BLM Update - Proposed Hydraulic Fracturing Rule and Additional Environmental Data Requirements*

Jeff Prude¹

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Abstract

BLM recognizes and understands the public's concerns related to hydraulic fracturing. In May 2012, the Bureau of Land Management (BLM) published in the Federal Register a proposed rule entitled Oil and Gas; Well Stimulation, Including Hydraulic Fracturing, on Federal and Indian Lands. The BLM used the comments on that draft to make improvements, and in May 2013, published a revised proposed rule incorporating those comments. Key issues in the updated draft included: the use of an expanded set of cement evaluation tools to help ensure that usable water zones have been isolated and protected from contamination; and more detailed guidance on how trade secrets claims will be handled, modeled on the procedures promulgated by the State of Colorado. The revised proposed rule also provided opportunities for the BLM to coordinate standards and processes with individual States and tribes to reduce administrative costs and to improve efficiency. After receiving more than 1.35 million comments on that revised proposed rule, BLM is currently preparing a final rule that will consider the additional comments. A final rule is expected to be published January 2015.

In addition, to facilitate a more thorough analysis of effects of these activities on public lands, BLM California has begun asking oil and gas operators for additional data to be incorporated into Applications for Permits to Drill (APDs). These data include information related to water management (aquifers, volumes and source of fluids, along with disposal of flowback fluids) and air quality.
BLM Update
Proposed Hydraulic Fracturing Rule
and
Additional Environmental Data Requirements

2014 Pacific Section AAPG – Joint Annual Meeting

U. S. Department of the Interior
Bureau of Land Management – www.blm.gov
jprude@blm.gov
Significant Management Issues

- Meeting the Nation’s Energy Needs
- Stewardship of National Landscape Conservation System Lands
- Management of Special Areas
- Land Use Planning
- Management of T&E and Special Status Species
- Recreation and Transportation
- Fire Management
Minerals Overview

• BLM Manages Mineral estate on 700 million acres of Public Land (47 million in CA)
• Largest Mineral owner in the U.S.
• Multiple Use Mandate
• Objective: Promote environmentally responsible energy development
BLM Bakersfield Field Office
Minerals Division

• Oil and gas operations statewide
  – Down hole Permitting, inspection and enforcement on all federal leases including leases on Forest Service lands

• 22 oil and gas employees- (Petroleum Engineers, Geologists, Realty Specialists, HazMat Specialists, Petroleum Engineering Technicians)
California Operations

- 8% Federal – 92% Fee
- Oil and gas operations focused in California’s Central Valley
  (Bakersfield Field Office)
- Largely mature oil fields
  - Very close well spacing
  - Very large % in tertiary (steam) recovery
BLM Oil and Gas Properties in California

• 230 producing leases with nearly 9,000 wells

• This year federal leases in CA are averaging over 44,000 bbls of oil and 19 million cubic feet of natural gas per day.

• Several BLM leases in CA are among the highest producing onshore federal leases in the lower 48
Other Regulatory Guidance and Orders

- Rules and Policy driven by
  - Audits, primarily GAO and OIG plus internal reviews
  - Litigation
- Updates underway – largely 1980’s and 90’s guidance
  - Onshore Order 1 (Approval of Operations, 2007)
  - Onshore Order 2 (Drilling)
  - Onshore Orders 3 (Site Security),
  - Onshore Order 4 (Oil Measurement)
  - Onshore Order 5 (Gas Measurement)
  - Onshore Order 6 (Hydrogen Sulfide Operations)
  - Onshore Order 7 (Disposal of Produced Water)
  - Onshore Order 9 (Beneficial Use and Emission Reduction)
Oil and Gas Activity Areas

Producing Oil Wells
Producing Gas Wells
Producing Oil and Gas Wells
BLM Surface and Minerals
BLM Minerals
Indian Trust Lands
Water

Map showing the distribution of oil and gas activity areas across the United States.
A Game Changer for Domestic Energy

- World’s major gas reserves:
  - Qatar                1200 TCF
  - Russia                400 TCF
  - US Marcellus      300 TCF
  - US Haynesville   250 TCF
  - US Eagle Ford (emerging)
  - US Niobrara     (emerging)

- Bakken Shale (N.D.)
  - Largest US oil discovery since Alaska at 3.6B bbls

- US is global leader in shale technology & development and in proven gas reserves!
Outline

- Basic wellbore construction
- Hydraulic fracturing – why and how
- Major areas of concern
- Federal regulations, current and proposed
Basic Wellbore Construction
Shale and Hydraulic Fracturing
Permeability

Aquifer

Oil and Gas Formation
No Permeability

Aquifer

Oil and Gas Formation
Typical Layout in Fracturing Operation
Roughly 200 tanker trucks deliver water for the fracturing process.

A pump truck injects a mix of sand, water, and chemicals into the well.

Natural gas flows out of well.

Recovered water is stored in open tanks, then taken to a treatment plant.

Storage tanks

Natural gas is piped to market.

Hydraulic fracturing involves the injection of more than a million gallons of water, sand, and chemicals at high pressure down and across into horizontally drilled wells as far as 10,000 feet below the surface. The pressurized mixture causes the rock layer, in this case the Marcellus Shale, to crack. These fissures are held open by the sand particles so that natural gas from the shale can flow up the well.
Common Concerns

- Aquifer contamination
- Surface contamination
- Disclosure
Aquifer

Cement Bond Log/Cement Evaluation Tool

Surface Casing

Intermediate Casing

Oil and Gas Formation
Aquifer

Cement Bond Log/Cement Evaluation Tool

Surface Casing

Intermediate Casing

Oil and Gas Formation
Common Concerns

- Aquifer contamination
- Surface contamination
- Disclosure
Typical Layout in Fracturing Operation
<table>
<thead>
<tr>
<th>Chemicals</th>
<th>Chemicals</th>
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<tbody>
<tr>
<td>Hydrochloric Acid</td>
<td>Isopropanol</td>
</tr>
<tr>
<td>Glutaraldehyde</td>
<td>Methanol</td>
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<tr>
<td>Quaternary Ammonium Chloride</td>
<td>Formic Acid</td>
</tr>
<tr>
<td>Quaternary Ammonium Chloride</td>
<td>Acetaldehyde</td>
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<tr>
<td>Tetrakis Hydroxymethyl-Phosphonium Sulfate</td>
<td>Petroleum Distillate</td>
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<tr>
<td>Ammonium Persulfate</td>
<td>Hydrotreated Light Petroleum Distillate</td>
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<tr>
<td>Sodium Chloride</td>
<td>Potassium Metaborate</td>
</tr>
<tr>
<td>Magnesium Peroxide</td>
<td>Triethanolamine Zirconate</td>
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<tr>
<td>Magnesium Oxide</td>
<td>Sodium Tetraborate</td>
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<td>Calcium Chloride</td>
<td>Boric Acid</td>
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<tr>
<td>Choline Chloride</td>
<td>Zirconium Complex</td>
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<tr>
<td>Tetramethyl ammonium chloride</td>
<td>Borate Salts</td>
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<tr>
<td>Sodium Chloride</td>
<td>Ethylene Glycol</td>
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<td>Methanol</td>
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<tr>
<td></td>
<td>Polyacrylamide</td>
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<tr>
<td>Hydrotreated Light Petroleum Distillate</td>
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<td>Sodium Hydroxide</td>
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<tr>
<td>Methanol</td>
<td>Potassium Hydroxide</td>
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<tr>
<td>Ethylene Glycol</td>
<td>Acetic Acid</td>
</tr>
<tr>
<td>Guar Gum</td>
<td>Sodium Carbonate</td>
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<tr>
<td>Petroleum Distillate</td>
<td>Potassium Carbonate</td>
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<tr>
<td>Hydrotreated Light Petroleum Distillate</td>
<td>Copolymer of Acrylamide and Sodium Acrylate</td>
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<tr>
<td>Petroleum Distillate</td>
<td>Sodium Polycarboxylate</td>
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<tr>
<td>Methanol</td>
<td>Phosphonic Acid Salt</td>
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<tr>
<td>Polysaccharide Blend</td>
<td>Lauryl Sulfate</td>
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<tr>
<td>Ethylene Glycol</td>
<td>Ethanol</td>
</tr>
<tr>
<td>Citric Acid</td>
<td>Naphthalene</td>
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<tr>
<td>Acetic Acid</td>
<td>Methanol</td>
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<tr>
<td>Thioglycolic Acid</td>
<td>Isopropyl Alcohol</td>
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<tr>
<td>Sodium Erythorbate</td>
<td>2-Butoxyethanol</td>
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<tr>
<td>Lauryl Sulfate</td>
<td></td>
</tr>
<tr>
<td>Isopropanol</td>
<td></td>
</tr>
</tbody>
</table>
Purpose of Chemical Additives

- Dissolve scale
- Eliminate bacteria
- Delay breakdown of fluid
- Prevent clays from swelling or shifting
- Inhibit corrosion
- Maintain viscosity under high temperature
- Reduce friction
- Thicken the water
- Prevent precipitation of metals
- Prevent formation of emulsions
- pH control
- Inhibit scale buildup
- Stabilize other chemicals
Common Concerns

• Aquifer contamination
• Surface contamination
• Disclosure
Welcome to FracFocus 2.0! We’re excited about our latest upgrades designed to dramatically enhance the site's functionality for the public, state regulatory agencies and industry users. Our user-friendly 'Find A Well' chemical disclosure registry now includes more extensive search options.

FracFocus continues to evolve and expand, adding more participating companies and reported wells from across the country. Our continued success is the result of nationally recognized organizations working with state governments and the oil and natural gas industry to provide public transparency.
### Hydraulic Fracturing Fluid Product Component Information Disclosure

<table>
<thead>
<tr>
<th>Fracture Date</th>
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<tr>
<td>State</td>
<td>California</td>
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<tr>
<td>County</td>
<td>Kern</td>
</tr>
<tr>
<td>API Number</td>
<td>04-030-41628</td>
</tr>
<tr>
<td>Operator Name</td>
<td>ExxonMobil Corporation</td>
</tr>
<tr>
<td>Well Name and Number</td>
<td>Hill 631D</td>
</tr>
<tr>
<td>Longitude</td>
<td>-119.755625</td>
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<tr>
<td>Latitude</td>
<td>35.483473</td>
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<tr>
<td>Long/Lat Projection</td>
<td>WGS84</td>
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<tr>
<td>True Vertical Depth (TVD)</td>
<td>2,917</td>
</tr>
<tr>
<td>Total Water Volume (gal)*</td>
<td>252,840</td>
</tr>
</tbody>
</table>

### Ingredients

<table>
<thead>
<tr>
<th>Component</th>
<th>(% by mass)**</th>
<th>(% by mass)***</th>
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</thead>
<tbody>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>100.00%</td>
</tr>
<tr>
<td>Sand</td>
<td>Crystalline Silica (quartz)</td>
<td>14808-86-7</td>
</tr>
<tr>
<td>GW3-LDF</td>
<td>Geliant - Water</td>
<td>Proprietary</td>
</tr>
<tr>
<td>XLW-32</td>
<td>BJ Services</td>
<td>Cross Linker</td>
</tr>
<tr>
<td>BF-7L</td>
<td>Methanol</td>
<td>67-56-1</td>
</tr>
<tr>
<td>ENZYME G Conc (GBW-12 CD)</td>
<td>Potassium Carbonate</td>
<td>594-08-7</td>
</tr>
<tr>
<td>KCL</td>
<td>Hemicellulase Enzyme</td>
<td>N.A.</td>
</tr>
<tr>
<td>GBW-5</td>
<td>Potassium Chloride</td>
<td>7447-40-7</td>
</tr>
<tr>
<td>XCIIDE-207</td>
<td>Ammonium Persulfate</td>
<td>7727-64-0</td>
</tr>
<tr>
<td>5-chloro-2methyl-4-isothiazole-3-one</td>
<td>28172-55-4</td>
<td>10.00%</td>
</tr>
<tr>
<td>2-Methyl-4-isothiazole-3-one</td>
<td>2862-20-4</td>
<td>5.00%</td>
</tr>
<tr>
<td>Magnesium nitrate</td>
<td>10377-80-3</td>
<td>10.00%</td>
</tr>
<tr>
<td>Magnesium chloride</td>
<td>7766-30-3</td>
<td>5.00%</td>
</tr>
<tr>
<td>Diatomaceous earth, calcined</td>
<td>51053-36-3</td>
<td>80.00%</td>
</tr>
<tr>
<td>Crystalline silica: cristobalite</td>
<td>14464-46-1</td>
<td>1.00%</td>
</tr>
<tr>
<td>Crystalline silica: Quartz (SiO2)</td>
<td>14808-86-7</td>
<td>1.00%</td>
</tr>
<tr>
<td>ENZYME 0-1</td>
<td>Baker Hughes</td>
<td>Special Breaker</td>
</tr>
</tbody>
</table>
Current Regulations (43 CFR 3162.3-2)

Approval only required for “non-routine” fracturing jobs
Proposed Regulations

Round 1
• **May 2012**: Proposed regulations published for Tribal and Federal Land
• **September 2012**: Close of public comment period
• **October 2012 – May 2013**: Respond to 177,000 comments received; Revise proposed rule

Round 2
• **June - August 2013**: Public comment period
• **Sept. 2013 to present**: Review 1.35 million comments received
Proposed Regulations (Round 1)

• All stimulation must be approved
• Cement bond log required on every well
• Aquifers < 10,000 TDS must be protected
• Mechanical integrity test required
• Monitor during HF
• Flow-back fluid stored in tanks or lined pits
• Application must disclose chemical compositions, water management, fracture lengths...
Proposed Regulations (Round 2)

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Proposed Regulations (Round 2)

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- Cement bond log required on “type wells”
- Aquifers < 10,000 TDS must be protected
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- Monitor during HF
- Flow-back fluid stored in tanks or lined pits
- Application must disclose chemical compositions, water management, fracture lengths…
Proposed Regulations (Round 2)

- All fracturing must be approved
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- Aquifers < 10,000 TDS must be protected (with exceptions)
- Mechanical integrity test required
- Monitor during HF
- Flow-back fluid stored in tanks or lined pits
- Application must disclose chemical compositions, water management, fracture lengths…
Proposed Regulations (Round 2)

• All fracturing must be approved
• Cement bond log required on “type wells”
• Aquifers < 10,000 TDS must be protected (with exceptions)
• Mechanical integrity test required
• Monitor during HF
• Flow-back fluid stored in tanks or lined pits
• Application must include water management, fracture lengths…
Proposed Regulations (Round 2)

• Waivers may be granted to allow acceptance of individual State or Tribal regulations
Best Management Practices (BMP)

It is the BLM’s policy to require state-of-the-art mitigation measures.

Minimize Footprint

Reduce Contrast

www.blm.gov/bmp

Improve Reclamation
California is different
Current Status of Proposed Hydraulic Fracturing Rule

• If you would like to help us sort through 1.35 million comments . . .
• Estimated completion date January 2015
Questions? Comments?
APD and Sundry Notice Procedures

Jeff Prude
Field Office O&G Program Lead
jprude@blm.gov
661-391-6140
Applications For Permit To Drill (APD)

Sundry Notices
Knowledge of Federal Regulations

- Code of Federal Regulations (43CFR)
- Onshore Oil and Gas Orders (1-7)
Onshore Order 1

Provides the requirements for approval of Applications for Permit to Drill (APD) wells on federal lands.
Application for Permit to Drill

An APD Package must include the following:

1. A Completed Form 3160-3
2. Well Plat with location in:
   a. Feet along section/property lines
   b. NAD83 format (lat/long in decimal degrees)
3. 9-Point Drilling Program
4. 12-Point Surface Use Program
5. Bonding (Lease bond and Surface Bond)
6. $6500 APD Fee (current as of 4-29-2014)
7. Operator Certification
Application for Permit to Drill (APD)

FORM 3160-3
**Application for Permit to Drill (APD)**

<table>
<thead>
<tr>
<th>UNITED STATES DEPARTMENT OF THE INTERIOR</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUTHWEST LAND MANAGEMENT</td>
<td></td>
</tr>
<tr>
<td>APPLICATION FOR PERMIT TO DRILL OR REENTER</td>
<td></td>
</tr>
</tbody>
</table>

**In:** Type of Work: **Drill**

**In:** Type of Well: **On Well**

**In:** Name of Operator

**In:** Address

**In:** Location of Well (Report location clear and in accordance with any State requirements):
- As surface
- As proposed depth

**In:** Distance from proposed location to nearest other well

**In:** No. of Acreages

**In:** Spacing Unit indicated to the well

**In:** Proposed Depth

**In:** HMRHA Bond No. on file

**In:** Elevations (Show whether OS, OI, OII, etc.)

**In:** Appropriate state work milestone

**In:** Estimated duration

**In:** Attachments
- The following completed in accordance with the requirements of Section 8 and OGS Order 8 (b) shall be attached to this form:
  1. Well plan certified by a registered seismologist.
  2. ADetailed Plans.
  3. ASurface Line Plan (if the location is on National Forest System Lands, the USFS shall be filed with the appropriate Forest Service Office).
  4. Road to access the operations union served by an existing road on file (see Item 20 above).
  5. Approval certification.
  6. Title to any other specific information and/or plans as may be required by the Administrator.

**In:** Signature

**In:** Date

**In:** Title

**In:** Approved by (Signature)

**In:** Date

**In:** Title

**In:** Office

Application approved, disapproval, or denial shall notify the applicant in writing and indicate the reasons for such action.

Title 18 U.S.C. Section 1001 and Title 41 U.S.C. Section 1205 make it a crime for any person knowingly and willfully to make or cause to be made or cause to be made to any department or agency of the United States any false or fraudulent statements or representations in any matter within its jurisdiction.

*Estimated duration varies.*
Guidelines for Preparing the APD

- 12-Point Surface Use Program
- 9-Point Drilling Plan
12-Point Surface Use Program

1. Existing roads to the well.
2. Access roads to be constructed.
3. Location of existing wells (within 1 mile)
4. Location of facilities if well is productive.
5. Location and type of water supply.
12-Point Surface Use Program (Cont’d)

8. Ancillary facilities.
9. Well site layout.
11. Surface ownership.
12. Other information.
Additional Information now Required

- Recent requests from environmental groups to become more involved at the individual well level
- BLM CA realized there were probably some areas that were not adequately addressed in APD EAs
- Met with Industry organizations and individual operators to outline these draft requirements
- Permits will take a bit longer, but extra time can be minimized if the pkg is complete when we receive it
Additional Information, cont’d

- Identify fresh water zone if applicable and provide info to BLM
- Detailed info on drilling fluid additives
- ““ frac fluid additives
- “” acid
- Produced water analysis
- Volumes, sources of water, and composition
- Flowback fluid disposal – composition, volume, destination
- Drill cuttings disposition
Additional Information, cont’d

- Emissions inventory
- Statement of likelihood of wellbore failures, e.g. collapsed csg at a certain depth, parted csg, etc.
- History of Surface Expressions in area?
- Other data?
- Much of this data is already in DOGGR’s SB4 requirements – BLM will coordinate w/ them
- Maybe copies of permits from other agencies – RWQCB, CARB, DOGGR
- DRAFT for now – it’s a work in progress
9-Point Drilling Plan

1. Tops of important geologic markers.
2. Depths and thickness of:
   - fresh water,
   - oil, gas, or
   - other mineral-bearing formations
3. Blowout Prevention Equipment (BOPE)
   - diagram showing size, pressure ratings
9-Point Drilling Plan (cont’d)

4. Casing program.
5. Cement (amount and type).
6. Drilling Mud (amount, type, weighting material, and monitoring equipment)
7. Testing, logging, and coring.
8. Expected bottom hole pressure and temperatures.
9. Additional information.
Application for Permit to Drill (cont’d)

- Submit APD in triplicate.

- BLM posts the APD for 30 days for public comment.

- Within 10 days, the operator is notified as to whether or not the application is complete.
APD/NOS Processing Timeframe

- BLM posts the APD/NOS for 30 days for public comments.
- Unless there are surface issues or waiting for additional information from the operator, APDs can often be processed within 30 days.
Master Development Plan (MDP)

• The Order also establishes a new approval process for MDP where an operator can submit plans for field development of a multiple well program.

• MDP can be addressed in a single NEPA analysis.
Master Development Plan (MDP)

- Approval of MDP serves as approvals of all of the APDs submitted with the Plan.

- After the MDP is approved, subsequent APDs can reference the MDP and be approved using the NEPA analysis for the MDP.

- Need to submit only APD Form 3160-3 and well survey Plat for each well.
Sundry Notices

- Many downhole operations
- Production measurement methods
- Commingling proposals
- Surface disturbance
- Rights-Of-Way
- Gas flaring and venting
- Sump closure
- Road mix
- Idle well issues
- Other
No Sundry Notices Required

- No change in downhole schematic
- Frac’ing/acidizing the well
  (NOTE: PROPOSED RULEMAKING IN PROGRESS THAT CHANGES THIS)
- Running /pulling tubing
- Well cleanout
- Removing scale from pipe
Sundry Notice Processing Timeframe

• There is no time requirement in the regulations for Sundry Notices.
• Most are processed within 10 days.
• Some may take as long as one month.
• Urgent/emergency situations: verbal approvals may be granted.
# APD and Sundry Notices

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<th>Year</th>
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</table>
Final Quiz, Part 1

Arrange the following sources in terms of how much water is needed to generate 1 MMBTU of energy

Nuclear
Soy Biodiesel
Coal
Deep-Shale Fracked Natural Gas Well
Corn Ethanol
Part 1 Answers

- Gas well: 3 gals
- Nuclear Energy: 11 gals
- Coal: 23 gals
- Corn Ethanol: 15,800 gals
- Soy Biodiesel: 44,500 gals

Source – U.S. DOE and Ground Water Protection Council
Final Quiz, Part 2

What is the Surface area required to generate a yrs supply of electricity to 1000 homes?

- Wind farm
- Coal
- Solar panels
- Nuclear
- Gas Well
Part 2 Answers

- Gas well 0.4 acres
- Nuclear 0.7 acres
- Coal 0.75 acres
- Wind farms 6 acres
- Solar Panels 8.4 acres

Source – U.S. DOE and Ground Water Protection Council
Questions? Comments?