

DEPARTMENT OF NATURAL RESOURCES  
AND CONSERVATION  
BOARD OF OIL AND GAS CONSERVATION



STEVE BULLOCK, GOVERNOR

OIL AND GAS CONSERVATION DIVISION

STATE OF MONTANA

September 6, 2016

Linda Nelson, Chairman  
Wayne Smith, Vice Chairman  
Steven Durrett  
Ronald S. Efta  
Paul Gatzemeier  
Peggy Ames-Nerud

Dear Board Members,

Enclosed for your review is Wyoming's Well Stimulation rule.

The Board will discuss Earthjustice's rulemaking petition regarding fracking on September 22, 2016, at 1:00 p.m.

Regards,

A handwritten signature in cursive script that reads "Jennifer Rath".

Jennifer Rath  
Program Specialist

Enclosures

cc: Jim Halvorson  
Rob Stutz

DIVISION OFFICE  
1625 ELEVENTH AVENUE  
PO BOX 201601  
HELENA, MONTANA 59620-1601  
(406) 444-6675

TECHNICAL AND  
SOUTHERN FIELD OFFICE  
2535 ST. JOHNS AVENUE  
BILLINGS, MONTANA 59102-4693  
(406) 656-0040

NORTHERN FIELD OFFICE  
201 MAIN STREET  
PO BOX 690  
SHELBY, MONTANA 59474-0690  
(406) 434-2422

shall be ineffective and revoked by the Commission, unless, for good cause shown, the Commission extends that time.

(h) Any interested person may file an application with the Wyoming Oil and Gas Conservation Commission requesting an order applicable only to the proposed unit area described in the application which shall provide for the percentage of approval or ratification to be reduced from eighty percent (80%) to seventy-five percent (75%). The application shall contain the information required by WYO. STAT. ANN. § 35-11-315(a) and any order of the Commission entered pursuant to the application shall comply with WYO. STAT. ANN. § 35-11-316(b). Notice of the hearing on the application shall be given in the same manner and to the same persons as required by WYO. STAT. ANN. § 35-11-316(a).

(i) An order entered by the Wyoming Oil and Gas Conservation Commission under this section may be amended as provided by WYO. STAT. ANN. § 35-11-316(e).

(j) The Wyoming Oil and Gas Conservation Commission, upon its own motion or upon application, and with notice and hearing, may modify its order regarding the operation, size or other characteristic of the unit area in order to prevent or assist in preventing a substantial inequity resulting from operation of the unit, provided that no such modification may amend any permit issued under WYO. STAT. ANN. §§ 35-11-313 and 35-11-316(d).

(k) Any owner of pore space within a geologic sequestration site who has not been included within a unitization application or order authorizing a unit under this section, may petition for inclusion in the unit area, as provided by WYO. STAT. ANN. § 35-11-316(g).

#### **Section 44. Change of Address.**

Any Owner/Operator of a well shall, at all times, keep the Commission apprised of their current mailing and physical address. This may be done on a Sundry Notice (Form 4) or in the form of a letter.

#### **Section 45. Well Stimulation.**

(a) An approved Application for Permit to Drill (APD, Form 1) or an approved Sundry Notice (Form 4) is required prior to the initiation of any well stimulation activity. Additional stimulation fluid information shall be provided to the Commission as an addendum to the APD (Form 1), or as part of a comprehensive drilling/completion/recompletion plan, or on a Sundry Notice (Form 4). A federal fieldwide development document or similar document may be accepted by the Supervisor. The Supervisor may require, prior to the well stimulation, the Owner or Operator to perform a suitable mechanical integrity test of the casing or of the casing-tubing annulus or other mechanical integrity test methods using procedures set forth in Chapter 2, Section 6 and Chapter 4, Section 7(e)(i).

(b) Where multiple stimulation activities will be undertaken for several wells proposed to be drilled to the same zone(s) within an area of geologic similarity, approval may be sought from the Supervisor to accept a comprehensive master drilling/completion/recompletion plan containing the information required. The approved master drilling/completion/recompletion plan will then be referenced on each individual well's Application for Permit to Drill (Form 1).

(c) The Owner or Operator shall provide geological names, geological description and depth of the formation into which well stimulation fluids are to be injected.

(d) The Owner or Operator shall provide detailed information to the Supervisor as to the base stimulation fluid source. The Owner or Operator or service company shall provide to the Supervisor, for each stage of the well stimulation program, the chemical additives, compounds and concentrations or rates proposed to be mixed and injected, including:

(i) Stimulation fluid identified by additive type (such as but not limited to acid, biocide, breaker, brine, corrosion inhibitor, crosslinker, demulsifier, friction reducer, gel, iron control, oxygen scavenger, pH adjusting agent, proppant, scale inhibitor, surfactant);

(ii) The chemical compound name and Chemical Abstracts Service (CAS) number shall be identified (such as the additive biocide is glutaraldehyde, or the additive breaker is aluminum persulfate, or the proppant is silica or quartz sand, and so on for each additive used);

(iii) The proposed rate or concentration for each additive shall be provided (such as gel as pounds per thousand gallons, or biocide at gallons per thousand gallons, or proppant at pounds per gallon, or expressed as percent by weight or percent by volume, or parts per million, or parts per billion);

(iv) The Owner or Operator or service company may also provide a copy of the contractor's proposed well stimulation program design including the above detail;

(v) The Supervisor may request additional information under this subsection prior to the approval of the Application for Permit to Drill (Form 1) or of the Sundry Notice (Form 4);

(vi) The Supervisor retains discretion to request from the Owner or Operator and/or the service company, the formulary disclosure for the chemical compounds used in the well stimulation(s).

(e) The Owner or Operator shall provide a detailed description of the proposed well stimulation design, which shall include:

- (i) The anticipated surface treating pressure range;
- (ii) The maximum injection treating pressure;
- (iii) The estimated or calculated fracture length and fracture height.

(f) Upon prior request via Application for Permit to Drill (Form 1), and/or a comprehensive drilling/completion/recompletion plan, or by Well Completion Report (Form 3), or by Sundry Notice (Form 4), and/or by written letter to the Supervisor justifying and documenting the nature and extent of the proprietary information, confidentiality protection shall be provided consistent with WYO. STAT. ANN. § 16-4-203(d)(v) of the Wyoming Public Records Act for the following records: “trade secrets, privileged information and confidential commercial, financial, geological or geophysical data furnished by or obtained from any person.”

(g) The injection of volatile organic compounds, such as benzene, toluene, ethylbenzene and xylene, also known as BTEX compounds or any petroleum distillates, into groundwater is prohibited. The proposed use of volatile organic compounds, such as benzene, toluene, ethylbenzene and xylene, also known as BTEX compounds or any petroleum distillates for well stimulation into hydrocarbon bearing zones is authorized with prior approval of the Supervisor. It is accepted practice to use produced water that may contain small amounts of naturally occurring petroleum distillates as well stimulation fluid in hydrocarbon bearing zones.

(h) The Owner or Operator or service company shall provide the Supervisor, on a Well Completion or Recompletion Log (Form 3), or on a Sundry Notice (Form 4) for an existing well, the following post well stimulation detail:

- (i) The actual total well stimulation treatment volume pumped;
- (ii) Detail as to each fluid stage pumped, including actual volume by fluid stage, proppant rate or concentration, actual chemical additive name, type, concentration or rate, and amounts;
- (iii) The actual surface pressure and rate at the end of each fluid stage and the actual flush volume, rate and final pump pressure;
- (iv) The instantaneous shut-in pressure, and the actual 15-minute and 30-minute shut-in pressures when these pressure measurements are available;
- (v) In lieu of (i) through (iv) above, Owner or Operator shall submit the actual well stimulation service contractor’s job log, without any cost/pricing data from the field ticket, or an Owner or Operator representative’s well treatment job log or any report

providing the above required information. If information on the actual field ticket describes the Owner's or Operator's proprietary completion design and/or well stimulation design, confidentiality may be afforded per subsection (f) above.

(i) During the well stimulation operation, the Owner or Operator shall monitor and record the annulus pressure at the bradenhead. If intermediate casing has been set on the well being stimulated, the pressure in the annulus between the intermediate casing and the production casing shall also be monitored and recorded. A continuous record of the annulus pressure during the well stimulation shall be submitted on Well Completion or Recompletion Log (Form 3) or on a Sundry Notice (Form 4).

(i) If during the stimulation, the annulus pressure increases by more than five hundred (500) pounds per square inch gauge (psig) as compared to the pressure immediately preceding the stimulation, the Owner or Operator shall verbally notify the Supervisor as soon as practicable but no later than twenty-four (24) hours following the incident. The Owner or Operator shall include a report containing all details pertaining to the incident, including corrective actions taken, as an attachment to the Well Completion Report (Form 3).

(j) The Owner or Operator shall provide information to the Supervisor on Well Completion Report (Form 3) or on Sundry Notice (Form 4) as to the amounts, handling, and if necessary, disposal at an identified appropriate disposal facility, or reuse of the well stimulation fluid load recovered during flow back, swabbing, and/or recovery from production facility vessels. Storage of such fluid shall be protective of groundwater as demonstrated by the use of either tanks or lined pits. If lined pits are utilized to store fluid for use in well stimulation, or for reconditioning, for reuse, or to hold for appropriate disposal, then the requirements of Chapter 4, Section 1 of these rules shall be met to protect wildlife and migratory birds.

#### **Section 46. Groundwater Baseline Sampling, Analysis and Monitoring**

**Note: Effective date of Chapter 3, Section 46 is March 1, 2014.**

(a) All operators are required to submit a groundwater baseline sampling, analysis and monitoring plan with an Application for Permit to Drill or Deepen a Well (Form 1). The groundwater monitoring program will consist of initial baseline water sampling and testing followed by a series of subsequent sampling and testing after setting the production casing or liner. This Rule will not apply to an existing oil or gas well that is converted to an injection well for enhanced recovery or disposal purposes.

(b) If four (4) or fewer available water sources are present within a one-half (1/2) mile radius of the location of a proposed oil well, gas well (including coalbed methane wells), dedicated injection well, or Commission approved monitoring well, the operator shall collect a sample from each available water source.

DEPARTMENT OF NATURAL RESOURCES  
AND CONSERVATION

BOARD OF OIL AND GAS CONSERVATION

STEVE BULLOCK, GOVERNOR

OIL AND GAS CONSERVATION DIVISION



STATE OF MONTANA

September 12, 2016

To: Board Members

From: J.W. Halvorson *JWH*

Re: Legislative and rulemaking history for hydraulic fracturing and chemical disclosure

In response to a request for expanded legislative and regulatory history, attached are copies of House Bill 243 from the 2015 legislative session and the notice of adoption of our current rule.

- HB243 included expanded landowner notice and would have changed requirements with respect to chemical disclosure. The bill was tabled in the House Federal Relations, Energy, and Telecommunications Committee early in the last session.
- The notice of adoption of our current rule includes comments made at the time rulemaking was proposed and responses to those comments. Many comments and responses from the initial rulemaking are applicable to the current request.

Ben Jones has prepared a review of the literature submitted with the petition. This is also included in the package.

Please call if you have any additional questions or would like more information.

DIVISION OFFICE  
1625 ELEVENTH AVENUE  
PO BOX 201601  
HELENA, MONTANA 59620-1601  
(406) 444-6675

TECHNICAL AND  
SOUTHERN FIELD OFFICE  
2535 ST. JOHNS AVENUE  
BILLINGS, MONTANA 59102-4693  
(406) 656-0040

NORTHERN FIELD OFFICE  
201 MAIN STREET  
PO BOX 690  
SHELBY, MONTANA 59474-0690  
(406) 434-2422

## HOUSE BILL NO. 243

INTRODUCED BY M. DUNWELL

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A BILL FOR AN ACT ENTITLED: "AN ACT REQUIRING PUBLIC DISCLOSURE AND LANDOWNER NOTICE OF FRACTURING FLUID INFORMATION IN OIL AND GAS OPERATIONS; AMENDING SECTIONS 82-11-101, 82-11-117, 82-11-123, 82-11-136, 82-11-163, 82-11-181, AND 82-11-182, MCA; AND PROVIDING AN IMMEDIATE EFFECTIVE DATE."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF MONTANA:

NEW SECTION. **Section 1. Fracturing fluid disclosure -- requirements.** (1) The fracturing fluid disclosure required by 82-11-123 must include:

(a) the complete composition of the fracturing fluid, including the product name, the additive type, the chemical compound name, the chemical abstracts service registry number, and any hazardous component listed on a material safety data sheet as defined in 50-78-102;

(b) the proposed rate or concentration for each additive per gallon, which may be expressed as percent by weight, percent by volume, parts per million, or parts per billion; and

(c) the maximum surface treating pressure range, the maximum injection treating pressure, and the estimated or calculated fracture length and fracture height.

(2) The administrator shall post the information submitted pursuant to subsection (1) to the board's website.

(3) After the posting required in subsection (2), the owner shall provide at least 45 days' notice by mail before fracturing occurs to each property owner with a water supply that is located within 3,000 feet of the well where fracturing will occur.

**Section 2.** Section 82-11-101, MCA, is amended to read:

**"82-11-101. (Temporary) Definitions.** As used in this chapter, unless the context requires otherwise, the following definitions apply:

(1) "Administrator" means the administrator of the division of oil and gas conservation.

(2) "Board" means the board of oil and gas conservation provided for in 2-15-3303.

1 (3) "Class II injection well" means a well, as defined by the federal environmental protection agency or  
2 any successor agency, that injects fluids:

3 (a) that have been brought to the surface in connection with oil or natural gas production;

4 (b) for purposes of enhancing the ultimate recovery of oil or natural gas; or

5 (c) for purposes of storing liquid hydrocarbons.

6 (4) "Department" means the department of natural resources and conservation provided for in Title 2,  
7 chapter 15, part 33.

8 (5) "Determinations" means those decisions delegated to the state by or under authority of the Natural  
9 Gas Policy Act of 1978 or any successor or similar legislation relating to oil and gas.

10 (6) "Enhanced recovery" means the increased recovery from a pool achieved by artificial means or by  
11 the application of energy extrinsic to the pool; such artificial means or application includes pressuring, cycling,  
12 pressure maintenance, or injection into the pool of any substance or form of energy as is contemplated in  
13 secondary recovery and tertiary programs but does not include the injection in a well of a substance or form of  
14 energy for the sole purpose of aiding in the lifting of fluids in the well or stimulating of the reservoir at or near the  
15 well by mechanical, chemical, thermal, or explosive means.

16 (7) "Field" means the general area underlaid by one or more pools.

17 (8) "Fluid" means any material or substance that flows or moves, whether in a semisolid, liquid, sludge,  
18 gas, or any other form or state.

19 (9) "Fracturing" means the introduction of fluid that may carry in suspension a propping agent under  
20 pressure into a formation containing oil or gas for the purpose of creating cracks in the formation to serve as  
21 channels for fluids to move to or from the well bore.

22 ~~(9)~~(10) "Owner" means the person who has the right to drill into and produce from a pool and to  
23 appropriate the oil or gas the person produces from a pool either for the person or others or for the person and  
24 others, and the term includes all persons holding that authority by or through the person with the right to drill.

25 ~~(10)~~(11) "Person" means any natural person, corporation, association, partnership, receiver, trustee,  
26 executor, administrator, guardian, fiduciary, or other representative of any kind and includes any agency or  
27 instrumentality of the state or any governmental subdivision of the state.

28 ~~(11)~~(12) "Pollution" means contamination or other alteration of the physical, chemical, or biological  
29 properties of any state waters that exceeds that permitted by state water quality standards or standards adopted  
30 by the board, including but not limited to the disposal, discharge, seepage, drainage, infiltration, flow, or injection

1 of any liquid, gaseous, solid, or other substance into any state waters that will or is likely to create a nuisance or  
 2 render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild  
 3 animals, birds, fish, or other wildlife. A disposal, discharge, seepage, drainage, infiltration, flow, or injection of fluid  
 4 that is authorized under a rule, permit, or order of the board is not pollution under this chapter.

5 ~~(12)~~(13) "Pool" means an underground reservoir containing a common accumulation of oil or gas or both;  
 6 each zone of a structure which is completely separated from any other zone in the same structure is a pool, as  
 7 that term is used in this chapter.

8 ~~(13)~~(14) "Producer" means the owner of a well or wells capable of producing oil or gas or both.

9 ~~(14)~~(15) "Responsible person" means a person who is determined by the board under 82-10-402 to have  
 10 abandoned an oil or gas well, injection well, disposal well, water source well, drill site, sump, seismographic shot  
 11 hole, or other area where oil and gas drilling and production operations were conducted.

12 ~~(15)~~(16) "State waters" means any body of water, either surface or underground.

13 ~~(16)~~(17) (a) "Waste" means:

14 (i) physical waste, as that term is generally understood in the oil and gas industry;

15 (ii) the inefficient, excessive, or improper use of or the unnecessary dissipation of reservoir energy;

16 (iii) the location, spacing, drilling, equipping, operating, or producing of any oil or gas well or wells in a  
 17 manner which causes or tends to cause reduction in the quantity of oil or gas ultimately recoverable from a pool  
 18 under prudent and proper operations or which causes or tends to cause unnecessary or excessive surface loss  
 19 or destruction of oil or gas; and

20 (iv) the inefficient storing of oil or gas. (The production of oil or gas from any pool or by any well to the  
 21 full extent that the well or pool can be produced in accordance with methods designed to result in maximum  
 22 ultimate recovery, as determined by the board, is not waste within the meaning of this definition.)

23 (b) The loss of gas to the atmosphere during coal mining operations is not waste within the meaning of  
 24 this definition.

25 **82-11-101. (Effective on occurrence of contingency) Definitions.** As used in this chapter, unless the  
 26 context requires otherwise, the following definitions apply:

27 (1) "Administrator" means the administrator of the division of oil and gas conservation.

28 (2) "Board" means the board of oil and gas conservation provided for in 2-15-3303.

29 (3) "Carbon dioxide" means carbon dioxide produced by anthropogenic sources that is of such purity  
 30 and quality that it will not compromise the safety of a geologic storage reservoir and will not compromise those

1 properties of a geologic storage reservoir that allow the reservoir to effectively enclose and contain a stored gas.

2 (4) (a) "Carbon dioxide injection well" means a well that injects carbon dioxide for the underground  
3 storage of carbon dioxide in a geologic storage reservoir.

4 (b) The term does not include a class II injection well in which carbon dioxide is injected for the purpose  
5 of enhancing the recovery of oil and gas.

6 (5) "Class II injection well" means a well, as defined by the federal environmental protection agency or  
7 any successor agency, that injects fluids:

8 (a) that have been brought to the surface in connection with oil or natural gas production;

9 (b) for purposes of enhancing the ultimate recovery of oil or natural gas; or

10 (c) for purposes of storing liquid hydrocarbons.

11 (6) "Department" means the department of natural resources and conservation provided for in Title 2,  
12 chapter 15, part 33.

13 (7) "Determinations" means those decisions delegated to the state by or under authority of the Natural  
14 Gas Policy Act of 1978 or any successor or similar legislation relating to oil and gas.

15 (8) "Enhanced recovery" means the increased recovery from a pool achieved by artificial means or by  
16 the application of energy extrinsic to the pool; artificial means or application includes pressuring, cycling, pressure  
17 maintenance, or injection into the pool of any substance or form of energy as is contemplated in secondary  
18 recovery and tertiary programs but does not include the injection in a well of a substance or form of energy for  
19 the sole purpose of aiding in the lifting of fluids in the well or stimulating of the reservoir at or near the well by  
20 mechanical, chemical, thermal, or explosive means.

21 (9) "Field" means the general area overlaid by one or more pools.

22 (10) "Fluid" means any material or substance that flows or moves, whether in a semisolid, liquid, sludge,  
23 gas, or any other form or state.

24 (11) "Fracturing" means the introduction of fluid that may carry in suspension a propping agent under  
25 pressure into a formation containing oil or gas for the purpose of creating cracks in the formation to serve as  
26 channels for fluids to move to or from the well bore.

27 ~~(11)~~(12) "Geologic storage operator" means a person holding or applying for a carbon dioxide injection  
28 well permit.

29 ~~(12)~~(13) (a) "Geologic storage reservoir" means a subsurface sedimentary stratum, formation, aquifer,  
30 cavity, or void, whether natural or artificially created, including vacant or filled reservoirs, saline formations, and

1 coal seams suitable for or capable of being made suitable for injecting and storing carbon dioxide.

2 (b) The term does not include a natural gas storage reservoir. However, the owner of a natural gas  
3 storage reservoir may convert a depleted natural gas storage reservoir into a geologic storage reservoir to be  
4 used pursuant to Title 82, chapter 11, parts 1 and 2.

5 ~~(13)~~(14) "Owner" means the person who has the right to drill into and produce from a pool and to  
6 appropriate the oil or gas the person produces from a pool either for the person or others or for the person and  
7 others, and the term includes all persons holding that authority by or through the person with the right to drill.

8 ~~(14)~~(15) "Person" means any natural person, corporation, association, partnership, receiver, trustee,  
9 executor, administrator, guardian, fiduciary, or other representative of any kind and includes any agency or  
10 instrumentality of the state or any governmental subdivision of the state.

11 ~~(15)~~(16) "Pollution" means contamination or other alteration of the physical, chemical, or biological  
12 properties of any state waters that exceeds that permitted by state water quality standards or standards adopted  
13 by the board, including but not limited to the disposal, discharge, seepage, drainage, infiltration, flow, or injection  
14 of any liquid, gaseous, solid, or other substance into any state waters that will or is likely to create a nuisance or  
15 render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild  
16 animals, birds, fish, or other wildlife. A disposal, discharge, seepage, drainage, infiltration, flow, or injection of fluid  
17 that is authorized under a rule, permit, or order of the board is not pollution under this chapter.

18 ~~(16)~~(17) "Pool" means an underground reservoir containing a common accumulation of oil or gas or both.  
19 Each zone of a structure that is completely separated from any other zone in the same structure is a pool. For  
20 the purposes of unitization pursuant to Title 82, chapter 11, part 2, "pool" also includes an underground reservoir  
21 for the long-term storage of carbon dioxide after the effective date of this section.

22 ~~(17)~~(18) "Producer" means the owner of a well or wells capable of producing oil or gas or both.

23 ~~(18)~~(19) "Responsible person" means a person who is determined by the board under 82-10-402 to have  
24 abandoned an oil or gas well, injection well, disposal well, water source well, drill site, sump, seismographic shot  
25 hole, or other area where oil and gas drilling and production operations were conducted.

26 ~~(19)~~(20) "State waters" means any body of water, either surface or underground.

27 ~~(20)~~(21) "Verification and monitoring" means measuring the amount of carbon dioxide stored at a specific  
28 geologic storage reservoir, checking the site for leaks or deterioration of storage integrity, and ensuring that  
29 carbon dioxide is stored in a way that is permanent and not harmful to the ecosystem. The term includes:

30 (a) using models to show, before injection is allowed, that injected carbon dioxide will be securely stored.

1 Modeling includes but is not limited to consideration of seismic activity, possible paths for fugitive emissions, and  
 2 chemical reactions in the geologic formation.

3 (b) tracking plume behavior after injection of carbon dioxide, including the use of pressure monitoring;  
 4 and

5 (c) establishing a system of leak monitors.

6 ~~(21)(22)~~ (a) "Waste" means:

7 (i) physical waste, as that term is generally understood in the oil and gas industry;

8 (ii) the inefficient, excessive, or improper use of or the unnecessary dissipation of reservoir energy;

9 (iii) the location, spacing, drilling, equipping, operating, or producing of any oil or gas well or wells in a  
 10 manner that causes or tends to cause reduction in the quantity of oil or gas ultimately recoverable from a pool  
 11 under prudent and proper operations or that causes or tends to cause unnecessary or excessive surface loss  
 12 or destruction of oil or gas; and

13 (iv) the inefficient storing of oil or gas.

14 (b) (i) The production of oil or gas from any pool or by any well to the full extent that the well or pool can  
 15 be produced in accordance with methods designed to result in maximum ultimate recovery, as determined by the  
 16 board, is not waste within the meaning of subsection ~~(21)(a)~~ (22)(a).

17 (ii) The loss of gas to the atmosphere during coal mining operations is not waste within the meaning of  
 18 subsection ~~(21)(a)~~ (22)(a)."

19

20 **Section 3.** Section 82-11-117, MCA, is amended to read:

21 **"82-11-117. Confidentiality of records.** (1) Any information that is furnished to the board or the board's  
 22 staff or that is obtained by either of them is a matter of public record and open to public use. However, any  
 23 information unique to the owner or operator that would, if disclosed, reveal methods or processes entitled to  
 24 protection as trade secrets must be maintained as confidential if so determined by the board.

25 (2) ~~If~~ Except as provided in subsection (4), if an owner or operator disagrees with a determination by the  
 26 board that certain material will not be maintained as confidential, the owner or operator may file a declaratory  
 27 judgment action in a court of competent jurisdiction to establish the existence of a trade secret if the owner or  
 28 operator wishes the information to enjoy confidential status. The department must be served in the action and  
 29 may intervene as a party.

30 (3) Any information not intended to be public when submitted to the board or the board's staff must be

1 submitted in writing and clearly marked as confidential.

2 (4) (a) An owner or operator subject to the requirements of [section 1] may file a declaratory judgment  
 3 action in a court of competent jurisdiction to establish the existence of a trade secret for fracturing fluids unique  
 4 to the owner or operator that, if disclosed, would reveal methods or processes entitled to protection as trade  
 5 secrets. The trade secret must be clearly designated on materials provided to the administrator in accordance  
 6 with [section 1]. Except as provided in subsection (4)(b), the administrator shall maintain the trade secret  
 7 information as confidential.

8 (b) Information describing physical or chemical characteristics of fracturing fluids that have been or may  
 9 be released into the environment are not considered confidential. The administrator has access to and may use  
 10 any trade secret information in carrying out the activities of [section 1] as may be necessary to protect the public  
 11 health, safety, or welfare or the environment while maintaining the information as confidential.

12 ~~(4)~~(5) Data describing physical and chemical characteristics of a liquid, gaseous, solid, or other  
 13 substance injected or discharged into state waters may not be considered confidential.

14 ~~(5)~~(6) The board may use any information in compiling or publishing analyses or summaries relating to  
 15 water pollution if the analyses or summaries do not identify the owner or operator or reveal any information that  
 16 is otherwise made confidential by this section."  
 17

18 **Section 4.** Section 82-11-123, MCA, is amended to read:

19 **"82-11-123. (Temporary) Requirements for oil and gas operations.** Subject to the administrative  
 20 control of the department under 2-15-121, the board shall require:

21 (1) identification of ownership of oil or gas wells, producing properties, and tanks;

22 (2) the making and filing of acceptable well logs, including bottom-hole temperatures (in order to facilitate  
 23 the discovery of potential geothermal energy sources), the making and filing of reports on well locations, and the  
 24 filing of directional surveys, geological sample logs, mud logs, core descriptions, and ordinary core analysis, if  
 25 made; however, logs of exploratory or wildcat wells need not be filed for a period of 6 months following completion  
 26 of those wells;

27 (3) the drilling, casing, producing, and plugging of wells and class II injection wells in a manner that  
 28 prevents the escape of oil or gas out of one stratum into another, the intrusion of water into oil or gas strata,  
 29 blowouts, cave-ins, seepages, and fires and the pollution of fresh water supplies by oil, gas, salt, or brackish  
 30 water;

1 ~~(4)~~ prior to fracturing, the disclosure and notice required by [section 1];

2 ~~(4)(5)~~ the restoration of surface lands to their previous grade and productive capability after a well is  
3 plugged or a seismographic shot hole has been utilized and necessary measures to prevent adverse hydrological  
4 effects from the well or hole, unless the surface owner agrees in writing, with the approval of the board or its  
5 representatives, to a different plan of restoration;

6 ~~(5)(6)~~ the furnishing of a reasonable bond with good and sufficient surety, conditioned for performance  
7 of the duty to properly plug each dry or abandoned well. The bond may be forfeited in its entirety by the board  
8 for failure to perform the duty to properly plug each dry or abandoned well and may not be canceled or absolved  
9 if the well fails to produce oil or gas in commercial quantities, until:

10 (a) the board determines the well is properly plugged and abandoned as provided in the board's rules;

11 or

12 (b) the requirements of 82-11-163 are met.

13 ~~(6)(7)~~ proper gauging or other measuring of oil and gas produced and saved to determine the quantity  
14 and quality of oil and gas;

15 ~~(7)(8)~~ that every person who produces, transports, or stores oil or gas or injects or disposes of water in  
16 this state shall make available within this state for a period of 5 years complete and accurate records of the  
17 quantities. The records must be available for examination by the board or its employees at all reasonable times.  
18 The person shall file with the board reports as it may prescribe with respect to quantities, transportations, and  
19 storages of the oil, gas, or water.

20 ~~(8)(9)~~ the installation, use, and maintenance of monitoring equipment or methods in the operation of  
21 class II injection wells.

22 **82-11-123. (Effective on occurrence of contingency) Requirements for oil and gas and carbon**  
23 **dioxide injection operations.** (1) Subject to the administrative control of the department under 2-15-121, the  
24 board shall require:

25 (a) identification of ownership of carbon dioxide injection wells, carbon dioxide, geologic storage  
26 reservoirs, and oil or gas wells, producing properties, and tanks;

27 (b) the making and filing of acceptable well logs, including bottom-hole temperatures, in order to facilitate  
28 the discovery of potential geothermal energy sources, the making and filing of reports on well locations, and the  
29 filing of directional surveys, geological sample logs, mud logs, core descriptions, and ordinary core analysis, if  
30 made. However, logs of exploratory or wildcat wells need not be filed for a period of 6 months following

1 completion of those wells.

2 (c) the drilling, casing, producing, and plugging of wells, carbon dioxide injection wells, and class II  
3 injection wells in a manner that prevents the escape of carbon dioxide, oil, or gas out of one stratum into another,  
4 the intrusion of water into carbon dioxide, oil, or gas strata, blowouts, cave-ins, seepages, and fires and the  
5 pollution of fresh water supplies by carbon dioxide, oil, gas, salt, or brackish water;

6 (d) prior to fracturing, the disclosure and notice required by [section 1];

7 ~~(d)~~(e) the restoration of surface lands to their previous grade and productive capability after a well is  
8 plugged or a seismographic shot hole has been utilized and necessary measures to prevent adverse hydrological  
9 effects from the well or hole, unless the surface owner agrees in writing, with the approval of the board or its  
10 representatives, to a different plan of restoration;

11 ~~(e)~~(f) except as provided in subsection ~~(4)~~(1)~~(f)~~(g), the furnishing of a reasonable bond with good and  
12 sufficient surety, conditioned for performance of the duty to properly plug each dry or abandoned well. The bond  
13 may be forfeited in its entirety by the board for failure to perform the duty to properly plug each dry or abandoned  
14 well and may not be canceled or absolved if the well fails to produce oil or gas in commercial quantities, until:

15 (i) the board determines the well is properly plugged and abandoned as provided in the board's rules;

16 or

17 (ii) the requirements of 82-11-163 are met.

18 ~~(f)~~(g) the furnishing of reasonable bond or other surety for a carbon dioxide injection well, geologic  
19 storage reservoir, and the carbon dioxide stored in the reservoir with good and sufficient surety for performance  
20 of the duty to operate and manage a carbon dioxide injection well, geologic storage reservoir, and the carbon  
21 dioxide stored in the reservoir and to properly plug and reclaim each carbon dioxide injection well. The bond or  
22 other surety may be forfeited in its entirety by the board for failure to perform the duty to properly manage and  
23 operate a well, reservoir, and stored carbon dioxide or to plug a well. Except as provided in 82-11-183(8), the  
24 bond or other surety may not be canceled or absolved.

25 ~~(g)~~(h) proper gauging or other measuring of oil and gas produced and saved to determine the quantity  
26 and quality of oil and gas;

27 ~~(h)~~(i) that every person who produces, transports, or stores oil or gas or injects or disposes of water or  
28 carbon dioxide in this state shall make available within this state for a period of 5 years complete and accurate  
29 records of the quantities. The records must be available for examination by the board or its employees at all  
30 reasonable times. The person shall file with the board reports as it may prescribe with respect to quantities,

1 transportations, and storages of the oil, gas, carbon dioxide, or water.

2 (†)(j) the installation, use, and maintenance of monitoring equipment or methods in the operation of  
3 carbon dioxide injection wells and class II injection wells.

4 (2) In addition to the requirements of subsection (1), the geologic carbon dioxide injection well permitting  
5 system must include:

6 (a) recordkeeping and reporting requirements sufficient to measure the effectiveness of carbon dioxide  
7 injection wells and geologic storage reservoirs;

8 (b) characterization of the injection zone and aquifers above and below the injection zone that may be  
9 affected, including applicable pressure and fluid chemistry data to describe the projected effects of injection  
10 activities;

11 (c) verification and monitoring at geologic storage reservoirs;

12 (d) mitigation of leaks, including the ability to stop the leaking of carbon dioxide and to address impacts  
13 of leaks;

14 (e) adequate baseline monitoring of drinking water wells within 1 mile of the perimeter of the geologic  
15 storage reservoir; and

16 (f) at a minimum, requirements pursuant to applicable federal regulatory standards established by:

17 (i) the Energy Independence and Security Act of 2007, Public Law 110-140, and subsequent acts;

18 (ii) the Safe Drinking Water Act, 42 U.S.C. 300f, et seq.; and

19 (iii) the underground injection control program, 40 CFR, parts 144 through 147."  
20

21 **Section 5.** Section 82-11-136, MCA, is amended to read:

22 **"82-11-136. (Temporary) Expenditure of funds from bonds for plugging wells.** The board may  
23 accept and expend all funds received by it from bonds for properly plugging dry or abandoned wells as authorized  
24 in ~~82-11-123(5)~~ 82-11-123(6).

25 **82-11-136. (Effective on occurrence of contingency) Expenditure of funds from bonds for**  
26 **plugging wells.** (1) The board may accept and expend all funds received by it from bonds for properly plugging  
27 dry or abandoned wells as authorized in ~~82-11-123(4)(e)~~ 82-11-123(1)(f).

28 (2) The board may accept and expend all funds received by it from bonds for properly plugging  
29 abandoned carbon dioxide injection wells as authorized in ~~82-11-123(4)(f)~~ 82-11-123(1)(g)."  
30

1           **Section 6.** Section 82-11-163, MCA, is amended to read:

2           **"82-11-163. (Temporary) Landowner's bond on noncommercial well.** If the owner of the surface land  
3 upon which has been drilled a well that fails to produce oil or gas in commercial quantities acquires the well for  
4 domestic purposes, the board may cancel and absolve the bond required in 82-11-123 upon its acceptance of  
5 surety in the form of a certificate of deposit or a surety bond in the amount of \$5,000 for a single well or in the  
6 amount of \$10,000 for more than one well or in the form of a property bond of two times the value of the required  
7 certificate of deposit or surety bond. The release of the certificate of deposit, surety bond, or property bond must  
8 be conditioned on proof provided by the landowner that the well has been properly plugged.

9           **82-11-163. (Effective on occurrence of contingency) Landowner's bond on noncommercial well.**

10 If the owner of the surface land upon which has been drilled a well that fails to produce oil or gas in commercial  
11 quantities acquires the well for domestic purposes, the board may cancel and absolve the bond required in  
12 ~~82-11-123(1)(e)~~ 82-11-123(1)(f) upon its acceptance of surety in the form of a certificate of deposit or a surety  
13 bond in the amount of \$5,000 for a single well or in the amount of \$10,000 for more than one well or in the form  
14 of a property bond of two times the value of the required certificate of deposit or surety bond. The release of the  
15 certificate of deposit, surety bond, or property bond must be conditioned on proof provided by the landowner that  
16 the well has been properly plugged."

17  
18           **Section 7.** Section 82-11-181, MCA, is amended to read:

19           **"82-11-181. (Effective on occurrence of contingency) Geologic storage reservoir administrative**  
20 **fee -- account established.** (1) (a) A geologic storage operator shall pay to the board a fee on each ton of  
21 carbon dioxide injected for storage for the purpose of carrying out the state's responsibility to monitor and manage  
22 geologic storage reservoirs. If a geologic storage operator chooses to indefinitely accept liability pursuant to  
23 82-11-183(9)(a), the board shall remit the fee to the operator. If a geologic storage operator is required to  
24 maintain liability pursuant to 82-11-183(9)(b), the board may not remit the fee.

25           (b) The fee must be in the amount set by board rule.

26           (c) The amount must be based on the anticipated actual expenses that the board will incur in monitoring  
27 and managing geologic storage reservoirs during their postclosure phases.

28           (2) There is a geologic storage reservoir program account in the special revenue fund.

29           (3) (a) Each fiscal year there must be deposited in the account the fees collected pursuant to  
30 82-11-184(2)(b) and subsection (1) of this section, to be used by the board for monitoring and managing geologic

1 storage reservoirs pursuant to 82-11-183(6) and (8).

2 (b) Funds received from bonds or other surety as authorized in ~~82-11-123(1)(f)~~ 82-11-123(1)(g) and  
3 82-11-183 must be deposited in the account.

4 (4) Interest and earnings on the funds in the geologic storage reservoir program account accrue to that  
5 account."

6

7 **Section 8.** Section 82-11-182, MCA, is amended to read:

8 **"82-11-182. (Effective on occurrence of contingency) Liability for carbon dioxide during injection.**

9 (1) Until the certificate of project completion is issued pursuant to 82-11-183(1) and title to the stored carbon  
10 dioxide and geologic storage reservoir is transferred to the state pursuant to 82-11-183(7), the geologic storage  
11 operator is liable for the operation and management of the carbon dioxide injection well, the geologic storage  
12 reservoir, and the injected or stored carbon dioxide.

13 (2) Bond or other surety furnished pursuant to ~~82-11-123(1)(f)~~ 82-11-123(1)(g) must be adequate to meet  
14 the requirements of subsection (1).

15 (3) For the purposes of 82-11-183 and this section, "title" includes title to the geologic storage reservoir  
16 and the stored carbon dioxide."

17

18 NEW SECTION. **Section 9. Codification instruction.** [Section 1] is intended to be codified as an  
19 integral part of Title 82, chapter 11, part 1, and the provisions of Title 82, chapter 11, part 1, apply to [section 1].

20

21 NEW SECTION. **Section 10. Effective date.** [This act] is effective on passage and approval.

22 - END -





Linda McCulloch  
MONTANA SECRETARY OF STATE

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BEFORE THE BOARD OF OIL AND GAS CONSERVATION AND  
THE DEPARTMENT OF NATURAL RESOURCES  
AND CONSERVATION OF THE STATE OF MONTANA

In the matter of the adoption of New Rules I through V regarding oil and gas well stimulation )  
NOTICE OF PUBLIC HEARING )  
ON PROPOSED ADOPTION )

To: All Concerned Persons

1. On June 15, 2011, at 10:00 a.m., the Department of Natural Resources and Conservation will hold a public hearing in the Richland County Fairgrounds Commercial Building, 2118 West Holly Street, Sidney, Montana, to consider the proposed adoption of the above-stated rules.

2. The department will make reasonable accommodations for persons with disabilities who wish to participate in this rulemaking process or need an alternative accessible format of this notice. If you require an accommodation, contact the department no later than 5:00 p.m. on June 8, 2011, to advise us of the nature of the accommodation that you need. Please contact Tom Richmond, Board of Oil and Gas Conservation, 2535 St. Johns Avenue, Billings, MT 59102; telephone (406) 656-0040; fax (406) 655-6015; e-mail [FracComments@mt.gov](mailto:FracComments@mt.gov).

3. The rules proposed to be adopted provide as follows:

NEW RULE I WELL STIMULATION ACTIVITIES COVERED BY DRILLING PERMIT

(1) Well completions which include hydraulic fracturing, acidizing, or other chemical stimulation done to complete a well are considered permitted activities under the drilling permit for that well only if the processes, anticipated volumes, and types of materials planned for use are expressly described in the permit application for that well.

(2) For wildcat or exploratory wells or when the operator is unable to determine that hydraulic fracturing, acidizing, or other chemical treatment will be done to complete the well, the operator must obtain prior written approval of such activities from the board's staff at any time prior to commencing such activities provided that:

(a) the written information describing the fracturing, acidizing, or other chemical treatment must be provided to the board's staff at least 24 hours before commencement of well stimulation activities.

(3) For the purpose of this section, an adequate description of the proposed well stimulation includes:

- (a) the estimated total volume of treatment to be used;
- (b) the trade name or generic name;
- (c) amount or volume of the principle components such as viscosifiers, acids, or gelling agents;
- (d) the weight or volume of inert substances such as proppants and other substances injected to aid in well cleanup, either for each stage of a multistage job or for the total job; and
- (e) the anticipated surface treating pressure and the maximum anticipated treating

pressure. The owner, operator, or service company may provide:

- (i) a copy of a final design of well treatment actually used for similar wells and which reflects the likely design for the well to be permitted; or
- (ii) a prefiled generic design submitted for specific geologic formations, geographic areas, or well types likely to be used in a particular well.

AUTH: 82-11-111, MCA

IMP: 82-11-111, 82-11-122, MCA

#### NEW RULE II DISCLOSURE OF WELL STIMULATION FLUIDS

(1) The owner or operator of a well shall provide the board, on its Form No. 4 for a new well or Form No. 2 for an existing well:

- (a) a description of the interval(s) or formation treated;
- (b) the type of treatment pumped (acid, chemical, fracture stimulation); and
- (c) the amount and type(s) of material pumped and the rates and maximum pressure during treatment.

(2) For hydraulic fracturing treatments the amount and type of material used must include:

- (a) a description of the stimulation fluid identified by additive type (e.g. acid, biocide, breaker, brine, corrosion inhibitor, crosslinker, demulsifier, friction reducer, gel, iron control, oxygen scavenger, pH adjusting agent, proppant, scale inhibitor, surfactant); and

- (b) the chemical compound name and the Chemical Abstracts Service (CAS) Registry number, as published by the Chemical Abstracts Service, a division of the American Chemical Society ([www.cas.org](http://www.cas.org)), for each constituent of the additive used. The rate or concentration for each additive shall be provided in appropriate measurement units (pounds per gallon, gallons per thousand gallons, percent by weight or percent by volume, or parts per million).

(3) The owner or operator may submit the service contractor's job log, final treatment report (without any cost/pricing data), or an owner or operator representative's well treatment job log or other report providing the above required information.

(4) The administrator may waive all or a portion of (2) or (3) of this rule if:

- (a) the owner or operator demonstrates that it has provided information to the Interstate Oil and Gas Compact Commission/Groundwater Protection Council hydraulic fracturing web site; or

- (b) other Internet information repositories that can be accessed by the public.

AUTH: 82-11-111, MCA

IMP: 82-11-111, MCA

#### NEW RULE III PROPRIETARY CHEMICALS AND TRADE SECRETS

(1) As provided in 82-11-117, MCA, where the use or composition of a chemical product is unique to the owner or operator or service contractor and would, if disclosed, reveal methods or processes entitled to protection as trade secrets such a chemical need not be disclosed to the board or staff. The owner, operator, or service contractor may identify the trade secret chemical or product by trade name, inventory name, or other unique name and the quantity of such constituent(s) used.

(2) If necessary to respond to a spill or release of a trade secret product the owner, operator, or service contractor must provide to the board or staff, upon request, a list of the chemical constituents contained in a trade secret product. The administrator may request information be provided orally or be provided directly to a laboratory or other third party performing analysis for the board.

(3) The owner, operator, or service contractor must also provide the chemical constituents of a trade secret product to a health professional who provides a written statement that knowledge of the chemical constituents of such product is needed for purposes of diagnosis or treatment of an individual and the individual being diagnosed or treated may have been exposed to the chemical concerned. The health professional may not use the information for purposes other than the health needs asserted in the statement of need, and may be required to execute a nondisclosure agreement.

(4) Where a health professional determines that a medical emergency exists and the chemical constituents of a trade secret product are necessary for emergency treatment, the owner, operator, or service contractor shall immediately disclose the chemical constituents of a product to that health professional upon a verbal acknowledgement by the health professional that such information shall not be used for purposes other than the health needs asserted and that the health professional shall otherwise maintain the information as confidential. The owner or operator or service contractor may request a written statement of need, and a confidentiality agreement from a health professional as soon as circumstances permit.

AUTH: 82-11-111, MCA

IMP: 82-11-111, MCA

NEW RULE IV SAFETY AND WELL CONTROL REQUIREMENTS – HYDRAULIC FRACTURING (1) New and existing wells which will be stimulated by hydraulic fracturing must demonstrate mechanical integrity.

(2) Prior to initiation of fracture stimulation, production casing or intermediate casing must be tested to the maximum anticipated treating pressure in the unsupported (uncemented) portion of the casing exposed to treating pressure. If the casing fails the pressure test it must be repaired or the operator must use a temporary casing string (fracturing string).

(a) A fracturing string must be stung into a liner or run on a packer set not less than 100 feet below the cement top of the production or intermediate casing and must be tested to not less than maximum anticipated treating pressure minus the annulus pressure applied between the fracturing string and the production or immediate casing.

(3) A casing pressure test will be considered successful if the pressure applied has been held for 15 minutes with no more than five percent pressure loss.

(4) A pressure relief valve(s) must be installed on the treating lines between pumps and wellhead to limit the line pressure to the test pressure determined above.

(5) The surface casing valve must remain open while hydraulic fracturing operations are in progress; the annular space between the fracturing string and the intermediate or production casing must be monitored and may be pressurized to a pressure not to exceed the pressure rating of the lowest rated component that would be exposed to pressure should the fracturing string fail.

AUTH: 82-11-111, MCA

IMP: 82-11-111, MCA

NEW RULE V WORK-OVER, RECOMPLETION, WELL STIMULATION – NOTICE AND APPROVAL (1) No well may be reperfored, recompleted, reworked, chemically stimulated, or hydraulically fractured without first notifying the board on Form No. 2 and receiving approval from the administrator or other authorized representative of the board. Within 30 days following completion of the well work, a subsequent report of the actual work performed must be submitted on Form No. 2.

(2) Well repairs, including tubing, pump, sucker rod replacement or repair, repairs and reconfiguration of well equipment which do not substantially change the mechanical configuration of the well bore or casing do not require prior approval or a subsequent report. Acid and chemical treatments of less than 5000 gallons, hot oil treatments, and similar treatments intended to clean perforations, remove scale or paraffin, or remedy near-well bore damage do not require prior approval.

AUTH: 82-11-111, MCA

IMP: 82-11-111, MCA

REASONABLE NECESSITY: New Rules I through V are reasonably necessary in order to address safety issues associated with techniques used for oil and gas well completions. These techniques include hydraulic fracturing, which has become more prevalent throughout the United States in recent years. The implementation of these rules will allow the Board of Oil and Gas Conservation to specifically address reporting regulations that will be applied to well completion

methods in conjunction with other oil and gas rules.

4. Concerned persons may submit their data, views, or arguments, either orally or in writing, at the hearing. Written data, views, or arguments may also be submitted to Tom Richmond, Department of Natural Resources and Conservation, 2535 St. Johns Avenue, Billings, MT 59102; telephone (406) 656-0040; fax (406) 655-6015; e-mail [FracComments@mt.gov](mailto:FracComments@mt.gov), and must be received no later than 5:00 p.m. on June 23, 2011.

5. Norman Peterson, Department of Justice Agency Legal Services, has been designated to preside over and conduct the public hearing.

6. An electronic copy of this Notice of Public Hearing on Proposed Adoption is available through the department's web site at <http://www.dnrc.mt.gov>. The department strives to make the electronic copy of this Notice of Public Hearing on Proposed Adoption conform to the official version of the notice, as printed in the Montana Administrative Register, but advises all concerned persons that in the event of a discrepancy between the official printed text of the notice and the electronic version of the notice, only the official printed text will be considered.

7. The department maintains a list of interested persons who wish to receive notices of rulemaking actions proposed by this agency. Persons who wish to have their name added to the list shall make a written request that includes the name, e-mail, and mailing address of the person to receive notices and specifies that the person wishes to receive notices regarding conservation districts and resource development, forestry, oil and gas conservation, trust land management, water resources, or a combination thereof. Notices will be sent by e-mail unless a mailing preference is noted in the request. Such written request may be sent or delivered to the contact person in 4 above or may be made by completing a request form at any rules hearing held by the department.

8. The bill sponsor contact requirements of 2-4-302, MCA, do not apply.

#### DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

/s/ Mary Sexton  
MARY SEXTON  
Director  
Natural Resources and Conservation

/s/ Tommy Butler  
TOMMY BUTLER  
Rule Reviewer

/s/ Terri Perrigo  
TERRI PERRIGO  
Executive Secretary  
Board of Oil and Gas Conservation

Certified to the Secretary of State on May 16, 2011.

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For questions regarding the content, interpretation, or application of a specific rule, please contact the agency that issued the rule. A directory of state agencies is available online at <http://www.mt.gov/govt/agencylisting.asp>.

For questions about the organization of the ARM or this web site, contact [sosarm@mt.gov](mailto:sosarm@mt.gov).

Attachment corrected /  
replaced, 11/3/2016

## **Summary of Cited Literature**

Review by Ben Jones, Petroleum Engineer

After reviewing the cited literature that was attached to the petition for rulemaking, it was determined that essentially only three papers had discussion that could be used to justify the rule suggestions in the petition. The three papers are Beak et al. 2015, DiGiulio and Jackson 2016, and Llewellyn 2015. A brief summary of each of these papers is below.

**Beak et al. 2015** – This paper examined an incident involving a blowout and parted casing that occurred during a multi-stage hydraulic fracture treatment in Killdeer, ND. It found that chemicals most likely related to the stimulation were detected in monitor wells drilled subsequent to the blowout. This event occurred prior to the Board’s current hydraulic fracturing rules and was considered in the drafting of the rules for safety and well control requirements related to hydraulic fracturing (ARM 36.22.1106).

**DiGiulio and Jackson 2016** – This paper evaluated the impact to Underground Sources of Drinking Water (USDW’s) as a result of acid stimulation and hydraulic fracturing in the Pavillion, WY, Field. The study suggests there was an impact to USDW’s due to a likely loss of zonal isolation during stimulation, upward solute migration to depths of current groundwater use, and legacy pit disposal practices. There have been numerous other studies on the subject that offer differing conclusions including one by the Wyoming DEQ that suggests the gas in the USDW’s was the result of upward gas seepage which could have been happening naturally before gas well development and it is unlikely that hydraulic fracturing fluids have risen to shallow depths intercepted by water supply wells.

**Llewellyn 2015** – This paper investigates a case where it was suspected that Marcellus Shale gas wells in PA caused inundation of natural gas and foam in initially potable groundwater. Through the investigation, they conclude that the data does not implicate upward flowing fluids along fractures from the target shale as the source of contaminates. The paper also suggest that shallow to intermediate depth contaminant flow paths are not limited to wells that are hydraulically fractured but can also occur in conventional wells. There have been other articles written that question much of the information in this paper that are worth looking at for viewpoints from both sides.

All three of these papers suggest that well construction is the key to preventing contamination, and without appropriate well construction, there might be issues whether the well is conventional or unconventional. In Montana well construction is considered at the time the well is permitted. Further discussion of these types of concerns can also be brought before the board through the board’s current permit notification rule and proposed homeowner notification rule.

The rest of the papers contain discussions of general health hazards that could be associated in some aspect to oil and gas development, however, they either don’t contain evidence to support that the current rules in Montana are inadequate or, that the rule changes suggested in the petition would resolve the issues presented in the papers. A brief overview of those papers can be found attached.

Below is a brief review of each of the references that were attached to the petition to support the statements regarding the hazards of hydraulic fracturing in the petition. The Board recognizes the public concern and potential hazards of the chemicals used in hydraulic fracturing operations and did adopt rules in August of 2011 to address these concerns.

**Casey et al. 2016** – This paper looked birth outcomes as it relates to unconventional natural gas development. The authors looked at health record data and the mother’s proximity to unconventional natural gas development to draw conclusions about the effect the drilling activity had on birth outcomes. The paper doesn’t provide any factual reasons to suggest the current hydraulic fracturing rules in Montana are inadequate or that the suggested rulemaking would resolve issues presented in paper.

**Colborn et al. 2011** – This paper looks at the chemicals in hydraulic fracturing fluid and the hazards associated with them. It does not provide evidence that there are any risks related to hydraulic fracturing operations, just that chemicals in frac fluid can be hazardous. It doesn’t provide any evidence that current chemical disclosure rules are inadequate.

**Haley et al. 2016** – The discussion in this paper suggests that presently utilized setbacks may leave the public vulnerable to explosions, radiant heat, toxic gas clouds, and air pollution from hydraulic fracturing activities. None of these issues can be address with the rulemaking petition.

**Hays and Shonkoff 2016** – This paper concludes there may be health risks associated with unconventional natural gas development based solely on the fact there is an increasing number of papers that suggest there may be health risks associated with unconventional natural development. It contains no science or facts that can be used to evaluate the merits of the rulemaking petition.

**Jemielita et al. 2015** – This paper suggests that hospital utilization rates increase as well density increases. The paper has no evidence to suggest the cause for its findings (water well contamination, air pollution, etc.). The paper doesn’t provide any factual reasons to suggest the current hydraulic fracturing rules in Montana are inadequate or that the suggested rulemaking would resolve issues presented in paper.

**Lund et al. 2015** – This paper gives a general overview of the hydraulic fracturing process in Montana as well as potential hazards. The paper references a National Groundwater Association study of 33 domestic and 25 production wells in the Williston basin for evidence of negative impacts from oil and gas activities. The study showed no water quality issues. This also leaves no reason to believe the current hydraulic fracturing rules in Montana are inadequate.

**McKenzie et al. 2014** - This paper observed an association between density and proximity of natural gas wells to birth defects. The paper seems to lean toward suggesting air pollution is the most likely cause. The paper doesn’t provide any factual reasons to suggest the current hydraulic fracturing rules in Montana are inadequate or that the suggested rulemaking would resolve issues presented in paper.

**Rabinowitz et al. 2015** – This paper looks at the proximity of natural gas wells to homes and how it relates to health status. The research in the paper was done through household surveys in Washington County, PA. Based on the survey results, the authors attempt to tie the health issues reported to a process of natural gas development without any supporting evidence stated. The paper doesn't provide any factual reasons to suggest the current hydraulic fracturing rules in Montana are inadequate or that the suggested rulemaking would resolve issues presented in paper.

**Webb et al. 2014** – This paper looks at the health hazards caused by chemicals found in fluids used with unconventional oil and gas operations by giving examples of negative health effects related chemicals caused in unrelated industries in different countries. There is no original evidence provided that shows actual negative health effects from unconventional oil and gas operations.

**Webb et al. 2016** – This paper looks at the effects unconventional oil and gas air pollution has among infants and children. Air pollution is not an issue that can be addressed by the request in the petition for rulemaking.