BEFORE THE ENVIRONMENTAL APPEALS BOARD
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C.

In re:	)
Panoche Energy Center, LLC, Class I Underground Injection Wells 1-6, Permit No. R9UIC-CA1-FY17-2R	)

PANOCHE ENERGY CENTER, LLC's REPLY IN SUPPORT OF PETITION FOR REVIEW

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INTRODUCTION

Panoche Energy Center, LLC ("PEC") operates a gas-fired electric generation facility critical to California's electric grid. When PEC is generating electricity, it uses water in part for cooling purposes and thereby generates wastewater. For fourteen years PEC has injected its wastewater for disposal deep into an underground sandstone formation under a Class I Underground Injection Control ("UIC") Permit issued by EPA Region 9. Nothing in the administrative record shows that PEC's activities affect the underground sources of drinking water ("USDWs") located thousands of feet above PEC's injection zone. The record shows that PEC constructed a new wastewater treatment system in 2016 that significantly reduced the volume of fluids PEC injects underground, thereby reducing pressure in the injection zone.

In its Permit renewal application, PEC used empirical site-specific data and conservative estimates in a standard EPA-accepted model to demonstrate that the pressure increase from PEC's injection activities would be significantly less than the pressure needed to endanger an USDW. EPA issued the Permit[1] with no required corrective actions, affirming that PEC's injection activities will not result in fluid movement from the injection zone and into an USDW.

Notwithstanding its finding of no endangerment to USDWs, EPA imposed a new requirement, not contained in the prior permit, that PEC drill a new 3,900 foot-deep well, on property not owned or controlled by PEC, to monitor the quality of the lowermost USDW above the injection zone. EPA's sole basis for this ambient monitoring well is because some older, abandoned wells near PEC's injection wells were sealed with drilling muds many years ago. EPA speculates that these drilling muds could fail with age, and thus create a conduit for fluid to migrate from PEC's injection zone upward into and contaminate overlying USDWs.

[1] Class I Non-Hazardous Permit No. R9UIC-CA1-FYI17-2R (the "Permit"); *see* AR # 84.

The fundamental problem with EPA's position, however, is that there is no evidence in the record that drilling muds used to seal abandoned wells actually fail with age. To the contrary, the record shows that muds retain their significant sealing properties, and that numerous other safeguards would prevent any potential endangerment to USDWs. EPA's justification for the monitoring well requirement is based solely on speculation, unsupported by any site-specific or academic literature information. Moreover, EPA's monitoring requirement contradicts the agency's position that it does not impose permit conditions that a permit applicant does not have legal authority to implement (e.g., going onto another's property to drill a monitoring well).

EPA's opposition brief relies on unfounded, conclusory assertions about the *potential* risk of endangerment to USDWs from PEC's injection activities. But the record belies any such potential risk of endangerment. EPA disregards, without any justification, the empirical and other site-specific data PEC produced showing that PEC's injection activities will not result in fluid movement into USDWs. The empirical, site-specific data, along with modeling and technical analysis provided to EPA to demonstrate that there is no potential for fluid movement, is consistent with long-standing engineering standards and practices used across the United States and relied upon by EPA to make permitting decisions just like the decision at issue here.

To adopt Region 9's approach here would undermine decades of science and engineering that support the UIC program, eliminate the agency's regulatory obligation to demonstrate a site-specific basis for ambient monitoring prior to imposing such a condition, and contradict long-standing agency guidance prohibiting permit conditions that an applicant cannot legally implement. Because the ambient monitoring requirements EPA has imposed are not rational, justifiable, or supported by the administrative record, they must be vacated.

ARGUMENT

The monitoring well and other requirements EPA imposed in section II.E.2 of the Permit (the "Ambient Monitoring Requirement") must be vacated because there is no factual support for those requirements in the record and because they contradict formal agency guidance. The Ambient Monitoring Requirement is also irrational because it lacks a causal relationship between PEC's injection activities and any observed changes to water quality. EPA clearly erred in imposing these requirements. *See In Re Stonehaven Energy Management, LLC*, 15 E.A.D. 817, 830 (EAB 2013).

A. The Record Does Not Show Potential Risk of Endangerment to USDWs

There is no dispute that EPA may impose monitoring conditions under the Permit. As discussed in PEC's petition, certain monitoring conditions are required under UIC regulations and serve to monitor injection zone dynamics to assess, among other things, whether injection activities may endanger overlying USDWs. Pet. at 2, 28. In contrast, ambient monitoring requirements are not required under UIC regulations and the imposition of such requirements are subject to the agency's discretion. *See* EPA Opp. at 13. But there are limits to that discretion. What EPA Region 9 seeks is unfettered authority to impose costly monitoring requirements on permittees merely by speculating about a concern, even if that concern is unfounded and lacks any factual basis in the administrative record. EPA's position, however, is foreclosed by the Board's precedents recognizing that the "appearance of rationality evaporates" where "the Board can find little or no support" for EPA's decision in the record. *In Re Stonehaven, LLC*, 15 E.A.D. at 831; *see also* PEC's Petition for Review ("Pet.") at 22-23. This is not a case where the petitioner merely draws different conclusions from the record than EPA did, *see* EPA Opp. at 11. This is a case where the record simply does not support EPA's decision.

1. It is Undisputed that USDWs are Not Endangered by PEC's Injection Activities

The record shows that PEC's injection activities will not endanger USDWs and that EPA agrees. The underground sandstone formation, into which PEC injects fluids some 7,200 feet below the ground surface, is also penetrated by wells that were drilled years ago by other parties exploring for and extracting oil and gas. These exploratory wells were unproductive "dry holes" or were productive wells that reached their economic limit, and so were abandoned. Plugging records for each and every well are available in the public records maintained by the California Geologic Management Division (CalGEM) within the California Department of Conservation.[2] If those wells were not plugged, then increased pressure in the injection zone could potentially push fluids from the injection zone upward through the empty wellbores and into an USDW residing in rock layers thousands of feet above the injection zone (the lowermost USDW is located 3,500 feet above the top of the Injection Zone in IW2 – Figure F-5). AR ## 1d at 5, 1f at 5.

Where, as here, the wells are properly plugged with drilling muds and cement plugs, the conduit for fluid movement between the injection zone and USDWs is blocked and an USDW can become endangered only if the pressure in the injection zone becomes so great that it forces the column of mud and cement plugs in the abandoned wellbores upward, such that fluids from the injection zone would have a pathway upward into the USDW. *See* AR # 43x, AR # 43aa.

[2] *See* https://www.conservation.ca.gov/calgem. PEC provided CalGEM records for each abandoned well in the AoR. *See* AR # 3 at Table C-1 (2017 application submission), AR # 1c at Ex. C-1 (2019 application submission). These records were contained on a compact disc that PEC's consultants sent to EPA. *See* AR # 1c at Ex. C-1 (referencing submission at page 77 of 309 total PDF pages). The records on the compact disc were not included in the Administrative Record produced by EPA. PEC has asked EPA to complete the Administrative Record with these records. For convenience, the records are attached to the Declaration of Robin Shropshire filed herewith, Exhibit A. Also, because they are official agency documents that are within the public realm, the Board can take "official notice" of them. *See In Re: Stonehaven Energy Management, LLC*, 15 E.A.D. 817, 2013 WL 1308715 (EAB Mar. 28, 2013) at n. 11 (noting that courts allow agencies wide latitude in taking official notice; citing cases). The accuracy of official CalGEM records also cannot reasonably be questioned. *See* Fed. R. Evid. 201.

PEC successfully met its burden under 40 C.F.R. § 144.12(a) to show that its injection activities will not result in fluid movement from the injection zone into USDWs, because the resulting pressure in the injection zone will be far below the pressures that would be required to displace the weight of muds in the abandoned wells within the Area of Review ("AoR"). *See* Pet. at 6-13.

In particular, the pressure change in the injection zone at Silver Creek Well # 18-33 ("Silver Creek 18" - the abandoned well closest to PEC's injection wells) will be less than 100 pounds per square inch. Moreover, pressure changes of more than 400 pounds per square inch would be required to displace the weight and gel strength of drilling muds in Silver Creek 18. *See* Pet. at 14.[3] This calculation is conservative because it *does not* account for the additional pressure resistance from cement plugs within the wellbore and steel plates welded over the wellhead, as well as other geologic factors like intervening buffer aquifers that would absorb any fluids migrating up an abandoned wellbore before reaching an USDW. *See* Pet. at 9-13. EPA concedes that these modeling methods are "based on rigorous science," and are "well-established scientific tools" that are "the foundation of a no-migration demonstration." AR # 49 at 14.

The fact that PEC met its burden to show that USDWs will not be endangered by its injection activities is demonstrated by EPA's issuance of the Permit *without any corrective action*. *See* Permit Part II. C (PEC is "not required to conduct any corrective action, in accordance with 40 C.F.R. §§ 144.55 and 146.7."); *see also* EPA Opp. at 2 (acknowledging that its regulations "prohibit injection activities that would allow the movement of fluid containing contaminants into USDW…"). For EPA to issue the Permit, the agency had to conclude that PEC's injection activities *will not cause the movement of fluid into USDWs*.

[3] *See also* AR # 43d at p. 20, Fig. 5.

2. EPA Ignores PEC's Site-Specific Evidence Showing No Risk of Endangerment

Despite its finding of no endangerment to USDWs, EPA nevertheless contends that the Ambient Monitoring Requirement is necessary because there is "a potential risk of fluid movement from PEC's injection activities into the USDW near Silver Creek #18." EPA Opp. at 14. EPA ignores record evidence that cuts against its contention.

To impose ambient monitoring requirements, EPA must make a "site-specific assessment of the potential for fluid movement from the well or injection zone and on the potential value of monitoring wells to detect such movement." 40 C.F.R. § 146.13(d)(1). EPA's opposition brief ignores the site-specific information PEC provided showing that the injection activities will not result in fluid movement into USDWs.

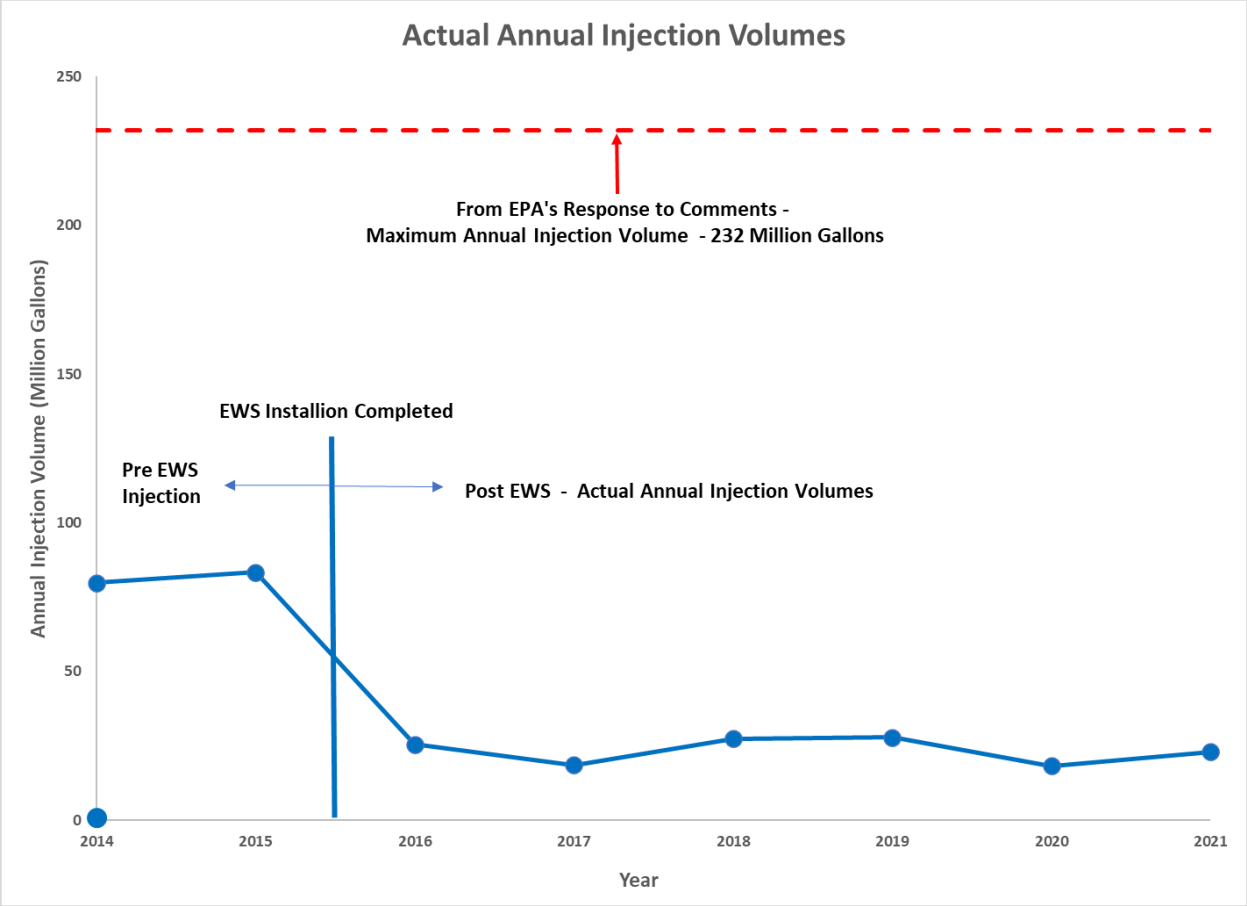
EPA does not address the fact that the pressure change in the injection zone would have to increase to four times the pressure resulting from PEC's injection activities to displace the muds in Silver Creek #18 and create a conduit for fluid movement between the injection zone and USDWs. *See* Pet. at 11, 14.

EPA's Ambient Monitoring Requirement also fails to account for the reduced injection volumes resulting from PEC's Enhanced Wastewater System ("EWS"), which has the effect of reducing pressure in the injection zone. *See* Pet. at 13-16. EPA imposed new monitoring requirements even though the prospective impact of PEC's injection activities will be *less than* what EPA previously permitted for 14 years without such monitoring requirements. EPA similarly disregards the operational limitations on PEC due to PEC's air permit, which limits the amount of wastewater PEC can generate for injection. *See* Pet. at 15.[4] EPA contends that PEC's air permit "contains no provisions for the protection of USDWs," EPA Opp. at 19. EPA

[4] A rational response to concerns about maximum injection volumes would have been to propose a lower injection limit, but EPA did not explore that here.

irrationally looks only at the face of the permit but disregards the operational realities and limitations that flow from that permit (i.e., wastewater is only produced for injection during facility operations; and facility operations are limited on an annual basis by the air permit).

EPA faults PEC for not explaining how its air permit effectively limits the maximum injection volume to 84 million gallons per year. *See* EPA Opp. at 19-20. PEC's air permit allows each of the four generators to operate for 5,000 hours per year for a total of 20,000 hours per year. *See* Pet. at 15. Based on this limitation, PEC then compared the number of hours its facility has operated and the volumes of wastewater generated in that time, and then extrapolated what those volumes would be if PEC operated at the maximum possible capacity its air permit allows. For example, since commissioning the EWS in 2016, the facility has produced between 2,800 and 4,200 gallons of water per engine fired hour ("EFH"). Looking at 2022 as a point of reference, when the facility generated 4,200 gallons per EFH, the annual maximum gallons that would have been injected if the facility operated for 20,000 hours would have been 84,000,000 gallons. This operational limit is set by the air permit, and PEC only produces wastewater when it operates its facility. There simply is no scenario where PEC would produce 232 million gallons of wastewater in a given year, as EPA assumes.



EPA disregards the obvious—that PEC's air permit imposes operational limitations on PEC and the wastewater it generates—and irrationally focuses instead on what the impact to formation pressures would be *if* PEC were to inject 232 million gallons of wastewater per year.

EPA also ignores the fact that all of the abandoned wells within the AoR have cement plugs. *See* Pet. at 11. Silver Creek # 18, for example, has three cement plugs: one between 1,437 to 1,700 feet below the surface, one from 678 to 817 feet below surface, and one from 8 to 35 feet below surface—totaling 429 feet of cement—with a steel plate welded over the top of the well casing. AR # 1c;[5] *see also* AR # 43c at Figure C-9 (Revised). Setting aside the weight and

[5] *See* Shropshire Decl., supra note 2, Ex. A (well history reports, specifically Division of Oil and Gas – Well Summary Report (Form 100), dated April 24, 1974; History of Oil or Gas Well (Form 103), dated April 18, 1974; and Report of Operations (Form 109), dated April 9, 1974); *see also* AR # 1c at Ex. C-1 (once EPA completes the Administrative Record with these records)

gel strength of the drilling muds sealing the rest of the wellbore, *id*., EPA nowhere explains how pressure in the injection zone from PEC's activities could possibly push 429 feet of cement plugs in Silver Creek # 18 upward such that fluids could migrate from the injection zone into USDWs.

Nor does EPA address *any* of the geologic features *of this particular site* that provide further protection to USDWs. As PEC pointed out, underground layers overlying the Panoche Formation within the AoR (the Kreyenhagen and Moreno Formations) consist of clay and shales that swell and constrict boreholes, *see* Pet. at 8, 12-13. EPA ignores evidence in the record that these types of rock will naturally close and seal abandoned wellbores.[6] In addition, record evidence shows there are buffer aquifers between the injection zone and USDWs (the Domengine and Martinez Formations). *See* Pet. at 13. This means that any fluids migrating up a wellbore from the injection zone would flow into an underground saline aquifer that acts as a bleed-off zone for migrating fluids and prevents further migration upwards to an USDW. This geological reality is supported in the record with drilling records provided to EPA, and supported by decades of geological science AR # 43ag at 70-89. Moreover, EPA ignores its own rulemaking that explains how this buffer aquifer serves as an "additional safeguard" to protect USDWs, 53 Fed. Reg. 28118, 28133 (July 16, 1988). *See* Pet. at 13. Buffer aquifers are present in the Domengine, Lodo, and Morano intervals located between the PEC Injection Zone and the Kreyenhagen Shale. *See* AR # 1f at Figures F-5 and F-6.

It is a fundamental principle of administrative law that an agency must address and respond to comments about its proposed course of action, and failure to do so renders the agency's decision arbitrary and capricious. *See Fox Television Stations, Inc. v. F.C.C.*, 280 F.3d 1027, 1051 (D.C. Cir. 2002), *opinion modified on reh'g*, 293 F.3d 537 (D.C. Cir. 2002) (failing

[6] *See* AR 43s.

to respond to comments "require[s] that we reverse as arbitrary and capricious the [agency's] decision"). It is neither rational nor appropriate for EPA to simply ignore and fail to directly respond to record evidence that directly undercuts its decision-making.

3. EPA's Speculative Concerns Lack Support in the Record

Setting aside the site-specific information PEC provided that shows no potential for fluid movement into USDWs, which as discussed above EPA ignores, EPA contends that four factors support its decision to impose the Ambient Monitoring Requirement. Specifically, EPA contends that drilling muds used to seal abandoned wells can fail over time, the injection zone is "overpressured," the abandoned wells within the AoR lack "long-string casings," and there are no cement plugs at the base of the lowermost USDW. *See* EPA Opp. at 13-19. A close examination of the record shows that each of these purported concerns is unfounded and without support. Without factual support in the record, EPA's speculative concerns are legally insufficient to impose costly monitoring requirements. *See In Re Stonehaven*, 15 E.A.D. at 830-31. *See also Amerijet Int'l, Inc. v. Pistole*, 753 F.3d 1343, 1350 (D.C. Cir. 2014) ("[C]onclusory statements will not do; an agency's statement must be one of *reasoning.*") (internal quotations and citation omitted).

a. There is no evidence in the record that older drilling muds fail.

EPA's primary stated concern underlying the Ambient Monitoring Requirement is that drilling muds used to seal abandoned wells in the AoR could fail over time and create a conduit for fluids to migrate from the injection zone upward into USDWs. *See* EPA Opp. at 15-17. The only evidence in the record on this point actually cuts against EPA's position.

EPA states that "old wells" within the AoR "may have been improperly plugged and abandoned." EPA Opp. at 4. However, this statement lacks any support in the record and

contradicts long-standing geological science on which EPA relies in implementing the UIC program.

As PEC has explained, all of wells within the AoR were properly plugged and abandoned –i.e., each was sealed with direct oversight from California regulators (CalGEM) who generated plugging certificates documenting that each well was abandoned using proper procedures, as specified for each well in issued Division of Oil and Gas – Well Summary Report (Form 159).[7] There is no basis in the record for EPA to contend that these wells were "improperly plugged;" the CalGEM plugging certificates are definitive evidence to the contrary. *See Gov't of Guam v. Guerrero*, 11 F.4th 1052, 1058 (9th Cir. 2021) ("a public actor is entitled to the presumption of regularity…which an opposing party must rebut with clear, affirmative evidence to the contrary"). Across the United States, EPA and state agencies rely on the validity and empirical basis of closure reports to complete AoR analyses and make determinations regarding the need for corrective action, monitoring, and potential endangerment of USDWs. To ignore these validly issued closure reports would upend the UIC program.

As in its permitting decision, the only evidence EPA cites for its stated concern about the integrity of older drilling muds is the Utah Study. *See* EPA Opp. at 17 (citing AR # 25). EPA contends that "[a]s observed in this study," there is a "potential pathway for fluid movement" where "the integrity of the mud used to plug the wells has been compromised throughout time." *Id*. But the Utah Study did not "observe" any such compromise of integrity of muds in any specific well. The Utah Study merely *speculated about potential pathways* that could explain why certain abandoned wells had higher salinity and water pooling at the surface. AR # 25 at 29-30. More importantly, however, the study concluded that underground injection activities

[7] *See* Shropshire Decl., supra note 2, Ex. A (well history reports); *see also* AR # 1c at Ex. C-1 (once EPA completes the Administrative Record).

were not the cause of the movement of fluids into USDWs. AR # 25 at 1. In summary, the Utah Study contradicts Region 9's position.

Indeed, the record does not contain and Region 9 does not offer in any of its briefing *a single example*—from anywhere in the world—where the integrity of drilling muds fail over time and result in fluid movement through a borehole. This makes sense because, as PEC demonstrated to EPA during the Permit comment period, the geologic literature demonstrates that drilling muds—which are generally a slurry of clays—are durable and purposely formulated to provide stability in the borehole and keep out formation fluids.[8]

There are hundreds of thousands of abandoned wells all over the country.[9] If drilling mud integrity failed over time, EPA would have evidence of it. But EPA cites no such evidence, and relies instead on unfounded speculation and misapplies the findings from a single study that contradicts the agency's position here. Rational decision-making requires more.

EPA also disregards evidence in the record that undercuts its position. EPA overlooks geological literature that shows the integrity of drilling muds *is not* compromised over time, but *actually improves* over time. For example, a 1989 study examined the re-entry of a well in Texas that was plugged in 1959 with mud weighing 10.6 to 11.0 pounds per gallon. *See* AR # 43ad. Some thirty years later, the mud in the abandoned wellbore weighed 11.1 pounds per gallon, indicating it did not appreciably change over time and became slightly heavier and thus able to withstand more pressure. *See id*. Other studies in the record show that drilling muds are suitable for use as a long-term sealing agent. *See* AR # 43j (citing Polk & Gray (1984)). Site-

[8] *See* AR # 43 at 22-24, 43n, 43w, 43x, 43y, 43ab, and 43ad. For example, the clay-based muds used to seal the Silver Creek #18 well weigh 10.03 pounds per gallon. *See* Shropshire Decl., supra note 2, Ex. A (well history reports, specifically Division of Oil and Gas History of Oil or Gas Well (Form 103), dated April 18, 1974 showing the drilling mud at total depth is "75 p.s.i., which is 10.03 pounds per gallon mud). *See also* AR # 1c at Ex. C-1 (once EPA completes the Administrative Record).

[9] *See* AR # 49 at 13 ("EPA estimates that there may be as many as 300,000 abandoned wells…potentially in the AoRs of Class I injection wells.").

specific evidence from abandoned wells near the AoR in this case showed similar mud properties, with stiff, thick muds in those wellbores. *See* AR # 43j.

EPA evidently wanted PEC to re-open the abandoned wells to check on the integrity of the drilling muds used to seal them. *See, e.g.,* EPA Opp. at 17 ("PEC did not provide empirical evidence that the mud in the abandoned wells has not been compromised."). Re-entering a sealed and abandoned well is rarely done. The mud EPA wants "empirical" data about is thousands of feet below ground surface and below three cement plugs in the wellbore. Drilling yet another penetration to such depths to take a sample is no small undertaking and itself would increase risks to USDWs. EPA's demands are manifestly unreasonable, particularly given the extensive, site-specific evidence in the record that shows no risk of endangerment and no need for well re-entry.

b. PEC's site-specific modeling accounted for the ambient formation pressure.

EPA asserts the formation into which PEC injects fluids is "overpressured." *See, e.g.*, EPA Opp. at 5, 13. The term imparts the specter of risk where there is none.

In an overpressured formation, there is a potential for fluids to migrate upwards from areas of higher pressure to areas of lower pressure, but *only if* the formations overlying the injection zone cannot impede that migration. Similarly, abandoned wells can act as conduits from the injection interval *only if* the overpressure is sufficient to mobilize fluid flow and there is nothing within the boreholes (like drilling muds and cement plugs) that can impede its upward migration. Consisting of the swelling clays and shales, the Kreyenhagen and Moreno Formations are effective barriers to vertical fluid movement. With respect to the second potential mechanism, the salient point is that PEC's modeling took the ambient pressure of the formation into account in projecting the additional pressures needed to displace the drilling muds in the properly sealed and abandoned wells within the AoR. AR ## 1, 1a.

The site-specific modeling that PEC performed took due account of the ambient formation pressure, and found no issue. AR # 1a. Specifically, for Silver Creek # 18, PEC's conservative modeling showed that the pressure change resulting from PEC's injection activities would be one-quarter of the pressure increase needed to displace the muds in that abandoned well. AR # 12 at Figure 5.

In addition to failing to account for the effect of PEC's EWS on injection volumes and operational limits, as discussed above, EPA disregards the fact that PEC's conservative analysis of projected future operations shows resulting pressures far below thresholds of concern.

EPA warns that "subsurface pressures will increase as injection activities proceed," Opp. at 14. As elsewhere in EPA's briefing, the statement lacks any support in the record and is wrong as a geological matter. The injection zone is not a closed system like a balloon; the zone ultimately absorbs and disperses the fluids injected into it.[10] Furthermore, as noted above, buffer aquifers confine the injection zone and serve as a pressure release valve if any fluids migrate upward. In addition, PEC has—as required under its historic permit—monitored pressure in the formation where it injects, and monitoring results show that wellhead pressures have actually *decreased* over time from maximum values:[11] EPA ignores this empirical, site-specific evidence that undercuts its decision-making.

c. The lack of long-string casings in the abandoned wells does not increase risk of endangerment.

EPA contends that Silver Creek # 18 "has no long-string casing" which "increases the risk of fluids migrating laterally through the injection zone and into the abandoned wells." EPA

[10] This occurs due to "transient flow," which is a flow regime where the radius of pressure wave propagates away from a wellbore but has not reached any boundaries within the reservoir, and follows Darcy's Law. *See* Freeze, R.A., and Cherry, J.A., 1979, Groundwater: Prentice-Hall, Inc., Englewood, New Jersey, p. 604.
[11] *See* AR # 36 at Figure 6.

Opp. at 6. As EPA notes, long-string casings are pipes inserted into the borehole for support. *Id*. at 6 n. 6. EPA cites to no academic literature or site-specific information in support of its position, which is unfounded for several reasons.

First, exploration wells that are ultimately abandoned typically do not have long-string casing extending all the way to the bottom of the wellbore. Long-string casings are typically inserted to support oil and gas extraction; for a "dry hole", where no oil or gas resources were found, it would be uneconomical and pointless to insert long-string casings to the bottom of the wellbore. CalGEM regulations do not require the insertion of long-string casing in order to seal and abandon a well.[12]

The record evidence EPA cites also cuts against its stated concern. *See* EPA Opp. at 6 (citing AR # 49 at 13-14). EPA cites a study discussing "Well Failure," and how that occurs when fluids migrate in the gap between the outside of the casing and the wellbore. *See* AR # 49 at 13 ("Contamination due to well failure is caused by leaks in the well tubing and casing or when injected fluid is forced upward between the well's outer casing and the well bore."). The evidence EPA cites contradicts its own position because the study shows that long-string casing *increases the risk* of fluid movement. Where, as here, drilling muds were used to seal an uncased wellbore, no such risks would arise. EPA irrationally ignores the sealing effect of drilling muds in Silver Creek # 18 and other wells within the AoR.

d. The location of cement plugs in the wellbore is not relevant here.

EPA asserts that the lack of cement plugs at the base of the lowermost USDW presents a potential risk that fluids will migrate from the injection zone into the USDW. *See, e.g.*, EPA Opp. at 6, 13. Specifically, EPA contends that "the lack of a cement plug at the base of the

[12] *See* Cal. Code Regs., tit. 14, §§ 1723, 1722.4.

USDW" is a problem because "if fluids reach Silver Creek #18, there would be no effective barrier preventing their upward migration, which would result in endangerment." Opp. at 6; *see also* Opp. at 5 (fluids could migrate "with little to no resistance"). This contention ignores record evidence to the contrary and is flawed for three reasons.

First, Silver Creek # 18 (like other abandoned wells within the AoR) is sealed with drilling muds, so there is in fact an "effective barrier" in the wellbore preventing upward fluid migration. These are not open boreholes; they are filled with drilling muds that are intentionally formulated to serve as a barrier to surrounding fluids. Indeed, this is partly why EPA found no endangerment to USDWs.

Second, as discussed above, in addition to drilling muds, Silver Creek #18 has 429 feet of cement plugs that provide added pressure control that PEC's conservative modeling did not take into account. While it is correct that the cement plugs are not located at the base of the USDW, the relevant question is whether pressure in the injection zone would displace the entire column of muds and cement plugs in the wellbore.

This is the question and analysis that EPA uses to determine whether an injection activity may endanger USDWs. To simply conclude that anytime a certified and properly plugged and abandoned well, which lacks a cement plug at the base of the USDW, could potentially fail would upend the UIC program. In effect, all such wells would require corrective action because the lack of such a cement plug means there is a "potential" for movement of fluids; and no site-specific analysis would be required to impose discretionary monitoring conditions.

While there is a benefit to having a cement plug at the base of a USDW in an abandoned well, that is not the end of the story and certainly does not account for site-specific evidence. Here, the location of the cement plug is not relevant because closure reports demonstrate that

pressures in the injection zone would need to increase 400% in Silver Creek # 18 before the mud and gel strength would fail (under PEC's conservative modeling analysis); significantly more pressure would be needed to also displace the 429 feet of cement plugs in Silver Creek #18. EPA disregards this analysis in favor of a "bright-line" test that all abandoned wells must have a cement plug at the base of the lowermost USDW, otherwise the well would constitute a "potential" endangerment. This bright-line test is not codified anywhere in EPA's regulations, articulated in any EPA guidance, or supported by any case law.

Third, EPA's analysis irrationally assumes that there is no mud in the Silver Creek #18 wellbore beneath the lowest cement plugs, when evidence in the record shows conclusively that mud is present. AR # 1c. For Silver Creek # 18, drilling muds extend to the bottom of the drilled wellbore at 8,698 feet.[13] It is not rational for EPA to assume away documented facts in the record.

B. The Ambient Monitoring Requirement is Not Rational

As explained in PEC's Petition, the Board should also vacate the Ambient Monitoring Requirement for the additional reason that it is not rationally explained or related to the concerns EPA has expressed. *See* Pet. at 26-29. Specifically, because EPA concedes that water quality in USDWs could change for a variety of reasons, the water quality testing required under Ambient Monitoring Requirement would not indicate one way or another whether the drilling muds in an abandoned wellbore had failed and resulted in migration of fluids from the injection zone to USDWs. *Id*. at 26. Specifically, EPA states the following:

> A trend showing pressure or water quality changes in the USDW *could* indicate a hydraulic communication between the injection zone and the USDW, potentially

[13] *See* Shropshire Decl., supra note 2, Ex. A (well history reports, specifically Division of Oil and Gas – Well Summary Report (Form 108), dated April 5, 1974, History of Oil or Gas Well (Form 103), dated April 18, 1974); *see also* AR # 1c at Ex. C-1 (once EPA completes the Administrative Record).

> warranting a full evaluation of the potential impact to the USDW. EPA Opp. at 20 (*emphasis* added).
>
> "Furthermore, even if there were multiple reasons why water quality could change or subsurface pressure could increase, that does not render the monitoring requirement unwarranted. The monitoring is expected to *prove instrumental in discovering such changes*, see RTC #13 at 14, and any such discovery would, where appropriate, trigger further scrutiny to determine if the changes observed are due to PEC's injection activities. The Region would then work with PEC to determine whether corrective action is necessary." EPA Opp. at 21.

As such, the Ambient Monitoring Requirement would not provide the "early warning" EPA claims. *Id*. at 28. Instead, the relevant metric to monitor is pressure within the injection zone—to ensure that pressures remain below those levels that would displace the mud/cement columns in the abandoned wellbores—and PEC is already required by other parts of the Permit to monitor pressure at the injection zone where pressure is the highest. *Id*. The Ambient Monitoring Requirement is also irrational because it compels PEC to drill a well on land that PEC does not own or have access to. *Id*. at 29. EPA's responses to these arguments lack merit and the Board should reject them.

The Ambient Monitoring Requirement is again premised on EPA's concerns about the integrity of drilling muds used to seal the abandoned wells in the AoR. *See* EPA Opp. at 21, 22 n. 14 (PEC's monitoring of pressure at the injection site could be used to model pressure at the abandoned wells, but "those predictions would be based on the same lack of empirical evidence about the strength of the mud in the abandoned wells"). As discussed above, there is no evidence in the record to support EPA's concerns about the strength of such muds.

EPA acknowledges that there could be multiple reasons why water quality could change or pressure could increase in USDWs, and contends that the monitoring is "expected to prove instrumental in discovering such changes." EPA Opp. at 21. This proves the point: EPA is forcing PEC to provide water quality data about USDWs, even though EPA already determined

when it issued the Permit that PEC's injection activities will not endanger USDWs. More and better data about water quality changes in USDWs may have some utility for EPA, but there is no rational basis to force PEC to provide EPA with such data, which is the relevant issue here.

EPA cites 40 C.F.R. § 144.12(b) for the proposition that it can require monitoring where "a permit applicant fails to provide sufficient evidence to conclusively redress a known risk." EPA Opp. at 19. Here, there is no "known risk." The regulation only applies where "water quality monitoring…indicates the movement of any contaminant into the underground source of drinking water." 40 C.F.R. § 144.12(b). There is no indication in the record that any contaminant has moved into an USDW, so EPA's reliance on this regulation is erroneous.

C. EPA's Action Violates Its Own Regulations and Guidance

The Ambient Monitoring Requirement is a significant and unexplained departure from the regulatory scheme underlying EPA's UIC Program. The Board should vacate that monitoring requirement for this reason as well. *See Ctr. for Biological Diversity v. Zinke*, 900 F.3d 1053, 1070 (9th Cir. 2018) (an "unexplained inconsistency" between two agency actions can render the action arbitrary and capricious).

1. Modeling is How EPA Assesses Risk of Endangerment of USDW.

The UIC Program is based on the use of modeling to determine pressure and risk of endangerment of USDWs from injection activities and abandoned wells.[14] According to EPA, "[s]ite-specific modeling" is the "foundation" for a non-endangerment demonstration. AR # 49 at 14. EPA explained that while a long-term analysis would be preferable, it is "impractical" in this context. *Id*. It is EPA's position that modeling provides a "long-term prediction" of how wastewater will migrate, and demonstrates, "using conservative assumptions, that the wastewater

[14] "Models are also the basis on which the requirements for hazardous and non-hazardous waste disposal were developed." AR # 49 at 14.

will remain contained or [be] rendered non-hazardous." *Id*. According to EPA, modeling is "based on rigorous science, and models are well-established scientific tools. All of the models on which studies and no-migration petitions are based are accepted by the scientific and regulatory communities." *Id*. Similarly, in this case, PEC's modeling was based on these same accepted modeling approaches, and EPA accepted that modeling to conclude that PEC's injection activities will not endanger USDW.

Yet EPA rejected that same modeling to conclude there is a "potential" for endangerment here. Instead, Region 9 relies on its speculative theories about old muds and the lack of concrete plugs at the base of USDWs in the abandoned wells within the AoR. It is arbitrary for EPA to rely on modeling for answering the primary question—whether USDW will be endangered—but then reject the same modeling when evaluating ambient monitoring requirements. EPA does not explain why modeling is suitable for one purpose but not the other.

2. EPA Concluded that Monitoring Wells Are Not Effective or Appropriate.

Moreover, when promulgating the technical criteria and standards for the UIC Program, 40 C.F.R Part 146, EPA acknowledged that efforts to evaluate the efficacy of the UIC program through the use of ground water-quality wells would be ineffective:

> In addition to its extremely high cost, this approach has two other serious drawbacks. It provides no information on the effect of nearby wells in the area of review on groundwater or on the effectiveness of the UIC program in abating pollution from these wells. It also would not provide valid data on the effectiveness of the UIC program in ensuring that leaking injection wells are repaired.

45 Fed. Reg. 42472, 42499 (June 24, 1980). EPA does not explain why it is now requiring PEC to drill a monitoring well in the face of its own conclusion that such an approach is not appropriate.

3. EPA Concluded that Forcing Permittees to Take Actions On Other People's Property Is Inappropriate.

EPA's Ambient Monitoring Requirement would require PEC to drill a 3,900 foot-deep well on someone else's property. EPA states that such a requirement is not subject to challenge and beyond any reproach. *See* EPA Opp. at 23 ("The Board should likewise reject PEC's attempt to call into question the Region's technical assessment of the need for, and location of, an ambient monitoring well based on the specter of property rights issues.").

EPA's position conflicts with the regulatory approach EPA adopted after notice-and-comment rulemaking. When promulgating Part 146 of the UIC Regulations, the agency stated that:

> EPA agrees that it is *inappropriate* for these regulations to require an applicant *to perform actions which may not be within his legal ability*, as a condition or recondition of obtaining a permit.

45 Fed. Reg. at 42481 (emphasis added; responding to a comment that EPA should not require "the applicant to go onto the property of others"). Again, EPA does not explain the inconsistency between its formal position and the action it took here.

There is no rational purpose for EPA's Ambient Monitoring Requirement and it unreasonably imposes conditions on PEC that EPA itself has determined are inappropriate. The Board should vacate the requirement for these reasons as well.

D. EPA's Action Here Is Bad Policy and Bad Precedent

Region 9's approach to monitoring is not only arbitrary as explained above, it conflicts with EPA guidance and practice in other regions. This presents a problem for EPA's UIC Program. "A fundamental norm of administrative procedure requires an agency to treat like cases alike." *Westar Energy, Inc., v. F.E.R.C.*, 473 F.3d 1239, 1241 (D.C. Cir. 2007).

If Region 9's decision stands, going forward any abandoned wells sealed with muds but without cement plugs at the base of the USDW will allegedly present "potential" risk to USDWs—regardless of whether the wells were properly plugged and abandoned with certifications from regulators, regardless of pressure modeling showing no endangerment to USDWs, regardless of any geological formations that EPA itself has concluded present an "additional safeguard" to USDWs, regardless of whether a permittee would have to enter land that it does not control and drill a multimillion dollar monitoring well, and regardless of whether or not the monitoring well would inform EPA about the causes of water quality changes within a USDW. In other words, evaluation of the "site-specific" conditions required to craft appropriate monitoring requirements under 40 C.F.R. § 146.13(d)(1) will be replaced by a singular focus on muds and cement plugs. EPA must ensure consistent treatment of permit applicants across the country, and this new approach will fundamentally change the UIC Program to make it less scientific and less functional.

CONCLUSION

PEC respectfully urges the Board to find EPA's Ambient Monitoring Requirement in the Permit was clearly erroneous and/or an abuse of discretion, reverse EPA's determination to impose the Ambient Monitoring Requirement, and remand the Permit to Region 9 for further actions consistent with the Board's decision.

Respectfully submitted this 31st day of January, 2023.

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STATEMENT OF COMPLIANCE WITH WORD LIMITATION

I hereby certify that this Reply in Support of Panoche Energy Center LLC's Petition for Review, including all relevant portions, contains fewer than 7,000 words, pursuant to 40 C.F.R. §124.19(d)(3).

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CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing Reply in Support of Petition for Review in the matter of Panoche Energy Center, LLC, Permit No. R9UIC-CA1-FY17-2R, were served on the following persons, this 31 day of January, 2023, in the manner specified:

By EAB eFiling System to:

Clerk of the Board
U.S. Environmental Protection Agency
Environmental Appeals Board
1200 Pennsylvania Avenue, NW
Mail Code 1103M Washington, DC 20460-0001

By email in accordance with the Environmental Appeals Board's September 21, 2020 Revised Order Authorizing Electronic Service of Documents in Permit and Enforcement Appeals and by U.S. Mail (to be mailed on January 31, 2023) to:

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