

IN RE FUTUREGEN INDUSTRIAL ALLIANCE, INC.

UIC Appeal Nos. 14-68 to 14-71

ORDER DENYING REVIEW

Decided April 28, 2015

Syllabus

In this consolidated appeal, the Leinberger Family (Andrew H. Leinberger Family Trust and DJL Farm LLC) and William and Sharon Critchelow (“Petitioners”) petitioned the Environmental Appeals Board to review four Class VI Underground Injection Control permits that the U.S. Environmental Protection Agency Region 5 issued to FutureGen Industrial Alliance, Inc. (“FutureGen”). These Class VI permits authorize FutureGen to construct and operate four geologic sequestration wells for the purpose of injecting and storing carbon dioxide, a process also known as carbon sequestration. The FutureGen permits are among the first permits issued under regulations that EPA promulgated to govern carbon sequestration wells in the United States.

Petitioners raised a number of issues with respect to the permit decision. Petitioners first assert that the FutureGen’s modeling materially understates the size of the anticipated carbon dioxide plume. Next, Petitioners assert that FutureGen’s and the Region’s justification for the number and placement of monitoring wells is inadequate. Petitioners then argue that the Region inadequately identified wells within the area of review and failed to investigate reported well impacts. Finally, Petitioners challenge the financial responsibility provisions of the permits on a number of grounds including: (1) the amount of financial responsibility required for emergency and remedial response costs; (2) the use of a trust fund as the sole instrument for financial assurance; (3) an improper pay-in-period; and (3) the failure to require financial assurance for the life of the permit.

Held: Petitioners have identified no clear error of fact or law, abuse of discretion, or matter of policy warranting the Board’s review under 40 C.F.R. § 124.19(a)(4).

First, contrary to Petitioners’ arguments, Region 5 was not required to independently model the anticipated plume and Region 5 conducted a thorough review of FutureGen’s modeling in a manner fully consistent with the Region’s obligations under the regulations. Additionally, Petitioners’ technical arguments concerning the size and shape of the plume are immaterial, given the relative size of the delineated area of review, which is based on the pressure front rather than the plume. Moreover, the Board

defers to the Region's well-explained and supported technical determinations with respect to the modeling of the plume. Finally, notwithstanding Petitioners' argument to the contrary, the Region did not rely on the requirement for further future evaluation of the area or review as a substitute for adequately delineating the area of review in this permit proceeding. Rather, the Region pointed out the reevaluation provisions as added reassurance. In sum, the Region did not err or abuse its discretion in approving the area of review for the FutureGen permits.

Second, the administrative record reflects that the Region reviewed and approved the number and placement of the monitoring wells for the FutureGen permits in a manner consistent with the discretion afforded by the regulations. The Board will not second guess the Region's clear and supported rationale, particularly where Petitioners have identified no flaw in the monitoring plan warranting review.

Third, the Region did not clearly err or abuse its discretion in identifying and considering wells within the area of review. Owners or operators of Class VI wells are required to identify all wells within the area of review *that may penetrate the confining zone*. The Region's identification efforts took into account the stratigraphy of the 1,814 square mile area of review, as well as the depths of the thousands of wells it identified using the State's public databases. Based on that information, the Region reasonably determined that site reconnaissance, review of aerial and satellite imagery, and geophysical surveys were neither necessary nor appropriate. Moreover, Petitioners' identification of two wells on the Leinberger's property that were not identified by the Region, were not in the public databases, and for which there was no basis from which to assume the wells would come anywhere near the confining zone, is not indicative of a flawed well identification process. In sum, Petitioners have not established any error of abuse of discretion in the Region's well identification efforts.

Additionally, contrary to Petitioners' contention, the Region did investigate impacts to the Critchelow well that allegedly occurred contemporaneously with FutureGen's drilling of a stratigraphic well in 2011. The Region discovered no information from which it could conclude that the Critchelow drinking water well could in any way present a possible pathway for fluid migration from the confining layer. As such, the Region had no basis from which to conclude that the Critchelow well required corrective action.

Finally, the Region acted well within its discretion when it approved of FutureGen's demonstration of financial assurance for emergency and remedial response costs. The Region provided a clear explanation on the record for its approval of the amount of financial assurance for emergency and remedial response costs, as well as its approval of a trust fund as the sole mechanism for financial assurance and its corresponding rejection of the proposed insurance policy. The Region also appropriately approved a pay-in-period shorter than that suggested by the guidance. Furthermore, the requirement to maintain financial assurance for the life of the project that Petitioners seek is provided directly by the regulations.

For all the reasons provided in this decision, the Board denies the petitions in their entirety in this consolidated appeal.

Before Environmental Appeals Judges Leslye M. Fraser and Kathie A. Stein.

Opinion of the Board by Judge Fraser:

I. STATEMENT OF THE CASE

In four separate petitions, the Leinberger Family (Andrew H. Leinberger Family Trust and DJL Farm LLC) and William and Sharon Critchelow (collectively “Petitioners”) asked the Environmental Appeals Board (“Board”) to review four Class VI Underground Injection Control (“UIC”) permits that the U.S. Environmental Protection Agency (“EPA” or “Agency”) Region 5 (“Region”) issued to FutureGen Industrial Alliance, Inc. (“FutureGen”). Each of the four petitions raises identical challenges and differs only with respect to the specific permit challenged. For administrative efficiency, the Board¹ consolidated these petitions into one permit appeal.

The permits at issue authorize FutureGen to construct and operate four geologic sequestration wells (or “Class VI wells”) for the purpose of injecting and storing carbon dioxide (“CO₂”), a process known as “carbon sequestration.” These permits are among the first permits issued under the 2010 regulations that EPA promulgated to regulate carbon sequestration wells in the United States.² Notice of Public Comment on First Carbon Storage Draft Permits at 1 (Apr. 2014) (Administrative Record Index (“A.R.”)³ #16). Both the Region and FutureGen filed a consolidated response to the petitions, as well as surreplies in response to

¹ For ease of discussion in this decision, the Board uses the short citation of “Petitions” to refer to all four Petitions for Review filed under this consolidated appeal. The page numbers cited are the same for each separate petition.

² One other Class VI permit, also issued by EPA Region 5, became effective on December 1, 2014. *See In re Archer Daniels Midland Co.*, UIC Appeal No. 14-72 (EAB Nov. 26, 2014) (granting the voluntary dismissal of the petition for review of that permit).

³ The Index to the Administrative Record for each of the four final permits is identical, except for the permit number and the well that it identifies. For ease of discussion in this decision, the Board refers generically to “A.R.” and the index numbers cited are the same for each permit decision.

Petitioners' reply. Briefing was complete on December 17, 2014. The Board has determined that it will not hold oral argument on this matter. For the reasons discussed below, the Board denies all four Petitions for Review.

II. ISSUES ON APPEAL

The petitions in this matter present the following issues for resolution:

- A. Did the Region clearly err or abuse its discretion in approving the area of review for the permits ?
- B. Did the Region abuse its discretion in approving the monitoring network for the permits?
- C. Did the Region clearly err or abuse its discretion in identifying and considering wells and well impacts within the area of review?
- D. Did the Region clearly err or abuse its discretion in approving the financial responsibility conditions of the permits?

III. PRINCIPLES GOVERNING BOARD REVIEW

Section 124.19 of title 40 of the Code of Federal Regulations governs Board review of a UIC permit. In any appeal from a permit decision issued under part 124, the petitioner bears the burden of demonstrating that review is warranted. *See* 40 C.F.R. § 124.19(a)(4).

Under 40 C.F.R. § 124.19, the Board has discretion to grant or deny review of a permit decision. *See In re Avenal Power Ctr., LLC*, 15 E.A.D. 384, 394-95 (EAB 2011) (citing Consolidated Permit Regulations, 45 Fed. Reg. 33,290, 33,412 (May 19, 1980)), *remanded on other grounds sub nom. Sierra Club v. EPA*, 762 F.3d 971 (9th Cir. 2014). Ordinarily, the Board will deny review of a permit decision and thus not remand it unless the permit decision either is based on a clearly erroneous finding of fact or conclusion of law, or involves a matter of policy or exercise of discretion that warrants review. 40 C.F.R. § 124.19(a)(4)(i)(A)-(B); *accord, e.g., In re Prairie State Generating Co.*, 13 E.A.D. 1, 10 (EAB 2006), *aff'd sub nom. Sierra Club v. EPA*, 499 F.3d 653 (7th Cir. 2007); *see also* Revisions to Procedural Rules Applicable in Permit Appeals, 78 Fed. Reg. 5,281, 5,282 (Jan. 25, 2013). In considering whether to grant or deny review of a permit decision, the Board is guided by the preamble to the regulations authorizing appeal under part 124, in which the Agency stated that the Board's power to grant review "should be only sparingly exercised," and that

“most permit conditions should be finally determined at the [permit issuer’s] level.” Consolidated Permit Regulations, 45 Fed. Reg. 33,290, 33,412 (May 19, 1980); *see also* 78 Fed. Reg. at 5,282.

When evaluating a challenged permit decision for clear error, the Board examines the administrative record that serves as the basis for the permit to determine whether the permit issuer exercised his or her “considered judgment.” *See, e.g., In re Steel Dynamics, Inc.*, 9 E.A.D. 165, 191, 224-25 (EAB 2000); *In re Ash Grove Cement Co.*, 7 E.A.D. 387, 417-18 (EAB 1997). The permit issuer must articulate with reasonable clarity the reasons supporting its conclusion and the significance of the crucial facts it relied upon when reaching its conclusion. *E.g., In re Shell Offshore, Inc.*, 13 E.A.D. 357, 386 (EAB 2007). As a whole, the record must demonstrate that the permit issuer “duly considered the issues raised in the comments” and ultimately adopted an approach that “is rational in light of all information in the record.” *In re Gov’t of D.C. Mun. Separate Storm Sewer Sys.*, 10 E.A.D. 323, 342 (EAB 2002); *accord In re City of Moscow*, 10 E.A.D. 135, 142 (EAB 2001); *In re NE Hub Partners, LP*, 7 E.A.D. 561, 567-68 (EAB 1998), *review denied sub nom. Penn Fuel Gas, Inc. v. EPA*, 185 F.3d 862 (3d Cir. 1999).

The Board will uphold a permitting authority’s reasonable exercise of discretion if that decision is cogently explained and supported in the record. *See, e.g., In re Guam Waterworks Auth.*, 15 E.A.D. 437, 443 n.7 (EAB 2011) (discussing the abuse of discretion standard). *See Ash Grove*, 7 E.A.D. at 397 (“[A]cts of discretion must be adequately explained and justified.”); *see also Motor Vehicles Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 48 (1983) (“We have frequently reiterated that an agency must cogently explain why it has exercised its discretion in a given manner * * *.”).

On matters that are fundamentally technical or scientific in nature, the Board typically will defer to a permit issuer’s technical expertise and experience, as long as the permit issuer adequately explains its rationale and supports its reasoning in the administrative record. *See In re Dominion Energy Brayton Point, LLC (“Dominion I”)*, 12 E.A.D. 490, 510, 560-62, 645-47, 668, 670-74 (EAB 2006); *see also, e.g., In re Russell City Energy Ctr.*, 15 E.A.D. 1, 29-32, 66 (EAB 2010), *petition denied sub nom. Chabot-Las Positas Cmty. Coll. Dist. v. EPA*, 482 F. App’x 219 (9th Cir. 2012); *NE Hub Partners*, 7 E.A.D. at 570-71.

IV. REGULATORY FRAMEWORK

A. *Background on Carbon Sequestration*

As this Agency has explained, “climate change is happening now and the effects can be seen on every continent and in every ocean.” Federal Requirements Under the UIC Program for CO₂ Geologic Sequestration Wells, 75 Fed. Reg. 77,230, 77,234 (Dec. 10, 2010). The long-term future effects of climate change “pose considerable risks to human health and the environment.” *Id.* Science has shown that most of the recent warming of the planet can be attributed to the release of greenhouse gases, and of carbon dioxide (“CO₂”) in particular, into the atmosphere from human activities, such as the combustion of fossil fuels. *Id.* The level of greenhouse gases being released into the atmosphere is “increasing at a faster rate than at any time in hundreds of thousands of years.” *Id.* Notwithstanding the impending threats of climate change, the combustion of fossil fuels is expected to remain a significant source of energy production well into the 21st century, and concentrations of CO₂ will continue to increase “unless energy producers reduce CO₂ emissions to the atmosphere.” *Id.*

One option for reducing the amount of greenhouse gas emissions into the atmosphere is to geologically sequester CO₂ in deep subsurface rock formations for the purpose of long-term storage. *Id.* at 77,233-34. Geologic sequestration of CO₂ is one part of a larger process called carbon capture and sequestration (or storage), otherwise known as “CCS.” *Id.* Carbon dioxide is first captured from emission sources and compressed from a gaseous state to a supercritical state at high pressures where it exists as both a liquid and a gas. It then is delivered to the sequestration site by pipeline, or alternatively by tanker trucks or ships, where it is injected through wells into deep subsurface rock formations (at depths anticipated to be greater than 2,645 feet). *Id.* After being injected, CO₂ is sequestered (i.e., stored) by a combination of trapping mechanisms, including physical and geochemical processes. *See id.* at 77,233 (describing how CO₂ becomes trapped).

B. *EPA Regulations Governing Geologic Sequestration of Carbon Dioxide*

Recognizing the potential for geologic sequestration to reduce CO₂ emissions in the United States, in December 2010, the EPA promulgated regulations to govern geologic sequestration of CO₂, both to ensure the protection of underground sources of drinking water (“USDWs”) and to ensure consistency in permitting of geologic sequestration operations across the country. 75 Fed. Reg. at 77,230. EPA based the new regulations for geologic sequestration (Class VI) wells on the pre-existing UIC regulatory framework, with modifications to address the unique nature of CO₂ injection for geologic sequestration. The

regulations apply to owners and operators⁴ of Class VI wells and set minimum criteria for permitting. The permitting standards include technical criteria for geologic site characterization, for determining the area of review and corrective action, for establishing financial responsibility, and for well construction and operation, mechanical integrity testing, monitoring, well plugging, post-injection site care, and site closure. *See id.* at 77,230, 77,233; *see generally* 40 C.F.R. subpt. H.

When promulgating the permitting regulations for Class VI wells, the Agency recognized that uncertainties remain regarding geological sequestration and thus adopted an “adaptive rulemaking approach.” *Id.* at 77,240. By structuring the regulations to allow an iterative permitting program, which accounts for increased knowledge and operational experience as permitting moves forward, the Agency established necessary requirements during the earliest phases of geologic sequestration deployment, while also creating a mechanism for incorporating new research, data, and information on geologic sequestration technologies. *Id.* at 77,240-41; 40 C.F.R. §§ 146.84(e) (pertaining to the delineation of the area of review and corrective action requirements), 146.85(c)(2) (pertaining to the financial responsibility requirements), 146.90(j) (pertaining to the testing and monitoring requirements). The Agency anticipates that new information may provide increased protectiveness, streamline implementation, reduce costs or otherwise inform the requirements for geologic sequestration of CO₂. 75 Fed. Reg. at 77,241.

The four permits EPA issued to FutureGen were among the first final permits issued for Class VI wells for geologic sequestration of CO₂ under the new permitting regulations.⁵ In this consolidated appeal, Petitioners challenge the Region’s application of the Class VI regulations to the FutureGen project in establishing the terms of the permits.

V. ANALYSIS

Petitioners present the following four overarching issues for resolution in this appeal. First, Petitioners question the Region’s approval of the “area of review” for the permits. Second, Petitioners question the Region’s approval of

⁴ The regulatory phrase “owner or operator” refers, at the early stage of the permitting process, to the applicant for a proposed permit to own or operate an injection well.

⁵ *See* note 3, above.

the monitoring network for the permits. Third, Petitioners assert the Region did not adequately identify existing wells within the area of review and did not adequately investigate alleged impacts to an existing well for the purpose of determining whether corrective action was required. Finally, Petitioners challenge the Region's approval of the financial responsibility conditions of the permits. The Board addresses each of these issues in turn below.

Before doing so, however, the Board notes that in nearly every issue raised, in addition to alleging that the Region committed clear errors and abused its discretion, Petitioners also assert that the issue raises a matter of policy that the Board in its discretion should review. Petitioners' policy arguments essentially reflect disagreement with the underlying policy decisions EPA made when promulgating the Class VI regulations. *See* Petitions at 6-7 (expressing concern over the "unique risks" of geologic sequestration), at 15 (urging the "strict review" of the number and placement and monitoring wells), at 19 (arguing that "all wells, particularly those within a mile of the anticipated CO₂ plume," must be properly accounted for and analyzed for "a first-of-its-kind experimental injection well that exposes underground drinking water and people to danger"), and at 25 (urging the financial assurance requirements should be based on the highest estimates given the high degree of risks and the numerous unknowns associated with geologic sequestration).

The Class VI regulations underwent their own notice and comment process pursuant to 42 U.S.C. § 300h(a)(2) and 5 U.S.C. § 553 and are now final. *See also* Federal Requirements Under the UIC Program for CO₂ Geologic Sequestration Wells, 73 Fed. Reg. 43,492 (Jul. 25, 2008) (proposed rule); Notice of Data Availability and Request for Comment, 74 Fed. Reg. 44,802 (Aug. 31, 2009); *see also* 75 Fed. Reg. at 77,230 (final rule). To the extent that Petitioners are dissatisfied with the structure of the regulations, which provide for an iterative permitting process and give broad discretion to the permitting authority, or the policy judgments underlying those regulations, a petition for review to this Board is not the appropriate forum. *See In re Tondu Energy Co.*, 9 E.A.D. 710, 715-16 (EAB 2001) ("As the Board has repeatedly stated, permit appeals are not appropriate fora for challenging Agency regulations."); *In re City of Port St. Joe and Fla. Coast Paper Co.*, 7 E.A.D. 275, 287 EAB (1997) ("A permit appeal proceeding is not the appropriate forum in which to challenge either the validity of Agency regulations or the policy judgments that underlie them"). Under Part 124, the Board is charged with reviewing permitting decisions and determining whether the permitting authority has acted in accordance with Agency regulations; the Board is not charged with reviewing the underlying Agency regulations. *See generally* 40 C.F.R. § 124.19. Thus, despite Petitioners' urging,

the Board will not review the policy considerations underlying the duly promulgated Class VI regulations in the context of this permitting appeal.

A. The Region Did Not Clearly Err or Abuse Its Discretion in Approving the Area of Review

Petitioners first challenge the “area of review” that the Region approved for the FutureGen permits. The area of review is “the region surrounding the geologic sequestration project where [underground sources of drinking water] may be endangered by the injection activity.” 40 C.F.R. §§ 146.81, 146.84(a). Many of the permits’ substantive requirements derive from the delineated area of review. For example, the Class VI regulations require owners or operators to identify all wells penetrating the confining zone within the area of review that require corrective action, and then to perform that corrective action. *See id.* § 146.84(c)-(d). Additionally, the regulations state that owners or operators must use the data they collect and any modeling results they obtain in delineating the area of review to inform the monitoring frequency and spatial distribution of monitoring wells. *See id.* § 146.90(d). Thus, the delineation of the area of review is a critical component of a Class VI injection well permit.

1. Area of Review Regulatory Requirements

Applicants for a Class VI injection well permit must delineate the area of review for the permit, and that delineation must be approved by the permitting authority.⁶ 40 C.F.R. § 146.84(b). EPA’s regulations require the owner or operator of a Class VI permit to delineate the area of review using “computational modeling that accounts for the physical and chemical properties of all phases of the injected carbon dioxide stream and is based on available site characterization, monitoring and operational data.” *Id.* § 146.84(a); *see also id.* § 146.81(d) (defining area of review). The owner or operator must use the computational modeling (based on existing site characterization, monitoring and operational data) to “*predict*” the “projected lateral and vertical migration of *the carbon dioxide plume* and formation fluids in the subsurface from the commencement of injection activities until the plume movement ceases, until pressure differentials sufficient to cause the movement of injected fluids or formation fluids into [an

⁶ UIC regulations use the term “Director” to describe the permitting authority. 40 C.F.R. § 146.3. In this case, the permitting authority for the FutureGen permits is EPA’s Regional Administrator for Region 5. For clarity, the Board will refer to the “permitting authority,” “permit issuer,” or the Region, as appropriate, in places where the regulation uses the term “Director.”

underground source of drinking water] are no longer present, or until the end of a fixed time as determined by the [permitting authority].” 40 C.F.R. § 146.84(c)(1) (emphases added). These regulations also require that whenever monitoring and operational conditions warrant (but at a minimum fixed frequency not to exceed every five years), the permittee must reevaluate the area of review and submit an amended area of review and corrective action plan. *Id.* § 146.84(e). Thus, the delineation of the area of review under the regulations is very site- and project-specific, leaving much to the discretion of the permitting authority. *See generally id.* § 146.84.⁷

⁷ The relevant regulatory language is as follows:

(a) The area of review is the region surrounding the geologic sequestration project where [underground sources of drinking water] may be endangered by the injection activity. The area of review is delineated using computational modeling that accounts for the physical and chemical properties of all phases of the injected carbon dioxide stream and is based on available site characterization, monitoring, and operational data.

(b) The owner or operator of a Class VI well must prepare, maintain, and comply with a plan to delineate the area of review for a proposed geologic sequestration project, periodically reevaluate the delineation, and perform corrective action that meets the requirements of this section and *is acceptable to the [permitting authority]*. The requirement to maintain and implement an approved plan is directly enforceable regardless of whether the requirement is a condition of the permit. * * *

(c) Owners or operators of Class VI wells must perform the following actions to delineate the area of review and identify all wells that require corrective action:

(1) Predict, using existing site characterization, monitoring and operational data, and computational modeling, the projected lateral and vertical migration of the carbon dioxide plume and formation fluids in the subsurface from the commencement of injection activities until the plume movement ceases, until pressure differentials sufficient to cause the movement of injected fluids or formation fluids into a USDW are no longer present, or until the end of a fixed time period *as determined by the [permitting authority]* * * *.

* * * *

(e) At the minimum fixed frequency, not to exceed five years, as specified in the area of review and corrective action plan, or when monitoring and operational conditions warrant, owners or operators must:

2. *The Delineation of FutureGen's Area of Review*

Following the promulgation of the Class VI well regulations, EPA issued a guidance document for use in evaluating the area of review and determining corrective action requirements for Class VI UIC permits. *See* Office of Water, U.S. EPA, EPA 816-R-13-005, *Geologic Sequestration of Carbon Dioxide, Underground Injection Control (UIC) Program Class VI Well Area of Review Evaluation and Corrective Action Guidance* (May 2013) (“*AoR & Corrective Action Guidance*”). In this case, FutureGen delineated the area of review using a computational modeling tool that is one of the methods recognized in EPA’s area of review guidance.⁸ *See* U.S. EPA, *Underground Injection Control Permit, Class VI (“FutureGen Final Permits”)*,⁹ Attach. B (Area of Review and Corrective Action Plan), at B1 (Aug. 29, 2014) (A.R. #594); *AoR & Corrective Action Guidance*, at 28. The Region independently reviewed FutureGen’s modeling by evaluating and comparing each of the inputs and assumptions FutureGen used with the site characterization data and the proposed operational information, and then conducted its own run of the model. EPA Region 5 Consolidated Response to Petitions for Review (“Region’s Resp. Br.”) at 10. From its independent evaluation and review of the model, the Region confirmed the consistency of the model with those data and determined that FutureGen’s modeling approach was suitable for the proposed site. *Id.*; U.S. EPA Region 5, *Response to Comments for Draft Class VI Permits Issued to the FutureGen Industrial Alliance (“Response to Comments”)* at 57 (Aug. 29, 2014) (A.R. #511) (explaining that the Region’s assessment resulted in a plume area of 6.46 square miles, which the Region determined was consistent with FutureGen’s predicted plume of 6.35 square miles). The steps the Region took to independently evaluate FutureGen’s modeling are fully explained in the record. *See* FutureGen Alliance Class VI

(1) Reevaluate the area of review in the same manner specified in paragraph (c)(1) of this section[.]

* * * *

40 C.F.R. § 146.84 (emphases added).

⁸ The model used is the “Subsurface Transport Over Multiple Phases” or “STOMP.”

⁹ All references to the “FutureGen Final Permits” refer to the final UIC Class VI permits issued for all four FutureGen Class VI wells (i.e., IL-137-6A-0001 (FutureGen 2.0 Well #1), IL-137-6A-0002 (FutureGen 2.0 Well #2), IL-137-6A-0003 (FutureGen 2.0 Well #3), and IL-137-6A-0004 (FutureGen 2.0 Well #4)).

Injection Project: Evaluation of Area of Review Delineation and Corrective Action (“FutureGen Area of Review Eval.”) (Mar. 2014) (A.R. #296).

3. *Specific Issues*

Petitioners challenge the Region’s approval of FutureGen’s area of review on a number of grounds. The Board addresses each of these below.

a. *The Region Was Not Required to Independently Model the Plume*

Petitioners initially argue that the Region was required to “conduct” its own independent modeling and review of the area of review and could not rely on its “re-run” of FutureGen’s model “using the same parameters.” Petitions at 10, 12-13. In their reply brief, however, Petitioners concede that EPA guidance does not require the Region to create an independent model of the plume.¹⁰ Nevertheless, Petitioners continue to assert that the Region was obligated *in this case* to conduct independent modeling because the Region at least twice in the Response to Comments document stated that it “conducted independent modeling” of the area of review, and these statements would be misleading otherwise. Petitioners’ Consolidated Reply in Support of Their Petitions for Review (“Petitioners’ Reply”) at 10 (Dec. 4, 2014) (citing Response to Comments at 73, 76).

The Board disagrees. The record taken as a whole reflects that, as explained above, the Region conducted a thorough and independent *review* of FutureGen’s modeling that was fully consistent with its obligations under the regulations. *See* discussion in Part V.A.2, above. Additionally, the steps that the Region took to independently *review* the modeling are well-documented in the record, including in the Response to Comments document. *See* FutureGen Area of Review Eval. at 37 (explaining that the Region “conducted an independent assessment model using STOMP [, the same model that FutureGen used,] to confirm [FutureGen’s modeling] results and conducted sensitivity analyses for

¹⁰ As Petitioners concede, the regulations neither contemplate nor require the Region to independently model the plume or its predicted movement to delineate the area of review. *See* 40 C.F.R. § 146.84(a)-(b) (requiring that “[o]wners or operators * * * delineate the area of review * * * using computational modeling” that the Region then must approve as part of the permit approval process). Consistent with the regulations, the guidance document provides that the permitting authority may, as appropriate, replicate the computational modeling exercise to verify the appropriateness of the applicant’s modeling effort, but does not suggest that the permitting authority must independently model the plume. *AoR & Corrective Action Guidance*, at 38.

selected output parameters to address uncertainties in input parameters”) (A.R. #296). The Board does not agree that the two statements identified by Petitioners in the Response to Comments document, taken in context, were misleading or created a regulatory obligation that otherwise did not exist. *See, e.g.*, Response to Comments at 57 (referring to the Region’s “independent modeling assessment”), 62 (referring to the model “developed for the independent evaluation”), 73 (referring to the Region’s “detailed, independent evaluation”). As Petitioners concede, the regulations do not require and the guidance does not suggest that the Region must independently model the area of review. Therefore, the Board finds that the Region did not clearly err or abuse its discretion in not independently modeling the plume.

b. *Petitioners’ Technical Criticisms With Respect to the Plume Size Are Immaterial Because the Area of Review Is Based on the Pressure Front, Not the Plume*

Petitioners’ primary objection to the delineation of the area of review is that modeling deficiencies significantly understate the CO₂ *plume* size and shape. Petitions at 10-13 (referring solely and repeatedly to the projected plume size and configuration, and making no connection between the modeled plume and the delineation of the area of review). The Region’s primary response to that objection is that Petitioners’ technical arguments concerning the accuracy of the plume size and shape make no material difference in the overall evaluation of the permits because the area of review is defined not by the plume, but by the pressure front that widely encompasses the entire plume.¹¹

In the course of independently evaluating FutureGen’s analytical approach and delineation, the Region determined that the “plume-based” area of review that FutureGen originally proposed was inappropriate for this project because it did not account for the anticipated pressure front. Response to Comments at 57; FutureGen Area of Review Eval. at 36 (A.R. #296); FutureGen Final Permits, Attach. B, at B40. The Region explained that, because the injection zone for the FutureGen project is over-pressurized relative to the underground source of drinking water, the pressure front extends a significant distance from the wells, far beyond the predicted CO₂ plume. *See* FutureGen Area of Review Eval. at 35-37; FutureGen Final Permits, Attach. B, at B40 (depicting map of the permitted area of review). The Region determined that to be conservative and fully protective,

¹¹ The pressure front is “the extent of pressure increase of sufficient magnitude to force fluids from the injection zone into the formation matrix of [an underground source of drinking water].” *AoR & Corrective Action Guidance*, at 38.

the area of review should be defined by the maximum extent of the pressure front over the lifetime of the project. Response to Comments at 59; FutureGen Area of Review Eval. at 35-37; FutureGen Final Permits, Attach. B, at B43; *see also AoR & Corrective Action Guidance*, at 46. Thus, the Region worked with FutureGen to greatly expand the proposed area of review to comprise a 1,814 square mile area, fully encompassing FutureGen's estimated 6.35 square mile plume. *See* Response to Comments at 57; FutureGen Final Permits, Attach. B, at B41.

Accordingly, as the Region argues, the area of review, as defined by the pressure front, extends approximately 25 miles in each direction from the injection wells and effectively dwarfs the fully encompassed modeled CO₂ plume boundary, which has a radius of approximately 1.5 miles. *See* Region's Resp. Br. at 8; *see also* FutureGen Final Permits, Attach. B, at B41. In other words, the area of review casts a wide parameter around the predicted plume, which as the Region explains, fully accounts for any potential variation in plume size identified by Petitioners. This ensures that the area of review encompasses the entire area where any underground source of drinking water may be endangered by the injection activity, as required by the Class VI regulations. *See* Region's Resp. Br. at 8; Response to Comments at 59-60, 61; *see also* 40 C.F.R. § 146.84.

As stated above, Petitioners' technical challenges to the modeling relate specifically to the plume size and configuration. *See, e.g.*, Petitions at 10 ("The Plume Size is Materially Understated Due to Deficiencies in the FutureGen Model"), 12 ("all of the data in the record reasonably identifies the plume as larger in scope than assumed in the permit"), 13 (describing alleged flaws in the plume configuration). Nowhere in their petitions do Petitioners argue, however, that the alleged underestimation of the plume boundary results in an insufficient, pressure front-based, area of review. Thus, even if the Board were to accept as true Petitioners' assertions of technical inaccuracies with the margins of the modeled plume – which, as discussed in Part V.A.3.c below, the Board does not – Petitioners do not articulate any clear error with respect to the Region's approval of the delineation of the area of review, as required by the part 124 regulations governing petitions for review.

At most, Petitioners assert that the Region was required to more accurately reflect the plume size in the permits because to do otherwise "does not ensure that *areas potentially impacted* by the proposed operation are delineated." Petitions at 13. This argument too must fail because, by definition, the "area potentially impacted" is the area of review, which as described above, fully accounts for any potential variation in plume size identified by Petitioners.

In their reply brief, and for the first time on appeal, Petitioners suggest that the pressure front *may* be inaccurately delineated as a result of inaccurate plume modeling. Petitioners' Reply at 12 ("By incorporating appropriately conservative model input parameter values, the delineated pressure front and [the area of review] *may* increase in size.") (emphasis added). Petitioners, however, may not raise new issues and arguments for the first time in their reply brief. *See* 40 C.F.R. § 124.19(c)(2) (prohibiting petitioners from raising "new issues or arguments" in the reply); *see also In re Knauf Fiber Glass GmbH*, 8 E.A.D. 121, 126 n.9 (EAB 1999) ("[N]ew issues raised at the reply stage of the proceedings are equivalent to late filed appeals and must be denied on the basis of timeliness.") (citations omitted).

Although Petitioners argue that this point was raised both during the public comment period and in their petitions, Petitioners cite not to the petition, but to the "Expert Report" of Dr. Gregory Schnaar, Ph.D. that Petitioners submitted with their comments and Dr. Schnaar's "Supplemental Expert Report" that Petitioners attached to their Petitions. *See* Petitioners' Reply at 12 (citing Petitioners' Comments on FutureGen's UIC Draft Permits ("Petitioners' Comments"), Ex. 2, at 3 (May 15, 2014) (A.R. #497) and Petition, Ex. 1, at 4-6 (Dr. Schnaar's "Supplemental Expert Report")). Arguments and issues on appeal, however, must be raised *in the petition for review*. Petitioners cannot rely on comments made during the comment period. Nor can Petitioners rely on an attachment to their Petitions to articulate the arguments on appeal. *See* 40 C.F.R. § 124.19(a)(4) (describing the required contents of the petition). This is particularly true where, as here, the Supplemental Expert Report was created after the Region issued the permits, and thus the Region did not consider it when making its permit decision. *See In re Dominion Energy Brayton Point, LLC*. ("Dominion II"), 13 E.A.D. 407, 417 (EAB 2007) ("General principles of administrative law dictate that the official administrative record for an agency decision include all documents, materials, and information that the agency relied on directly or indirectly in making its decision."). Thus, contrary to Petitioners' assertion that this issue was preserved, Petitioners did not raise any arguments with respect to the delineation of the *pressure front* in their Petitions.¹²

¹² Petitioners argue that Dr. Schnaar's supplemental report was "incorporated by reference" into their Petitions. Petitioners' Reply at 34 (citing Petition, at 11). Petitioners' stated intention to "incorporate" the report by reference, however, does not relieve Petitioners of the obligation to raise all arguments in the petition itself. It is not incumbent upon the Board to sift through multiple documents to identify the issues and arguments raised in an appeal. *See In re Palmdale Hybrid Power Plant*, PSD Appeal No. 11-07 at 3, 5 (EAB Apr. 5, 2012) (Order Identifying Petition for Review) (identifying

Moreover, even if this argument had been properly raised, Petitioners assert only that incorporating more conservative model parameters “*may*” increase the size of the delineated pressure front. Petitioners do not at any point suggest that the area of review, as delineated by the pressure front, fails to meet the regulatory obligation to comprise “the region surrounding the geologic sequestration project where [underground sources of drinking water] may be endangered by the injection activity.” *See* 40 C.F.R. §146.84(a); *see also* Petitioners’ Reply at 12-13.

In reply, Petitioners also suggest that the “modeling concerns * * * are relevant even if they will likely have a minor impact on the extent of the [area of review] (as it is defined by the extent of the pressure front)” because “[r]isks to [underground sources of drinking water] are generally understood to be greatest in areas overlying the extent of the CO₂ plume.” Reply Br. at 13. Again, Petitioners may not raise new issues and arguments for the first time in their reply brief. *See* 40 C.F.R. § 124.19(c)(2). Moreover, Petitioners again fail to explain how the area of review for this permit proceeding, which fully encompasses (and dwarfs) the

one document as the petition for review and declining to consider other documents as an addendum or supplement to the petition). Moreover, to the extent that Dr. Schnaar’s supplemental report provides any new technical analyses (as opposed to additional argument), Petitioners have provided no explanation for why they did not raise such analyses during the public comment period.

The Board does not agree with Petitioners that Dr. Schnaar’s supplemental report is analogous to the post-petition declarations that the Board allowed in *In re Guam Waterworks Auth.*, 15 E.A.D. 437, 454 (EAB 2011) (allowing two declarations proffered in support of one of petitioner’s main claims on appeal – that the permitting authority had “closed the window” of opportunity to provide information in support of the application, which the permitting authority denied having done). Additionally, Petitioners’ reliance on the Board’s Practice Manual is misplaced. *See* Petitioners’ Reply at 35 (quoting *Environmental Appeals Board Practice Manual* at 45-46 (EAB Aug. 2013)). While the Board does “expect[] a petitioner to present ‘references to studies, reports or other materials that provide relevant, detailed and specific facts and data,’” in permit challenges to technical issues, *Practice Manual* at 45-46, that information must either be a part of the administrative record, or the petitioner must present a valid exception to the general prohibition on supplementing the record on appeal. The Board’s review of Dr. Schnaar’s Supplemental Expert Report reveals that its contents consist primarily of additional arguments in further support of the issues raised during the public comment period, which the Region fully considered. In sum, the Board finds no basis for including the supplemental expert report in the administrative record and declines to incorporate it into this appeal.

plume and which by definition identifies “the region surrounding the geologic sequestration project where [underground sources of drinking water] may be endangered by the injection activity,” is insufficient to address any risks overlying the plume.

In sum, Petitioners’ arguments concerning plume size and shape do not demonstrate that the area of review (which is defined by the pressure front, not the plume, and which widely encompasses the plume) does not meet the regulatory requirement to comprise “the region surrounding the geologic sequestration project where [underground sources of drinking water] may be endangered by the injection activity.” 40 C.F.R. §146.84(a).

c. The Board Defers to the Region’s Well-Explained and Supported Technical Determinations

Even if Petitioners had argued in their petitions that the Region’s alleged deficient modeling of the plume materially affected the delineation of the pressure front, and consequently underestimated the area of review, Petitioners have not met their burden to show that the Region’s technical determinations regarding the modeling of the plume warrant review. Decisions regarding computational modeling and the prediction of projected plumes is inherently and highly technical. Evaluating and comparing inputs and assumptions with site characterization data and the proposed operational information in conjunction with computational modeling involves precisely the kind of technical judgment to which the Board typically defers to the Region’s expertise. *See, e.g., In re Energy Answers Arecibo, LLC*, 16 E.A.D. 294, 365 (EAB 2014) (noting the highly technical nature of determining the “representativeness of meteorological data”); *In re Cape Wind Assocs., LLC*, 15 E.A.D. 327, 337-38 (EAB 2011) (noting the highly technical nature of air quality modeling); *In re N.E. Hub Partners, LP*, 7 E.A.D. 561, 570 (EAB 1998) (declining to review the Region’s “quintessentially technical” determinations regarding the required construction techniques for proposed Class III UIC wells), *review denied sub nom. Penn Fuel Gas, Inc. v. EPA*, 185 F.3d 862 (3d Cir. 1999). A petitioner challenging these types of technical issues bears a particularly heavy burden. *See, e.g., In re Phelps Dodge Corp.*, 10 E.A.D. 460, 517-19 (EAB 2002); *In re Steel Dynamics, Inc.*, 9 E.A.D. 165, 201 (EAB 2000); *In re Town of Ashland Wastewater Treatment Facility*, 9 E.A.D. 661, 667 (EAB 2001).

As we have explained:

[W]hen presented with technical issues, we look to determine whether the record demonstrates that the [permit issuer] duly

considered the issues raised in the comments and whether the approach ultimately adopted by the [permit issuer] is rational in light of all the information in the record. If we are satisfied that the [permit issuer] gave due consideration to comments received and adopted an approach in the final permit decision that is rational and supportable, we typically will defer to the [permit issuer's] position. Clear error or reviewable exercise of discretion are not established simply because the petitioner presents a different opinion or alternative theory regarding a technical matter, particularly when the alternative theory is unsubstantiated.

In re MCN Oil & Gas Co., UIC Appeal No. 02-03, at 25 n.21 (EAB Sept. 4, 2002) (Order Denying Review) (citations omitted); *accord Steel Dynamics*, 9 E.A.D. at 180 n.16, 201 (EAB 2000); *NE Hub Partners*, 7 E.A.D. at 567-68.

Petitioners' argument that the plume boundary may be understated is primarily based on Petitioners' assertions that (a) the model's sensitivity analyses were too limited, and (b) the delineation of the plume did not include 100% of the supercritical CO₂ mass. *See* Petitions at 10-13. Petitioners argue that more conservative inputs could have resulted in a materially expanded plume.¹³ *Id.* When these issues were raised below, the Region responded that it had evaluated the plume size using different definitions of the plume. Response to Comments at 58, 60. The Region also explained that although *100% of the CO₂ was modeled*, the CO₂ plume plotted on maps is the surface expression of 99% of the CO₂ injected. *Id.* The Region further explained that "[t]his was done due to difficulties in representing (and the limited value of representing) very low concentrations of supercritical CO₂ at the margins of the modeled plume." *Id.* The Region determined that "the difference in areal coverage of the plume between 99% or 100% of * * * CO₂ mass" was very minimal, particularly in light

¹³ Petitioners argue that errors in modeling underestimate the plume by 120-125%. Petitions at 12-13, Petitioners' Comments at 8 & Ex. 2, at 2-3 (referring to figure 1 in the Petitioners' exhibit) (A.R. #497); *see also* Petitioners' Reply at 8 (referring to a plume 125% larger). At other times, Petitioners describe their larger (expanded) plume, based on Petitioners' desired inputs, as a "120% plume." Petitions at 12; Petitioners' Comments at 8. The illustration to which Petitioners refer in their comments clarifies that Petitioners' projected plume is expanded by *at most* 20% and is not 120% larger (i.e., it is not more than twice the size of the FutureGen modeled plume). Thus, it would be more accurate to describe it as a 120% plume, or 20% larger. *See* Petitioners Comments Ex. 2 (Dr. Schnaar's Supplemental Expert Report), fig.1. Regardless of how Petitioners characterize their proposed plume, the plume remains completely encompassed and dwarfed by the delineated area of review. *See also* FutureGen Surreply at 2-3.

of the pressure front-based area of review (as opposed to a plume-based area of review). *Id.* For this reason, the Region determined that the existing plume depiction was “a reasonable representation of the maximum extent of the supercritical CO₂.” *Id.* at 60; *see also id.* at 59 (discussing the Region’s decision not to require separate delineation of the dissolved CO₂).

With respect to Petitioners’ concerns regarding the sensitivity analyses, the Region explained that “depictions of the results of sensitivity analyses can be misleading.” Response to Comments at 61. While Petitioners might prefer that the most conservative scenario be modeled, the Region explained that the purpose of modeling the plume is to provide the most accurate estimation possible. Response to Comments at 61 (“Plume depictions should represent the applicant’s and Agency’s best estimate of where the supercritical CO₂ will be at a certain point in time.”). By modeling the plume as accurately as possible (rather than as conservatively as possible), the Region can compare future monitoring results with the model predictions to determine if the model is accurately predicting the location of the CO₂ in the subsurface and, based on that information, then can determine whether the model needs to be revised to more closely match observations. *See* Region’s Resp. Br. at 13; *see also* Response to Comments at 61.

Petitioners’ arguments on appeal essentially mirror their comments below. Petitioners’ specific challenges to the Region’s technical determinations merely “present a different opinion or alternative theory” regarding how conservative the modeling parameters should be. As the Board explained above, “[c]lear error or reviewable exercise of discretion are not established simply because the petitioner presents a different opinion or alternative theory regarding a technical matter,” *MCN Oil & Gas Co.* at 25 n.21 (quoting *NE Hub Partners*, 7 E.A.D. at 567). While Petitioners may disagree with the Region’s approach to predicting the plume (and its approval of the modeling of the plume), and may believe that their suggested approach would more appropriately and conservatively model the plume, that disagreement does not overcome the deference the Board typically affords the Region. Based on its review of the record, the Board defers to the Region’s rational and supported conclusions regarding the Region’s approach to approving the modeling of the plume and the delineation of the area of review.

d. *The Region Did Not Rely on Future Reevaluation as a Substitute for Adequately Delineating the Area of Review*

Finally, in addressing Petitioners' concerns regarding the delineation of the area of review, the Region repeatedly provides added assurance by explaining that the permits require FutureGen to reevaluate and revise, and the Region to reapprove, the area of review as the project moves forward. Response to Comments at 58-62; Region's Resp. Br. at 7. Petitioners suggest that the Region relies on the reevaluation provisions of the permits to justify its "acceptance" of what Petitioners characterize as FutureGen's inaccurate modeling of the plume. Petitions at 12; Petitioners' Reply at 8. The Board disagrees.

As fully set forth above, the Region first explained that FutureGen appropriately modeled the plume. Response to Comments at 57; FutureGen Area of Review Eval. at 37 (A.R. #296). The Region then explained that the area of review would not be plume-based, but would instead be pressure front-based. FutureGen Area of Review Eval. at 36; Response to Comments at 57. Because the pressure front-based area of review extends many miles beyond the modeled plume, the Region determined (and explained) that the area of review fully accounts for the variations in plume size and shape identified by Petitioners. Finally, the Region explained that if the actual plume varies from the modeled plume, there are provisions in the permits to address and account for such variation. Response to Comments at 57.

More specifically, as provided in Part V.A.1. above, EPA's permitting regulations require permittees to "[r]eevaluate the area of review" at a "minimum fixed frequency, not to exceed five years, as specified in the area of review and corrective action plan, or when monitoring and operational conditions warrant." 40 C.F.R. § 146.84(e). The FutureGen Final Permits require FutureGen to reevaluate the area of review even more frequently than every five years. Under the FutureGen Final Permits, injection of CO₂ into the wells may not commence until after FutureGen reviews and updates (and the Region reapproves) the area of review, based on final site characterization information and taking into account any relevant information obtained from pre-injection testing. FutureGen Final Permits at 21-22; *see also* FutureGen Area of Review Eval. at 1 (explaining the two stages of determining the area of review prior to injection) (A.R. #296). Additionally, FutureGen must reevaluate (and the Region must reapprove) the area of review *annually* for the first five years "to account for any operational variation during the startup period." FutureGen Final Permits, Attach. B, at B43. After the first five years, FutureGen must continue to reevaluate (and the Region must reapprove) the area of review at a minimum of every five years in

accordance with 40 C.F.R. § 146.84(e). *Id.* The permits also specifically list conditions that will warrant reevaluation of the area of review prior to the next scheduled cycle, including any “new site characterization data” or “unexpected changes in rate, direction, and extent of plume/pressure front movement.” *Id.* at B45. Finally, the Region explained that any newly developed information that requires modifications to the permit, depending on the nature of the changes, could warrant an additional public notice and comment period, as provided by 40 C.F.R. part 144. *See* Response to Comments at 59, 61; FutureGen Final Permits, Attach. B, at B43 (describing the Reevaluation Cycle in general); *see also* Response to Comments at 58-62 (discussing the pre-operational testing requirements and FutureGen’s obligation to develop – and the Region’s obligation to review – relevant information before, during, and after injection).

In context, the Region’s reference to the reevaluation provisions simply recognizes the inherent uncertainties present in this permitting process and provides additional assurance that the Region will use any newly developed information from well construction and operation (or information inconsistent with FutureGen’s modeling) to amend, as appropriate, the terms of the permits and ensure that all underground sources of drinking water are protected. Thus, contrary to Petitioners’ assertion, the Region does not rely on reevaluation as a substitute for adequately delineating the area of review.

4. *The Board Denies Review of the Region’s Approval of the Area of Review*

Based on a thorough review of the record and the arguments presented, the Board concludes that the Region conducted a thorough and independent review of FutureGen’s modeling by collecting the information and conducting the analyses necessary to understand and evaluate all model inputs, assumptions, construction and results as required under the regulations. The Board further concludes that the Region considered and approved the area of review in a manner consistent with the discretion afforded to it under the regulations. As such, the Region did not clearly err or abuse its discretion in approving the area of review, and the Board denies the Petitions for Review on this issue.

B. *The Region Did Not Clearly Err or Abuse Its Discretion in Approving the Monitoring Network*

Petitioners also challenge the testing and monitoring requirements of the permits, arguing that (1) the number and placement of monitoring wells was based on inaccurate modeling of the plume, and (2) the number and placement of monitoring wells was not adequately explained. Petitions at 14. Petitioners also

state, without legal citation or technical support, that “additional deep and shallow monitoring wells are needed.” *Id.* at 14-15. The Region argues that it explained and supported its rationale for approving the monitoring network in its Response to Comments and that Petitioners have not identified any specific flaws in the monitoring network, other than to say that “additional deep and shallow monitoring wells are needed.” Region’s Resp. Br. at 18; *see also* FutureGen’s Resp. Br. at 14.

Testing and monitoring requirements are provided in 40 C.F.R. § 146.90. The relevant regulations require the “owner or operator of a Class VI well [to] prepare, maintain, and comply with a testing and monitoring plan to verify that the geologic sequestration project is operating as permitted and is not endangering [underground sources of drinking water].” 40 C.F.R. § 146.90.¹⁴ The permit issuer must approve the testing and monitoring plan. *Id.* Although the regulations do not dictate the location and number of monitoring wells, the location and placement must be “based on baseline geochemical data that has been collected * * * and on any modeling results in the area of review evaluation.” *Id.* § 146.90(d)(2).¹⁵ The Class VI regulations also require “[t]he

¹⁴ This provision also provides that “[t]he requirement to maintain and implement an approved plan is directly enforceable regardless of whether the requirement is a condition of the permit.” 40 C.F.R. § 146.90.

¹⁵ The relevant provisions of 40 C.F.R. § 146.90 provide as follows:

Testing and monitoring associated with geologic sequestration projects must, at a minimum, include:

(a) Analysis of the carbon dioxide stream with sufficient frequency to yield data representative of its chemical and physical characteristics;

* * * *

(d) Periodic monitoring of the ground water quality and geochemical changes above the confining zone(s) that may be a result of carbon dioxide movement through the confining zone(s) or additional identified zones including:

(1) The location and number of monitoring wells based on specific information about the geologic sequestration project, including injection rate and volume, geology, the presence of artificial penetrations, and other factors; and

owner or operator [to] periodically review the testing and monitoring plan” and to incorporate new monitoring and operational data collected, no less than “once every five years.” *Id.* § 146.90(j).¹⁶ That review is subject to the approval of the permitting authority. *Id.*

As would be expected in any regulation involving site-specific technical requirements, the regulations confer considerable discretion to the permitting authority to review and approve the testing and monitoring plan, including the number and placement of testing and monitoring wells. Because the number and placement of monitoring wells necessarily requires the Region’s exercise of discretion, the Board applies an abuse of discretion standard. *See Guam Waterworks Auth.*, 15 E.A.D. at 443 n.7. Moreover, the placement of testing and monitoring wells necessarily involves highly technical judgment and expertise – the very type of technical determinations for which this Board typically defers to the permitting authority, as long as the administrative record adequately reflects and supports the permit issuer’s decision. *See Dominion I*, 12 E.A.D. at 510, 560-62, 645-47; *see also, e.g., Russell City Energy Ctr.*, 15 E.A.D. at 29-32, 66; *NE Hub Partners*, 7 E.A.D. at 570-71.

Condition M of the FutureGen permits establishes the testing and monitoring requirements. *See* FutureGen Final Permits at 12 (incorporating by reference Attach. C (the permit’s Testing and Monitoring Plan)). FutureGen is required to maintain and update an approved testing and monitoring plan in a manner that complies with 40 CFR §§ 144.51(j), 146.88(e), and 146.90, as an enforceable condition of the permits. *Id.*

(2) The monitoring frequency and spatial distribution of monitoring wells based on baseline geochemical data that has been collected under §146.82(a)(6) and on any modeling results in the area of review evaluation required by §146.84(c).

¹⁶ The specific language of 40 C.F.R. § 146.90(j) provides:

The owner or operator shall periodically review the testing and monitoring plan 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). In no case shall the owner or operator review the testing and monitoring plan less often than once every five years. Based on this review, the owner or operator shall submit an amended testing and monitoring plan or demonstrate to the [permitting authority] that no amendment to the testing and monitoring plan is needed.

Petitioners first challenge the number and placement of monitoring wells based on their premise that the underlying plume modeling was flawed. *See* Petitions at 14 (“[A]s set forth above, FutureGen’s modeled CO₂ plume must be enlarged * * *. The proposed monitoring configuration is inappropriate in light of a material change to the size and shape of the projected plume.”). As explained in Part V.A.3.c above, however, the Board disagrees with that premise. As such, the Board’s consideration of this issue is focused on whether the Region adequately explained and supported the permits’ testing and monitoring plan requirements in the record.

Petitioners assert that the Region did not provide its rationale either for the number and placement of the monitoring wells, or for the two “early detection” monitoring wells, in particular. Petitions at 14-15. The record, however, belies that assertion. FutureGen’s Testing and Monitoring Plan went through several iterations, based on multiple communications between Region 5 and FutureGen that are documented in the record. *See* Region’s Resp. Br. at 15 (providing a long string of record references that document the iterative development of FutureGen’s Testing and Monitoring Plan). The Testing and Monitoring Plan required by the permits describes the strategic approach of the required monitoring network as having two aims: (1) “to demonstrat[e] that the well is operating as planned” (i.e., that “the carbon dioxide plume and pressure front are moving as predicted and that there is no endangerment to underground sources of drinking water”); and (2) to “validate and adjust the geological models used to predict the distribution of the CO₂ within the injection zone to support [area of review] reevaluations and a non-endangerment demonstration.” FutureGen Final Permits, Attach. C, at C1.

The Region summarized its rationale in the FutureGen Final Permits for the number and placement of monitoring wells as follows:

The monitoring network (Figure 1) is a comprehensive network designed to detect unforeseen CO₂ and brine leakage out of the inject zone and for the protection of USDWs. Central to this monitoring strategy is the measurement of CO₂ saturation within the reservoir using three reservoir access tubes (RATs) extending through the Mount Simon Formation and into the Precambrian basement. * * * The three wells have been placed at increasing radial distances from the injection site to provide measures of CO₂ saturation at locations within the outer edges of the predicted 1-, 2-, and 4-year CO₂ plumes, respectively. The three RAT installations have also been distributed across three different azimuthal directions, providing CO₂ arrival information for three of the four predicted lobes of the CO₂ plume.

The monitoring network will also include two Single-Level in-Reservoir (SLR) wells completed across the planned injection interval within the Mount Simon Formation to continuously and directly measure for pressure, temperature, and specific conductance (P/T/SpC) over the injection and post-injection monitoring periods. * * * *

Another central component of the monitoring strategy is to monitor for any unforeseen leakage from the reservoir as early as possible. This will be accomplished by monitoring for CO₂ and brine intrusion immediately above the confining zone. These two “early-detection” wells will be completed in the first permeable unit above the Eau Claire caprock within the Ironton Sandstone. * * *

The monitoring network will also include one well located in the lowermost USDW, the St. Peter Sandstone. This well will be instrumented to monitor continuously for P/T/SpC, and periodically samples will be collected for characterizing aqueous chemistry. This USDW well is co-located with the ACZ well located closest to the injection well site.

Beyond the direct measures of the monitoring well network, two indirect monitoring techniques * * * will be used to detect the development of the pressure front * * *.

Id. at C1-C2.

The final Testing and Monitoring Plan represents an increase from the five wells FutureGen originally proposed. *See* Region’s Resp. Br. at 15; Revised Underground Injection Control Permit Applications for FutureGen 2.0, § 5.14, at 5.5-5.8 (May 15, 2013) (“FutureGen Permit Appl.”) (A.R. #2). Ultimately, the Testing and Monitoring Plan requires nine monitoring wells (three in the injection zone to monitor CO₂ saturation, two within the injection zone to monitor pressure and temperature, two above the confining zone, one groundwater monitoring well in the formation with the lowest underground source of drinking water, and one additional pressure monitoring well to be constructed within the first five years of injection with its placement to be determined based on information obtained during the early years of injection). *See* FutureGen Final Permits, Attach. C, at C1 to C2, C4; *see also* Region’s Response Br. at 15-16.¹⁷

¹⁷ The Region’s brief states that the permits require six of the nine monitoring wells to be located in the injection zone. Region’s Resp. Br. at 15. The FutureGen Final Permits, however, provide that five of the nine monitoring wells will be located in the

In addressing concerns regarding inherent uncertainties in the projected plume's formation and migration, the Region explained that the monitoring network will adopt "an 'adaptive' or 'observational' monitoring approach (i.e., the monitoring approach will be adjusted as needed based on observed monitoring and updated modeling results)." FutureGen Final Permits, Attach. C, at C2. The Region further explained that monitoring will evolve with the CO₂ plume and pressure front by "continually evaluating monitoring results and making adjustments to the monitoring program as needed, including the option to install additional wells in outyears." *Id.* at C2-C3. As part of this adaptive monitoring approach, FutureGen is required to construct a pressure-monitoring well within five years of the start of injection, the location of which will be "informed by any observed asymmetry in pressure front development during the early years of injection." *Id.* at C2. That well will be located outside of the CO₂ plume, and the distance from the plume boundary will be based on the information obtained. *Id.* at C2-C3; *see also* Response to Comments at 170, 173.

The Region addressed additional concerns raised during the public comment period regarding the "early detection" monitoring wells, explaining that "[t]he two monitoring wells in the Ironton Sandstone * * * are sufficient to detect changes in fluid chemistry, temperature, and pressure, that would indicate the movement of CO₂ beyond the injection zone formation." Response to Comments at 170. The Region further explained that "this is particularly true during the early years of the project where the CO₂ plume would typically still be relatively close to the wells and a potential problem with the confining zone (such as previously unknown faults or fractures or other permeable features) would be likely to become apparent." *Id.* at 170. The Region noted that this placement of the wells was consistent with the Agency's guidance, which provides that "monitoring wells be placed strategically to maximize the ability of the monitoring well network to detect potential leakage and track the plume migration and pressure front while minimizing the number of wells, which increase the risk for fluid movement." *Id.*

Finally, the permits require FutureGen to regularly review and revise, as appropriate, the Testing and Monitoring Plan. *See* FutureGen Final Permits at 13; Response to Comments at 170. Under Part Q of the FutureGen Final Permits, reevaluation of the Testing and Monitoring Plan is required even before injection begins. FutureGen Final Permits at 21-22.

injection zone. FutureGen Final Permits, Attach. C, at C1-C2, C4, C19-C20. This discrepancy in the Region's brief, however, does not alter the Region's rationale for its permitting decision, or the Board's conclusions on this issue.

The Petitions for Review do not specifically discuss any of the above rationale provided by the Region or explain why the Region's explanation for the number and placement of wells is insufficient. *See* Petitions at 14, 15. Rather Petitioners argue that the Region provides *no* discussion of the sufficiency of monitoring well locations and *no* justification for the number and placement of wells. *Id.* In their reply brief, Petitioners refine their argument by stating that the Region did not “provided a systematic, detailed and rigorous explanation” for the number and placement of the early detection wells (i.e. baseline geochemistry, project modeling).” Petitioners’ Reply at 15.

The Board finds that on the contrary, the administrative record clearly reflects that the Region reviewed and approved the monitoring provisions for the FutureGen permits in a manner consistent with the discretion afforded to it under the regulations. Moreover, the Region clearly explained and supported its rationale in the record, and grounded its rationale on site-specific data and modeling. The Board will not second-guess the Region's technical determinations based on Petitioners' bald assertion that “[a]dditional deep and shallow monitoring wells are needed.” *See* Petitions at 14. As such, Petitioners have identified no flaw warranting review in the FutureGen Testing and Monitoring Plan, and the Board denies the Petitions for Review on this issue.

C. The Region's Identification and Consideration of Wells Within the Area of Review

Next, Petitioners challenge the permits based on the Region's “failure to identify all wells within the [area of review],” as well as the Region's “failure to investigate” alleged impacts to a private water well allegedly caused by a stratigraphic test well that FutureGen drilled in 2011.¹⁸ Petitions at 15, 19. The Region contends that it surveyed wells within the area of review in a manner consistent with the regulatory requirements and that it fully responded to Petitioners' concerns regarding specific wells in the Response to Comments document. Region's Resp. Br. at 19, 25; *see also* FutureGen Resp. Br. at 18. Ultimately, the Region identified “no wells * * * within the [area of review] that require corrective action.” FutureGen Final Permits, Attach. B, at B43. Thus, the Board next considers whether the Region identified and considered wells within the area of review in accordance with the regulatory requirements.

¹⁸ FutureGen drilled a stratigraphic well (also referred to as the project's “characterization well”) to obtain site-specific information on the geologic, hydrogeologic, and biogeochemical conditions. FutureGen Permit Appl. at 1.4 (A.R. #2). The well provided data that FutureGen then used to characterize the belowground surface

1. *Relevant Regulatory Requirements for Identification and Consideration of Wells*

The Class VI regulations contain several requirements relevant to well identification. First, the owner or operator of an injection well must submit, and the permitting authority must consider, “a map showing the injection well for which a permit is sought and the applicable area of review *consistent with § 146.84.*” 40 C.F.R. § 146.82(a)(2) (emphasis added). Further,

[w]ithin the area of review, the map must show the number or name, and location of all injection wells, producing wells, abandoned wells, plugged wells or dry holes, deep stratigraphic boreholes, State- or EPA-approved subsurface cleanup sites, surface bodies of water, springs, mines (surface and subsurface), quarries, water wells, other pertinent surface features including structures * * * and roads. * * * * *Only information of public record is required to be included on this map.*

Id. (emphasis added). Section 146.84 further provides the requirements for delineating the area of review and for identifying wells in need of corrective action. Specifically, *using methods approved by the permitting authority*, owners or operators of Class VI wells are required to:

[I]dentify all penetrations including active and abandoned wells and underground mines, in the area of review *that may penetrate the confining zone(s)*. Provide a description of each well’s type, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the [permitting authority] may require.

Id. § 146.84(c)(2) (emphasis added). Owners or operators of Class VI wells then must determine which wells “have been plugged in a manner that prevents the movement of carbon dioxide or other fluids that may endanger [underground sources of drinking water],” *id.* at § 146.84(c)(3), and perform corrective action on those that do not, *id.* at § 146.84(c)(4).

In essence, these regulatory provisions require that all wells within an area of review *that may penetrate the confining zone*, and thus may serve as a conduit for the movement of fluid into underground sources of drinking water, be identified and evaluated to determine whether corrective action is necessary. The

environment, assess the feasibility of using the site for CO₂ storage, and design the storage site. *Id.* FutureGen plans to use the stratigraphic well in the future as one of its monitoring wells. *Id.*

confining zone is defined as “a geologic formation, group of formations, or part of a formation stratigraphically overlying the injection zone(s) that acts as [a] barrier to fluid movement.” *Id.* § 146.81(d). The injection zone is the geological formation, group of formations, or part of a formation, beneath the confining zone, that receives carbon dioxide through a well or wells as part of the geologic sequestration project. *See id.* The converse of these requirements is that the owner or operator of a Class VI well is not obligated to identify and evaluate for corrective action those wells that are not in the public record and that are so shallow that they could not penetrate the confining zone, and thus could not serve as a conduit for the movement of fluid into underground sources of drinking water. In the context of these regulations, the Board next examines the Region’s identification and consideration of wells in this permit proceeding.

2. *Well Identification for the FutureGen Permits*

a. *The Region Examined Relevant Public Databases and Investigated Petitioners’ Comments to Identify Wells Within the Area of Review*

We begin with a brief overview of the relevant subsurface zones underlying the FutureGen area of review. According to the Region, the top of the FutureGen injection zone is more than 3,785 feet below ground surface. Region’s Resp. Br. at 20; FutureGen Final Permits, Attach. B, at B8. The confining zone that isolates the injection zone from any potential underground source of drinking water is located between 3,425 feet and 3,764 feet below ground surface. Region’s Resp. Br. at 20; FutureGen Final Permits, Attach. B, at B15. Thus, any well that may penetrate the confining zone would need to have a depth of approximately 3,425 feet below ground surface. In contrast, according to the Region, the base of the deepest potential underground source of drinking water is 1,942 feet below ground surface, significantly above both the injection and confining zones. Region’s Resp. Br. at 20 & n.11; *see also* FutureGen Permit Appl., at v & fig. S.2 (A.R. #2). Petitioners dispute none of these geophysical facts in their Petitions. *See generally* FutureGen Final Permits, Attach. B (describing the site stratigraphy and geologic structure of the project area).

As required, FutureGen submitted with its permit application a map showing wells within a survey area covering its proposed area of review (which encompassed the estimated extent of the CO₂ plume). When the Region determined that the area of review should be based on the pressure front, which creates a much more expansive area of review than when based on the plume, the Region undertook its own well identification exercise. Region’s Resp. Br. at 20; *see also* FutureGen Corrective Action Evaluation, Illinois State Geological Survey (“ISGS”) Well Data (Jul. 2014) (“Corrective Action Eval.”) (A.R. #538);

Response to Comments at 93, 95. Using public records, the Region identified and tabulated at least 6,110 wells in the FutureGen area of review.¹⁹ Region's Resp. Br. at 20; Corrective Action Eval. at 4 (A.R. #538); Response to Comments at 95; FutureGen Final Permits, Attach. B, at B-32. The Region based its review on data from the Illinois State Geological Survey ("ISGS"), *as well as data* from the Illinois State Water Survey ("ISWS"). Corrective Action Eval. at 1. The ISGS is an official repository for records of wells drilled in the state of Illinois. Region's Resp. Br. at 21 n.12 (citing Region 5's Documentation of Use of the State of Illinois' ISGS online Database (A.R. #392), *available at* <http://www.isgs.illinois.edu/>).

Of the thousands of wells the Region identified and evaluated, not including FutureGen's stratigraphic well, the Region identified only *two* as penetrating the top of the confining zone within the area of review: the Whitlock well (#7-15) and the Criswell well (#1-16). Corrective Action Eval. at 3 (A.R. #538). Both wells are in an active natural gas storage facility, located approximately sixteen miles from the injection site. *Id.* at 3-4. The Region determined that the Criswell well was adequately plugged and required no corrective action. *Id.* at 4. The Region determined that the Whitlock well is plugged with 180 feet of cement at the bottom (which the Region determined is adequate to prevent the well from acting as a conduit for fluid movement up the well) and is also being monitored as an active observation well. *Id.*; Region's Resp. Br. at 23 n.14 (citing Memo to File by Jeffrey R. McDonald, EPA Region 5 (Aug. 28, 2014) (regarding a phone conversation with operators of gas storage facility in Waverly, IL) (A.R. #566)). The Region anticipated that this location would receive only increased pressure, *if anything*, and that such effects would not occur until after injection into the FutureGen wells proceeds for a significant time. Response to Comments at 95. As such, the Region determined that the Whitlock well does not need corrective action at this time. The permits require, however, that FutureGen regularly assess the Whitlock well, and the Region noted that it will require corrective action in the future if such action becomes

¹⁹ The permits state that 4,386 of the wells surveyed were water wells and 740 were oil and gas wells. FutureGen Final Permits, Attach. B, at B32. It is unclear whether the other wells making up the 6,110 wells identified in the administrative record were duplicative of the water and oil wells described in the permits, or whether they were some other type of well. Regardless, as discussed further below, the Region determined that only two of the thousands of wells identified penetrate the confining zone (the Whitlock well and the Criswell well). *Id.*

necessary. Response to Comments at 96, 98; *see also* FutureGen Final Permits, Attach. B, at B32-B43.²⁰

Additionally, in reviewing the thousands of wells identified, the Region determined that drinking wells constituted the large majority of the surface penetrations in the area of review. Region's Resp. Br. at 21; *see also* Corrective Action Eval. at 4 ("Of the 6,110 wells within the [area of review] in the ISGS dataset, 5,660 (approximately 93%) are shallow wells less than 500 ft deep."); Response to Comments at 93 ("[T]he productive aquifers that are generally used for drinking water supplies * * * are generally shallow (less than a couple of hundred feet deep), * * * hundreds of feet above the confining and injection zones for this project[.]). The Region also concluded that given the depths of the deepest potential sources of drinking water relative to the depth of the confining zone, drinking water wells throughout the area of review would not come anywhere close to penetrating the confining zone. Region's Resp. Br. at 20-21; Response to Comments at 93-96. On this basis, the Region determined that additional investigation into private water wells was unnecessary. Response to Comments at 93-96. The Region further explained that "[o]il and gas wells in the region are also shallow in relation to the injection and confining zones of this project." *Id.* at 94; *see also* Corrective Action Eval. (containing the original well data from ISGS and the Region's detailed summary of that data).

b. *Petitioners Have Identified No Reviewable Error or Abuse of Discretion With Respect to the Region's Identification and Consideration of Wells*

Petitioners argue that the Region's identification of wells was flawed for several reasons, all of which relate to the Region's methods of identification or their rationale for those methods, and none of which relate to a specific well within the area of review that penetrates the confining zone. The Board addresses each of Petitioners' issues in turn.

First, Petitioners cite *In re Bear Lake Properties, L.L.C.*, 15 E.A.D. 630 (EAB 2012), as the standard for the Region's regulatory obligation to identify wells within the area of review. Petitions at 15, 18. The *Bear Lake* matter, while

²⁰ The Region's review of these wells identified and corrected factual errors in FutureGen's application with respect to these two wells. *See* Region's Resp. Br. at 23 n.14. Petitioners suggest that these corrections indicate that the well information the Region collected is deficient. Petitions at 19. On the contrary, the Region's review and evaluation of the available information and inquiry into the status of these wells represents the kind of careful review expected in the course of the permitting process.

instructive as to the Region's obligation to justify its conclusions in the record, is not directly on point and is readily distinguishable from this case.

The *Bear Lake* matter involved the appeal of two Class II UIC permits issued by EPA Region 3 and the question of whether the Region had satisfactorily accounted for and considered all drinking water wells within the designated area of review. *Bear Lake*, 15 E.A.D. at 635-40. In that decision, the Board did not hold that the Region had failed to properly identify and assess wells within the relevant area of review; rather, the Board remanded the *Bear Lake* permits for the Region to better articulate the basis for its decision. *Id.* at 13 n.11. In *Bear Lake*, the relevant "area of review" comprised a one-quarter-mile radius around the proposed injection wells, and the Region had surveyed a one-mile radius of the proposed injection wells for existing wells. *Id.* at 635-36. In response to doubts raised during the comment period about whether the permit applicant had adequately surveyed drinking water wells in the area of review, the Region required the permittee to resurvey the area for wells, which resulted in a completely different set of wells being identified. *Id.* at 636-37. In the final permit record, the Region did not explain or comment on the discrepancies between the surveys, nor provide any articulation of the data it relied upon in making its permit determination. *Id.* at 639. Without more, the Board was unable to determine from the record whether the Region had satisfied its regulatory obligation to consider accurate data regarding the number and location of drinking water wells within the selected area of review. *Id.* at 639 n.11. Indeed, the Board could not ascertain which data the Region had relied upon in making its permitting determination. *Id.* Thus, the Board remanded the permits so that the Region could clearly articulate the data it had relied upon and demonstrate whether the Region had complied with its obligations. *Id.* at 639-40.

In contrast, the FutureGen record does not contain two divergent sets of well survey data that the Region has failed to explain. Instead, the Region responded to comments regarding its well identification efforts for the FutureGen permits by further evaluating the wells it allegedly had not identified and providing explanations for its consideration of all wells within the 1,814 square mile area of review, including explaining its determination that no further investigation or consideration was required at this time. The Region's determinations were based on site-specific information considered in the context of Class VI regulations, which require the Region to identify and evaluate for corrective action *only* those wells that may penetrate the confining zone. *See* 40 C.F.R. § 146.84(c)(2). Thus, the basis for remand in *Bear Lake* does not exist here.

Bear Lake also is distinguishable based on the regulatory program underlying the permits. The *Bear Lake* appeal involved two *Class II* injection well permits, as opposed to the *Class VI* injection well permits in this case, and the relevant regulatory requirements for each of these two classes of wells are distinct. Compare 40 C.F.R. subpt. C (providing the criteria and standards applicable to *Class II* injection wells, including the requirements for identifying wells within the defined “area of review”) with 40 C.F.R. subpt. H (providing the criteria and standards applicable to *Class VI* injection wells, including its distinctly defined “area or review” and the requirements for identifying wells within that area). Thus, the Board’s analysis of the permitting authority’s application of the *Class II* injection well permitting regulations in *Bear Lake*, would not be directly relevant to the Board’s analysis of the Region’s *Class VI* injection well permitting regulations in this appeal. See 75 Fed. Reg. at 77,243 (explaining that the injection of CO₂ for long-term storage presents unique challenges warranting the designation of a new class of well and accompanying regulations). For these reasons, *Bear Lake* is inapposite.

Next, and for reasons that are not clear, Petitioners argue that the Region erred by relying *solely* on the Illinois State Water Survey because that source of data is known to be “sparse” and incomplete. See Petitions at 16 (citing an E-Mail from William F. Saylor, Ill. State Water Survey, to William Tong, EPA Region 5 (Aug. 14, 2014) (A.R. #514)); see also Petitioners’ Reply at 17-18, 19. Contrary to Petitioners’ repeated assertions, the Region did not rely on the ISWS as the sole source for its well data. Rather, as stated above and as set forth in the record, the Region relied much more heavily on a much more extensive database – the Illinois State Geological Survey (ISGS) – for its well review.²¹ Corrective Action Eval. at 1; Response to Comments at 93, 95; see also Region 5’s Documentation of Use of the State of Illinois’ ISGS Online Database (A.R. #392), available at <http://www.isgs.illinois.edu/>. Petitioners do not acknowledge, let alone dispute, the Region’s reliance on the ISGS data.

Petitioners next argue that the Region should have used aerial and satellite imagery and geophysical surveys to identify wells. Petitions at 16-17. In support of their argument, Petitioners cite the Agency’s *Area of Review Evaluation and Corrective Action Guidance* for *Class VI* UIC wells, in which the Agency

²¹ The ISGS online database contains paper records archived for over 700,000 wells. Region’s Resp. Br. at 21 n.12. Some of the records go back as far as the late 1800s. *Id.*

“recommends” using such imagery to identify abandoned wells and conducting geophysical surveys throughout regions of the area of review that may have been subject to oil and gas exploration, deep well injection, or any other activity that may result in deep well penetration. *AoR & Corrective Action Guidance*, at 53-54. In its Response to Comments, the Region explained that options like “site reconnaissance, review of aerial and satellite imagery and geophysical surveys” are not required, nor are they always appropriate. Response to Comments at 96. The Region explained why such steps were not necessary for the FutureGen permits: “Given that there are no known private water wells in the [area of review] that are deep enough to be of concern and given known hydrogeologic information of the area, [the Region] believes that there is no concern of any unknown private water wells that would penetrate the confining zone.” *Id.* The Region reached the same conclusion with respect to oil and gas wells. *Id.* at 94.

Nothing in the guidance document suggests that the additional steps of aerial and satellite imagery and geophysical surveys are warranted where the depth of the confining layer relative to the shallowness of the more than 6,000 wells identified make it highly unlikely that any well potentially overlooked might penetrate the confining zone. Moreover, the guidance document clearly provides that the “suggestions for implementation” provided go beyond the minimum requirements of the regulation and do not impose legally binding requirements on EPA, States, or the regulated community. *AoR & Corrective Action Guidance*, at *i*. While guidance documents are valuable tools in aiding the Agency’s deliberative processes, particularly where statutes or regulations may lack details about implementation, guidance documents do not confer any rights nor are they legally binding. *See In re City of Attleboro*, 14 E.A.D. 398, 438 n.71 (EAB 2009); *see also In re Wyo. Ref. Co.*, 2 E.A.D. 221, 225 (Adm’r 1986) (explaining the fundamental principle of administrative law that informal documents of an Agency do not confer any substantive or procedural rights upon the public). In the introduction to the *Area of Review Evaluation and Corrective Action Guidance*, EPA specifically retains the discretion to adapt its approaches on a case-by-case basis, as appropriate. *AoR & Corrective Action Guidance*, at *i*. Given all of the above, the Board concludes that the Region did not abuse its discretion in determining that the use of aerial and satellite imagery and geophysical surveys to further identify wells in the FutureGen area of review was unnecessary. *See also* 40 C.F.R. § 146.84(c) (requiring that wells be identified “using methods approved by the permitting authority”).

Finally, Petitioners contend that Region 5’s alleged failure to properly identify wells is “underscored” by two, nonproducing natural gas wells located on the Leinberger property that are not reflected in the draft permits or in the ISGS

database. Petitions at 17. Petitioners identified these two wells in their comments on the draft permits and provided a general location, but did not provide well depths or any other information about the alleged unidentified natural gas wells on Petitioner Leinberger's property. *See* Petitioners' Comments at 8-9 & Ex. 4 (Declaration of Karl Leinberger) (A.R. #497); Petitions at 17-18. The Region stated that, absent this information, it could not verify the existence of the wells nor determine their depth. Corrective Action Eval. at 7. Nonetheless, the Region took steps to evaluate all of the wells it could identify on the Leinberger property. *Id.* In particular, the Region georeferenced the Leinberger property boundaries on a map with the ISGS dataset and identified twenty wells on the Leinberger property. *Id.* Among those twenty wells, twelve were dry holes, five were gas wells, one was a water well, one was a coal test well, and one was permitted but may never have been drilled. The deepest of the twenty wells was 390 feet – which is well above the confining zone. *Id.* Based on all of the information it had, the Region concluded there was no basis to believe that any unidentified oil and gas wells on the Leinberger property would come anywhere near the confining layer. Region's Resp. Br. at 22-23; Response to Comments at 94 (“Oil and gas wells in the region are also shallow in relation to the injection and confining zones of this project. Therefore, even if an oil and gas well was drilled that the ISGS did not know about, it would likely be much too shallow to pose a threat of leakage outside of the injection formation”); Corrective Action Eval. at 7.

The Petitions do not dispute the Region's conclusions regarding the depths of the wells on the Leinberger properties, nor the depth of the wells in the area relative to the confining zone. Nor do the Petitions assert that the depths of the Leinberger wells are anywhere near the confining zone. Petitioners simply argue that the Region's failure to identify these two wells demonstrates a flawed identification process. Under 40 C.F.R. § 124.19(a)(4)(ii), however, Petitioners must explain why the Region's response to a comment was clearly erroneous or otherwise warrants review. Petitioners have failed to do so here.

In their reply brief on appeal, Petitioners argue for the first time that there is a risk that the unidentified wells may extend to the confining layer. Petitioners' Reply at 21-24 (essentially arguing that it is the Region's or FutureGen's obligation to establish that the wells do not penetrate the confining zone; it is not the Petitioners' obligation to “prove that there is migratory pathway for carbon dioxide”). This argument is both untimely and without merit. *See* 40 C.F.R. § 124.19(c)(2). In support of their argument, Petitioners point to a general statement in the guidance that “[m]ost deep wells that may penetrate the primary confining zone of a proposed [geologic sequestration] project site are related to

gas exploration and production.” *AoR & Corrective Action Guidance*, at 52. Petitioners also point to the Whitlock well and the Criswell well, two “oil or gas wells that artificially penetrate the confining zone” in the area of review, as “proof” that the unidentified Leinberger wells may penetrate the confining zone. Petitioners’ Reply at 21-24. The Board disagrees with Petitioners on both of these points.

First, the general statement in the guidance regarding the depths of oil and gas wells is not intended to outweigh or override the Region’s site-specific determinations, which take into account the depth of the proposed project and the site-specific geophysical and well data. *See AoR & Corrective Action Guidance*, at *i* (explaining that the guidance offers “suggestions for implementation” that “go beyond the minimum requirements of the rule,” and that EPA specifically retains the discretion to adapt its approaches on a case-by-case basis, as appropriate). Second, the Whitlock and the Criswell wells to which Petitioners refer were drilled at a distant gas *storage* field for the purpose of storage, as opposed to oil and gas production wells in the area of review. *Corrective Action Eval.* at 3-4, 7; *Response to Comments* at 94. As such, the depths of the Whitlock and Criswell wells do not suggest that the depths of any unidentified natural gas wells (drilled for production, even if nonproducing) on the Leinberger property would be near the confining zone. Thus, Petitioners’ post-petition attempts to further challenge the Region’s identification of wells also must fail. Given the information available, the Region reasonably concluded that there was no basis for further investigation of the two wells on the Leinberger property. Moreover, the alleged existence of these wells is not indicative of a flawed well identification process, as Petitioners argue.

In sum, the uncontested geophysical data in the record and the well information obtained on approximately 6,000 wells within the area of review support the Region’s identification and evaluation of wells within the area of review that may penetrate the confining zone. Petitioners have not identified any well within the area of review that penetrates the confining zone that the Region failed to identify. Moreover Petitioners have not articulated any clear error of fact or law, or any abuse of discretion, with respect to the methods employed by the Region for identifying wells. As such, Petitioners have not established that the Board’s review of the Region’s well identification efforts is warranted.

3. *The Region Did Not Err or Abuse Its Discretion in Investigating the Alleged Impacts to the Critchelov Well*

Petitioners next contend that the Region “failed to investigate” impacts to the Critchelov family water well that allegedly occurred when FutureGen drilled the stratigraphic well in 2011. Petitions at 19-20. Importantly, this stratigraphic well is not an injection well, is not regulated under the UIC program, and is not within the EPA’s jurisdiction. Region’s Resp. Br. at 23 & n.15; Response to Comments at 29, 96-97. Thus, although it seems Petitioners are arguing for an after-the-fact inquiry into alleged impacts to its water well in 2011 in the context of this permit proceeding, the Board only can resolve questions relating to provisions of the Class VI well permits. As described above, Class VI well permittees must identify wells that may penetrate the confining zone within the area of review, then evaluate and determine whether any of those wells require corrective action. *See* Part V.C.1., above; *see also* 40 C.F.R. § 146.84(c). Accordingly, the question the Board can resolve in this appeal is whether the Region erred in its consideration of the Critchelov water well when it evaluated the corrective action requirements for the permits.

Notwithstanding Petitioners’ assertion to the contrary, the Region did consider the alleged impacts to the Critchelov water well. The Region determined, however, that no further investigation or corrective action was necessary. Response to Comments at 29; FutureGen Final Permits, Attach. B, at B43 (determining that “no wells [were] identified within the [area of review] that require corrective action.”). In response to Petitioners’ comments during the permitting process for the Class VI wells, the Region reviewed Mr. Critchelov’s one-page declaration in which Mr. Critchelov asserts that FutureGen’s test well drilling had impacted his water well. Response to Comments at 29, 96-97. The Region contacted the Illinois Department of Natural Resources (under whose authority the drilling and construction of the stratigraphic test well had occurred) and found that there were no complaints of well contamination registered in the county regarding the drilling of the test well. *Id.* at 29, 96-97; Memo to File from Jeffrey R. McDonald, EPA Region 5 (Aug. 28, 2014) (regarding phone conversations with representatives of the State and FutureGen about alleged water well contamination) (A.R. #591). The Region explained that Mr. Critchelov’s declaration contained minimal details and provided no information regarding the well depth or location from which the Region could draw any direct correlation between the issues with the Critchelov well and the test well drilling. Response to Comments at 97. The Region stated that given what it already knew of the geophysical characteristics of the area, the Region had no basis from which to conclude that the Critchelov drinking water well extended near the confining

layer or otherwise presents a possible pathway for fluid migration. *Id.* at 96. Based on the information it had, the Region could not conclude that the Critchelow's well required corrective action. *Id.* As such, the Region investigated no further.

Nevertheless, to provide assurance to the Critchelows that there is no linkage between the FutureGen activities and the Critchelow drinking water well, the Region offered to require FutureGen to provide advance notice to the Critchelows of well construction to enable the Critchelows to determine whether their well shows any impacts. Response to Comments at 29. The Region also noted that if impacts to the Critchelow well are observed in the future, then the permits require that the well would be subject to corrective action. *Id.*; *see also* FutureGen Final Permits § G.2 & Attach. B; 40 C.F.R. § 146.84(c)-(e).

Petitioners are not satisfied with the Region's response and argue that the Region should have investigated further. In particular, Petitioners point to the one-page memorandum-to-file in the record documenting the Region's efforts to determine whether the Critchelows registered any complaints during the well drilling with FutureGen or the Illinois Department of Natural Resources. Petitions at 20. Petitioners, however, do not dispute the Region's contention that no complaints were registered. Nor do Petitioners dispute or provide any technical or other reliable support to refute the Region's conclusions regarding the shallowness of the aquifers in the area relative to the depth of the confining zone and the lack of connectedness to the Critchelow well. A permitting authority's response to a comment need only be commensurate with the comprehensiveness of the comment itself. *See, e.g., NE Hub Partners, 7 E.A.D. at 582-84* (explaining that the sufficiency of the permitting authority's response need only succinctly demonstrate that all significant comments were considered). Without more than what Petitioners provided, the Region had no basis from which to determine that the Critchelow well should be further evaluated for corrective action under these permits.²²

²² Petitioners mischaracterize the applicant's burden under the Class VI regulations. *See* Petitions at 20. The burden in this permit proceeding is to ensure that the planned *future* injection of CO₂ into the Class VI well for geologic sequestration will not endanger any underground sources of drinking water by ensuring that injected fluid will migrate into or out of the confining layer. 40 C.F.R. § 146.84. The burden is not to explain why the Critchelow's well water became "yellowish/brownish" and "overflowed" during "a portion of [the time between October through the first part of December in 2011]," which is approximately the time period when the stratification test well was

Additionally, Petitioners object to the Region's willingness to require FutureGen to provide notice to the Critchelows of well construction and to the statement that any future impacts will be addressed by corrective action under the permits. Petitioners seem to presume that the Region is relying on the availability of a future corrective action plan in place of further investigating the well now. On the contrary, the Region has determined that no connection can be established between the test well drilling and the Critchelow well and thus no further investigation of the event in 2011 is necessary. Notwithstanding that determination, the Region provides assurance to Petitioners that the permits require corrective action if the FutureGen project impacts the Critchelow water well in the future.

In sum, given the geophysical characteristics of the area of review and the relative depths of the aquifers, the drinking water wells, and the confining zone, when compared to the single affidavit offered by the Critchelows, which contains no technical or other reliable basis for connecting the alleged impacts to the well to the test drilling, the Region reasonably determined that no further investigation or corrective action requirements were warranted. Moreover, the Region adequately explained and justified its consideration of the Critchelow's comment in the administrative record. Accordingly, the Board denies the Petitions on this issue.

D. Financial Assurance

The regulations governing CO₂ geologic sequestration wells require that the permittee demonstrate and maintain financial responsibility that meets certain specified conditions of the rule, as determined by the permitting authority. *See* 40 C.F.R. § 146.85. Petitioners object to the financial assurance that the Region approved for FutureGen on a number of grounds. The Board addresses each of these challenges below.

- 1. The Region Properly Acted Within Its Discretion in Determining the Amount of Financial Assurance Required for Emergency and Remedial Response Costs*

Petitioners contend that the amount of financial assurance that the Region required under the permits is insufficient to cover all potential emergency and

drilled. *See* Petitioners' Comments Ex. 5, Decl. of William Critchelow (May 7, 2014) (A.R. #497); *see also* note 19, above.

remedial response costs.²³ Petitions at 24. Petitioners further argue that the Region should have approved an amount “closer to” the high-end of the Region’s cost estimate, rather than the mid-range. *Id.* Emergency and remedial response costs are the expenses likely to be incurred to address any movement (or release) of injected fluids that may cause an endangerment to an underground source of drinking water, during any phase of the project (e.g., construction, operation, or post-injection site care). 40 C.F.R. §§ 146.85, .94. Petitioners also assert that the Region provided “little support or explanation” for its financial responsibility determination for emergency and remedial response costs. Petitions at 25. As explained below, the Board disagrees.

The regulations governing financial responsibility for Class VI wells require that the financial responsibility instrument cover the cost of emergency and remedial response. 40 C.F.R. §§ 146.85, .94. The permitting authority also must consider and approve of the financial responsibility demonstration. *Id.* § 146.85 (a) (providing that “[t]he owner or operator must demonstrate and maintain financial responsibility as determined by the [permitting authority]), and (a)(5) (providing that “[t]he qualifying financial responsibility instrument(s) must be approved by the [permitting authority]”). The regulations also require that detailed written estimates of the cost of performing emergency and remedial response be submitted to the permitting authority.²⁴ *Id.* § 146.85(c). Cost

²³ There are four categories of costs for which the owner or operator of a Class VI well must demonstrate financial responsibility. *See* 40 C.F.R. § 146.85(a)(2). These are emergency and remedial responses costs that meet the requirements of 40 C.F.R. § 146.94; corrective action costs that meet the requirements of 40 C.F.R. § 146.84; injection well plugging costs that meet the requirements of 40 C.F.R. § 146.92; and post-injection site care and site closure costs that meet the requirements of 40 C.F.R. § 146.93.

²⁴ In a related argument, Petitioners contend that detailed cost estimates are not included in the permits. Petitions at 25. Although the regulations require that a permittee must submit a detailed written estimate to the Region to demonstrate financial responsibility and maintain an updated cost estimate, as approved by the permitting authority, throughout the life of a permit, nothing in the regulations requires that a detailed written estimate be “included in the permit.” *See* 40 C.F.R. §§ 146.82(a)(14), .85(a)(5), .85(c)(2). The permits require FutureGen to maintain financial responsibility as required by 40 C.F.R. part 146 sufficient to cover the estimated costs of (a) corrective action (\$0.62 million), (b) injection well plugging (\$2.7 million), (c) post-injection site care (\$18.3 million) and site closure (\$3.4 million), and (d) emergency and remedial response costs (\$26.7 million). FutureGen Final Permits at 5 & Attach. H (Financial Responsibility Determination for the Permit). The permits provide that the specific amount of financial responsibility for each of those categories is “based on cost estimates

estimates “must be performed for each phase separately and must be based on the costs to the regulatory agency of hiring a third party to perform the required activities.” *Id.* § 146.85(c)(1). The regulations, however, do not otherwise specify how the cost estimate is to be generated, or dictate factors to be considered, leaving the approval of financial assurance largely to the permitting authority’s discretion. *See id.* § 146.85(c). Nothing in the preamble to the regulations further clarifies how the permitting authority must exercise its discretion in approving or disapproving the amount of financial responsibility. Thus, the Board reviews the Region’s approval of the FutureGen’s Demonstration of Financial Responsibility to determine whether the Region adequately explained and supported its exercise of discretion in the record in light of what the Class VI regulations require.

Following the establishment of the Class VI well regulations, EPA issued a financial responsibility guidance document for use by the EPA and potential permittees in demonstrating and approving financial assurance for Class VI wells. Office of Water, U.S. EPA, EPA 816-R-11-005, *Geologic Sequestration of Carbon Dioxide, Underground Injection Control (UIC) Program Class VI Financial Responsibility Guidance*, at 40 (Jul. 2011) (“*Financial Responsibility Guidance*”). The *Financial Responsibility Guidance* describes the cost estimate for financial assurance as representing the total approved likely liability for geologic sequestration activities. *Id.* The guidance explains that the cost estimate should be based on the actual costs of contracting an independent third party to conduct the activities and all related costs. *Id.* The appendix to the guidance, titled *Cost Estimation Methodology*, states that owners or operators “need to accurately estimate costs,” particularly in areas such as emergency and remedial response, where less experience with estimating and evaluating these costs exists. *Id.* App. C, at C1. With respect to emergency and remedial response costs, the guidance also states that estimating the costs for emergency and remedial response costs is complicated by the uncertainties as to whether such events will occur and the nature of the events (and therefore the cost of responding), while also noting the importance of not underestimating the potential for such events to occur. *Id.* at C16. Finally, the guidance describes the need for Class VI well owners to “accurately estimate costs” because “accurate cost estimation is the underpinning of demonstrating financial responsibility.” *Id.* at C1.

provided during the permit application and review process.” *Id.* Attach. H, at H1. Petitioners have provided no legal basis for requiring a more detailed cost estimate to be included in the permits.

After issuing the guidance, EPA developed its own cost tool – “Cost Estimation Tool for Class VI Financial Responsibility Demonstrations” (“EPA Cost Tool”) – to “provide an ‘acceptable range of costs’ for [geologic sequestration] financial responsibility activities based on information submitted with a permit application.” Summary of Financial Responsibility Estimates for FutureGen Based on Cost Tool Outputs at 1 n.1 & App. A (Mar. 2014) (“FutureGen Cost Estimates Summary”) (referring to the document attached as Appendix A: *Cost Estimation Tool for Class VI Financial Responsibility Demonstrations: Summary of Design Characteristics, Assumptions and Potential Sources of Uncertainty* (Rev. Feb. 2014)) (A.R. #320). The EPA Cost Tool outputs for each financial responsibility activity are intended to be accurate enough for the permitting authority to assess whether the costs estimates provided by the permittee are likely to be adequate. *Id.* The estimated amounts are intended “to provide a check on the owner or operator’s cost estimate based on pre-established national data, not to reproduce exact results based on site specific conditions.” *Id.*

In this case, Future Gen submitted a detailed cost estimate for the purpose of demonstrating financial assurance in conjunction with its permit application, including its estimate for emergency and remedial response costs of \$6.1 million. FutureGen Permit Appl. at 9-2 to 9-3 (A.R. #2); FutureGen Cost Estimates Summary, App. C, at C2. The Region evaluated FutureGen’s estimate for emergency and remedial response costs and determined that the cost estimate was an acceptable starting point, but also concluded that FutureGen’s estimate omitted the emergency scenario in which CO₂ moves into an underground source of drinking water (which is generally the costliest to remediate). FutureGen Cost Estimates Summary at 9 & Apps. B and C; *see also* Response to Comments at 114-15.

In further reviewing FutureGen’s cost estimate, the Region independently estimated costs using the EPA Cost Tool and relevant information about the project that FutureGen had provided. *See* FutureGen Cost Estimates Summary at 1, 4; *see also* Response to Comments at 114-15. The EPA Cost Tool generated three cost estimates for emergency and remedial response activities for four injection wells: \$14.7 million (low-end estimate); \$27.5 million (medium-end estimate); and \$78 million (high-end estimate). FutureGen Cost Estimates Summary, App. B, at B-1.

The Region then considered the assumptions made by the EPA Cost Tool and evaluated the primary differences between the range of estimates. In doing so, the Region observed that a significant portion of the difference between the

middle-end cost estimate and the high-end cost estimate (worst case scenario) was attributable to the assumptions relating to the length of groundwater pump and treat operations. *Id.* at 9. More specifically, the EPA Cost Tool estimate for groundwater remediation was based on costs for creating a hydraulic barrier using groundwater remediation data from EPA Superfund studies.²⁵ *Id.* App. A, at A-2. The EPA Cost Tool estimated that pump and treat activities may continue for between two and thirty years (and that difference in duration largely accounts for the significant difference between the low-end, medium-end, and high-end cost estimates). *Id.* at 9. The Region explained that “the middle[-end] cost estimate used to provide the basis for the [Emergency and Remedial Response costs] estimate assumes that pump and treat would continue for 18 years.” *Id.*; *see also* Response to Comments at 115-16.

Additionally, the Region explained that while the Region does not expect that a Class VI well failure would produce the same kinds of toxic contamination that would be found at a Superfund site, the Superfund estimates were the best available source for costs of pump and treat operations. FutureGen Cost Estimates Summary, App. A, at A-2. Moreover, because emergency and remedial response costs at geologic sequestration sites likely will require less complex treatment than would a Superfund site, the Region determined that the EPA Cost Tool likely overestimates the costs that would be needed to treat underground sources of drinking water contaminated by CO₂. *Id.* at 8 n.4; *see also* Response to Comments at 116.

Based on the EPA Cost Tool results, FutureGen revised its estimate for emergency and remedial response costs, taking into account the emergency scenario in which CO₂ moves into an underground source of drinking water (which the Region had determined FutureGen had previously omitted). Its revised costs estimate was \$26.7 million. FutureGen Cost Estimates Summary at 9 n.5; *see also* FutureGen Final Permits, Attach. H, at H1. The Region determined that this revised cost estimate was “at the middle of the range of estimated costs generated by the [EPA] Cost Tool (\$14.7 million - \$77.9 million).”²⁶ FutureGen Cost Estimates Summary at 9. The Region concluded,

²⁵ Superfund refers to EPA’s environmental program that was established to address abandoned toxic waste sites under the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (or “CERCLA”), codified at 42 U.S.C. §§ 9601-9675.

²⁶ Although \$26.7 million is not literally in the middle between \$14.7 million and \$77.9 million, it is within that range, and it is also consistent with the middle cost

based on its evaluation of the EPA Cost Tool estimates, its comparison with the FutureGen estimates, and its consideration of the underlying assumptions in generating the estimates, that FutureGen's revised cost estimate "falls within the range of costs generated by the [EPA] Cost Tool," and thus was sufficient to demonstrate financial responsibility. *Id.* The Region further explained that "because of the conservatism build into the Cost Estimate Tool assumptions" (e.g., using Superfund groundwater remediation costs even though they are likely to be an overestimate of the costs to remediate CO₂ contamination), "the proposed trust fund is sufficient to demonstrate financial responsibility and [the Region] did not find it necessary to additionally fund the trust to the high-end estimates generated by the Cost Estimation Tool at this time." Response to Comments at 116. The Region approved FutureGen's revised demonstration of financial responsibility, and the permits require FutureGen to maintain financial responsibility for emergency and remedial response costs (for all four injection wells as one integrated facility) in the amount of \$26.7 million. FutureGen Final Permits, Attach. H, at H1, H10. FutureGen remains under the obligation to revise that cost estimate on an ongoing basis. FutureGen Final Permits at 5 & Attach. H, at H1; 40 C.F.R. § 146.85(c)(2).

Petitioners primarily argue, apparently as a matter of policy, that the Region should have required financial assurance for emergency and remedial response costs in an amount "closer to the high end" of the EPA Cost Tool estimate, based on "the high degree of risks and the numerous unknowns for this project."²⁷ Petitions at 25. The Board does not agree. The permitting program for Class VI wells takes into account the uncertainties associated with geologic sequestration in numerous ways, including by using Superfund remediation costs to estimate CO₂ remediation costs and requiring ongoing review and revision of

estimate produced by the EPA Cost Tool, which as noted was \$27.5 million (based on pump and treat activities for 18 years).

²⁷ Petitioners also argue in their reply brief that the amount is insufficient "in light of FutureGen's insurance broker stating that a pollution liability policy * * * should have a limit between \$50 and \$100 million." Petitioners' Reply at 31. As the Board already has explained, Petitioners may not raise new issues and arguments for the first time in their reply brief. *See* 40 C.F.R. § 124.19(c)(2). Additionally, as discussed further below, the insurance policy to which Petitioners refer "was intended to cover costs associated with potential damages and liabilities in addition to the engineering costs" and thus does not provide a relevant comparison with the amount of financial assurance required for emergency and remedial response costs under the Class VI regulations. *See* Part VI.D.2, below; *see also* FutureGen Cost Estimates Summary at 8.

costs estimates based on new information. Overestimating the financial assurance amounts for emergency and remedial response costs would be contrary to the guidance and could be detrimental to the intent of the permitting program. *See Financial Responsibility Guidance*, at 21 & App. C at C1; *see also* 75 Fed. Reg. at 77, 234 (describing the goals of the geologic sequestration program).

Additionally, Petitioners misapprehend the intent of the EPA Cost Tool when Petitioners assert that the Region erred by approving an amount that was “less than” the amount generated by the EPA Cost Tool. Petitions at 30. As explained above, the EPA Cost Tool is intended to assist the Region in evaluating the cost estimates submitted by Class VI well owners or operators; it is not intended to reproduce the same results or substitute results. FutureGen Cost Estimates Summary at A-1.

The task of estimating potential emergency and remedial response costs necessarily involves a certain amount of speculation and uncertainty, which requires significant technical expertise and the exercise of discretion. Having fully considered the record of decision with respect to the development of the financial assurance amount required for emergency and remedial response costs for the FutureGen permits, the Board concludes that the Region’s approval of FutureGen’s financial responsibility demonstration was reasonable and well within its discretion. Despite Petitioners’ arguments to the contrary and as demonstrated above, the Region provided a clear explanation in the record of how it arrived at its decision, and the record supports the Region’s decision. As such, the Board will not second-guess the Region’s expertise in this regard or the exercise of its discretion. *See* Part III, above (explaining that the Board will uphold a permitting authority’s reasonable exercise of discretion if that decision is cogently explained and supported in the record).

2. *The Region Acted Within Its Discretion When It Approved a Trust Fund as the Qualifying Financial Instrument to Cover FutureGen’s Estimated Emergency and Remedial Response Costs*

Petitioners challenge the Region’s approval of a trust fund as the *exclusive* financial assurance mechanism for potential emergency and remedial response costs. Petitions at 22. Petitioners argue that the Region did not adequately explain its decision to rely on a trust fund for emergency and remedial response costs, and that the decision to do so runs contrary to the recommendations in the Agency’s own guidance. *Id.* at 23. Petitioners argue that the Region instead should have required FutureGen to obtain the insurance coverage that FutureGen had proposed originally, *as a supplement* to the trust, and that the failure to do so was both clear error and an abuse of discretion. *Id.*

Petitioners have cited no regulatory support for the argument they advance. The regulations governing financial assurance for Class VI wells explicitly identifies “Trust Funds” in its list of “qualifying instruments” for demonstrating and maintaining financial responsibility.²⁸ *See* 40 C.F.R. § 146.85(a)(1). The regulations further provide that the owner or operator “may demonstrate financial responsibility by using one or multiple qualifying financial instruments for specific phases of the geologic sequestration project.” 40 C.F.R. § 146.85(a)(6). Nothing in the regulations prohibits the use of a trust fund for covering estimated emergency and remedial response costs. *See id.* Moreover, the Region is specifically permitted to “disapprove” any financial instrument that it determines is insufficient to meet the requirements of the regulation.²⁹ *Id.*

²⁸ 40 C.F.R. § 146.85(a)(1) provides in relevant part:

The financial responsibility instrument(s) used must be from the following list of qualifying instruments:

- (i) Trust Funds.
- (ii) Surety Bonds.
- (iii) Letter of Credit.
- (iv) Insurance.
- (v) Self Insurance (i.e., Financial Test and Corporate Guarantee).
- (vi) Escrow Account.
- (vii) Any other instrument(s) satisfactory to the [permitting authority].

²⁹ The financial responsibility provisions require that “[t]he qualifying financial responsibility instrument(s) must be approved by the [permitting authority].” 40 C.F.R. § 146.85(a)(5). Additionally, the provisions provide:

- (i) The [permitting authority must] consider and approve the financial responsibility demonstration for all the phases of the geologic sequestration project prior to issu[ing] a Class VI permit (§146.82).
- (ii) The owner or operator must provide any updated information related to their financial responsibility instrument(s) on an annual basis and if there are any changes, the [permitting authority] must evaluate, within a reasonable time, the financial responsibility demonstration to confirm that the instrument(s) used remain adequate for use. The owner or operator must maintain financial responsibility requirements regardless of the status of the [permitting authority’s] review of the financial responsibility demonstration.

§ 146.85(a)(5)(iii). Based on the regulations alone, the Board has no basis from which to conclude that the Region “clearly erred” in approving a trust fund as the exclusive financial assurance mechanism for the FutureGen permits. Next, the Board considers whether the Region abused its discretion.

Petitioners rely on language in EPA’s guidance on financial assurance for Class VI wells to argue that the Region should have accepted the permittee’s proposed insurance policy instead of selecting a trust fund as the lone financial assurance for emergency and remedial response costs. Although the guidance acknowledges that the regulation on financial assurance “specifically [lists] trust funds as one option for a financial responsibility instrument,” the guidance also suggests that a trust fund is a less suitable instrument for emergency and remedial response costs when compared with the other instruments identified. *Financial Responsibility Guidance*, at 10, 21 & tbl. 4. The guidance explains that emergency and remedial response costs are “relatively uncertain in terms of when (and if) they will occur and how much they will cost.” *Id.* at 20. The uncertainties associated with such costs increase the likelihood that a trust fund could be either overfunded or underfunded. *See id.* at 21. In ranking the financial instruments, however, the guidance attempts to identify the “relative strengths and weaknesses associated with each instrument”; it does not eliminate or advise against the use of a trust fund for emergency and remedial response costs. *Id.*

In considering the Region’s exercise of discretion here, the Board is cognizant that EPA’s stated approach to regulating carbon sequestration wells is an adaptive one. *See* 75 Fed. Reg. at 77,240-41, 77,246; *Financial Responsibility Guidance*, at *iii*. EPA has stated that it intends to continue evaluating ongoing research and demonstration projects to refine both the program and the guidance as necessary. *See* 75 Fed. Reg. at 77,240-41, 77,246; *Financial Responsibility Guidance*, at *iii*. The incorporation of new research, data, and information may increase protectiveness, streamline implementation, reduce costs, or otherwise inform the requirements for geological sequestration of CO₂. 75 Fed. Reg. at 77,241. Contrary to Petitioners’ urging, EPA clearly states in its guidance that “the obligations of the regulated community are determined by the statutes, regulations, or other legally binding requirements”; the guidance itself is not legally binding. *Financial Responsibility Guidance*, at *iii*; *see also In re City of*

(iii) The [permitting authority] may disapprove the use of a financial instrument if [it] determines that it is not sufficient to meet the requirements of this section.

Id. § 146.85(a)(i)-(iii).

Attleboro, 14 E.A.D. 398, 438 n.71 (EAB 2009) (explaining that guidance documents do not confer any rights, nor are they legally binding); *see also In re Wyo. Ref. Co.*, 2 E.A.D. 221, 225 (Adm'r 1986) (explaining the fundamental principle of administrative law that informal documents of an Agency do not confer any substantive or procedural rights upon the public). Moreover, the EPA acknowledges that the guidance document “may not apply to a particular situation based upon the circumstances” and states that the permitting authority “retain[s] the discretion to adopt approaches on a case-by-case basis that differ from [the] guidance where appropriate.” *Financial Responsibility Guidance*, at *iii*. Through this lens, the Board evaluates the Region’s exercise of discretion with respect to the financial assurance required in the permits.

In responding to comments, the Region explained that FutureGen originally had “proposed to establish an insurance policy with a \$10 million coverage limit for the pre-injection phase and to develop a policy with a \$100 million coverage limit for the injection phase.” Response to Comments at 120. The Region rejected this insurance proposal for a number of reasons. First, the Region concluded that because the insurance policy would cover costs unrelated to emergency and remedial response costs (such as personal injury and property damage), and would include standard incident and aggregate limits, the Region could not be certain of the amount of overall coverage available for emergency and remedial response costs. *Id.* Second, FutureGen was unable to provide a commitment for coverage extending beyond the drilling and well construction phase of the project, calling into question whether the policy could provide financial assurance for all phases of the project as required by the regulations. *Id.* Additionally, the policy FutureGen offered allowed for broader cancellation rights and shorter notice provisions than those required by 40 C.F.R. § 146.85(a)(4)(i)(A), and did not include the automatic renewal provisions outlined in 40 C.F.R. § 146.85(a)(4)(i)(B). *See* Office of Water, U.S. EPA, EPA 816-B-13-008, *Insurance Checklist*, Completed for FutureGen Alliance (Mar. 11, 2014) (A.R. #249); E-mail from Jeffrey McDonald, EPA Region 5, to Tyler J. Gilmore, FutureGen Alliance (Mar. 14, 2014) (A.R. #271) (discussing the shortfalls of the insurance policy submitted); E-mail from Lucinda Swartz, FutureGen Alliance, to Jeffrey McDonald, EPA Region 5 (Mar. 13, 2014) (A.R. #267). Given all of these deficiencies, the Region could not be certain that the insurance policy FutureGen provided could meet “the protective conditions of coverage required by 40 C.F.R. § 146.85(a)(4)(i).” Response to Comments at 120. The Region concluded that fully funding the trust fund to include the emergency and remedial response costs estimate would provide “full and certain coverage for the entire * * * cost estimate” in accordance with the regulatory requirements. *Id.* at 121.

The Region provided a thorough explanation for why it rejected the insurance instrument and approved the trust fund for emergency and remedial response costs. Although the Region did not specifically address the guidance document or its departure from the guidance in the Response to Comments document, the Region's rationale in this permit proceeding outweighs the rationale in the guidance for avoiding the use of a trust fund as the financial assurance instrument. Moreover, the regulations explicitly authorize the Region to disapprove of a financial instrument that is determined to be insufficient. 40 C.F.R. § 146.85(a)(6). As such, the record fully supports the Region's decision not to follow the recommendations in the guidance, which was within its discretion to do.

Petitioners argue that the Region should have "accepted" FutureGen's proposed insurance policy coverage "as a supplement to the trust." Petitions at 23. Petitioners, however, provide no regulatory authority for requiring financial assurance beyond that specifically required by the UIC regulations. Moreover, overfunding financial assurance by requiring both insurance *and* a fully funded trust fund would represent an inefficient use of funds that unnecessarily raises the cost of geologic sequestration. This approach runs counter to the goals of the program. *See Financial Responsibility Guidance*, at 21; *see also* 75 Fed. Reg. at 77, 234 (describing the goals of the geologic sequestration program).

For all of these reasons, the Region's decision to approve the use of a trust fund as the sole means of financial assurance was well-founded and is entirely consistent with the regulations. As such, the Region did not clearly err or abuse its discretion when it selected a trust fund as the financial mechanism for providing financial assurance for emergency and remedial response costs and rejected the proposed insurance policy.

3. *The Trust Pay-in-Period Was Within the Region's Discretion*

Next, Petitioners challenge the length of time allowed to fund the trust and the increments in which the trust will be funded (i.e., the "pay-in-period"). Specifically, Petitioners argue that the trust fund will be inadequately funded at the beginning of the project because the amount required to be funded is "insufficient to cover an emergency and remedial response event during construction." Petitions at 28. Petitioners believe that the initial funding of the trust should cover all of FutureGen's emergency and remedial response costs prior to drilling, "or at the very least," the pay-in-period should be shortened "to minimize the risk" that the trust fund will fail to cover potential emergency and remedial response costs. *Id.* at 29.

The regulations specifically authorize the Region to approve the use and length of a pay-in-period for trust funds established to assure financial responsibility. *See* 40 C.F.R. § 146.85(f) (providing that “[t]he [permit authority] must approve the use and length of pay-in-periods for trust funds or escrow accounts”). The preamble to regulation further explains that “EPA understands that in some cases a short pay-in-period (*e.g., three years or less*) will provide some financial flexibility for owners or operators while balancing financial risk.” 75 Fed. Reg. at 77,271 (emphasis added). The financial assurance guidance recommends that payments into trust funds be made annually (in equal parts) over a three-year period and provides, as an example, a pay-in-period in which the first third of the trust must be paid *before* the initial injection of carbon dioxide. *Financial Responsibility Guidance*, at 26.

In the FutureGen permits, the Region approved a pay-in-period of two years total from the time of permit issuance – a pay-in-period that is at least one year shorter than that recommended in the guidance. Specifically, the FutureGen permits require payment of \$8.823 million into the trust fund within 7 days of final permit issuance, which represents 17% of the total trust fund value. FutureGen Final Permits, Attach. H, at 2. That amount is intended to cover pre-injection activities. *Id.* Of that amount, \$6.1 million is earmarked for potential emergency and remedial response costs. *Id.* FutureGen then must place an additional \$22.345 million into the trust fund within one year of final permit issuance, *or at least 7 days prior to injection*, whichever comes first. *Id.* Thus, before the initial injection of carbon dioxide, 60% (or \$31.168 of the \$51.7 million total)³⁰ of the trust fund must be funded. All of those funds would be available for estimated emergency and remedial response costs, if needed. *See* FutureGen Final Permits, Attach. H (attached Trust Agreement § 4). Moreover, the majority of the costs estimated for emergency and remedial response are related to post-injection catastrophic failure and would not come into play prior to initial injection. FutureGen Cost Estimates Summary, App. C, at C-2. Thus, the pay-in amounts required prior to injection for these permits significantly exceeds the 33% that is recommended by the guidance. *Financial Responsibility Guidance*, at 26.

³⁰ The Region’s brief mistakenly states that the trust will be funded to a total amount of \$57.1 million, and calculates that 55% of that total, or \$31.258 million, will be funded at the time of injection. Region’s Resp. Br. at 35 & n.27. The permits, however, clearly provide that the total is \$51.7 million, 60% of which is \$31.258 million. FutureGen Final Permits, Attach. H, at 2.

Additionally, the final installment of \$20.6 million is required to be funded within two years of final permit issuance, regardless of whether injection actually has started. FutureGen Final Permits, Attach. H, at 2. If the trust were funded as recommended in the guidance, the trust might not be fully funded until two years after injection had started. *Financial Responsibility Guidance*, at 26.

While Petitioners may prefer that FutureGen fund the trust in full prior to injection, nothing in the regulations requires that such payment be made. The Region's approved pay-in period is reasonable, consistent with the recommendations in the guidance, and was well within the discretion afforded to the Region by the regulations. *See* Part III, above (explaining that the Board will uphold a permitting authority's reasonable exercise of discretion if that decision is cogently explained and supported in the record).

4. *Financial Assurance Must Be Maintained for the Life of the Project*

Finally, Petitioners assert that the permits "fail[] to contain a provision requiring FutureGen to maintain financial assurance through[out] the duration of the project" because the permits allow the FutureGen trust to be "terminated by the Grantor and Trustee, with the concurrence of [EPA]." Petitions at 27. Petitioners argue that "[w]ithout an affirmative statement in the [permits] that FutureGen must have sufficient financial assurance throughout the project, FutureGen could terminate the financial assurance without creating another [financial assurance] mechanism." *Id.*

The reassurance that petitioners seek is provided directly in the regulations, which expressly provide that "[t]he requirement to maintain adequate financial responsibility and resources is directly enforceable regardless of whether the requirement is a condition of the permit." 40 C.F.R. § 146.85(b). Adequate financial assurance under the regulations includes funds sufficient to cover all costs as required by the regulation for the life of the project. *See id.* § 146.85. Additionally, under the regulations, FutureGen may be released from a financial instrument, but *only* under certain circumstances that include either the substitution of a replacement financial instrument with approval from the Region or the demonstrated completion of the sequestration project for which the instrument was required, as determined by the Region. *See id.* § 146.85(b)(2)(i)-(ii). Petitioners essentially ask the Board to presume that the Region might approve the termination of the trust fund in violation of regulations, which the Board will not do. For the reasons stated, above, the board denies the Petitions on this issue.

VI. *CONCLUSION AND ORDER*

In considering this consolidated appeal, the Board finds that the Region thoroughly and thoughtfully reviewed the FutureGen permits, particularly given the magnitude and complexity of this first-of-its-kind proposed project. The depth of the Region's review is evidenced by an administrative record index that includes nearly 600 entries, a 228-page Response to Comments document that responds to written comments exceeding 300 pages from 29 parties. The record illustrates that numerous EPA scientists and engineers, and additional personnel contributed to this permitting decision. Having fully considered these petitions, the administrative record of the permitting decision, and the applicable regulatory provisions, the Board finds no clear error or abuse of discretion with respect to any of the issues that Petitioners have raised. In many instances challenged in these Petitions, the Board finds that the Region imposed additional requirements beyond the minimum required by EPA's regulations. Additionally, the Board observes that for each of the permit areas challenged (i.e., the area of review delineation, the corrective action plan, the monitoring network, and the financial responsibility demonstration), the regulations and the permits provide for reevaluation and amendment early and often as the project moves forward.

For all of the reasons provided in this decision, the Board denies the Petitions for Review in this consolidated appeal.

So ordered.