11/20/98
06/10/99 REVISED

PERMIT CONDITIONS
DEVONIAN SHALE/ORISKANY SANDSTONE WELLS
ASHTABULA AND LAKE COUNTIES

1. A 12 ¼ inch (or 10 inch if 7 inch casing is used) diameter surface hole shall be drilled on a fresh water mud system.

2. 180 feet of 8 5/8 inch (or 7 inch) diameter surface casing shall be set in the surface hole with 100 % excess cement to circulate to surface. The casing shall be mechanically centralized with a centralizer 50 feet from the top and base of the surface casing.

3. Borehole conditions must be static prior to circulating cement.

4. Division approved gas-blocking cement shall be allowed to set undisturbed until it reaches a compressive strength of 500 PSI prior to removal of the casing head.

5. A blowout preventor (BOP) in good working condition of sufficient size and working pressure rating to control normal hydrostatic pressure for deepest pool to be penetrated must be installed on the surface casing and tested under the supervision of an inspector prior to drilling below the surface casing. The blowout preventor must be capable of closing off the annulus between the surface casing and drill pipe, as well as closing off the surface casing when the drill pipe has been withdrawn from the hole.

6. A rotary airhead in good working condition must be installed and inspected prior to drilling below the surface casing.

7. A staked, steel discharge line must be vented not less than 80 feet from the well into a steel tank or an approved drilling pit. The discharge line shall be directed away from all inhabited structures. All natural gas encountered below surface casing base must be flared. A lit smudge shall be positioned and maintained below the surface-casing base.

8. A staked , steel bleed-off line with a minimum diameter of 2 inches must be vented at least 80 feet from the well to serve as a pressure bleed-off line or kill line if the blowout preventor is engaged. The bleed-off line shall be directed away from inhabited structures. If gas is vented through the bleed-off line, a lit smudge must be positioned in a manner which will flare all gas. If elbows must be used, they must be high-pressure elbows.

9. If the well is drilled to the Devonian Oriskany Sandstone/Bass Island Dolomite, 4 ½ inch casing shall be set in the production hole, and cement shall be circulated at least 50 feet above the top of the Big Lime.

10. All fluids must be removed from the tank or pits within one week after completion of drilling operations unless an extension is granted by the Division.

11. Cuttings must be treated or disposed in a manner approved by the Division.

20/40-ACRE PERMIT CONDITIONS

This permit for the proposed **Firestone Unit # 1-A** well, located in **Lot 5, Tract 12 Coventry Township, Summit County**, is being issued to **M & M Royalty, Ltd** (Operator) under the following conditions:

Due to the conflicting information concerning the depth of the "Clinton" formation in this area, this permit is being issued pursuant to the applicant's request for twenty (20) acre drilling unit spacing. In the event that the base of the "Clinton" formation is found below three thousand nine hundred and ninety-nine (3999) feet in the well, **M & M Royalty, Ltd** shall amend the drill unit to comply with the greater forty (40) acre spacing requirements of OAC 1501:9-1-04 (C) (4).

If the unit cannot be modified to satisfy the greater depth spacing requirements, then the well must be plugged back to a shallower source of supply or plugged and abandoned.

ANNULAR DISPOSAL, CONSTRUCTION, OPERATING AND REPORTING CONDITIONS

Construction requirements

1. Disposal of brine into any annular space of any well shall be prohibited except where approved in writing by the Chief and performed in accordance with this rule.

2. Each owner or his agent shall give the appropriate Division inspector at least six hours notice in advance of the time of cementing of surface casing and hook-up for annular disposal are to be performed. A division office shall be notified when the appropriate inspector cannot be contacted. If at least six hours notice is not given, annular disposal will not be authorized on the well.

3. Approval for annular disposal shall be granted by the Chief if the construction requirements have been satisfied and the mechanical integrity of the well has been demonstrated.

4. The surface casing of any annular disposal well permitted after June 19, 1989 shall be set and sealed with cement.

5. Surface casing shall be set at least fifty feet below the base of the deepest underground source of water containing less than ten thousand mg/L total dissolved solids.

6. Surface casing shall be free of all apparent defects including but not limited to bent joints, split-seams, stripped threads, and holes.

7. No cement baskets shall be used above the deepest underground source of drinking water unless a cement bond log is run to verify a continuous seal from the casing seat to the surface.

8. No well shall be approved for annular disposal unless a Division representative is present while casing is installed and cemented or unless an affidavit is submitted by the operator attesting to conditions subject to the requirements listed under issue number two.

9. Cement shall be mixed with fresh water and circulated to surface by the pump and plug method. The density of cement circulated prior to the dropping the top plug shall range within five percent, plus or minus, of the “American Petroleum Institute” optimum density standard for the type of cement used. The record of all cement and mix water additives and percentages by weight of mix water shall be included on the cement ticket. A copy of the cement ticket shall be supplied to the appropriate Division inspector. The cement head shall not be removed until the cement reaches a compressive strength of five hundred pounds per square inch (psi). Cement shall provide a continuous seal from the casing seat to the surface.

10. Any annular disposal well being used for disposal of brine produced on an adjacent lease shall have surface casing sealed by circulating cement to the surface. All brines shall be transported in a liquid tight piped system. The connection between the brine

pipeline and the annulus of the annular disposal well shall be visible and accessible for inspection by the Division. All annular systems shall be liquid tight.

11. Prior to obtaining approval from the Chief for the use of annular disposal and prior to commencement of injection of brine, each owner or his agent shall demonstrate that the well has mechanical integrity in the following manner:

    (a) Cement records shall be accepted as demonstration that there is no significant fluid movement into an underground source of drinking water through channels adjacent to the injection wellbore if all construction requirements have been satisfied.

    (b) Demonstrate mechanical integrity using one of the following tests:

        (1) After the well has been drilled to the depth attained prior to running production casing, a temporary plug consisting of either a packer run on tubing, or an electric bridge plug run on a wire-line, shall be set at the base of the surface casing. The surface casing shall be filled with fresh water, pressurized to three hundred psi and shut-in. If the pressure of three hundred psi is maintained for fifteen minutes with no more than a five percent decline, the demonstration that there is no significant leak in the casing is satisfied.

        (2) The positive differential gas pressure test may be performed as a demonstration of mechanical integrity.

    (c) Each owner or his agent shall give the appropriate Division inspector at least 24 hours notice in advance of conducting an initial mechanical integrity test. A Division representative must be present to witness this test.

    (d) The owner or his agent shall demonstrate mechanical integrity for all annular disposal wells at least once every five years by use of a method approved by the Chief. By written notice, the Chief may require the owner or his agent to comply with a schedule describing when such demonstrations shall be made.

Operating and monitoring requirements

1. Any annular disposal well with surface casing sealed by circulating cement to the surface may be used to dispose of a maximum average volume of ten barrels of brine a day per year.

2. A flow meter or other quantitative monitoring method shall be required if annular disposal is used.

3. No pressure, except that created by the force of gravity, shall be applied to brine disposed of into an annular space unless otherwise approved by the Chief.

4. The following information shall be posted in a conspicuous place on or near the storage tank (s) of any annular disposal operation; owner's name, lease name, well number, permit number, county, township, and emergency telephone number. In addition, the

permit number shall be displayed in a conspicuous place on or near the wellhead of any annular disposal well.

5. The entire injection system must be liquid tight from the storage container to the wellhead. A bradenhead may be used, or the casing at the surface orange-peeled and welded shut with a connection into the annulus. If venting is necessary, the well must be vented back to the brine storage container or a valve must be used that prevents the escape of liquids from the system.

6. Disposal of brine transported to the annular disposal well by any means other than pipeline, either on lease or across lease lines, shall be prohibited.

7. Under no circumstances shall liquids or waste matter from any source, other than brine or other waste substances resulting, obtained, or produced in connection with oil or gas drilling, exploration, or production on the same lease or, where authorized, on adjacent leases, be injected into any annular disposal well.

8. The owner shall notify the Chief in writing within fifteen days upon abandonment of annular disposal operations. When an annular disposal well becomes incapable of producing oil or gas, all annular disposal operations shall cease and the well shall be plugged and abandoned in accordance with Chapter 1509 of the Ohio Revised Code and any rules adopted thereunder.

9. The owner shall keep an accurate record of the volume of fluid injected and a copy of such record (Form 205) shall be furnished to the Chief upon request. Such owner shall file an annual report with the Chief, on or before the fifteenth of April, setting forth the total volume of fluid injected during the preceding calendar year.

10. A well completion record (Form 8) in accordance with Section 1509.10 of the Ohio Revised Code and Chapter 1501.9-3 of the Ohio Administrative Code shall be filed with the Division within thirty days after completion of any annular disposal well before final authorization is granted.

Failure to maintain compliance with the above requirements may be grounds for immediate revocation of the authorization to utilize annular disposal. Any questions concerning these conditions should be directed to the U.I.C. Section at (614) 265-6922

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PERMIT CONDITIONS
DEVONIAN SHALE/ORISKANY SANDSTONE WELLS
ASHTABULA AND LAKE COUNTIES

1. A 12 ¼ inch (or 10 inch if 7 inch casing is used) diameter surface hole shall be drilled on a fresh water mud system.

2. 180 feet of 8 5/8 inch (or 7 inch) diameter surface casing shall be set in the surface hole with 100 % excess cement to circulate to surface. The casing shall be mechanically centralized with a centralizer 50 feet from the top and base of the surface casing.

3. Borehole conditions must be static prior to circulating cement.

4. Division approved gas-blocking cement shall be allowed to set undisturbed until it reaches a compressive strength of 500 PSI prior to removal of the casing head.

5. A blowout preventor (BOP) in good working condition of sufficient size and working pressure rating to control normal hydrostatic pressure for deepest pool to be penetrated must be installed on the surface casing and tested under the supervision of an inspector prior to drilling below the surface casing. The blowout preventor must be capable of closing off the annulus between the surface casing and drill pipe, as well as closing off the surface casing when the drill pipe has been withdrawn from the hole.

6. A rotary airhead in good working condition must be installed and inspected prior to drilling below the surface casing.

7. A staked, steel discharge line must be vented not less than 80 feet from the well into a steel tank or an approved drilling pit. The discharge line shall be directed away from all inhabited structures. All natural gas encountered below surface casing base must be flared. A lit smudge shall be positioned and maintained below the surface-casing base.

8. A staked , steel bleed-off line with a minimum diameter of 2 inches must be vented at least 80 feet from the well to serve as a pressure bleed-off line or kill line if the blowout preventor is engaged. The bleed-off line shall be directed away from inhabited structures. If gas is vented through the bleed-off line, a lit smudge must be positioned in a manner which will flare all gas. If elbows must be used, they must be high-pressure elbows.

9. If the well is drilled to the Devonian Oriskany Sandstone/Bass Island Dolomite, 4 ½ inch casing shall be set in the production hole, and cement shall be circulated at least 50 feet above the top of the Big Lime.

10. All fluids must be removed from the tank or pits within one week after completion of drilling operations unless an extension is granted by the Division.

11. Cuttings must be treated or disposed in a manner approved by the Division.

PERMIT CONDITIONS FOR
DEVONIAN SHALE/ORISKANY SANDSTONE WELLS
IN ASHTABULA AND LAKE COUNTIES

1. A 12 ¼ inch (or 10 inch if 7 inch casing is used) diameter surface hole shall be drilled on a fresh water mud system.

2. 180 feet of 8 5/8 inch (or 7 inch) diameter surface casing shall be set in the surface hole with 100% excess cement to circulate to surface. The casing shall be mechanically centralized with a centralizer 50 feet from the top and base of the surface casing.

3. Borehole conditions must be static prior to circulating cement.

4. Division of Oil and Gas Resources Management approved gas-blocking cement shall be allowed to set undisturbed until it reaches a compressive strength of 500 PSI prior to removal of the casing head.

5. A blowout preventor (BOP) in good working condition of sufficient size and working pressure rating to control normal hydrostatic pressure for the deepest pool to be penetrated must be installed on the surface casing and tested under the supervision of an inspector prior to drilling below the surface casing. The BOP must be capable of closing off the annulus between the surface casing and drill pipe, as well as closing off the surface casing and drill pipe, as well as closing off the surface casing when the drill pipe has been withdrawn from the hole.

6. A rotary airhead in good working condition must be installed and inspected prior to drilling below the surface casing.

7. A staked, steel discharge line must be vented not less than 80 feet from the well into a steel tank or an approved drilling pit. The discharge line shall be directed away from all inhabited structures. All natural gas encountered below surface casing base must be flared. A lit smudge shall be positioned and maintained in a manner, which will flare, all gas encountered below the surface-casing base.

8. A staked, steel bleed-off line with a minimum diameter of 2 inches must be vented at least 80 feet from the well to serve as a pressure bleed-off line or kill line if the BOP is engaged. The bleed-off line shall be directed away from inhabited structures. If gas is vented through the bleed-off line, a lit smudge must be positioned in a manner, which will flare all gas. If elbows must be used, they must be high-pressure elbows.

9. If the well is drilled to the **Devonian Oriskany Sandstone/Bass Island Dolomite,** 4 ½ inch casing shall be set in the production hole, and cement shall be circulated at least 50 feet above the top of the Big Lime.

10. All fluids must be removed from the tank or pits within one week after completion of drilling operations unless an extension is granted by the Division of Mineral Resources Management.

11. Cuttings must be treated or disposed in a manner approved by the Division of Oil and Gas Resources Management.

11/20/98
06/10/99 Revised

THE OHIO DEPARTMENT OF NATURAL RESOURCES
THE DIVISION OF OIL AND GAS RESOURCES MANAGEMENT

DIRECTIONAL DRILLING PERMIT CONDITIONS

Within thirty (30) days of completion drilling, a copy of the bore hole deviation survey and a revised surveyor's plat showing the actual base of the target formation must be submitted to the Ohio Department of Natural Resources, The Division of Oil and Gas Resources Management, Oil & Gas Permitting Section, 2045 Morse Road, Building F-2, Columbus, Ohio 43229-6693.

Please Note: Effective August 9, 1993, an addition (L) to Rule 1501:9-1-02 now requires that the Revised surveyor's plat be accompanied by a **FIFTY-DOLLAR FEE.**

Permit Conditions for Horizontal Wells Drilled Near Known Faults or Areas of Seismic Activity

These conditions must be displayed with the permit in a conspicuous place at the well site in accordance with Section 1509.05 of the Ohio Revised Code.

A horizontal well drilled within three (3) miles of a known fault in the Pre-Cambrian basement or within three (3) miles of a location of a seismic event greater than 2.0 magnitude that has occurred since 1999 (as mapped by the Ohio Geological Survey) is subject to these conditions.

1. A seismic monitoring plan must be developed to include the type, number and placement of the monitors that will provide an accurate depth and location of any seismic event that may be detected during hydraulic fracturing operations. Prior to commencement of hydraulic fracturing operations, the plan must be submitted to and approved by the Division of Oil & Gas Resources Management.

2. Seismic monitors must be installed at least two (2) weeks prior to the commencement of hydraulic fracturing operations. Continuous monitoring should be conducted for at least one week prior to hydraulic fracturing. Upon installation of monitors and commencement of monitoring, notify the Division at (614) 265-6922 during normal business hours.

3. Monitors must be set-up for real-time monitoring and analysis. Monitoring and analysis may be done by the Division's Earthworm system or through an independent seismic contractor.

4. If these monitors detect a seismic event greater than 1.0 magnitude, the Division must be immediately notified at (614)265-6922 during normal business hours or (614)799-3581 after hours and on weekends or holidays. When reporting a seismic event, the pad name, well number and permit number of the well being stimulated should be provided. All completion activity shall cease while the cause is investigated.

5. If the investigation indicates a probable connection to the hydraulic fracturing process, all well completion operations will be indefinitely suspended on the well pad.

6. If no seismic event greater than 1.0 magnitude was detected, the monitors can be removed once all hydraulic fracturing operations are completed. If a seismic event greater than 1.0 magnitude was detected, the Division will determine when the monitors can be removed.

The Ohio Department of Natural Resources
The Division of Oil and Gas Resources Management
2045 Morse Road, Building F-2
Columbus, Ohio 43229-6693

HORIZONTAL DRILLING PERMIT CONDITIONS

Within sixty (60) days of completion of drilling operations, the following items **must** be submitted to the Division of Oil and Gas Resources Management:

- A copy of the bore hole deviation survey
- A revised surveyor's plat showing:
    1. Surface Location;
    2. Actual location of the first perforation;
    3. Actual location of the last perforation;
    4. Actual ending point of the bore hole in the target formation;
    5. X, Y coordinates of the above four points.
- A fifty-dollar ($ 50.00) fee for the revised surveyor's plat.

Revised September 7, 2012

November 14, 1988
Revised: November 19, 2007
Revised: August 4, 2011
Revised: September 11, 2014

THESE STIPULATIONS MUST BE DISPLAYED WITH THE PERMIT IN A CONSPICUOUS PLACE AT THE WELL SITE IN ACCORDANCE WITH SECTION 1509.05 OF THE OHIO REVISED CODE.

HYDROGEN SULFIDE GAS PERMIT CONDITIONS

ALERT:
Hydrogen sulfide gas has been encountered in the "Big Lime" section in this township. Hydrogen sulfide can cause corrosion of the casing and tubing strings, deterioration of the surface equipment, contamination of fresh water resources and is a potential hazard to the health and safety of drilling crew workers, service company personnel, Division staff, and the local public. **Pursuant to 1509.17 of the Revised Code, the following permit conditions must be followed while drilling this well.**

1. If a sustained flow of hydrogen sulfide gas greater than 10 ppm is encountered in the "Big Lime" section and the well is being drilled on air, the rig shall convert to fluid drilling and shall remain on fluid until total depth or until the hydrogen sulfide zone is cemented.

2. Once set, the casing shall be cemented with a sufficient volume of SULFATE RESISTANT cement so as to provide a continuous sheath of cement to the top of the "Big Lime" section.

3. If the specific gas bearing zone can be identified it is only necessary to cement across the identified zone. A minimum of one hundred (100) feet of SULFATE RESISTANT cement shall be placed across the hydrogen sulfide bearing zone.

4. The Division's field inspector must be notified at least 12 hours prior to cementing this string of casing.

LAKE & ASHTABULA COUNTIES-NORTH OF ROUTE 90
PERMIT CONDITIONS FOR FLUID ROTARY RIGS
(Devonian Shale Wells)

THESE STIPULATIONS MUST BE DISPLAYED WITH THE PERMIT IN A CONSPICUOUS PLACE AT THE WELL SITE IN ACCORDANCE WITH SECTION 1509.05 O.R.C.

1. All fluids produced during drilling operations must be contained in steel tanks or in liquid tight pits constructed in a manner approved by the Division, if the production hole is drilled with a salt water mud system.

2. A 12 ¼" diameter surface hole shall be drilled on a fresh water mud system.

3. 200 feet of 8 5/8" diameter surface casing shall be set in the surface hole with 100 % excess cement circulated to surface. The casing shall be mechanically centralized with a centralizer 50 feet from the top and base of the surface casing.

4. Division approved gas-blocking cement shall be allowed to set undisturbed for a minimum of eight hours or until it reaches a compressive strength of 500 psi, whichever is greater, prior to removal of the casing head. The wait-on-cement time shall be established by the Division based on engineering data for the type of cement used at 60 deg. F.

5. A blowout preventer in good working condition of sufficient size and working pressure rating to control normal hydrostatic pressure for the deepest pool to be penetrated must be installed on the surface casing and tested under the supervision of an inspector prior to drilling below the surface casing. The blowout preventer must be capable of closing off the annulus between the surface casing and drill pipe, as well as closing off the surface casing when the drill pipe has been withdrawn from the hole. The blowout preventer shall be chained to the rig substructure in a manner which minimizes jarring of the surface casing.

6. A rotary airhead in good working condition must be installed and inspected prior to drilling below the surface casing.

7. A staked, steel discharge line must be vented not less than 80 feet from the well into a steel tank or an approved drilling pit. The discharge line shall be directed away from all inhabited structures. All natural gas encountered below surface casing base must be flared. A lit smudge shall be positioned and maintained in a manner which will flare all gas encountered below the surface casing base.

8. A staked, steel bleed-off line with a minimum diameter of 2 inches must be vented at least 80 feet from the well to serve as a pressure bleed-off line or kill line if the blowout preventer is engaged. The bleed-off line shall be directed away from all inhabited structures. If gas is vented through the bleed-off line, a lit smudge must be positioned

in a manner which will flare all gas. If elbows must be used, they must be high pressure elbows.

9. The Division shall be promptly notified if Devonian shale gas is encountered and flared.

10. If the production hole is drilled with a salt water mud system, all fluids must be removed from the tank or drilling pit within one week after completion of drilling operations unless an extension is granted by the Division.

I. LAKE PLAIN REGION
PERMIT CONDITIONS FOR AIR/FLUID ROTARY RIGS
(ORISKANY OR DEEPER WELLS)

THESE STIPULATIONS MUST BE DISPLAYED WITH THE PERMIT IN A CONSPICUOUS PLACE AT THE WELL SITE IN ACCORDANCE WITH SECTION 1509.05 THE OHIO REVISED CODE

1. All fluids produced during drilling operations must be contained in steel tanks or in liquid tight pits constructed in a manner approved by the Division of Oil and Gas Resources Management.

2. An oil and gas well inspector shall be notified at least 24 hours prior to pit construction and installation of the liner to allow inspection.

3. All drilling pits shall be prepared with an approved soil sealant in a manner approved by the Division of Oil and Gas Resources Management. Soil sealant shall be evenly applied to the soil at a minimum rate of two pounds per square foot. Soil sealant shall be mixed with the soil to a minimum depth of four inches, compacted and wetted prior to liner installation. Alternate methods for soil sealant application must be approved by the Division prior to liner installation.

4. All drilling pits shall be lined with one piece or factory seamed liner that meets or exceed the following standards:

Tensile Strength/Elongation

Non-reinforced Liners	ASTM D 882-83	1550 PSI 300%
Reinforced Liners	ASTM D 882-83	1500 PSI 10%
Puncture Resistance	ASTM 2582-67	40 lbs. Force
Hydrostatic Resistance	ASTM D 751A-31 Or FTMS 191-5512	50 lbs.
Seam Strength	Meet or exceed parent material properties for factory seams and 80% for field seams For the aforementioned standards.	

5. The liner apron shall be secured around the berm in a manner which will prevent slumping of the liner below the fluid level prior to restoration.

6. At no time shall brine be allowed to rise above the base of any unrepaired tears, damaged or slumped portions of the liner.

7. Fluid level in the pit shall not exceed eighteen inches below the lowest level of the embankment.

8. Pits may not be used for storage or disposal of no-exempt wastes as defined by U.S. EPA's regulatory determination (53 FR 25453-25454).

9. 200 feet of 8 5/8 " diameter surface casing shall be set in the surface hole with 100% excess cement circulated to surface. The casing shall be mechanically centralized with a centralizer 50 feet from the top and base of the surface casing.

10. Borehole conditions must be static prior to circulating cement.

11. Cement shall be allowed to set undisturbed until it reaches a compressive strength of 500 PSI, prior to removal of the casing head.

12. A blowout preventor in good working condition of sufficient size and working pressure rating to control normal hydrostatic pressure for the deepest pool to be penetrated must be installed on the surface casing and tested under the supervision of an inspector prior to drilling below the surface casing. The blowout preventor must be capable of closing off the annulus between the surface casing and drill pipe, as well as closing off the surface casing when the drill pipe has been withdrawn from the hole. The blowout preventor shall be chained to the rig substructure in manner which minimizes jarring of the surface casing.

13. A rotary airhead in good working condition must be installed and inspected prior to drilling below the surface casing.

14. A staked, steel discharge line must be vented not less than 80 feet from the well into a steel tank or an approved drilling pit. The discharge line shall be directed away from all inhabited structures. All natural gas encountered below surface casing base must be flared. A lit smudge shall be positioned and maintained in a manner which will flare all gas encountered below the surface-casing base.

15. The discharge line must be set up in a manner which will prevent damage to the pit liner by expelled cuttings.

16. A staked, steel bleed-off line with a minimum diameter of 2 inches must be vented at least 80 feet from the well to serve as a pressure bleed-off line or kill line if the blowout preventor is engaged. The bleed-off line shall be directed away from all inhabited structures. If gas is vented through the bleed-off line, a lit smudge must be positioned in a manner, which will flare all gas. If elbows must be used, they must be high-pressure elbows.

17. Prior to drilling below surface casing base, a protective soil cover at least, 12 inches thick shall be emplaced over the liner in a manner, which will protect the liner from flame damage. The soil cover must be maintained above fluid level in the pit throughout the drilling operation.

18. If the liner is damaged, the Division may require replacement of the liner.

19. The Division shall be promptly notified if Devonian shale or Oriskany gas is encountered and flared.

20. If gas is encountered in the Oriskany, the production string shall be cemented at least 200 feet above the Oriskany.

21. In the event that a major flare is sustained, the Division may require that the drilling operations cease or may require that the drilling operation be converted to fluid procedures.

22. In the event that excessive volumes of brine are encountered, the brine must be hauled away and properly disposed of or the drilling operation must convert to fluid procedures.

23. All frac returns must be contained in steel tanks.

24. Annular disposal of brine is not permitted.

25. All fluids must be removed from the tank or drilling pit within one week after completion of drilling operations unless an extension is granted by the Division.

26. Pits must be restored within one month after completion of drilling operations unless an extension is granted by the Division. Brine saturated cuttings shall be disposed of in one of two ways:

    a. Cuttings may be solidified with cement fines and encapsulated in plastic lined lateral trenches or pits on site, or

    b. Cuttings may be solidified and removed to an approved landfill in accordance with Ohio EPA regulations and guidelines

27. Upon completion of drilling operations, a fitting must be installed which allows gauging of the annular shale gas pressure. A ¼ inch, female, threaded fitting with a stop valve must be installed in a manner which is accessible at the surface.

5/97; Revised1/01

PERMIT CONDITIONS
OIL AND GAS WELLS DRILLED IN THE LAKE PLAIN REGION
(WELLS DRILLED TO THE UTICA OR DEEPER)

NOTIFICATION

1. The owner shall notify the Division of Oil and Gas Resources Management, local inspector, Jerry Kohl, at (614) 205-6351 or the Northern Region office at (330) 896-0616, if the inspector is not available, at least 24 hours prior to all equipment and pit or tank installation.

SITE PREPARATION

1. The rat and/or mouse hole should be liquid-tight and constructed of steel pipe with a welded basal plate or bull plug. The annulus should be sealed with bentonite to prevent backside loss of brine or drilling fluids.

2. Pits should not be excavated into the water table. Steel tanks must be used in lieu of pits if a high water table renders construction of an adequate size reserve pit impractical. If steel tanks are used, they must be underlain by a plastic apron to capture any fluids that are not contained by the tank.

3. The bottom and sides of all pits shall be graded and free of objects, which could perforate the liner. If it is impractical to remove all objects, which could puncture a liner, the base of the pit should be padded with straw, sand, clay geotextile fabric, or other material capable of preventing damage to the liner. Sidewalls should be covered with a cellotex, or other similar material, to preserve liner integrity.

4. If the location has sufficient size, pit side slopes should be at least twenty degrees out of vertical to prevent slumping of sidewalls.

5. If permeable sand and gravel deposits are encountered during excavation of a pit, the owner shall spray-apply bentonite slurry to the pit base and sidewalls prior to emplacing the synthetic liner.

PIT LINER INSTALLATION

1. All drilling and/or reserve pits should be line with a **single piece liner** that meets or exceeds the following standards:

Tensile strength/Elongation

Non-Reinforced Liners	ASTM D-882-83	1550 PSI 300 %
Reinforced Liners	ASTM D-882-83	1500 PSI 10 %
Puncture Resistance	ASTM 2582-67	40 lbs. Force
Hydrostatic Resistance Or	ASTM D-751-A-31 FTMS 191-5512	50 lbs.
Seam Strength properties for	Meet or exceed parent material Factory seams and 80 % for field seams for the Aforementioned standards	

2. The liner apron shall be secured around the berm in a manner, which will prevent slumping of the liner below fluid level prior to restoration.

3. The liner shall be installed with sufficient slack to prevent tearing of the liner when the pit is filled with cuttings and fluid.

PIT OPERATIONS

1. If drilling by rotary tools using air, a rotary airhead in good working condition should be installed and maintained to prevent the spray of brine onto the ground surface.

2. The discharge line shall be set up in a manner, which will prevent damage to the pit liner, by expelled cuttings. Ideally, the reserve pit should be constructed parallel to the discharge line and cuttings should be submerged.

3. A staked, steel discharge line must be vented not less than 80 feet from the well into a steel tank or an approved reserve pit. The discharge line shall be directed away from all inhabited structures. All natural gas encountered below the surface and intermediate casings must be flared. A lit smudge shall be positioned and maintained in a manner, which will flare, all gas encountered below the surface and intermediate casings.
4. If the liner is damaged, at no time should fluid be allowed to rise above a tear which would allow the escape of brine or oilfield waste.

5. If a natural gas flare is anticipated, it is recommended that the sloped areas of the reserve pit, where the liner is susceptible to flame damage, be protected with dirt at least twelve inches thick.

6. If the liner is damaged or destroyed by a natural gas flare, all free standing fluids should be immediately pumped into storage tanks and/or transported to a permitted Class II brine disposal well in accordance with the brine disposal plan.

7. Frac returns should be contained in steel tanks to prevent damage to liners by high-velocity fluid impact.

CASING

1. The surface hole shall be drilled on a freshwater mud system.

2. 11-3/4 inch diameter surface casing in new condition shall be set approximately 200 feet into the Ohio Shale and cemented to surface with at least 50 percent excess; Division approved gas-blocking cement circulated to surface.

3. 8-5/8 inch diameter intermediate casing in new condition shall be set at approximately 850 feet deep. Mechanical Centralizers shall be set 250 feet below and 50 feet from the base of the intermediate casing. Division approved gas-blocking cement circulated to surface with at least 50 percent excess.

4. An inspector must be present during setting and cementing of the surface and intermediate casings. A cement, approved by the Division, shall be used to seal the surface and intermediate casings in accordance with the following procedures:

a. No cement baskets shall be used;

b. Cement shall be circulated to surface by the pump and plug method;

c. Cement shall be circulated prior to dropping the top plug shall range within five percent, plus or minus, of the " American Petroleum Institute" optimum density standard for the type of cement used. The cement shall be circulated out of the hole if this is not achieved;

d. The record of all cement and mix water additives and percentages by weight of mix water shall be included on the cement ticket.

e. A copy of the cement ticket shall be applied to the appropriate Division inspector.

f. The cement head shall be shut-in at equilibrium until the cement reaches a compressive strength of five hundred pounds per square inch (PSI). The Division shall approve the wait-on-cement time.

g. If cement fails to circulate or drops, the owner shall grout out the backside of the casing by pumping cement down the annulus or pumping cement through a spaghetti string. Cement shall provide a continuous seal from the casing seat to the surface.

NATURAL GAS CONTROL

1. A staked, steel bleed-off line with a minimum diameter of 2 inches must be vented at least 80 feet from the well to serve as a pressure bleed-off line or kill line if the blowout preventor is engaged. The bleed-off line shall be directed away from all inhabited structures. If gas is vented through the bleed-off line, a lit smudge must be positioned in a manner, which will flare all gas. If elbows must be used, they must be high-pressure elbows.

2. A blowout preventor (BOP) is required. The BOP test shall be conducted in accordance with guidelines established by the Division and witnessed by an inspector before drilling resumes below the surface casing. The Division of Oil and Gas Resources Management's local inspector, shall be notified at least 8 hours prior to the BOP test. The BOP must hold at least 500 PSI with less than 5 percent loss of pressure during a 15-minute test.

SPCC

1. The drilling rig shall operate in compliance with Federal SPCC regulations (40 CFR 112.7)

WASTE DISPOSAL REQUIREMENTS

1. Only cuttings, drilling fluids, native soils, cementing materials and/or approved pit solidification materials may be placed in reserve pit (s).

Non-exempt, exploration and completion wastes, as defined by U.S. EPA's regulatory determination (53 FR 25453-25454) should be segregated from exempt wastes. Non-exempt wastes include, but are not limited to:

- Unused fracturing fluids or acids
- Painting wastes
- spent solvents
- used or unused oil lubrication oils
- used or unused hydraulic fluids

All non-exempt wastes shall be disposed in accordance with Ohio EPA regulations and guidelines.

2. All free liquids above the solids in the reserve pit (s) shall be removed to the maximum extent practical and disposed at a permitted Class II brine disposal well within 7 days after completion of drilling operations.

3. The operator will contain all frac fluids in steel tanks and haul them to an approved disposal site no later than 7 days after treatment.

Permit Conditions
Oil and Gas Wells Drilled in a
Municipal Wellhead Protection Area

Notification

1. The owner shall notify the Division of Oil and Gas Resources Management's local inspector, **Robert Roush**, at **(330) 690-8837** or the Regional Office at **(330) 896-0616**, if the inspector is not available, at least **24** hours prior to all equipment and pit or tank installation.

2. The owner shall notify the municipal water well field officials at least **24** hours prior to commencement of drilling operations.

Site Preparation

1. The rat and/or mouse hole should be liquid-tight and constructed of steel pipe with a welded basal plate or bull plug. The annulus should be sealed with bentonite to prevent backside loss of brine or drilling fluids.

2. The cellar shall be lined in a manner that collects and channels all fluids that accumulate beneath the rig substructure to the reserve pit.

3. A continuous spill prevention apron should extend from the cellar, beneath the discharge line to reserve pit. The lined trough should have sufficient slope to enable all overflow from the cellar to drain into the reserve pit.

Pit Construction

1. An inspector must be present to witness excavation and construction of all pits.

2. Pits shall not be excavated into the water table. Steel tanks must be used in lieu of pits if a high water table renders construction of an adequate size drilling pit impractical. If steel tanks are used, they must be underlain by a plastic apron to contain any fluids that are not contained by the tank.

3. The bottom and sides of all pits shall be graded and free of objects, which could perforate the liner. If it is impractical to remove all objects, which could puncture a liner, the base of the pit should be padded with straw, sand, clay, geotextile fabric or other material capable of preventing damage to the liner. Side walls should be covered with a cellotex or other similar material, to preserve liner integrity.

4. If the location has sufficient size, pit side slopes should be at least twenty degrees out of vertical slumping of side walls.

5. The owner shall spray-apply bentonite slurry to the pit base and sidewalls prior to emplacing the synthetic liner.

Pit Liner Installation

1. All drilling and/or reserve pits should be lined with a **single piece liner** that meets or exceeds the following standards:

Tensile strength/Elongation

Non-reinforced Liners		ASTM D 882-83	1550 PSI 300%
Reinforced Liners		ASTM D 882-83	1500 PSI 10%
Puncture Resistance		ASTM 2582-67	40 lbs. Force
Hydrostatic Resistance		ASTM D 751-A-31	50 lbs.
	or	FTMS 191-5512	
Seam Strength		Meet or exceed parent material properties for factory seams and 80 % for field seams for the aforementioned standards	

2. The liner apron shall be secured around the berm in a manner, which will prevent slumping of the liner below fluid level prior to restoration.

3. The liner shall be installed with sufficient slack to prevent tearing of the liner when the pit is filled with cuttings and fluid.

Pit Operations

1. If drilling by rotary tools using air, a rotary airhead in good working condition should be installed and maintained to prevent the spray of brine onto the ground surface.

2. The discharge line shall be set up in a manner, which will prevent damage to the pit liner, by expelled cuttings. Ideally, the reserve pit should be constructed parallel to the discharge line and cuttings should be submerged.

3. If the liner is damaged, at no time should fluid be allowed to rise above a tear, which would allow the escape of brine or oilfield waste. Tears in the liner should be documented and immediately repaired.

4. If a natural gas flare is anticipated, it is recommended that sloped areas of the pit, where the liner is susceptible to flame damage, be protected with dirt at least twelve inches thick.

5. If the liner is damaged or destroyed by a natural gas flare, all free standing fluids should be immediately pumped into storage tanks and/or transported to a permitted Class II brine disposal well in accordance with the brine disposal plan.

6. Frac returns should be contained in steel tanks to prevent damage to liners by high velocity fluid impact.

Casing

1. The conductor and surface hole will be drilled on a freshwater mud system.

2. 20 inch diameter conductor pipe in new condition shall be set approximately **100** feet in depth through **Glacial Drift** and cemented to surface with at least 50 percent excess cement circulated to the surface.

3. 13-3/8 inch diameter surface casing, in new condition with at least three casing centralizers shall be set at **a minimum of 50 feet** below the base of the **Big Injun,** with at least 50 percent excess cement circulated to surface.

4. An inspector must be present during setting and cementing of the conductor and surface strings. A Class A cement with gel, approved by the Division, shall be used to seal the conductor and surface casings in accordance with the following procedures:

    a. No cement baskets shall be used;

    b. Cement shall be circulated to surface by the pump and plug method;

    c. The density of the cement circulated prior to dropping the top plug shall range within five percent, plus or minus, of the "American Petroleum Institute" optimum density standard for the type of cement used. The cement shall be circulated out of hole if this is not achieved;

    d. The record of all cement and mix water additives and percentages by weight of mix water shall be included on the cement ticket. Material Safety Data Sheets shall also be provided for all cement and mix water additives. A manufacturers or contractors certification shall be provided verifying that the cement provided by the manufacturer/supplier was the cement requested.

    e. A copy of the cement ticket shall be supplied to the appropriate Division Inspector;

    f. The cement head shall be shut-in at equilibrium until the cement reaches a compressive strength of five hundred pounds per square inch (psi). The Division shall approve the wait-on-cement time.

    g. If cement fails to circulate or drops, the owner shall grout the backside of the casing by pumping cement down the annulus or pumping cement through a spaghetti string. Cement shall provide a continuous seal from the casing seat to the surface.

5. Prior to well stimulation, demonstration (e.g., inspector witnessed, job log or cement bond log) that the production casing is adequately cemented to assure that the hydraulic fracture is contained in the producing zone.

SPCC

1. The drilling rig shall operate in compliance with Federal SPCC regulations (40 CFR 112.7)

Waste Disposal Requirements

1. The operator shall document the volume, chemical composition and function of all materials used during the drilling and well completion process including, but not limited to, drilling muds, additives, fuel, lubricants, and well stimulation fluids. The operator shall provide the Division of Oil and Gas Resources Management with copies of all Material Safety Data Sheets and volume and/or weight records for all materials as they are used at the drilling site.

2. Only cuttings, drilling fluids, native soils, cementing materials and/or approved pit solidification materials may be placed in reserve pit (s).

   Non-exempt, exploration and completion wastes, as defined by U.S. EPA's regulatory determination (53 FR 25453-25454) should be segregated from exempt wastes. Non-exempt wastes include, but are not limited to:

   - Unused fracturing fluids or acids
   - Painting wastes
   - Spent solvents
   - Used or unused lubrication oils
   - Used or unused hydraulic fluids

   All non-exempt wastes shall be disposed in accordance with Ohio EPA regulations and guidelines.

3. No annular disposal is allowed.

4. All free liquids above the solids in the reserve pit (s) shall be removed to the maximum extent practical and disposed at a permitted Class II brine disposal well within **7** days after completion of drilling operations.

5. The operator will contain all frac fluids in steel tanks and haul them to an approved disposal site no later than **7** days after treatment.

6. Muds and cuttings shall be solidified and encapsulated above the annual high water table level, disposed by another method approved by the Division of Oil and Gas Resources Management.

Permit Conditions
Oil and Gas Wells Drilled in a
Municipal Wellhead Protection Area/Source Water Protection Area
(Wells Drilled below the Queenston Shale)

Notification

1. The owner shall notify the Division of Oil and Gas Resources Management's local inspector at _____or the Regional Office at _____, if the inspector is not available, at least **24** hours prior to all equipment and pit or tank installation.

2. The owner shall notify the municipal water well field officials at least **24** hours prior to commencement of drilling operations.

Site Preparation

1. The rat and/or mouse hole should be liquid-tight and constructed of steel pipe with a welded basal plate or bull plug. The annulus should be sealed with bentonite to prevent backside loss of brine or drilling fluids.

2. The cellar shall be lined in a manner that collects and channels all fluids that accumulate beneath the rig substructure to the reserve pit.

3. A continuous spill prevention apron should extend from the cellar, beneath the discharge line to reserve pit. The lined trough should have sufficient slope to enable all overflow from the cellar to drain into the reserve pit.

Pit Construction

1. An inspector must be present to witness excavation and construction of all pits.

2. Pits shall not be excavated into the water table. Steel tanks must be used in lieu of pits if a high water table renders construction of an adequate size drilling pit impractical. If steel tanks are used, they must be underlain by a plastic apron to contain all fluids that are not contained by the tank.

3. The bottom and sides of all pits shall be graded and free of objects, which could perforate the liner. If it is impractical to remove all objects, which could puncture a liner, the base of the pit should be padded with straw, sand, clay, geotextile fabric or other material capable of preventing damage to the liner. Side walls should be covered with a cellotex or other similar material, to preserve liner integrity.

4. If the location has sufficient size, pit side slopes should be at least twenty degrees out of vertical slumping of side walls.

5. The owner shall spray-apply bentonite slurry to the pit base and sidewalls prior to emplacing the synthetic liner.

Pit Liner Installation

1. All drilling and/or reserve pits should be lined with a **single piece liner** that meets or exceeds the following standards:

Tensile strength/Elongation

Non-reinforced Liners	ASTM D 882-83	1550 PSI 300%
Reinforced Liners	ASTM D 882-83	1500 PSI 10%
Puncture Resistance	ASTM 2582-67	40 lbs. Force
Hydrostatic Resistance	ASTM D 751-A-31 Or FTMS 191-5512	50 lbs.
Seam Strength	Meet or exceed parent material Properties for factory seams And 80 % for field seams for the Aforementioned standards	

2. The liner apron shall be secured around the berm in a manner, which will prevent slumping of the liner below fluid level prior to restoration.

3. The liner shall be installed with sufficient slack to prevent tearing of the liner when the pit is filled with cuttings and fluid.

Pit Operations

1. If drilling by rotary tools using air, a rotary airhead in good working condition should be installed and maintained to prevent the spray of brine onto the ground surface.

2. The discharge line shall be set up in a manner, which will prevent damage to the pit liner, by expelled cuttings. Ideally, the reserve pit should be constructed parallel to the discharge line and cuttings should be submerged.

3. If the liner is damaged, at no time should fluid be allowed to rise above a tear, which would allow the escape of brine or oilfield waste. Tears in the liner should be documented and immediately repaired.

4. If a natural gas flare is anticipated, it is recommended that sloped areas of the pit, where the liner is susceptible to flame damage, be protected with dirt at least twelve inches thick.

5. If the liner is damaged or destroyed by a natural gas flare, all free standing fluids should be immediately pumped into storage tanks and/or transported to a permitted Class II brine disposal well in accordance with the brine disposal plan.

6. Frac returns should be contained in steel tanks to prevent damage to liners by high velocity fluid impact.

Casing

1. The conductor and surface hole will be drilled on a freshwater mud system.

2. 11-3/4 inch diameter conductor pipe in new condition shall be set approximately ____ feet in depth through **Glacial Drift** and cemented to surface with at least 50 percent excess cement circulated to the surface.

3. 8-5/8 inch diameter surface casing, in new condition with at least three casing centralizers shall be set at **a minimum of feet**, below the _____ with a least 50 percent excess cement circulated to surface.

4. An inspector must be present during setting and cementing of the conductor and surface strings. A Class A cement with gel, approved by the Division, shall be used to seal the conductor and surface casings in accordance with the following procedures:

   a. No cement baskets shall be used;

   b. Cement shall be circulated to surface by the pump and plug method;

   c. The density of the cement circulated prior to dropping the top plug shall range within five percent, plus or minus, of the "American Petroleum Institute" optimum density standard for the type of cement used. The cement shall be circulated out of hole if this is not achieved;

   d. The record of all cement and mix water additives and percentages by weight of mix water shall be included on the cement ticket. Material Safety Data Sheets shall also be provided for all cement and mix water additives. A manufacturers or contractors certification shall be provided verifying that the cement provided by the manufacturer/supplier was the cement requested.

   e. A copy of the cement ticket shall be supplied to the appropriate Division Inspector;

   f. The cement head shall be shut-in at equilibrium until the cement reaches a compressive strength of five hundred (500) pounds per square inch (psi). The Division shall approve the wait-on-cement time.

   g. If cement fails to circulate or drops, the owner shall grout the backside of the casing by pumping cement down the annulus or pumping cement through a spaghetti string. Cement shall provide a continuous seal from the casing seat to the surface.

5. Prior to well stimulation, demonstration (e.g., inspector witnessed, job log or cement bond log) that the production casing is adequately cemented to assure that the hydraulic fracture is contained in the producing zone.

Blow-out Preventor

1. A blow-out preventor (BOP) is required. The BOP test shall be conducted in accordance with guidelines established by the Division of Mineral Resources Management and witnessed by an inspector before drilling resumes below the surface casing. The Division of Oil and Gas Resources Management, the local inspector and/or his immediate supervisor shall be notified at least 24 hours prior to the BOP test. The BOP must hold at least 500 psi with less than 5 percent loss of pressure during a 15-minute test.

SPCC

1. The drilling rig shall operate in compliance with Federal SPCC regulations (40 CFR 112.7)

Waste Disposal Requirements

1. The operator shall document the volume, chemical composition and function of all materials used during the drilling and well completion process including, but not limited to, drilling muds, additives, fuel, lubricants, and well stimulation fluids. The operator shall provide the Division of Oil and Gas Resources Management with copies of all Material Safety Data Sheets and volume and/or weight records for all materials as they are used at the drilling site.

2. Only cuttings, drilling fluids, native soils, cementing materials and/or approved pit solidification materials may be placed in reserve pit (s).

   Non-exempt, exploration and completion wastes, as defined by U.S. EPA's regulatory determination (53 FR 25453-25454) should be segregated from exempt wastes. Non-exempt wastes include, but are not limited to:

   - Unused fracturing fluids or acids
   - Painting wastes
   - Spent solvents
   - Used or unused lubrication oils
   - Used or unused hydraulic fluids

   All non-exempt wastes shall be disposed in accordance with Ohio EPA regulations and guidelines.

3. No annular disposal is allowed.

4. All free liquids above the solids in the reserve pit (s) shall be removed to the maximum extent practical and disposed at a permitted Class II brine disposal well within 7 days after completion of drilling operations.

5. The operator will contain all frac fluids in steel tanks and haul them to an approved disposal site no later than 7 days after treatment.

6. Muds and cuttings shall be solidified and encapsulated above the annual high water table level, disposed by another method approved by the Division of Oil and Gas Resources Management.

SPCC

1. The drilling rig shall operate in compliance with Federal SPCC regulations (40 CFR 112.7)

Waste Disposal Requirements

1. The operator shall document the volume, chemical composition and function of all materials used during the drilling and well completion process including, but not limited to, drilling muds, additives, fuel, lubricants, and well stimulation fluids. The operator shall provide the Division of Oil and Gas Resources Management with copies of all Material Safety Data Sheets and volume and/or weight records for all materials as they are used at the drilling site.

2. Only cuttings, drilling fluids, native soils, cementing materials and/or approved pit solidification materials may be placed in reserve pit (s).

   Non-exempt, exploration and completion wastes, as defined by U.S. EPA's regulatory determination (53 FR 25453-25454) should be segregated from exempt wastes. Non-exempt wastes include, but are not limited to:

   - Unused fracturing fluids or acids
   - Painting wastes
   - Spent solvents
   - Used or unused lubrication oils
   - Used or unused hydraulic fluids

   All non-exempt wastes shall be disposed in accordance with Ohio EPA Regulations and guidelines.

3. No annular disposal is allowed.

4. All free liquids above the solids in the reserve pit (s) shall be removed to the maximum extent practical and disposed at a permitted Class II brine disposal well within 7 days after completion of drilling operations.

5. The operator will contain all frac fluids in steel tanks and haul them to an approved disposal site no later than 7 days after treatment.

6. Muds and cuttings shall be solidified and encapsulated above the annual high water table level, disposed by another method approved by the Division of Oil and Gas Resources Management.

Permit Conditions
Oil and Gas Wells Drilled in a
Municipal Wellhead Protection Area
(Wells Drilled no deeper than the Clinton Sandstone)

Notification

1. The owner shall notify the Division of Oil and Gas Resources Management's local inspector, **Robert Roush**, at **(330) 690-8837** or the Regional Office at **(330) 896-0616**, if the inspector is not available, at least **24** hours prior to all equipment and pit or tank installation.

2. The owner shall notify the municipal water well field officials at least **24** hours prior to commencement of drilling operations.

Site Preparation

1. The rat and/or mouse hole should be liquid-tight and constructed of steel pipe with a welded basal plate or bull plug. The annulus should be sealed with bentonite to prevent backside loss of brine or drilling fluids.

2. The cellar shall be lined in a manner that collects and channels all fluids that accumulate beneath the rig substructure to the reserve pit.

3. A continuous spill prevention apron should extend from the cellar, beneath the discharge line to reserve pit. The lined trough should have sufficient slope to enable all overflow from the cellar to drain into the reserve pit.

Pit Construction

1. An inspector must be present to witness excavation and construction of all pits.

2. Pits shall not be excavated into the water table. Steel tanks must be used in lieu of pits if a high water table renders construction of an adequate size drilling pit impractical. If steel tanks are used, they must be underlain by a plastic apron to contain any fluids that are not contained by the tank.

3. The bottom and sides of all pits shall be graded and free of objects, which could perforate the liner. If it is impractical to remove all objects, which could puncture a liner, the base of the pit should be padded with straw, sand, clay, geotextile fabric or other material capable of preventing damage to the liner. Side walls should be covered with a cellotex or other similar material, to preserve liner integrity.

4. If the location has sufficient size, pit side slopes should be at least twenty degrees out of vertical slumping of side walls.

5. The owner shall spray-apply bentonite slurry to the pit base and sidewalls prior to emplacing the synthetic liner.

Pit Liner Installation

1. All drilling and/or reserve pits should be lined with a **single piece liner** that meets or exceeds the following standards:

Tensile strength/Elongation

Non-reinforced Liners		ASTM D 882-83	1550 PSI 300%
Reinforced Liners		ASTM D 882-83	1500 PSI 10%
Puncture Resistance		ASTM 2582-67	40 lbs. Force
Hydrostatic Resistance		ASTM D 751-A-31	50 lbs.
	or	FTMS 191-5512	
Seam Strength		Meet or exceed parent material properties for factory seams and 80 % for field seams for the aforementioned standards	

2. The liner apron shall be secured around the berm in a manner, which will prevent slumping of the liner below fluid level prior to restoration.

3. The liner shall be installed with sufficient slack to prevent tearing of the liner when the pit is filled with cuttings and fluid.

Pit Operations

1. If drilling by rotary tools using air, a rotary airhead in good working condition should be installed and maintained to prevent the spray of brine onto the ground surface.

2. The discharge line shall be set up in a manner, which will prevent damage to the pit liner, by expelled cuttings. Ideally, the reserve pit should be constructed parallel to the discharge line and cuttings should be submerged.

3. If the liner is damaged, at no time should fluid be allowed to rise above a tear, which would allow the escape of brine or oilfield waste. Tears in the liner should be documented and immediately repaired.

4. If a natural gas flare is anticipated, it is recommended that sloped areas of the pit, where the liner is susceptible to flame damage, be protected with dirt at least twelve inches thick.

5. If the liner is damaged or destroyed by a natural gas flare, all free standing fluids should be immediately pumped into storage tanks and/or transported to a permitted Class II brine disposal well in accordance with the brine disposal plan.

6. Frac returns should be contained in steel tanks to prevent damage to liners by high velocity fluid impact.

Casing

1. The conductor and surface hole will be drilled on a freshwater mud system.

2. 20 inch diameter conductor pipe in new condition shall be set approximately **100** feet in depth through **Glacial Drift** and cemented to surface with at least 50 percent excess cement circulated to the surface.

3. 13-3/8 inch diameter surface casing, in new condition with at least three casing centralizers shall be set at **a minimum of 50 feet** below the base of the **Big Injun,** with at least 50 percent excess cement circulated to surface.

4. An inspector must be present during setting and cementing of the conductor and surface strings. A Class A cement with gel, approved by the Division, shall be used to seal the conductor and surface casings in accordance with the following procedures:

   a. No cement baskets shall be used;

   b. Cement shall be circulated to surface by the pump and plug method;

   c. The density of the cement circulated prior to dropping the top plug shall range within five percent, plus or minus, of the "American Petroleum Institute" optimum density standard for the type of cement used. The cement shall be circulated out of hole if this is not achieved;

   d. The record of all cement and mix water additives and percentages by weight of mix water shall be included on the cement ticket. Material Safety Data Sheets shall also be provided for all cement and mix water additives. A manufacturers or contractors certification shall be provided verifying that the cement provided by the manufacturer/supplier was the cement requested.

   e. A copy of the cement ticket shall be supplied to the appropriate Division Inspector;

   f. The cement head shall be shut-in at equilibrium until the cement reaches a compressive strength of five hundred pounds per square inch (psi). The Division shall approve the wait-on-cement time.

   g. If cement fails to circulate or drops, the owner shall grout the backside of the casing by pumping cement down the annulus or pumping cement through a spaghetti string. Cement shall provide a continuous seal from the casing seat to the surface.

5. Prior to well stimulation, demonstration (e.g., inspector witnessed, job log or cement bond log) that the production casing is adequately cemented to assure that the hydraulic fracture is contained in the producing zone.

SPCC

1. The drilling rig shall operate in compliance with Federal SPCC regulations (40 CFR 112.7)

Waste Disposal Requirements

1. The operator shall document the volume, chemical composition and function of all materials used during the drilling and well completion process including, but not limited to, drilling muds, additives, fuel, lubricants, and well stimulation fluids. The operator shall provide the Division of Oil and Gas Resources Management with copies of all Material Safety Data Sheets and volume and/or weight records for all materials as they are used at the drilling site.

2. Only cuttings, drilling fluids, native soils, cementing materials and/or approved pit solidification materials may be placed in reserve pit (s).

   Non-exempt, exploration and completion wastes, as defined by U.S. EPA's regulatory determination (53 FR 25453-25454) should be segregated from exempt wastes. Non-exempt wastes include, but are not limited to:

   - Unused fracturing fluids or acids
   - Painting wastes
   - Spent solvents
   - Used or unused lubrication oils
   - Used or unused hydraulic fluids

   All non-exempt wastes shall be disposed in accordance with Ohio EPA regulations and guidelines.

3. No annular disposal is allowed.

4. All free liquids above the solids in the reserve pit (s) shall be removed to the maximum extent practical and disposed at a permitted Class II brine disposal well within **7** days after completion of drilling operations.

5. The operator will contain all frac fluids in steel tanks and haul them to an approved disposal site no later than **7** days after treatment.

6. Muds and cuttings shall be solidified and encapsulated above the annual high water table level, disposed by another method approved by the Division of Oil and Gas Resources Management.

Permit Conditions
Oil and Gas Wells Drilled in a
Municipal Wellhead Protection Area
(Wells Drilled to the Knox Unconformity Play)

Notification

1. The owner shall notify the Division of Oil and Gas Resources Management's local inspector at _____or the Regional Office at _____, if the inspector is not available, at least **24** hours prior to all equipment and pit or tank installation.

2. The owner shall notify the municipal water well field officials at least **24** hours prior to commencement of drilling operations.

Site Preparation

1. The rat and/or mouse hole should be liquid-tight and constructed of steel pipe with a welded basal plate or bull plug. The annulus should be sealed with bentonite to prevent backside loss of brine or drilling fluids.

2. The cellar shall be lined in a manner that collects and channels all fluids that accumulate beneath the rig substructure to the reserve pit.

3. A continuous spill prevention apron should extend from the cellar, beneath the discharge line to reserve pit. The lined trough should have sufficient slope to enable all overflow from the cellar to drain into the reserve pit.

Pit Construction

1. An inspector must be present to witness excavation and construction of all pits.

2. Pits shall not be excavated into the water table. Steel tanks must be used in lieu of pits if a high water table renders construction of an adequate size drilling pit impractical. If steel tanks are used, they must be underlain by a plastic apron to contain any fluids that are not contained by the tank.

3. The bottom and sides of all pits shall be graded and free of objects, which could perforate the liner. If it is impractical to remove all objects, which could puncture a liner, the base of the pit should be padded with straw, sand, clay, geotextile fabric or other material capable of preventing damage to the liner. Side walls should be covered with a cellotex or other similar material, to preserve liner integrity.

4. If the location has sufficient size, pit side slopes should be at least twenty degrees out of vertical slumping of side walls.

5. The owner shall spray-apply bentonite slurry to the pit base and sidewalls prior to emplacing the synthetic liner.

Pit Liner Installation

1. All drilling and/or reserve pits should be lined with a **single piece liner** that meets or exceeds the following standards:

Tensile strength/Elongation

Non-reinforced Liners	ASTM D 882-83	1550 PSI 300%
Reinforced Liners	ASTM D 882-83	1500 PSI 10%
Puncture Resistance	ASTM 2582-67	40 lbs. Force
Hydrostatic Resistance	ASTM D 751-A-31 Or FTMS 191-5512	50 lbs.
Seam Strength	Meet or exceed parent material Properties for factory seams And 80 % for field seams for the Aforementioned standards	

2. The liner apron shall be secured around the berm in a manner, which will prevent slumping of the liner below fluid level prior to restoration.

3. The liner shall be installed with sufficient slack to prevent tearing of the liner when the pit is filled with cuttings and fluid.

Pit Operations

1. If drilling by rotary tools using air, a rotary airhead in good working condition should be installed and maintained to prevent the spray of brine onto the ground surface.

2. The discharge line shall be set up in a manner, which will prevent damage to the pit liner, by expelled cuttings. Ideally, the reserve pit should be constructed parallel to the discharge line and cuttings should be submerged.

3. If the liner is damaged, at no time should fluid be allowed to rise above a tear, which would allow the escape of brine or oilfield waste. Tears in the liner should be documented and immediately repaired.

4. If a natural gas flare is anticipated, it is recommended that sloped areas of the pit, where the liner is susceptible to flame damage, be protected with dirt at least twelve inches thick.

5. If the liner is damaged or destroyed by a natural gas flare, all free standing fluids should be immediately pumped into storage tanks and/or transported to a permitted Class II brine disposal well in accordance with the brine disposal plan.

6. Frac returns should be contained in steel tanks to prevent damage to liners by high velocity fluid impact.

Casing

1. The conductor and surface hole will be drilled on a freshwater mud system.

2. 11-3/4 inch diameter conductor pipe in new condition shall be set approximately ____ feet in depth through **Glacial Drift** and cemented to surface with at least 50 percent excess cement circulated to the surface.

3. 8-5/8 inch diameter surface casing, in new condition with at least three casing centralizers shall be set at **a minimum of feet**, with a least 50 percent excess cement circulated to surface.

4. An inspector must be present during setting and cementing of the conductor and surface strings. A Class A cement with gel, approved by the Division, shall be used to seal the conductor and surface casings in accordance with the following procedures:

   a. No cement baskets shall be used;

   b. Cement shall be circulated to surface by the pump and plug method;

   c. The density of the cement circulated prior to dropping the top plug shall range within five percent, plus or minus, of the "American Petroleum Institute" optimum density standard for the type of cement used. The cement shall be circulated out of hole if this is not achieved;

   d. The record of all cement and mix water additives and percentages by weight of mix water shall be included on the cement ticket. Material Safety Data Sheets shall also be provided for all cement and mix water additives. A manufacturers or contractors certification shall be provided verifying that the cement provided by the manufacturer/supplier was the cement requested.

   e. A copy of the cement ticket shall be supplied to the appropriate Division Inspector;

   f. The cement head shall be shut-in at equilibrium until the cement reaches a compressive strength of five hundred pounds per square inch (psi). The Division shall approve the wait-on-cement time.

   g. If cement fails to circulate or drops, the owner shall grout the backside of the casing by pumping cement down the annulus or pumping cement through a spaghetti string. Cement shall provide a continuous seal from the casing seat to the surface.

5. Prior to well stimulation, demonstration (e.g., inspector witnessed, job log or cement bond log) that the production casing is adequately cemented to assure that the hydraulic fracture is contained in the producing zone.

Blow-out Preventor

1. A blow-out preventor (BOP) is required. The BOP test shall be conducted in accordance with guidelines established by the Division of Oil and Gas Resources Management and witnessed by an inspector before drilling resumes below the surface casing. The Division of Oil and Gas Resources Management, the local inspector and/or his immediate supervisor shall be notified at least 8 hours prior to the BOP test. The BOP must hold at least 500 psi with less than 5 percent loss of pressure during a 15-minute test.

SPCC

1. The drilling rig shall operate in compliance with Federal SPCC regulations (40 CFR 112.7)

Waste Disposal Requirements

1. The operator shall document the volume, chemical composition and function of all materials used during the drilling and well completion process including, but not limited to, drilling muds, additives, fuel, lubricants, and well stimulation fluids. The operator shall provide the Division of Oil and Gas Resources Management with copies of all Material Safety Data Sheets and volume and/or weight records for all materials as they are used at the drilling site.

2. Only cuttings, drilling fluids, native soils, cementing materials and/or approved pit solidification materials may be placed in reserve pit (s).

   Non-exempt, exploration and completion wastes, as defined by U.S. EPA's regulatory determination (53 FR 25453-25454) should be segregated from exempt wastes. Non-exempt wastes include, but are not limited to:

   - Unused fracturing fluids or acids
   - Painting wastes
   - Spent solvents
   - Used or unused lubrication oils
   - Used or unused hydraulic fluids

   All non-exempt wastes shall be disposed in accordance with Ohio EPA regulations and guidelines.

3. No annular disposal is allowed.

4. All free liquids above the solids in the reserve pit (s) shall be removed to the maximum extent practical and disposed at a permitted Class II brine disposal well within 7 days after completion of drilling operations.

5. The operator will contain all frac fluids in steel tanks and haul them to an approved disposal site no later than 7 days after treatment.

6. Muds and cuttings shall be solidified and encapsulated above the annual high water table level, disposed by another method approved by the Division of Oil and Gas Resources Management.

SPCC

1. The drilling rig shall operate in compliance with Federal SPCC regulations (40 CFR 112.7)

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1. The operator shall document the volume, chemical composition and function of all materials used during the drilling and well completion process including, but not limited to, drilling muds, additives, fuel, lubricants, and well stimulation fluids. The operator shall provide the Division of Oil and Gas Resources Management with copies of all Material Safety Data Sheets and volume and/or weight records for all materials as they are used at the drilling site.

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   - Painting wastes
   - Spent solvents
   - Used or unused lubrication oils
   - Used or unused hydraulic fluids

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The Ohio Department of Natural Resources
The Division of Oil and Gas Resources Management
2045 Morse Road, Building F-2
Columbus, Ohio 43229-6693

NO PERFORATION ZONE PERMIT CONDITIONS

A variance has been approved for this permit for a no perforation zone (a portion of the wellbore that will not be perforated). Within sixty (60) days after the completion of the well, the following items **must** be submitted to the Division of Oil and Gas Resources Management:

- A copy of the bore hole deviation survey

- A revised surveyor's plat showing:

    1) Surface Location;
    2) Actual track of the wellbore;
    3) Actual location of the first perforation;
    4) Actual location of the last perforation;
    5) Actual ending point of the bore hole in the target formation;
    6) X, Y coordinates of the above four points.
    7) The boundaries of any unleased tract(s) within the unit;
        a) the closest perforations on the wellbore to this property;
        b) the distance from these perforations to the unleased property.

- A fifty-dollar ($50.00) revision fee.

Noise Mitigation—Best Management Practices (BMP)
Pre-Drilling Guidance

The Division of Oil and Gas Resources Management (DOGRM) has established a Best Management Practice (BMP) to address noise mitigation practices in Urban settings.

Section 1509.03 (A) (6) requires "Noise mitigation for purposes of the drilling of a well and the operation of a well, excluding safety and maintenance operations."

Division inspectors currently review and recommend procedures to mitigate noise through the pre-permitting site reviews.

Factors that should be considered for drilling site noise mitigation may include:

- **Equipment Mufflers**
  - Hospital Grade
  - Multiple Mufflers
  - Submersion of exhaust
  - Shrouding

Equipment mufflers that are properly sized and fitted to equipment shall be reviewed. Muffler systems may include hospital grade or multiple mufflers. All equipment must be fitted with required devices. Engine noise may also be mitigated with shrouding and in some cases with the submersion of the exhaust of fluids.

- **Equipment Orientation**
  - Rig position—exhaust direction
  - Pump position—exhaust direction
  - Vehicle Orientation

Equipment orientation and placement must be considered to mitigate noise. Where possible, the equipment placement and orientation shall be specified. Exhaust systems should be directed to mitigate noise. Shrouding may also be required.

- **Drilling Method**
  - Air rotary
  - Fluid rotary

Drilling methods do affect noise, but may also affect the overall amount of time required to drill a well. Drilling methods shall be reviewed on a site specific basis. To the degree possible, drillers shall minimize certain activities during the evening hours (see "Time of Day" following).

Noise Mitigation

- **Isolation Barriers**
  - Topsoil placement
  - Frac tank placement
  - Portable sound barriers
    - Individual sound barriers

Isolation Barriers shall be reviewed and required where such application will mitigate noise. Effective barriers may include topsoil piles, equipment, tanks, and shrouds or portable sound barriers.

- **Time of Day**
  - For certain phases of the operation
  - Delivery of supplies/equipment
  - Site construction activities

Time of day may be considered in order to mitigate noise. When appropriate, certain activities may be limited to daylight hours.

Factors that may be considered to mitigate noise at producing operations may include:

- **Pumping unit power source**
  - Electric
  - Natural Gas

Pumping unit power sources may have an impact on noise mitigation at producing operations. Where possible, electric pumping units may be required.

- **Production timing where possible**

- **Positioning of equipment**

- **Isolation barriers**
  - Mounding of soils
  - Vegetative screening
  - Fencing types

PERMIT CONDITIONS FOR ALL WELLS DRILLED THROUGH THE KNOX UNCONFORMITY

These conditions must be displayed with the permit in a conspicuous place at the well site in accordance with Section 1509.05 of the Ohio Revised Code.

ALERT: Owners should prepare to encounter large volumes of high-pressure natural gas when drilling through reservoirs below the Knox Unconformity. In accordance with Section 1501:9-9-02 of the Ohio Administrative Code, the owner, contractor and all persons in control of wells being drilled, shall use all reasonable means to safeguard against hazards to life, limb and property.

1. Surface casing shall be set to a depth which is at least 50 feet through the deepest underground source of drinking water (USDW) with sufficient excess cement circulated to surface.

2. When drilling to a permitted formation deeper than the "Clinton" sand, an intermediate string of casing shall be set and cemented through the Berea Sandstone or to a depth of 1000 feet, whichever is greater.

3. A blow-out preventer (BOP), equipped with a choke manifold of sufficient size and pressure rating to control normal hydrostatic pressures for the deepest pool to be penetrated, must be installed on the surface casing. The BOP shall be chained to the rig substructure in a manner which minimizes any potential jarring or damage to the surface casing and/or collar threads.

4. A BOP test shall be conducted before drilling resumes below the surface casing. The test shall require a minimum pressure of 250 PSI for at least fifteen minutes. It is recommended that the BOP be tested at 500 PSI or the maximum anticipated surface pressure for the deepest pool to be penetrated. The owner shall provide a minimum of 8 hours advance notice to the appropriate Division inspector, so that the inspector may be present to witness the BOP test. The inspector may authorize the test to proceed in his/her absence. If the inspector is not present at the scheduled time, the owner can conduct the BOP test.

5. For air rotary operations, a rotating air-head in good working condition must be installed on the surface casing. Stripper rubbers should be inspected and replaced, if necessary, prior to drilling into formations where natural gas is anticipated.

6. For air rotary operations, a staked and chained steel blow (discharge) line must be vented not less than 80 feet from the well into a pit. For fluid rotary operations, a staked and chained blow line, at least 40 feet long, should be directed into a pit. Whether, drilling on air or fluid, the blow line shall be directed away from all inhabited structures and traveled roads that could be affected if high-pressure natural gas is encountered. All line fittings must be of high-pressure grade. The owner shall also install a kill line(s) for control of gas and/or oil shows.

7. To control high-pressured gas and/or oil that may be encountered below the Knox Unconformity, the operator may drill on a fluid system or maintain a smudge from a depth of 400 feet above the expected top of the producing formation to total depth. When a smudge is maintained, the local fire department should be notified of the potential controlled flare prior to drilling into the producing formation. When a fluid system is used the density of the fluid shall be sufficient to control all gas and/or oil shows encountered.

8. The owner shall maintain a sufficient supply of brine and/or mud at the well site for possible well control emergencies.

9. THE DIVISION OF OIL AND GAS RESOURCES MANAGEMENT MUST GRANT PRIOR APPROVAL BEFORE ANY MODIFICATION OF THESE CONDITIONS.

PERMIT CONDITIONS FOR ALL WELLS
DRILLED TO THE TREMPEALEAU DOLOMITE

Alert Owners should prepare to encounter large volumes of high-pressure natural gas when drilling through reservoirs below the Knox Unconformity. In accordance with Section 1501:9-9-02 of the Ohio Administrative Code, the owner, contractor and all persons in control of wells being drilled, shall use all reasonable means to safeguard against hazards to life, limb and property.

THESE STIPULATIONS MUST BE DISPLAYED WITH THE PERMIT IN A CONSPICUOUS PLACE AT THE WELL SITE IN ACCORDANCE WITH SECTION 1509.05 OF THE OHIO REVISED CODE.

1. Surface casing shall be set to a minimum depth of 450 feet. The surface casing shall be cemented with sufficient excess cement circulated to surface.

2. A blowout preventor (BOP), equipped with a choke manifold of sufficient size and pressure rating to control normal hydrostatic pressures for the deepest pool to be penetrated, must be installed on the surface casing. The BOP shall be chained to the rig substructure in a manner which minimizes any potential jarring or damage to the surface casing and/or collar threads.

3. A BOP test shall be conducted before drilling resumes below the surface casing. The test shall require a minimum pressure of 250 PSI for at least fifteen minutes. It is recommended that the BOP be tested at 500 PSI or the maximum anticipated surface pressure for the deepest pool to be penetrated. The owner shall provide a minimum of 8 hours advance notice to the appropriate Division inspector, so that the inspector may be present to witness the BOP test. The inspector may authorize the test to proceed in his/her absence. If the inspector is not present at the scheduled time, the owner can conduct the BOP test.

4. For air rotary operations, a rotating air-head in good working condition must be installed on the surface casing. Stripper rubbers should be inspected and replaced, if necessary, prior to drilling into formations where natural gas is anticipated.

5. For air rotary operations, a staked and chained steel blow (discharge) line must be vented not less than 80 feet from the well into a pit. For fluid rotary operations, a staked and chained blow line, at least 40 feet long, should be directed into a pit. Whether, drilling on air or fluid, the blow line shall be directed away from all inhabited structures and traveled roads that could be affected if high-pressure natural gas is encountered. All line fittings must be of high-pressure grade. The owner shall also install a kill line(s) for control of gas and/or oil shows.

6. To control high-pressured gas that may be encountered, the operator may drill into the **Trenton Limestone** on a fluid system or maintain a smudge from a depth of 400 feet above the expected top of the **Trenton Limestone** to total depth. When a smudge is maintained, the local fire department will be notified of the potential controlled flare prior to drilling into the **Trenton Limestone**. When a fluid system is used the density of the fluid shall be sufficient to control all gas and/or oil shows encountered.

7. The owner shall maintain a sufficient supply of brine and/or mud at the well site for possible well control emergencies.

8. **THE DIVISION OF OIL AND GAS RESOURCES MANAGEMENT MUST GRANT PRIOR APPROVAL BEFORE ANY MODIFICATION OF THESE CONDITIONS.**

SO/llc
Updated 12-15-04

Ohio Department of Natural Resources
Division of Oil and Gas Resources Management
2045 Morse Rd. Bldg. H-3 – Columbus OH 43229-6693

Pre-Construction Permit Conditions

Application Number ODNR _____ Permit Number _____ Inspection Date _____ Modification Date (if applicable) _____

Company _____ Lease Name/Well # _____

County _____ Township _____

Section/Lot _____ Urban Area (if applicable) _____

Inspected By _____

Accompanied By _____

Directions to Location _____

_____

ITEM	LEASE ROAD, WELL SITE CONSTRUCTION	Comments:
1	Tree/Brush Removal/Disposition	
2	Topsoil Removal/Stockpiles/Placement	
3	Erosion/Sediment Control (Silt Fence, Berms)	
4	Drainage Controls (Diversion Ditches, Culverts, Waterways, Crossings)	
5	Signage	
6	Apron/Culverts/Road Materials	
7	Pull Off Area	
8	Parking	
9	GPS – Access Road	
10	GPS – Well Stake	
11	GPS – Tank Battery	
12	GPS – Pit Location	
13	Site Construction Plan	

ITEM	DRILLING CONSIDERATIONS	Comments:
14	Location Dimensions (Length, Width, Approximate Acreage)	
15	Multiple Wells? ☐ Yes ☐ No	
16	Rig Type	
17	Is a blow-out preventer required? ☐ Yes ☐ No	
	If No, explain:	
18	Equipment Placement/ Orientation (Rig/Frac Tanks/Etc.)	

19	Mine Voids?		Yes	☐	No	
20	Verify Water Wells Within 300'					
21	Verify Structures Within 500'					
22	Verify Streams and Drainage					
23	Flood Plain?	☐	Yes	☐	No	
24	Stream Crossing?	☐	Yes	☐	No	
	Corps of Engineers Notified?	☐	Yes	☐	No	
25	Wetlands?	☐	Yes	☐	No	
	EPA Notified?	☐	Yes	☐	No	

ITEM	PITS	Comments:
26	Drilling Pits (Placement/Orientation)	
27	Pit Dimensions (Length, Width, Depth)	
28	Estimated Volume/Capacity	
29	Number & Type of Liners	
30	Thickness of Liner	
31	Type of Material Under Liner	
32	Pit Construction Plan	
33	Fencing (Pits/Entire Location)	

ITEM	RESTORATION	Comments:
34	Pit Closure – (Standard/Solidification/ Off-Site Disposal – state time frame)	
35	Site-Specific Time Frame for Restoration	
36	Erosion/Sediment Control	
37	Drainage Control	

ITEM	PRODUCTION					Comments:
38	Is the Access Road Gate required?	☐	Yes	☐	No	
	If No, explain:					

	WAIVERS					Comments:
39	Is the Company required to submit a waiver?	☐	Yes	☐	No	
	If yes, submit the following waiver requests:					

Is the Company required to submit revised drawings? ☐ Yes ☐ No

THE FOLLOWING ITEMS HAVE BEEN CHANGED FROM THE ORIGINAL APPLICATION:

Ohio Department of Natural Resources
Division of Oil and Gas Resources Management
2045 Morse Rd. Bldg. H-3 – Columbus OH 43229-6693

Pre-Construction Permit Conditions

Application Number _____ Permit Number _____ Inspection Date _____ Modification Date (if applicable) _____

Company _____ Lease Name/Well # _____

County _____ Township _____

Section/Lot _____ Urban Area (if applicable) _____

Inspected By _____

Accompanied By _____

Directions to Location _____

ITEM	LEASE ROAD, WELL SITE CONSTRUCTION	Comments:
1	Tree/Brush Removal/Disposition	
2	Topsoil Removal/Stockpiles/Placement	
3	Erosion/Sediment Control (Silt Fence, Berms)	
4	Drainage Controls (Diversion Ditches, Culverts, Waterways, Crossings)	
5	Signage	
6	Apron/Culverts/Road Materials	
7	Pull Off Area	
8	Parking	
9	GPS – Access Road	
10	GPS – Well Stake	
11	GPS – Tank Battery	
12	GPS – Pit Location	
13	Site Construction Plan	

ITEM	DRILLING CONSIDERATIONS					Comments:
14	Location Dimensions (Length, Width, Approximate Acreage)					
15	Multiple Wells	☐	Yes	☐	No	
16	Rig Type					
17	Is a blow-out preventer required?	☐	Yes	☐	No	
	If No, explain:					
18	Equipment Placement/ Orientation (Rig/Frac Tanks/Etc.)					
19	Mine Voids		Yes	☐	No	
20	Verify Water Wells Within 300’					
21	Verify Structures Within 500’					

22	Verify Streams and Drainage					
23	Flood Plain	☐	Yes	☐	No	
24	Stream Crossing	☐	Yes	☐	No	
	Corps of Engineers Notified	☐	Yes	☐	No	
25	Wetlands	☐	Yes	☐	No	
	EPA Notified	☐	Yes	☐	No	

ITEM	PITS	Comments:
26	Source of water for drilling	
27	Source of water for hydrofrac	
28	Drilling Pits (Placement/Orientation)	
29	Pit Dimensions (Length, Width, Depth)	
30	Estimated Volume/Capacity	
31	Number & Type of Liners	
32	Thickness of Liner	
33	Type of Material Under Liner	
34	Pit Construction Plan	
35	Fencing (Pits/Entire Location)	

ITEM	RESTORATION	Comments:
	Pit Closure – (Standard/Solidification/	
36	Off-Site Disposal – state time frame)	
37	Site-Specific Time Frame for Restoration	
38	Erosion/Sediment Control	
39	Drainage Control	

ITEM	PRODUCTION					Comments:
40	Is the Access Road Gate required?	☐	Yes	☐	No	
	If No, explain:					

	WAIVERS					Comments:
41	Is the Company required to submit a waiver?	☐	Yes	☐	No	
	If yes, submit the following waiver requests:					

Is the Company required to submit revised drawings? ☐ Yes ☐ No

THE FOLLOWING ITEMS HAVE BEEN CHANGED FROM THE ORIGINAL APPLICATION:

Ohio Department of Natural Resources
Division of Oil and Gas Resources Management
2045 Morse Rd. Bldg. H-3 – Columbus OH 43229-6693

Urbanized Area Permit Conditions

Application Number		**Permit Number**		**Inspection Date**		**Modification Date (if applicable)**	

Company		**Lease Name/Well #**	
County		**Township**	
Section/Lot		**Urban Area**	
Inspected By			
Accompanied By			

Directions to Location	

ITEM	LEASE ROAD, WELL SITE CONSTRUCTION	Comments:
1	Tree/Brush Removal/Disposition	
2	Topsoil Removal/Stockpiles/Placement	
3	Erosion/Sediment Control (Silt Fence, Berms)	
4	Drainage Controls (Diversion Ditches, Culverts, Waterways, Crossings)	
5	Signage	
6	Apron/Culverts/Road Material	
7	Pull Off Area	
8	Parking	
9	GPS – Access Road	
10	GPS – Well Stake	
11	GPS – Tank Battery	

ITEM	DRILLING CONSIDERATIONS	Comments:
12	Noise Mitigation (Mufflers, Extra Frac Tanks, Tarps)	
13	Rig Type	

14	Is a blow out preventer required?		Yes		No
	If No, explain:				

15	Equipment Placement/ Orientation (Rig/ Frac Tanks/ etc.)	
16	Drilling Pits (Placement/Orientation)	
17	Fencing (Pits/Entire Location)	
18	Flood Plain	
19	Mine Voids	
20	Verify Water Wells Within 300’	
21	Verify Structures Within 500’	
22	Verify Streams and Drainage	

ITEM	RESTORATION	Comments:
23	Pit Closure – (Standard/ Solidification/ Off-Site Disposal – state time frame)	
24	Site Specific Time Frame For Restoration	
25	Erosion/Sediment Control	
26	Drainage Control	

ITEM	PRODUCTION				Comments:
27	Is the Access Road Gate required?		Yes		No
	If No, explain:				

28	Landscaping/Screening (Wellhead, Tank Battery) (Waiver Attached if applicable)	
29	Fencing (Wellhead, Tank Battery) (Waiver Attached if applicable)	

WAIVERS				Comments:
Is the Company required to submit a waiver?		Yes		No
If yes, submit the following waiver requests:				

Is the Company required to submit revised drawings?		Yes		No

THE FOLLOWING ITEMS HAVE BEEN CHANGED FROM THE ORIGINAL APPLICATION:

Permit Conditions for Horizontal Wells Drilled Near Known Faults or Areas of Seismic Activity

These conditions must be displayed with the permit in a conspicuous place at the well site in accordance with Section 1509.05 of the Ohio Revised Code.

A horizontal well drilled within three (3) miles of a known fault in the Pre-Cambrian basement or within three (3) miles of a location of a seismic event greater than 2.0 magnitude that has occurred since 1999 (as mapped by the Ohio Geological Survey) is subject to these conditions.

1. A seismic monitoring plan must be developed to include the type, number and placement of the monitors that will provide an accurate depth and location of any seismic event that may be detected during hydraulic fracturing operations. Prior to commencement of hydraulic fracturing operations, the plan must be submitted to and approved by the Division of Oil & Gas Resources Management.

2. Seismic monitors must be installed at least two (2) weeks prior to the commencement of hydraulic fracturing operations. Continuous monitoring should be conducted for at least one week prior to hydraulic fracturing. Upon installation of monitors and commencement of monitoring, notify the Division at (614) 265-6922 during normal business hours.

3. Monitors must be set-up for real-time monitoring and analysis. Monitoring and analysis may be done by the Division's Earthworm system or through an independent seismic contractor.

4. If these monitors detect a seismic event greater than 1.0 magnitude, the Division must be immediately notified at (614)265-6922 during normal business hours or (614)799-3581 after hours and on weekends or holidays. When reporting a seismic event, the pad name, well number and permit number of the well being stimulated should be provided. All completion activity shall cease while the cause is investigated.

5. If the investigation indicates a probable connection to the hydraulic fracturing process, all well completion operations will be indefinitely suspended on the well pad.

6. If no seismic event greater than 1.0 magnitude was detected, the monitors can be removed once all hydraulic fracturing operations are completed. If a seismic event greater than 1.0 magnitude was detected, the Division will determine when the monitors can be removed.

Shallow Surface Casing Permit Conditions

Wells drilled to the "Clinton sandstone" or deeper in areas of shallow surface casing requirements for these counties: – Ashtabula, Cuyahoga, Geauga, Lake, Lorain – Columbia and Eaton townships, Medina – Litchfield township, Summit – Macedonia, Northfield Center, Richfield, Sagamore Hills and Twinsburg townships.

1. Conductor casing must be landed to bedrock and cemented to surface. Circulation must be established and the hole must be properly conditioned, before the conductor casing is cemented. The division inspector or respective division regional office must receive ample notification before the cementing operation in order for the state to witness the condition of the well bore, placement of pipe and cementing operations.

2. The surface hole shall be drilled on freshwater or freshwater-based fluid only.

3. The 8-5/8" surface casing shall be set at least 50 feet below the deepest USDW and cemented to surface (see casing program on permit). Circulation must be established and the hole must be properly conditioned, before the surface casing is cemented. The division inspector or respective division regional office must receive ample notification before the cementing operation in order for the state to witness the condition of the well bore, placement of pipe and cementing operations.

4. The owner shall record all zones and depths where natural gas, oil and brine are encountered or circulation was lost during drilling operations. This information must be made available to the inspector prior to the production casing being cemented. This information must be forwarded to the inspector as a report, as notations on the geolograph or other format approved by the chief. Additionally, this information shall be recorded on the well completion record (Form 8).

5. The division inspector or respective division regional office must be notified when the well is drilled to total depth.

6. For vertical wells, the operator will run a geophysical log suite (minimum log suite: gamma ray, compensated density, neutron, and caliper) of the entire borehole, including the Berea Sandstone, to detect potential gas zones. A field copy of the log shall be made available to the division inspector prior to the act of running the production casing.

7. During the primary cementing operation for the production string the top of cement must be at least 100' above the top of the Lockport formation before perforating, acidizing or stimulating the well. Circulation must be established and the hole must be properly conditioned, before the production casing is cemented. If there is a significant break in circulation during the primary cementing

operations for the production casing, the operator shall run a Cement Bond Log (CBL), to verify the top of the cement job.

8. The annular pressure must be monitored for a period of five (5) days after the longstring casing is cemented.
   - If the pressure in the annulus does not exceed 70% of the hydrostatic pressure at the casing shoe of the surface casing string (determined by multiplying .303 times the depth of the casing shoe) after 5 days, work on the well can continue. Pressure should be recorded each day and then weekly thereafter until the well is placed into production. This data must be provided to the inspector before the well is completed. If the pressure relief valve is activated, the division must be immediately notified.
   - If the annular pressure exceeds 70% of the hydrostatic pressure at the casing shoe of the surface casing string, the owner must complete remedial cementing operations to the top of the "Big Lime" before completing the well.
   - **Under no circumstances should the annulus be shut in, except during a pressure test.**
   - The division inspector or respective division regional office must be notified a minimum of 24 hours prior to this cementing operation.

9. The 8-5/8" wellhead must be above grade or the annular space of the wellhead must be plumbed above grade and be readily accessible and unobstructed.

10. The operator shall maintain a gauge on the surface casing nipple to monitor gas pressure in the annulus. At no time shall gas be allowed to accumulate in the annulus at pressures exceeding 70% of the hydrostatic pressure at the casing shoe of the surface casing string. The surface casing nipple shall have a properly functioning relief valve, set to release gas, if pressure exceeds the allowable pressure. If venting cannot control the gas release, it may be flared according to the guidelines found in the OAC 1501:9-9-05 (B & C).

<u>1501:9-9-05 Producing operations.</u>
(B) All gas vented to the atmosphere must be flared, with the exception of gas released by a properly functioning relief device and gas released by controlled venting for testing, blowing down and cleaning out wells. Flares must be a minimum of one hundred (100) feet from the well, a minimum of one hundred (100) feet from oil production tanks and all other surface equipment, and one hundred (100) feet from existing inhabited structures and in a position so that any escaping oil or condensate cannot drain onto public roads or towards existing inhabited structures or other areas which could cause a safety hazard.

(C) Pits, pumps and flares must be safely fenced if within one hundred fifty (150) feet of an existing inhabited structure and if in the opinion of the Chief, such fence is necessary to protect life and limb.

Shallow Surface Casing Permit Conditions

Wells drilled to the "Clinton sandstone" or deeper in areas of shallow surface casing requirements for these counties: – Ashtabula, Cuyahoga, Geauga, Lake, Lorain – Columbia and Eaton townships, Medina – Litchfield township, Summit – Macedonia, Northfield Center, Richfield, Sagamore Hills and Twinsburg townships.

1. Conductor casing must be landed to bedrock and cemented to surface. Circulation must be established and the hole must be properly conditioned, before the conductor casing is cemented. The division inspector or respective division regional office must receive ample notification before the cementing operation in order for the state to witness the condition of the well bore, placement of pipe and cementing operations.

2. The surface hole shall be drilled on freshwater or freshwater-based fluid only.

3. The 8-5/8" surface casing shall be set at least 50 feet below the deepest USDW and cemented to surface (see casing program on permit). Circulation must be established and the hole must be properly conditioned, before the surface casing is cemented. The division inspector or respective division regional office must receive ample notification before the cementing operation in order for the state to witness the condition of the well bore, placement of pipe and cementing operations.

4. The owner shall record all zones and depths where natural gas, oil and brine are encountered or circulation was lost during drilling operations. This information must be made available to the inspector prior to the production casing being cemented. This information must be forwarded to the inspector as a report, as notations on the geolograph or other format approved by the chief. Additionally, this information shall be recorded on the well completion record (Form 8).

5. The division inspector or respective division regional office must be notified when the well is drilled to total depth.

6. For vertical wells, the operator will run a geophysical log suite (minimum log suite: gamma ray, compensated density, neutron, and caliper) of the entire borehole, including the Berea Sandstone, to detect potential gas zones. A field copy of the log shall be made available to the division inspector prior to the act of running the production casing.

7. During the primary cementing operation for the production string the top of cement must be at least 100' above the top of the Lockport formation before perforating, acidizing or stimulating the well. Circulation must be established and the hole must be properly conditioned, before the production casing is cemented. If there is a significant break in circulation during the primary cementing

operations for the production casing, the operator shall run a Cement Bond Log (CBL), to verify the top of the cement job.

8. The annular pressure must be monitored for a period of five (5) days after the longstring casing is cemented.
   - If the pressure in the annulus does not exceed 70% of the hydrostatic pressure at the casing shoe of the surface casing string (determined by multiplying .303 times the depth of the casing shoe) after 5 days, work on the well can continue. Pressure should be recorded each day and then weekly thereafter until the well is placed into production. This data must be provided to the inspector before the well is completed. If the pressure relief valve is activated, the division must be immediately notified.
   - If the annular pressure exceeds 70% of the hydrostatic pressure at the casing shoe of the surface casing string, the owner must complete remedial cementing operations to the top of the "Big Lime" before completing the well.
   - **Under no circumstances should the annulus be shut in, except during a pressure test.**
   - The division inspector or respective division regional office must be notified a minimum of 24 hours prior to this cementing operation.

9. The 8-5/8" wellhead must be above grade or the annular space of the wellhead must be plumbed above grade and be readily accessible and unobstructed.

10. The operator shall maintain a gauge on the surface casing nipple to monitor gas pressure in the annulus. At no time shall gas be allowed to accumulate in the annulus at pressures exceeding 70% of the hydrostatic pressure at the casing shoe of the surface casing string. The surface casing nipple shall have a properly functioning relief valve, set to release gas, if pressure exceeds the allowable pressure. If venting cannot control the gas release, it may be flared according to the guidelines found in the OAC 1501:9-9-05 (B & C).

<u>1501:9-9-05 Producing operations.</u>
(B) All gas vented to the atmosphere must be flared, with the exception of gas released by a properly functioning relief device and gas released by controlled venting for testing, blowing down and cleaning out wells. Flares must be a minimum of one hundred (100) feet from the well, a minimum of one hundred (100) feet from oil production tanks and all other surface equipment, and one hundred (100) feet from existing inhabited structures and in a position so that any escaping oil or condensate cannot drain onto public roads or towards existing inhabited structures or other areas which could cause a safety hazard.

(C) Pits, pumps and flares must be safely fenced if within one hundred fifty (150) feet of an existing inhabited structure and if in the opinion of the Chief, such fence is necessary to protect life and limb.

SPECIAL PERMIT CONDITIONS
FOR WELLS WITH SPACING LESS THAN 100 FEET

These Stipulations Must Be Displayed With The Permit In A Conspicuous Place At The Well Site In Accordance With Section 1509.05 Of The Ohio Revised Code

1. The owner shall provide sufficient (minimum of 24 hours) advance notice to the appropriate Division Inspector and if the offset well has a different owner, to that owner, prior to commencement of drilling operations.

2. The offset well (s) (wells within 100 feet) shall be shut-in prior to the drilling and completing operations of the new well.

3. The offset well (s) and associated surface equipment shall be free of any leaks and verified by the appropriate Division Inspector.

4. A staked and chained steel blow (discharge) line must be vented not less than 60 feet from the well into an approved pit. The blow line shall be directed away from all inhabited structures, wells, tank batteries, pipelines that are not buried and power lines.

5. A blowout preventor (BOP), equipped with a choke manifold of sufficient size and pressure rating to control normal hydrostatic pressures for the deepest pool to be penetrated, must be installed on the surface casing. The BOP shall be chained to the rig substructure in a manner, which minimizes any potential jarring, or damage to the surface casing and/or collar threads.

SURFACE CASING/MINE STRING COMBINATION PERMIT CONDITION

The applicant for this permit has requested that an 18 5/8" 'surface' casing string be set to 750 feet and cemented. At this location, the Division has identified a mine void at approximately 670 feet. Admin. Code 1501:9-1-08 (M)(2)(c) of the Well Construction Rules states that a mine string shall not serve as the only water protection string. This well shall then be cased and cemented as follows to protect all underground sources of drinking water:

A 30" conductor casing shall be set to approximately 100 feet with cement circulated to surface;

The company shall have monitoring in place sufficient to detect any stray gas present on location.

An 18 5/8" string of casing with a guide shoe shall be set no deeper than fifty (50) feet below the mine void and cemented. In order to protect any potential fresh water zone between the conductor and the mine void, an individualized casing/cementing plan for this interval must be pre- approved by the inspector before installation.

A 13 3/8" intermediate string of casing shall be set through the Berea Sandstone and cement shall be circulated to surface;

The inspector may require additional testing to ensure successful completion of the aforementioned plan.

PERMIT CONDITIONS
AREAS OF THIN GLACIAL TILL
OVERLYING FRACTURED BEDROCK AQUIFERS
(WELLS DRILLED ABOVE THE QUEENSTON SHALE)

Notification:

1. The owner shall notify the Division of Oil and Gas Resources Management, local inspector **Robert Roush** at **(330) 690-8837** or the Northern Region office at **(330) 896-0616**, if the inspector is not available, at least 24 hours prior to all equipment and pit or tank installation.

Site Preparation:

1. The rat and/or mouse hole should be liquid-tight and constructed of steel pipe with a welded basal plate or bull plug. The annulus should be sealed with bentonite to prevent backside loss of brine or drilling fluids.

2. The cellar shall be lined in a manner that collects and channels all fluids that accumulate beneath the rig substructure to the reserve pit.

3. A continuous spill prevention apron should extend from the cellar, beneath the discharge line, to the reserve pit. The lined trough should have sufficient slope to enable all overflow from the cellar to drain into the reserve pit.

Pit Construction:

1. An inspector must be present to witness excavation and construction of all pits.

2. Pits shall not be excavated into the water table. Steel tanks must be used in lieu of pits if a high water table renders construction of an adequate size-drilling pit impractical. If steel tanks are used, they must be underlain by a plastic apron to capture any fluids that are not contained by the tank.

3. The bottom and sides of all pits should be graded and free of objects which could perforate the liner. If it is impractical to remove all objects which could puncture a liner, the base of the pit should be padded with straw, sand, clay, geotextile fabric, or other material capable of preventing damage to the liner. Side walls should be covered with a cellotax, or other similar material, to preserve liner integrity.

4. If the location has sufficient size, pit side slopes should be at least twenty degrees out of vertical to prevent slumping of side walls.

5. If fractured bedrock or unconsolidated sand and gravel deposits are encountered during excavation of the drilling pit, a bentonite slurry, sufficiently viscous to adhere to the pit walls and base shall be spray applied to a minimum thickness of .75 inches.

Pit Liner Installation:

1. All drilling and/or reserve pits should be lined with a **single piece liner** that meets or exceeds the following standards:

Tensile strength/Elongation			
Non-reinforced Liners		ASTM D 882-83	1550 PSI 300 %
Reinforced Liners		ASTM D 882-83	1500 PSI 10%
Puncture Resistance		ASTM 2582-67	40 lbs. Force
Hydrostatic Resistance		ASTM D-751-A-31	50 lbs.
	Or	FTMS 191-5512	
Seam Strength		Meet or exceed parent material Properties for factory seams and 80% For field seams for the aforementioned Standards.	

2. The liner apron shall be secured around the berm in a manner, which will prevent slumping of the liner below fluid level prior to restoration.

3. The liner shall be installed with sufficient slack to prevent tearing of the liner when the pit is filled with cuttings and fluid.

Pit Operations:

1. If drilling by rotary tools using air, a rotary airhead in good working condition should be installed and maintained to prevent the spray of brine onto the ground surface.

2. The discharge line shall be set up in a manner, which will prevent damage to the pit liner, by expelled cuttings. Ideally, the reserve pit should be constructed parallel to the discharge line and cuttings should be submerged.

3. If the liner is damaged, at no time should fluid be allowed to rise above a tear, which would allow the escape of brine and oilfield waste.

4. If a natural gas flare is anticipated, it is recommended that sloped areas of the pit, where the liner is susceptible to flame damage be protected with dirt at least twelve (12) inches thick.

5. If the liner is damaged or destroyed by a natural gas flare, all free standing fluids should be immediately pumped into storage tanks and/or transported to a permitted Class II Brine disposal well in accordance with the brine disposal plan.

6. Frac returns should be contained in steel tanks to prevent damage to liners by high-velocity fluid impact.

Casing:

1. Conductor casing string shall be set to a depth of at least **60 feet** with cement circulated to surface.

2. Surface casing shall be set to approximately **400 feet** or to a minimum of fifty (50) below the Berea Sandstone.

Waste-Disposal Requirements:

1. Only cuttings, drilling fluids, native soils, cementing materials and/or approved pit solidification materials may be placed in reserve pit (s).

   Non-exempt, exploration, and completion wastes, as defined by the U.S. EPA's regulatory determination (53 FR 25453-25454) should be segregated from exempt wastes. Non-exempt wastes include, but are not limited to:

   - Unused fracturing fluids or acids
   - Painting wastes
   - Spent solvents
   - Used or unused lubrication oils
   - Used or unused hydraulic fluids

   All non-exempt wastes shall be disposed in accordance with Ohio EPA regulations and guidelines.

2. All free liquids above the solids in the reserve pit (s) shall be removed to the maximum extent practical and disposed at permitted Class II brine disposal well within 15 days of completion of drilling operations.

3. The operator will contain all frac fluids in steel tanks and haul them to an approved disposal site no later than 30 days after treatment.

4. Muds and cuttings shall be solidified and encapsulated above the annual high water table level, or disposed by another method approved by the Division of Oil and Gas Resources Management.

PERMIT CONDITIONS
AREAS OF THIN GLACIAL TILL
OVERLYING FRACTURED BEDROCK AQUIFERS
(WELLS DRILLED TO THE KNOX UNCONFORMITY PLAY)

Notification:

1. The owner shall notify the Division of Oil and Gas Resources Management, local inspector (_____) at _____or the Northern Region office at (330) 896-0616, if the inspector is not available, at least 24 hours prior to all equipment and pit or tank installation.

Site Preparation:

1. The rat and/or mouse hole should be liquid-tight and constructed of steel pipe with a welded basal plate or bull plug. The annulus should be sealed with betonite to prevent backside loss of brine or drilling fluids.

2. The cellar shall be lined in a manner that collects and channels all fluids that accumulate beneath the rig substructure to the reserve pit.

3. A continuous spill prevention apron should extend from the cellar, beneath the discharge line, to the reserve pit. The lined trough should have sufficient slope to enable all overflow from the cellar to drain into the reserve pit.

Pit Construction:

1. An inspector must be present to witness excavation and construction of all pits.

2. Pits shall not be excavated into the water table. Steel tanks must be used in lieu of pits if a high water table renders construction of an adequate size-drilling pit impractical. If steel tanks are used, they must be underlain by a plastic apron to capture any fluids that are not contained by the tank.

3. The bottom and sides of all pits should be graded and free of objects which could perforate the liner. If it is impractical to remove all objects which could puncture a liner, the base of the pit should be padded with straw, sand, clay, geotextile fabric, or other material capable of preventing damage to the liner. Side walls should be covered with a cellotax, or other similar material, to preserve liner integrity.

4. If the location has sufficient size, pit side slopes should be at least twenty degrees out of vertical to prevent slumping of side walls.

5. If fractured bedrock or unconsolidated sand and gravel deposits are encountered during excavation of the drilling pit, a bentonite slurry, sufficiently viscous to adhere to the pit walls and base shall be spray applied to a minimum thickness of .75 inches.

Pit Liner Installation:

1. All drilling and/or reserve pits should be lined with a **single piece liner** that meets or exceeds the following standards:

Tensile strength/Elongation			
Non-reinforced Liners		ASTM D 882-83	1550 PSI 300 %
Reinforced Liners		ASTM D 882-83	1500 PSI 10%
Puncture Resistance		ASTM 2582-67	40 lbs. Force
Hydrostatic Resistance		ASTM D-751-A-31	50 lbs.
	Or	FTMS 191-5512	
Seam Strength		Meet or exceed parent material Properties for factory seams and 80% For field seams for the aforementioned Standards.	

2. The liner apron shall be secured around the berm in a manner, which will prevent slumping of the liner below fluid level prior to restoration.

3. The liner shall be installed with sufficient slack to prevent tearing of the liner when the pit is filled with cuttings and fluid.

Pit Operations:

1. If drilling by rotary tools using air, a rotary airhead in good working condition should be installed and maintained to prevent the spray of brine onto the ground surface.

2. The discharge line shall be set up in a manner, which will prevent damage to the pit liner, by expelled cuttings. Ideally, the reserve pit should be constructed parallel to the discharge line and cuttings should be submerged.

3. If the liner is damaged, at no time should fluid be allowed to rise above a tear, which would allow the escape of brine and oilfield waste.

4. If a natural gas flare is anticipated, it is recommended that sloped areas of the pit, where the liner is susceptible to flame damage be protected with dirt at least twelve (12) inches thick.

5. If the liner is damaged or destroyed by a natural gas flare, all free standing fluids should be immediately pumped into storage tanks and/or transported to a permitted Class II Brine disposal well in accordance with the brine disposal plan.

6. Frac returns should be contained in steel tanks to prevent damage to liners by high-velocity fluid impact.

Casing:

1. Surface casing shall be set to a depth, which is at least ten percent (10%) of the total depth (TD) of the well or 50 feet throughout the deepest underground source of drinking water (USDW), whichever depth is greater. In addition, sufficient surface casing shall be set to allow the blowout preventor to contain any formation pressures that may be encountered before deeper casing is set. The surface casing shall be cemented with sufficient excess cement circulated to surface.

Blowout Prevention:

1. A blowout preventor (BOP), equipped with a choke manifold of sufficient size and pressure rating to control normal hydrostatic pressures for the Rose Run Sandstone or deepest pool to be penetrated, must be installed on the surface casing. The BOP shall be chained to the rig substructure in a manner, which minimizes any potential jarring, or damage to the surface casing and/or collar threads.

2. A BOP test shall be conducted before drilling resumes below the surface casing. The test shall require a minimum pressure of 500 PSI for at least fifteen minutes. It is recommended that the BOP be tested at the maximum anticipated surface pressure from the deepest formation to be penetrated. The owner shall provide sufficient advance notice to the appropriate Division Inspector, so that the inspector can be present to witness the BOP test.

3. A staked and chained steel blow (discharge) line must be vented not less than 80 feet from the well into an approved pit. The blow line shall be directed away from all inhabited structures. All blow line fittings must be of high-pressure grade.

4. A staked and chained, steel bleed-off/kill line (minimum of 4 inches in diameter and unrestricted) or two staked and chained steel lines (2 inches in diameter) must be vented at least 60 feet from the well and directed away from all inhabited structures. All line fittings must be of high-pressure grade.

5. To control high-pressure gas and/or oil that may be encountered below the Knox Unconformity, the operator may drill into the Rose Run Sandstone on a fluid system or maintain a smudge from a depth of 400 feet from the expected top of the Rose Run Sandstone to total depth. When a smudge is maintained the local fire department will be notified of the potential controlled flare prior to drilling in to the Rose Run Sandstone. When a fluid system is used the density of the fluid shall be sufficient to control all gas and/or oil shows encountered.

6. It is highly recommended that a sufficient supply of brine and/or mud be maintained at the well site for possible well control emergencies.

7. **THE DIVISION OF OIL AND GAS RESOURCES MANAGEMENT MUST GRANT PRIOR APPROVAL BEFORE ANY MODIFICATIONS OF THESE CONDITIONS.**

Waste-Disposal Requirements:

1. Only cuttings, drilling fluids, native soils, cementing materials and/or approved pit solidification materials may be placed in reserve pit (s).

   Non-exempt, exploration, and completion wastes, as defined by the U.S. EPA's regulatory determination (53 FR 25453-25454) should be segregated from exempt wastes. Non-exempt wastes include, but are not limited to:

   - Unused fracturing fluids or acids
   - Painting wastes
   - Spent solvents
   - Used or unused lubrication oils
   - Used or unused hydraulic fluids

   All non-exempt wastes shall be disposed in accordance with Ohio EPA regulations and guidelines.

2. All free liquids above the solids in the reserve pit (s) shall be removed to the maximum extent practical and disposed at permitted Class II brine disposal well within 15 days of completion of drilling operations.

3. The operator will contain all Frac fluids in steel tanks and haul them to an approved disposal site no later than 30 days after treatment.

4. Muds and cuttings shall be solidified and encapsulated above the annual high water table level, or disposed by another method approved by the Division of Oil and Gas Resources Management.

PERMIT CONDITIONS
AREAS OF THIN GLACIAL TILL
OVERLYING FRACTURED BEDROCK AQUIFERS
(WELLS DRILLED BELOW THE QUEENSTON SHALE)

Notification:

1. The owner shall notify the Division of Oil and Gas Resources Management, local inspector **Michael Dinsmore** at **330-957-0052** or the Northern Region office at **330-896-0616**, if the inspector is not available, at least 24 hours prior to all equipment and pit or tank installation.

Site Preparation:

1. The rat and/or mouse hole should be liquid-tight and constructed of steel pipe with a welded basal plate or bull plug. The annulus should be sealed with betonite to prevent backside loss of brine or drilling fluids.

2. The cellar shall be lined in a manner that collects and channels all fluids that accumulate beneath the rig substructure to the reserve pit.

3. A continuous spill prevention apron should extend from the cellar, beneath the discharge line, to the reserve pit. The lined trough should have sufficient slope to enable all overflow from the cellar to drain into the reserve pit.

Pit Construction:

1. An inspector must be present to witness excavation and construction of all pits.

2. Pits shall not be excavated into the water table. Steel tanks must be used in lieu of pits if a high water table renders construction of an adequate size-drilling pit impractical. If steel tanks are used, they must be underlain by a plastic apron to capture and contain all fluids that are not contained by the tank.

3. The bottom and sides of all pits should be graded and free of objects which could perforate the liner. If it is impractical to remove all objects which could puncture a liner, the base of the pit should be padded with straw, sand, clay, geotextile fabric, or other material capable of preventing damage to the liner. Side walls should be covered with a cellotax, or other similar material, to preserve liner integrity.

4. If the location has sufficient size, pit side slopes should be at least twenty degrees out of vertical to prevent slumping of side walls.

Pit Liner Installation:

1. All drilling and/or reserve pits should be lined with a **single piece liner** that meets or exceeds the following standards:

Tensile strength/Elongation			
Non-reinforced Liners		ASTM D 882-83	1550 PSI 300 %
Reinforced Liners		ASTM D 882-83	1500 PSI 10%
Puncture Resistance		ASTM 2582-67	40 lbs. Force
Hydrostatic Resistance		ASTM D-751-A-31	50 lbs.
	Or	FTMS 191-5512	
Seam Strength		Meet or exceed parent material Properties for factory seams and 80% For field seams for the aforementioned Standards.	

2. The liner apron shall be secured around the berm in a manner, which will prevent slumping of the liner below fluid level prior to restoration.

3. The liner shall be installed with sufficient slack to prevent tearing of the liner when the pit is filled with cuttings and fluid.

Pit Operations:

1. If drilling by rotary tools using air, a rotary airhead in good working condition should be installed and maintained to prevent the spray of brine onto the ground surface.

2. The discharge line shall be set up in a manner, which will prevent damage to the pit liner, by expelled cuttings. Ideally, the reserve pit should be constructed parallel to the discharge line and cuttings should be submerged.

3. If the liner is damaged, at no time should fluid be allowed to rise above a tear, which would allow the escape of brine and oilfield waste.

4. If a natural gas flare is anticipated, it is recommended that sloped areas of the pit, where the liner is susceptible to flame damage be protected with dirt at least twelve (12) inches thick.

5. If the liner is damaged or destroyed by a natural gas flare, all free standing fluids should be immediately pumped into storage tanks and/or transported to a permitted Class II Brine disposal well in accordance with the brine disposal plan.

6. Frac returns should be contained in steel tanks to prevent damage to pit liners by high-velocity fluid impact.

Casing:

1. Conductor casing string shall be set to a depth of at least **60 feet** with cement circulated to surface.

2. Surface casing shall be set to approximately **400 feet** or to a minimum of fifty (50) below the Berea Sandstone.

3. An intermediate casing string shall be set and cemented to allow installation of the blowout preventor. All conductor, surface and intermediate casing shall be cemented with sufficient excess cement circulated to surface.

Blowout Prevention:

1. A blowout preventor (BOP) equipped with a choke manifold of sufficient size and pressure rating to control normal anticipated hydrostatic pressures for the deepest pool to be penetrated must be installed on the surface or intermediate casing. The BOP shall be chained to the rig substructure in a manner, which minimizes any potential jarring, or damage to the casing and/or collar threads.

2. A BOP test shall be conducted before drilling resumes below the casing. The test shall require a minimum pressure of 500 PSI for at least fifteen minutes. It is recommended that the BOP be tested at the maximum anticipated surface pressure from the deepest formation to be penetrated. The owner shall provide 24 hours advance notice to the Division Inspector, so that the inspector can be present to witness the BOP test.

3. A staked and chained steel blow (discharge) line must be vented not less than 80 feet from the well into an approved pit. The blow line shall be directed away from all inhabited structures. All blow line fittings must be of high-pressure grade.

4. A staked and chained, steel bleed-off/kill line (minimum of 4 inches in diameter and unrestricted) or two staked and chained steel lines (2 inches in diameter) must be vented at least 60 feet from the well and directed away from all inhabited structures. All line fittings must be of high-pressure grade.

5. It is highly recommended that a sufficient supply of brine and/or mud be maintained at the well site for possible well control emergencies.

6. **THE DIVISION OF OIL AND GAS RESOURCES MANAGEMENT MUST GRANT APPROVAL PRIOR TO ANY MODIFICATION OF THESE CONDITIONS.**

Waste-Disposal Requirements:

1. Only cuttings, drilling fluids, native soils, cementing materials and/or approved pit solidification materials may be placed in reserve pit (s).

   Non-exempt, exploration, and completion wastes, as defined by the U.S. EPA's regulatory determination (53 FR 25453-25454) should be segregated from exempt wastes. Non-exempt wastes include, but are not limited to:

   - Unused fracturing fluids or acids
   - Painting wastes
   - Spent solvents
   - Used or unused lubrication oils
   - Used or unused hydraulic fluids

   All non-exempt wastes shall be disposed in accordance with Ohio EPA regulations and guidelines.

2. All free liquids above the solids in the reserve pit (s) shall be removed to the maximum extent practical and disposed at permitted Class II brine disposal well within 15 days of completion of drilling operations.

3. The operator will contain all Frac fluids in steel tanks and haul them to an approved disposal site no later than 30 days after treatment.

4. Muds and cuttings shall be solidified and encapsulated above the annual high water table level, or disposed by another method approved by the Division of Oil and Gas Resources Management.

PERMIT CONDITIONS FOR ALL WELLS DRILLED TO THE TREMPEALEAU DOLOMITE (MORROW COUNTY WELLS ONLY)

ALERT: Owners should prepare to encounter large volumes of high-pressure natural gas when drilling through reservoirs below the Knox Unconformity. In accordance with Section 1501:9-02 of the Ohio Administrative Code, the owner, contractor and all persons in control of wells being drilled, shall use all reasonable means to safeguard against hazards to life, limb and property.

THESE STIPULATIONS MUST BE DISPLAYED WITH THE PERMIT IN A CONSPICIOUS PLACE AT THE WELL SITE IN ACCORDANCE WITH SECTION 1509.05 OF THE OHIO REVISED CODE.

1. Surface casing shall be set to a minimum depth of 450 feet. The surface casing shall be cemented with sufficient excess cement circulated to surface.

2. A blowout preventor (BOP) equipped with a choke manifold of sufficient size and pressure rating to control normal hydrostatic pressure for the deepest pool to be penetrated must be installed on the surface casing. The BOP shall be chained to the rig substructure in a manner which minimizes any potential jarring or damage to the surface casing and/or collar threads.

3. A BOP test shall be conducted before drilling resumes below the surface casing. The test shall require a minimum pressure of 250 PSI for at least fifteen minutes. It is recommended that BOP be tested at 500 PSI or the maximum anticipated surface pressure for the deepest pool to be penetrated. The owner shall provide sufficient advance notice to the appropriate Division inspector, so that the inspector may be present to witness the BOP test. The inspector may authorize the test to proceed in his/her absence. If the inspector is notified at least 8 hours prior to commencement of a BOP test, but is not present at the scheduled time, the owner can conduct the BOP test without an inspector.

4. For air rotary operations, a rotating air-head in good working condition must be installed on the surface casing. Stripper rubbers should be inspected and replaced, if necessary, prior to drilling into formations where natural gas is anticipated.

5. For air rotary operations, a staked and chained steel blow (discharge) line must be vented not less than 80 feet from the well into a pit. For fluid rotary operations, a staked and chained blow line, at least 40 feet long should be directed into a pit. Whether, drilling on air or fluid, the blow line shall be directed away from all inhabited structures and traveled roads that could be affected if high-pressure natural gas is encountered. All line fittings must be of high-pressure grade.

6. The owner shall also install a kill line (s), using high-pressure grade fittings, for control of gas and/or oil shows.

7. To control high-pressured gas that may be encountered, the operator may drill into the **Trenton Limestone** on a fluid system or maintain a smudge from a depth of 400 feet from the expected top of the **Trenton Limestone** through the Black River interval. When a smudge is maintained the local fire department will be notified of the potential controlled flare prior to drilling into the **Trenton Limestone.** When a fluid system is used the density of the fluid shall be sufficient to control all gas and/or oil shows encountered.

8. It is highly recommended that the owners maintain a sufficient supply of brine and/or mud at the well site for possible well control emergencies.

9. **THE DIVISION OF OIL AND GAS RESOURCES MANAGEMENT MUST GRANT PRIOR APPROVAL BEFORE ANY MODIFICATION OF THESE CONDITIONS.**

SK/TGT/cn
REVISED: 7-14-00

SPECIAL PERMIT CONDITIONS
FOR WELLS WITH A WELLHEAD SPACING EXCEPTION

These Stipulations Must Be Displayed With The Permit In A Conspicuous Place At The Well Site In Accordance With Section 1509.05 Of The Ohio Revised Code

1. The owner shall provide sufficient (minimum of 24 hours) advance notice to the appropriate Division inspector and if the offset well has a different owner, to that owner prior to commencement of drilling operations.

2. The offset well(s) (wells within 100 feet) shall be shut-in prior to the drilling and completing operations of the new well.

3. The offset well(s) and associated surface equipment shall be free of any leaks and verified by the appropriate Division inspector.

4. A staked and chained steel blow (discharge) line must be vented not less than 60 feet from the well into an approved pit. The blow line shall be directed away from all inhabited structures, wells, tank batteries, pipelines that are not buried, and power lines.

5. A blowout preventor (BOP), equipped with a choke manifold of sufficient size and pressure rating to control normal hydrostatic pressures for the deepest pool to be penetrated, must be installed on the surface casing. The BOP shall be chained to the rig substructure in a manner which minimizes any potential jarring or damage to the surface casing and/or collar threads.

JHG/llk

08/01/97