

Fracking in Kentucky

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Kentucky Geological Survey



KGS Annual Meeting
Lexington, Kentucky, 15-May-2015

What is Fracking?

- Inject high–pressure fluids underground
- Induce new fractures
- Connect to existing natural fractures
- Create
 - A larger stimulated reservoir volume
 - Permeable pathways for oil and gas to flow into the well bore

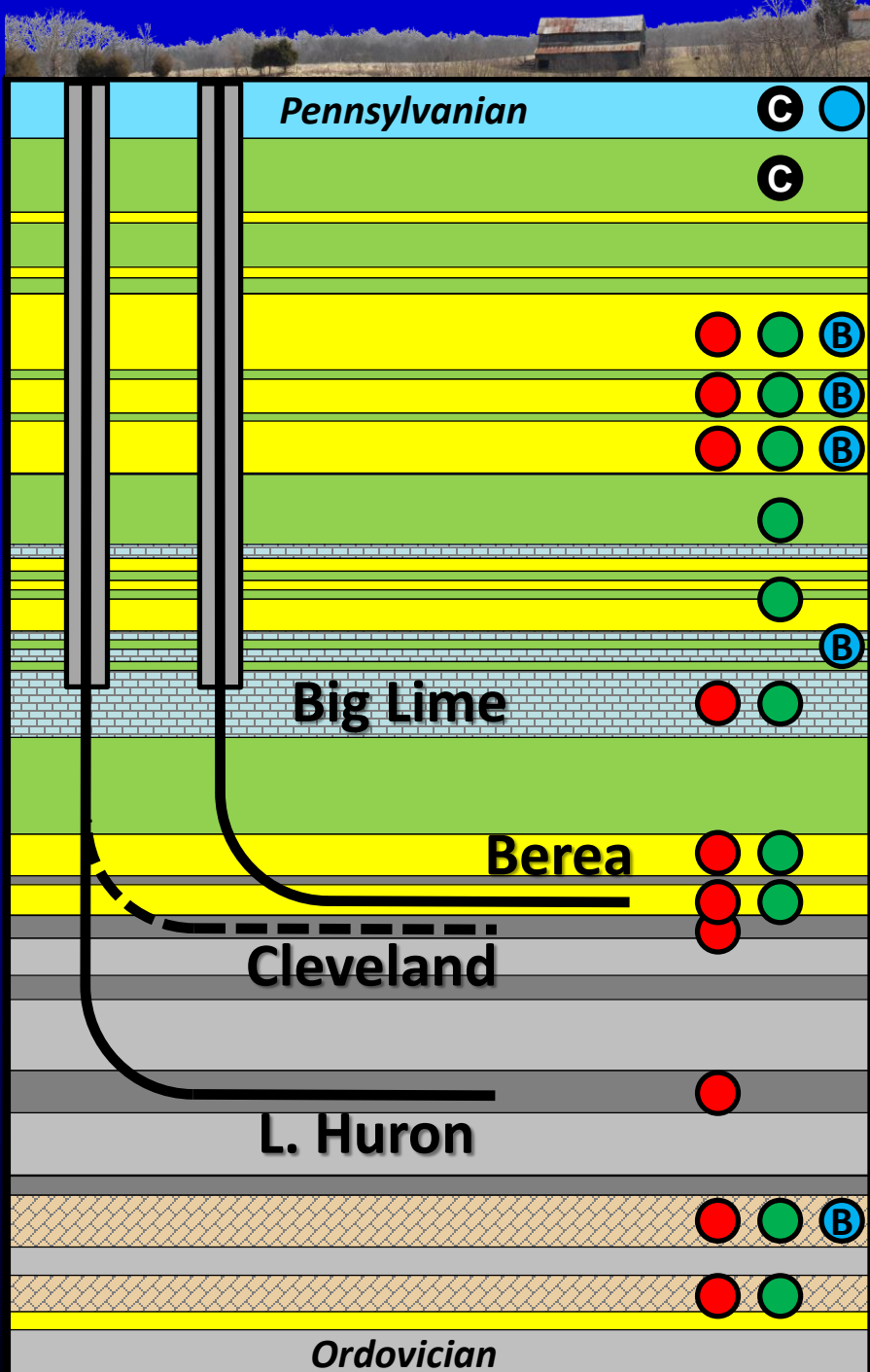
EPA 2015: Fracking in the U.S.

- **Water (68% to 99%, median 88%)***
 - <30,000 gal. to >8,000,000 gal.
- **Chemicals (2% or less, median 0.43%)**
 - Control fluid properties
 - Maintain well integrity
- **Sand (2.4% to 24%, median 11%)**

** Composition by mass, data from 2015 EPA analysis of frac fluid data from FracFocus 1.0*

Fracture stimulation has been used in Kentucky for more than 200 years

- 1806: Explosives to improve water wells
- 1888: 1st Kentucky oil well to be “shot”
- 1960: Hydraulic fracturing
 - 1946: 1st in U.S. (Kansas)
- 1972: Nitrogen frac – Ohio shale
 - Nitrogen frac – vertical wells
 - Nitrogen-foam – horizontal wells (since 2006)
- Hydraulic fracks
 - Berea (Lawrence and Greenup Counties)
 - New Albany shale (Breckinridge County)



Typical Completions

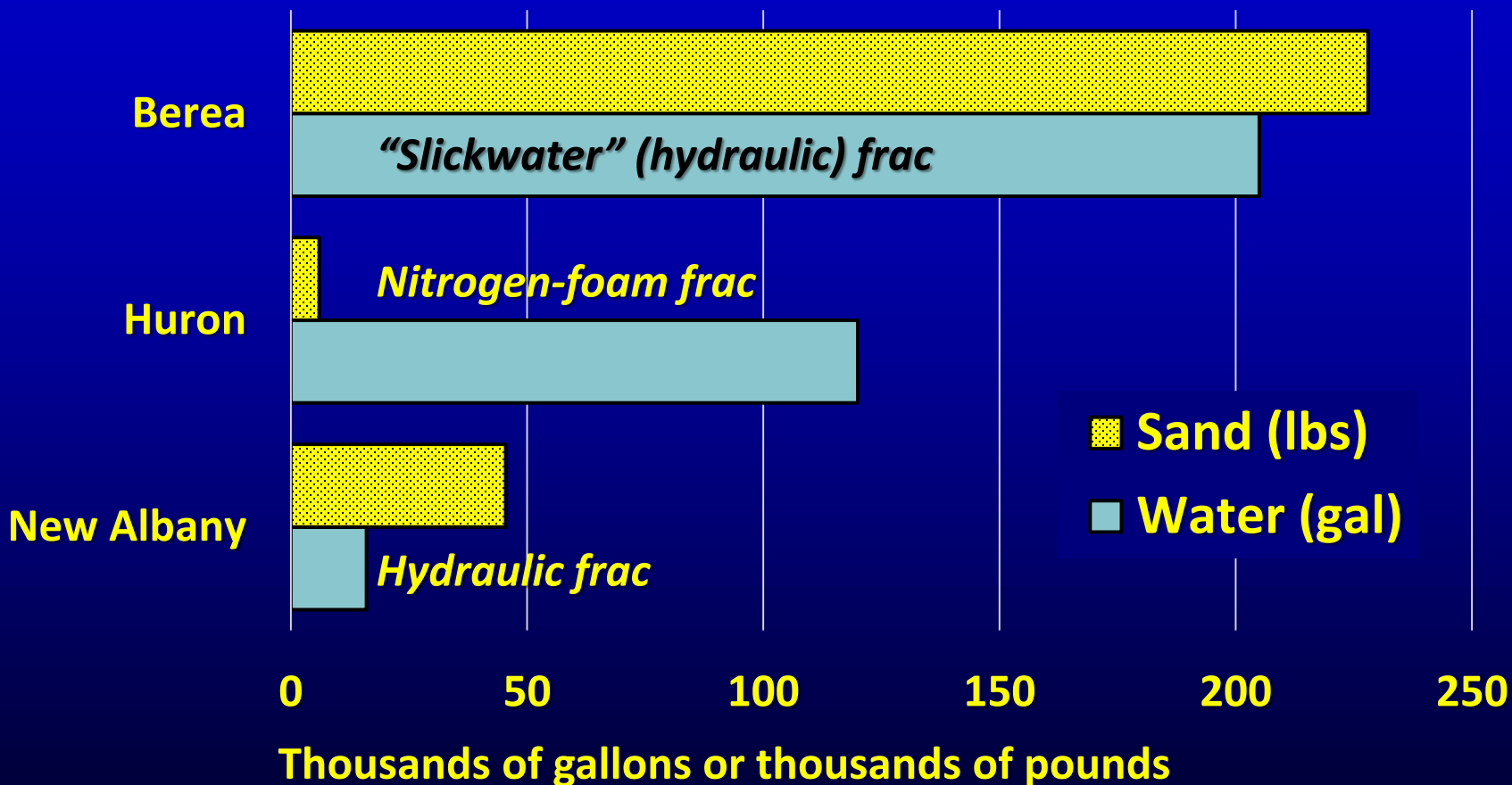
Lawrence & Greenup
1,200 ft to 1,800 ft

East Kentucky
2,000 ft to 5,000 ft

- C** Coal
- Water**
- Oil**
- Gas**
- B** Brine

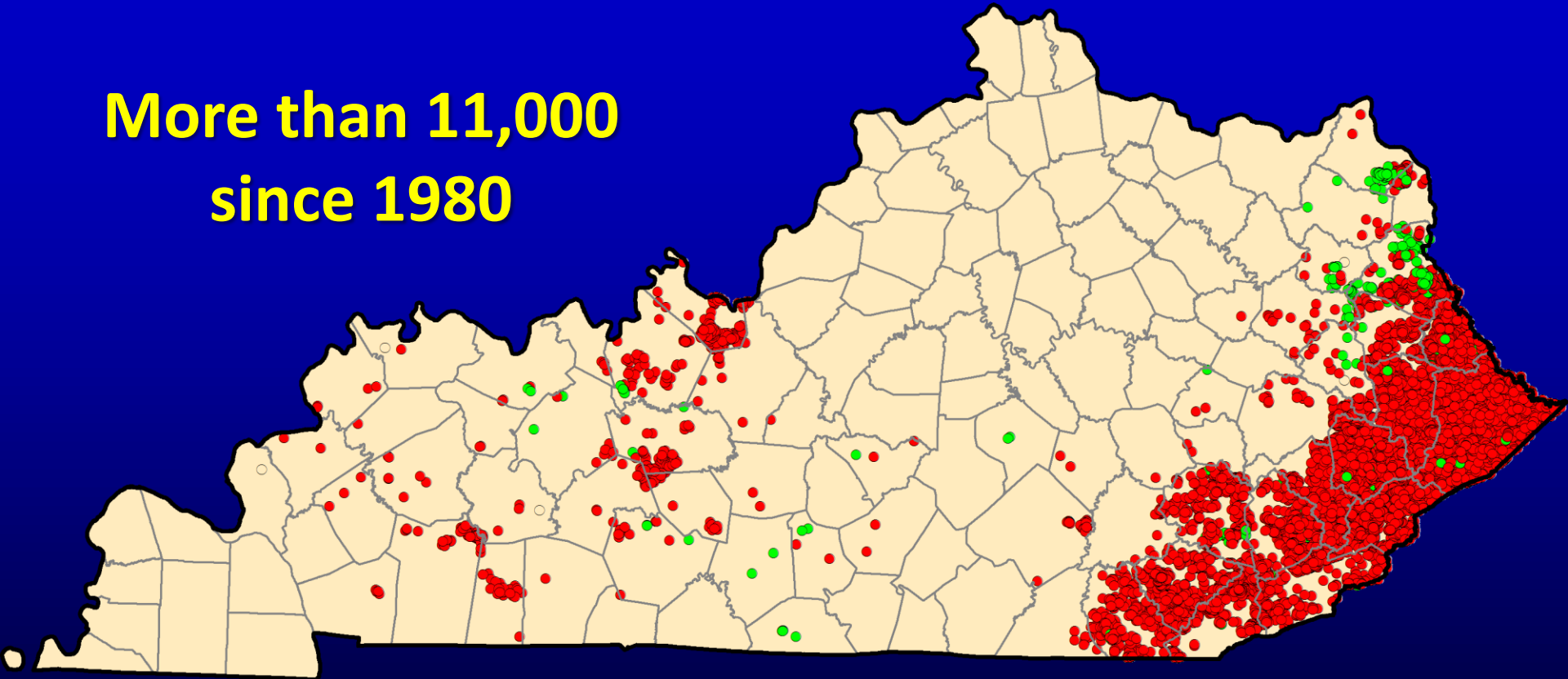
Depth and thickness varies across Kentucky

Water Use in Kentucky Fracks



Fracked Wells in Kentucky

More than 11,000
since 1980



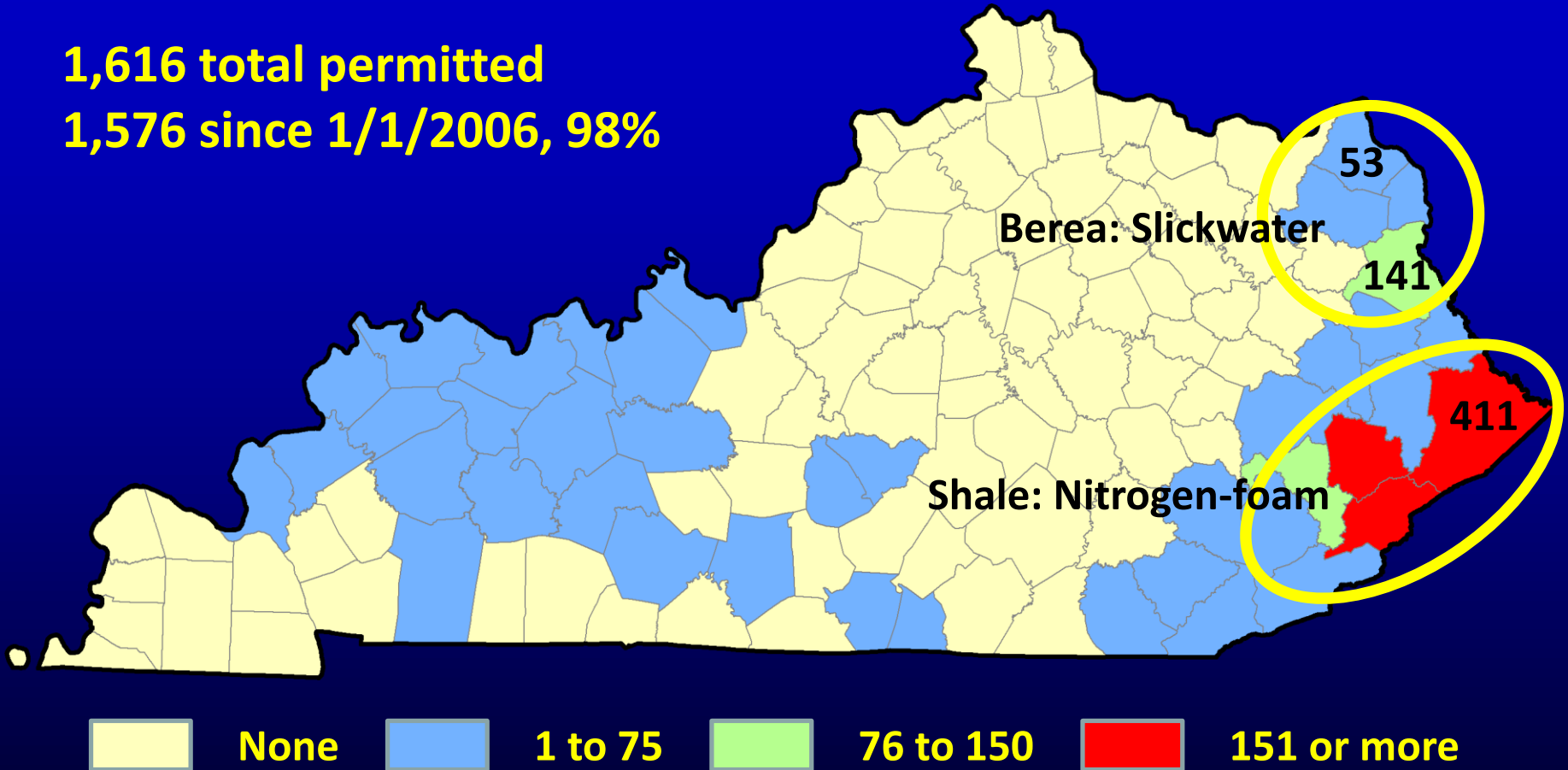
Nitrogen Frac, Eastern KY



Courtesy Brint Camp, NGAS

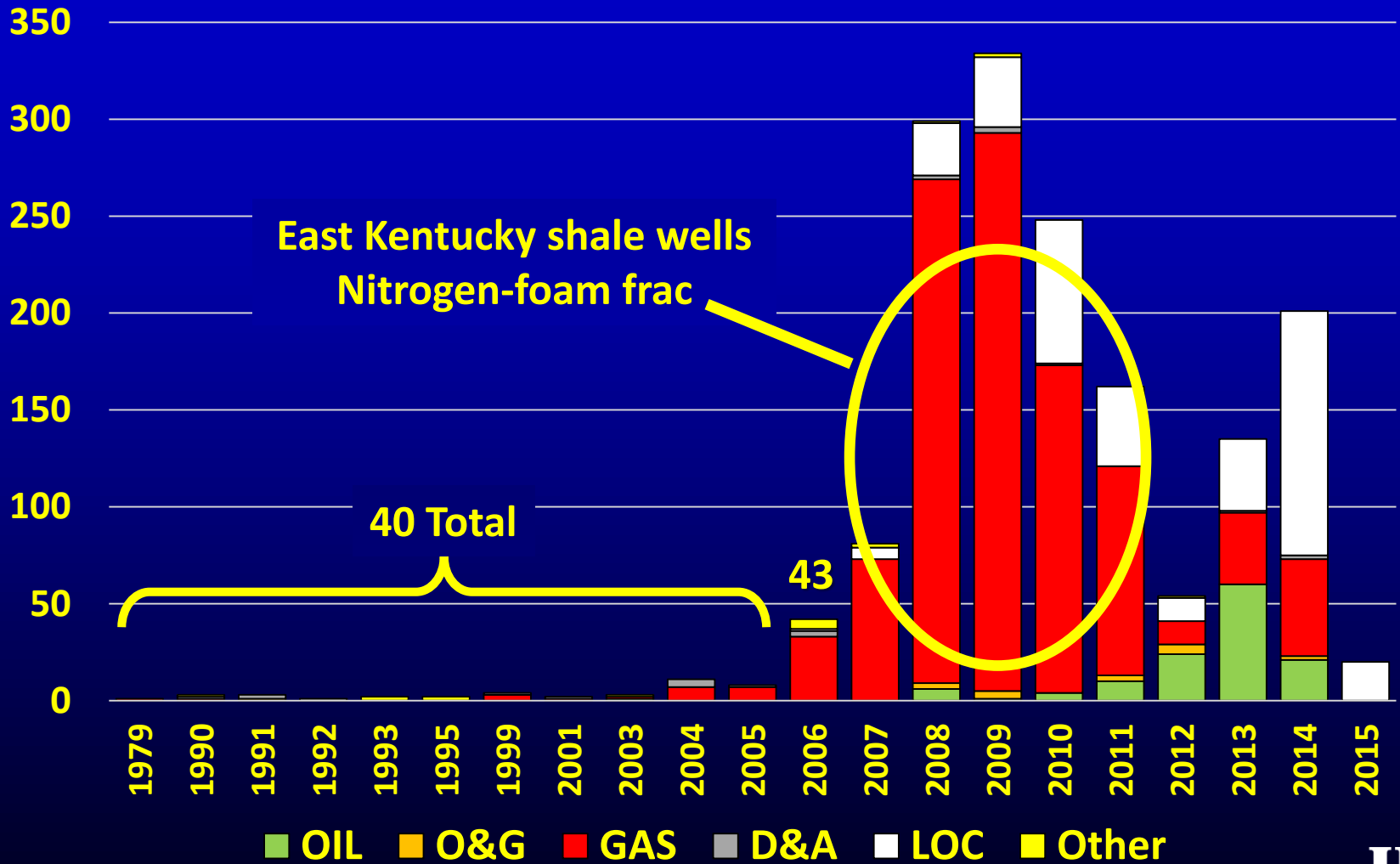
Horizontal Wells in Kentucky

1,616 total permitted
1,576 since 1/1/2006, 98%

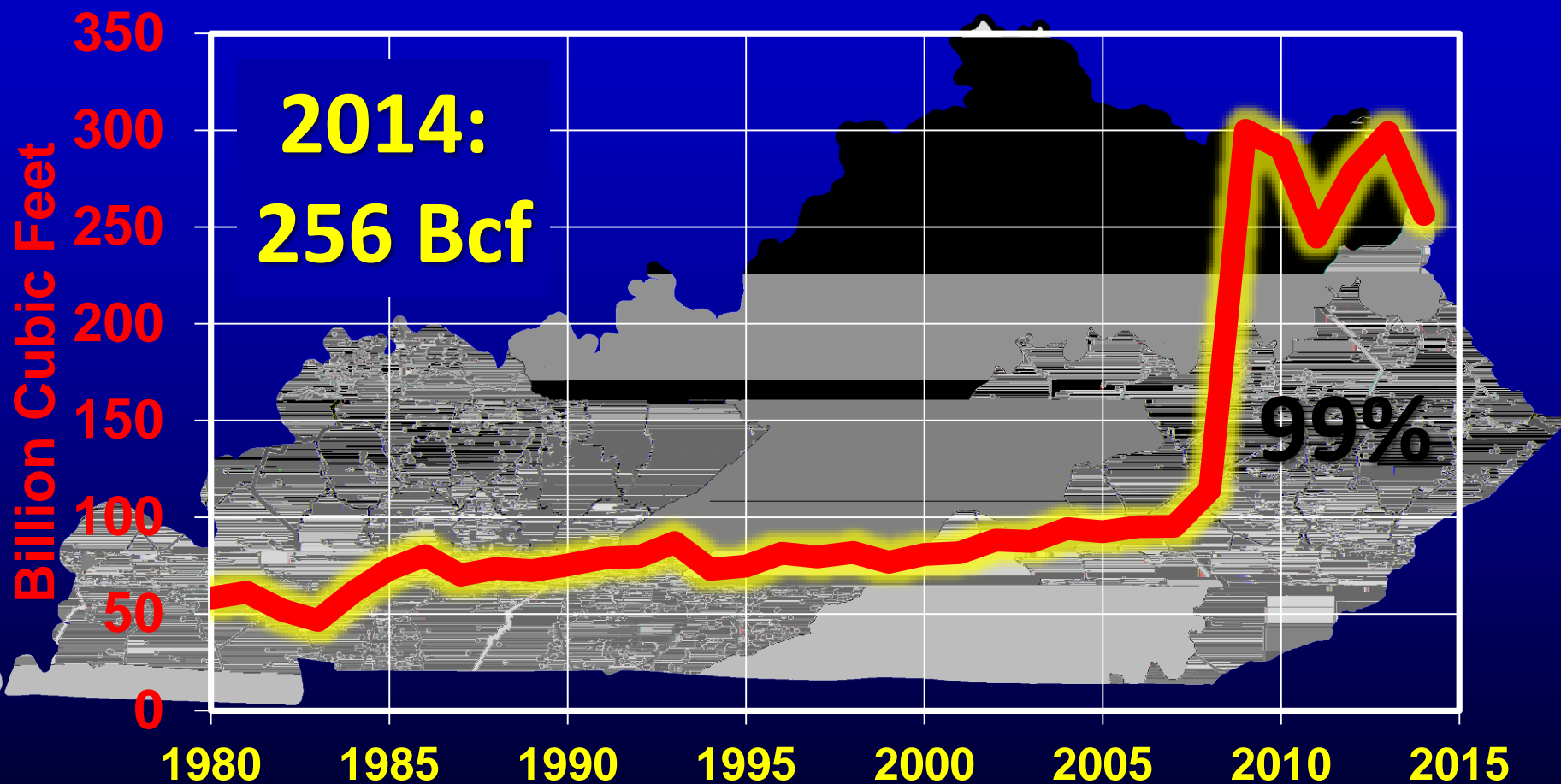


April, 2015

Horizontal Wells By Year

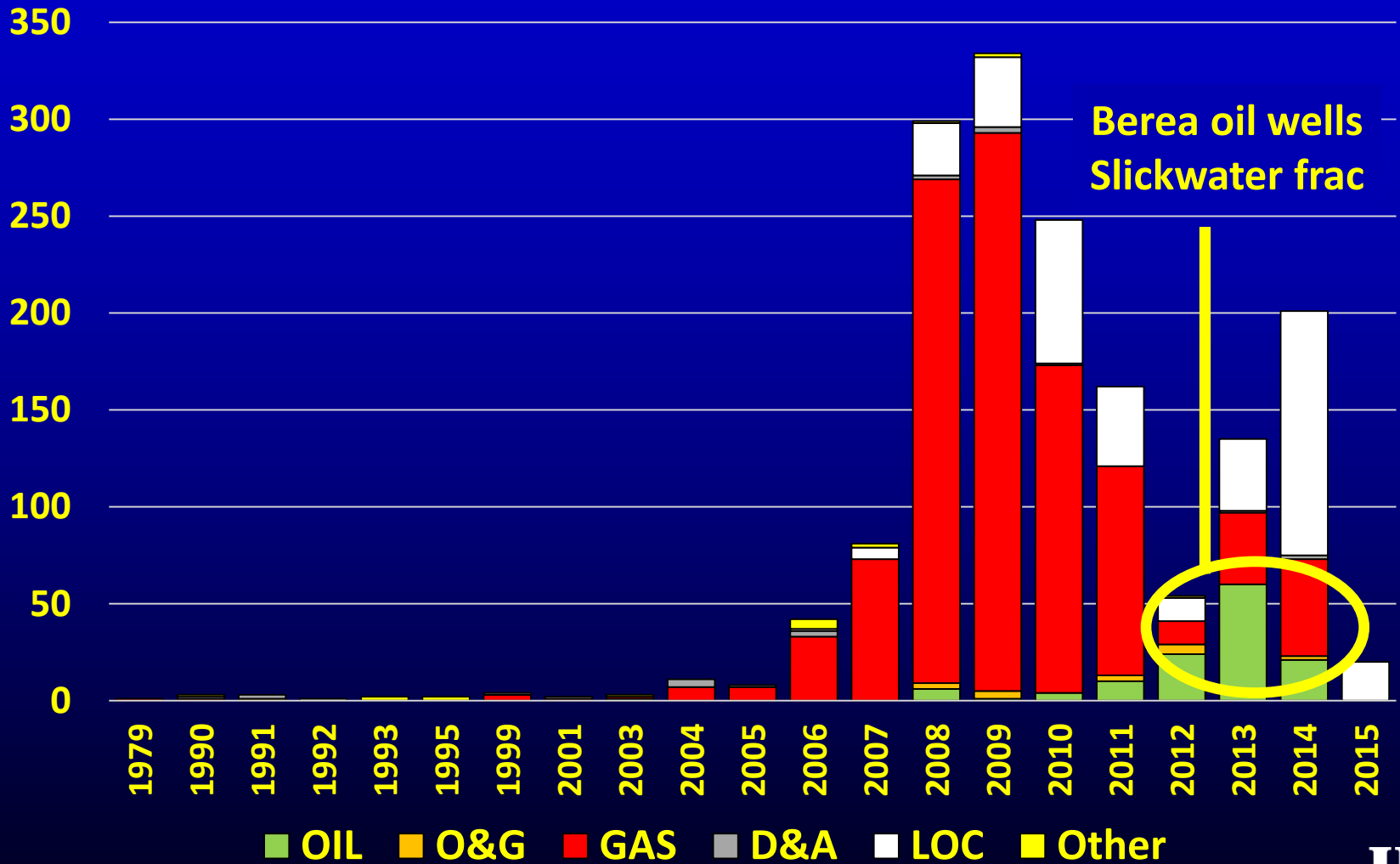


Kentucky Natural Gas Production

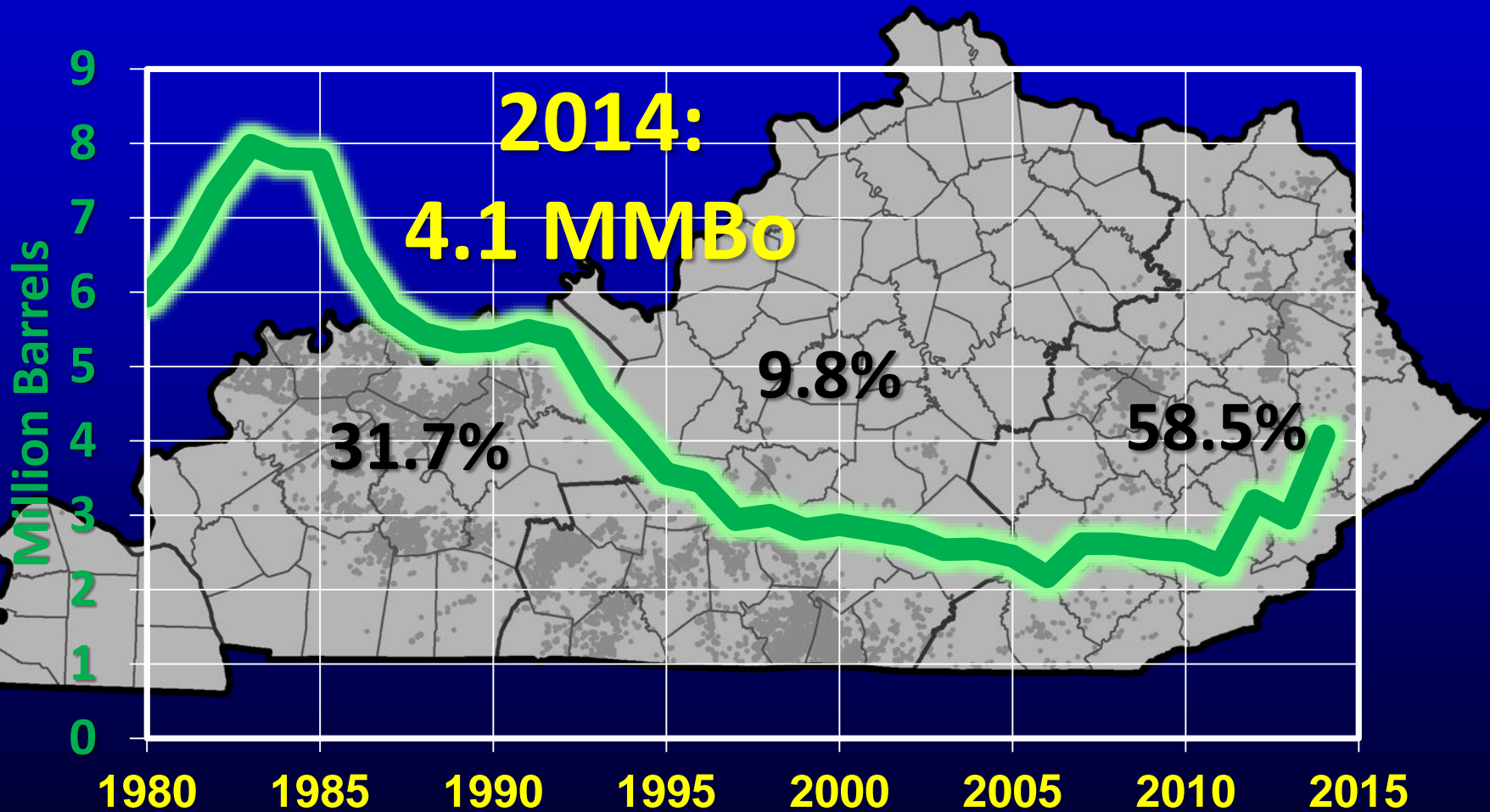


34 Kentucky counties

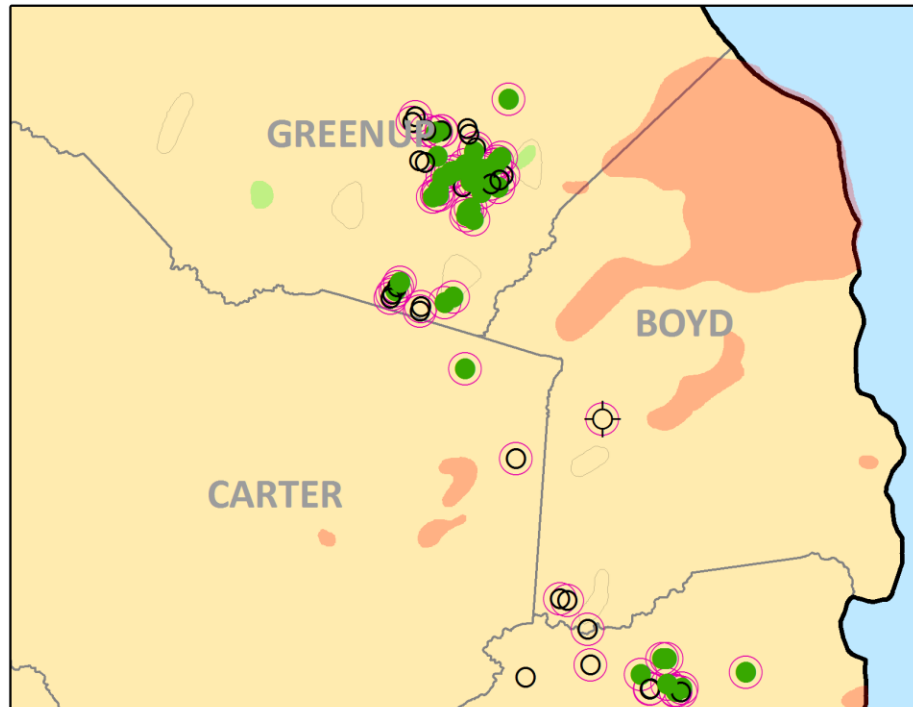
Horizontal Wells By Year



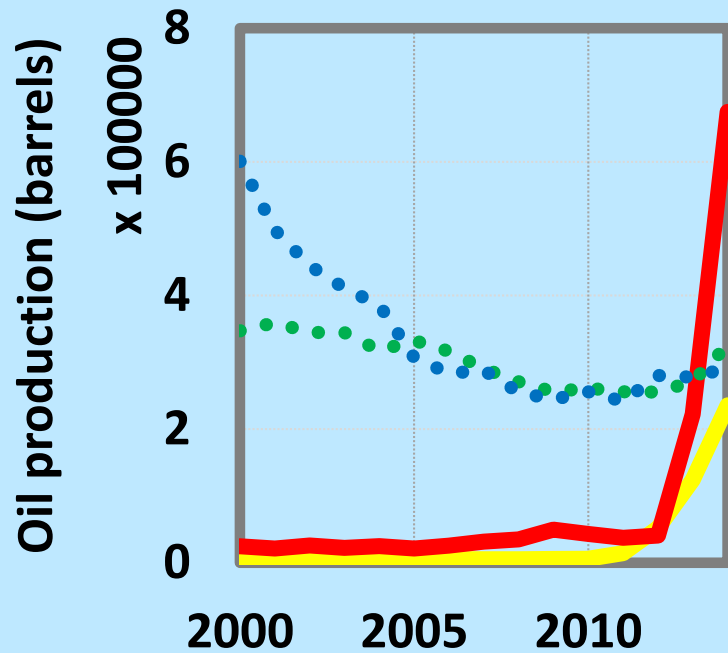
Kentucky Oil Production



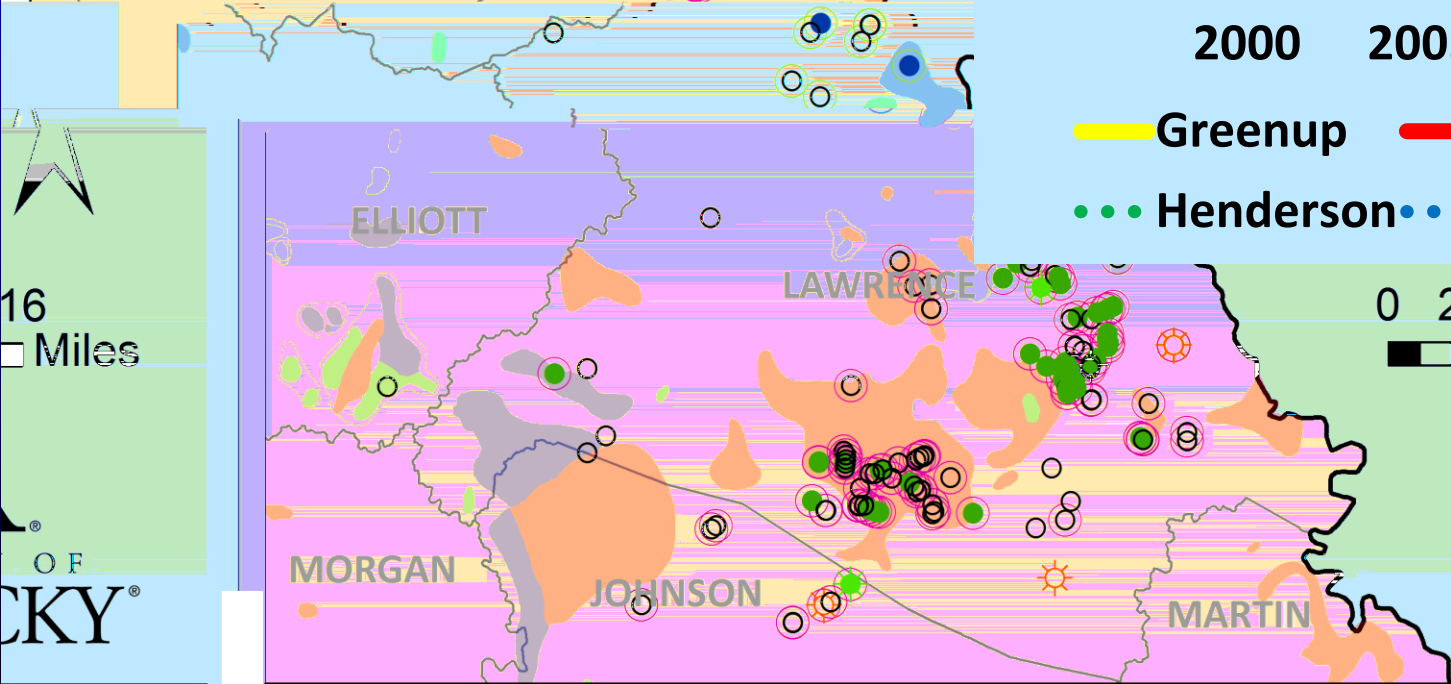
63 Kentucky counties



Devonian Berea Activity



— Greenup — Lawrence
••• Henderson ••• Union



0 2 4 8 12

16 Miles

OF
CKY

UK
UNIVERSITY
KENTUC



Energy and Environment Cabinet

Department for Natural Resources

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Division of Oil and Gas

eec.ky.gov

Search



oilandgas.ky.gov

Division of Oil and Gas

The mission of the Division of Oil and Gas is to regulate the crude oil and natural gas industry in the Commonwealth; protect the correlative rights of mineral owners, fresh water zones and minable coal seams; and conserve and protect oil and gas reserves in Kentucky.

The Division of Oil and Gas maintains a well history database for each well containing data relative to the permit, operator, well location, pertinent dates and well completion. Currently, there are 136,286 wells stored online. This information is shared with the Kentucky Geological Survey (KGS) to assist in the compilation of oil and gas data.



Quick Links

➔ [Kentucky Geological Survey](#)

Senate Bill 186 – KRS 353 Update

- **Energy & Environment Cabinet Workgroup**
 - Dept. of Natural Resources
 - Div. Oil & Gas
 - Div. Water
 - KOGA
 - Ky Resources Council
 - Ky EQC
 - Economic Development
 - Department of Ag
- **Kentucky Oil and Gas Regulatory Modernization Act**
- **Signed by Governor Beshear 19-Mar-2015**
- **Law 24-Jun-2015**

SB 186 – Hydraulic Fracking

- “High-volume” (HVHF) defined
 - >80,000 gallons for any stage
 - >320,000 gallons in aggregate for all stages
- Baseline water quality testing, post-frac monitoring
- Notification (surface owners within 1,000’)
- Disclosure at chemical registry, FracFocus.org
 - Trade secrets must be available to health professionals on request
- Site reclamation, BMP

EEC Listening Sessions

- **Public comments (not a debate)**
 - Oil & gas development
 - Report to oil and gas workgroup
- **Check eec.ky.gov for news release**
 - Place: Hazard, Somerset, and Madisonville
 - Date & time: TBD

Public records are available through online services at www.uky.edu/kgs.

The screenshot shows the homepage of the Kentucky Geological Survey (KGS) website. The browser window title is "Welcome to Kentucky Geological Survey" and the address bar shows "www.uky.edu/KGS/". The website features a navigation menu with links for Home, Mobile, Contact, About, Staff, and Calendar. A search bar is located in the top right corner. The main content area includes a large image of a scenic view along the Sky Bridge Trail, a "Quick Links" section with links to search oil & gas wells, online geologic map, groundwater, recent publications, and coordinate conversion service, and a "Of Interest" section with a photo of State Geologist Jim Cobb speaking. The footer contains logos for AASG, Kentucky Consortium for Carbon Storage, Fossils & prehistoric life, Real-time earthquake recordings, KGS photos and images, See KGS presentations, YouTube, Podcast, Facebook, and Twitter, along with the Kentucky Paleontological Society logo. Copyright information at the bottom states: "All files associated with this page are copyrighted © 1997 – 2005 by the Kentucky Geological Survey, University of Kentucky. An Equal Opportunity University. Contact the Webmaster. Last modified October 2, 2012."

Online search

Interactive maps

Enable pop up windows!



KGS home page

Public records

Scanned documents are available for browsing, printing, or downloading.

Completion and stimulation

Oil & Gas Records Search Results | R00137126.djvu (image/x.djvu Object)



kgs.uky.edu/oilgasimages/0/0/1/3/7/R00137126/R0

Most Visited | Getting Started | Latest Headlines | W3C Feed Validation S... | Bookmarks

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Kentucky Geological Survey

COMMONWEALTH OF KENTUCKY
DEPARTMENT FOR NATURAL RESOURCES
DIVISION OF OIL AND GAS CONSERVATION
P.O. Box 2244
FRANKFORT, KY 40601 PHONE (502) 573-0147

  **F WELL LOG ETION REPORT**
D BY LAW

(TYPE OR PRINT IN INK) OPERATOR'S PHONE: 606-785-0781

WELL IDENTIFICATION PERMIT NO. 104874
OPERATOR Clean Gas, Inc.
FARM NAME Emory Moore Heirs WELL NO. 375

TYPE OF OPERATION LOCATION Letcher
TWIN COUNTY
REOPEN
NEWWELL SEC. 20 LTR. H. NO. 80
WORKOVER FHL 1537 FEL
DEEPENING FHL 1537 FHL

ELEVATION 1418 (GROUND) (D.F.) (K.B.)

OPERATIONAL DATES
COMMENCED 12/16/2009 COMPLETED 01/12/2010
PLUGGED SHUT-IN 01/15/2010

DRILLING CONTRACTOR
NAME Crownwell Drilling, Inc.
ADDRESS P.O. Box 10
Albany, KY 42602

WATER ENCOUNTERED (FRESH, SALT, SULFUR)
TYPE FROM TO
Fresh Water None
Salt Water None

COMMENTS

GEOPHYSICAL LOGS RUN (AS REQUIRED BY KRS 203.000(2))
(ELECTRICAL INDUCTION, SONIC, GAMMA RAY, NEUTRON, DENSITY, ETC.)
TYPE FROM TO
Gamma Ray Surface TD
Density/PE 494 TD
Temp/Sonic 494 TD
Neutron 494 TD
Dual Induction 494 TD

TOTAL DEPTH DRILLED 4456

CASING DATA

CASING OUTSIDE DIAMETER	HOLE DIAMETER	DEPTH	CEMENT NO. SKS	PULLED YES/NO
13.36"	17 1/2"	58	0	NO
9.58"	12.14"	494	185	NO
4.1/2"	8.7/8"	4435	310	NO

CEMENT YIELD IN CUBIC FEET/BACK = 368 CUBIC FEET
COMMENTS 9.5/8" = 185 sks (1.20 R3/sk)
4.1/2" = 310 sks (1.9 R3/sk)

TYPE OF COMPLETION (CHECK ONE)
DRY HOLE
OIL
GAS DOMESTIC GAS

ENHANCED RECOVERY: SERVICE WELL:
WATER INJECTION WATER SUPPLY
GAS INJECTION SALT WATER DISPOSAL
GAS STORAGE OBSERVATION
INJECTION-EXTRACTION OTHER

WELL TREATMENT TYPE OF FRAC. SHOT
TYPE SHOT Select Fire & HSC
SHOT INTERVAL Shale(1) =4197-4361 Shale(2) = 3873-4064
SHOT AMOUNT Big Lime(3) =3420-3448

COMPLETION INTERVAL, PERFORATIONS OR OPEN HOLE
FORMATION Shale(1) INTERVAL 4197-4361 20H
FORMATION Shale(2) INTERVAL 3873-4064 20H
PLUGGED Big Lime (3) SHUT-IN 3420-3448 22H

TREATMENT
TYPE OF TREATMENT Shale(1) &(2) = N2 Big Lime = 60Q Foamed Acid
ACID AMOUNT (1)=12,(2)=6 BBLs (3)=65.3 BBLs
TOTAL FLUID (1)=12,(2)=6 BBLs (3)=65.3 BBLs
TOTAL NITROGEN (1)=901,400 (2)=901,100 (3)=271,000 SCF
TOTAL SAND _____ LBS

SOQUEZE CEMENT SKS _____ TOP _____ INTERVAL _____
PLUG BACK SKS _____ TOP _____ INTERVAL _____

INITIAL TEST VOLUMES
OIL NATURAL B/D _____ DATE _____
AFTER TREATMENT B/D _____ DATE _____
GAS NATURAL odor MCF 01/12/2010 DATE _____

AGAINST BACKPRESSURE OF ATM _____ PSI
SHUT-IN PRESSURE _____ HOURS
AFTER TREATMENT Shut in - oil MCP 01/15/2010 DATE _____
AGAINST BACKPRESSURE OF ATM _____ PSI
SHUT-IN PRESSURE 440 AFTER 48 HOURS

LIST DSTY'S, CORES, FILL-UP TESTS AND OTHER SPECIALIZED TESTS
TYPE _____

RECEIVED
FEB 8 2010
DIVISION OF OIL & GAS

JPC
OVER

FORM LOG-3 (REV. 6/05) ALL PREVIOUS FORMS ARE OBSOLETE

WELL TREATMENT TYPE OF FRAC. SHOT
TYPE SHOT Select Fire & HSC

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TOTAL SAND _____ LBS


MENT **PULLED**
L. SKS **YES/NO**

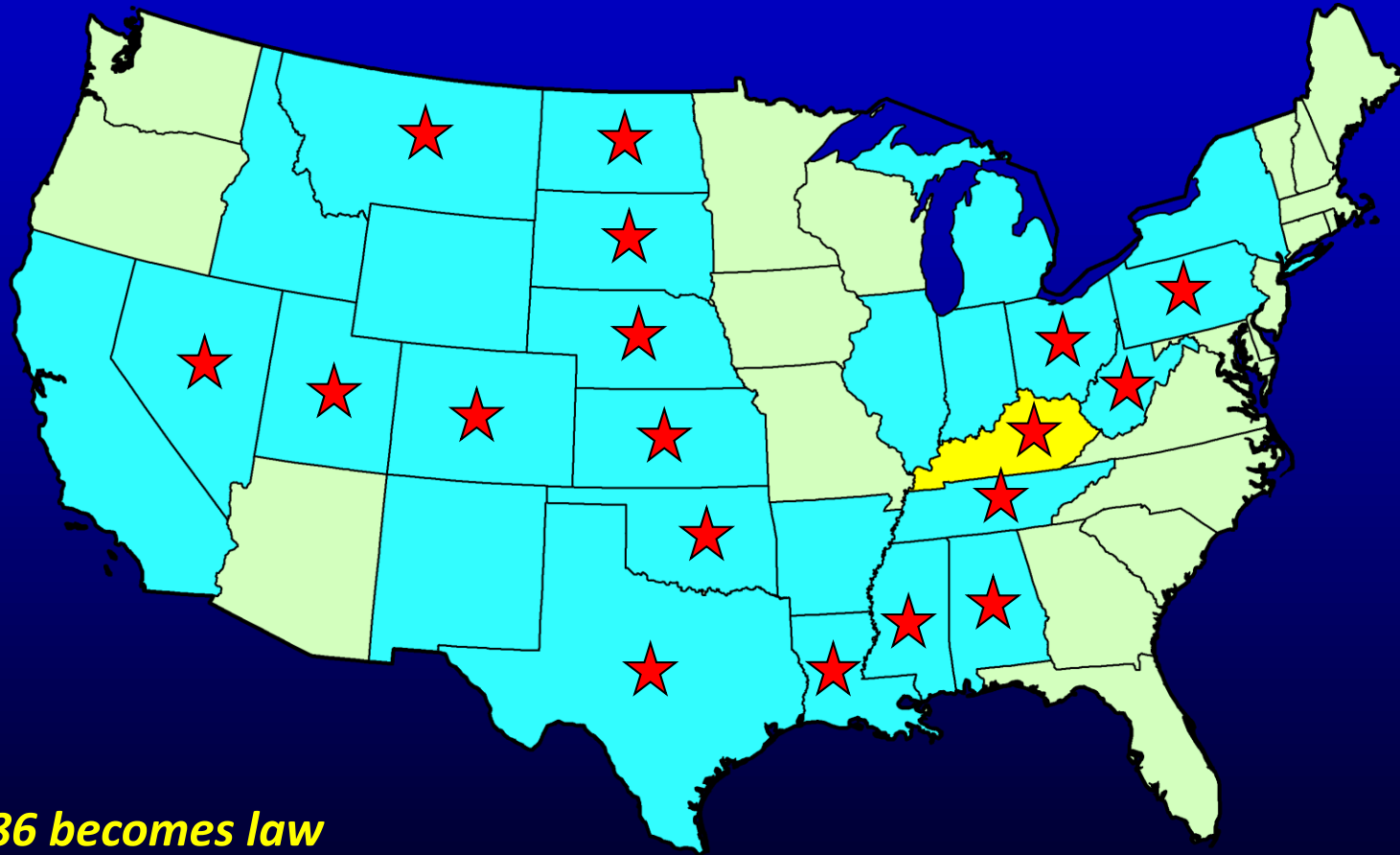
_____ NO
5 _____ NO
_____ NO

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KENTUCKY

FracFocus.org


27 states
require
disclosure


18 states
designate
FracFocus



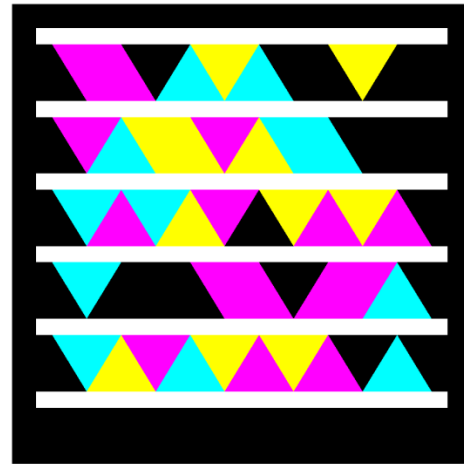
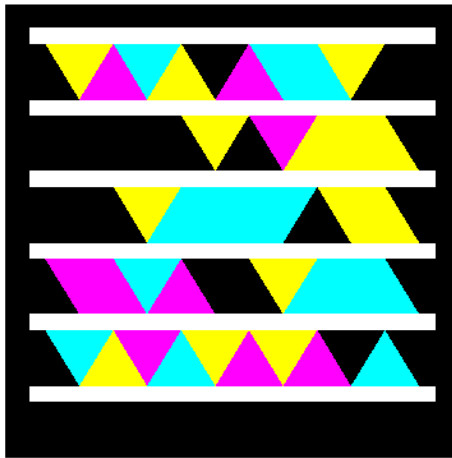
*Kentucky – SB 186 becomes law
24-Jun-2015*

Summary

- **Fracking**
 - Used for decades
 - Combined with horizontal wells
 - Devonian Ohio Shale (natural gas)
 - Devonian Berea Sand (oil)
- **HVHF regulations (SB 186)**
 - Notification
 - Water testing
 - Mandatory disclosure
 - Reclamation

Thank you

- bnuttall@uky.edu
- www.uky.edu/KGS
- (859) 323-0544



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