

Railroad Commission of Texas Rulemaking Update

**GWPC Underground Injection
Control Conference**

January 2014

Leslie Savage, Railroad Commission of Texas

Texas E&P Overview

- +1.25 wells drilled since 1866
- Depths of 100 to +30,000 feet
- 238/254 counties
- #1 US Producer:
 - 1/3rd total domestic oil
 - 1/3rd total domestic gas
- \$115 billion to TX economy



RRC JURISDICTION

- Well spacing, density, drilling, completion (including HF), production, and plugging
- Pipelines
- Safety
- Waste management :
 - Storage
 - Transport
 - Disposal
 - NORM disposal

NOT RRC JURISDICTION

- **Traffic**
- **Noise**
- **Scenic impact**
- **Property values**
- **Zoning**

SOME RRC JURISDICTION

- **Water Use**
 - RRC: Encourage and regulate recycling
 - TCEQ: Temporary surface water rights
 - TCEQ/TWDB/GCDs: Groundwater withdrawal
- **Air**
 - RRC: Flaring/venting/H₂S (safety)
 - TCEQ/EPA: Pollutant emissions

Hydraulic Fracturing

**Practiced since early
1950s**

**First large scale Barnett
Shale hydraulic
fracturing stimulation:
1986**

**Approximately 85% of
all wells fracture
stimulated**



HYDRAULIC FRACTURING

- ❖ **Deep Formations** – Deeper than 1 mile
- ❖ **Shallow groundwater** – less than 1000 feet
- ❖ **Operator incentives to carefully design fracture program**
 - ❖ Cost of wells
 - ❖ Minimization of wastewater
 - ❖ Maximization of production
 - ❖ Protection of well and formation

RRC RULEMAKING

- **SWR 29: HF chemical disclosure**
- **SWR 13: Well completion**
- **SWR 8/Chapter 4, Subchapter B:
Recycling**
- **SWR 9/46: Disposal/Injection Wells**

HB 3328 – CHEMICAL DISCLOSURE

RRC Rules:

- **Use of FracFocus**
- **Service companies to supply information**
- **Allow Trade Secrets**
- **Limited challenges to Trade Secret**
- **Provide information to emergency responders and health professionals**



SWR 29 – CHEMICAL DISCLOSURE

- **Definitions**
- **Applicability**
- **Required disclosures**
- **Disclosures not required**
- **Trade Secret protection**
- **Trade Secret challenge**
- **Trade Secret confidentiality**
- **Penalties**



SWR 29 – CHEMICAL DISCLOSURE

Applicability

HF Treatment performed on a well for which RRC has issued initial drilling permit on or after February 1, 2012



SWR 29 – CHEMICAL DISCLOSURE

- **MSDS Chemicals**
 - **Provide all information requested by FracFocus**
- **Non-MSDS Chemicals**
 - **Provide chemical names and CAS#**



Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration In Additive (% by mass)**	Maximum Ingredient Concentration In HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water	7732-18-5	100.00%	83.89991%	
Frac-336 1000	Baker Hughes	Biocide	2,2-Dibromo-3-Nitropropionamide	10222-21-2	100.00%	0.00777%	
			Water	7732-18-5	5.00%	0.00039%	
Alpha 452	Baker Hughes	Biocide	Tetrakis(hydroxymethyl) Phosphonium Sulfate	55968-30-8	40.00%	0.01006%	
Enzyme G-I	Baker Hughes	Breaker	Hemicellulase Enzyme Concentrate	9025-56-3	3.00%	0.00108%	
			Water	7732-18-5	97.00%	0.03500%	
GBW-23L	Baker Hughes	Breaker	Magnesium Hydroxide	1309-43-8	5.00%	0.00188%	
			Magnesium Oxide	1309-48-4	2.00%	0.00075%	
			Magnesium Peroxide	14452-57-4	3.00%	0.00113%	
			White Mineral Oil	8042-47-5	91.00%	0.03419%	
BF-3L, 55 gal drum	Baker Hughes	Buffer	Potassium Carbonate	554-26-7	80.00%	0.03239%	
			Potassium Hydroxide	1310-58-3	30.00%	0.01820%	
XLW-30AQ, tote	Baker Hughes	Crosslinker	Hydrotreated Light Distillate	64742-47-8	70.00%	0.04464%	
XLW-32	Baker Hughes	Crosslinker	Boric Oxide	1303-86-2	20.00%	0.00191%	
			Methanol	67-56-1	90.00%	0.00860%	
GW-3LDF	Baker Hughes	Gelling Agent	Guar Gum	9000-30-0	40.00%	0.21827%	
			Petroleum Distillate Blend	CB1	70.00%	0.37848%	
NE-300, tote	Baker Hughes	Non-emulsifier	Methanol	67-56-1	30.00%	0.01205%	
			Nonyl Phenyl Polyethylene Glycol Ether	9016-45-9	10.00%	0.00402%	
Sand, White, 40/70	Baker Hughes	Proppant	Crystalline Silica (Quartz)	14808-60-7	100.00%	4.70068%	
Mg Light, 20/40	Baker Hughes	Proppant	Magnesium Iron Silicate	1317-71-1	10.00%	0.95537%	
			Magnesium Silicate	1343-88-0	60.00%	5.73223%	
			Silicon Dioxide (Amorphous As Glass)	7631-86-9	40.00%	3.82149%	
ScaleSorb 3, (25# pail)	Baker Hughes	Scale Inhibitor	Amino Tri (Methylene Phosphonic Acid)	6419-19-8	30.00%	0.00583%	
			Calcined Diatomaceous Earth	91053-36-3	100.00%	0.01943%	
			Crystalline Silica Quartz	14808-60-7	1.00%	0.00019%	
			Phosphonic Acid	13598-36-2	1.00%	0.00019%	
INFlo 250W	Baker Hughes	Surfactant	2-Butoxyethanol	111-76-2	20.00%	0.00800%	
			Methanol	67-56-1	30.00%	0.01335%	
			Surfactants	CB1	80.00%	0.03560%	
Additional Components							
			Alkyl Benzenesulfonic Acid	88584-22-5			
			Boric Anhydride	1303-86-2			
			Copolymer	CB1			
			Crystalline Silica	14808-60-7			
			Ethylene Glycol Monobutyl Ether	111-76-2			
			Hydrotreated Light Distillate	64742-47-8			
			Methanol	67-56-1			
			Modified Amide	88442-77-3			
			Poly (oxy-1,2-ethanediyl)	24938-91-8			
			Propylene Carbonate	108-32-7			
			Quaternary Ammonium Compounds bis(Hydrogenated Tallow Alkyl) Dimethyl Salts With Bentonite	88953-58-2			
			Sodium Sulfate	7757-82-6			
			Sodium mon(2-dodecyl) Disulfonated Diphenyl Oxide	119345-04-9			
			Sodium tetraborate	1330-43-4			
			Water	7732-18-5			

Classic FracFocus Template, MSDS Ing.

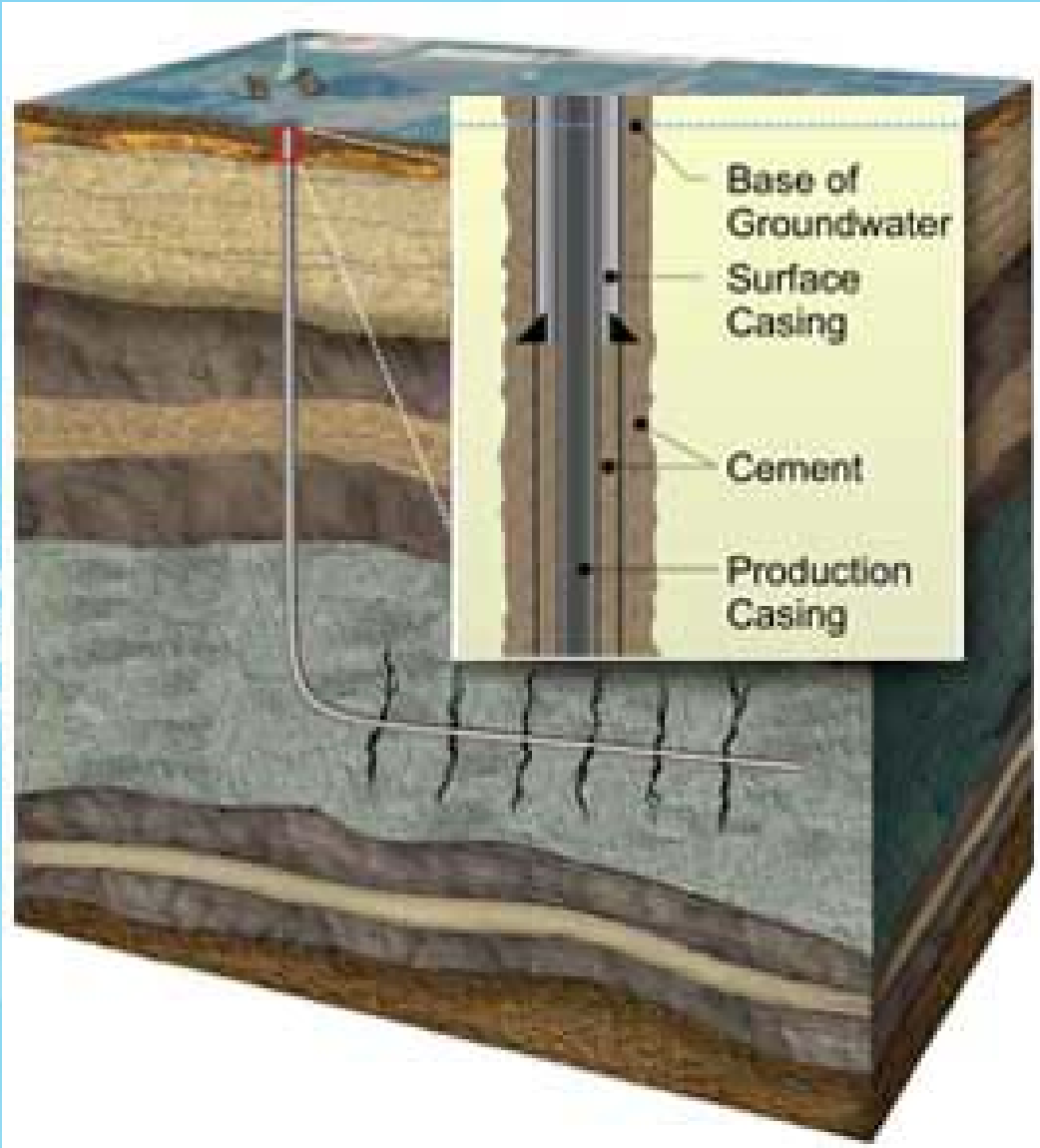
Non-MSDS Ingredient

WELL COMPLETION

- **Surface casing and cement**
- **Production casing and cement**
- **Tubing and packer**
- **Casing pressure testing**
- **Well control at all times**
- **Quality cement; testing**
- **Centralizers**



Protected Ground Water



- Surface casing set and cemented thru deepest useable water quality aquifer
- Depth of protected ground water defined by RRC GAU on a well by well basis

SWR 13 – Casing, Cementing, Completion Requirements

- **Amendments:**
 - **Transfer of TCEQ Surface Casing Section to RRC Groundwater Advisory Unit**
 - **Update references to standards**
 - **Update requirements for drilling, casing, cementing, well control, and fracture stimulation**



SWR 13 – Casing, Cementing, Completion Requirements

- **Define “usable quality water”**
- **Require isolation of “potential flow zones” and “zones with corrosive formation fluids”**
- **Require integrity testing of surface casing after drillout after reaching total depth or the depth of the next casing string if rotating hours greater than 360 hrs**

SWR 13 – Casing, Cementing, Completion Requirements

- **Requirements for well on which hydraulic fracturing treatment(s) (HFT) will be performed:**
 - **Standards for internal yield pressure rating of casing**
 - **Pressure test casing**
 - **Monitor all annuli during HFT**
 - **Notify RRC if pressures deviate**

SWR 13 – Casing, Cementing, Completion Requirements

- **Requirements for “minimum separation wells” - distance between protection depth and top of FM to be fractured < 1000 feet or inadequate separation, or structurally complex geologic setting;**
 - **All requirements for HFT wells**
 - **Cement evaluation**
 - **Notify RRC if results indicate insufficient isolation**



Recycling Regulations

- **Amendments adopted March 26, 2013:**
 - **Authorize certain on-lease, non-commercial recycling of hydraulic fracturing flowback fluid, with conditions**
 - **Clarify permitting requirements for commercial or centralized recycling of hydraulic fracturing flowback fluid**

Recycling Regulations

- **Authorized Reuse:**
 - Reuse as makeup water or other use in the wellbore of an oil, gas or geothermal well
 - Reuse in any other manner pursuant to a permit issued by another state or federal agency
 - Any reuse if water distilled
 - No discharge to waters of the state without permit



RECYCLING???



SWR 9/46 – Disposal/Injection Wells

- **Proposed amendments:**
 - **Clarification of existing requirements**
 - **Notice**
 - **Amendment of existing permits**
 - **Special conditions for certain areas**
 - **All wells w/in AoR have adequate and properly placed cement to ensure confinement of injected fluids within permitted interval**
 - **No automatic transfer of commercial disposal well permits**



SWR 9/46 – Disposal/Injection Wells

- **CLEARLY STATES INTENT:**
 - Confine injected fluids to permitted interval;
 - Isolate UQW to prevent contamination and harm from migration of injected fluids or displaced formation fluids;
 - Isolate potential productive and flow zones to prevent vertical migration of fluids behind the casing; and
 - Ensure injection of fluids will not endanger USDWs or human health and safety.

SWR 9/46 – Disposal/Injection Wells

- **New definitions:**

- **Groundwater Advisory Unit**
- **Orphaned well**
- **Protection depth**
- **Potential flow zone**
- **Usable quality water (UQW)**
- **Underground source of drinking water (USDW)**

SWR 9/46 – Disposal/Injection Wells

- **PERMIT EXPIRATION**

- A disposal well permit with a stated term expires on the last day of that term.
- Permits w/o stated term expire 2-3 years after permit issuance if operator has not spudded the well, or, in the case of the conversion of an existing well, the operator has not commenced operations on the well specific to the conversion of the well to injection.

SWR 9/46 – Disposal/Injection Wells

- **GEOLOGICAL REQUIREMENTS**

- **Impervious strata adequate to protecting UQW and USDWs**

- **Minimum of 250 feet of impermeable strata between the base of UQW and the top of the injection interval, of which at least one zone has a continuous thickness of at least 100 feet**
 - **Minimum of 100 feet of continuous impermeable strata between the base of the deepest USDW and the top of the injection interval.**

SWR 9/46 – Disposal/Injection Wells

- **GEOLOGICAL REQUIREMENTS**

- **Groundwater Protection Determination:**

- **Injection into formation will not endanger UQW in the area**
 - **Formations to be used for disposal are not USDWs**

SWR 9/46 – Disposal/Injection Wells

- **NOTICE:**

- On or not more than 30 days before applicant files

- Additional entities to be notified:

- Operator of any well with an unexpired drilling permit located w/in ½-mile of proposed disposal well
- For all tracts w/in ½-mile of the proposed well, lessees of record for tracts that have no designated operator and all owners of record of unleased mineral interests
- Groundwater Conservation District



SWR 9/46 – Disposal/Injection Wells

- **SUBSEQUENT COMMISSION ACTION**

- Clarifies RRC can modify, suspend or terminate permit if:
 - Continued operation of the well likely to endanger USDWs or human health or safety
 - Applicant provided incorrect information
 - Applicant failed to provide the required notice
- Transfer of commercial disposal well would require written approval by director after an inspection and a review that confirms compliance with a permit and Commission rules

SWR 9/46 – Disposal/Injection Wells

- **AREA OF REVIEW (AoR)**

- Review of ALL wells that penetrate the top of the proposed disposal interval within 1/4 mile to determine if wells are completed to prevent the movement of fluids from the disposal interval into UQW.
- Wells that penetrate the proposed disposal interval within a 1/4 mile radius must be cemented across the injection interval to prevent movement of fluids from the disposal interval into UQW.
- Director cannot approve a permit application for a disposal well for which the AoR includes any orphaned wells that penetrate the top of the proposed injection interval.

SWR 9/46 – Disposal/Injection Wells

- **CASING AND CEMENT**

- Compliance with SWR13 and such that injected fluids will not endanger oil, gas, geothermal resources or USDWs
- Director cannot approve permit application for:
 - any well in which the surface casing is not set and cemented from the ground surface to the BUQW
 - any well in which the casing is not cemented across and extending above the base of the deepest USDW

SWR 9/46 – Disposal/Injection Wells

- **Clearly states if well fails integrity testing:**
 - Shut in
 - Remediate
 - Re-test
 - **Get RRC approval before recommencing injection**

SWR 9/46 – Disposal/Injection Wells

- **INCORPORATES PERMIT CONDITIONS AND ADDS:**
 - Additional logging requirements
 - Additional commercial well requirements:
 - Lined secondary containment for tanks at commercial disposal wells
 - On-site sewage system

Leslie Savage, P.G.
Chief Geologist
Oil & Gas Division
Railroad Commission of Texas
Leslie.savage@rrc.state.tx.us

However beautiful the strategy,
you should occasionally look at the results.

Winston Churchill

