Division of Water and Waste Management
Underground Injection Control
Permit Application for a Class 6 Well

(Collected under the authority of the WV Code 22-11-8)

For Official Use Only
Date received:
Permit Number:

Read Attached Instructions Before Starting

I. Owner Name, Address, Phone Number and/or Email	II. Operator Name, Address, Phone Number and/or Email

III. Facility Details	IV. Ownership	V. Permit Action Requested
☐ Commercial ☐ Non-Commercial SIC Code(s) _____ _____ _____ _____	☐ Private ☐ County ☐ State ☐ Federal ☐ Municipal ☐ Tribal Lands	☐ New Permit ☐ Renewal ☐ Modification ☐ Closure ☐ Other: _____

VI. Type of Class 6 Well	
☐ New Well Drilling ☐ Renewal ☐ Modification/Conversion ☐ Other: _____	☐ Class 2 Conversion API Number: _____ Permit Number: _____ Date Well Constructed: _____ Date Injection Started: _____

VII. Location of Well(s) Approximate Center of Well Head (Injection Wells, Monitoring Wells etc.)	
Well Type:_____: Latitude: _____Longitude: _____ Well Type:_____: Latitude: _____Longitude: _____ Well Type:_____: Latitude: _____Longitude: _____ Well Type:_____: Latitude: _____Longitude: _____	[insert or attach mapping]

VIII. Area of Review (AoR) [Show Calculations and modeling for extent and attach representative mapping]	
Tabulation of Wells within AoR:	
Re-evaluation Schedule of AoR:	
Corrective Action:	
IX. Siting and Geological Data	
X. Pre-Operational Testing Plan	
XI. Injection Formation Testing	

XII. Well Construction Information						
Casing Size (In.)	Hole Size (In.)	Casing Wt. (lb./ft.)	Depth Top (ft.)	Depth Bot (ft.)	Tot. Cement Used	Type/Grade Cement
Elev. of Datum:		Datum: MSL GL KB			Total Depth:	
Co2 Corrosion Analysis:						
Stimulation Plan (if proposed):						

XIII. Casing and Lining Information						
Casing Liner Size OD-In.)	Hole Size (In.)	CasingLiner Wt. (lb./ft.)	Depth Top (ft.)	Depth Bot (ft.)	Injection Pressure (Internal/External)	Injection Pressure (Axial)

XIV. Conductor Pipe and Packer Specifications						
Hole Size (In.)	Wall Thk. (ft.)	Material Type	Diameter (In.)	Normal Wt. (lbs.)	Joint Length (ft.)	Joint Specifications

- Attach all associated conductor pipe and packer schematics

XV. Pre-Operational Testing Plan

XVI. Proposed Injection Interval			
Depth of Proposed Injection Zone (ft.):	Depth Top (ft.)	Depth Bot. (ft.)	Injection Formation Name
Injection Through:	Perforation	Open Hole	Screen
Proposed Perforated/Open Hole Interval(s)(ft.):			

XVII. Proposed Injection Stream						
Injection Pressure (psi)	Annulus Pressure (psi)	Max. Flow Rate (Sm3/h)	Cumulative Volume (t/d)	Avg. Max. Daily Rate (Sm3/h)	Avg. Injection Pressure (psi)	Max Injection Pressure (psi)
Co2 Source Information:						
Physical and Chemical Characteristics Analysis of Co2 Stream:						

XVIII. Aquifer Exemption (if Applicable)	
Attach Injection Waiver Request:	

XIX. Testing and Monitoring Plan	
Co2 Stream Analysis:	
Cont. Recording & Operational Parameters:	
Corrosion Monitoring:	
Confining Zone Monitoring:	
External MIT:	
Pressure Fall-off Testing:	
Co2 Plume and Pressure Front Tracking: (Direct and Indirect)	
Surface Air Monitoring:	
Soil Gas Monitoring:	
Quality Assurance and Surveillance Plan:	

XX. Plugging and Abandonment Plan

XXI. Post Injection Site Care and Closure (PISC) Plan

XXII. Emergency and Remedial Response Plan

XXIII. Financial Assurance and Responsibility

XXIV. Additional Permit Information	
O&G Division Well Work Package	
Groundwater Protection Plan	
The Wild and Scenic Rivers Act, 16 U.S.C. 1273 et seq.	
The National Historic Preservation Act of 1966, 16 U.S.C. 470 et seq.	
The Endangered Species Act, 16 U.S.C. 1531 et seq.	
Emergency and Remedial Response Plan	

XXV. Attachments
[In addition to this form, complete attachments on separate sheets. Submit complete information, as required in the instructions, and list all attachments, maps or other figures, by the applicable roman numeral.]

XXVI. Responsible Officer Certification		
All permit applications must be signed by a responsible corporate officer for a corporation, by a general partner for a partnership, by the proprietor of a sole proprietorship, or by a principal executive or ranking elected official for a public agency.		
I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 47 CSR 10 4.6.d.)		
Name and Official Title (type or print):	**Signature:**	**Date:**

XXVII. Professional Engineer Certification		
I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of West Virginia.		
(Seal)	**Signature:**	**Date:**
	Printed or Typed Name:	
	My license renewal date is:_____ **Pages/Sheets/Attachments covered by this seal:** _____	

INSTRUCTIONS FOR PERMIT APPLICATION (CLASS 6 WELLS)

A permit application must be completed by all owners or operators of current or proposed Class 6 injection wells subject to the requirement to obtain an Underground Injection Control (UIC) permit as described at **WV Code 22-11-8, WV 47 CSR 13,** and others. Please note that this form must be signed by a responsible entity as described at **WV 47 CSR13 14.12.k.**,even if the attachments are prepared by contractors or service companies. If the application covers multiple wells, use additional pages as necessary to provide all the requested information. The following instructions and associated regulations represent significant portions of required permit application data but a complete review of both **US EPA 40 CFR 146 and WV 47 CSR 13** regulations is recommended to develop a complete and accurate permit application.

I. OWNER NAME, ADDRESS, PHONE AND/OR EMAIL: Enter the name, and street address, city/town, state, and ZIP code of the owner of the well, well field, or company. Also provide an email address (if available) and/or a phone number.

II. OPERATOR NAME, ADDRESS, PHONE AND/OR EMAIL: Enter the name and street address, city/town, state, and ZIP code of the operator of well or well field; also provide an email address (if available) and/or a phone number. If the operator is the same as the owner, enter "same as owner."

III. Facility Details: Check the appropriate box to indicate the type of facility. A commercial facility is a single or multiple well facility that is specifically engaged in the business of injection of carbon dioxide for the purpose of carbon capture and sequestration generated by third party producers that originates off-site and transported to the facility for a fee or compensation. Include the SIC code for the specific type of facility that is producing Co2 for injection.

IV. OWNERSHIP: Check the appropriate box to indicate whether the owner of the well/facility is a private, Federal, or State/County/Municipal entity.

V. TYPE OF PERMIT ACTION REQUESTED: Check "new permit" if the well has never been subject to a UIC permit (e.g., newly constructed well that has never been drilled). Check "permit renewal" for an application associated with extending an expiring UIC permit. Check "modification" for an application to modify an existing permit that was previously permitted. Check "class 2 conversion" for a class 2 EOR (Enhanced Oil and/or gas Recovery) conversion to UIC. Check "add well to area permit" if additional wells are to be covered under an existing UIC area permit. Check "other," if needed and describe the situation.

VI. TYPE OF Class 6 Well: Check "Individual" or "Area" to indicate the type of permit requested. Individual permits cover a single injection well, while area permits may cover more than one injection well. Note that area permits are issued at the discretion of the Director and that wells covered by an area permit must: be at one contiguous site and be under the control of one entity. If an area permit is requested, enter the ***number of wells*** to be included in the permit. Also provide the name of the well field and project name. Area of Review (AOR) will be calculated based on the center point radius of each well head within the well array.

VII. Well Location: Enter the location of the well using latitude and longitude. When using latitude and longitude, use decimal degrees to five or six places after the decimal, if possible, be sure to include a negative sign for the longitude of a well. For area permit applications, provide the latitude and longitude of the approximate center of the area, as well as the individual wells. You may submit an addendum to the application if additional space is needed.

VIII. Area of Review (AOR): Demonstrate that the AOR, as modeled, represents the area in which USDWs may be endangered by the injection operation and ensure that all artificial penetrations that may allow fluid movement into USDWs are identified and appropriately addressed. For complete information on the requirements of **40 CFR 146.82(a)(4), (13) and 146.84(b)** see US EPA Class VI AOR Evaluation and Corrective Action Guidance and the Class VI Project Plan Development Guidance.

WV 47CSR13: 13.5.4. For Class 6 wells, that area of review is the region surrounding the geologic sequestration project where USDWs may be endangered by the injection activity. The area of review is delineated using computational modeling that accounts for the physical and chemical properties of all phases of the injected carbon dioxide stream and is based on available site characterization, monitoring, and operational data.

IX. Siting and Geological Data: demonstrate that the Class VI well will be sited in an area with a suitable geologic system, consisting of an injection zone with sufficient capacity to receive the CO2 and a confining zone that is free of transmissive faults or fractures. Include maps and cross sections of AoR, including but not limited to, information on faults and fractures, data on injection and confining zone(s), seismic, geologic and topographic mapping and associated cross sections. Also include, hydrologic mapping and cross sections to include, but not limited to, baseline geochemical data, demonstrated site suitability and protection and location of USDWs. For complete information on the requirements of **40 CFR 146.82(a)(2),(3),(5), and (6)** see the US EPA Class VI Well Geologic Site Characterization Guidance.

WV 47CSR13: 13.2. Minimum Criteria for Siting; **13.2.a.** Owners or operators of Class 6 wells must demonstrate to the satisfaction of the Director that the wells will be sited in areas with a suitable geologic system. The owners or operators must demonstrate that the geologic systems comprises; **13.2.a.1.** An injection zone(s) of sufficient areal extent, thickness, porosity, and permeability to receive the total anticipated volume of the carbon dioxide stream.

13.2.b. The DIrector may require owners or operators of Class 6 wells to identify and characterize additional zones that will impede vertical fluid movement, are free of faults and fractures that may interfere with containment, allow for pressure dissipation, and provide additional opportunities for monitoring, mitigation, and remediation.

X. Pre-Operational Testing Plan: Demonstrate that information will be collected to address any uncertainties about subsurface formations and fluid geochemistry that were identified during the geologic site characterization and verify that the well is properly constructed. For complete information on the requirements of **40 CFR 146.82(a)(8) and 146.87** see the US EPA Class VI Injection Well Construction Guidance, Class VI Well Geologic Site Characterization Guidance, Class VI Reporting, Recordkeeping, and Data Management Guidance.

XI. Injection Formation Testing: Describe plans to gather information on the fluid temperature, pH, conductivity, reservoir pressure and static fluid level of the injection zone(s). Describe and calculate the target injection zone(s) fracture pressure up to and including injection pressure limits. Determine the physical/chemical characteristics of the injection and confining zones and characterize formation fluids in the injection and confining zone(s) to evaluate the compatibility of the injectate with formation fluids; **40 CFR 146.82(a)(8) and 146.87**.See Sections 4.3 and 4.4 of the US EPA Class VI Well Geologic Site Characterization Guidance.

XII. Well Construction Information: Procedures and well construction schematics that demonstrate the injection well will be constructed in a manner that is appropriate to planned operations, is compatible with the CO2 stream, subsurface chemistry (as referenced in attached baseline geochemical data) and will maintain mechanical integrity. Provide Co2 corrosion analysis as it relates to casing and cement used in the construction of the injection well. If a stimulation plan is to be used, provide a description of stimulation fluids to be used and determination that stimulation will not interfere with containment. For complete information on the requirements of **40 CFR 146.82(a)(11), (12) and 146.86** see the US EPA Class VI Injection Well Construction Guidance.

WV 47CSR13: 13.3.; The Director shall prescribe requirements for the construction of Class 6 injection wells. Existing wells shall achieve compliance with such requirements according to a specific compliance schedule established by the Director as a condition of the permit. New wells shall be in compliance with construction requirements before injection operations begin. The owner or operator of a proposed injection well shall submit plans to the DIrector for testing, drilling, and construction and obtain the approval of the initial plans as a condition of the permit. The Director's approval of any modifications of the plan shall be obtained before incorporating them into the construction of the injection well. For additional information see; **WV 47CSR13, 13.3.a.1, 13.3.a.2., 13.3.a.3.**

XIII. Casing and Liner Information: Design and describe and include design schematics for casing strings and liners that are appropriate to the geology and planned operations to ensure that the surface casing will protect all USDWs and the long-string casing will extend to the injection zone. Demonstrate that casing and liner materials that can withstand contact with formation fluids, the injected CO2 stream, product of mixing formation fluids and CO2 and downhole stresses they will encounter so that they will not experience degradation or loss of material integrity during injection operations. For complete information on the requirements of **40 CFR 146.86(b)(1)** see the US EPA Class VI Injection Well Construction Guidance.

WV 47CSR13: 13.3.b.1.; Casing and cement or other materials used in the construction of each Class 6 well must have sufficient structural strength and be designed for the life of the geologic sequestration project. All well materials must be compatible with fluids with which the materials may be expected to come into contact and must meet or exceed standards developed for such materials by the American Petroleum Institute, ASTM International, or comparable standards acceptable to the Director.

XIV. Conductor Pipe and Packer Information: Design, describe and include design schematics for conductor pipe tubing and packers that are compatible with the CO2 stream, the formation fluids and/or products of mixing formation and injection fluids that may be encountered so that they can resist corrosion for the duration of the project. **40 CFR 146.86(c)(1)**.

WV 47CSR 13.3.(c).1.; Tubing and packer materials must meet or exceed standards developed for such materials by the American Petroleum Institute, ASTM International, or comparable standards acceptable to the Director.

XV. Pre-Operational Testing Plan: demonstrate that information will be collected to address any uncertainties about subsurface formations and fluid geochemistry that were identified during the geologic site characterization and verify that the well is properly constructed. This information will satisfy the requirements of **40 CFR 146.82(a)(8) and 146.87**. For additional information, see the US EPA Class VI Injection Well Construction Guidance, the Class VI Well Geologic Site Characterization Guidance, and the Class VI Reporting, Recordkeeping, and Data Management Guidance.

WV 47CSR 13.5: 13.5.a.; During the drilling and construction of a Class 6 injection well, the owner or operator must run appropriate logs, surveys and tests to determine or verity the depth, thickness, porosity, permeability, and lithology of, and the salinity of any formation fluids in all relevant geologic formations to ensure conformance with the injection well construction requirements under section 13.3 and to establish accurate baseline data against which future measurements may be compared. The owner or operator must submit to the Director a descriptive report prepared by a knowledgeable log analyst that includes an interpretation of the results of such logs and tests. For a complete description of requirements see; **WV 47CSR 13.5 sections; 13.5.a.1. thru 13.5.f.**

XVI. Proposed Injection Interval: Describe plans to gather information on the fluid temperature, pH, conductivity, reservoir pressure, and static fluid level of the injection zone(s). Describe plans to collect and analyze core samples within the injection and confining zones to refine site characterization data and provide information to support stratigraphic correlation, interpretation of depositional environments and wireline log calibrations. For

additional information, see the US EPA Class VI Well Geologic Site Characterization Guidance sections 4.2, 4.3 and 4.4.

XVII. Proposed Injection Stream: Describe the proposed injection rate that is appropriate to the site geology, properties of the injection zone and the well construction. Describe the proposed injection pressure that is no more than 90 percent of the injection zone fracture pressure to prevent the injection zone from being fractured and reduce potential for fracture of the confining zone. Propose a total volume of CO2 to be injected throughout the life of the GS project that the injection zone can receive and contain without endangering USDWs. Provide information to demonstrate that the proposed maximum annular pressure will be greater than the injection pressure or propose an alternative annular pressure and demonstrate that it will be appropriate and protective. Include source information for Co2 and analysis of the chemical and physical characteristics of Co2 injection stream. For more information see Section 4.1 of the US EPA Class VI Well Construction Guidance and Section 3.3 of the US EPA Class VI Testing and Monitoring Guidance.

XVIII. Aquifer Exemption: If appropriate, to demonstrate that USDWs above and below the injection zone are protected from endangerment if injection into non-USDWs that are located above or between USDWs is planned. This information will satisfy the requirements of **40 CFR 146.82(d). 40 CFR 146.95 (a)** requires owners or operators seeking a waiver of the Class VI injection depth requirements to submit additional information for a comprehensive assessment of site suitability to inject into a non-USDW above or between USDWs. Owners or operators must submit a waiver application report concurrent with the Class VI permit application **[40 CFR 146.82(d) and 146.95(a)]**. The waiver application report is a separate submittal which complements the Class VI permit application. For additional information, see the US EPA Class VI Reporting, Recordkeeping, and Data Management Guidance.

WV 47CSR 13.3: 13.3.1; An aquifer or a portion thereof which meets the criteria for an "underground source of drinking water" in section 2 may be determined to be an exempted aquifer if it meets the following criteria found in the following regulatory sections; **WV 47CSR 13.3 sections 13.3.1.a. Thru 13.3.1.d.3.**

XIX. Testing and Monitoring Plan: Demonstrate that planned testing and monitoring of the injectate, the well, and the geologic environment will be appropriate to planned operations, the well's construction, and site-specific geologic conditions. The testing and monitoring plan will include, but not limited to, Co2 stream analysis, continuous recording of operational parameters, corrosion monitoring, confining zone monitoring, external MIT, pressure fall-off testing, direct Co2 plume and pressure front tracking (direct and in-direct), surface air monitoring and/or soil gas monitoring. Also included will be a quality assurance and surveillance plan. This information will satisfy the requirements of **40 CFR 146.82(a)(15), 146.89, and 146.90**. For additional information, see the US EPA Class VI Well Testing and Monitoring Guidance and the Class VI Reporting, Recordkeeping, and Data Management Guidance.

WV 47CSR 13.6: 13.6.b; The owner or operator of a Class 6 well must prepare, maintain, and comply with a testing and monitoring plan to verify that the geologic sequestration project is operating as permitted and is not endangering USDWs. The requirement to maintain and implement an approved plan is directly enforceable regardless of whether the requirement is a condition of the permit. The testing and monitoring plan must be submitted with the permit application, for Director approval, and must include a description of how the owner or operator will meet the requirements of this section, including accessing sites for all necessary monitoring and testing during the life of the project. Testing and monitoring associated with geologic sequestration projects must, at minimum, include (see the following sections) of **WV 47CSR 13.6.b; 13.6.b.1. thru 13.6.c.1.F.v.**

XX. Plugging and Abandonment Plan: Demonstrate that the materials and procedures proposed for injection well plugging are appropriate to the well's construction and the site's geology and geochemistry so that the well will not serve as a conduit for fluid movement that could endanger USDWs following cessation of injection. Prepare an Injection Well Plugging Plan that describes the procedures for properly plugging the Class VI well to prevent fluid movement that could endanger USDWs following the cessation of injection. This information will satisfy the requirements of **40 CFR 146.82(a)(16) and 146.92**. For additional information, see the US EPA Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance and the Class VI Project Plan Development Guidance.

XXI. Post Injection Site Care and Closure (PISC) Plan: Demonstrate that post-injection monitoring strategies will ensure non-endangerment of USDWs throughout the PISC phase and the site will be properly closed. Standard PISC site plan will detail a default 50 year plan, if an alternative plan timeframe is proposed, please detail alternate timeframe PISC plan. This information will satisfy the requirements of **40 CFR 146.82(a)(17),(18) and 146.93**. For additional information, see the US EPA Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance.

WV 47CSR 13.9: 13.9.a.; The owner or operator of a Class 6 well must prepare, maintain, and comply with a plan for post-injection site care and site closure that meets the requirements of subsection 13.9.a.2. And is acceptable to the Director. The requirement to maintain and implement an approved plan is directly enforceable regardless of whether the requirement is a condition of the permit. For further guidance refer to the following sections; **WV 47CSR 13.9.a.1. thru 13.9.h.**

XXII. Emergency and Remedial Response Plan: Demonstrate that appropriate and timely responses will be taken to protect USDWs from endangerment should an emergency event occur during the construction, operation, and post-injection phases of the project. Prepare a proposed Emergency and Remedial Response Plan that describes the actions that would be taken in the unlikely event of an emergency in order to expeditiously mitigate any emergency situations and protect USDWs from endangerment. The Plan should consider the geologic setting, planned operations, and the well's construction. This information will satisfy the requirements of **40 CFR**

146.82(a)(19) and 146.94. For additional information, see the US EPA Class VI Project Plan Development Guidance.

WV 47CSR 13.7; 13.7a.: The owner or operator must provide the Director with an emergency and remedial response plan that describes actions the owner or operator must take to address movement of the injection or formation fluids that may cause an endangerment to a USDW during construction, operation, and post-injections site care periods. The requirement to maintain and implement an approved plan is directly enforceable regardless of whether the requirement is a condition of the permit. See the following sections for further information: **WV 47CSR 13.7.b thru 13.7.d.3.**

XXIII. Financial Assurance and Responsibility: Demonstrate that sufficient resources are available for all needed corrective action, injection well plugging, post-injection site care (PISC) and site closure, and emergency and remedial response. Provide estimates of the cost for contracting an independent third party to carry out corrective action, injection well plugging, PISC and site closure, and emergency and remedial response to prevent the general public from bearing the costs of abandoned GS projects. Describe proposed financial responsibility instruments that are secure and meet the UIC requirements to facilitate enforceability and prevent gaps in financial coverage over the duration of the project. This information will satisfy the requirements of **40 CFR 146.82(a)(14) and 146.85(a).** For additional information, see the US EPA Class VI Financial Responsibility Guidance.

WV 47CSR 14.7; 14.7.g.: The permit shall require the permittee, including the transferor of a permit, to demonstrate and maintain financial responsibility and resources to close, plug, and abandoned underground injection wells in a manner prescribed by the Director until: the well has been plugged and abandoned and the report submitted; or the well has been converted; or the transferor of the permit receives notice that the transferee has demonstrated financial responsibility. The permittee must show evidence of financial responsibility to the DIrector by submission of a surety bond, or other adequate assurance, such as a financial statement or other material acceptable to the Director. For all applicable financial assurance regulations of Class 6 permits see the following applicable provisions found within **WV 47 CSR Sections 14.7.g.1 thru 14.7.g.18.**

XXIV. Additional Permit Information: Attach and include the following completed permits. Applications for these permits can be found within the West Virginia Department of Environmental Protection website.

O&G Division Well Work Package (Attached)

Groundwater Protection Plan

The Wild and Scenic Rivers Act, 16 U.S.C. 1273 et seq.

The National Historic Preservation Act of 1966, 16 U.S.C. 470 et seq.

The Endangered Species Act, 16 U.S.C. 1531 et seq.

Emergency and Remedial Response Plan

XXV. Attachments: Attach completed mapping, analysis, cross sections and drill data.

XXVI. Certification: All permit applications must be signed by either: a responsible corporate officer for a corporation, by a general partner for a partnership, by the proprietor of a sole proprietorship, or by a principal executive or ranking elected official for a public agency.

XXVII. Certified Professional Engineering Certification: All technical design, assessment and calculations including but not limited to; attachments, maps, schematics, cross-sections, etc. must be signed by a licensed Professional Engineer who holds a current license to practice engineering in West Virginia.

For further guidance on Class 6 permit development requirements:

Please review the *Class VI Rule* and the *EPA guidance documents*, which are available on US EPA's web site in order to gain a full understanding of the Class VI permit application process.

Also, Please review the Class 6 regulatory requirements that can be found within the West Virginia Legislature website; **wvlegislature.gov/wvcode/code.cfm**

Please feel free to contact WVDEP with any questions at;

West Virginia Department of Environmental Protection:

Department of Water and Waste Management/WVDEP DWWM/Groundwater UIC