusses potential circumstances that may render indirect plume tracking methods infeasible.</p>
3.1.8 Surface air monitoring and/or soil gas monitoring (if required)			
23	CSC	<p>p. 31 lines 34-37. Surface and/or soil gas monitoring may be required by the agency, but must be “based on potential risks to USDWs within the AoR.” (page 31, second last paragraph). The issue of surface air and/or soil gas monitoring has been addressed before and we reiterate those concerns with the following from the Carbon Sequestration Council, which was filed on December 23, 2008. “The goal of any UIC program regulation for GS should be to ensure that injected CO2 streams remain confined in the subsurface and do not endanger underground sources of drinking water. We are recommending sufficient requirements to ensure that this goal is achieved. As EPA seems to recognize, surface air or soil gas monitoring would impose substantial costs and the results of such monitoring would be subject to a host of confounding factors. Worst of all, such monitoring would be aimed at leakage of CO2 all the way to the surface, which – in the case of any properly-permitted GS project – would by definition be an extraordinarily low probability scenario. Accordingly, such requirements should not be imposed, nor should regulators have discretion to impose them. If there is any serious concern that injected CO2 might actually vent to the surface in a particular location, injection should not be permitted at that site in the first place. The regulations should not suggest otherwise.”</p>	<p>EPA acknowledges the comments on the Guidance from the CSC. However, EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period.</p> <p>EPA clarifies that surface air and/or soil gas monitoring is required only where needed to protect USDWs.</p>
24	AEP	<p>p. 31 lines 34-37. Surface and/or soil gas monitoring may be required by the agency, but must be "based on potential risks to USDWs within the AoR." (page 31, second last paragraph). The issue of surface air and/or soil gas monitoring has been addressed before and we reiterate those concerns with the following from the Carbon Sequestration Council, which was filed on December 23, 2008. "The goal of any UIC program regulation for GS should be to ensure that injected CO2 streams remain confined in the subsurface and do not endanger underground sources of drinking water. We are</p>	<p>EPA acknowledges the comments on the Guidance from the AEP. However, EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period.</p> <p>EPA clarifies that surface air and/or soil gas monitoring is required only where needed to protect USDWs.</p>

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		<p>recommending sufficient requirements to ensure that this goal is achieved. As EPA seems to recognize, surface air or soil gas monitoring would impose substantial costs and the results of such monitoring would be subject to a host of confounding factors. Worst of all, such monitoring would be aimed at leakage of CO2 all the way to the surface, which - in the case of any properly-permitted GS project -- would by definition be an extraordinarily low probability scenario. Accordingly, such requirements should not be imposed, nor should regulators have discretion to impose them. If there is any serious concern that injected CO2 might actually vent to the surface in a particular location, injection should not be permitted at that site in the first place. The regulations should not suggest otherwise." AEP hopes that agency Directors use appropriate discretion and limits any application of this testing methodology.</p>	
25	Texas RRC	<p>p. 32 lines 7-8 Because §146.90 states in part that the Director <i>may</i> require this monitoring, the sentence needs the conditional clause: “Compliance with these Part 98 requirements is considered a condition of the Class VI permit [§146.90(h)(3)] <u>if surface air/gas monitoring is required by the UIC Program Director.</u>”</p>	<p>EPA acknowledges the Texas RRC’s suggested edits to the Guidance section in question. EPA agrees that the edits will add clarity.</p> <p>To address this and other comments, EPA edited the subject sentence as follows: “Compliance with these 40 CFR Part 98 requirements is considered a condition of the Class VI permit if surface air and/or soil gas monitoring is required by the UIC Program Director [40 CFR 146.90(h)(3)] and the UIC Program Director approves the use of monitoring employed under Subpart RR.”</p>
26	CSC	<p>p. 32 lines 4-8. Recommended Revision: If the UIC Program Director requires the installation and use of surface air/soil gas monitoring technologies, Class VI well owners or operators may use the same technologies as they will employ to comply with the Carbon Dioxide Injection and GS Reporting rulemaking (subpart RR) under the Greenhouse Gas Reporting Program (40 CFR Part 98). <u>If an owner or operator demonstrates that monitoring employed under §§ 98.440 to 98.449 of this chapter (Clean Air Act, 42 U.S.C. 7401 et seq.) accomplishes the goals of paragraphs (h)(1) and (2) of this section, and meets the requirements pursuant to § 146.91(c)(5), a Director that requires surface air/soil gas monitoring must approve the use of monitoring employed under §§ 98.440 to 98.449 of this chapter.</u> Compliance with these Part 98 requirements is considered a condition of the Class VI permit [§146.90(h)(3)].</p>	<p>EPA acknowledges the CSC’s suggested edits. EPA agrees that the Guidance section in question needs additional clarification.</p> <p>To address this and other comments, EPA edited the section as follows: “Where the UIC Program Director approves the use of monitoring employed under Subpart RR, Class VI well owners or operators may use the same technologies as they will employ to comply with Subpart RR and present this as part of the Testing and Monitoring Plan.”</p>

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#	Commenter	Comment	EPA Response
		<p>Discussion: The language of the draft Guidance document is not acceptable because it reverses the provisions of the actual regulation to suggest that subpart RR rules require to use of air/soil gas monitoring technologies; yet subpart RR does not prescribe such use. Instead, the language of 146.90(h)(3) states that whatever monitoring is done under an approved monitoring, reporting and verification plan to meet the requirements of subpart RR should be presumptively considered as compliance with the 146.90(h)(1) and (2) requirements. The language of the draft Guidance should be revised to track the rule.</p>	
<p>3.1.9 Any additional monitoring required by the UIC Program Director</p>			
27	CSC	<p>p. 32 lines 39-42. Recommended Revision: The rule provides the UIC Program Director discretion to require the owner or operator to perform any additional monitoring necessary to support, upgrade, and improve computational modeling of the AoR, and to determine compliance with standards that prevent movement of fluids to <u>endangerment</u> of USDWs [§146.90(i)].</p> <p>Discussion: The regulatory language does not prevent movement of all fluids into USDWs; instead, it requires compliance with the standards of 144.12. The language of the draft Guidance document should be revised to accord with the regulation.</p>	<p>EPA acknowledges the CSC’s suggested edits. EPA clarifies that 40 CFR 144.12 prohibits movement of fluids to USDWs. However, EPA agrees that the Guidance section in question needs additional clarity.</p> <p>To address this comment, EPA edited the section as follows: “...and to determine compliance with standards that prevent movement of fluids into USDWs [40 CFR 146.90(i)].”</p>
28	CSC	<p>p. 32 line 44. As with the use of surface and/or soil gas monitoring (see above comments to 1.1), the required use of tracers is not appropriate for CCS projects. The agency notes that “tracer use is not appropriate in all situations,” (page 33, top paragraph), but the use of tracers should be left to the discretion of the permittee. The Carbon Sequestration Council filed comments on this issue on December 23, 2008 and they are repeated here for your convenience:</p> <p>“There are at least two fundamental issues with respect to tracers. First, tracers are unlikely to enhance the protection of USDWs. This is true not just because the Class VI regulations are designed to minimize the likelihood of the kind of leakage tracers would ostensibly help detect, but because – even in the event of such a leak – tracers are not likely to be especially useful in leak detection (as discussed in the context of monitor wells, fluid monitoring in the deep subsurface provides only very localized information and is unlikely be very effective in leak detection whether or not tracers are used). Second, tracers are at least as likely to create “false positives” as to aid in the detection of actual downhole leaks. The problem in this respect is</p>	<p>EPA clarifies that the Guidance does not suggest that tracers are required; however, if the owner or operator chooses to include them in the testing and monitoring plan, the plan should describe their use.</p>

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		<p>simple: it is much easier for accidental leaks and releases to occur in the surface environment than in the deep subsurface.</p> <p>A final consideration is perhaps the most obvious: a requirement for tracers would be unique in the UIC program, and would unavoidably undermine public confidence in permitting determinations that – by definition – would be based on the premise that leaks from injection wells and properly permitted injection formations are extraordinarily unlikely to occur.”</p>	
29	AEP	<p>p. 32 line 44. As with the use of surface and/or soil gas monitoring (see above comments to 1.1), AEP feels that the use of tracers is not appropriate for CCS projects. The agency notes that "tracer use is not appropriate in all situations." (page 33, top paragraph), but AEP feels that the use of tracers should be left to the discretion of the permittee, The Carbon Sequestration Council filed comments on this issue on December 23, 2008 and they are repeated here for your convenience. "There are at least two fundamental issues with respect to tracers. First, tracers are unlikely to enhance the protection of USDWs. This is true not just because the Class VI regulations are designed to minimize the likelihood of the kind of leakage tracers would ostensibly help detect, but because - even in the event of such a leak – tracers are not likely to be especially useful in leak detection (as discussed in the context of monitor wells, fluid monitoring in the deep subsurface provides only very localized information and is unlikely to be very effective in leak detection whether or not tracers are used). Second, tracers are at least as likely to create "false positives" as to aid in the detection of actual down-hole leaks. The problem in this respect is simple: it is much easier for accidental leaks and releases to occur in the surface environment than in the deep subsurface. A final consideration is perhaps the most obvious: a requirement for tracers would be unique in the UIC program, and would unavoidably undermine public confidence in permitting determinations that - by definition - would be based on the premise that leaks from injection wells and properly permitted injection formations are extraordinarily unlikely to occur."</p>	<p>EPA clarifies that the Guidance does not suggest that tracers are required; however, if the owner or operator chooses to include them in the testing and monitoring plan, the plan should describe their use.</p>
30	NGOs	<p>pp. 32-33 lines 44-5. EPA should include a rationale and strong recommendation that GS site operators should determine in advance, stable carbon isotopic signatures of both the injected and the naturally occurring CO₂ in the AoR alongside the discussion about tracers (p. 32-33). Recent events at Weyburn have demonstrated the importance of being able to distinguish between naturally occurring CO₂ above the EOR field and the CO₂ injected from anthropogenic sources. Moreover, stable carbon isotopic signatures can accomplish similar objectives to the use of tracers. EPA</p>	<p>EPA discusses isotopic signatures of injected and naturally occurring carbon dioxide in the Testing and Monitoring Guidance.</p>

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		<p>should include a discussion of the use of stable carbon isotopes and provide a recommendation in Section 3.1.9.</p>	
31	CSC	<p>p. 33 lines 2-5. Recommended Revision: [T]racer use is not appropriate in all situations. For this reason, they are not required at all GS sites, although the UIC Program Director has the discretion to require their use if he/she determines that using tracers could improve the monitoring of the site and enhance USDW protection <u>is necessary to support, upgrade, and improve computational modeling of the area of review evaluation required under § 146.84(c) and to determine compliance with standards under § 144.12 of this chapter.</u></p> <p>Discussion: The language of the draft Guidance suggests that the Director can add required techniques with impunity and without cause. That is not what the rule allows. There must be a determination of necessity that is grounded in the protection of USDWs from endangerment.</p>	<p>EPA acknowledges the CSC’s suggested edits. EPA agrees that the Guidance section in question needs additional clarification.</p> <p>To address this comment, EPA edited the section for consistency with the rule at 40 CFR 146.90(i) as follows: “For this reason, they are not required at all GS sites, although the UIC Program Director has the discretion to require their use if he/she determines that using tracers is necessary to support, upgrade, and improve computational modeling of the area of review evaluation required under 40 CFR 146.84(c) and to determine compliance with standards under 40 CFR 144.12.”</p>
3.2 UIC Program Director’s Evaluation of the Testing and Monitoring Plan			
32	NGOs	<p>p. 33 lines 25-34. EPA should discuss and recommend as a critical component of a proposed Testing and Monitoring Plan (and the monitoring in the post-injection phase as part of the Post Injection Site Care and Site Closure Plan) to provide immediate warning for timely activation of the Emergency and Remedial Response Plan (p. 33, 45). In addition to the five listed factors in the draft Guidance, EPA should include the ability of a Testing and Monitoring Plan and Post Injection Site Care and Site Closure Plan to detect deviations from normal operating conditions by establishing thresholds which would necessitate an immediate response and activation of actions listed in the Emergency and Remedial Response plan. This is a crucial function of a monitoring plan and a prerequisite for its completeness, as the success of the Emergency and Remedial Response Plan depends on it. EPA should describe the components of an early warning system that is sufficiently robust so as to warn the GS site operator, as well as when and how to respond. For example, at the Gulf Coast Carbon Center’s Cranfield Reservoir Phase III test site in Mississippi [sic], researchers have demonstrated the ability of satellite technology to immediately relay deviations in injection reservoir pressure from a monitoring well to the operator of the site. The same comment applies to the Post Injection Site Care and Site Closure Plan for the period after injection has ceased.</p>	<p>EPA acknowledges the NGOs’ suggested edits. EPA notes that the Guidance addresses the need for and interaction of the various plans, e.g., in Table 1. Further, EPA disagrees that setting thresholds for triggering emergency responses that would apply in all situations is appropriate. However, EPA agrees that the Guidance section in question needs additional clarification.</p> <p>To address this comment, EPA has made the following updates to the Guidance:</p> <ol style="list-style-type: none"> 1. EPA modified the first bullet in Section 3.2 to read: “Is the planned testing and monitoring sufficiently robust (e.g., the proposed frequency, location, parameters) to provide early warning if USDWs are endangered <u>or when emergency or remedial response is needed?</u>” 2. EPA added text to Section 6.1 (emergency and remedial response plan) to say that proposed response actions should be tied to planned testing and monitoring, so that the owner or operator can quickly respond to any

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			endangerment detected during monitoring at the site.
33	CSC	<p>p. 33 lines 29-30. Recommended Revision: • Will the proposed plan provide necessary <u>sufficient</u> data and model inputs to verify predictions of carbon dioxide plume movement and to reevaluate the AoR?</p> <p>Discussion: The data requirements are satisfied if sufficient data are available to meet the demonstration and verification requirements.</p>	<p>EPA acknowledges the CSC’s suggested edit to the Guidance section in question. EPA agrees that the edit will add clarity.</p> <p>EPA incorporated the suggested edit.</p>
34	C12	<p>p. 33 lines 30-37. Section 3.2 should not require an iterative process, it should require an adequate testing and monitoring plan. Section 3.2 states that “[t]he submittal, evaluation, and approval of the testing and monitoring plan are meant to be parts of an iterative process.” The purpose of the UIC Rules and the corresponding guidance, including the Project Plan Guidance, is to protect USDWs, not to create a process in and of itself. The Project Plan Guidance should emphasize outcomes, not processes.</p>	<p>EPA believes that the UIC Program Director must have authority to revise any of the plans as needed to ensure that the project is operated in a manner that protects USDWs. Given state workload issues, EPA does not envision that Directors will exercise this discretion unless there is good reason (i.e., to protect USDWs from endangerment).</p>
35	CSC	<p>p. 33 lines 36-37. The guidance states that, “the submittal, evaluation, and approval of the testing and monitoring plan are meant to be part of an iterative process.” (page 33, last paragraph). It goes on to state that the Director has the authority to request that the plan be revised at his or her discretion. If the Testing and Monitoring Plan will become an enforceable part of the UIC permit, frequent modifications to the permit will make the administrative process more cumbersome and a potential bottleneck. Frequent requirements for revision will also devalue the “protection” that is afforded by such permits allowing permittees to operate without the fear of sporadically changing compliance requirements. These comments apply not only to the Testing and Monitoring Plan, but to the Injection Well Plugging Plan, the Post- Injection Site Care and Site Closure Plan and the Emergency and Remedial Response Plan as well.</p>	<p>EPA believes that the UIC Program Director must have authority to revise any of the plans as needed to ensure that the project is operated in a manner that protects USDWs. Given state workload issues, EPA does not envision that Directors will exercise this discretion unless there is good reason (i.e., to protect USDWs from endangerment).</p>
36	AEP	<p>p. 33 lines 36-37. The guidance states that, "the submittal, evaluation, and approval of the testing and monitoring plan are meant to be part of an iterative process." (page 33, last paragraph). It goes on to state that the Director has the authority to request that the plan be revised at his or her discretion. If the Testing and Monitoring Plan will become an enforceable part of the UIC permit. AEP is concerned that frequent modifications to the permit will 1) repeatedly open the permit to public comment and 2) remove the "protection" that is afforded by such permits allowing permittees to operate on the basis of a monitoring plan that is not expected to change on an unknown schedule. If the plan were not an enforceable part of the UIC</p>	<p>EPA believes that the UIC Program Director must have authority to revise any of the plans as needed to ensure that the project is operated in a manner that protects USDWs. Given state workload issues, EPA does not envision that Directors will exercise this discretion unless there is good reason (i.e., to protect USDWs from endangerment).</p>

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		<p>permit or if revisions to the permit were limited to a frequency of once every five years, for example, the permittee would be able to confidently operate the facility without the fear of continually changing compliance requirements. The above comments apply not only to the Testing and Monitoring Plan, but to the Injection Well Plugging Plan, the Post-Injection Site Care and Site Closure Plan and the Emergency and Remedial Response Plan as well.</p>	
3.3 Amending the Testing and Monitoring Plan			
37	C12	<p>To enable sequestration projects to occur in a way that protects USDWs without undue burden, the Project Plan Guidance should be revised as follows.</p> <p>a) The Project Plan Guidance should remove any reference to the level of detail required, and simply require that the plans be sufficient to protect USDWs through compliance with the Class VI UIC Rules.</p> <p>For the reasons articulated above, the project plans should not be required to contain detailed obligations. It is far better that they contain general obligations, without unnecessarily prescriptive requirements.</p>	<p>The guidance as written aims to recommend approaches for developing an approvable plan. EPA believes that Directors will need to see specific monitoring technologies planned to assess whether the planned testing and monitoring is sufficient to protect USDWs.</p>
38	CSC	<p>p. 34 lines 14-17. Recommended Revision: The GS Rule requires that the Testing and Monitoring Plan be reviewed and, if necessary, amended following each reevaluation of the AoR [§146.90(j)]. The purpose of this review is to ensure that the management of the GS project and all of the project plans are based on the most up-to-date information available. continue to provide for the protection of USDWs from endangerment.</p> <p>Discussion: There is no need to revise any of the plans just to substitute newer data if the plans continue to be valid and meet the requirements of the regulations.</p>	<p>EPA acknowledges the CSC’s suggested edits. EPA agrees that the Guidance section in question needs additional clarification.</p> <p>To address this comment, EPA edited the section as follows: “The Class VI Rule requires that the Testing and Monitoring Plan be reviewed and, if necessary, amended following each reevaluation of the AoR [40 CFR 146.90(j)]. The purpose of this review is to ensure that the management of the GS project and all of the project plans are based on the most up-to-date information available and continue to provide for the protection of USDWs from endangerment.”</p>
39	CSC	<p>p. 34 lines 23-26. This statement in the Guidance is accurate and places the emphasis on the correct assessment approach. Moreover, it clarifies what it means “to incorporate monitoring data collected under this subpart, operational data collected under § 146.88, and the most recent area of review reevaluation performed under § 146.84(e)” into the testing and monitoring plan”.</p>	<p>EPA acknowledges the comments on the Guidance from the CSC.</p>
40	CSC	<p>p. 34 lines 27-29. This is problematic rule language. This should not specify</p>	<p>EPA clarifies that the Guidance specifies, per the rule</p>

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#	Commenter	Comment	EPA Response
		when “[a]mended plans or demonstrations shall be submitted to the Director” but rather when the testing and monitoring plan should be “reviewed”. The guidance language is much better here and provides an important clarification.	requirements, when the amended plan must be submitted, and notes that comments on the rule are beyond the scope and intent of this Guidance comment period.
41	CSC	<p>p. 35 lines 1-3. Model revisions should follow, not lead a review. Using the language of the following bullet, the clarification is that “Carbon dioxide plume and pressure front monitoring data, e.g., any changes in the size or shape of the AoR or indications that the plume is moving differently than predicted. These changes may indicate the need for [revision of the model].” Draft Guidance at 35. The immediately following statement is extremely important and should be considered a more general modifier:</p> <p>Since some variability is expected, the owner or operator is advised to evaluate the significance of these changes and discuss with the UIC Program Director the need for any additional testing and monitoring. Draft Guidance at 35.</p>	<p>The considerations in this discussion are intended to describe all of the information and data that owners or operators may need to consider in updating the testing and monitoring plan (which will take place after any needed update – i.e., modeling of the AoR).</p> <p>To address this comment, EPA reordered the list so that modeling data is not the first item, in order to put modeling data in context of the other considerations.</p>

Comments on Chapter 4

#	Commenter	Comment	EPA Response
4. Injection Well Plugging Plan			
1	C12	<p>d) Section 4 should be modified to require greater detail with respect to appropriate plugging and cementing materials.</p> <p>Section 4.1 currently requires the operator to consider “the composition of the carbon dioxide,” which can affect appropriate plugging and cementing materials. The Project Plan Guidance should require consideration of brine as well as CO₂-rich brine as they can affect the plugging and cementing materials.</p>	<p>The well plugging and post-injection site care guidance will provide more detail on appropriate plugging and cementing materials.</p>
4.1 Developing the Injection Well Plugging Plan			
2	CSC	<p>p. 36 lines 36-37. Recommended Revision: [O]ne important consideration is that Class VI injection wells must be plugged using methods and materials that are compatible with the carbon dioxide stream <u>conditions to which the plugs and plugged wells will be exposed.</u></p> <p>Discussion: This is unfortunate wording. Once plugged, these wells are not going to be exposed to the carbon dioxide stream itself. The following sentence is better: “Therefore, the owner or operator must demonstrate, to the satisfaction of the UIC Program Director, that the wells will be plugged in a manner that will resist degradation in the presence of carbon dioxide or carbonic acid.” But it would be even clearer to say that “the wells will be plugged in a manner that will resist degradation in the presence of the fluids to which those plugged wells will be exposed.”</p>	<p>EPA acknowledges the CSC’s suggested edits. EPA agrees that the Guidance section in question needs additional clarification.</p> <p>To address this comment, EPA edited the section as follows: “...one important consideration is that Class VI injection wells must be plugged using methods and materials that are compatible with the carbon dioxide stream. Additionally, EPA recommends that, when selecting plugging materials and methods, the owner or operator consider the formation fluids and conditions to which the materials will be exposed.”</p>
3	CSC	<p>p. 38 lines 22-23. Recommended Revision: The composition of the carbon dioxide <u>injectate and formation fluid geochemistry, including any geochemical changes anticipated during the post-injection period</u>, which can affect appropriate plugging and cementing materials; and</p> <p>Discussion: At the very least, this should say “carbon dioxide stream” rather than carbon dioxide. More importantly, it is not the CO₂ stream, but the combination of the CO₂ stream with formation fluid that must be considered. This is the right question: “Are the plugs and the cement that the owner or operator proposes to use appropriate for the injectate and formation fluid geochemistry, including any geochemical changes anticipated during the injection period?” Draft Guidance at 38 These same considerations could apply to the post-injection period as well.</p>	<p>EPA acknowledges the CSC’s suggested edits. EPA agrees that the Guidance section in question needs additional clarification.</p> <p>To address this comment, EPA edited the section as follows: “The composition of the carbon dioxide stream and formation fluid geochemistry, including any geochemical changes anticipated during the post-injection period, which can affect appropriate plugging and cementing materials; and”</p>
4.2 UIC Program Director’s Evaluation of the Injection Well Plugging Plan			
4	CSC	<p>p. 39 lines 13-16. The GS rule does not include any express requirement to</p>	<p>EPA believes that this statement reflects the UIC</p>

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		provide such “additional data” for the Injection Well Plugging Plan. Accordingly, the guidance should provide a citation to the authority on which this statement is based so that Directors and permit applicants can appropriately assess their respective responsibilities for collecting and reviewing this information.	Program Director’s authority under SDWA to impose any requirements needed (including requesting additional data) to protect USDWs.
4.3 Amending the Injection Well Plugging Plan			
5	CSC	p. 39 lines 32-35. The Guidance should recognize and discuss how the responsibility to review and amend the Injection Well Plugging Plan relates to the responsibility for maintaining financial responsibility under section 146.85.	Chapter 8 of the Financial Responsibility Guidance discusses responsibilities for both owners or operators and the Director resulting from plan updates, including updates to the Injection Well Plugging Plan.

Comments on Chapter 5

#	Commenter	Comment	EPA Response
5. Post-Injection Site Care (PISC) and Site Closure Plan			
1	Texas RRC	<p>p. 40 lines 38-40. The RRC believes that the word “extensive” is not appropriate and recommends the following revisions: “Following cessation of injection activities, Class VI injection well owners or operators must conduct <u>appropriate</u> [extensive] site monitoring until the movement of the carbon dioxide plume and pressure front have ceased and the injectate does not pose a risk to USDWs.”</p>	<p>EPA acknowledges the Texas RRC’s suggested edit to the Guidance section in question. EPA agrees that the Guidance section in question needs additional clarification.</p> <p>To address this and another comment, EPA edited the sentence as follows: “Following cessation of injection activities, Class VI injection well owners or operators must conduct comprehensive site monitoring until the owner or operator can demonstrate to the UIC Program Director that the GS project does not pose a risk to USDWs.”</p>
2	CSC	<p>p. 40 lines 38-40. Recommended Revision: Following cessation of injection activities, Class VI injection well owners or operators must conduct extensive site monitoring until the movement of the carbon dioxide plume and pressure front have ceased and the injectate does not pose a risk to USDWs <u>the geologic sequestration project does not pose an endangerment to USDWs.</u></p> <p>Discussion: Use of the word “extensive” is inappropriate as the amount of monitoring required will be determined on a site-specific basis according to the PISC plan. In addition, the Guidance should not state that the operator must demonstrate that “movement of the carbon dioxide plume and pressure front have ceased and the injectate does not pose a risk to USDWs.” It is not necessary that movement of the plume cease completely, which may not happen in many cases because some subsurface movement of formation fluids is normally expected. Nor should the Guidance suggest that it is necessary to demonstrate that the injectate “does not pose a risk” as there will always be some level of risk, albeit of a de minimis and acceptable nature. It is only necessary to show that the geologic sequestration project will not pose an endangerment of USDWs. And this wording is better than formulations using “will no longer pose”, which suggests that geologic sequestration projects were endangering USDWs during normal permitted operations.</p>	<p>EPA acknowledges the CSC’s suggested edits. EPA agrees that the Guidance section in question needs additional clarification.</p> <p>To address this and another comment, EPA edited the sentence as follows: “Following cessation of injection activities, Class VI injection well owners or operators must conduct comprehensive site monitoring until the owner or operator can demonstrate to the UIC Program Director that the GS project does not pose a risk of endangerment to USDWs.”</p>
3	CSC	<p>p. 41 lines 8-11: Guidance Statement: The PISC and Site Closure Plan will</p>	<p>EPA acknowledges the CSC’s suggested edits. EPA</p>

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#	Commenter	Comment	EPA Response
		<p>also help identify the appropriate types and amounts of data needed to determine that the injected fluid and the carbon dioxide plume and pressure front do not endanger USDWs, and it will support a determination of the conditions that warrant an end to PISC (i.e., there is no longer a risk of endangerment to USDWs) [§146.93(a)].</p> <p>Discussion: The first part of this statement provides a much better indication of the requirements, but the parenthetical reverts back to use of the “no longer” misnomer, suggesting that there was a time in the life of a geologic sequestration when it was acceptable for the project to endanger USDWs and that we are waiting for that risk to decline to an acceptable level. The point is to be able to project on the basis of the available information that the discontinued project will not endanger USDWs.</p>	<p>agrees that the Guidance section in question needs additional clarification.</p> <p>To address this comment, EPA edited the parenthetical to read as follows: “... (i.e., the GS project no longer poses an endangerment to USDWs)...” This matches text at 40 CFR 146.93(b)(1).</p>
5.1 Developing the Post-Injection Site Care and Site Closure Plan			
4	CSC	<p>p. 41 lines 16-18. Recommended Revision: Owners or operators must submit a PISC and Site Closure plan that outlines the proposed post-injection monitoring strategies and how non-endangerment of USDWs will be demonstrated <u>maintained</u> throughout the PISC period.</p> <p>Discussion: Should be to demonstrate <i>continuing</i> non-endangerment for the reasons stated above.</p>	<p>EPA acknowledges the CSC’s suggested edits. EPA agrees that the Guidance section in question needs additional clarification.</p> <p>To address this comment, EPA edited the section to read as follows: “...how non-endangerment of USDWs will be ensured throughout the PISC period.”</p>
5.1.1 Pre-injection and predicted post-injection pressure differentials in the injection zone			
5		No comments on this section.	
5.1.2 Predicted position of the carbon dioxide plume and pressure front at site closure			
6	CSC	<p>p. 42 lines 19-21. Recommended Revision: Site closure refers to the point at the end of PISC, following a demonstration that fluid movement has slowed and pressures have declined to the point that there is no longer <u>not</u> a risk of endangerment to USDWs from the carbon dioxide injection activities.</p> <p>Discussion: Again, the wording should be improved to reflect what is actually required. We acknowledge that some difficulty is inherent in the wording of the rule itself, which we have asked to have clarified or revised. But especially in light of the potentially confusing wording of the rule, it is all the more important for the Guidance to provide the necessary clarification.</p>	<p>EPA acknowledges the CSC’s suggested edits. EPA agrees that the Guidance section in question needs additional clarification.</p> <p>To address this comment, EPA edited the sentence to be consistent with 40 CFR 146.93(b)(1).</p>
7	C12	<p>p. 42 lines 19-21. Site Closure should not occur unless threats to USDWs are removed. The Project Plan Guidance refers to arbitrary monitoring periods (e.g., 50 years after injection ceases) as opposed to time periods necessary to ensure protection of USDWs. As the overall purpose of the Class VI Rules is to ensure protection of USDWs, the Project Plan Guidance</p>	<p>EPA acknowledges the comments on the Guidance from C12, but clarifies that the rule sets the schedule and timeframe of site closure. EPA notes that comments on the rule are beyond the scope and intent of this Guidance comment period.</p>

#	Commenter	Comment	EPA Response
		<p>should not authorize site closure until threats to USDWS are removed. The Project Plan Guidance states that: Site closure refers to the point at the end of PISC, following a demonstration that fluid movement has slowed and pressures have declined to the point that there is no longer a risk of endangerment to USDWs from the carbon dioxide injection activities.²⁰ As set out below, the definition of site closure should be revised to exclude any notion of “slow fluid movement” and replace it with the notion that the CO₂ plume must remain within the MESPOP. ²¹ The key differences between the approach articulated in the Project Plan Guidance and that encompassing the idea of containing CO₂ plumes within the MESPOP is best illustrated by three case examples:</p> <p>1) Case A: Injection under a slightly updipping caprock. The MESPOP may extend many tens (or even hundreds) of miles in the updip direction as CO₂ migrates post-injection. Only once the entire plume has ceased to move, due to the combined actions of residual trapping, dissolution, mineralization, and small pockets of buoyant trapping, does the plume no longer represent a possible danger to overlying USDW. The original definition of site closure would presumably allow an operator to close a site while the plume is still moving, such that the eventual MESPOP may not yet be fully known. During plume migration, due to uncertainty subsurface properties, this moving plume may still represent a danger to USDWs. Therefore, the onus should be on the operator to demonstrate that the plume will remain within a conservatively estimated MESPOP, and that it will pose no danger to USDW within that MESPOP prior to site closure.</p> <p>2) Case B: Injection near the top of a structural trap. During the injection phase, CO₂ will most likely have pooled near the top of the structural trap under the action of buoyancy, and displaced native brine. When injection ceases, the plume may redistribute slightly as gravity becomes the main driving force (rather than injection pressures); always pushing the CO₂ upwards. Fluid motion will be slow, and pressures will have declined substantially, so that the original definition of site closure is adequate. The proposed definition of site closure is also adequate, since the MESPOP is determined by the topography of the injection formation / caprock interface; and known well in advance of cessation of injection.</p> <p>3) Case C: Injection below the spill point of a structural trap. During the injection phase, CO₂ will flow in whichever direction is dictated by</p>	

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#	Commenter	Comment	EPA Response
		<p>injection pressure, buoyancy, groundwater flow, and subsurface heterogeneity. A significant portion of the CO₂ will migrate upwards to above the spill point of the structural trap, but some fraction of the free phase CO₂ will not yet have accumulated within the spill point by the cessation of injection activities. When injection ceases, this free phase CO₂ will rise, driven by buoyancy, and eventually ‘fill up’ the structural trap, as well as any conformable baffle-like structures below the main injection formation / caprock interface. Although the fluid may still move such that the original definition of site closure may consider the motion ‘too fast’, pressures are low, and the CO₂ is bound by geology and physics to remain within the MESPOP. This MESPOP is determined by the topography of the injection formation / caprock interface; and known well in advance of cessation of injection.²²</p> <p>18 Project Plan Guidance, p. 12. 19 The problem of contradictory, or simply differing, requirements from the other guidance documents is endemic throughout the Project Plan Guidance, and warrant serious review and revision if EPA decides to retain the Project Plan Guidance. 20 Project Plan Guidance, p. 42. 21 See C12 Comments on Area of Review Guidance for more information on the importance of the MESPOP in protecting USDWs. 22 Note that Case C may be the more desirable case from the perspective of fully utilizing available pore space in a given areal footprint; the guidance documents should be written in such a way that they allow for this more optimal use of the natural resource, while still protecting USDW in every possible way.</p>	
5.1.3 Monitoring location, methods, and proposed frequency			
8	CSC	<p>p. 43 lines 3-5 We are also concerned about the tendency in the draft Guidance to focus on meeting other expectations or criteria that are not necessarily related directly to the proper focus on protecting USDWs from endangerment. For example, the draft says (page 43) that reduced post-injection monitoring may be appropriate if the operator can demonstrate “that no geochemical changes are occurring” when the proper focus would be on whether monitoring can be reduced without endangering USDWs. It seems unrealistic to assume that operators will ever be able to demonstrate that “no geochemical changes are occurring”.</p>	<p>EPA acknowledges the CSC’s comment. EPA agrees that it is unlikely that operators will be able to demonstrate that no geochemical changes are occurring.</p> <p>To address this comment, EPA edited the section to read as follows: “Reduced monitoring frequencies and parameters may be appropriate as the owner or operator demonstrates, based on monitoring data, that movement of the carbon dioxide plume and pressure front is slowing and that there are no adverse changes in ground water geochemistry that could indicate that USDWs are</p>

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#	Commenter	Comment	EPA Response
			being endangered.”
9	CSC	<p>p. 43 lines 2-5. Recommended Revision: Reduced monitoring frequencies and parameters may be appropriate as the owner or operator demonstrates, based on monitoring data, that injection-induced movement of the carbon dioxide plume and pressure front is slowing and that no fluid movement and geochemical changes are occurring resulting from the geologic sequestration project do not endanger USDWs.</p> <p>Discussion: Reductions in monitoring frequency and parameters should not require a demonstration that subsurface fluid movement has ceased or that there are “no geochemical changes occurring” either of which may never happen. The question is whether any changes occurring are well enough understood to conclude that they will not endanger USDWs.</p>	<p>EPA acknowledges the CSC’s comment. EPA agrees that it is unlikely that operators will be able to demonstrate that no geochemical changes are occurring.</p> <p>To address this comment, EPA edited the section to read as follows: “Reduced monitoring frequencies and parameters may be appropriate as the owner or operator demonstrates, based on monitoring data, that movement of the carbon dioxide plume and pressure front is slowing and that there are no adverse changes in ground water geochemistry that could indicate that USDWs are being endangered.”</p>
10	CSC	<p>p. 43 lines 8-9. Should be “these data”. This is a change to be made throughout all of the guidance documents. “Data” is the plural form of the noun.</p>	<p>Both uses of data (i.e., as a singular and plural term) are acceptable.</p>
5.1.4 Schedule for submitting post-injection site care monitoring results			
11	CSC	<p>p. 43 lines 19-22. Recommended Revision: The owner or operator and the UIC Program Director may wish to consider the submittal of these reports as an opportunity to discuss the rate of fluid movement decline, pressure changes reductions, and any other significant processes within the subsurface, as well as whether modifying the testing frequency is appropriate.</p> <p>Discussion: Again, the Guidance should be very clear about what is anticipated to be happening as well as what is acceptable.</p>	<p>EPA believes the discussion should also describe situations where the site is not performing as expected/ desired. Pressure changes can include increases or decreases, both of which may warrant changes to monitoring frequency.</p>
5.1.5 Demonstration of an alternative post-injection site care timeframe			
12	CSC	<p>p. 43 line 30 Finally, we are concerned that the draft Guidance does not take the opportunity to clarify that the provisions allowing an operator to make a demonstration supporting approval of an alternative post-injection site care period are available throughout the lifetime of the project. We support allowing operators to make such demonstrations and want to be sure that this option will be open throughout the lifetime of a GS project so that an operator will be encouraged and able to use monitoring and operational data and experience to support and periodically improve such a demonstration. Our concern arises from the use of the words “during the permitting process” in section 146.93(c) of the final rule (and on page 43 of the draft Guidance), the statement in the preamble to the final rule that “[t]his demonstration must be submitted as part of the permit application pursuant</p>	<p>EPA added text to Section 5.3 of the Guidance to explain how the owner or operator may, at any time during the life of the project (including as part of a PISC and Site Closure Plan amendment), submit information to support establishing an alternative PISC timeframe or revising the PISC timeframe in the original PISC and Site Closure Plan.</p>

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		<p>to § 146.82(a)(18)” (75 Fed. Reg. at 77267) and from presentations by EPA officials following promulgation of the rule stating that this demonstration must be made “at the time of permitting.” Considered together, these statements appear to indicate that there is only a one-time opportunity to make such a demonstration in the original permit application and not at any later time. Because Class VI permits are effective for the life of the project, the “permitting process” is arguably completed once the permit is issued. To be effective and to provide incentives for the best possible understanding and projections of GS project performance, the Guidance should clearly state that these demonstrations are allowed at every stage of the project, which is what we believe was intended. (See also the MSD letter to EPA Administrator Jackson on May 20, 2011.)</p>	
13	CSC	<p>p. 43 lines 30-32. This should not be discretionary and it should be available during the entire lifetime of the project. We are concerned that the provisions allowing an operator to make a demonstration supporting approval of an alternative postinjection site care period will not operate as was intended by EPA. We support allowing operators to make such demonstrations but want to be sure that this option will be open throughout the lifetime of a GS project so that an operator will be encouraged and able to use monitoring and operational data and experience to support and periodically improve such a demonstration. Our concern arises from the use of the words “during the permitting process” in section 146.93(c) of the final rule, the statement in the preamble to the final rule that “[t]his demonstration must be submitted as part of the permit application pursuant to § 146.82(a)(18)” (75 Fed. Reg. at 77267) and from presentations by EPA officials following promulgation of the rule stating that this demonstration must be made “at the time of permitting.” Considered together, these statements appear to indicate that there is only a one-time opportunity to make such a demonstration in the original permit application and not at any later time. Because Class VI permits are effective for the life of the project, the “permitting process” is arguably completed once the permit is issued. To be effective and to provide incentives for the best possible understanding and projections of GS project performance, these demonstrations must be allowed at every stage of the project, which is what we believe was intended.</p>	<p>EPA added text to Section 5.3 of the Guidance to explain how the owner or operator may, at any time during the life of the project (including as part of a PISC and Site Closure Plan amendment), submit information to support establishing an alternative PISC timeframe or revising the PISC timeframe in the original PISC and Site Closure Plan.</p>
14	C12	<p>p. 43 lines 30-45. The timeframe for post injection site care should be set by a demonstration that fluid movement is constrained to within the eventual MESPOP, and pressures have declined to the point that there is no longer a risk of endangerment to USDWs from the carbon dioxide injection activities.</p>	<p>EPA added text to Section 5.3 of the Guidance to explain how the owner or operator may, at any time during the life of the project (including as part of a PISC and Site Closure Plan amendment), submit information to support establishing an alternative PISC timeframe or</p>

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#	Commenter	Comment	EPA Response
		<p>The default 50 year period, as provided in the Project Plan Guidance, should be revised to ensure protection of USDWs.²³ There is simply no guarantee – especially in the case of a migrating CO2 plume – that USDWs will be protected after a 50 year post injection period. It is likely that default ‘settings’ will be adopted readily by Program Directors, and strongly argued for by CO2 storage operators. The Project Plan Guidance should guard against such a situation, and guarantee that USDWs are protected into the future.</p> <p>23 See Project Plan Guidance, pp, 43, 46.</p>	<p>revising the PISC timeframe in the original PISC and Site Closure Plan.</p>
15	CSC	<p>pp. 43-44 lines 44-2. It is totally absurd to limit this to the initial permitting process; it must be available throughout the life of the project so that it can be based and updates on the data and experience developed in the project. Although we believe it would be best to revise some provisions of the final rule to clarify that demonstrations of alternative time frame can be made throughout the project life, it is important for the Guidance to make this clarification. Indeed, the importance of making this clarification increases in the absence of any change to the regulatory language.</p>	<p>EPA added text to Section 5.3 of the Guidance to explain how the owner or operator may, at any time during the life of the project (including as part of a PISC and Site Closure Plan amendment), submit information to support establishing an alternative PISC timeframe or revising the PISC timeframe in the original PISC and Site Closure Plan.</p>
16	CSC	<p>p. 44 lines 4-16. Guidance Statement: The following factors may be considered and included in developing the post-injection site care and site closure plan: • The predicted size and shape of the AoR, which would affect the number and location of monitoring wells or the extent of geophysical surveys; • Predicted pressure changes during and following injection, e.g., the rate at which pressures are predicted to decline, which would impact appropriate testing frequencies; • The site characteristics, depth and proximity of USDWs and the depth and thickness of the confining zone(s), which may affect the amount of monitoring needed; • Baseline subsurface aqueous- and solid-phase geochemistry at the site and the composition of the carbon dioxide, which would impact ground water monitoring needs; and • Planned information needs for non-endangerment demonstrations for determining the end of the PISC period.</p> <p>Discussion: The Guidance should recognize that all of these factors are subject to change as the project proceeds, increasing the importance of being able to modify the project plans as well as being able to modify any alternative time frame demonstration at any stage of the project.</p>	<p>EPA added text to Section 5.3 of the Guidance to explain how the owner or operator may, at any time during the life of the project (including as part of a PISC and Site Closure Plan amendment), submit information to support establishing an alternative PISC timeframe or revising the PISC timeframe in the original PISC and Site Closure Plan.</p> <p>Section 5.3 of the Guidance also provides considerations regarding amending the post-injection site care plan, and the Injection Well Plugging and Post-Injection Site Care Guidance addresses early non-endangerment demonstrations.</p>
17	Texas RRC	<p>p. 43 lines 34-41. The applicable rule (appropriately cited in the previous paragraph of the draft guidance, page 43) is §146.93(a)(2)(v), which does</p>	<p>EPA clarifies that it included the “specifics” referenced by the commenter as examples, and clarifies that these</p>

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#	Commenter	Comment	EPA Response
		<p>not include “specifics.” In addition, three of the “specifics” listed are not included anywhere in the new rules: “site-specific chemical processes that will result in carbon dioxide trapping; the predicted rate of carbon dioxide trapping; ...and laboratory analyses or studies to verify the information on trapping.” The RRC was unable to find where these three are listed as criteria or objectives in the rules. At best, these three are implied and may be useful, but do not otherwise appear to be required by rule. The others listed appear to be required under §146.82 and §146.83, but are not stated as criteria to be considered under §146.93.</p> <p>Therefore, in accord with the guidance disclaimer, the RRC recommends the following revisions: “The demonstration should must be based on site-specific information, including the results of site-specific computational modeling; the predicted timeframe for pressure decline; the predicted rate of carbon dioxide plume migration; site-specific chemical processes that will result in carbon dioxide trapping; the predicted rate of carbon dioxide trapping; characterization of the confining zone(s); laboratory analyses or studies to verify the information on trapping; the presence of potential conduits for fluid movement and the quality of abandoned well plugs within the AoR; the distance between the injection zone and USDWs above and/or below the injection zone; and any additional site-specific factors determined by the UIC Program Director.”</p>	<p>examples are not part of the rule.</p> <p>To address this comment, EPA edited the section to read as follows: “to be acceptable to the UIC Program Director, the demonstration should be based on...”</p>
5.1.6 Site Closure Plan			
18		No comments on this section.	
5.2 UIC Program Director’s Evaluation of the Post-Injection Site Care and Site Closure Plan			
19	API	The Guidance does not mention whether a certificate of closure that is issued by the Program Director could serve as the initializing instrument for a long-term liability program.	EPA clarifies that the Class VI rule does not address long-term liability. Owners or operators may be released from all financial responsibility instruments based on certifications submitted to the UIC Program Director indicating that all GS activities have been completed in accordance with the post injection site care and site closure plan. However, after PISC has ended, owners or operators are still financially liable for the site.
20	CSC	p. 44 lines 42-44. This is an excellent restatement of the requirement.	EPA acknowledges the comments on the Guidance from the CSC.
21	CSC	pp. 45-46 lines 44-1. As noted in the Multi- Stakeholder Recommendations that we joined on a number of occasions, we support allowing the potential for continued monitoring after site closure, but we are concerned that the final regulations can be read to preclude that result. That being the case, it is	EPA clarifies that continued monitoring after site closure is not allowed; there is no authority to keep these wells open past closure.

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#	Commenter	Comment	EPA Response
		<p>important for the Guidance to clarify that this is allowed and to explain the steps to be taken to ensure that any future monitoring will not endanger USDWs and that there will be adequate provision for the management and closure of those monitoring wells. See the MSD recommendations filed with EPA on October 9, 2009, proposed section 146.25(k)(2)(iii) and (4) (language is quoted in the column to the left). [below in blue here]</p> <p>(iii) Prior to authorization for site closure, the owner or operator must demonstrate to the Director, 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. The owner or operator must demonstrate, based on the current understanding of the site, including monitoring data and/or modeling, all of the following: * * *</p> <p>(F) any remaining project monitoring wells at the site are being used and managed pursuant to a plan approved by the Director in accordance with §146.25(k)(4). * * *</p> <p>(4) After the Director has authorized site closure, the owner or operator must plug all monitoring wells in a manner which will not allow movement of injection or formation fluids that endangers an USDW except that designated wells may remain unplugged pursuant to §146.25(k) (2)(iii)(F) with the consent of the owner and operator and pursuant to a post-closure monitoring and plugging plan approved by the Director which shall provide for, and designate the person responsible for, operating and plugging all such monitoring wells in a manner which will not allow movement of injection or formation fluids that endangers an USDW.</p>	<p>To address this comment, EPA clarified in the Guidance that monitoring after site closure is prohibited.</p>
5.3 Amending the Post-Injection Site Care and Site Closure Plan			
22		No comments on this section.	

Comments on Chapter 6

#	Commenter	Comment	EPA Response
6. Emergency and Remedial Response Plan			
1		No comments on this section.	
6.1 Developing the Emergency and Remedial Response Plan			
2	CSC	p. 49 lines 2-6. The guidance states that all potentially impacted resources or infrastructure near Class VI injection wells are to be identified and may include, the “biosphere/ecosystems, the atmosphere, and the geosphere.” These are very broad terms and by definition, could include every conceivable entity within the AoR. Further guidance should provide clarification on how to define those entities that could be affected by a GS project or and some reasonable limits on the scope of the Emergency and Remedial Response Plan.	EPA clarifies that this language reflects the Vulnerability Evaluation Framework and that it is intended to recommend as inclusive an emergency and remedial response plan as possible that reflects consideration of all potentially affected resources.
3	AEP	p. 49 lines 2-6. The guidance states that all potentially impacted resources or infrastructure near Class VI injection wells are to be identified and may include, the "biosphere/ecosystems, the atmosphere, and the geosphere." These are very broad terms and by definition, could include every conceivable entity within the AoR. Further guidance or how to define those entities that could be affected by a CCS project or some reasonable limits on the scope of the Emergency and Remedial Response Plan would be appropriate.	EPA clarifies that this language reflects the Vulnerability Evaluation Framework and that it is intended to recommend as inclusive an emergency and remedial response plan as possible that reflects consideration of all potentially affected resources.
4	CSC	p. 49 lines 23-24. This provides excellent guidance.	EPA acknowledges the comments on the Guidance from the CSC.
6.2 UIC Program Director’s Evaluation of the Emergency and Remedial Response Plan			
5	NGOs	p. 51 lines 21-28. Along similar lines, EPA when evaluating an Emergency and Remedial Response Plan, EPA should examine whether response can be initiated in a timely fashion based on detection mechanisms (p. 51). In addition to the factors listed in the draft Guidance that the Director should use to evaluate the Emergency and Remedial Response Plan, particular attention should be given to the feasibility to initiate emergency and remedial response in a timely manner. Among other factors, this will depend on the ability to detect the exceedance of key parameters and monitored values. A rapid response is often crucial in minimizing and preventing further damage and to reducing the degree of remediation needed. Even if the Emergency and Remedial Response Plan identifies the right course of action, the Plan’s sufficiency should also be evaluated against the ability to initiate it in time. This ties in with our immediately preceding comment on the ability of the Testing and Monitoring Plan to detect the necessary	EPA acknowledges the NGOs’ comments. EPA agrees that the Guidance section in question needs additional clarification. To address this comment, EPA added the following to the list of factors to consider in the UIC Program Director’s evaluation: “Does the plan include proper procedures, including ties to the testing and monitoring plan, for quickly detecting and responding to situations that may endanger USDWs?”

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#	Commenter	Comment	EPA Response
		changes in a timely fashion.	
6.3 Amending the Emergency and Remedial Response Plan			
6	CSC	p. 54 lines 6-10. Minor amendments should include all changes in contact information.	EPA agrees and clarifies that a contact name change does not result in a permit modification.

Comments on Appendices

#	Commenter	Comment	EPA Response
General Comments on Appendices			
1	Texas RRC	Appendices A through F appear to be helpful suggestions in drafting the plans required under rule.	EPA acknowledges the comments on the Guidance from the Texas RRC.
Appendix A Sample Template of an Area of Review and Corrective Action Plan			
2	CSC	p. A-5 line 25 Triggers for More Frequent AoR Reevaluations. Discussion: Should just be triggers for AoR reevaluation	EPA acknowledges the CSC’s suggested edit to the Guidance section in question. EPA agrees that the edit will add clarity. EPA changed the title of the table to: “Triggers for AoR reevaluation prior to next scheduled reevaluation.”
Appendix C Sample Template of an Injection Well Plugging Plan			
3	CSC	p. C-3 figure 1st box. Diameter of Boring in Which Plug Will be Placed. Discussion: Shouldn’t this be diameter of the casing?	EPA clarifies that this box is consistent with form 7520-14. The casing may or may not be pulled prior to plugging.
4	CSC	p. C-3 figure 2nd box. Depth to Bottom of Tubing or Drill Pipe. Discussion: Should be casing.	EPA clarifies that this box is consistent with form 7520-14. The casing may or may not be pulled prior to plugging.
5	CSC	p. C-3 figure 9th box. Method of Emplacement (e.g., balance method, retainer method, or two-plug method). Discussion: Will the casing be breached to anchor the plug?	EPA clarifies that this box is consistent with form 7520-14. The casing may or may not be pulled prior to plugging.
Appendix D Sample Template of a PISC and Site Closure Plan			
6	CSC	p. D-5 line 1. Proposed Schedule for Submitting Post-Injection Monitoring Requests. Discussion: “Requests” should be “Results”.	EPA acknowledges the CSC’s suggested edit to the Guidance section in question. EPA agrees that the edit will add clarity. EPA incorporated the suggested edit.
Appendix F Checklist of Recommended Considerations for Evaluating Plans and Amendments			
7	C12	Appendix F should be modified to: <ul style="list-style-type: none"> o Require determination of the final resting place of the CO2 plume as well as its location at 100 year, 500 year, and 1000 year timeframes. o Require access for site monitoring at all stages of CO2 plume migration. <p>The checklist is excellent, but it should include questions about the long-term fate of the CO2 plume, as well as access for monitoring purposes in the future, to ensure protection of USDWs for all time.</p>	EPA clarifies that Appendix F is a list of factors and actions to consider, not a list of required actions. EPA addresses the long-term fate of the carbon dioxide plume elsewhere in the Guidance.

