Public Hearing for WVDEP Proposed Legislative Rule 47CSR13

Date: Friday, July 23, 2021

Time: 6:00PM

Location: Zoom

(https://us02web.zoom.us/j/88477859211?pwd=aUFzZThUUTg0aGZINFJEWE95bXdXdz09)

Attendees

Name	**Organization**
Terry Fletcher	WVDEP – Public Information Office
Jennifer Wilson	Court Reporter, Sargent's Court Reporting Services
Connie Anderson	WVDEP-DWWM
Yogesh Patel	WVDEP-DWWM
James Martin	WVDEP - Office of Oil & Gas
Andrew L. Lockwood	WVDEP - Office of Oil & Gas
Samuel Taylor	West Virginia University Energy Institute, samuel.taylor@mail.wvu.edu
Jessica Moore	WVGES-West Virginia Geological and Economic Survey, jmoore@wvgs.wvnet.edu
Gretchen Kohler	Environmental and Regulatory Compliance at Antero Resources, gkohler@anteroresources.com
Aileen Curfman	West Virginia Sierra Club (acurfman@gmail.com)
Hannah King	West Virginia Environmental Council & West Coalition, hking1275@gmail.com

STATE OF WEST VIRGINIA

DEPARTMENT OF ENVIRONMENTAL PROTECTION

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IN RE: PROPOSED LEGISLATIVE RULE 47CSR13

PUBLIC HEARING

* * * * * * * * *

BEFORE: Terry Fletcher

Jennifer Wilson

Connie Anderson

Yogesh Patel

James Martin

Andrew L. Lockwood

Samuel Taylor

Jessica Moore

Gretchen Kohler

Aileen Curfman

Hannah King

HEARING: Friday, July 23, 2021

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PROCEEDINGS

The hearing was held at the scheduled date and time. However, transcript of the proceeding is not yet available, but will be supplied in an amendment as soon as it becomes available.

HG Energy, LLC
5260 Dupont Road
Parkersburg, WV 26101
(304) 420-1100 - Office
(304) 863-3172 - Fax

Roger Heldman
Operations Manager

7/15/21

Connie Anderson
UIC Program, DWWM
WV Department of Environmental Protection
601 57 th St, S. E.
Charleston, WV 25304

Dear Ms. Anderson,

HG Energy is the only operator in WV actively developing Enhanced Recovery projects. After reviewing the proposed changes to Legislative Rule 47 C.S.R. 13, Underground Injection Control Rule § 47-13-9. 9.2.b.2.A " Resistivity, Spontaneous Potential, and Caliper logs before casing is installed" and 9.2.b.2.A "A Cement Bond, Temperature, or Density Log after casing is set and cemented", both seem unnecessary. The requirement for these logs will add several thousand dollars to the cost of each well with no potential benefit. Often times the surface hole is unstable and the extra time required for these open hole logs could result in the hole collapsing and the potential loss of the logging tools.

H G Energy currently runs 100% excess cement on surface casing strings and we get good cement returns to surface. We believe a better solution is if good cement returns are not realized then a Cement Bond Log should be run and the situation reviewed by the operator and WVDEP to determine if any remedial action is necessary. This is the procedure we currently follow and it has proven to be effective on the rare occasion when it is necessary. This procedure is much less expensive and less risky than the proposed alternative.

If you or anyone else within the WVDEP would like to discuss this please let me know and I will be happy to make myself available.

Sincerely,

Roger Heldman

XC: James Martin, WVDEP
Charles T Brewer, WVDEP

WestVirginiaUniversity.
ENERGY INSTITUTE

July 20, 2021
Director Harold Ward
Cabinet Secretary
West Virginia Department of Environmental Protection
601 57th Street SE, Charleston, WV 25304

RE: Amendment to Underground Injection Control Rules, Including Addition of Class VI (six) Carbon Sequestration Wells. (WV Code Title 47, Series 13).

Director Ward:
Thank you for the opportunity to comment on this proposed rule. The West Virginia University Energy Institute (WVUEI) is the coordinating institution for energy research at West Virginia University, working with stakeholders within the university, across the state and region, to help stimulate energy and environmental economic development in West Virginia. On behalf of WVUEI, we are pleased to provide comments on the proposed amendment to Underground Injection Control Rules, including the addition of Class VI carbon sequestration rules.

Overall, WVUEI is strongly in support of the WVDEP obtaining primacy for Class VI injection wells, and thus having coordinated oversight of the range of Underground Injection Control (UIC) wells within West Virginia. WVUEI believes that WVDEP obtaining Class VI primacy and developing clear regulatory language removes a key barrier to the growth of CO2 capture, utilization, and sequestration industries in West Virginia, as well as providing new options for existing industries to meet future CO2 regulations within the state.

While WVUEI supports Class VI primacy through the WVDEP, there are items that we believe need further clarification in a final rule.

Establishment of clear guidelines for the transition of other classes of UIC wells to Class VI. Enhanced Petrochemical Recovery (either Enhanced Oil Recovery (EOR) or Enhanced Gas Recovery (EGR)) are currently the most common pathway for CO2 utilization in industry. West Virginia has a history of CO2 enhanced recovery projects, which are currently managed under the Class II UIC designation. While steps are outlined in the proposed rules (47-13-13, sec 1.c, in particular), more specific definition for transition would be helpful to both operators and regulators. Examples could include specification for reservoir production rates or changes in CO2 injection rates or reservoir pressure changes and change rates.

Better definition of "Seismic Risk Zones". Avoiding seismic risk is key for these projects, however the definitions used in Section 47-13-7, sec 4.a are somewhat confusing, based on our review of literature. An example map is shown in Figure 1, from the United States Geological Survey. Better understanding of the seismic risk zones and their definition is recommended, to

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prevent unnecessarily precluding activity in areas that may have relevant existing industrial activity. The West Virginia Geological and Economic Survey has extensive experience in seismicity and induced seismicity in the state, and WVUEI recommends cooperative engagement with the Survey on this question, and inclusion of reference to the maps/databases used to define these Seismic Risk Zones.

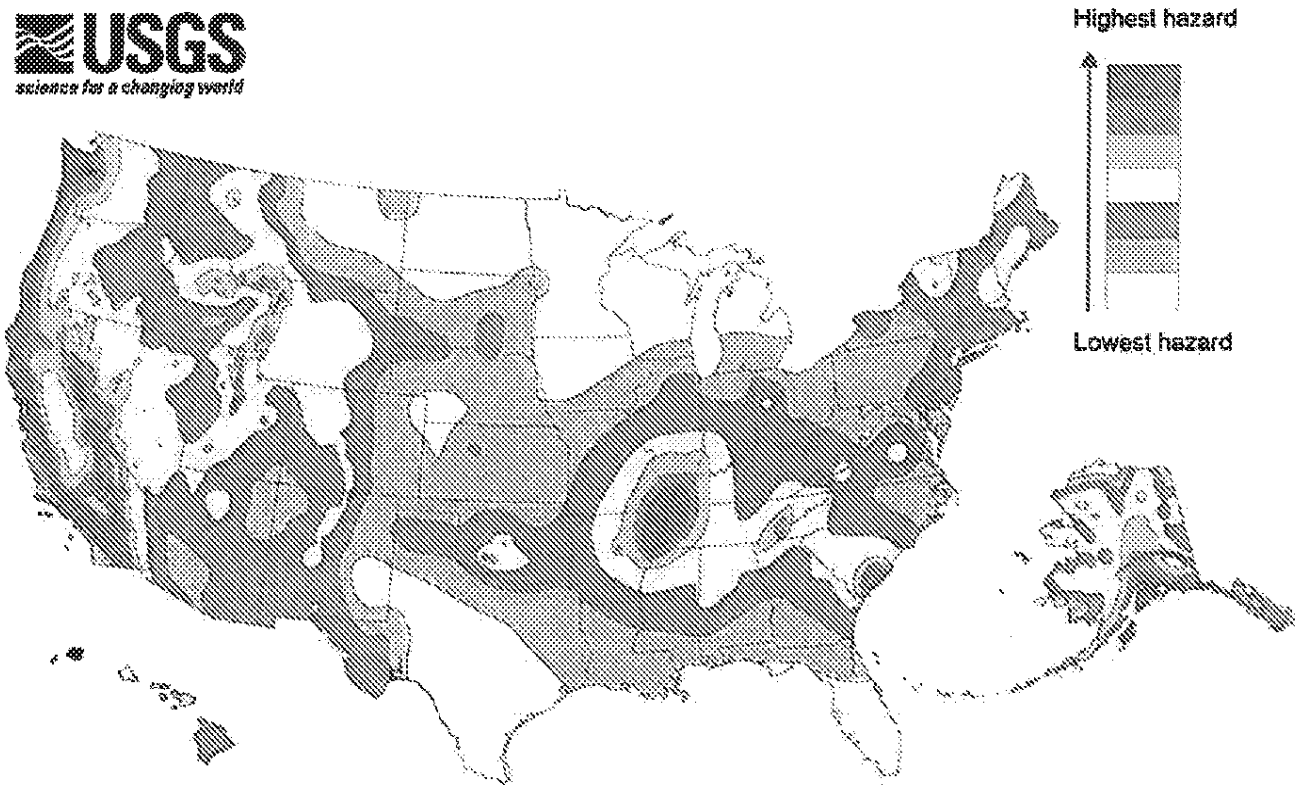

Figure 1. 2018 Long-term National Seismic Hazard Map. Source: United States Geological Survey, https://www.usgs.gov/media/images/2018-long-term-national-seismic-hazard-map

Interagency Review. The West Virginia Geological and Economic Survey has extensive research and field experience in carbon sequestration and carbon storage projects, as well as in support of the oil and gas industry in West Virginia. WVUEI recommends a cooperative, proactive engagement of the Survey for technical and feasibility reviews of any proposed Class VI project, including review of projects transitioning from other well classes to Class VI (i.e. Class II to Class VI).

Post-injection site care and site closure plan. The language proposed in section 47-13-13, (sec 9.b.1 and 2, in particular) regarding post-injection closure is generally reasonable. However,

the 50-year requirement for monitoring is likely to be discouraging of operations or will encourage "shortcutting" of the process through structuring of companies/entities that are not intended to exist for the duration of 50 years, raising the risk of default on monitoring and any related bonds. Further, even strong public companies may not have management who would agree to a 50-year liability. To mitigate these concerns, WVUEI recommends a two-pronged strategy of stringent bonding requirements (such as those defined in section 47-13-14 sec 7), and proactive engagement with project operators on the development of approved alternative post-injection care plans to actively shorten this period, lessening risk to both operator and to the State. WVUEI recommends that the qualifying instrument definition should reflect sufficiency to cover costs throughout the final monitoring period, reflecting future value (i.e. inflation adjustment to future costs) vs a present value.

Here at WVUEI, we are actively engaging with economic development agencies and authorities, and with industrial partners throughout the region, and there is significant interest in CO2 management, including utilization and sequestration from an industry perspective. The reduction of non-technical risk in these commercial areas through the development of clear, rigorous, and enforceable rules for CO2 injection and Class VI wells is enabling to this entire sector of activity. WVDEP obtaining Class VI primacy is a crucial first step in that process.

Sincerely,

Samuel Taylor, Ph.D.
Assistant Director, Strategic Partnerships and Technologies
West Virginia University Energy Institute
Morgantown WV 26505

GAS & OIL ASSOCIATION
OF WEST VIRGINIA

Comments on Proposed Changes to 47 CSR 13 Underground Injection Control

July 23, 2021

To: Connie Anderson
Division of Water and Waste Management
WV Department of Environmental Protection
601 57th St. S.E.
Charleston, WV 25304

Via E-mail: Connie.J.Anderson@WV.gov

The Gas and Oil Association of WV, Inc. ("GO WV") appreciates the opportunity to submit these comments concerning the proposed changes to Legislative Rule 47 CSR 13, Underground Injection Control ("UIC"). The West Virginia Department of Environmental Protection ("DEP") published a notice on June 23, 2021, soliciting comments on proposed changes to the Underground Injection Control rule and requested that comments be submitted by July 23, 2021 ("Proposed Rule").

GO WV is the trade association that resulted from the merger of the West Virginia Oil and Natural Gas Association into the Independent Oil and Gas Association of West Virginia that became effective on January 1, 2021. GO WV serves the entire oil and natural gas industry in the State of West Virginia, including organizations involved in drilling, completing and producing wells; gathering, processing, transporting, storing and distributing natural gas, oil and liquid hydrocarbons; and, numerous ancillary activities, including right of way acquisition, engineering design and construction and environmental services. GO WV member companies have a cumulative investment of nearly ten billion dollars throughout the State, accounts for more than 80% of the State's oil and natural gas production, operates more than 20,000 miles of pipeline, and provides product to more than 300,000 West Virginia homes and businesses. The purpose of GO WV is to promote the responsible development of natural gas, oil and liquids markets, supply, and transportation infrastructure through its growing and diverse membership in West Virginia.

GO WV's members therefore have a keen interest in every regulation, policy, and guidance document associated with natural gas and oil activities. We have a particular interest in the Proposed Rule because waste management through the use of underground injection wells is a significant element in the responsible development of natural gas and oil in West Virginia. Moreover, the inclusion in the Proposed Rule of a new Class 6 well category for the stated purpose of carbon capture and sequestration is of significant interest to GO WV. It is with GO WV's longstanding relationship to DEP and its experience in the natural gas and oil industry that it submits these comments.

We recognize that the UIC Rule was last updated in 2002, and that updating the Rule in connection with maintaining and obtaining primacy authorization from the U.S. Environmental Protection Agency ("EPA") is appropriate. GO WV supports DEP's efforts to maintain primary responsibility for the administration and enforcement of underground injection well controls rules and regulations. In addition, GO WV supports the addition of Class 6 wells for use in connection with carbon capture and sequestration to the Proposed Rule and DEP's efforts to obtain primacy authorization for this new category of well.

General Comments

GO WV urges DEP to avoid and eliminate any language that imposes obligations that are more stringent or burdensome than the federal language concerning underground injection wells. The DEP has a statutory obligation to impose requirements that are no less stringent than federal programs in accordance with the intent of the Governor's Executive Order 2-18 regarding issuance of new and modified rules after January 10, 2018. Similarly, the West Virginia Legislature established the public policy in W. Va. Code §22-1-3a that legislative rules "may include new or amended environmental provisions which are more stringent than the counterpart federal rule or program to the extent that the director first provides specific written reasons which demonstrate that such provisions are reasonably necessary to protect, preserve or enhance the quality of West Virginia's environment or human health or safety, taking into consideration the scientific evidence, specific environmental characteristics of West Virginia . . . ." The Proposed Rule is not supported by any such specific written reasons and, therefore, should not exceed the federal standards.

Pursuant to the West Virginia State Administrative Procedures Act, W. Va. Code §29A-3-5 and §29A-3-4(b), a fiscal note "itemizing the cost of implementing the rules as they relate to this state and to persons affected by the rules" is required to accompany the notice of a proposed rule. The notice of the proposed changes to 47 CSR 13 states that "[n]o economic impacts on the state or its residents are anticipated." However, the increased regulatory burden imposed in the Proposed Rule clearly creates a negative economic impact on owners and operators of underground injection wells. Accordingly, the DEP must conduct an economic impact analysis regarding the proposed revisions before it can make an informed decision on amendments to the rule and the public can more appropriately comment on the Proposed Rule. We urge the DEP to promptly evaluate and identify the costs associated with the Proposed Rule on the regulated community and report that impact to the West Virginia Legislature and the public.

GO WV also urges the DEP to carefully limit the regulatory requirements for Class 6 wells to avoid making the requirements so burdensome that no carbon capture and sequestration wells will be developed in WV. Class 6 wells could be a significant economic benefit to State and local governments through tax assessments on the property and activity generated by such wells.

Specific Comments

Section 8.6 is new and governs "Post-Closure Care," but that term is not defined in the definitions section 2. We suggest that an appropriate definition for "post-closure care" be added to the Proposed Rule.

Section 6.2.c.5.C refers to "the Administrator" which is an undefined term. We suggest using the term "Regional Administrator" which is defined or add a definition for the term "Administrator." Alternatively, please delete the last sentence of the section.

Sections 8.1.a. and 13.1.b. use the term "existing well" and define it differently than "existing injection well" included in section 2. Please use the term "existing injection well" or explain the difference between the two terms.

Section 8.1. includes many new requirements for Class 1 wells that impose obligations on well operators. Please include language to clarify that "existing injection wells" do not need to comply with the new obligations, or be specific concerning what new obligations are imposed on existing injection wells. Please clarify that section 8.2 "Construction Requirements" does not apply to existing injection wells.

Section 13.9.f.1. includes the phrase "of the appropriate EPA Regional Office." Because Regional Administrator is defined as the EPA Region 3 Administrator, the phrase "of the appropriate EPA Regional Office" should be deleted.

Section 14.6.i. refers to "Class I, II, III or VI" which should refer to "Class 1, 2, 3 or 6" for consistency with the remainder of the rule.

Sections 14.7.f.2.A. and B. refer to "Regional Administrator" which we suggest should refer to "Director," assuming primacy is authorized by the EPA.

Section 14.8.d.3.B. refers to "Regional 6666." We request clarification of this reference.

Section 14.22.c.11. refers to "Director of the U.S. EPA." We suggest that phrase be revised to "Director" or "Regional Administrator."

Section 14.31 refers to "major facility," but that terms is not defined in section 2. We request that the term "major facility" be defined more particularly.

GO WV requests that DEP carefully consider these comments and revise the Proposed Rule accordingly.

Respectfully Submitted,

Gas and Oil Association of WV, Inc.

WEST VIRGINIA RIVERS

July 23, 2021

West Virginia Department of Environmental Protection
UIC Program, DWWM
601 57th Street S.E.
Charleston, WV 25304

Attn: Connie Anderson

Re: 47CSR13 Underground Injection Control Rule

Dear Ms. Anderson:

West Virginia Rivers Coalition, on behalf of our members, respectfully submits the following comments on 47CSR13 Underground Injection Control (UIC) Rule. Additionally, we endorse the comments submitted by the West Virginia Chapter of the Sierra Club.

The UIC program regulations fall under the Safe Drinking Water Act. The purpose of the program is to protect groundwater resources. The disposal of waste is secondary to the protection of groundwater resources. DEP must prioritize the protection of groundwater resources over waste disposal. In 2019, a report published by the Natural Resource Defense Council (NRDC) found inadequate regulation of Underground Injection in West Virginia[1]. Record reviews showed that WV failed to meet the UIC program standards. In their analysis of Class II Disposal Wells, the most serious concerns outlined in the report include:

- Roughly one-quarter of the wells submitted reports indicating continued injection under an expired permit.
- Mechanical integrity tests (MITs) were often not conducted as frequently as required, and far fewer operators than required conducted their mandatory MITs in the presence of a qualified state witness.
- More than half of the wells appear to have been abandoned without being plugged as required, some for more than 10 years.

[1] NRDC: WEST VIRGINIA'S GROUNDWATER IS NOT ADEQUATELY PROTECTED FROM UNDERGROUND INJECTION (PDF)

These are serious infractions that must be addressed if WV wants to maintain primacy of the UIC program. Additional comments on the proposed rule are as follows:

The Area of Review should be increased for all well types.

Section 5.1 gives DEP discretion to select the methods to establish an Area of Review (AOR), as either the "Zone of Endangering Influence" or a radius of ¼ mile (Section 5.3.c.1). But ¼ mile is too small in most cases. Fluids from injection wells have been known to travel as much as 5 miles underground to cause problems with contamination of wells, explosions, or damage to land and structures. The rule should be amended to eliminate that discretion and to require that the DEP use whichever distance is greater. In particular, a thorough review for any abandoned wells or fissures and fractures should be required, and minimum standards for the search for, and evaluation of such wells or fissures should be established.

The Area of Review should require inclusion of Seismic Activity Reviews.

Injection of gas well fluids has been demonstrated to cause small-to-medium sized earthquakes, in several states including Oklahoma, Ohio and West Virginia. Even minor earthquakes have the potential to cause extensive damage to structures, and create risks to underground facilities such as pipelines, mines, and utilities. In China, fluid injection into the ground has "increased the occurrence rate of M>5 earthquakes at least threefold[2]". Local geology plays a large factor in earthquake occurrences, which calls for an in-depth assessment and study on seismic activity for injection locations. While Section 8.4.b.9.E allows the Director to require this "where he has reason to believe …" it is needed, it is unclear how the Director would know this or have reason to require it without such a review. Seismic Activity Reviews should be mandatory for all UIC Classes.

The rule should establish setbacks for injection wells from sensitive areas.

Improperly managed UICs have the potential to impact water resources for both recreation and drinking water sources. There must be a minimum setback of UICs sited near sensitive areas. Sensitive areas can be defined as places where people and vulnerable populations spend significant amounts of time, places that may impact public drinking water, and places that have recreational and environmental significance. Setback distances of at least ½ mile or 2,640

[2] Lei, X., Su, J. & Wang, Z. Growing seismicity in the Sichuan Basin and its association with industrial activities. *Sci. China Earth Sci.* 63, 1633–1660 (2020). https://doi-org.proxy.lib.odu.edu/10.1007/s11430-020-9646-x

feet from schools, health care facilities, public lands, and source water protection areas would help protect vulnerable populations and recreational opportunities as fracking development continues.

Class 2 wells should be required to monitor radiation of injected wastes.

Exposure to radium-226 and radium-228, both present in many forms of oil and gas waste, can cause cancer.[3] State regulations should include site monitoring of surface, groundwater, and air emissions; site safety including signage and labeling; baseline surveys of land and water; standards for site cleanup and reuse; data collection and recordkeeping; and required reporting of spills and other releases.

The rules should require immediate cessation of injection in wells lacking mechanical integrity.

Sections 14.6.h and 14.6.i allow continued injection for up to 48 hours after finding that wells lack mechanical integrity. That is unacceptable and the rules should require immediate cessation of injection in wells lacking mechanical integrity.

Section 14.28 creates an unreasonable burden on the public.

Section 14.28 requires that "All supporting materials shall be included in full and not be incorporated by reference". This essentially mandates that members of the public present their entire case for an appeal during the 30-day public comment period, and creates an unreasonable burden limiting the public's access to justice. To encourage public participation, this should be optional for the public.

Public hearings should be mandatory upon request.

Section 14.27.1 give the DEP too much discretion on whether to hold a public hearing depending on his/her definition of what is "a significant degree of public interest". Public hearings should be mandatory upon request.

A broader regulatory approach is needed for CCS wells.

The UIC rules focus primarily on water supplies, but do not address issues such as determining property rights to pore space, transfer of liability, pipeline transport, and others beyond the scope of the Safe Drinking Water Act. Because the CCS program is still largely

[3] NRDC: A HOT FRACKING MESS - How Weak Regulation of Oil and Gas Production Leads to Radioactive Waste In Our Water, Air, and Communities (PDF)

experimental, the regulatory program for CCS should be constructed using a precautionary principle until such time as the technology is demonstrated to be safe. Due to the extremely large volumes to be injected, Class 6 well projects are likely to extend over an area that is unprecedented in previous UIC wells. A single major accident, resulting from inadequate regulatory oversight, could seriously endanger the future viability of geologic sequestration for greenhouse gases.

Increased fees are needed for Class 6 UICs.

The DEP has been understaffed in many departments, which leads to a lack of oversight for essential operations. Requiring higher fees for Class 6 UIC wells could help fund more staff to ensure proper oversight for these wells. According to a report by ProPublica[4] with data from the EPA, in 2008-2010, there were a total of 620 well violations out of 4,815 Class 1-5 Underground Injection Wells in West Virginia. In comparison, New York had a total of 703 well violations from a total of 31,550 wells. As DEP is newly establishing Class 6 wells, more staff will be needed to adequately monitor the wells and ensure they are operating under regulations.

We appreciate your thorough consideration of these comments and look forward to your response.

Signed,
Angie Rosser
West Virginia Rivers Coalition

Dave Bassage
New River Conservancy

Vivian Stockman
Ohio Valley Environmental Council

Linda Frame
West Virginia Environmental Council

Larry Thomas

[4] State-by-State: Underground Injection Wells (propublica.org)

West Virginia Highlands Conservancy

Gary Zuckett
West Virginia Citizen Action Group

Sierra Club

West Virginia Chapter

P.O. Box 4142

Morgantown, WV
26504

Connie Anderson
UIC Program, DWWM
WV Department of Environmental Protection
601 57th St. S.E.
Charleston, WV 25304

Via e-mail to: connie.j.anderson@wv.gov

Re: Comments on proposed amendments to 47-CSR-13, Underground Injection Control

Dear Ms. Anderson:

Please accept the following comments on behalf of the West Virginia Chapter of Sierra Club. The Sierra Club appreciates the opportunity to comment on this draft rule, because significant environmental risks remain with underground injection of the diverse materials to be regulated under this rule.

In particular, the use of Class 6 wells for geologic sequestration of carbon dioxide may become widespread in the future and carries significant risks that are not fully understood. Carbon Capture and Sequestration (CCS) could play a large role in the deep reductions in greenhouse gas emissions needed to mitigate greenhouse gas emissions from fossil fuel-fired power plants and other large industrial facilities. Because this program is still largely experimental, we believe that the regulatory program for CCS should be constructed using a precautionary

principle until such time as the technology is demonstrated to be safe. Due to the extremely large volumes to be injected, Class 6 wells are likely to extend over an area that is unprecedented in previous UIC projects. A single major accident, resulting from inadequate regulatory oversight, could seriously endanger the future viability of geologic sequestration for greenhouse gases.

We also believe that WV-DEP needs to establish a more comprehensive regulatory framework. The Safe Drinking Water Act, under which the UIC program is established, is not of sufficient scope to address the numerous diverse issues associated with CCS. Issues such as determining property rights for pore space, transfer of liability, and others are beyond the scope of the Safe Drinking Water Act. Because carbon dioxide is heavier than air, leakage from a CCS well, given the tremendous volumes and high pressures involved, has the potential of creating a cloud of carbon dioxide that would move down-gradient and suffocate all life in its path. In particular, a CCS facility must demonstrate that the carbon dioxide can be permanently sequestered (greater than 100 years without leakage). Land, air, water, and energy requirements need strict site evaluation to avoid **environmental justice** issues and adverse environmental impacts. Most CCS wells would likely be established near emitting facilities, further burdening communities already disproportionately burdened by pollution, noise, traffic, and degraded property values.

It is not clear that WV-DEP's enforcement programs have the resources and staff needed to properly manage a Class 6 well program. A recent report on WV-DEP's existing Class 2 wells (https://www.nrdc.org/sites/default/files/west-virginia-groundwater-underground-injection-report.pdf) found that 17 of 19 wells analyzed had at least one issue of concern, but lax enforcement has allowed those concerns to continue unabated. Adding the much more complex issues associated with Class 6 wells will certainly exacerbate this problem. UIC permit fees for Class 1-5 wells are described in 47-CSR-9, but there does not appear to be a permit fee schedule for Class 6 wells. This implies that the costs of running this program and reviewing an application will be an unfunded mandate and consume existing resources. The cost of permit review and enforcement should be a cost of doing business borne fully by the applicant, and the taxpayer should not have to subsidize these activities.

For this reason, WV-DEP should consider delaying any efforts to obtain primacy for Class 6 wells until liability for accidents has been addressed adequately by the WV Legislature. Absent such legislative action, WV-DEP should analyze the potential liability costs that would be incurred by the State and its taxpayers in case of an accident, and include these costs in their calculation of permit fees. If WV-DEP chooses to seek primacy, we recommend that the WV rules regulating such wells follow EPA rules as closely as possible.

Please consider the following specific comments:

1) Section 2.33 cites references to "to §§ 146.4 and 144.7(d) of this chapter". These citations appear to be from the federal rule, but the WV rule should cite the appropriate section of 47CSR13, or else clarify explicitly the rule to which the citation refers. It may be appropriate to include language to assure that "sequestration project" does not apply if the carbon dioxide used for enhanced oil or gas recovery is not permanently sequestered.

2) Section 2.51. A "plugging record" should also include results of any test to verify the integrity of the plug and associated well site.

3) The federal rule includes a definition of "pore space" as follows: "Open spaces in rock or soil. These are filled with water or other fluids such as brine (i.e., salty fluid). CO2 injected into the subsurface can displace pre-existing fluids to occupy some of the pore spaces of the rocks in the injection zone." The draft rule omits a definition. "Pore space" was the subject of substantial discussion in the WV Carbon Dioxide Working Group (2011), and the federal definition appears to be appropriate. We recommend that this definition be included.

4) Section 2.53. The definition of "Post-injection site care" is limited to Class VI wells in this rule, but no such limitation occurs in the federal rule. We recommend that post-injection site care "to ensure that USDWs are not endangered" be included for all UIC wells.

5) Section 4.2 defines Class 2 wells to include fluids brough to the surface in connection with "natural gas storage". However, development of gas storage via solution mining in salt caverns seems to be more appropriately described as a Class 3 well. At least one gas storage site in Ohio plans to develop their storage by solution mining in salt strata. At a minimum, Class 2 wells should be limited to fluids during operation of gas storage, not those produced during development via solution mining.

6) Section 5.3.a. and 5.3.b describe the zone of endangering influence and refer to sections 13.3 and 13.4 respectively, but those sections refer to Class 6 well permits and permits for abandoning Class 6 wells. Should these refer to the re-numbered sections 14.3 and 14.4? If not, why does this section limit the concept to Class 6 wells? Further, in section 5.3.b, the definition of "r" is unclear and, at first glance, differs from that provided in 5.3.b.1. This whole section would be more clear if it was moved to Table 14-5A, as the parameters in that Table are not defined there. Section 5.3.b refers to the table on the last page as 14-5A, but it is labeled 13-5A on the last page. Furthermore, it is unclear why this is labeled "14-5A"? Are there Tables 14-1 through 14-4, and is there a Table 14-5 B?

7) The Area of Review (AOR) must be increased for all well types, and especially for Class 6 (CCS) wells. Section 5.1 gives DEP discretion to select the methods to establish an AOR, as either the "Zone of Endangering Influence" or a radius of ¼ mile (Section 5.3.c.1). But ¼ mile is much too small in most cases. Fluids from injection wells have been known to travel as much as 5 miles underground to cause problems with contamination of wells, explosions, and damage to land and structures. The rule should be amended to eliminate that discretion and to require that the DEP use whichever distance is greater. In particular, a thorough review for any abandoned wells or fissures and fractures should be required, and minimum standards for the search for, and evaluation of such wells or fissures should be established.

8) The Area of Review should require inclusion of Seismic Activity Reviews. Injection of gas well fluids has been demonstrated to cause small-to-medium sized earthquakes, in several states including Oklahoma, Ohio and West Virginia. Even minor earthquakes have the potential to cause extensive damage to structures, and create risks to underground facilities such as pipelines, mines, and utilities. While Section 8.4.b.9.E allows the Director to require this "where he has reason to believe ..." it is needed, it is unclear how the Director would know this or have reason to require it without such a review. Further, this section appears to apply only to Class 1 wells. Seismic Activity Reviews should be mandatory, not

discretionary, and should be required for all classes of wells, especially Class 2 wells which have been demonstrated to result in increased seismic activity in numerous states.

9) The rule should establish Setbacks for injection wells from residences, streams, public water supplies and other sensitive facilities. Leakage of underground fluids are almost impossible to clean up. Rules in Ohio use a distance of 2,000 feet from a 5-year time of travel zone for a public water supply, and this should be a bare minimum, with larger setbacks mandated for residences, public water supplies, and other sensitive facilities where conditions warrant.

10) Section 6.2.b is unclear. It cites methods in 6.2.b.1. Should this also include 6.2.b.2? Or is that intended to cite 6.2.a.1?

11) Section 8.2.c.3 is new, and allows the use of a "fluid seal" instead of a "packer". It is unclear why a fluid seal substitution needed? We recommend that the section be deleted, or, at a minimum, the rule should mandate that a fluid seal would be allowed only where the applicant demonstrates that it is more protective.

12) Section 8.2.c.4 uses the word "annual". Should that be "annulus" or "annular"?

13) Several subsections of 8.2.c. (e.g., 5, 7, etc.) indicate that the cement shall be of "sufficient" quality and quantity, but there does not seem to be any objective measure of what is "sufficient"? This language should be replaced with numeric criteria, or an objective evaluation test of what is "sufficient"?

14) Section 8.2.e.4 indicates several parameters are to be "measured". We recommend that "Measurements of" these parameters "in the injection zone must be **recorded**", with records available to DEP and the public upon request.

15) Section 8.3.d refers to "MIT", but this acronym is undefined. Assuming this refers to "Mechanical Integrity Tests", we recommend that this be spelled out.

16) We support the provisions in Section 8.4.b.9.E. "The Director may require seismicity monitoring when he has reason to believe that the injection activity may cause seismic disturbances." We also support Section 8.5.a.3.A. "The protocol used to identify all wells within the area of review, and to determine if the wells are properly plugged." However, we recommend that these provisions both be mandatory, so that seismicity monitoring and protocols to identify all wells and their proper plugging be required of all applicants.

17) Section 9.1. Class 2 wells. We support the elimination of authorization by rule. Permits should be required for these wells. Also the rule should eliminate area permits. Only individual well permits should be authorized. Production wells should not be used as injection wells unless they meet all criteria.

18) Section 9.4.b.5. It is not clear why individual well monitoring is not required for hydrocarbon storage and enhanced recovery wells. We recommend that this section be deleted.

19) Section 9.5.a allows an applicant for renewal of an existing Class 2 well permit to omit

certain information if it is in an existing well permit file. Unfortunately, this places the burden on DEP to verify that the old information is still accurate and up-to-date. We recommend that this section be deleted.

20) Section 9.5.a.9 requires demonstration of the resources necessary to close, plug or abandon the well. We support that provision, but note that the current bond requirement in statute is inadequate to achieve this goal.

21) Section 12.1.e uses the acronym "MVWDWs" which is not defined. Assuming this refers to "Motor Vehicle Waste Disposal Wells", I recommend defining the acronym in this section and in the definition at section 2.44.

22) Section 13.1.a. specifies that owners of Class 1 wells or Class 5 experimental wells that will continue to injection of carbon dioxide must apply for a Class 6 well permit by December 10, 2011. This appears to be new language, but the 2011 date implies it is obsolete. This appears to be copied verbatim from the 2010 EPA rule, and should be corrected in this draft rule. Sections 13.1.b also appears to have an obsolete date, and has redundant wording ("waste hazardous waste") that is unclear.

23) Sections 14.6.h and 14.6.i allow continued injection for up to 48 hours after finding that wells lack mechanical integrity. That is unacceptable and the rules should require immediate cessation of injection in wells lacking mechanical integrity. These sections also appear to contradict the language in 14.6.f and 14.6.g that requires immediate cessation of injection. If the discovery of a lack of mechanical integrity by alarm or by the operator requires immediate cessation of injection, the discovery by DEP should also require immediate cessation. The more stringent language should prevail.

24) Section 14.12.j. Waste monitoring requirements should be more specific. For example, the rule should specify that Class 2 wells must include monitoring for radioactivity, and include at a minimum analyses of radium 226 and total radium.

25) Section 14.27.1 give the DEP too much discretion on whether to hold a public hearing depending on his/her definition of what is "a significant degree of public interest". Public hearings should be mandatory upon request.

26) Section 14.28 states that "All supporting materials shall be included in full and not be incorporated by reference". This implies that material not included in full may not be available for any later appeal of a permit. This provision essentially mandates that members of the public present their entire case for an appeal during the 30-day public comment period, and creates an unreasonable burden limiting the public's access to justice. To encourage public participation, this should be deleted.

27) Section 14.30, Response to Comments. DEP should respond to all comments and must provide a detailed response to substantive comments. All too frequently, WV-DEP's responses have been so generic as to not provide a meaningful response, and often do not address the specific issues raised in the comments.

Thank you for the opportunity to comment.

James Kotcon, Chair
Conservation Committee
West Virginia Chapter of Sierra Club

west virginia department of environmental protection

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Harold D. Ward, Cabinet Secretary
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July 30, 2021

Roger Heldman, HG Energy, LLC
Mark D. Clark, Spilman Thomas & Battle, PLLC
On behalf of GO WV
Dr. Samuel Taylor, WVUEI
James Kotcon, WV Chapter of Sierra Club
Angie Rosser, Autumn Crowe, WV Rivers Coalition
Dave Bassage, New River Conservancy
Vivian Stockman, Ohio Valley Environmental Council
Linda Frame, WV Environmental Council
Larry Thomas, WV Highlands Conservancy
Gary Zuckett, WV Citizen Action Group

Re: Proposed Rule changes to 47CSR13
Underground Injection Control Rule

Dear Commenters,

As you are aware the West Virginia Department of Environmental Protection (WV DEP) prepared a proposed rule change for 47CSR13, the Underground Injection Control Rule, which was filed with the Office of the Secretary of State and posted on their website. A public hearing was held in virtual format on July 23, 2021, at 6:00 pm. Comments were received and WV DEP's response to each is contained below.

The Agency would like to thank each commenter who reviewed the proposed Rule changes, participated in the hearing, and who submitted comments for the benefit of the citizens of the state.

If you have any questions or comments, please contact Connie Anderson, of my staff, at 304-926-0499 extension 43878.

Sincerely,

Scott G. Mandirola
Deputy Cabinet Secretary

KDE/amb

cc: James Martin, WVDEP – Office of Oil & Gas
Connie Anderson, WVDEP – DWWM

WVDEP's Response to Comments on the Proposed Rule Changes to 47CSR13

Commenter: Roger Heldman - HG Energy, LLC

Comment 1: HG Energy is the only operator in WV actively developing Enhanced Recovery projects. After reviewing the proposed changes to Legislative Rule 47 C.S.R. 13, Underground Injection Control Rule §47-13-9. 9.2.b.2.A "Resistivity, Spontaneous Potential, and Caliper logs before casing is installed" and 9.2.b.2.A "A Cement Bond, Temperature, or Density Log after casing is set and cemented", both seem unnecessary. The requirement for these logs will add several thousand dollars to the cost of each well with no potential benefit. Often times the surface hole is unstable and the extra time required for these open hole logs could result in the hole collapsing and the potential loss of the logging tools.

H G Energy currently runs 100% excess cement on surface casing strings and we get good cement returns to surface. We believe a better solution is if good cement returns are not realized then a Cement Bond Log should be run and the situation reviewed by the operator and WVDEP to determine if any remedial action is necessary. This is the procedure we currently follow and it has proven to be effective on the rare occasion when it is necessary. This procedure is much less expensive and less risky than the proposed alternative.

Response 1: Under the federal regulations, the well logging identified is required if deemed needed. The proposed language will be changed to provide clarity that the well logging will be required only if deemed needed by the West Virginia Department of Environmental Protection.

Commenter: Gas and Oil Association of WV, Inc.

Comment 1: GO WV urges DEP to avoid and eliminate any language that imposes obligations that are more stringent or burdensome than the federal language concerning underground injection wells. The DEP has a statutory obligation to impose requirements that are no less stringent than federal programs in accordance with the intent of the Governor's Executive Order 2-18 regarding issuance of new and modified rules after January 10, 2018. Similarly, the West Virginia Legislature established the public policy in W. Va. Code §22-1-3a that legislative rules "may include new or amended environmental provisions which are more stringent than the counterpart federal rule or program to the extent that the director first provides specific written reasons which demonstrate that such provisions are reasonably necessary to protect, preserve or enhance the quality of West Virginia's environment or human health or safety, taking into consideration the scientific evidence, specific environmental characteristics of West Virginia . . . ." The Proposed Rule is not supported by any such specific written reasons and, therefore, should not exceed the federal standards.

Pursuant to the West Virginia State Administrative Procedures Act, W. Va. Code §29A-35 and §29A-3 -4(b), a fiscal note "itemizing the cost of implementing the rules as they relate to this state and to persons affected by the rules" is required to accompany the notice of a proposed rule. The notice of the proposed changes to 47 CSR 13 states that "[n]o economic impacts on the state or its residents are anticipated." However, the increased regulatory burden imposed in the Proposed Rule clearly creates a negative economic impact on owners and operators of underground injection wells. Accordingly, the DEP must conduct an economic impact analysis regarding the proposed revisions before it can make an informed decision on amendments to the rule and the public can more appropriately comment on the Proposed Rule. We urge the DEP to promptly evaluate and identify the costs associated with the Proposed Rule on the regulated community and report that impact to the West Virginia Legislature and the public.

Response 1: The EPA guided WV DEP through the proposed changes to 47CSR13. There are no known Class 1 or Class 6 wells and definitely no permitted Class 1 or Class 6 wells in West Virginia. Since there are no owners or operators of these types of wells, there is no increased regulatory or financial burden imposed by the proposed Rule. Regarding Class 5 wells, radioactive waste wells were removed from shallow disposal, of which there are no known and no permitted Class 5 radioactive waste wells, so no increased burden. Class 5 changes also relieve burden and costs by clarifying when injection may be authorized by Rule rather than by permit.

Additionally, in regards specifically to the requirement that all rules include a fiscal note "and a statement of the economic impact of the rule on the state or its residents," notwithstanding whatever interpretation is given the cited language, the DEP does not have the authority to decide what information must be included in a fiscal note for rules. Rather, the Secretary of State's office and the Legislative Rulemaking Review Committee (LRMRC) are responsible for designing the fiscal note form and specifying its contents. The Secretary of State and the LRMRC use the same form as is used by the Legislature for the passage of legislation. DEP has used the appropriate form and the form does not include any requirement for conducting the research necessary for a full cost impact analysis of the economic impact upon industry. It only requires the agency to provide a clear and concise statement of potential economic impacts on the Agency.

Comment 2: GO WV also urges the DEP to carefully limit the regulatory requirements for Class 6 wells to avoid making the requirements so burdensome that no carbon capture and sequestration wells will be developed in WV. Class 6 wells could be a significant economic benefit to State and local governments through tax assessments on the property and activity generated by such wells.

Response 2: WVDEP does not propose any requirements beyond those the EPA has in place.

Comment 3: Section 8.6 is new and governs "Post-Closure Care," but that term is not defined in the definitions section 2. We suggest that an appropriate definition for "post-closure care" be added to the Proposed Rule.

Response 3: Section 8.6 spells out the requirements for owners/operators of Class 1 wells during the time period after the well is closed. Post-Closure Care is the title of the section, and all the requirements are laid out within the section.

Comment 4: Section 6.2.c.5.C refers to "the Administrator" which is an undefined term. We suggest using the term "Regional Administrator" which is defined or add a definition for the term "Administrator." Alternatively, please delete the last sentence of the section.

Response 4: The EPA Regional Administrator is the only Administrator identified in the Rule and all references therefore are to the person occupying that position.

Comment 5: Sections 8.1.a. and 13.1.b. use the term "existing well" and define it differently than "existing injection well" included in section 2. Please use the term "existing injection well" or explain the difference between the two terms.

Response 5: The clarifying dates and/or changes to injectates are specific to Class 1 in Section 8.1.a. and Class 6 in Section 13.1.b. Otherwise, the regular definition of existing injection well applies.

Comment 6: Section 8.1. includes many new requirements for Class 1 wells that impose obligations on well operators. Please include language to clarify that "existing injection wells" do not need to comply with the new obligations, or be specific concerning what new obligations are imposed on existing injection wells. Please clarify that section 8.2 "Construction Requirements" does not apply to existing injection wells.

Response 6: Construction Requirements spelled out in Section 8.2 apply to any well that has not yet been constructed. The proposed Rule states that "Owners or operators seeking to convert existing Class 1, Class 2, or Class 5 experimental wells to Class 6 geologic sequestration wells must demonstrate to the Director that the wells were engineered and constructed to meet the requirements at subsection 13.3.a. and ensure protection of USDWs, in lieu of requirements at subsection 13.3.b., 13.3.b.1. and 13.5."

Comment 7: Section 13.9.f.1. includes the phrase "of the appropriate EPA Regional Office." Because Regional Administrator is defined as the EPA Region 3 Administrator, the phrase "of the appropriate EPA Regional Office" should be deleted.

Response 7: Since the EPA Region 3 Administrator's office is established as the appropriate office to reference WV DEP does not find the matter significant as to warrant a change to the Rule as proposed during the public notice.

Comment 8: Section 14.6.i. refers to "Class I, II, III or VI" which should refer to "Class 1, 2, 3 or 6" for consistency with the remainder of the rule.

Response 8: WV DEP acknowledges the error and in order to be consistent throughout the document, the proposed Rule has been edited in this section to refer to Class 1, 2, 3, or 6.

Comment 9: Sections 14.7.f.2.A. and B. refer to "Regional Administrator" which we suggest should refer to "Director," assuming primacy is authorized by the EPA.

Response 9: WV DEP agrees with the commenter. Changes have been made to the proposed Rule.

Comment 10: Section 14.8.d.3.B. refers to "Regional 6666." We request clarification of this reference.

Response 10: In reviewing the proposed Rule, as found on the WV Secretary of State's website, WV DEP did not find that 14.8.d.3.B. contains Regional 6666.

Comment 11: Section 14.22.c.11. refers to "Director of the U.S. EPA." We suggest that phrase be revised to "Director" or "Regional Administrator."

Response 11: WV DEP acknowledges "Director" should be changed to "Regional Administrator" however this reference is found in 14.22.c.1., rather than 14.22.c.11, and that is where the Rule will be edited.

Comment 12: Section 14.31 refers to "major facility," but that terms is not defined in section 2. We request that the term "major facility" be defined more particularly.

Response 12: While not in the definition section of the proposed updated rule, it explains that major facilities are described identically to the EPA. As stated by the EPA "UIC Program Guidance," 40 CFR 122.3 defines a major facility as "One that has been so classified by the Administrator and/or the Director." Additionally, in the application for Primacy to the EPA, DEP intends to classify Class 1, 4, and 6 injection wells as major facilities.

Commenters: WV Rivers Coalition, New River Conservancy, Ohio Valley Environmental Council, WV Environmental Council, WV Highlands Conservancy, WV Citizen Action Group

Comment 1: The UIC program regulations fall under the Safe Drinking Water Act. The purpose of the program is to protect groundwater resources. The disposal of waste is secondary to the protection of groundwater resources. DEP must prioritize the protection of groundwater resources over waste disposal. In 2019, a report published by the Natural Resource Defense Council (NRDC) found inadequate regulation of Underground Injection in West Virginia[1]. Record reviews showed that WV failed to meet the UIC program standards. In their analysis of

Class II Disposal Wells, the most serious concerns outlined in the report include:

- Roughly one-quarter of the wells submitted reports indicating continued injection under an expired permit.
- Mechanical integrity tests (MITs) were often not conducted as frequently as required, and far fewer operators than required conducted their mandatory MITs in the presence of a qualified state witness.
- More than half of the wells appear to have been abandoned without being plugged as required, some for more than 10 years.

[1] NRDC: WEST VIRGINIA'S GROUNDWATER IS NOT ADEQUATELY PROTECTED FROM UNDERGROUND INJECTION (PDF)

These are serious infractions that must be addressed if WV wants to maintain primacy of the UIC program. Additional comments on the proposed rule are as follows:

Response 1: The DEP's Application for Substantial Program Update to the EPA must describe the enforcement capabilities of the Agency. Provided the protocols are sufficient, primacy will be granted, and EPA will oversee the activities of the DEP, including regular reviews of the manner in which enforcement cases are conducted.

Comment 2: The Area of Review should be increased for all well types. Section 5.1 gives DEP discretion to select the methods to establish an Area of Review (AOR), as either the "Zone of Endangering Influence" or a radius of 1/4 mile (Section 5.3.c.1). But 1/4 mile is too small in most cases. Fluids from injection wells have been known to travel as much as 5 miles underground to cause problems with contamination of wells, explosions, or damage to land and structures. The rule should be amended to eliminate that discretion and to require that the DEP use whichever distance is greater. In particular, a thorough review for any abandoned wells or fissures and fractures should be required, and minimum standards for the search for, and evaluation of such wells or fissures should be established.

Response 2: The DEP intends to follow EPA guidelines for regulating injection wells. For the area of review (AoR), the rule does not provide discretion to select between the zone of endangering influence and a fixed 1/4 mi radius. Instead, the options are the zone of endangering influence or a fixed radius no less than ¼ mile.

For Class 1 hazardous waste wells, the area of review is a 2-mile radius, per the Rule. In 2004, the National UIC Technical Workgroup submitted a work product to the EPA's Drinking Water Protection Division regarding concerns that have been raised surrounding the use of a ¼ mile fixed radius. While the report did emphasize a concern regarding the ¼ mile radius, no definitive suggestion to increase this value was presented.

The Rule gives the Director discretion to select the appropriate distance that best suits the applicable area should other methods fail to account for a factor that should be considered in establishing the AoR.

Regarding Class 6 wells, the area of review is defined using neither of these methods. Instead, the area of review for Class 6 wells 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 site characterization, monitoring, and operational data. At a technical workshop held by the EPA in 2007, following a presentation by Steve Platt (co-author of the previous report), "breakout group participants offered input on calculating the AoR for geologic sequestration (GS) sites: Is a fixed radius AoR appropriate for CO 2 GS, or should the AoR be based on calculations similar to those used to determine the ZEI? A fixed radius is not appropriate. The AoR size determination should be based on models."

The existing area of review requirement in the rule is consistent with the federal regulation for Class 2 and Class 3 wells. Additionally, reviews for abandoned wells and geologic conditions which could jeopardize the confining layer are conducted by the applicant, the West Virginia Department of Environmental Protection, and the West Virginia Geological and Economic Survey.

Comment 3: The Area of Review should require inclusion of Seismic Activity Reviews. Injection of gas well fluids has been demonstrated to cause small-to-medium sized earthquakes, in several states including Oklahoma, Ohio and West Virginia. Even minor earthquakes have the potential to cause extensive damage to structures, and create risks to underground facilities such as pipelines, mines, and utilities. In China, fluid injection into the ground has "increased the occurrence rate of M>5 earthquakes at least threefold[2]". Local geology plays a large factor in earthquake occurrences, which calls for an in-depth assessment and study on seismic activity for injection locations. While Section 8.4.b.9.E allows the Director to require this "where he has reason to believe ..." it is needed, it is unclear how the Director would know this or have reason to require it without such a review. Seismic Activity Reviews should be mandatory for all UIC Classes.

[2] Lei, X., Su, J. & Wang, Z. Growing seismicity in the Sichuan Basin and its association with industrial activities. Sci. China Earth Sci. 63, 1633–1660 (2020). https://doi-org.proxy.lib.odu.edu/10.1007/s11430-020-9646-x

Response 3: Based on past history, the likelihood of induced seismicity in West Virginia is low. However, to better safeguard against such occurrences, faults are required to be identified in UIC permit applications for Class 2 and Class 3 wells. This requirement is present in existing rule language for Class 3 wells and it has been added in the proposed revisions for Class 2 wells. Additionally, through a MOU between the West Virginia Department of Environmental Protection Office of Oil and Gas and the West Virginia Geological and Economic Survey (WVGES), the WVGES provides an additional review related to geologic matters, including seismicity.

The West Virginia Geological and Economic Survey (WVGES) has tentatively agreed to a Memorandum of Understanding (MOU) with DWWM similar to their agreement with the Office of Oil and Gas. DEP recognizes the experience of WVGES in the area of seismicity and each application for a Class 1 or Class 6 well will need reviewed by WVGES prior to consideration for permit approval. WV DEP's primacy application shall contain the MOU, for consideration during the public participation phase of the application process and also, the MOU and related public comments shall be submitted to the EPA for review while determining the appropriateness of approving primacy.

Comment 4: The rule should establish setbacks for injection wells from sensitive areas. Improperly managed UICs have the potential to impact water resources for both recreation and

drinking water sources. There must be a minimum setback of UICs sited near sensitive areas. Sensitive areas can be defined as places where people and vulnerable populations spend significant amounts of time, places that may impact public drinking water, and places that have recreational and environmental significance. Setback distances of at least 1/2 mile or 2,640 feet from schools, health care facilities, public lands, and source water protection areas would help protect vulnerable populations and recreational opportunities as fracking development continues.

Response 4: The WV DEP is proposing an update to 47CSR13 with the intention of applying for primacy regarding injection wells. The WV Legislature is the appropriate body for expanding regulatory authority via setbacks as suggested by the comment. The current rule language is consistent with the federal regulations regarding the location of Class 2 and Class 3 wells. Moreover, specifically regarding Class 2 wells, these are commonly converted from existing gas/oil wells that are now depleted and are located dependent upon reservoir characteristics. Those wells would have been located consistent with requirements at the time the well was drilled. Those same reservoir characteristics typically determine the suitability of a specific well being a candidate for injection.

Comment 5: Class 2 wells should be required to monitor radiation of injected wastes. Exposure to radium-226 and radium-228, both present in many forms of oil and gas waste, can cause cancer.[3] State regulations should include site monitoring of surface, groundwater, and air emissions; site safety including signage and labeling; baseline surveys of land and water; standards for site cleanup and reuse; data collection and recordkeeping; and required reporting of spills and other releases.

[3] NRDC: A HOT FRACKING MESS - How Weak Regulation of Oil and Gas Production Leads to Radioactive Waste In Our Water, Air, and Communities (PDF)

Response 5: In the existing rule language, Class 2 wells are those that inject the following fluids:

4.2.a. Which are brought to the surface in connection with conventional oil or natural gas production and may be commingled with waste waters from gas plants which are an integral part of production operations, unless those waters are classified as a hazardous waste at the time of injection;

4.2.b. For enhanced recovery of oil or natural gas; and

4.2.c. For storage of hydrocarbons which are liquid at standard temperature and pressure.

Federal regulations do not contain a specific set of parameters for testing. The existing rule language (above) is consistent with the federal regulation as is the language regarding monitoring and sampling. The language is missing the reference to "natural gas storage" which has been added in the proposed revisions. All new and reissued Class 2 permits contain permit requirements for radiological testing of injectate which include gross alpha, gross beta, radium 226 and radium 228.

Comment 6: The rules should require immediate cessation of injection in wells lacking

mechanical integrity. Sections 14.6.h and 14.6.i allow continued injection for up to 48 hours after finding that wells lack mechanical integrity. That is unacceptable and the rules should require immediate cessation of injection in wells lacking mechanical integrity.

Response 6: DEP does not recommend a change to the proposed rule. DEP is mirroring the approach by EPA in these sections and the rules provide the ability for the Director to require immediate cessation of injection.

Comment 7: Section 14.28 creates an unreasonable burden on the public.
Section 14.28 requires that "All supporting materials shall be included in full and not be incorporated by reference". This essentially mandates that members of the public present their entire case for an appeal during the 30-day public comment period, and creates an unreasonable burden limiting the public's access to justice. To encourage public participation, this should be optional for the public.

Response 7: DEP appreciates the work that members of the public put into reviewing draft permits and points out that the public notice period for draft permits may be extended an additional 30 days beyond the original timeframe. An extension may be given for good cause and preparation of an appeal may be cited in an extension request.

DEP is not in a position to take on the responsibility for researching material that supports an appeal that might be brought by the public. An example of the position this put the Agency in occurred this week, while staff researched comments for the proposed Rule on the topic of setbacks. One commenter stated that, "Rules in Ohio use a distance of 2,000 feet from a 5-year time of travel zone for a public water supply, and this should be a bare minimum, with larger setbacks mandated for residences, public water supplies, and other sensitive facilities where conditions warrant."

DEP staff could not locate the Ohio rule containing the setback, so contact with an Ohio representative was made and that person indicated there is no setback rule. One is currently proposed but does not conform to the criteria described in the comment. In short, the DEP was trying to locate research materials that apparently don't exist, therefore, the preferred manner of cooperating with the public is to extend the public notice period, when an extension request is based on a valid concern.

Comment 8: Public hearings should be mandatory upon request. Section 14.27.1 give the DEP too much discretion on whether to hold a public hearing depending on his/her definition of what is "a significant degree of public interest". Public hearings should be mandatory upon request.

Response 8: For the Agency to hold a Public Hearing for every permit application requested would require expending a tremendous amount of Agency resources that are currently earmark for other activities. Public hearings are a way for the public to provide comments to DEP. Written comments are accepted and responses prepared. However, when the public interest is high, the Director will hold a hearing. The Rule is reasonable, and WV DEP does not propose any change to the current wording in regard to public hearings.

Comment 9: A broader regulatory approach is needed for CCS wells. The UIC rules focus primarily on water supplies, but do not address issues such as determining property rights to pore space, transfer of liability, pipeline transport, and others beyond the scope of the Safe Drinking

Water Act. Because the CCS program is still largely experimental, the regulatory program for CCS should be constructed using a precautionary principle until such time as the technology is demonstrated to be safe. Due to the extremely large volumes to be injected, Class 6 well projects are likely to extend over an area that is unprecedented in previous UIC wells. A single major accident, resulting from inadequate regulatory oversight, could seriously endanger the future viability of geologic sequestration for greenhouse gases.

Response 9: The WV DEP is proposing an update to 47CSR13 with the intention of applying for primacy regarding injection wells. The WV Legislature is the appropriate body for expanding regulatory authority, as suggested by the comment.

Comment 10: Increased fees are needed for Class 6 UICs. The DEP has been understaffed in many departments, which leads to a lack of oversight for essential operations. Requiring higher fees for Class 6 UIC wells could help fund more staff to ensure proper oversight for these wells. According to a report by ProPublica[4] with data from the EPA, in 2008-2010, there were a total of 620 well violations out of 4,815 Class 1-5 Underground Injection Wells in West Virginia. In comparison, New York had a total of 703 well violations from a total of 31,550 wells. As DEP is newly establishing Class 6 wells, more staff will be needed to adequately monitor the wells and ensure they are operating under regulations.

[4] State-by-State: Underground Injection Wells (propublica.org)

Response 10: There are no Class 6 wells in West Virginia. EPA holds the authority to permit such wells. Should DEP be granted primacy, and an application submitted, the Agency will utilize existing funding for permit review and recommend the establishment of fees to the WV Legislature once it is possible to quantify the resources needed.

Commenter: Sierra Club WV Chapter – Aileen Curfman & James Kotcon

Comment 1: In particular, the use of Class 6 wells for geologic sequestration of carbon dioxide may become widespread in the future and carries significant risks that are not fully understood. Carbon Capture and Sequestration (CCS) could play a large role in the deep reductions in greenhouse gas emissions needed to mitigate greenhouse gas emissions from fossil fuel-fired power plants and other large industrial facilities. Because this program is still largely experimental, we believe that the regulatory program for CCS should be constructed using a precautionary principle until such time as the technology is demonstrated to be safe. Due to the extremely large volumes to be injected, Class 6 wells are likely to extend over an area that is unprecedented in previous UIC projects. A single major accident, resulting from inadequate regulatory oversight, could seriously endanger the future viability of geologic sequestration for greenhouse gases.

We also believe that WV-DEP needs to establish a more comprehensive regulatory framework. The Safe Drinking Water Act, under which the UIC program is established, is not of sufficient scope to address the numerous diverse issues associated with CCS. Issues such as determining property rights for pore space, transfer of liability, and others are beyond the scope of the Safe Drinking Water Act. Because carbon dioxide is heavier than air, leakage from a CCS well, given the tremendous volumes and high pressures involved, has the potential of creating a cloud of carbon dioxide that would move down-gradient and suffocate all life in its path. In particular, a

CCS facility must demonstrate that the carbon dioxide can be permanently sequestered (greater than 100 years without leakage). Land, air, water, and energy requirements need strict site evaluation to avoid environmental justice issues and adverse environmental impacts. Most CCS wells would likely be established near emitting facilities, further burdening communities already disproportionately burdened by pollution, noise, traffic, and degraded property values.

It is not clear that WV-DEP's enforcement programs have the resources and staff needed to properly manage a Class 6 well program. A recent report on WV-DEP's existing Class 2 wells (https://www.nrdc.org/sites/default/files/west-virginia-groundwater-underground-injection-report.pdf) found that 17 of 19 wells analyzed had at least one issue of concern, but lax enforcement has allowed those concerns to continue unabated. Adding the much more complex issues associated with Class 6 wells will certainly exacerbate this problem. UIC permit fees for Class 1-5 wells are described in 47-CSR-9, but there does not appear to be a permit fee schedule for Class 6 wells. This implies that the costs of running this program and reviewing an application will be an unfunded mandate and consume existing resources. The cost of permit review and enforcement should be a cost of doing business borne fully by the applicant, and the taxpayer should not have to subsidize these activities.

For this reason, WV-DEP should consider delaying any efforts to obtain primacy for Class 6 wells until liability for accidents has been addressed adequately by the WV Legislature. Absent such legislative action, WV-DEP should analyze the potential liability costs that would be incurred by the State and its taxpayers in case of an accident, and include these costs in their calculation of permit fees. If WV-DEP chooses to seek primacy, we recommend that the WV rules regulating such wells follow EPA rules as closely as possible.
Please consider the following specific comments:

Response 1: Enforcement -- The DEP's Application for Substantial Program Update to the EPA must describe the enforcement capabilities of the Agency. Provided the protocols are sufficient, primacy will be granted and EPA will oversee the activities of the DEP, including regular reviews of the manner in which enforcement cases are conducted.

Pore Space -- The issue of pore space property rights or "subsurface trespass" into pore space underlying an owner's land is a property rights issue that is outside the scope of the UIC program. Consistent with 40 CFR § 144.35(b) and (c), the Permit specifies that "[i]ssuance of this Permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of any other federal, state or local law or regulations." Therefore, to be consistent with the EPA, DEP has no authority to consider this issue in this UIC permitting decision.

Fees -- There are no Class 6 wells in West Virginia. EPA holds the authority to permit such wells. Should DEP be granted primacy, and an application submitted, the Agency will utilize existing funding for permit review and recommend the establishment of fees to the WV Legislature once it is possible to quantify the resources needed.

Seeking Primacy -- The WV DEP is proposing an update to 47CSR13 with the intention of applying for primacy regarding injection wells. WV DEP contends the rule will follow guidance of the federal rule.

Comment 2: Section 2.33 cites references to "to §§ 146.4 and 144.7(d) of this chapter". These citations appear to be from the federal rule, but the WV rule should cite the appropriate section of 47CSR13, or else clarify explicitly the rule to which the citation refers. It may be appropriate to include language to assure that "sequestration project" does not apply if the carbon dioxide used for enhanced oil or gas recovery is not permanently sequestered.

Response 2: DEP agrees with the typos, the citations should refer to 47CSR13-3 and 47CSR13-14.22 respectively.

Comment 3: Section 2.51. A "plugging record" should also include results of any test to verify the integrity of the plug and associated well site.

Response 3: The "plugging record" is defined identically to that in the Federal Rule. However, mechanical integrity testing of Class 1, 2, 3, and 6 wells is addressed in Section 14.7. Additionally, Section 13.4.b. addresses the well plugging plan which includes description of their mechanical integrity testing that is required in the mentioned "plugging plan". The "associated well site" has related information regarding site monitoring and modeling in the area of review (ex: modeling of CO_2 plume movement around the site). All of these things are required to be submitted by the responsible party and reviewed by the DEP.

Comment 4: The federal rule includes a definition of "pore space" as follows: "Open spaces in rock or soil. These are filled with water or other fluids such as brine (i.e., salty fluid). CO2 injected into the subsurface can displace pre-existing fluids to occupy some of the pore spaces of the rocks in the injection zone." The draft rule omits a definition. "Pore space" was the subject of substantial discussion in the WV Carbon Dioxide Working Group (2011), and the federal definition appears to be appropriate. We recommend that this definition be included.

Response 4: The issue of pore space property rights or "subsurface trespass" into pore space underlying an owner's land is a property rights issue that is outside the scope of the UIC program. Consistent with 40 CFR § 144.35(b) and (c), the Permit specifies that "[i]ssuance of this Permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of any other federal, state or local law or regulations." Therefore, to be consistent with the EPA, DEP has no authority to consider this issue in this UIC permitting decision.

Comment 5: Section 2.53. The definition of "Post-injection site care" is limited to Class VI wells in this rule, but no such limitation occurs in the federal rule. We recommend that post-injection site care "to ensure that USDWs are not endangered" be included for all UIC wells.

Response 5: The federal rule states: "Post-injection site care (PISC) means appropriate monitoring and other actions (including corrective action) needed following cessation of injection to ensure that USDWs are not endangered, as required under 40 CFR 146.93." This section of the Federal Rule refers to specific post-injection care and site closure requirements for Class 6 injection wells such as those in 47CSR13 Section 13.9. Certainly, the fundamental objective of UIC requirements is to ensure the protection of all underground sources of drinking water. While federal regulations do exist for post-injection site care associated with Class 6 wells, the requirements do not exist for Class 2 or Class 3 wells and the need for such requirements has not been demonstrated. As drafted, the rule is consistent with the federal regulation regarding post-injection site care specific to Class 2 and Class 3 wells.

Comment 6: Section 4.2 defines Class 2 wells to include fluids brough to the surface in connection with "natural gas storage". However, development of gas storage via solution mining in salt caverns seems to be more appropriately described as a Class 3 well. At least one gas storage site in Ohio plans to develop their storage by solution mining in salt strata. At a minimum, Class 2 wells should be limited to fluids during operation of gas storage, not those produced during development via solution mining.

Response 6: A solution mining operation conducted as part of the development of a storage facility would be considered a Class 3 operation and would be permitted through a Class 3 permit. Fluids produced during the solution mining would be considered Class 3 fluids. Produced water from the operation of natural gas storage would be considered a Class 2 fluid.

Comment 7: Section 5.3.a. and 5.3.b describe the zone of endangering influence and refer to sections 13.3 and 13.4 respectively, but those sections refer to Class 6 well permits and permits for abandoning Class 6 wells. Should these refer to the re-numbered sections 14.3 and 14.4? If not, why does this section limit the concept to Class 6 wells? Further, in section 5.3.b, the definition of "r" is unclear and, at first glance, differs from that provided in 5.3.b.1. This whole section would be more clear if it was moved to Table 14-5A, as the parameters in that Table are not defined there. Section 5.3.b refers to the table on the last page as 14-5A, but it is labeled 13-5A on the last page. Furthermore, it is unclear why this is labeled "14-5A"? Are there Tables 14-1 through 14-4, and is there a Table 14-5 B?

Response 7: DEP agrees the referenced sections 13.3. and 13.4. should be changed to 14.3. and 14.4. The term "r" is explained and defined in 5.3.b. and 5.3.b.1. The naming of Table "13-5A" is referring to 47CSR13 Section 5 titled "Area of Review" and is included as an attachment at the end of the proposed rule. There are no additional tables.

Comment 8: The Area of Review (AOR) must be increased for all well types, and especially for Class 6 (CCS) wells. Section 5.1 gives DEP discretion to select the methods to establish an AOR, as either the "Zone of Endangering Influence" or a radius of ¼ mile (Section 5.3.c.1). But ¼ mile is much too small in most cases. Fluids from injection wells have been known to travel as much as 5 miles underground to cause problems with contamination of wells, explosions, and damage to land and structures. The rule should be amended to eliminate that discretion and to require that the DEP use whichever distance is greater. In particular, a thorough review for any abandoned wells or fissures and fractures should be required, and minimum standards for the search for, and evaluation of such wells or fissures should be established.

Response 8: See Response 2 to WV Rivers Comment 2.

Comment 9: The Area of Review should require inclusion of Seismic Activity Reviews. Injection of gas well fluids has been demonstrated to cause small-to-medium sized earthquakes, in several states including Oklahoma, Ohio and West Virginia. Even minor earthquakes have the potential to cause extensive damage to structures, and create risks to underground facilities such as pipelines, mines, and utilities. While Section 8.4.b.9.E allows the Director to require this "where he has reason to believe ..." it is needed, it is unclear how the Director would know this or have reason to require it without such a review. Further, this section appears to

apply only to Class I wells. Seismic Activity Reviews should be mandatory, not discretionary, and should be required for all classes of wells, especially Class 2 wells which have been demonstrated to result in increased seismic activity in numerous states.

Response 9: See Response 3 to WV Rivers Coalition Comment 3.

Comment 10: The rule should establish Setbacks for injection wells from residences, streams, public water supplies and other sensitive facilities. Leakage of underground fluids are almost impossible to clean up. Rules in Ohio use a distance of 2,000 feet from a 5-year time of travel zone for a public water supply, and this should be a bare minimum, with larger setbacks mandated for residences, public water supplies, and other sensitive facilities where conditions warrant.

Response 10: No rule was found when researching Ohio. The State of Ohio DNR said there is a proposed rule, that if approved, would create a 1000-foot setback for wells, surface facilities, and pipelines with some exceptions. See Response 4 to WV Rivers Coalition Comment 4.

Comment 11: Section 6.2.b is unclear. It cites methods in 6.2.b.1. Should this also include 6.2.b.2? Or is that intended to cite 6.2.a.1?

Response 11: WV DEP agrees that the citation should read 6.2.a.1.

Comment 12: Section 8.2.c.3 is new, and allows the use of a "fluid seal" instead of a "packer". It is unclear why a fluid seal substitution needed? We recommend that the section be deleted, or, at a minimum, the rule should mandate that a fluid seal would be allowed only where the applicant demonstrates that it is more protective.

Response 12: The rule requires the responsible party to demonstrate the fluid seal is comparable to a packer. It is understood a fluid seal will be appropriate for some cases, but effectiveness must be demonstrated. DEP proposes to follow EPA guidance and keep the rule as is.

Comment 13: Section 8.2.c.4 uses the word "annual". Should that be "annulus" or "annular"?

Response 13: WV DEP acknowledges the misspelling, the word "annual" should be "annular".

Comment 14: Several subsections of 8.2.c. (e.g., 5, 7, etc.) indicate that the cement shall be of "sufficient" quality and quantity, but there does not seem to be any objective measure of what is "sufficient"? This language should be replaced with numeric criteria, or an objective evaluation test of what is "sufficient"?

Response 14: This language is consistent with the federal rule. WV DEP does not propose changes.

Comment 15: Section 8.2.e.4 indicates several parameters are to be "measured". We recommend that "Measurements of" these parameters "in the injection zone must be **recorded**", with records available to DEP and the public upon request.

Response 15: WV DEP agrees with the comment. Section 8.2.f. which describes information that must be submitted has been edited to include the measurements. 8.2.f. now reads, " At a

minimum, the measurements required in subsection 8.2.e.4 and the following information concerning the injection formation shall be determined for the new Class I wells, and submitted to the Director:"

Comment 16: Section 8.3.d refers to "MIT", but this acronym is undefined. Assuming this refers to "Mechanical Integrity Tests", we recommend that this be spelled out.

Response 16: The term first appears in 6.2.c.5.C., and the acronym has been added there.

Comment 17: We support the provisions in Section 8.4.b.9.E. "The Director may require seismicity monitoring when he has reason to believe that the injection activity may cause seismic disturbances." We also support Section 8.5.a.3.A. "The protocol used to identify all wells within the area of review, and to determine if the wells are properly plugged." However, we recommend that these provisions both be mandatory, so that seismicity monitoring and protocols to identify all wells and their proper plugging be required of all applicants.

Response 17: Both of these sections of the rule address requirements for Class I wells which by definition are those that are for the purpose of injection of hazardous waste. Federal regulations do not specify such requirements for Class 2 or Class 3 wells. Consequently, the rule as proposed is consistent with the federal regulations as it relates to Class 2 and Class 3 wells. DEP proposes to work with West Virginia Geologic and Economic Survey to evaluate seismic risk or if monitoring may be required. See Response 3 to WV Rivers Coalition Comment 3.

Comment 18: Section 9.1. Class 2 wells. We support the elimination of authorization by rule. Permits should be required for these wells. Also the rule should eliminate area permits. Only individual well permits should be authorized. Production wells should not be used as injection wells unless they meet all criteria.

Response 18: The language is consistent with federal regulations, which allow for area permits. Injection wells covered under an area permit must meet the same construction requirements as individually permitted wells. Production wells converted to injection must meet injection well requirements prior to approval.

Comment 19: Section 9.4.b.5. It is not clear why individual well monitoring is not required for hydrocarbon storage and enhanced recovery wells. We recommend that this section be deleted.

Response 19: Individual well monitoring is allowed due to the nature of the system under which these facilities operate and consistent with federal regulations. The manifold monitoring must be comparable to individual well monitoring and each well must pass a separate mechanical integrity test. Additionally, tubing pressures at each well must be monitored as part of the permit to ensure compliance with the established maximum wellhead injection pressure.

Comment 20: Section 9.5.a allows an applicant for renewal of an existing Class 2 well permit to omit certain information if it is in an existing well permit file. Unfortunately, this places the burden on DEP to verify that the old information is still accurate and up-to-date. We recommend that this section be deleted.

Response 20: The information required must be current and accurate. The burden of ensuring the information is current and accurate is with the applicant regardless of when the information is provided.

Comment 21: Section 9.5.a.9 requires demonstration of the resources necessary to close, plug or abandon the well. We support that provision, but note that the current bond requirement in statute is inadequate to achieve this goal.

Response 21: The bond in the statute is a performance bond and not intended to serve as a full cost plugging bond. Under 14.7.g., the permittee is required to maintain the resources to plug the well at such time as plugging would be appropriate, and as part of the permit, certify such ability.

Comment 22: Section 12.1.e uses the acronym "MVWDWs" which is not defined. Assuming this refers to "Motor Vehicle Waste Disposal Wells", I recommend defining the acronym in this section and in the definition at section 2.44.

Response 22: WV DEP agrees with the comment. 2.44 has been edited to "Motor Vehicle Waste Disposal Wells (MVWDW)" mean dry wells or septic tank and leachfield combinations that receive or have received fluids from motor vehicle repair or maintenance activities, such as an auto body repair shop, automotive repair shop, new and used car dealership, specialty repair shop (e.g. transmission and muffler repair shop), or any facility that does any vehicular repair work.

Comment 23: Section 13.1.a. specifies that owners of Class 1 wells or Class 5 experimental wells that will continue to injection of carbon dioxide must apply for a Class 6 well permit by December 10, 2011. This appears to be new language, but the 2011 date implies it is obsolete. This appears to be copied verbatim from the 2010 EPA rule, and should be corrected in this draft rule. Sections 13.1.b also appears to have an obsolete date, and has redundant wording ("waste hazardous waste") that is unclear.

Response 23: There are no known Class 1 or Class 5 experimental wells in WV. WV DEP proposes to retain the language to be consistent with the federal wording and also, in the case – as unlikely as it may be – that a non-permitted well of this type exists in the state, the regulatory language is in place for enforcement purposes.

Comment 24: Sections 14.6.h and 14.6.i allow continued injection for up to 48 hours after finding that wells lack mechanical integrity. That is unacceptable and the rules should require immediate cessation of injection in wells lacking mechanical integrity. These sections also appear to contradict the language in 14.6.f and 14.6.g that requires immediate cessation of injection. If the discovery of a lack of mechanical integrity by alarm or by the operator requires immediate cessation of injection, the discovery by DEP should also require immediate cessation. The more stringent language should prevail.

Response 24: See Response 6 to WV Rivers Coalition Comment 6.

Comment 25: Section 14.12.j. Waste monitoring requirements should be more specific. For example, the rule should specify that Class 2 wells must include monitoring for radioactivity, and include at a minimum analyses of radium 226 and total radium.

Response 25: See Response 5 to WV Rivers Coalition Comment 5.

Comment 26: Section 14.27.1 give the DEP too much discretion on whether to hold a public hearing depending on his/her definition of what is "a significant degree of public interest". Public hearings should be mandatory upon request.

Response 26: See Response 8 to WV Rivers Coalition Comment 8.

Comment 27: Section 14.28 states that "All supporting materials shall be included in full and not be incorporated by reference". This implies that material not included in full may not be available for any later appeal of a permit. This provision essentially mandates that members of the public present their entire case for an appeal during the 30-day public comment period, and creates an unreasonable burden limiting the public's access to justice. To encourage public participation, this should be deleted.

Response 27: See Response 7 to WV Rivers Coalition Comment 7.

Comment 28: Section 14.30, Response to Comments. DEP should respond to all comments and must provide a detailed response to substantive comments. All too frequently, WV-DEP's responses have been so generic as to not provide a meaningful response, and often do not address the specific issues raised in the comments.

Response 28: WV DEP strives to respond to all comments and to do so thoroughly. In the public notice, the name of a WV DEP employee is given so that comments may be sent in directly. Often, members of the public send comments to others within the Agency making it difficult for the responsible person to locate them all. The WV DEP appreciates the comment and assures the public that we are doing our best to respond to all comments regarding the proposed changes to 47SCR13.

Commenter: Samuel Taylor, Ph.D. – West Virginia University Energy Institute (WVUEI)

Comment 1: While WVUEI supports Class VI primacy through the WVDEP, there are items that we believe need further clarification in a final rule. Establishment of clear guidelines for the transition of other classes of UIC wells to Class VI. Enhanced Petrochemical Recovery (either Enhanced Oil Recovery (EOR) or Enhanced Gas Recovery (EGR)) are currently the most common pathway for CO2 utilization in industry. West Virginia has a history of CO2 enhanced recovery projects, which are currently managed under the Class II UIC designation. While steps are outlined in the proposed rules (47-13-13, sec 1.c, in particular), more specific definition for transition would be helpful to both operators and regulators. Examples could include specification for reservoir production rates or changes in CO2 injection rates or reservoir pressure changes and change rates.

Response 1: Should the legislature approve of the proposed changes to 47CSR13, WV DEP will submit a Substantial Program Update for Primacy application to the EPA which includes a request to administer the Class 6 well program. WV DEP intends to follow the EPA's guidance when considering permit applications for geologic sequestration of carbon dioxide, including the transition of Class 2 wells to Class 6 well types.

Comment 2: Better definition of "Seismic Risk Zones". Avoiding seismic risk is key for these projects, however the definitions used in Section 47-13-7, sec 4.a are somewhat confusing, based on our review of literature. An example map is shown in Figure 1, from the United States Geological Survey. Better understanding of the seismic risk zones and their definition is recommended, to prevent unnecessarily precluding activity in areas that may have relevant existing industrial activity. The West Virginia Geological and Economic Survey has extensive experience in seismicity and induced seismicity in the state, and WVUEI recommends cooperative engagement with the Survey on this question, and inclusion of reference to the maps/databases used to define these Seismic Risk Zones.

Response 2: This topic is found in the section for hazardous waste disposal wells. Out of concern for citizens and businesses located in the areas listed in 47CSR13 7.4.a., WV DEP does not propose a change to the list. Due to karst topography or extensive underground mining in the areas, WV DEP contends that the public is best served with the current wording. Also, please see response to Comment 3, concerning Class 1 hazardous waste wells.

Comment 3: Interagency Review. The West Virginia Geological and Economic Survey has extensive research and field experience in carbon sequestration and carbon storage projects, as well as in support of the oil and gas industry in West Virginia. WVUEI recommends a cooperative, proactive engagement of the Survey for technical and feasibility reviews of any proposed Class VI project, including review of projects transitioning from other well classes to Class VI (i.e. Class II to Class VI).

Response 3: The West Virginia Geological and Economic Survey (WVGES) has tentatively agreed to a Memorandum of Understanding (MOU) similar to their agreement with the Office of Oil and Gas. The commenter and WVDEP recognize the experience of WVGES in the area of seismicity and each application for a Class 1 or Class 6 well will need reviewed by WVGES prior to consideration for permit approval. WV DEP's primacy application shall contain the MOU, for consideration during the public participation phase of the application process and also, the MOU and related public comments shall be submitted to the EPA for review while determining the appropriateness of approving primacy.

Comment 4: Post-injection site care and site closure plan. The language proposed in section 47-13-13, (sec 9.b.1 and 2, in particular) regarding post-injection closure is generally reasonable. However, the 50-year requirement for monitoring is likely to be discouraging of operations or will encourage "shortcutting" of the process through structuring of companies/entities that are not intended to exist for the duration of 50 years, raising the risk of default on monitoring and any related bonds. Further, even strong public companies may not have management who would agree to a 50-year liability. To mitigate these concerns, WVUEI recommends a two-pronged strategy of stringent bonding requirements (such as those defined in section 47-13-14 sec 7), and proactive engagement with project operators on the development of approved alternative post-injection care plans to actively shorten this period, lessening risk to both operator and to the State. WVUEI recommends that the qualifying instrument definition should reflect sufficiency to cover costs throughout the final monitoring period, reflecting future value (I.e. inflation adjustment to future costs) vs a present value.

Here at WVUEI, we are actively engaging with economic development agencies and authorities, and with industrial partners throughout the region, and there is significant interest in CO2 management, including utilization and sequestration from an industry perspective. The

reduction of non-technical risk in these commercial areas through the development of clear, rigorous, and enforceable rules for CO2 injection and Class VI wells is enabling to this entire sector of activity. WVDEP obtaining Class VI primacy is a crucial first step in that process.

Response 4: Section 13.9.b.2. of 47CSR13 gives the Director the option to approve a timeframe of less than 50 years, upon satisfactory demonstration of the listed criteria.