



***UNDERGROUND INJECTION CONTROL (UIC)
PERMIT APPLICATION PACKAGE
CLASS 2 & 3***

Office of Oil and Gas

601 57th Street, SE
Charleston, WV 25304
Phone: (304) 926-0450

"Promoting a healthy environment"

INSTRUCTIONS/GUIDANCE TO COMPLETE A CLASS 2 and CLASS 3 UNDERGROUND INJECTION CONTROL (UIC) PERMIT APPLICATION

A. GENERAL INSTRUCTIONS

The Office of Oil and Gas (OOG) has developed a comprehensive permit package and instruction/guidance document to assist in the preparation of a UIC permit application. Where possible, standardized forms have been created and identified as Appendices to the UIC application package. **NOTE** the instruction/guidance document identifies additional requirements to be submitted with the application.

B. FEES

The application fee for a UIC permit is \$500.00. There will be an additional \$50.00 fee for a groundwater protection plan (GPP).

C. SUBMITTAL

Please submit an original and a complete copy of the UIC permit application package along with the application fee of \$550.00 to:

**West Virginia Department of Environmental Protection
Office of Oil and Gas
Underground Injection Control (UIC)
601 57th Street, SE
Charleston, WV 25304**

CHECKLIST FOR FILING A UIC PERMIT APPLICATION

Please utilize this checklist to ensure you have prepared, completed, and enclosed all required documentation and payment to ensure a timely review of your submittal.

Operator			
Existing UIC Permit ID Number		UIC Well API Number	

Office of Oil and Gas Office Use Only	
Permit Reviewer	
Date Received	
Administratively Complete Date	
Approved Date	
Permit Issued	

Please check the fees and payment included.

Fees		Payment Type	
UIC Permit Fee: \$500		Check	
Groundwater Protection Plan (GPP) Fee: \$50.00		Electronic	
		Other	

Please check the items completed and enclosed.

_____ Checklist

_____ UIC-1

_____ Section 1 – Facility Information

_____ Section 2 – Operator Information

_____ Section 3 – Application Information

_____ Section 4 – Applicant/Activity Request and Type

_____ Section 5 – Brief description of the Nature of the Business

_____ CERTIFICATION

_____ Section 6 – Construction

_____ Appendix A Injection Well Form

_____ Appendix B Storage Tank Inventory

_____ Section 7 – Area of Review

_____ Appendix C Wells Within the Area of Review

___Appendix D Public Service District Affidavit

___Appendix E Water Sources

___Appendix F Area Permit Wells

___ Section 8 – Geological Data on Injection and Confining Zones

___ Section 9 – Operating Requirements / Data

___Appendix G Wells Serviced by Injection Well

___ Section 10 – Monitoring

___ Section 11 – Groundwater Protection Plan (GPP)

___Appendix H Groundwater Protection Plan (GPP)

___ Section 12 – Plugging and Abandonment

___ Section 13 – Additional Bonding

___ Section 14 – Financial Responsibility

___Appendix I Financial Responsibility

___ Section 15 – Site Security Plan

___ Appendix J Site Security for Commercial Wells

___ Section 16 – Additional Information

___ Appendix K Other Permit Approvals

****NOTE: For all 2D wells an additional bond in the amount of \$5,000 is required.***

Reviewed by (Print Name): _____

Reviewed by (Sign): _____

Date Reviewed: _____

 WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION OFFICE OF OIL AND GAS 601 57th Street, SE Charleston, WV 25304 (304) 926-0450 www.dep.wv.gov/oil-and-gas	UNDERGROUND INJECTION CONTROL (UIC) PERMIT APPLICATION
UIC PERMIT ID # _____ API # _____ WELL # _____	

Section 1. Facility Information

Facility Name:	
Address: City: _____ State: _____ Zip: _____ County: _____	
Location description:	
Location of well(s) or approximate center of field/project in UTM NAD 83 (meters): Northing: _____ Easting: _____	
Environmental Contact Information: Name: _____ Title: _____ Phone: _____ Email: _____	

Section 2. Operator Information

Operator Name: Operator ID:	
Address: City: _____ State: _____ Zip: _____ County: _____	
Contact Name: _____ Contact Title: _____ Contact Phone: _____ Contact Email: _____	

Section 3. Applicant Information

Ownership Status: ☐ PRIVATE ☐ PUBLIC ☐ FEDERAL ☐ STATE
☐ OTHER (explain):

SIC code: ☐ 1311 (2D, 2H, 2R) ☐ 1479 (3S) ☐ OTHER (explain):

Section 4. Applicant / Activity Request and Type:

- A. Apply for a new UIC Permit: ☐ 2D ☐ 2H ☐ 2R ☐ 3S
- B. Reissue existing UIC Permit: ☐ 2D ☐ 2H ☐ 2R ☐ 3S
- C. Modify existing UIC Permit: ☐ 2D ☐ 2H ☐ 2R ☐ 3S
- (Submit only documentation pertaining to the modification request)
- 2D COMMERCIAL FACILITY: ☐ YES ☐ NO

Section 5. Briefly describe the nature of business and the activities to be conducted:



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, or a ¹duly authorized representative in accordance with 47CSR13-13.11.b.

A. Name and title of person applying for permit:

Print Name: _____

Print Title: _____

B. Signature and Date.

I certify under 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.

Signature: _____

Date: _____

¹ A person is a duly authorized representative if:

The authorization is made in writing by a person described in subdivision 47CSR13-13.11.a.

The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of the plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility.

The written authorization is submitted to the Director.

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS



Underground Injection Control - Class 2 and 3 UIC Wells

Permit Application Package Instructions and Guidance

Procedural explanation to be used to supplement the permit application package.

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Section 1 – UIC-1 Form, Facility Information:

Provide the facility name, mailing address (if available), environmental contact, telephone number, and a location description including: local directions/location and relative geographically significant surface features (i.e. roadways, trails, rivers, streams, lakes, etc.) of the facility for which the application is being submitted. This pertains to the PHYSICAL location of the UIC facility, not the contact information for the operator or owner.

Section 2 - UIC-1 Form, Operator Information:

Provide the current/proposed operator (the company/entity performing underground injection activities) name, address, telephone number, as well as the complete contact information for the individual(s) representing said company/entity as the facility manager(s).

Section 3 - UIC-1 Form, Application Information:

Provide the ownership type of the proposed injection well(s). Supply the appropriate SIC (Standard Industrial Classification) Code for the application submitted. Below are SIC Code descriptions for Class 2 and Class 3 wells in the Office of Oil and Gas permit application package:

- Class 2 UIC Well(s): 1311 Crude Petroleum and Natural Gas: These would include Disposal (2D), Hydrocarbon Storage (2H) and Enhanced Recovery wells (2R).
- Class 3 UIC Wells: 1479 Solution Mining wells (3S).

Section 4 - UIC-1 Form, Applicant/Activity Request and Type:

Provide the permit application type selecting either A, B, or C. Only ONE box may be checked by the applicant. If the applicant has been previously granted a UIC Permit ID Number for the facility, the identical UIC Permit ID Number shall be supplied on the UIC-1 form. For a permit reissuance, a complete permit package shall be **submitted to the Office Oil and Gas 180 days prior to the current permit expiration date.**

- A. Applies to all Class 2 and 3 UIC facilities that have never been issued a UIC permit by the Office of Oil and Gas.

- B. Applies to all Class 2 and 3 UIC facilities that are reapplying for a continuation of their current UIC permit. These shall be **submitted 180 days prior to permit expiration**; otherwise the applicant shall select a box from row A, above.
- C. Applies to all Class 2 and 3S UIC facilities that are currently operating under a permit that requires modification(s) to the existing facility permit terms and conditions (47CSR13-13.18.). (**NOTE** Minor modifications classified under 47CSR13-13.20 do not require a completed UIC permit application.)

Class 2 and 3 wells are described below:

- Class 2D: Well(s) used to dispose of Class 2 fluids that are brought to surface in connection with conventional oil or natural gas production.
- Class 2H: Well(s) used to inject hydrocarbons for storage that are liquid at standard temperature and pressure (0°C, 1 Bar).
- Class 2R: Well(s) used to inject fluids into reservoirs in an attempt to enhance recovery of oil and gas.
- Class 3S: Well(s) used to inject fluids for extraction of minerals.
 - Sulfur mining – Frasch process
 - In situ mining of uranium and other metals that are produced from ore bodies that have not been conventionally mined
 - Solution mining of salts and potash
 - Recovery of geothermal energy to produce electric power

Each Class 2D UIC well facility shall be recognized as either a “Commercial” or “Non-Commercial” facility. A “Commercial” Disposal facility is defined as: any Class 2D permitted operating facility that accepts and injects Class 2 fluids that have been produced by another oil and gas operator. These commonly require additional permit requirements in the form of analytical testing, manifest documents, and increased facility security measures (permit dependent).

Section 5 – UIC-1 Form, Brief description of the Nature of the Business and the Activities to be Conducted:

Briefly explain the industry and/or field in which the operator resides (i.e. oil and gas producer, commercial oil and gas waste fluid disposal company, unconventional salt mining company). Also, include a brief explanation of the injection activities proposed.

Section 6 – Construction:

Provide a description of the surface and subsurface construction of the proposed UIC facility. This should be comprised of the following:

1. An aerial map or appropriate drawing(s) of the proposed UIC injection well(s) facility/project area. This map focuses on the surface and near surface structures associated with the UIC activities. Included must be all intakes and discharge structures, storage, groundwater supply sources, pipelines, pumps, valves, tank or tank battery, secondary containment, and/or other fluid storage structures. The submitted surface map/drawing should include, but is not limited to: legend/key, scale, and orientation (i.e. north arrow, compass).
2. Provide a detailed well schematic for the proposed injection well(s). This is best fulfilled by developing a cross-sectional sketch/drawing of the proposed injection well(s), which shall include, but is not limited to: well casings with depth intervals, hole sizes, diameters, wall thicknesses, cement types, depths and tops. Include the packer depth, type, and depth intervals of perforation(s). In addition, the applicant shall include the depth intervals of the proposed injection and confining layers, and depths of all known Underground Sources of Drinking Water (USDWs) in the schematic.
3. Provide a completed injection well form and inventory list for above ground storage tanks in **APPENDIX A and B**, respectively.
4. Provide a descriptive report interpreting the results of all logs and other tests for the drilling of the injection well(s) which shall include at a minimum the following: (47CSR13-8.2.e) (47CSR13-10.2.c)
 - a. Any directional surveys or deviation checks conducted on all holes,
 - b. Any resistivity, porosity, gamma ray, spontaneous potential, caliper logs, cement bond, temperature, or density logs,
 - c. Fracture finder logs in appropriate situations as prescribed by the Director.

Section 7 – Area of Review:

The following shall be provided to satisfy the Area of Review (AOR) requirement:

1. The AOR shall be defined by a ¼ mile fixed radius or a calculated radius (Zone of Endangering Influence – ZEI):
 - a. A ¼ mile fixed radius around the proposed injection well bore(s) or in the event of an area permit, the ¼ mile radius around the injection field / project.
 - b. The applicant may calculate the Zone of Endangering Influence (ZEI). This can be used to define the AOR. Refer to page 16 for further explanation of this method.
2. Attach a topographic map extending one (1) mile beyond the boundary of the source, depicting the facility and each well where fluids from the facility are injected underground and those producing wells, injection wells, abandoned wells, dry holes, springs, and other surface water bodies, mine workings (surface and subsurface), quarries, and other pertinent surface features, including residences and roads, faults (if known or suspected), and water wells listed in public records or otherwise known to the applicant in the map area. Delineate the perimeter of the AOR on the map and show the API number(s) and location(s) of all producing wells, plugged wells, injection wells, abandoned wells and dry holes. Provide the record of completion and plugging (WR-35 and/or WR-38) for all wells within the AOR. Provide the list of wells on **APPENDIX C**.

To ensure all publically recorded drinking water wells are represented in the Area Map, the respective County Health Department should be contacted. If no water wells are present within a one (1) mile extent of the proposed injection facility, a written affidavit should be supplied by the Public Service District as ample verification. The Office of Oil and Gas also recommends that the applicant perform a thorough surface investigation to ensure no other avenues of contamination exist that may adversely affect the waters of the state. Reference **APPENDIX D**.

3. Depth to the bottom of all USDWs. (40CFR146.22(b)(1)(ii))

Include the geological name and depth for all USDWs in the AOR. USDWs include all aquifers with water quality less than 10,000 mg/L of total dissolved solids (TDS) and capable of yielding 2 gallons/minute of water. These aquifers need not presently supply drinking water to be considered a USDW. Additionally, any zone currently supplying drinking water regardless of quality is a USDW.

The depth of the USDWs are to be determined, if possible, from the elevation of the borehole electric log and in some cases, the porosity log in combination with available information on the geologic formations present in the area. The water resistivity of the deepest USDW is to be calculated by the static spontaneous potential method and

converted to TDS (mg/L) or sodium chloride equivalent to verify that the zone in question has less than 10,000 mg/L TDS. It may be necessary to calculate TDS in lower geologic units to verify that the overlying unit is the lowest USDW. Where information is available on USDWs in an area, it may not be necessary to calculate TDS. However, the site-specific depths of the USDWs should be determined from the borehole logs. The entire log should be provided in the permit application and the depth and name of all formations should be indicated on the log. The water resistivity calculations and TDS conversion factors should also be provided.

4. Locate and label all water wells within the AOR. All water wells within the AOR shall be tested. Provide laboratory analysis as supporting documentation. If there are no water wells within the AOR, strategically select and sample enough water wells to accurately describe the groundwater quality in the vicinity of the proposed well or facility. Water well analyses shall include at a minimum the following parameters: Total Petroleum Hydrocarbons (GRO, DRO, ORO), BTEX, pH, Aluminum, Arsenic, Barium, Calcium, Chloride, Detergents (MBAS), Iron, Manganese, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Total Organic Carbon (TOC), Sulfate, Dissolved Methane, Dissolved Ethane, Dissolved Butane, Dissolved Propane, and Bacteria (total coliform). Provide the summary analysis in **APPENDIX E**.
5. Samples shall be collected and analyzed in accordance with methods approved by the Chief or as set forth at 40 CFR Part 136. Laboratories utilized by the operator shall be approved by the agency as being certified and capable of performing sample analyses in accordance with this section. WVDEP certified laboratories may be identified at the link below.
<http://www.dep.wv.gov/WWE/Programs/lab/Pages/default.aspx>
6. Corrective Action: In determining the adequacy of corrective action proposed by the applicant and in determining the additional steps needed to prevent fluid migration into underground sources of drinking water, the following shall be considered by the Director:

For any wells in the AOR which are improperly sealed, completed, or abandoned, submit a "corrective action plan" which consists of the additional steps as are necessary to prevent movement of fluid into USDW(s). The plan must consider the factors below: (47CSR13-6.1) (47CSR13-13.9.a) (40CFR146.7)

- Nature and volume of injected fluid
- Nature of native fluids or by-products of injection
- Potentially affected population

- Geology
 - Hydrology
 - History of injection operation
 - Completion and plugging records
 - Applicant proposed cement well plugging plan for affected well(s)
 - Plugging procedure at the time of abandonment
 - Hydraulic connections with USDWs
7. For an area permit(s), Class 2R and Class 3S, provide the production, injection, monitoring, and observation wells in **APPENDIX F**.

Section 8 - Geological Data on the Injection and Confining Zone:

Conduct a detailed geologic investigation of subsurface features in the vicinity of the injection well(s). This investigation will assess for the presence of subsurface faults, fractures or potential seismically active features. At a minimum, this investigation will draw upon public or privately available geologic information such as seismic survey lines, well records, published academic reports, government reports or publications, earthquake history, geologic maps, or other like information to assess the likelihood of the proposed injection of fluids causing seismically anomalous events.

Submit appropriate geological data on the injection and confining zone(s) including lithological description, geological name, thickness, depth, and fracture pressure.

This may be demonstrated by the following:

- If available, any lithological logs and coring program information derived from the immediate area.
- If available, any geophysical logs derived from the immediate area. Identify the injection zone and confining zone(s) on all logs submitted.
- Provide a detailed evaluation of the physical and chemical characteristics of the proposed injection zone.
- Describe the confining zone(s) which would prevent the upward migration of injected fluid out of the proposed injection zone.
- Structural contour map of the top or bottom of the proposed injection and confining zone(s). Indicate the location of the proposed well or facility.
- Isopach map of the injection and confining zone(s). Indicate the location of the proposed well or facility.

- Provide a schematic/model of fluid migration over time within subsurface formation(s) around the proposed injection well.
- Groundwater use and dependence; and historical practices in the area.
- Chemical compatibility of the injected and formation fluids. At a minimum, fluids shall be tested for pH, Chloride, Iron, TDS, TOC, and Specific Gravity.
- Formation testing program (Class 3S Only) – See page 9.

The following is an explanation and guidance on the UIC geological investigation:

An injection zone is a geologic formation or part of a formation or a group of formations that has sufficiently high permeability and porosity, so that injected fluids can be safely injected into the proposed zone. The physical characteristics of the zone should include porosity, permeability and thickness information for the injection zone which may be obtained from data collected during drill stem testing, injectivity or production testing, geophysical logs, core analysis, or other appropriate methods (historic formation data, pertinent AOR neighboring well(s) information). The applicant should specify porosity type as being primary porosity (depositional intergranular pore space), secondary porosity (post depositional – fracture(s), suture(s) or vuggy pore space) or a combination of both (provide approximate percentages of each). The applicant may fulfill the chemical characteristic of the injection matrix requirement by providing a brief description of the composition of the proposed injection rock unit and cemented casing; paying particular attention to its compatibility with the injection fluid composition. The applicant is encouraged to draw upon all available drill log data, geophysical logs, geologic literature addressing the injection formation, or any other acceptable reference.

A confining zone is a geologic formation or part of a formation or a group of formations that has sufficiently low permeability so that injected fluids are isolated in the injection zone and will not migrate into USDWs. It is the applicant's responsibility to demonstrate that such a geologic unit exists. The applicant should provide as much information that is available on the confining zone, including its physical characteristics, thickness and lateral extent.

Faults and fractures within the AOR that penetrate the confining zone must be identified. The applicant should provide any information available within his/her knowledge that supports that the fault plane is sealed to fluid movement and will not provide a pathway for fluid migration into a USDW. If the amount of displacement along the fault plane is known, please provide this information.

All logs submitted should show names and depths of all injection formations (injection and confining zone(s)). The confining zone(s) should be identified on a log that identifies "confining characteristics" (i.e., for shales, a spontaneous potential/dual induction log; for dense limes, a density/porosity log). An electric log through both the confining and injection zones should also be submitted. An interpretation by a knowledgeable log analyst of the nature of the confining zones, including lithology, must be provided. Any other available information (i.e., driller's logs,

information from geological literature, etc.) should be incorporated into the description of the units.

For existing Class 2 wells or conversions, information on the injection and confining zone(s) should be provided from existing information, preferably from borehole logs in addition to other available information. If logs on the injection well are not available, then logs from a nearby well (preferably within the AOR) may be substituted.

The required formation maps, structure contour and isopach (injection and confining layers), shall at a minimum cover the AOR. The information used to develop said maps shall be developed using neighboring well data (if available), historical documentation and geologic literature.

(Class 3S Only) The formation testing program must obtain data on the fluid pressure, fracture pressure and physical and chemical characteristics of the injection zone. The permit application must propose to obtain the following information:

1. Formation fluid pressure must be determined by measuring the static fluid level in the well, drill stem testing, pressure transducer, or other appropriate method.
2. Formation fracture pressure may be based on historical data in the same field and formation or may be obtained from actual field data. The formation fracture pressure must be documented or be from readily available sources.
3. Formation water quality – produced water from the same lease and same formation may be analyzed; or the program must propose that the well be pumped, jetted, swabbed, back flowed or otherwise produced until a representative sample of the injection zone formation fluid can be obtained. It is recommended that conductivity or some other parameter be measured and recorded during the water retrieval process until the chemistry of the water stabilizes, then several gallons or barrels collected.

For proposed new wells, the application must provide a geophysical logging program to collect the required information on the injection and confining zones. At a minimum a caliper log, gamma ray log, and a spontaneous potential/dual induction log with shallow and deep resistivity curves will be required. Other data such as lithological samples, lithological logs and other appropriate data may also be required. If available, submit the logs to the Office of Oil and Gas.

For area permits, the above information requirements must be provided from borehole logs and other information from a selected number of wells spatially distributed within the AOR and must represent any variation in the geology of the field.

(For Class 3 wells only, provide additional geological information in accordance with 47CSR13-10.5.a.1 through 47CSR13-10.5.a.5.)

Section 9 – Operating Requirements/Data:

Provide the information below related to the operation of the injection well(s) and facility.

Provide proposed operating data and include such items as:

- a. Average daily rate or volume of fluid to be injected
- b. Maximum daily rate or volume of fluid to be injected
- c. Average injection pressure
- d. Maximum injection pressure

Injection activities shall not initiate new or propagate existing fractures in the injection and confining zones. Data may be obtained through a service company, pressure test results, well treatment data or instantaneous shut-in pressure. Other source(s) may be referenced.

2. Provide a list of all wells by API number to be serviced by a brine disposal well(s). The wells should be listed on **APPENDIX G**.

(Note additional sources of fluids may be approved upon written request by the permittee.)

3. Provide physical and chemical characteristics of the injection fluid. At a minimum fluid should be tested for: Total Petroleum Hydrocarbons (DRO, GRO, ORO), BTEX, pH, Aluminum, Arsenic, Barium, Calcium, Chloride, Iron, Manganese, Sodium, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Total Organic Carbon (TOC), Sulfate, Detergents (MBAS), Dissolved Methane, Dissolved Ethane, Dissolved Butane, Dissolved Propane, Bacteria (total coliform), Radiation (NORM), and specific gravity.
4. Provide a description of all injection fluid additives, including concentrations. Include all necessary chemical MSDS (Material Safety Data Sheets). (35CSR4-7.3.b.3)
5. Provide the nature of the annulus fluid (air is considered a fluid). This should include the type of fluid being used in the annulus between the tubing and the casing, the corrosivity of the annulus fluid, and pressure on the annulus. If liquid fluids are used, any corrosion inhibitors added should be analyzed, or a report of the chemical name and company should be submitted, (MSDS). The amount of inhibitor to be added should be included.
6. Provide a contingency plan outlining methods to prevent migration of fluids into any USDW in the event of well failure. The plan should address shut-ins or well failures with the proposed methods of shutdown for each type of well failure. The plan should also include an alternative method to dispose of injection fluids.

(For Class 3 applications only. Provide a stimulation program and injection procedure.)

Section 10 – Monitoring:

Provide a monitoring program including the following requirements:

1. The operator is required to monitor injection pressure, annulus pressure, flow rate, and cumulative volume of the injected fluid. The applicant should be able to demonstrate adequate procedures to monitor and record all WR-40 parameters. For Class 2R, 2H, and 3S wells, monitoring may be done on a field or project basis by manifold monitoring. Separate monitoring systems for each well are not required provided the owner/operator demonstrates that manifold monitoring is comparable to individual well monitoring.
2. The applicant shall maintain a manifesting system documenting adequate records of the fluid sources, quantity, transportation type, and dates for Class 2D disposal fluids. Provide a description of how the applicant proposes to track disposal fluids, how the information is recorded, individual(s) maintaining information, and its availability upon request.

Section 11 – Groundwater Protection Plan (GPP)

A Groundwater Protection Plan (GPP) must be provided for all UIC permits. The GPP is to be submitted and reviewed as part of the facility's or activity's permit application pursuant to 47CSR58. Utilize **APPENDIX H** for submittal of the plan.

A copy of 47CSR58 - Groundwater Protection Regulations and 47CSR13 - Underground Injection Control Regulations can be obtained by contacting the Secretary of State's office at (304) 558-6000.

Note: There is an annual Groundwater Protection fee of \$75.00 for Class 2D wells and Class 3 wells and \$50.00 for Class 2R wells.

The applicant shall address the following in the plan:

- **Processes & Activities:** The owner/operator should determine which operations, processes and materials present at the facility have the potential to contaminate groundwater resources.
- **Existing Processes:** The owner/operator should list and describe containment facilities and procedures present to protect groundwater resources from the potential contaminants listed above. These processes or facilities should be identified on the facility map if applicable. Pursuant 47CSR58-4.11.b., the following items should be addressed:

- Manufacturing Facilities
- Materials Handling
- Equipment Cleaning
- Construction and Maintenance Activities
- Pipelines Carrying Contaminants
- Sumps and Tanks Containing Contaminants

Operating practices and physical installations which prevent groundwater contamination for each of these categories should be included where applicable.

- **New Operations / Equipment:** The owner/operator should list procedures used when designing and adding new equipment and operations. New operations should be designed and constructed to protect groundwater. Also include specific safety/environmental committees and training associated with the new operations or equipment. Important considerations are included in the **Site Selection Criteria** (47CSR58, Section 4.10.) when a facility intends to construct new or expand existing operations. Adequate design of these operations should be considered in the GPP when making changes in areas of karst, wetlands, faults, subsidence, areas determined by the Bureau for Public Health to be delineated wellhead protection areas or other areas determined by the Director to be vulnerable based upon geologic or hydrogeologic information.

The facility should revise its existing GPP to address any newly delineated areas or other vulnerable areas upon notification by the Bureau for Public Health or the Director of West Virginia Division of Water and Waste Management (WVDWWM).

- **Activities Regulated for Groundwater Protection:** The owner/operator should summarize activities presently regulated for groundwater protection.
- **Groundwater Quality:** The owner/operator should include a discussion of all available groundwater quality data that exists for the facility. Attach a summary table of data for the last year if sampling has been conducted for more than a year. This section should also contain any other information that is readily available such as soil type, geologic formation, and depth to groundwater. Analyses of drinking water wells, springs or seeps should also be included if they have been sampled. Well locations or other sampling points should be identified on the facility map. The installation of monitoring wells and/or groundwater sampling may be required by the Director if the potential for groundwater contamination exists. These actions are not automatically required with every GPP. Facilities with no existing groundwater quality data should provide a statement documenting that no data has been collected.

- **Fill Material & Deicing:** A GPP should have a statement documenting that waste materials will not be used for deicing, fill, or any other use, unless that use is provided for in some other regulation or permit. A temporary construction demolition permit (D2) may allow waste to be used for fill. Any use of waste for deicing, fill, or similar use should be detailed along with the permit, regulation, or use authorization.
- **Responsibility & Training:** Instruction and training given to employees concerning groundwater protection should be summarized in this section. Job procedures associated with the protection measures should be detailed. Education on recognizing potential groundwater contaminants, spill notification and documentation should also be included in this section. The easiest way to manage a spill or contaminant is prevention. Groundwater is a resource which, by law, must be protected.
- **Inspections:** A minimum of quarterly inspections of the GPP elements by facility personnel are required. Documentation of these inspections may help with WVDEP inspections or demonstrate the facility's efforts to protect groundwater. This section should include a description of inspection procedures and how control structures and devices are managed. Attach a copy of the facility's inspection form if applicable.

Section 12 - Plugging and Abandonment:

Attach a plan that will ensure that plugging and abandonment of the injection well(s) will not allow the movement of fluids either into an underground source of drinking water or from one underground source of drinking water to another.

The plan must describe how the well(s) will be plugged with cement in a manner which will not allow the movement of fluids either into or between USDWs. For an area permit, all wells that are constructed in the same manner may be plugged and abandoned in the same manner, one description will be acceptable.

Section 13 – Additional Bonding:

CLASS 2D Only: A separate performance bond is required for each well drilled or converted for the introduction of liquids for the disposal of pollutants or the effluent therefrom. Each of these bonds shall be in the sum of five thousand dollars (\$5,000), payable to the State of West Virginia, conditioned on full compliance with all laws and rules relating to the drilling, redrilling, deepening, and stimulating of oil and gas wells.

Important notes:

- The disposal well bond is in ADDITION to any individual or blanket performance bonding that the injection well may currently possess, it must be specifically for the Class 2D UIC well.
- The additional bond does not satisfy Section 12 - Financial Responsibility requirement. This is a performance bond, not the necessary funds to plug the disposal well.
- The disposal well bond will continue throughout the operating life of the Class 2D UIC disposal well. If the operator is reapplying for a Class 2D UIC well and is in full compliance with permit requirements and regulations, their previous disposal well bonding is valid.
- Failure to obtain the additional bonding requirement will delay the issuance of the draft permit until such bonding has been obtained.

Section 14 – Financial Responsibility:

The applicant shall show evidence of financial responsibility and resources to close, plug, or abandon the underground injection well(s) in a manner prescribed by the Director. The applicant may submit a surety bond, or other adequate assurance, such as a financial statement or other material acceptable to the Director.

Refer to **APPENDIX I** for Financial Responsibility to Plug/Abandon an Injection Well document.

Section 15 – Site Security Plan:

Provide a detailed description of the method(s) utilized at the facility to restrict or prohibit illegal dumping of unauthorized waste or vandalism at the facility. Refer to **APPENDIX J** for Commercial 2D injection wells.

Section 16 - Additional Information:

List all permits or construction approvals received or applied for the UIC facility. Refer to **APPENDIX K**.

References:

W. Va. Code §22-6 / W. Va. Code §22-11

47CSR13/ 47CSR9 / 35CSR4/ 35CSR1 / 47CSR58 / 47CSR32

40CFR144-146

EPA UIC Guidance:

<http://water.epa.gov/type/groundwater/uic/index.cfm>

Search oil and gas well(s):

<http://www.wvgs.wvnet.edu/pipe2/OGDataSearch.aspx>

<http://www.dep.wv.gov/oil-and-gas/databaseinfo/Pages/OGD.aspx>

<http://www.senecatechnologies.com/>

Zone of Endangering Influence (ZEI) Explanation

The ZEI is a calculated radial distance from the well bore that can be used as an alternative to the fixed $\frac{1}{4}$ mile radius. This is determined using pertinent geological information and the proposed injection parameters. This shall model the horizontal extent of influence by the subsurface fluid flow into the injection zone. An area permit may also be determined using a calculated ZEI. Like a fixed radius, the calculated horizontal extent is applied to the project area, defining the “circumscribing area.” The calculated ZEI parameters necessary to develop an effective model shall include the following (established in the Theis fluid flow prediction model, WVDEP OOG suggested model):

- “K” hydraulic conductivity of the injection zone (length/time)
- “H” thickness of the injection zone (length)
- “t” time of injection (time)
- “S” storage coefficient (dimensionless)
- “Q” injection rate (volume/time)
- “ h_{bo} ” Observed original hydrostatic head of the injection zone (length) measured from the base of the lowermost underground source of drinking water
- “ h_w ” hydrostatic head of underground source of drinking water (length) measured from the base of the lowest underground source of drinking water
- “ $S_p G_b$ ” is equal to specific gravity of fluid in the injection zone (dimensionless)
- “pi” π is equal to 3.142 (dimensionless)

All equations shall be built upon the following assumptions:

- Injection zone is homogenous (uniform throughout) and isotropic (uniform in all directions)
- Injection zone has an infinite area extent
- Injection well penetrates the entire thickness of the injection zone
- The well diameter is infinitesimal compared to the radius of ZEI, “r”, when injection time is longer than a few minutes
- Emplacement of fluids into the injection zone creates an instantaneous increase in pressure

For an area permit the calculated distance is applied to the perimeter of the project area, defining the circumscribing area. The ZEI is determined by applying an appropriate groundwater flow model (such as Theis equation) with geologic information pertinent to the injection zone as well as anticipated operational parameters. This information shall be submitted with the permit application package. Refer to 47CSR13-5.3.b for further information regarding the calculation of the ZEI.

*When using the calculated ZEI for the AOR, the applicant shall include all values for quantitative parameters used, with appropriate units, to ensure that the ZEI is properly characterized.

The following equation may be used to determine ZEI:

$$r = \sqrt{\left(\frac{2.25 KHt}{S10^x}\right)}$$

Where:

$$X = \frac{4\pi KH(h_w - h_{bo})S_p G_b}{2.3Q}$$

APPENDIX A

Injection Well Form

1) GEOLOGIC TARGET FORMATION _____			
Depth _____	Feet (top) _____	Feet (bottom) _____	
2) Estimated Depth of Completed Well, (or actual depth of existing well): _____ Feet			
3) Approximate water strata depths: Fresh _____ Feet		Salt _____ Feet	
4) Approximate coal seam depths: _____			
5) Is coal being mined in the area? Yes _____ No _____			
6) Virgin reservoir pressure in target formation _____ psig		Source _____	
7) Estimated reservoir fracture pressure _____ psig (BHFP)			
8) MAXIMUM PROPOSED INJECTION OPERATIONS:			
Injection rate (bbl/hour) _____			
Injection volume (bbl/day) _____			
Injection pressure (psig) _____			
Bottom hole pressure (psig) _____			
9) DETAILED IDENTIFICATION OF MATERIALS TO BE INJECTED, INCLUDING ADDITIVES:			
Temperature of injected fluid: (°F) _____			
10) FILTERS (IF ANY)			
11) SPECIFICATIONS FOR CATHODIC PROTECTION AND OTHER CORROSION CONTROL			

APPENDIX A (cont.)

12. Casing and Tubing Program

TYPE	<u>Size</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling</u>	<u>INTERVALS: Left in Well</u>	<u>CEMENT: Fill-up (Cu. Ft.)</u>
Conductor							
Fresh Water							
Coal							
Intermediate 1							
Intermediate 2							
Production							
Tubing							
Liners							

TYPE	<u>Wellbore Diameter</u>	<u>Casing Size</u>	<u>Wall Thickness</u>	<u>Burst Pressure</u>	<u>Cement Type</u>	<u>Cement Yield (cu. ft./sk)</u>	<u>Cement to Surface ? (Y or N)</u>
Conductor							
Fresh Water							
Coal							
Intermediate 1							
Intermediate 2							
Production							
Tubing							
Liners							

PACKERS	Packer #1	Packer #2	Packer #3	Packer #4
Kind:				
Sizes:				
Depths Set:				

APPENDIX B

Storage Tank Inventory

[illegible]

APPENDIX C

Wells within the Area of Review

API #	Well Type	Well Status (Active, Abandoned, Shut-in, Plugged)	Northing (UTM NAD 83 Meters)	Easting (UTM NAD 83 Meters)	Penetrate Injection Zone (Y or N)	Penetrate Confining Zone (Y or N)	Total Vertical Depth	Surface Elevation

Make as many copies as necessary and include page numbers as appropriate.

APPENDIX D

Public Service District Affidavit

Underground Injection Control Permit applicants must identify all publically recorded drinking water sources within a one (1) mile radius of the proposed injection well facility. If no drinking water sources are present within this radius a written affidavit shall be supplied by the local Public Service District (PSD) as ample verification.

“I certify under penalty of law that (state name of business)

has verified with the public service district (state name of PSD)

that there are no such publically recorded sources.

(Signature of Authorized Representative)

Sworn and subscribed to before me this _____ day of _____, 20_____.

_____, my commission expires _____

(Notary Signature)

_____.

APPENDIX E

Water Sources

Operator: _____ Year _____ UIC Permit # _____

		Source # ____	Source # ____	Source # ____	Source # ____
Water Source Name					
Northing					
Easting					
Parameter	Units				
TPH - GRO	mg/L				
TPH - DRO	mg/L				
TPH - ORO	mg/L				
BTEX	mg/L				
Chloride	mg/L				
Sodium	mg/L				
Total Dissolved Solids (TDS)	mg/L				
Aluminum	mg/L				
Arsenic	mg/L				
Barium	mg/L				
Iron	mg/L				
Manganese	mg/L				
pH	SU				
Calcium	mg/L				
Sulfate	mg/L				
MBAS	mg/L				
Dissolved Methane	mg/L				
Dissolved Ethane	mg/L				
Dissolved Butane	mg/L				
Dissolved Propane	mg/L				
Bacteria (Total Coliform)	c/100m L				

APPENDIX F

Area Permit Wells

[illegible]

Make as many copies as necessary and include page numbers as appropriate.

APPENDIX G

Wells Serviced by Injection Wells

[illegible]

Make as many copies as necessary and include page numbers as appropriate.

APPENDIX H

GROUNDWATER PROTECTION PLAN

Facility Name: _____

County: _____

Facility Location:

Postal Service Address:		
Latitude and Longitude:		

Contact Information:

Person:	
Phone Number:	
E-mail Address:	

Date: _____

1. A list of all operations that may contaminate the groundwater.

--

2. A description of procedures and facilities used to protect groundwater quality from the list of potential contaminant sources above.

--

3. List procedures to be used when designing and adding new equipment or operations.

--

4. Summarize all activities at your facility that are already regulated for groundwater protection.

5. Discuss any existing groundwater quality data for your facility or an adjacent property.

6. Provide a statement that no waste material will be used for deicing or fill material on the property unless allowed by another rule.

7. Describe the groundwater protection instruction and training to be provided to the employees. Job procedures shall provide direction on how to prevent groundwater contamination.

8. Include provisions for inspections of all GPP elements and equipment. Inspections must be made quarterly at a minimum.

Signature: _____

Date: _____

APPENDIX I

Requirement for Financial Responsibility to Plug/Abandon an Injection Well

To: WV Department of Environmental Protection
Office of Oil and Gas
601 57th Street, SE
Charleston, West Virginia 25304-2345
ATTN: Underground Injection Control Program

From: _____

Date: _____

Subject: Underground Injection Control (UIC) Permit Application

Requirement for Financial Responsibility

I, _____, verify in accordance with 47CSR13-13.7.g., that I will maintain financial responsibility and resources to close, plug, and abandon underground injection wells(s) in a manner prescribed by the Chief of the Office of Oil and Gas.

Name: _____

Signature: _____

Date: _____

APPENDIX J

Site Security for Commercial Facilities

Provide a detailed description of the method(s) utilized at the facility to restrict or prohibit illegal dumping of unauthorized waste or vandalism at the facility.

1. Complete enclosure of all wells, holding tank/pits and manifold assemblies within a chain link or other suitable fencing; and
2. Require that all gates and other entry points be locked when the facility is unattended; or
3. Providing tamper-proof seals for the master valve on each well (a “lock-out” or chain & padlock system would be more secure; however, these devices could create a potential safety hazard if the well needed to be quickly shut in due to an emergency); and
4. Installing locking caps on all valves and connections on holding tanks, unloading racks, and headers.

APPENDIX K

**Identify permit or construction approvals received
or applied for under the following programs:**

Permit/approvals	ID Number
Hazardous Waste Management Program under RCRA	
NPDES Program	
Prevention of Significant Deterioration (PSD)	
Nonattainment Program	
Dredge or Fill	
NPDES/NPDES – Stormwater	
WVDEP – Office of Waste Management (OWM) – Solid Waste Facility	
WVDEP – OWM – RCRA (Hazardous Waste TSD or Transporter)	
WVDEP – OWM – UST	
CERCLA – Superfund	
WV Voluntary Remediation – Brownfields	
FIFRA – Federal Insecticide, Fungicide and Rodenticide Act	
Well Head Protection Program (WHPP)	
Underground Injection Control (UIC)	
Toxic Substances Control Act (TSCA)	
Best Management Plans	
Management of Used Oil	
Other Relevant Permits (Specify):	