



WYOMING OIL AND GAS RULES AND REGULATIONS

WELL STIMULATION RULE OVERVIEW

15 September 2010
Effective Date



RULE AMENDMENT PROCESS

- The rule amendment process was initiated in mid-2009 upon direction to the Commission from the 2008 State Legislature to promulgate a carbon sequestration unitization rule.
- Additional rule amendments included updating and clarification of some of the existing rule language, clarification of the cementing requirements for the plug and abandonment of coalbed methane wells in the Powder River Basin, requirements for directional drilling reporting and certification, and expansion of existing requirements for well stimulation.
- Public comments were taken in writing for a 45-day period from February 4 through March 22, 2010, at an informal one-day public meeting on March 30, 2010, at a regularly scheduled formal Commission hearing on April 13, 2010, and due to those verbal comments, a additional 15-day public written comment period was provided to April 28, 2010.



RULE AMENDMENT PROCESS - continued

- The Commissioner's held a public working session May 10, 2010 and at the regularly scheduled Commission meeting May 11, 2010, continued the decision to adopt the Rule Amendments until the June 8, 2010 hearing. Rule Amendments were adopted June 8, 2010 by unanimous vote of the Commission.
- The Governor signed off on the rules August 16, 2010 and the rules were posed on the Secretary of State's web page on August 17, 2010.
- The final approved rules are posted on the web page, <http://wogcc.state.wy.us>, click on "Rules and Regulations" in the right hand column of the home page. Click on the Bucking Horse Icon "Download Rules and Regulations". Click on "Agency", scroll down to "Oil and Gas Conservation Commission" then select "Current Rules" then click "Search" to view the new rules. Chapter 3 Sections 8, 22 and 45 address Well Stimulation.
- The rules officially went into effect September 15, 2010.



BASIS FOR THE WELL STIMULATION RULES:

Four major issues were addressed:

1.the protection of groundwater and the identification of permitted water supply wells within $\frac{1}{4}$ mile of the drilling and spacing unit or Commission approved drilling unit;

2.clarification of requirements for well integrity, casing setting depths, casing design and cementing properties;

3.requirements for disclosure of well stimulation fluid chemical additives, compounds and concentrations or rates;

4.and requirements for the handling of the well stimulation load fluid recovered.



1) IDENTIFICATION OF PERMITTED WATER SUPPLY WELLS and PROTECTION OF GROUNDWATERS

Requires identification of all water supply wells permitted by the Wyoming Office of the State Engineer located within one-quarter mile of the drilling and spacing unit or the Commission approved drilling unit, whichever is less, and the depth from which water is being appropriated.



1) IDENTIFICATION OF PERMITTED WATER SUPPLY WELLS and PROTECTION OF GROUNDWATER (continued)

(iv) Formation depth, geological and hydrological detail from public records, published or otherwise known information of useable groundwater underlying the drilling and spacing unit or the Commission approved drilling unit. Consistent with Wyoming Department of Environmental Quality Chapter 8, as revised April 26, 2005, "Quality Standards for Wyoming Groundwaters," and for purposes of these rules, groundwater will be protected, except for Class VI Groundwater of the State that is unusable or unsuitable for use:

(A) Due to excessive concentrations of total dissolved solids or specific constituents; or

(B) Is so contaminated that it would be economically or technologically impractical to make water useable; or

(C) Is located in such a way, including depth below the surface, so as to make use economically and technologically impractical.



2) DEMONSTRATE WELL BORE INTEGRITY

- Provide proposed casing program, including size, anticipated setting depths, API grade, weight per foot, burst pressure, tensile strength for both body and joint, yield pressure, if new or used casing is planned for the well, and other information required by the Supervisor. Note that prior approval of the Supervisor is required for use of non-API tubular.
- Description, type and setting depths of isolation techniques if used in openhole and uncemented liner stimulations in high angle and horizontal wells.
- Description of the cementing program, including API class of cement, additives to be used, slurry density to be mixed, estimated volumes to be used, including percent of excess volume. For openhole completions, similar information is required for the cement program above the completed interval. The Supervisor must be notified of the intent and give prior approval for the use of non-API class cement and additives.



2) DEMONSTRATE WELL BORE INTEGRITY - WELL INTEGRITY - SURFACE CASING

- Surface casing shall be run to reach a depth below all known or reasonably estimated utilizable groundwater (as defined in Chapter 3 Section 8(c)(iv) to protect the Use Class category and to prevent blowouts or uncontrolled flows.
- Unless otherwise approved by the Supervisor, surface casing shall be set at a minimum of three (3) joints or approximately one hundred (100) to one hundred twenty (120) feet below the depth of any Wyoming Office of State Engineer permitted water supply wells designated for domestic, stock water, irrigation or municipal use, within a minimum of one-quarter (1/4) mile radius and shall be cemented to surface. Any coalbed methane well receiving a Ground Water Appropriate Permit (Form UW 5) from the State Engineer's Office is exempt from this specific subsection.
- Fresh water flows detected during drilling including seismic, core, or other exploratory holes shall be recorded on Form 19 (Report of Fresh Water Flows) and reported to the Commission on the next business day. Information contained on the form shall describe the depth at which the sand was encountered, the thickness, and the rate of water flow, if known.



2) DEMONSTRATE WELL BORE INTEGRITY - WELL INTEGRITY - SURFACE CASING (continued)

- Fresh water flows detected during drilling including seismic, core, or other exploratory holes shall be recorded on Form 19 (Report of Fresh Water Flows) and reported to the Commission on the next business day. Information contained on the form shall describe the depth at which the sand was encountered, the thickness, and the rate of water flow, if known.
- In areas where pressures and formations are unknown, surface casing shall be of sufficient size to permit the use of an intermediate string or strings of casing.
- Surface casing shall be set in or through an impervious formation and shall be cemented by the pump and plug or displacement or other approved method with sufficient cement to fill the annulus to the top of the hole, all in accordance with reasonable requirements of the Supervisor. The Supervisor may require the Owner or Operator to pump a specified quantity of excess cement above the design volume if severe washed out hole conditions are known to exist on the surface hole portion of wells in the immediate vicinity of the well to be drilled.



2) DEMONSTRATE WELL BORE INTEGRITY - WELL INTEGRITY - SURFACE CASING (continued)

- If cement is not circulated to the surface during the primary operation, the Owner/Operator shall perform supplemental cementing operations to assure that the annular space from the casing shoe to the surface is filled with cement.
- The Supervisor may require the Owner or Operator to provide cased hole bond logs to be run for casing strings to demonstrate isolation from the placement of cement across and above the productive intervals or above the last casing shoe in the well, if there is a demonstrated reason to believe an inadequate cement job was performed.
- 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). (Chapter 3 Section 45)



3) DISCLOSURE OF WELL STIMULATION FLUIDS - Plans

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);



3) **DISCLOSURE OF WELL STIMULATION FLUIDS - Plans**

(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);



3) DISCLOSURE OF WELL STIMULATION FLUIDS - Plans

(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.



3) DISCLOSURE OF WELL STIMULATION FLUIDS – Plans - CONFIDENTIALITY

(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, the protection shall be provided consistent with Wyo. Stat. Ann. § 15-4-203(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.”



3) DISCLOSURE OF WELL STIMULATION FLUIDS - Plans - RESTRICTIONS

(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.



3) DISCLOSURE OF WELL STIMULATION FLUIDS - Plans - CASING PRESSURE MONITORING – During Well Stimulation

(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).



3) **DISCLOSURE OF WELL STIMULATION FLUIDS – Post Stimulation**

(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.



4) WELL STIMULATION FLUID LOAD RECOVERY – Post Stimulation

(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.