

HYDRAULIC FRACTURING

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U.S. ENVIRONMENTAL
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WHY IS EPA STUDYING HF?

BECAUSE CONGRESS TOLD US TO!

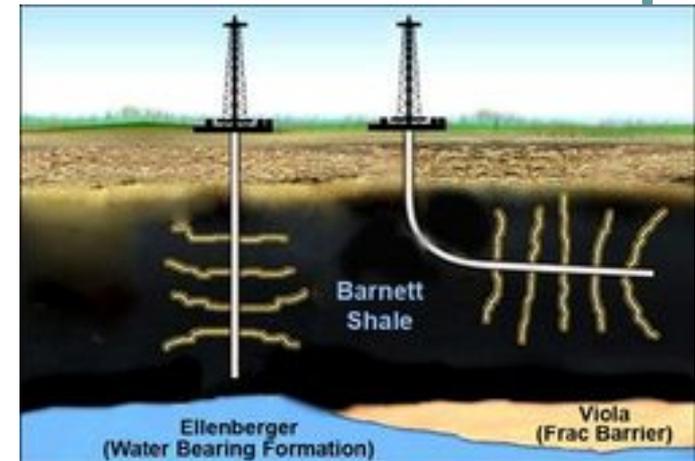
IN OUR FY 2010 BUDGET APPROPRIATIONS COMMITTEE CONFERENCE REPORT, THEY SAID:

2010 EPA BUDGET REPORT

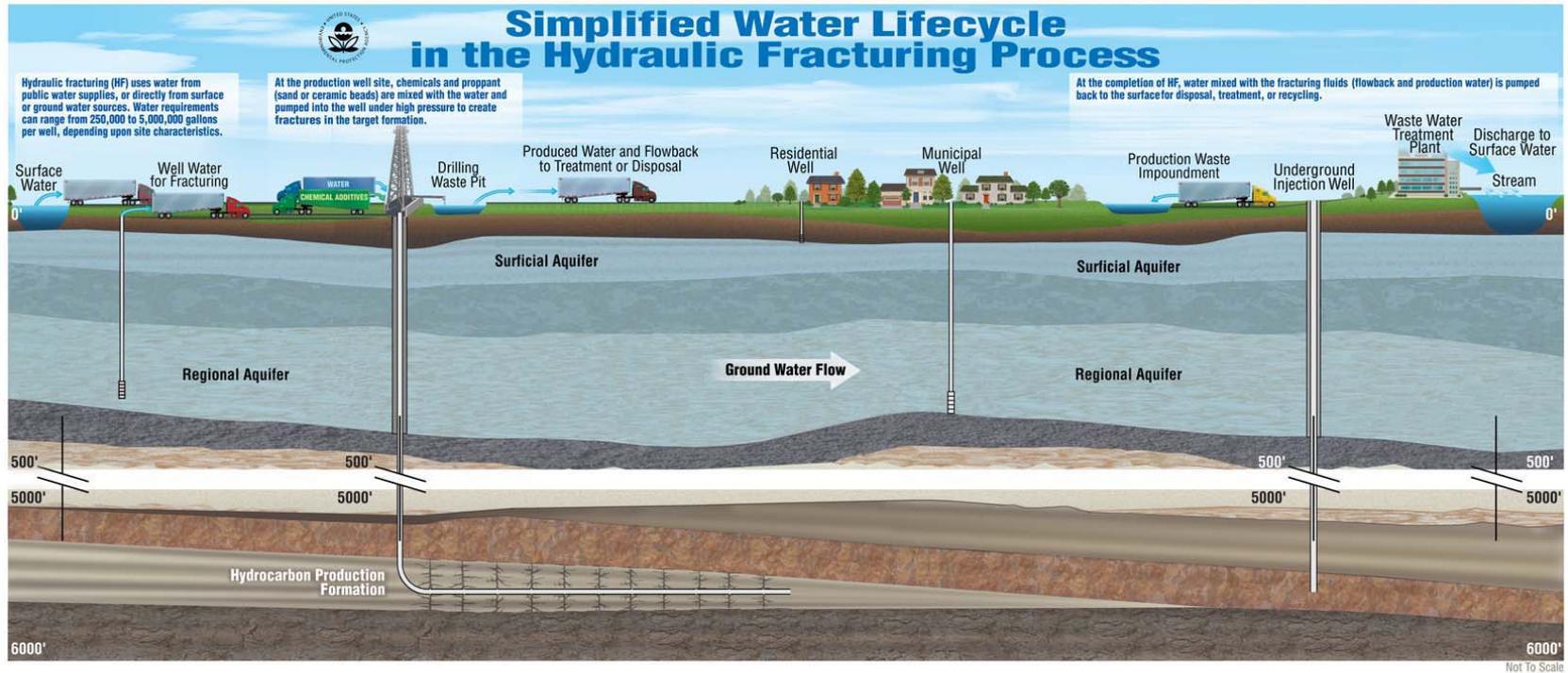
“The conferees urge the Agency to carry out a study on the relationship between hydraulic fracturing and drinking water, using a credible approach that relies on the best available science, as well as independent sources of information. The conferees expect the study to be conducted through a transparent, peer-reviewed process that will ensure the validity and accuracy of the data. The Agency shall consult with other Federal agencies as well as appropriate State and interstate regulatory agencies in carrying out the study, which should be prepared in accordance with the Agency's quality assurance principles.”

TODAY'S OBJECTIVES

- PROVIDE BACKGROUND ON HYDRAULIC FRACTURING
- DISCUSS TYPICAL CITIZEN COMPLAINTS
- STATUS OF THE EPA NATIONAL STUDY



Water and Hydraulic Fracturing



WHAT IS IN HYDRAULIC FRACTURING FLUIDS?

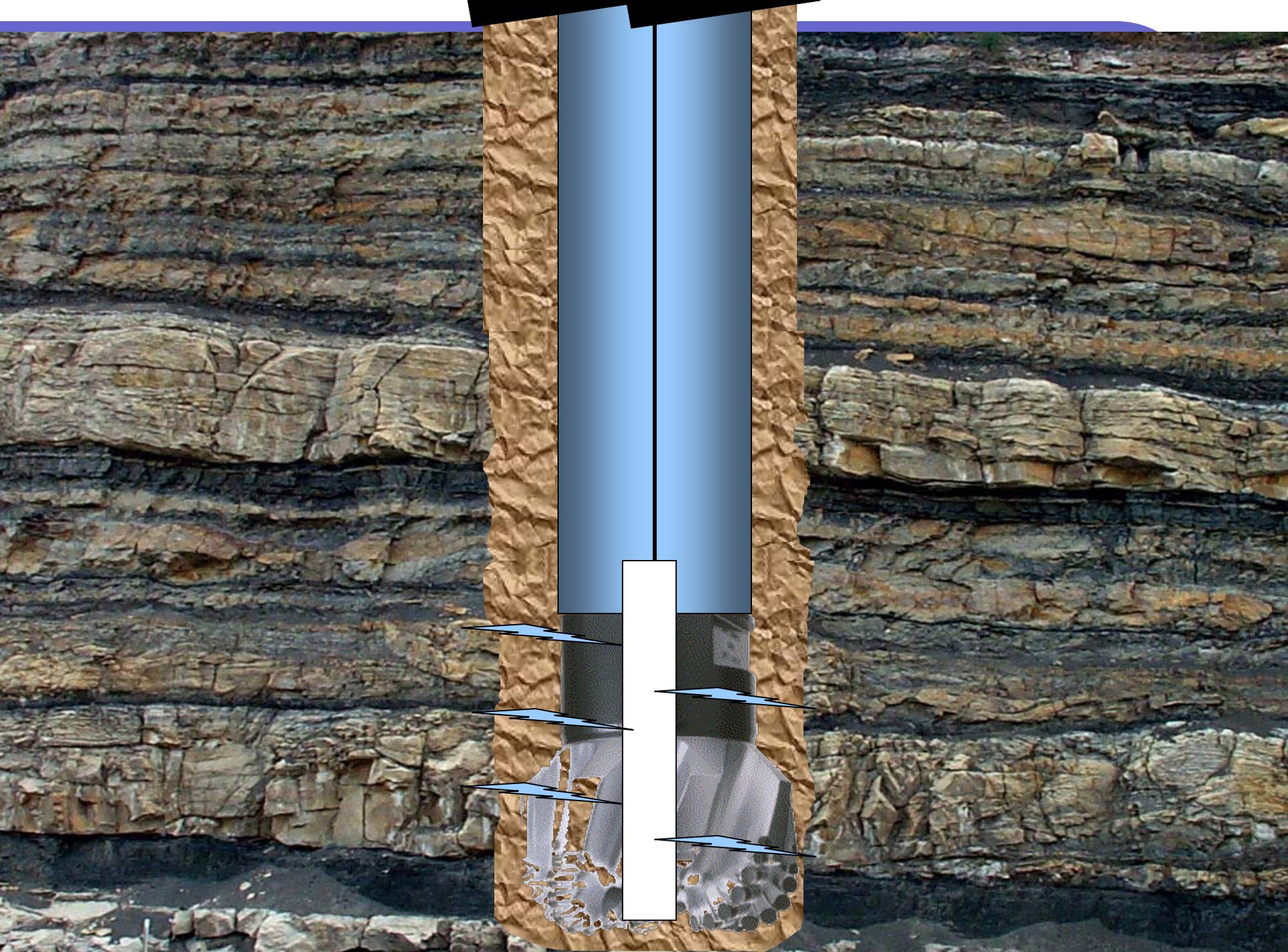
- 1-5 MILLION GALLONS WATER
- PROPPANTS (SAND, RESIN COATED SANDS, CERAMICS)
- ADDITIVES (GELS, BREAKERS, BIOCIDES, ACIDS, FRICTION REDUCERS, SCALE AND CORROSION INHIBITORS, ETC)

ANIMATION OF HYDRAULIC FRACTURING

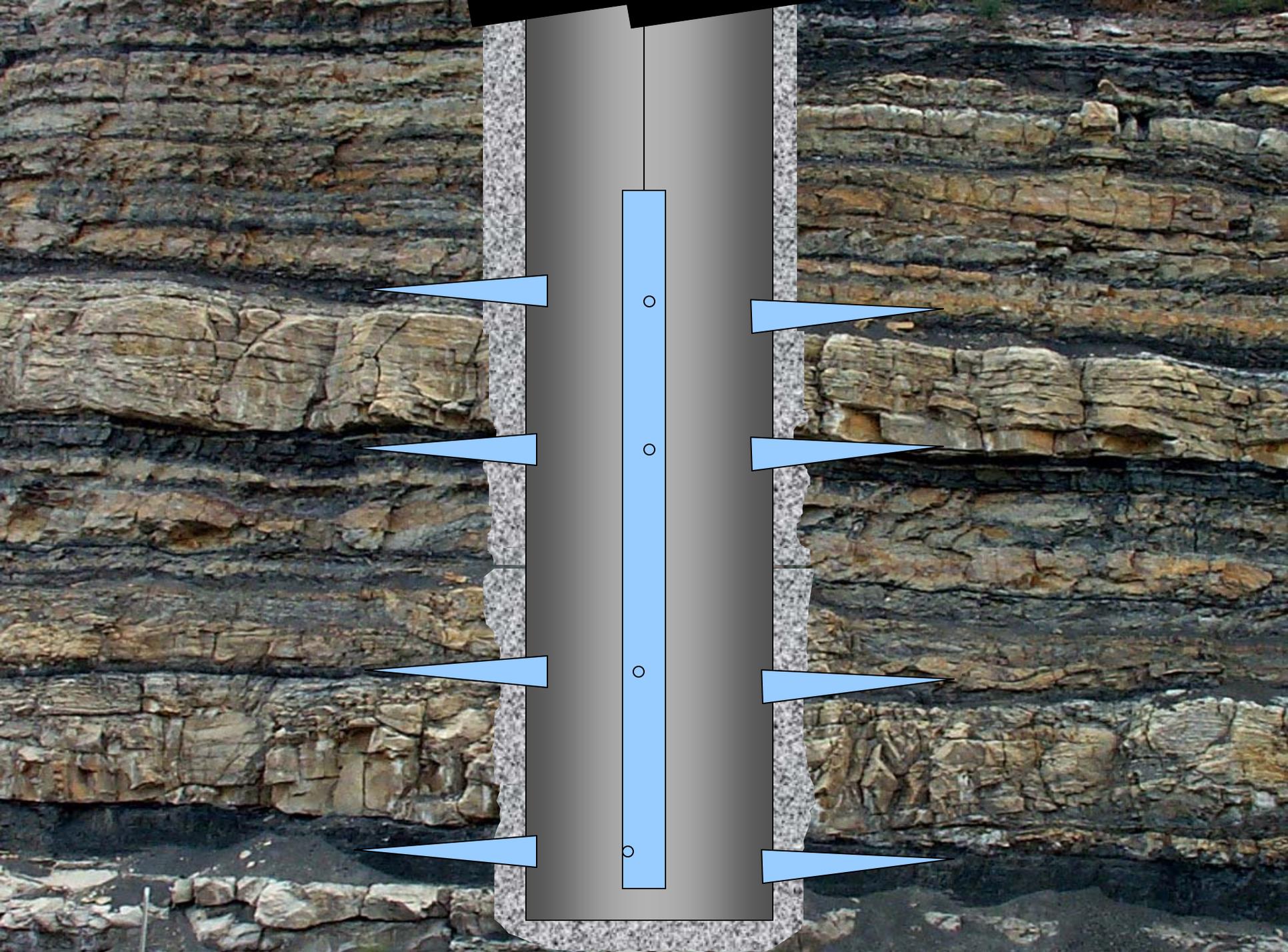
- Hydraulic fracturing involves the generation of vertical and horizontal fractures to facilitate extraction of gas (or oil) from subsurface formations (coalbeds, shale, etc).
- The process involves drilling a well, setting and perforating the casing, and then injecting hydraulic fracturing fluids under high-pressure to fracture the rock.

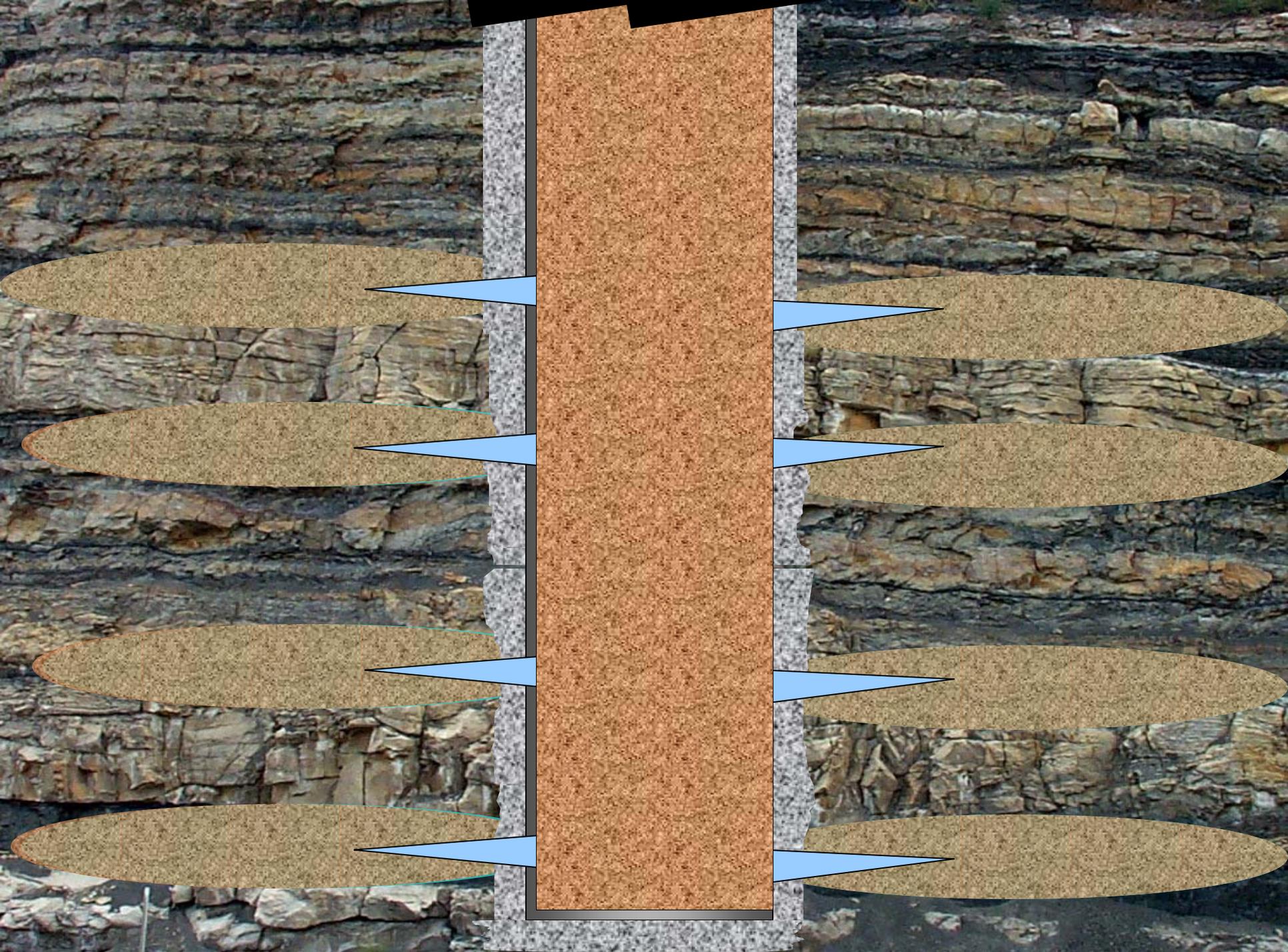
HYDRAULIC FRACTURING ANIMATION (Continued)

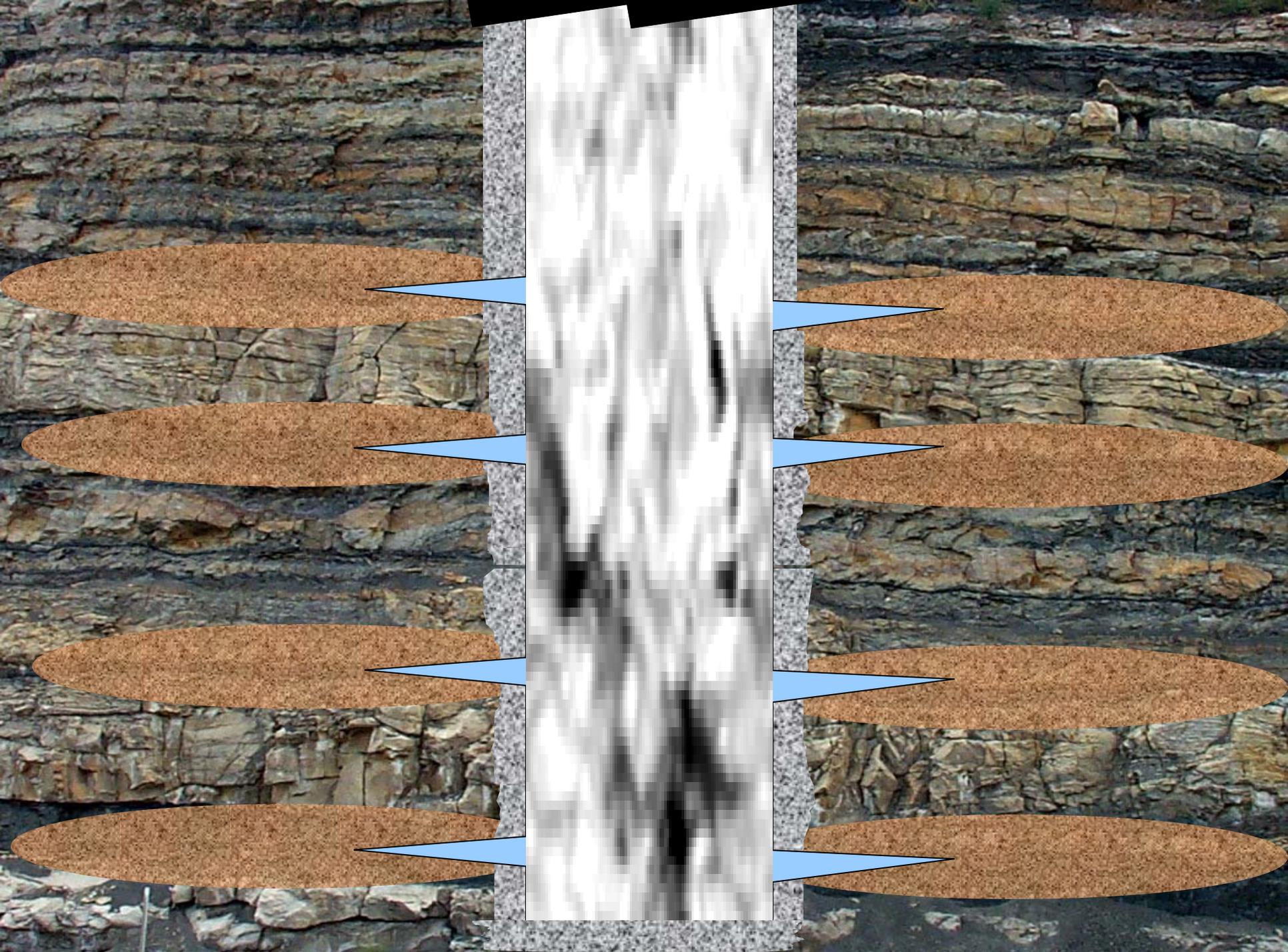
- A propping agent, usually sand, is pumped into the fractures to keep them from closing when the fracturing pressure is released.
- Gas is then extracted from the formation.
- Water is consumed and wastewater and residuals are generated





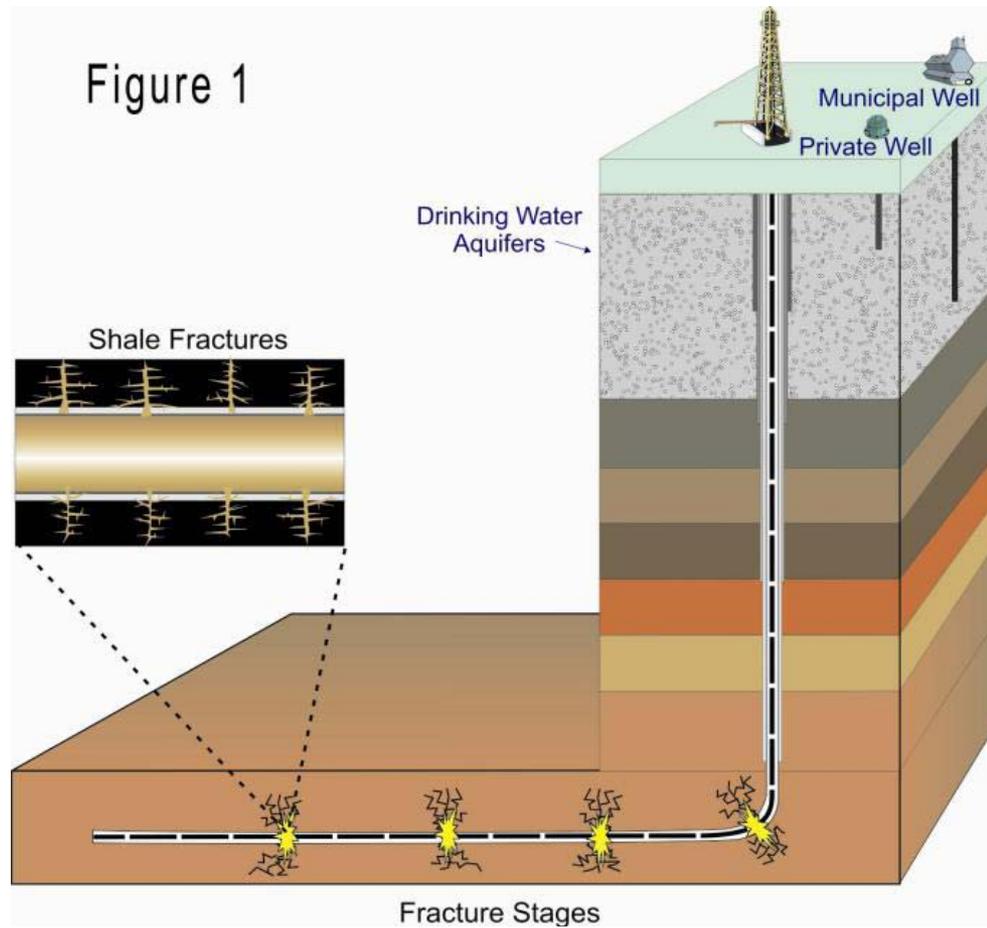




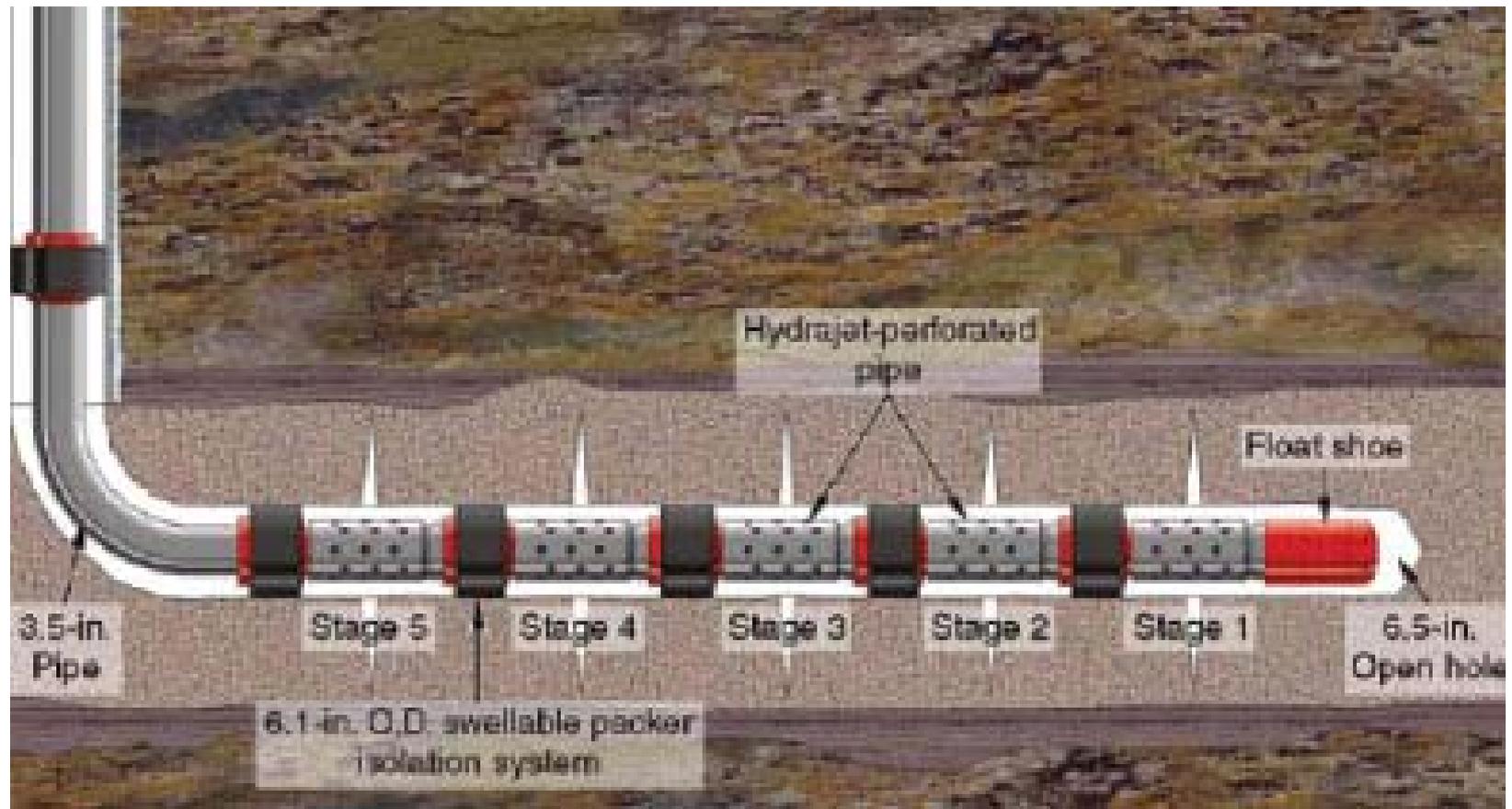


STAGES IN A HORIZONTAL WELL

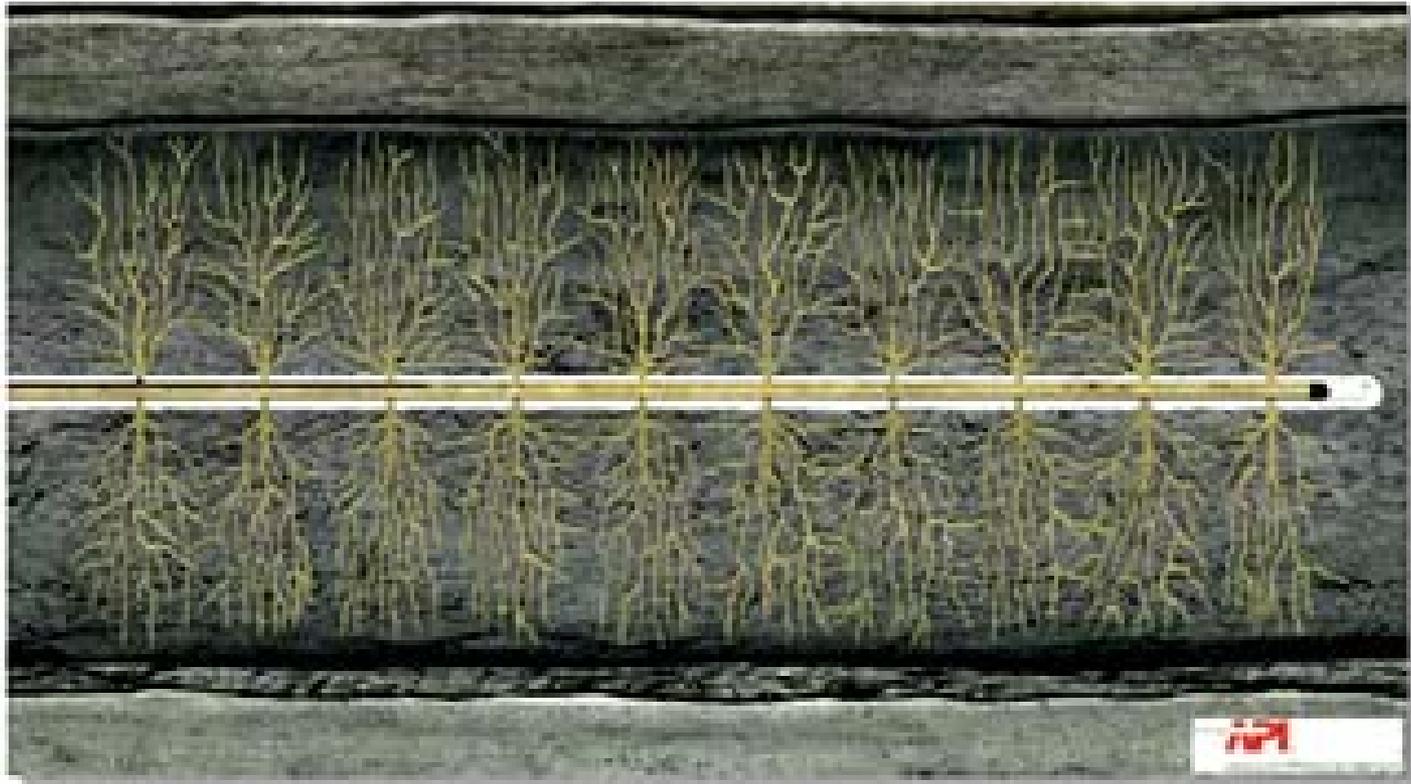
Figure 1



HORIZONTAL WELL STAGES



FRACTURING THE ROCK



A HIGHLY INDUSTRIALIZED PROCESS



IT'S A BIG JOB!



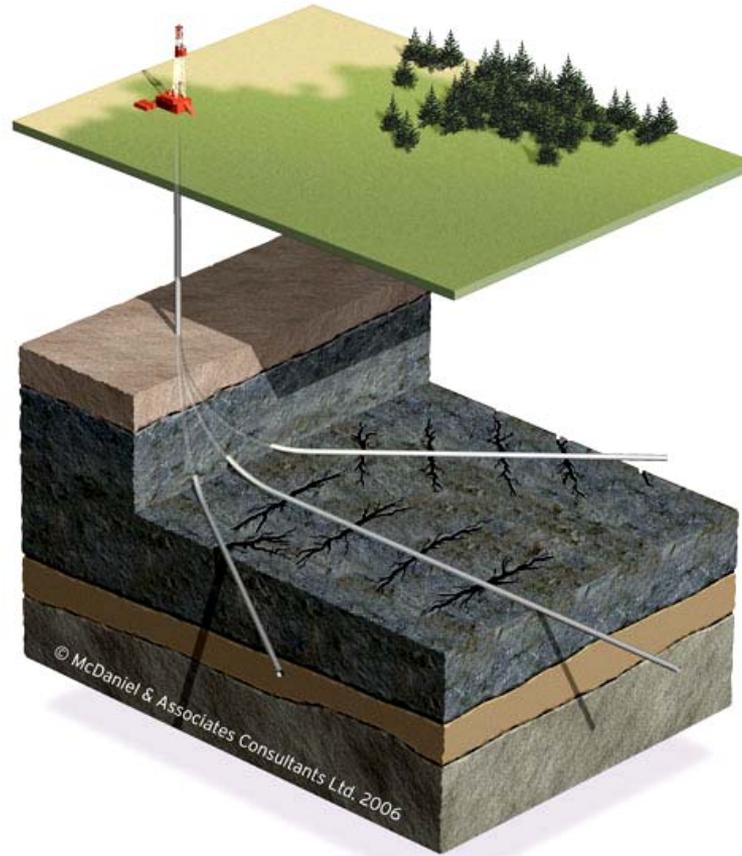
CITIZEN COMPLAINTS

- AIR EMISSIONS
- COMPRESSOR STATIONS
- WASTE MANAGEMENT
 - SPILLS, LEAKS, DUMPING, ON-SITE DISPOSAL
- PITS
- RUNOFF

CITIZEN COMPLAINTS

- **CONTAMINANTS IN FLOWBACK WATER:**
 - Total Dissolved Solids (TDS)
 - Technically Enhanced Naturally Occurring Radioactive Material (NORM)
 - HF Fluid Chemicals (???)
- **GROUND WATER & SURFACE WATER CONTAMINATION**

22 WELLS ON ONE PAD SITE



FLOWBACK PITS



FIRE HAZARDS



EXPLOSION HAZARD



IMPACTED WATER WELLS



- COLOR
- ODORS
- TASTES
- SHEENS
- FOAMING
- GAS
- SEDIMENT
- VOLUME

EARTHQUAKES

- CLEBURNE, TX
- DALLAS, TX
- GREENBRIAR AND GUY, AR
- INJECTION WELLS SHUT-IN



EPA'S STUDY OF HF

- REQUESTED DISCLOSURE OF HF CHEMICALS IN SEPTEMBER
- STUDY WORKPLAN WENT THROUGH INTERAGENCY REVIEW IN JANUARY
- SCIENCE ADVISORY BOARD REVIEW IN FEB, MARCH 7 & 8

EPA'S STUDY OF HF

- **RETROSPECTIVE CASE STUDIES AT 3-5 REPORTEDLY CONTAMINATED SITES**
- **PROSPECTIVE CASE STUDIES AT TWO ACTIVE FRACTURING SITES (MARCELLUS & HAYNESVILLE SHALES)**
- **SCENARIO EVALUATIONS**

RESEARCH QUESTIONS

- **WATER ACQUISITION**
 - **IMPACTS ON WATER AVAILABILITY**
 - **IMPACTS OF LARGE VOLUME WITHDRAWALS ON WATER QUALITY**

RESEARCH QUESTIONS

- **CHEMICAL MIXING IMPACTS**
 - **RELEASES TO GROUND WATER OR SURFACE WATER BY SPILLS OR LEAKS**
 - **CHEMICAL TRANSPORTATION ACCIDENTS**

RESEARCH QUESTIONS

- WELL INJECTION IMPACTS
 - WELL MALFUNCTIONS RESULTING IN MOBILIZATION OF, OR CONTAMINATION BY:
 - FRACTURE FLUIDS
 - FORMATION FLUIDS
 - FORMATION MATERIALS

RESEARCH QUESTIONS

- **IMPACTS FROM FLOWBACK AND PRODUCED WATERS**
 - **RELEASES TO SURFACE WATER OR GROUND WATER**
 - **LEAKAGE FROM ONSITE STORAGE**
 - **IMPROPER PIT CONSTRUCTION, MAINTENANCE OR CLOSURE**

RESEARCH QUESTIONS

- **TREATMENT & DISPOSAL IMPACTS**
 - **DISCHARGES INTO SURFACE WATERS OR GROUND WATER**
 - **INCOMPLETE TREATMENT AT WWTP'S AND RESIDUALS**
 - **TRANSPORTATION ACCIDENTS**

SCHEDULE

- BEGIN IMPLEMENTATION LATER THIS SPRING/SUMMER
- BEGIN WRITING REPORT TO CONGRESS NEXT SPRING
- INTERIM REPORT TO CONGRESS BY THE END OF 2012
- REPORT TO CONGRESS BY THE END OF 2014

HYDRAULIC FRACTURING RESOURCES ON THE WEB

- <http://www.api.org/policy/exploration/hydraulicfracturing/hydraulicfracturing.cfm>
- Poster on water use in HF:
http://www.epa.gov/safewater/uic/pdfs/poster_hf_lifecycle_poster_8x11.pdf
- Study homepage:
<http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/index.cfm>
- EPA HF study fact sheet:
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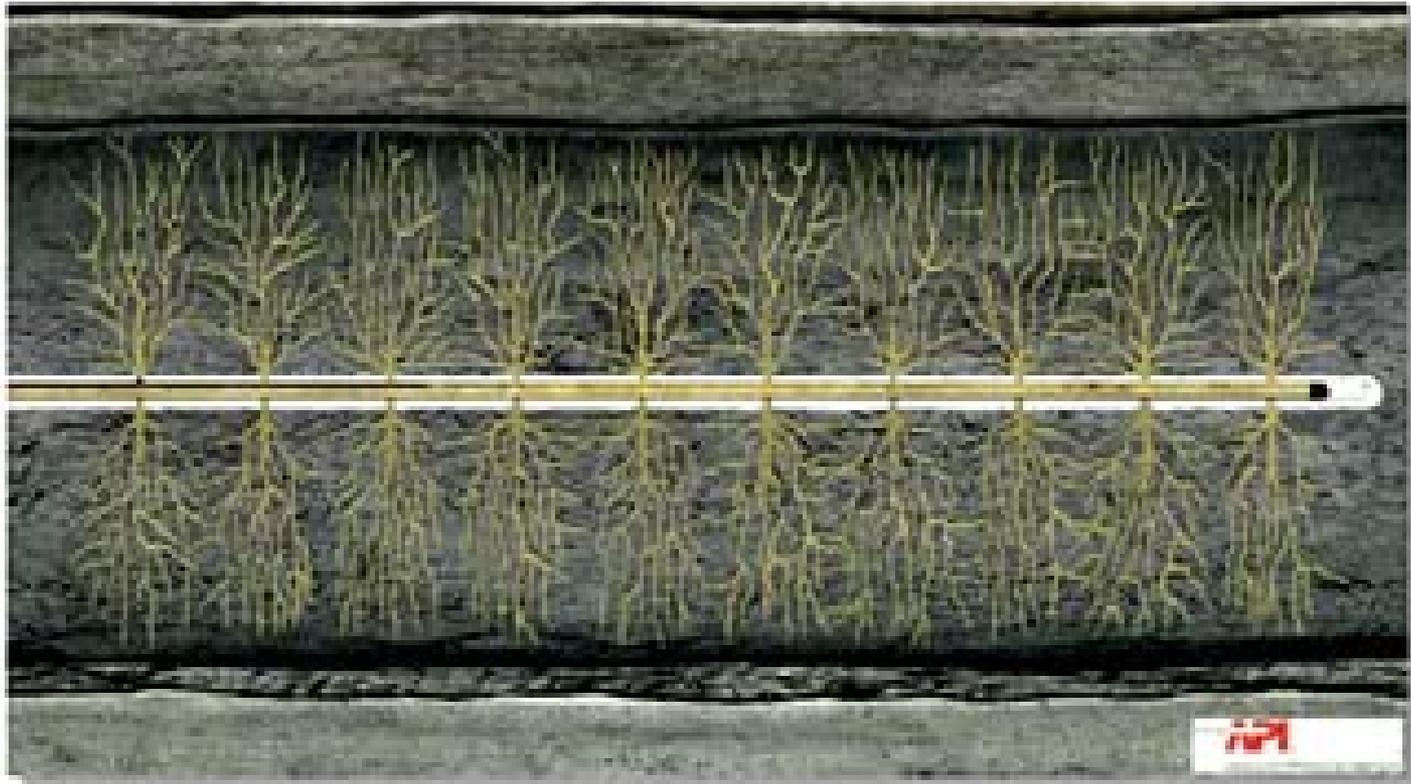
QUESTIONS? CONTACT ME @

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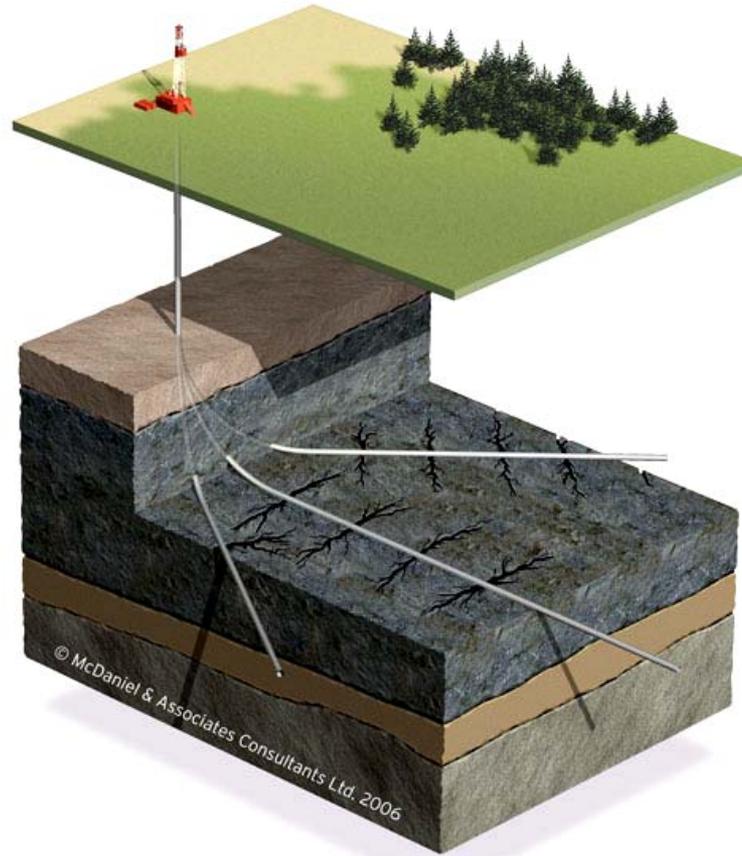
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