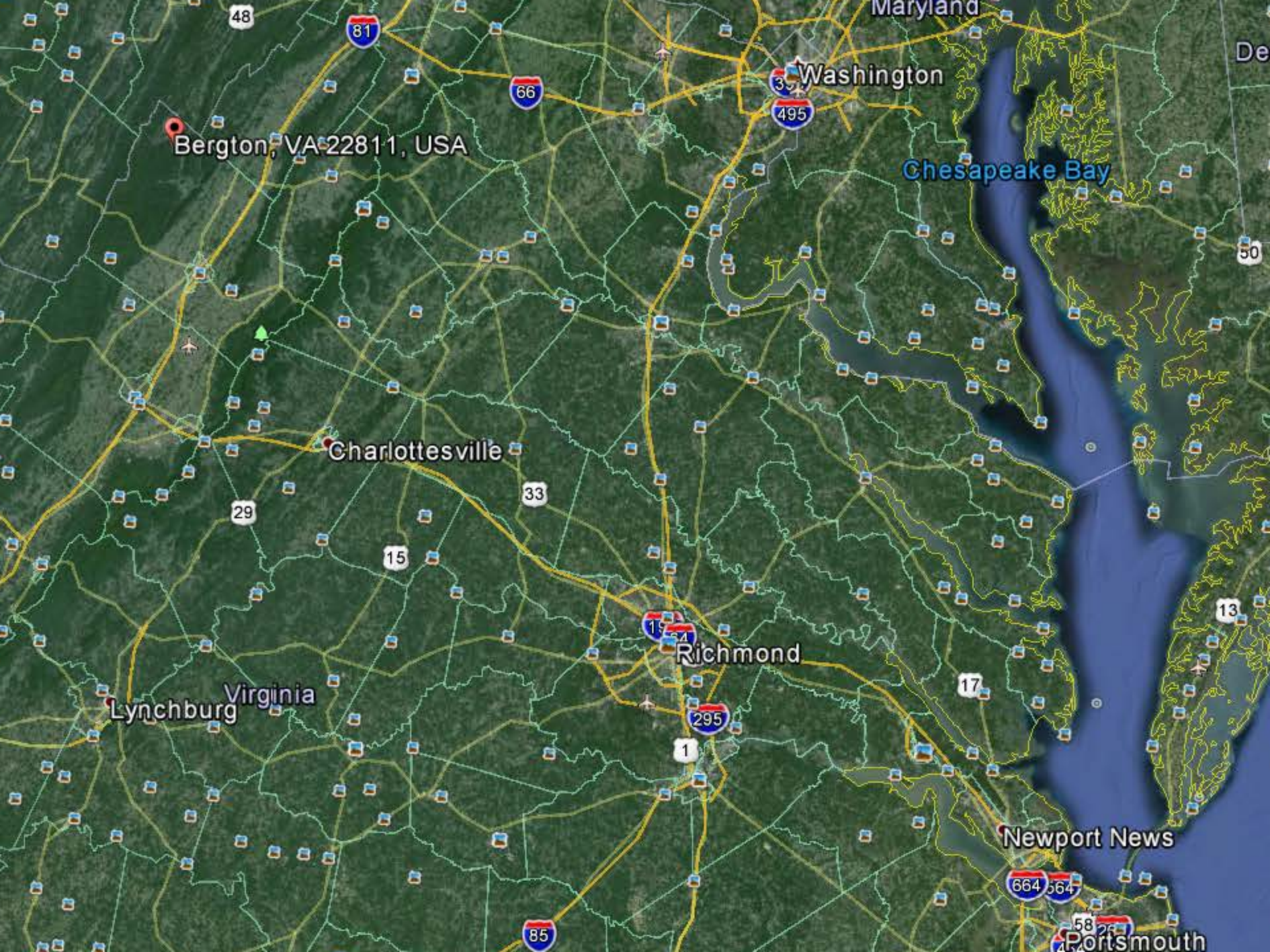
Rockingham County, Virginia


Maryland
Washington
Bergton, VA 22811, USA
Chesapeake Bay
Charlottesville
Richmond
Virginia
Lynchburg
Newport News
Portsmouth
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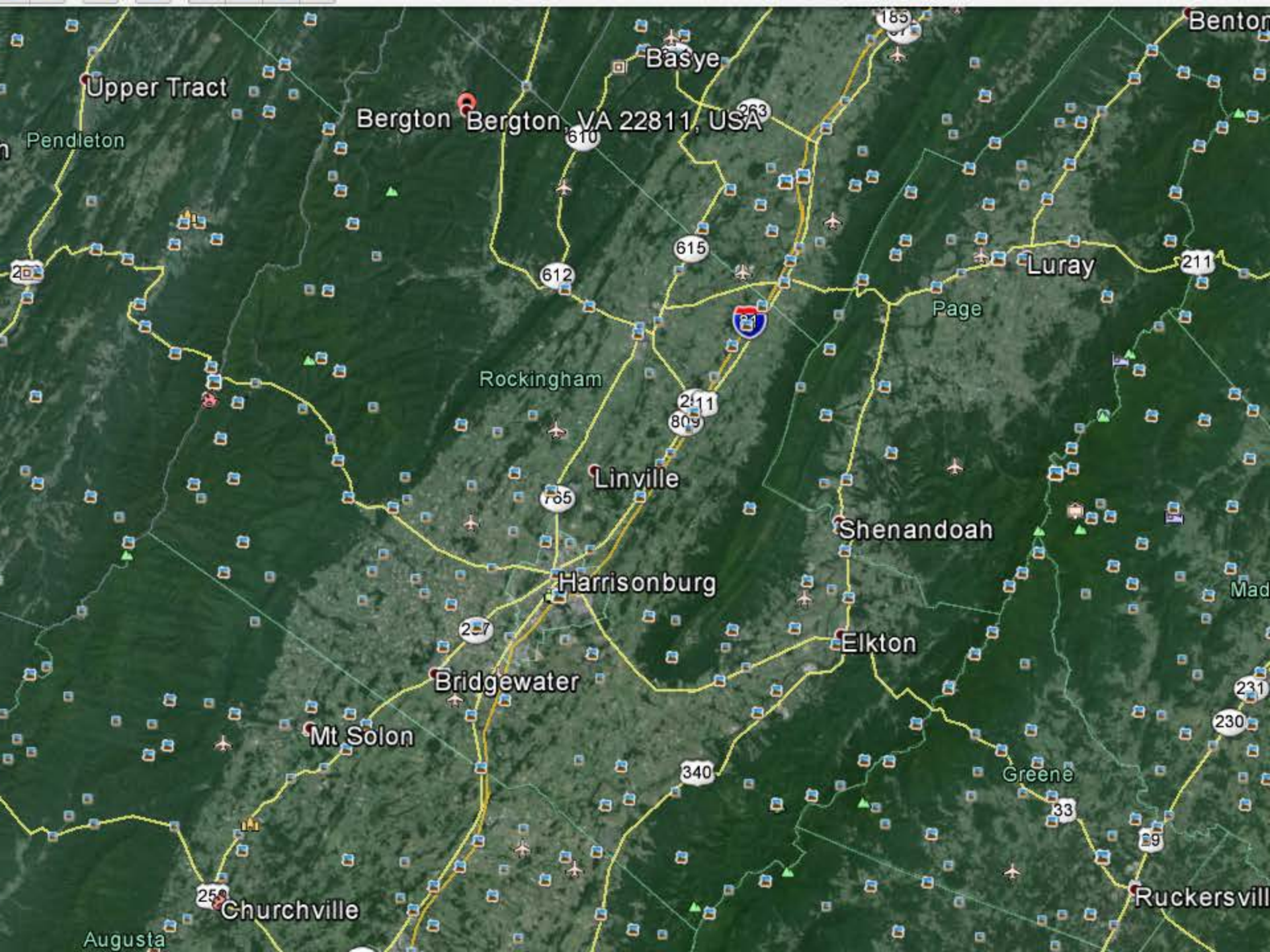
66
495
50
29
33
15
13
17
295
1
85
664


Upper Tract
Basye
Bergton
Bergton, VA 22811, USA
Pendleton
Luray
Page
Rockingham
Linville
Shenandoah
Harrisonburg
Elkton
Bridgewater
Mt Solon
Greene
Churchville
Augusta
Ruckersvill
610
615
612
263
211
809
340
231
230
33

DMME Communications

- Call from Gas and Oil to County Administrator in late 2009
- County felt like we were brought into the process very late
- Not the same mining/drilling/etc. familiarity as southwest VA, but treated as such
- Seemed like County process was perfunctory

DMME Communications

- County was hungry for information, but couldn't get answers
- Where can we see wells under development?
- Where can we see fracking?
- County had to do our own research
- Gas and Oil Division referred us to the Virginia Gas and Oil Association (Worried somewhat by relatonship
- DMME had essentially approved the permit without local input

Carrizo Communications

- County felt like we were brought into the process very late
- Not the same mining/drilling/etc. familiarity as southwest VA, but treated as such
- Not the same as West VA, but treated as such
- Learned of Carrizo well fracking just across state line in West Virginia

Sec. 17-27. - Special uses.

When, after review of an application and hearing thereon, in accordance with article VII, in this chapter, the board of supervisors finds as a fact that the proposed use is compatible with surrounding uses, is not detrimental to the character of the adjacent land, is consistent with the intent of this chapter, and is in the public interest, the following us may be permitted with a special use permit:

(a) Cemetery;
(b) Child care center;
(c) Taxidermy, accessory to residence;
(d) Sawmill, temporary or permanent, or commercial wood yard;
(e) Livestock sales pavilion;
(f) Quarry, gravel, shale, or sand operation;
(g) Well drilling and related pumping stations and pipelines;
(h) Telecommunications facility as provided by Article VII, Division 6A of this chapter.
(i) Telephone exchange with above-ground dimension exceeding one hundred ninety-two (192) cubic feet; telephone exchange building; electric generation substation or transmission tower. As a part of the special use permit application, a landscaping and maintenance plan for the site shall be include, and the site shall be landscaped and maintained pursuant to such plan (or amended plan as approved by the board of supervisors as a part of the special use permit approval).
(j) Raising fur-bearing animals and pelt processing;
(k) Circus, carnival, fair, sideshow, tent meeting, music festival of a temporary nature, flea market or book fair;
(l) Shooting range;
(m) Two-family dwelling, but only if converted from a single-family residential structure existing on a parcel at the time of enactment of this chapter;
(n) Railroad station or yard;
(o) Animal hospital;
(p) Auction sales or auction house;
(q) Boarding house operation;
(r) Family day-care home;
(s) Group home;
(t) Home for adults or nursing home;
(u) Kennel operation;
(v) Feed mill or seed and feed store;
(w) Recreation or amusement enterprise, outside a building, for profit and not otherwise listed;
(x) Riding stable or horse show ring;
(y) Airport, heliport, or flight strip;
(z) Auto graveyard or junkyard;
(aa) Auto service station;

Well Drilling History

- 23 wells drilled from 1950 to 1983
- Well depths to 10,000 feet
- Not determined viable at the time and were plugged and abandoned
- Carrizo request was different

2010
28

ROCKINGHAM COUNTY
SPECIAL USE PERMIT APPLICATION

CHECKLIST: Before this application can be accepted for processing, the following must be done

- ☐ **A.** Complete the application in full and sign. (If not landowner, the landowner must also sign).
- ☐ **B.** Enclose sketch as required in application. The sketch must be to scale and no larger than 8-1/2" x 11"
- ☐ **C.** Please contact the Zoning Administrator (564-3030) for appointment to review the completed application. If application is not complete, it will not be accepted.

FOR OFFICE USE ONLY

FEE: 550 ⁰⁰ DEADLINE DATE: _____

RECEIPT # 608619 HEARING DATE: 2/24/10

DATE REC 1/19/10

TAXES PAID Paid SUP # SUP-028

APPLICANT: CARRIZO (MARCELLUS) LLC

Indicate owner purchaser (other)

ADDRESS: 1000 LOUISIANA, SUITE 1500 Daytime Phone: 361-215-1321

HOUSTON, TX 77002 DAVID SCHNITZ

City/Town State Zip Contact Person

USE APPLIED FOR: GAS WELL DRILLING, COMPLETION, STIMULATION, AND PRODUCTION

LOCATION: (N(S)E W) side of (Road Name) CRAB RUN RD., Route # ~~SR~~ 820 approximately .2 (miles)feet

(N S E W) of (Road Name) BERGTON RD., Route # ~~SR~~ 865 in Election District # _____.

ACREAGE IN PARCEL: 60.313 ZONING: A TAX MAP NO: 10(A)-24

ACREAGE IN REQUEST: 3.2 ACRES

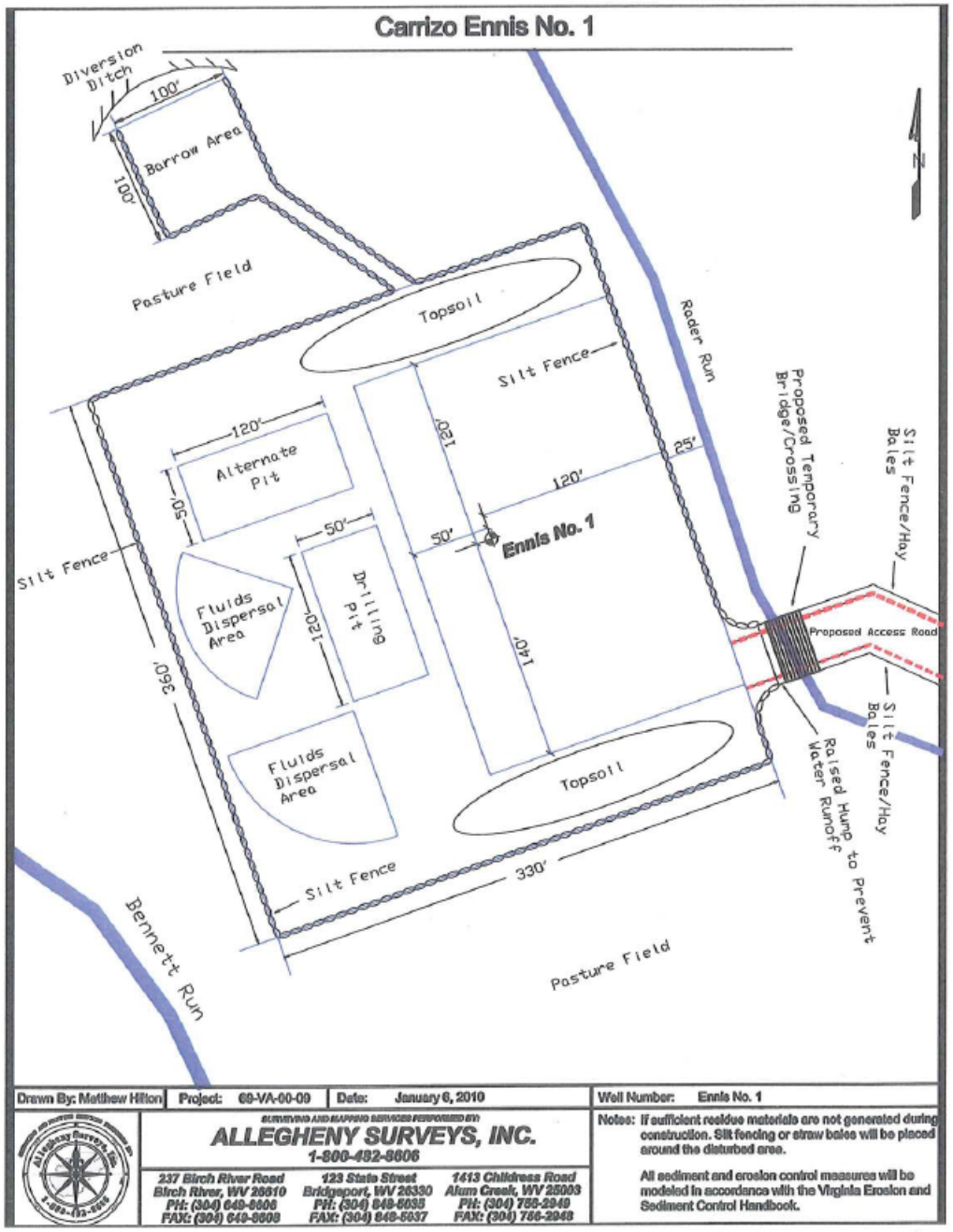
SIZE AND HEIGHT OF EXISTING OR PROPOSED BUILDING: NONE

FURNISH ON 8 1/2" X 11 PAPER, ONE (1) COPY OF A DRAWING SHOWING:

(1) Size and shape of parcel of land where use or building is to be located.
(2) Location of use of proposed and/or existing buildings---distance from public highways, from adjoining property.
(3) Size and shape of proposed and/or existing buildings.
(4) Access to and from property.
(5) Relation to street and highway intersections.
(6) Any planned screening or landscaping.
(7) Number and location of off-street parking spaces.
(8) Specify proposed use of area (if not contained in building).

Applicant Signature
DAVID SCHNITZ

x Ruby Emmes
Landowner's Signature
(if different from applicant)


Carrizo Ennis No. 1
Diversion Ditch
100'
Barrow Area
100'
Pasture Field
Topsoil
Silt Fence
Rader Run
Proposed Temporary Bridge/Crossing
Silt Fence/Hay Bales
120'
Alternate Pit
50'
120'
25'
120'
50'
50'
Ennis No. 1
Silt Fence
Fluids Dispersal Area
Drilling Pit
120'
140'
360'
Proposed Access Road
Silt Fence/Hay Bales
Raised Hump to Prevent Water Runoff
Fluids Dispersal Area
Topsoil
Silt Fence
330'
Bennett Run
Pasture Field
Drawn By: Matthew Hilton
Project: 09-VA-00-09
Date: January 6, 2010
Well Number: Ennis No. 1
SURVEYING AND MAPPING SERVICES PERFORMED BY:
ALLEGHENY SURVEYS, INC.
1-800-482-8606
237 Birch River Road
Birch River, WV 26610
PH: (304) 649-8606
FAX: (304) 649-8609
123 State Street
Bridgeport, WV 26330
PH: (304) 848-6035
FAX: (304) 848-6037
1413 Childress Road
Alum Creek, WV 25003
PH: (304) 756-2948
FAX: (304) 756-2948
Notes: If sufficient residue materials are not generated during construction. Silt fencing or straw bales will be placed around the disturbed area.
All sediment and erosion control measures will be modeled in accordance with the Virginia Erosion and Sediment Control Handbook.

County Issues/Concerns

- This is a land-use issue
  - Is it compatible
  - Impact on community and adjoing land owners
- Balance rights of those who own land and mineral rights with potential impact on community
- Not just a single well consideration
- Vacuum of information

County Research

- DMME/Gas and Oil
- James Madison University
- Arkansas State geologist
- Penn State
- Numerous Forums
- Wetzel County, West VA
- Washington County PA
- Southwest VA
- Multiple Online reports, studies, news articles, etc.


03/17/2010 09:39

Drilling Phase


STOP
Brock
Ridge Rd


122
HAWG HAULING
05/24/2010 10:58

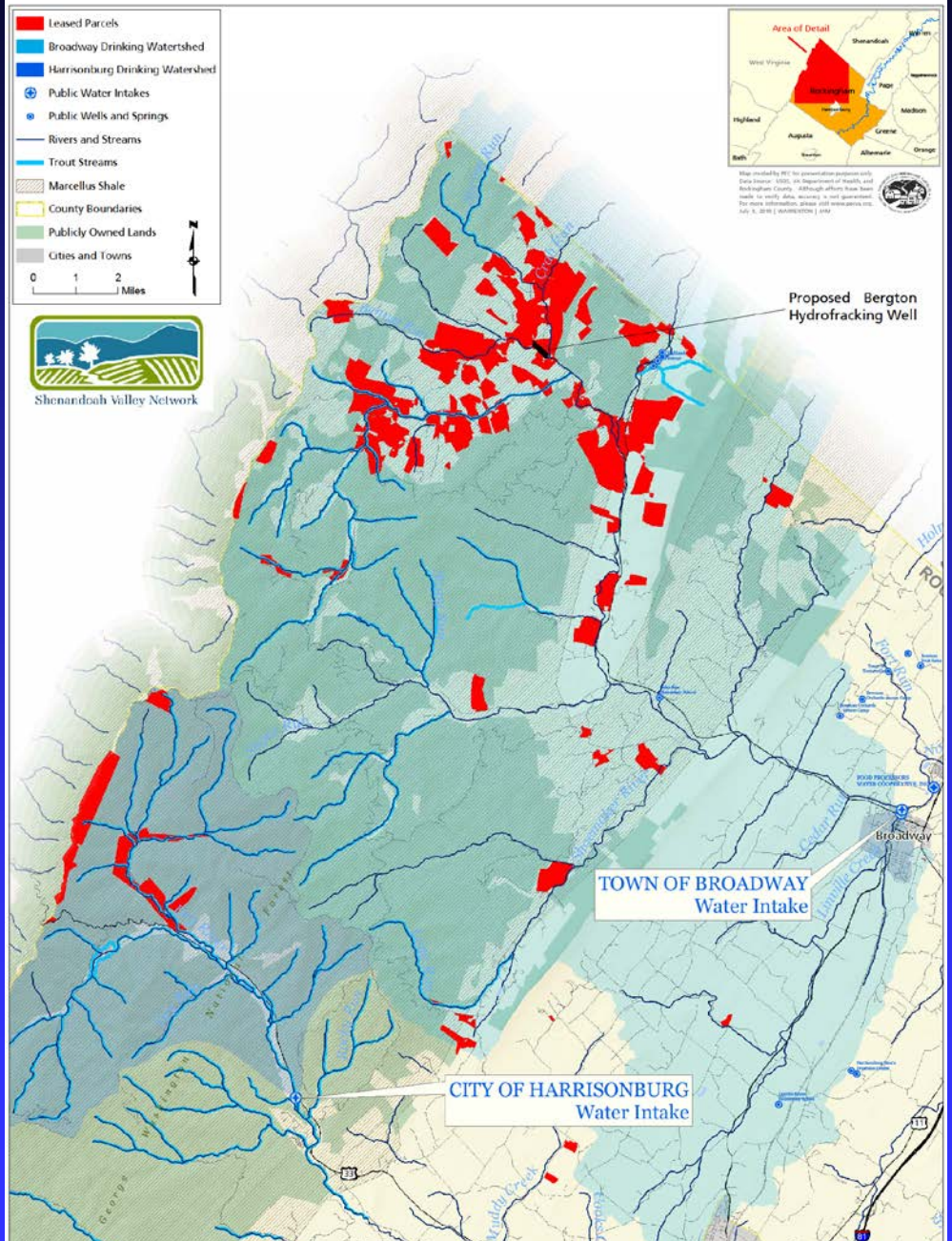

Water for fracking
Erosion and Sediment Control
05/24/2010 12:14

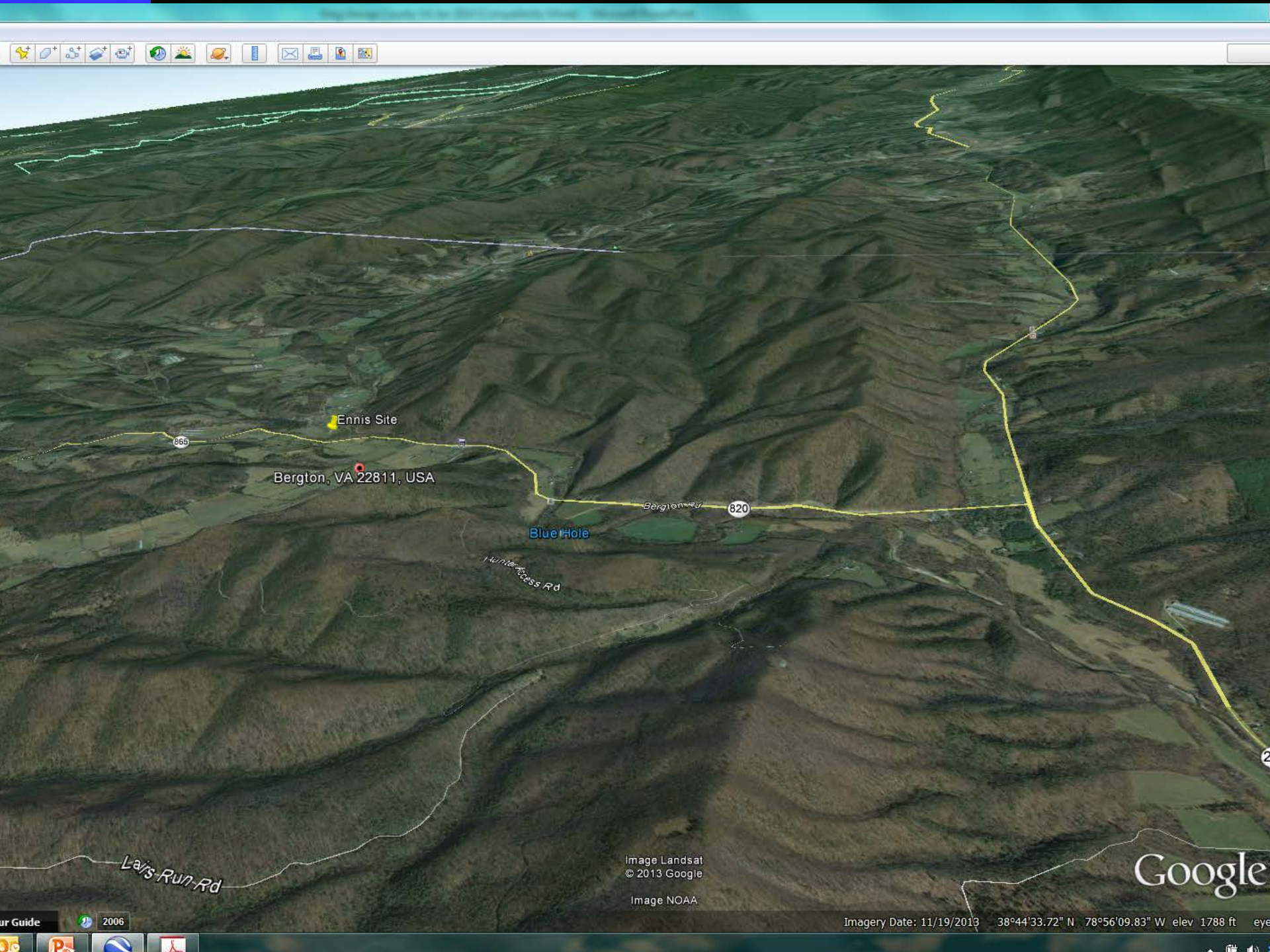

05/24/2010 11:33

Fracking

Compressor Station

MARCELLUS SHALE NATURAL GAS MINING LEASES:
Rockingham County, July 2010




Ennis Site
865
Bergton, VA 22811, USA
Bergton Rd
820
Blue Hole
Hunter Access Rd
Lavis Run Rd
Image Landsat
© 2013 Google
Image NOAA
Google
2006
Imagery Date: 11/19/2013 38°44'33.72" N 78°56'09.83" W elev 1788 ft


822
865
Ennis Site
Fulk Ln
Bergton
Bergton, VA 22811, USA


15163 Bergton Road
Exit Street View
© 2013 Google
© 2014 Google
Google earth


17276 Bergton Road
Exit

County Issues/Concerns

- Site in flood plain
- Native trout streams
- VDOT, DEQ, DCR/FEMA, Game and Inlands Fisheries, U.S. Army Corps of Engineers
- Risk of spills
- Bonding/Insurance only covers restoration of the site, what about other risks?
- Industrial type impact during development

County Issues/Concerns

- Fracking runs around the clock
- Potential groundwater impact?
- Where does the fracking water come from?
- Wastewater from fracking – Where does it go?
- Impact on Roads – Sand, water, wastewater
- Cumulative Impact of Added Wells

County Issues/Concerns

Fear/Concern more with what happens above ground than below ground.

Carrizo withdrew request.

QUESTIONS


5-10 well pads per compressor station

15 compressor stations feed the processing plant - $1B

Processing plant removes wet gases.

Virginia Department of Mines, Minerals & Energy

Hydraulic Fracing

Simplified Steps In Hydraulic Fracturing

1. Water, sand and additives are pumped at extremely high pressures down the wellbore.

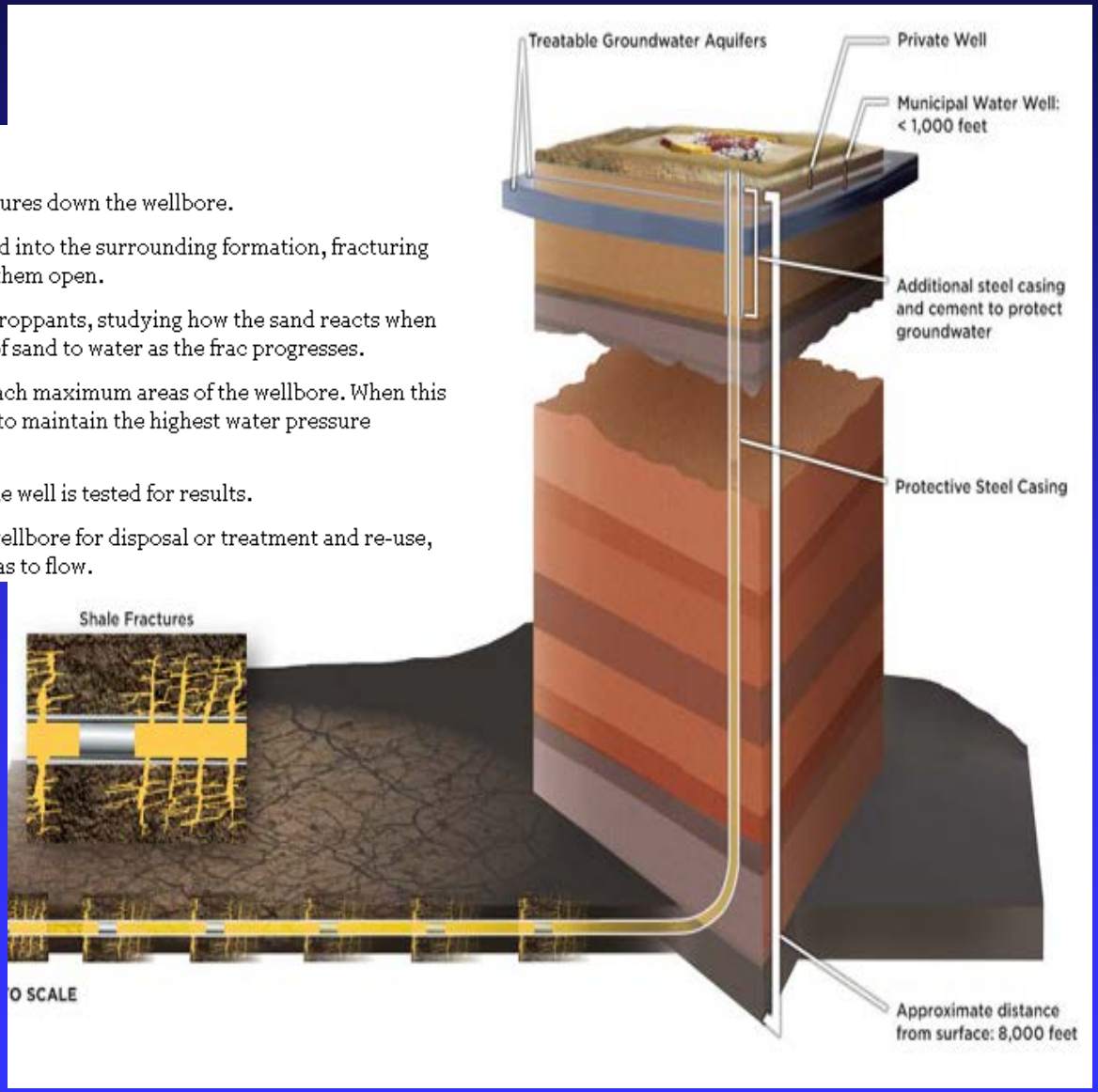
2. The liquid goes through perforated sections of the wellbore and into the surrounding formation, fracturing the rock and injecting sand or proppants into the cracks to hold them open.

3. Experts continually monitor and gauge pressures, fluids and proppants, studying how the sand reacts when it hits the bottom of the wellbore, slowly increasing the density of sand to water as the frac progresses.

4. This process may be repeated multiple times, in "stages" to reach maximum areas of the wellbore. When this is done, the wellbore is temporarily plugged between each stage to maintain the highest water pressure possible and get maximum fracturing results in the rock.

5. The frac plugs are drilled or removed from the wellbore and the well is tested for results.

6. The water pressure is reduced and fluids are returned up the wellbore for disposal or treatment and re-use, leaving the sand in place to prop open the cracks and allow the gas to flow.



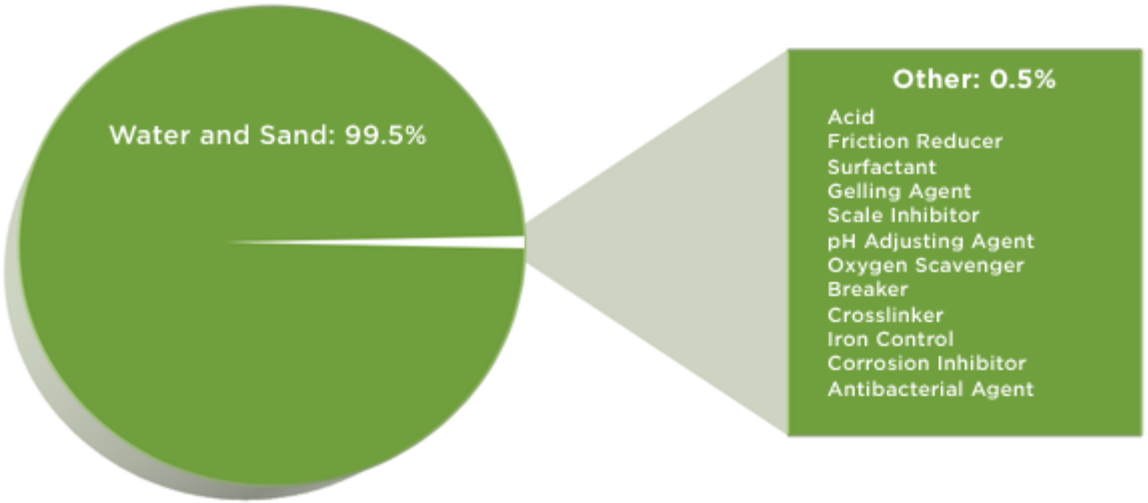
Source: Chesapeake Energy

Virginia Department of Mines, Minerals & Energy

Hydraulic Fracing

What chemicals are used in fracing?

Approximately 99.5% of the volume of materials used during the fracing of deep shale gas wells consists of water and sand. Other typical ingredients include a friction reducer, gelling agent and antibacterial agents. A typical deep shale fracturing mixture and a list of typical additives are provided below:



FRACTURING INGREDIENTS

Product Category	Main Ingredient	Purpose	Other Common Uses
Water	99.5% water & sand	Expand fracture and deliver sand	Landscaping and manufacturing
Sand		Allows the fractures to remain open so the gas can escape	Drinking water filtration, play sand, concrete and brick mortar
Other	**approximately 0.5%**		

Source: Chesapeake Energy

Virginia Department of Mines, Minerals & Energy

Hydraulic Fracing

FRACTURING INGREDIENTS			
Product Category	**Main Ingredient**	**Purpose**	**Other Common Uses**
Water	99.5% water & sand	Expand fracture and deliver sand	Landscaping and manufacturing
Sand		Allows the fractures to remain open so the gas can escape	Drinking water filtration, play sand, concrete and brick mortar
Other	**approximately 0.5%**		
Acid	Hydrochloric acid or muriatic acid	Helps dissolve minerals and initiate cracks in the rock	Swimming pool chemical and cleaner
Antibacterial agent	Glutaraldehyde	Eliminates bacteria in the water that produces corrosive by-products	Disinfectant; Sterilizer for medical and dental equipment
Breaker	Ammonium persulfate	Allows a delayed break down of the gel	Used in hair coloring, as a disinfectant, and in the manufacture of common household plastics
Corrosion inhibitor	n,n-dimethyl formamide	Prevents the corrosion of the pipe	Used in pharmaceuticals, acrylic fibers and plastics
Crosslinker	Borate salts	Maintains fluid viscosity as temperature increases	Used in laundry detergents, hand soaps and cosmetics
Friction reducer	Petroleum distillate	"Slicks" the water to minimize friction	Used in cosmetics including hair, make-up, nail and skin products
Gel	Guar gum or hydroxyethyl cellulose	Thickens the water in order to suspend the sand	Thickener used in cosmetics, baked goods, ice cream, toothpaste, sauces and salad dressings
Iron control	Citric acid	Prevents precipitation of metal oxides	Food additive; food and beverages; lemon juice ~7% citric acid
Clay stabilizer	Potassium chloride	Creates a brine carrier fluid	Used in low-sodium table salt substitute, medicines and IV fluids
pH adjusting agent	Sodium or potassium carbonate	Maintains the effectiveness of other components, such as crosslinkers	Used in laundry detergents, soap, water softener and dishwasher detergents
Scale inhibitor	Ethylene glycol	Prevents scale deposits in the pipe	Used in household cleansers, de-icer, paints and caulk
Surfactant	Isopropanol	Used to increase the viscosity of the fracture fluid	Used in glass cleaner, multi-surface cleansers, antiperspirant, deodorants and hair color

Source: Chesapeake Energy