UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
RESEARCH AND DEVELOPMENT

AUG 20 2012

Mr. Stuart Wittenbach
SandRidge Energy
123 Robert S Kerr Drive
Oklahoma City, Oklahoma 73102

Dear Mr. Wittenbach:

Thank you for participating in the U.S. Environmental Protection Agency's (EPA's) study on the potential impacts of hydraulic fracturing on drinking water resources. I am writing to provide an update on the project and to give you an overview of how we are using the materials that you provided.

In late 2010, the EPA received information from nine hydraulic fracturing service companies in response to a letter sent in September 2010.[1] These companies identified about 25,000 wells for which they had provided hydraulic fracturing services and the name of the operator of each well. Using a random sample and commonly accepted statistical procedures, the EPA arrived at a list of 350 wells operated by nine companies that reflect both geographic diversity and operator size. In August 2011, the EPA sent letters to these operators requesting information on activities occurring at these wells.[2] You received one of these letters.

In an attachment to the August 2011 letter, the EPA explained that it was undertaking a hydraulic fracturing study at the request of the U.S. Congress. The Appropriations Conference Committee of the House of Representatives asked the EPA 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 EPA requested your cooperation in providing material to support the study, based on the understanding that well design and construction is integrally related to the potential for drinking water impacts from hydraulic fracturing. The full study includes case studies, scenario evaluations, laboratory studies, toxicity assessments, and an analysis of other existing data in addition to the materials provided by the well operators and hydraulic fracturing service companies.

The EPA intends to issue two reports to address the Congressional request. In the first report, expected in late 2012, the EPA will report on the progress of the study, and expects to describe more specifically the methodology and approach for each project conducted under the study, part of which will include an analysis of materials covering the wells for which the EPA received information from the nine well operator companies, including from you. Over the next several years, the EPA expects to produce several peer-reviewed studies and a second report. The second report will provide the results of the full study, the purpose of which is to determine the relation, if any, between hydraulic fracturing and drinking water resources, and the driving factors for any such relation.

[1] http://www.epa.gov/hfstudy/September_2010_request_letter.pdf
[2] http://www.epa.gov/hfstudy/August_2011_request_letter.pdf

We appreciate your willingness to share material about well design, construction and operation. This information is helping the EPA, and ultimately the public, better understand the relationship between well design and construction and, subsequently, allow the EPA to evaluate whether there are potential impacts of hydraulic fracturing on drinking water resources.

Some of the information you provided is being used in the 2012 progress report to characterize, in a general manner, the wells that the EPA is studying. Source materials for the study will include materials found from public sources (such as peer-reviewed literature), in addition to the data provided by you, the other oil and gas well operators, and the service companies in the two data collections. Although some of the information used to identify and characterize the specific wells included in the study was claimed as confidential business information (CBI), the resulting discussions, tables, or figures in the 2012 report are very general, not company specific, or traceable to a company and therefore are not CBI.

The two reports will include general and aggregated descriptions of well construction and activities. Attached to this mailing are samples of the types of diagrams that the EPA intends to release as part of the 2012 progress report, containing hypothetical examples of the aggregate data that the EPA intends to use to illustrate the report, and samples of other charts and diagrams that may be used in the peer-reviewed articles and the second report. These diagrams include references to the states and hydrocarbon-bearing basins in which wells are located, the type of hydrocarbon detected in hydraulically fractured zones, and the number of wells that stimulate different lithologies. In these studies no wells will be specifically identified, and specific locations, such as GPS locations or street addresses, will not be provided. In some cases, high level discussions of different aspects of well construction will be included. For example, the reports may include a description of the range of well depths, including vertical and horizontal lengths, and the percentage of the well associated with each section of well construction.

If information was claimed as CBI, the EPA will not release that information clearly identifying it as being from a particular company unless we receive your permission to do so or release is otherwise consistent with our regulations. If, in any case, the desired analysis is company-specific, you will be contacted regarding the potential use of information you claimed as CBI. If you wish to make a claim that the aggregate information described in this letter and the attached examples is CBI, please contact the EPA **by September 6, 2012**. Materials claimed as CBI will only be disclosed in a manner consistent with EPA's CBI regulations.

Again, thank you for your cooperation in the EPA's ongoing study. Your information will allow the EPA to conduct a more thorough assessment of the potential impacts of hydraulic fracturing on drinking water resources. If you have any questions or concerns about the EPA's approach, please contact Susan Sharkey (202-564-8789 or sharkey.susan@epa.gov).

Sincerely,

Susan Sharkey

for Jeanne Briskin
Hydraulic Fracturing Research Coordinator
Office of Science Policy

Attachment

Hypothetical Examples of Tables and Figures Using Information from Well Files

The following tables and figures are hypothetical examples intended to illustrate how EPA may use information from the materials provided by the well operator companies. All examples use fictional information or data from public sources. Where applicable, the sample size for data on each graph is (or will be) presented on that graph (i.e. sample size "n"). The example graphs shown may be further broken down by lithology or basin, but will not be broken down by operator (other than the first table). Histogram figures may be replaced by scatter plots and vice versa.

Table A: Summary of Well Files Provided to EPA by operator and location (fictional information)

Well Operator	Operator Size*	Number of Drilled Wells
Clayton Williams Energy	Size	34
ConocoPhillips	Size	59
EQT Production	Size	31
Hogback Exploration	Size	12
Laramie Energy II	Size	19
MDS Energy	Size	26
Noble Energy	Size	69
Sand Ridge Operating	Size	34
Williams Production	Size	49
Total		333

*Operator size (small, medium, or large) is based on number of wells hydraulically fractured in 2009-2010. See http://www.epa.gov/hfstudy/analysis-of-existing-data.html for a more detailed description of operator size determinations.

Table B: Number of Wells in Each Hydrocarbon Producing Basin (fictional information)

Hydrocarbon Producing Basin*	Count of Wells** (n=334)
Anadarko	5
Appalachian	13
Arkoma	44
Bighorn	7
Denver	16
Fort Worth	4
Permian	16
Powder River	77
San Juan	56
TX-LA-MS Salt	3
Uinta-Piceance	33
Western Gulf	57
Williston	3

* Source: U.S Energy Information Administration, see http://www.eia.gov/oil_gas/rpd/shale_gas.pdf

** The number of drilled wells is 333. One well was never drilled.

Figure C: Proportions of Well Completion Types by Basin (fictional information)

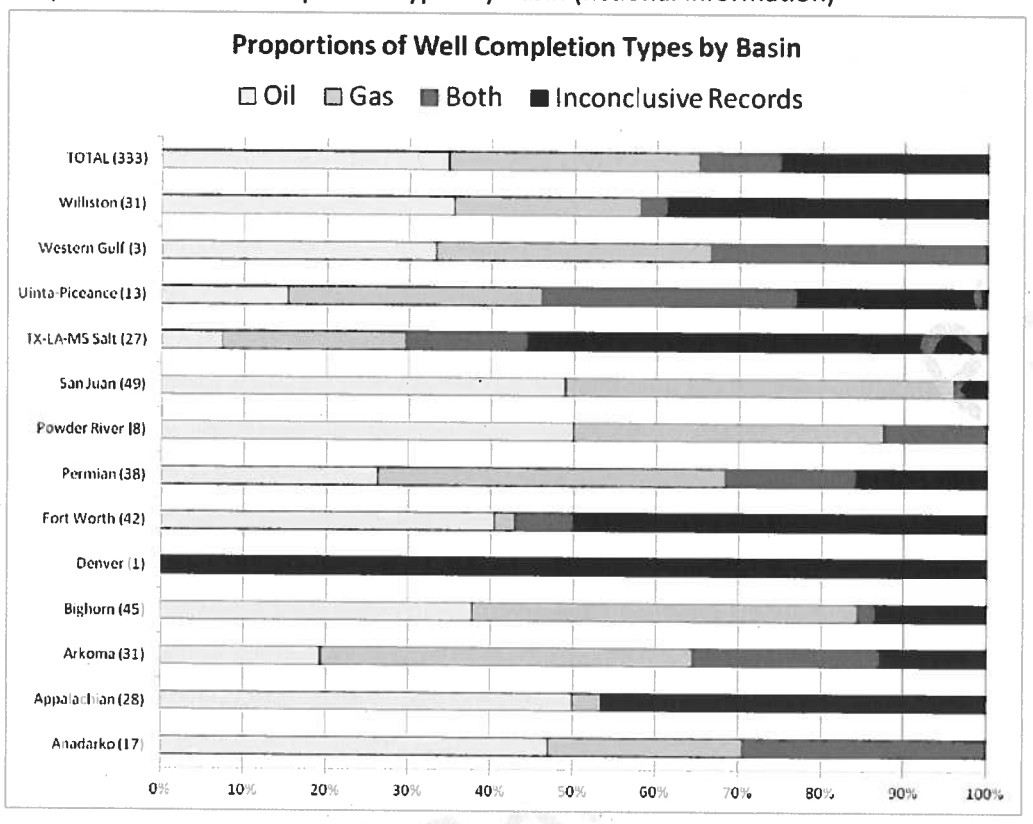


Figure D: Proportions of Producing Well Types by Basin (fictional information)

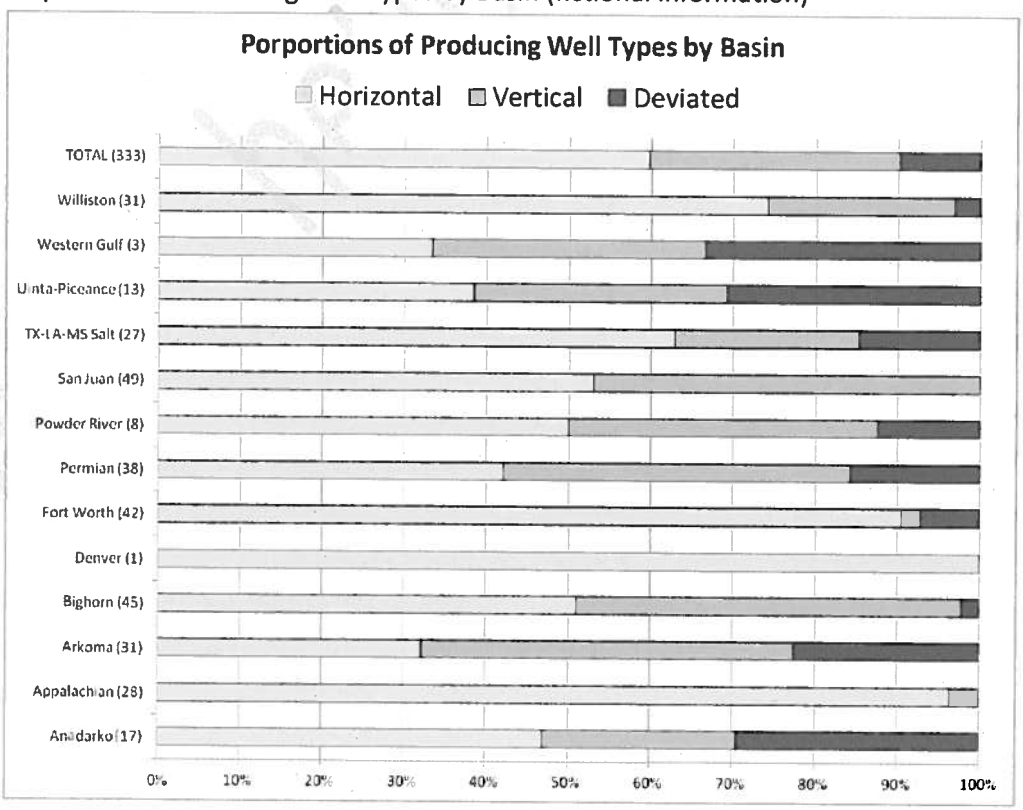


Figure E: Count of Wells by Measured Depth of Uppermost Fractured Zone (in feet of measured depth) (fictional information)

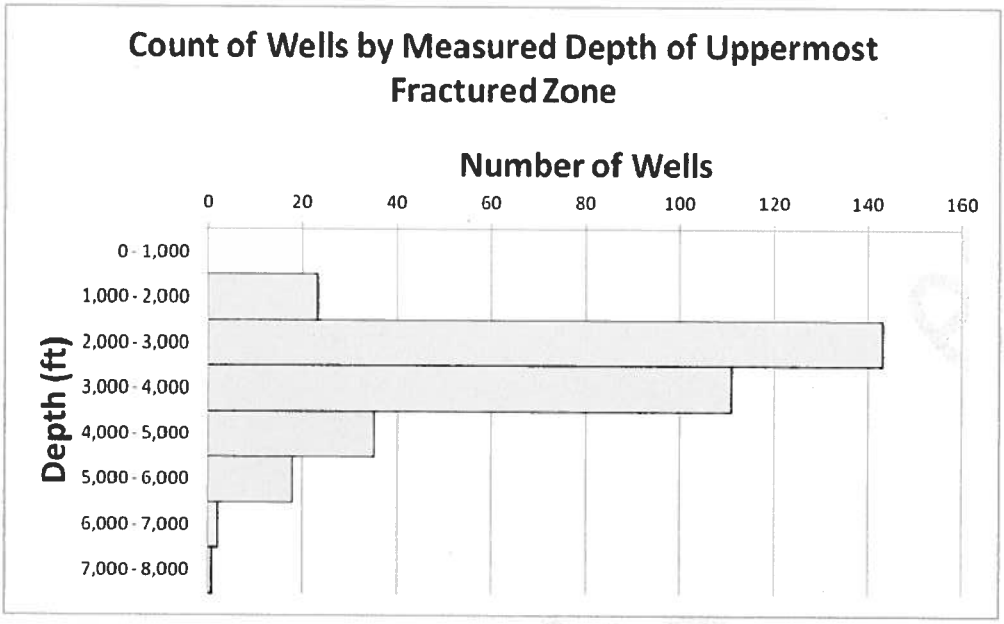


Figure F: Number of Wells Stimulating Various Lithologies by Type of Completion (fictional information)

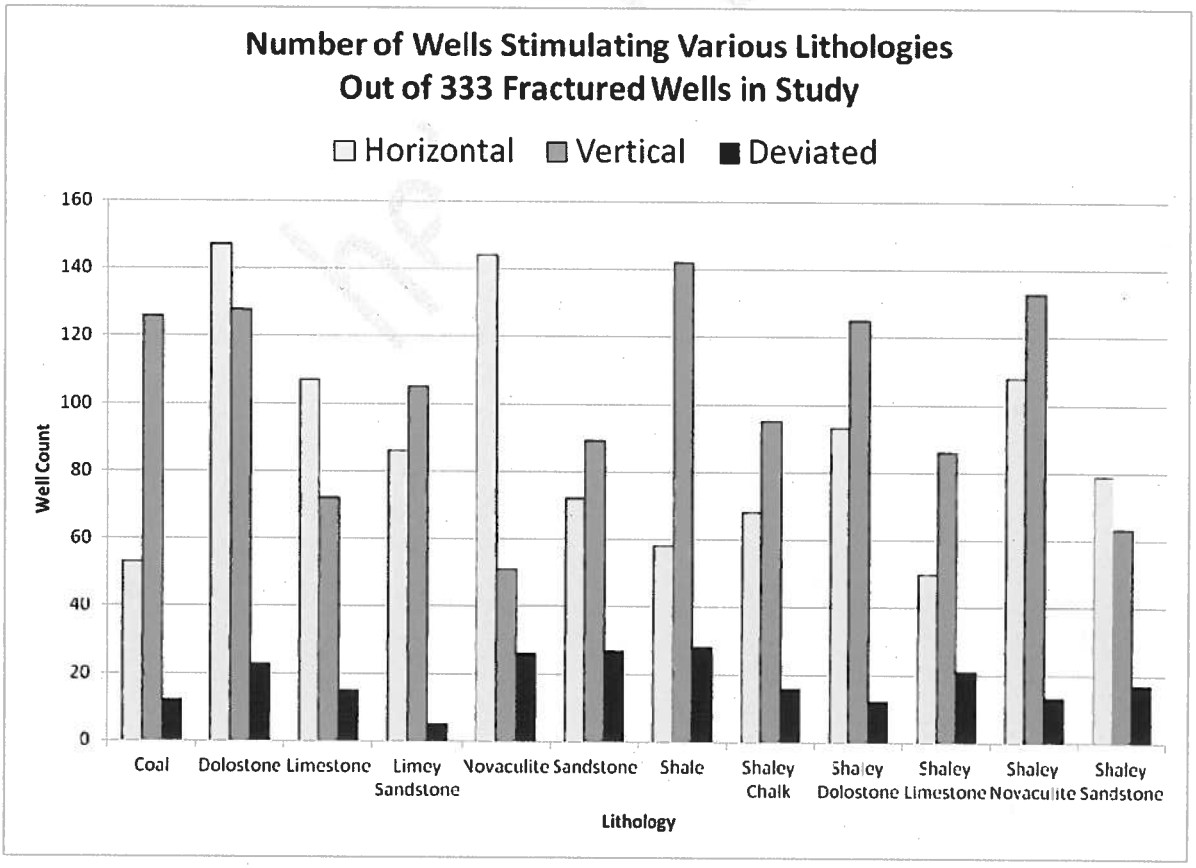


Figure G: Location of Hydraulically Fractured Wells Reviewed in Detail (obtained from FracFocus)

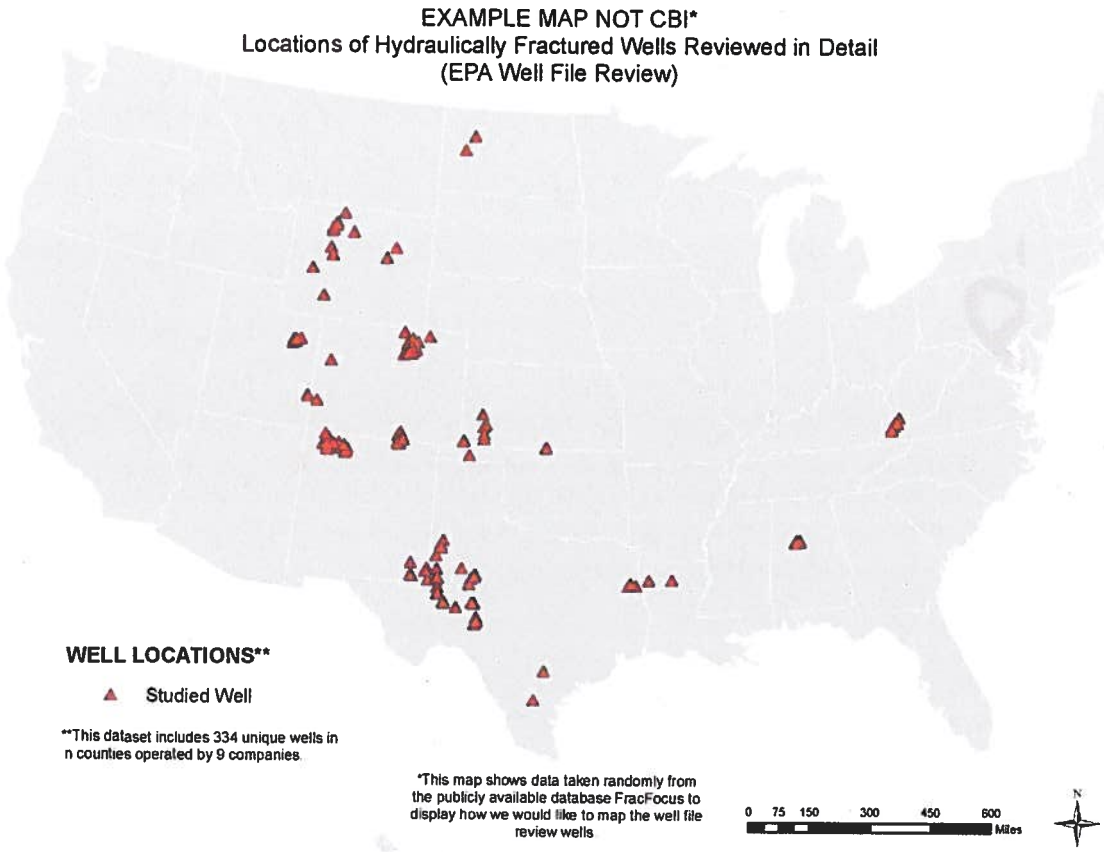
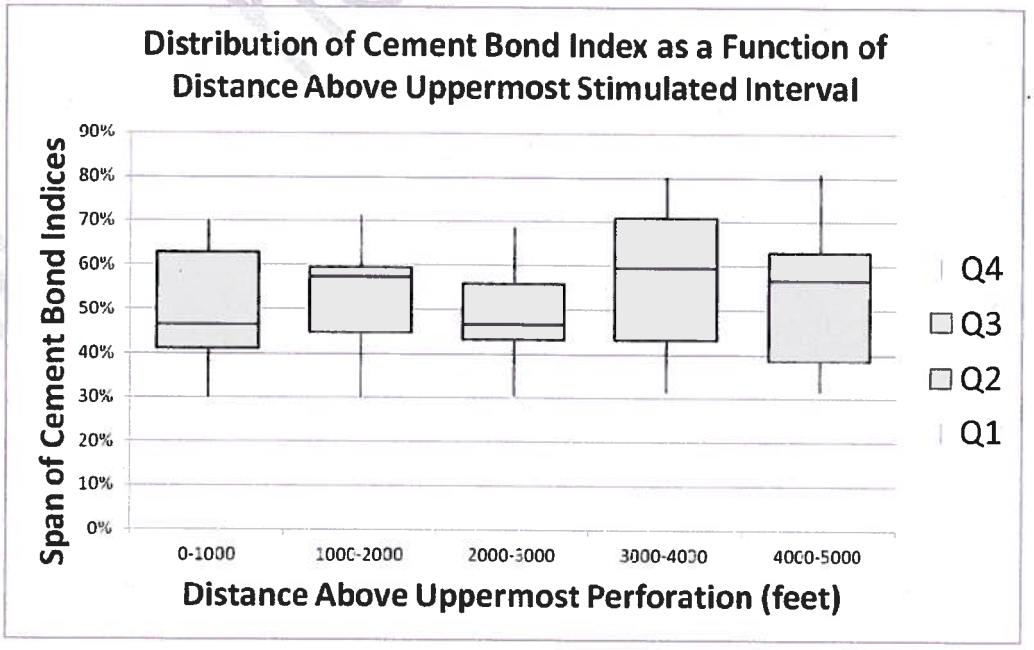


Figure H: Distribution of Cement Bond Index as a Function of Distance above Uppermost Stimulated Interval (fictional information)



For Figures I through L, alternate figures may include the use of different symbols to reflect different lithologies or basins.

Figure I: Injected Slurry Volume vs Date by Fracturing Event (fictional information)

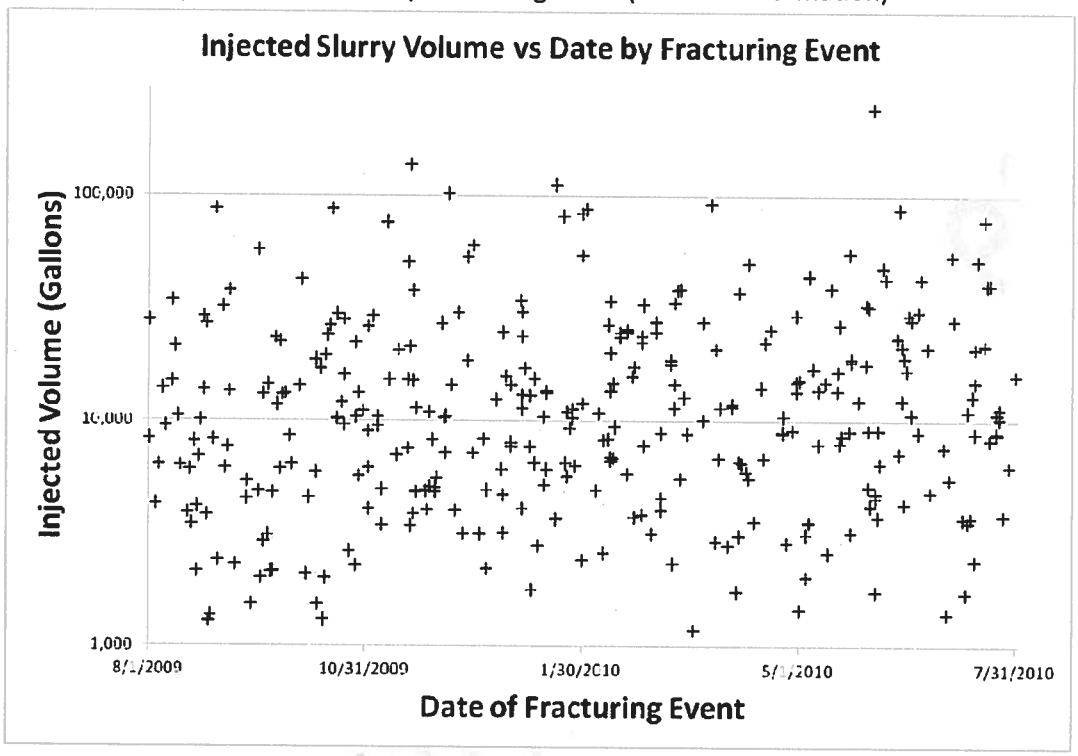


Figure J: Flowback Volume vs Injected Slurry Volume (fictional information)

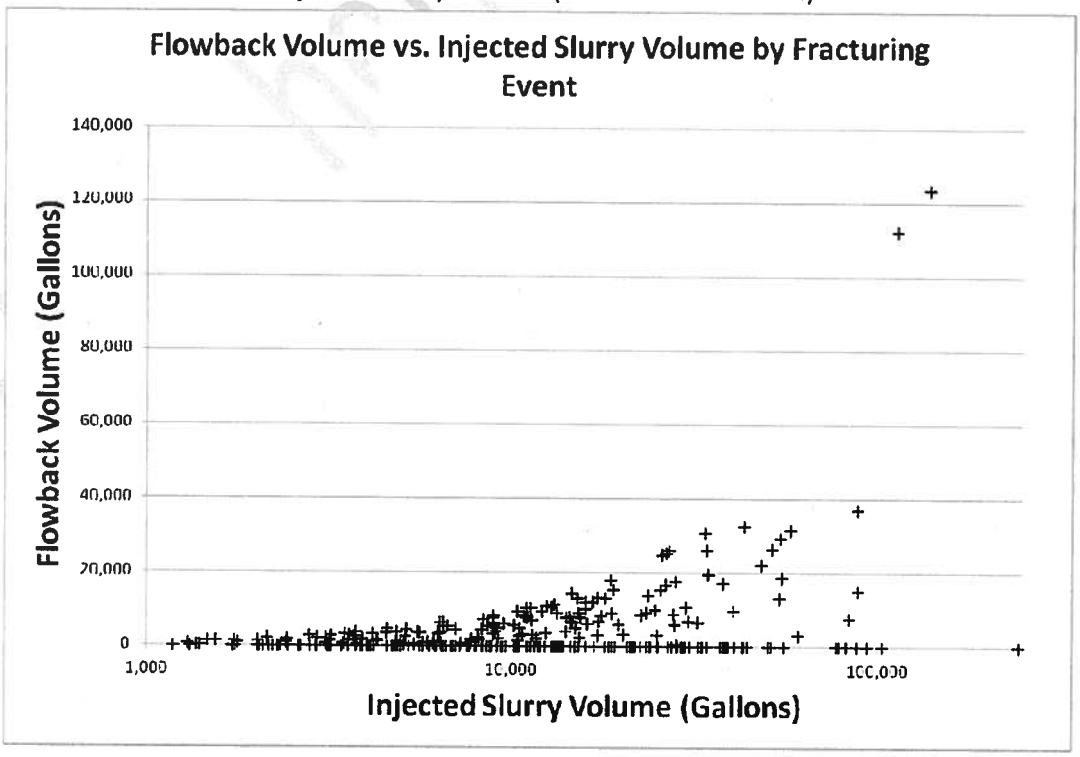


Figure K: Proppant Used vs Injected Volume of Clean Slurry (fictional information)

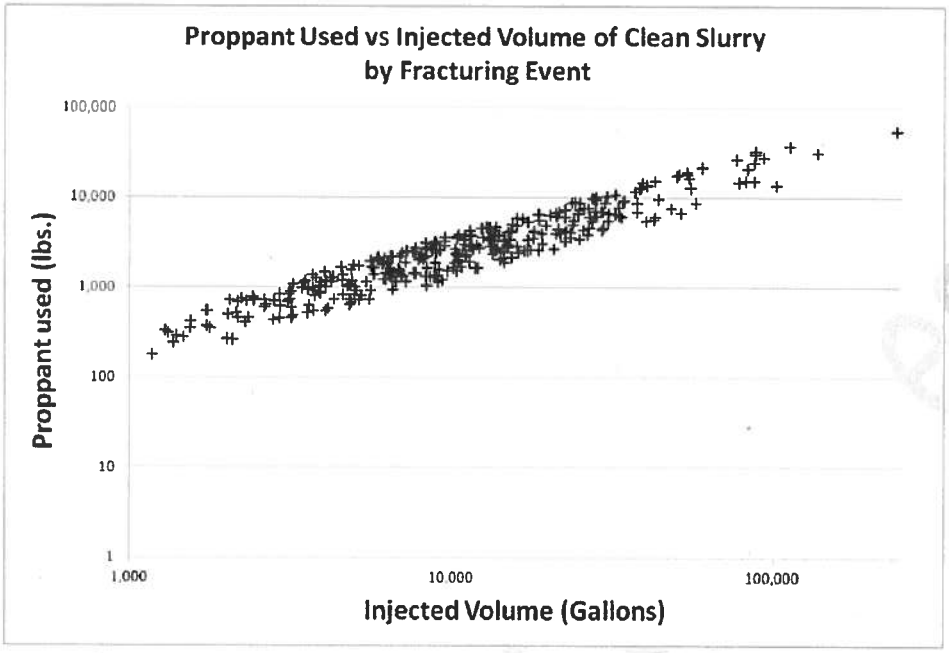


Figure L: Flowback as Percent of Injected Volume (fictional information)

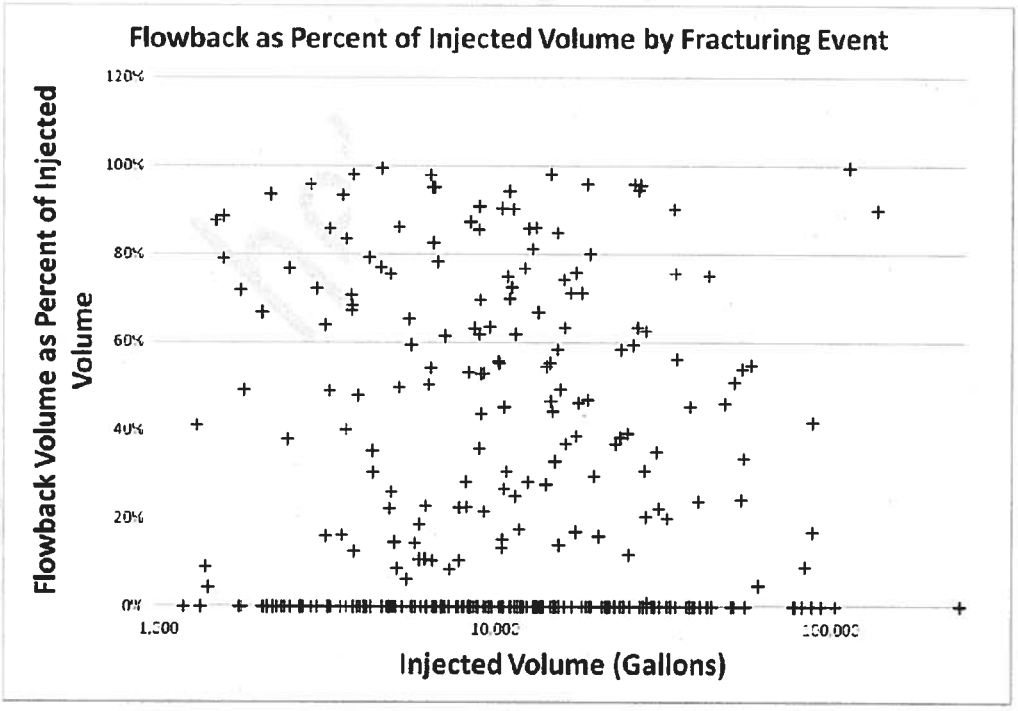


Figure M: Distribution of Injected Water Volume by Water Source (fictional information)

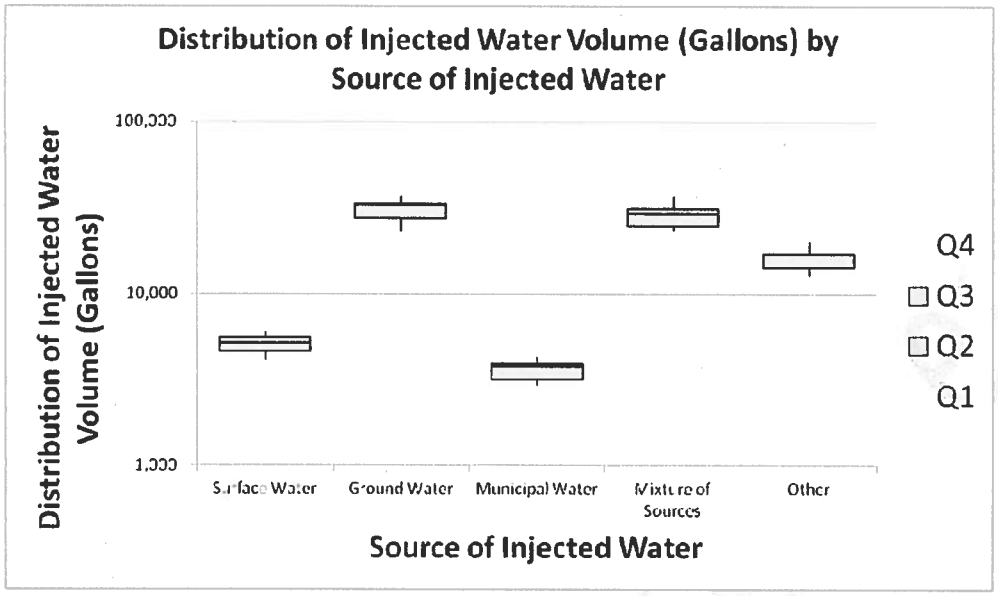


Figure N: Distribution of Well Completion Types and Number of Hydraulically Fractured Stages (fictional information)

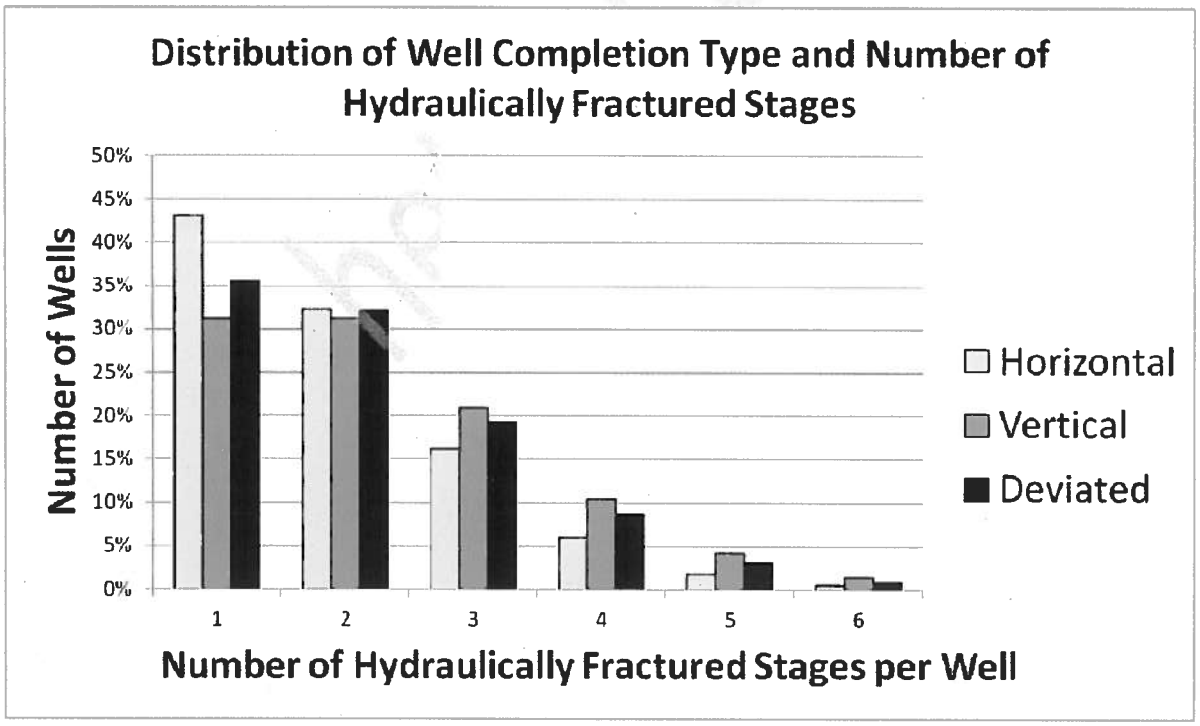


Figure O: Distribution of Distances from Uppermost Stimulated Depth to Top of Cement Surrounding Stimulated Casing (fictional information)

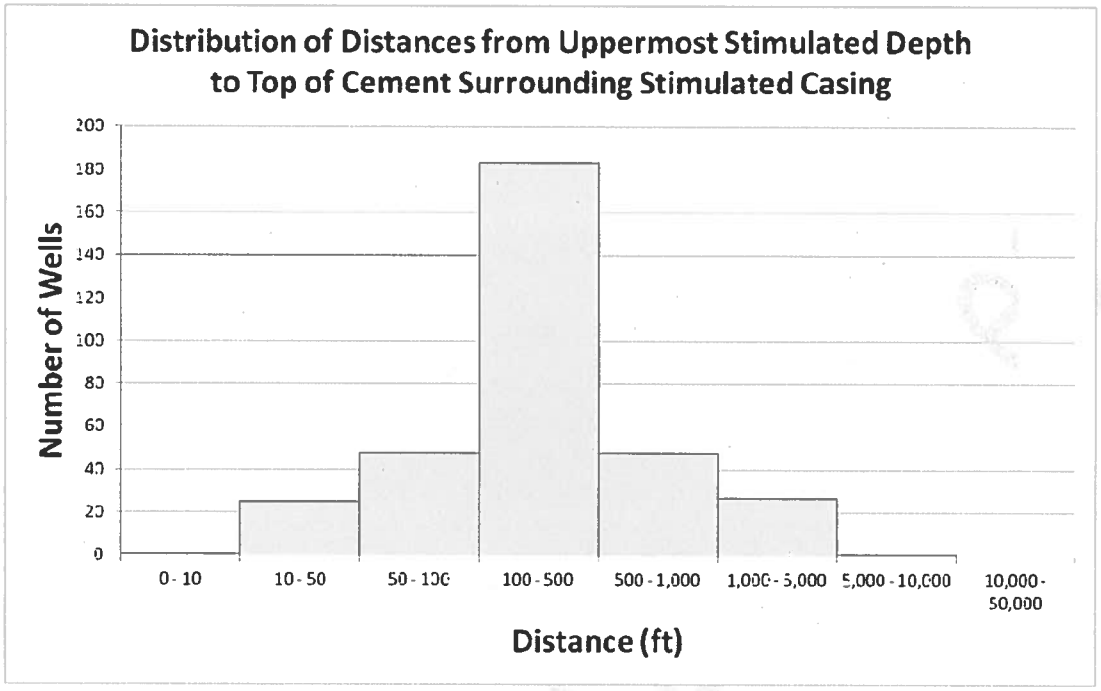


Figure P: Distribution of Percents of Differing Cemented Lengths of Surface Casing (fictional information)

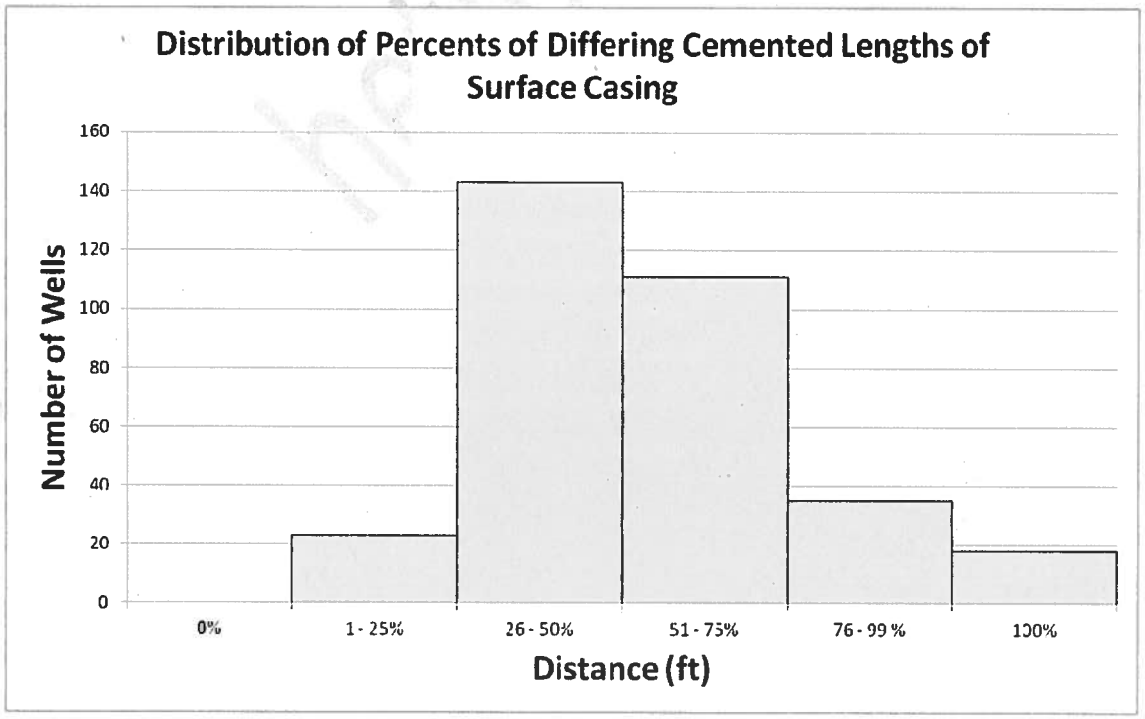


Figure Q: Complete vs Not Complete Cement Sheath Surrounding the Full length of Casing (Production, Intermediate, or Liner Casings)(fictional information)

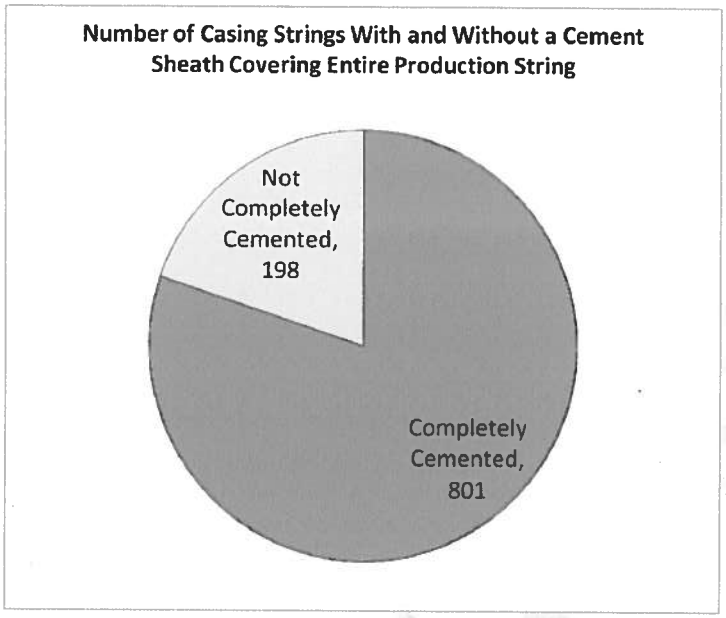


Figure R: Number of Strings by Completeness of Cementing and Shows of Hydrocarbons and Drinking Water Resources in Uncemented Depths (fictional information)

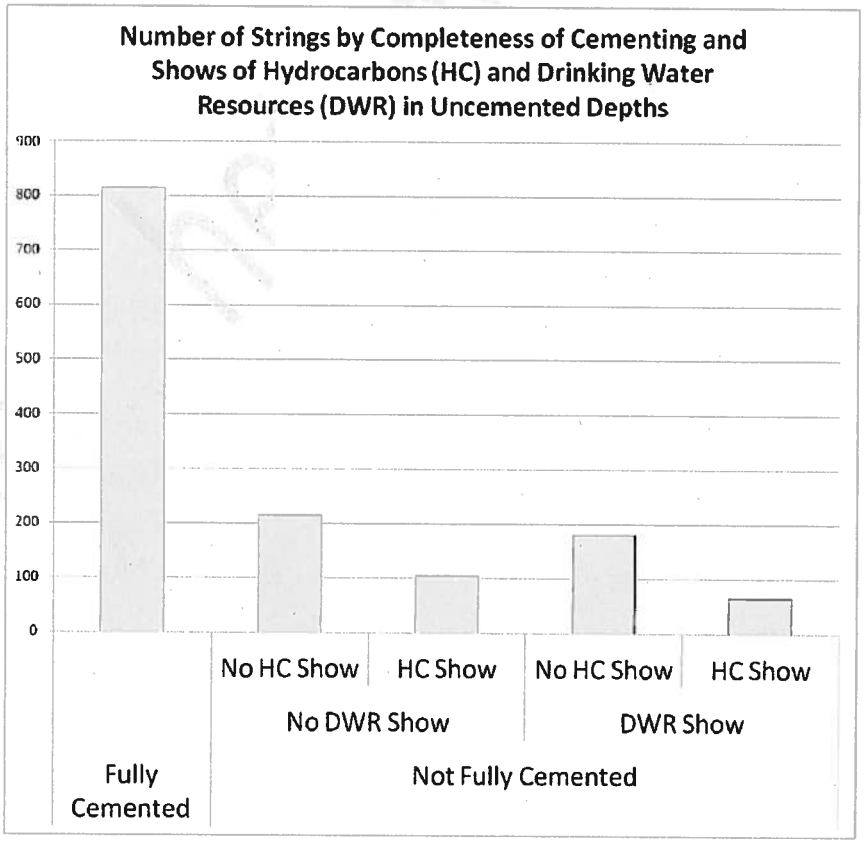


Figure S: Number of Wells Using Various Types of Casings (fictional information)

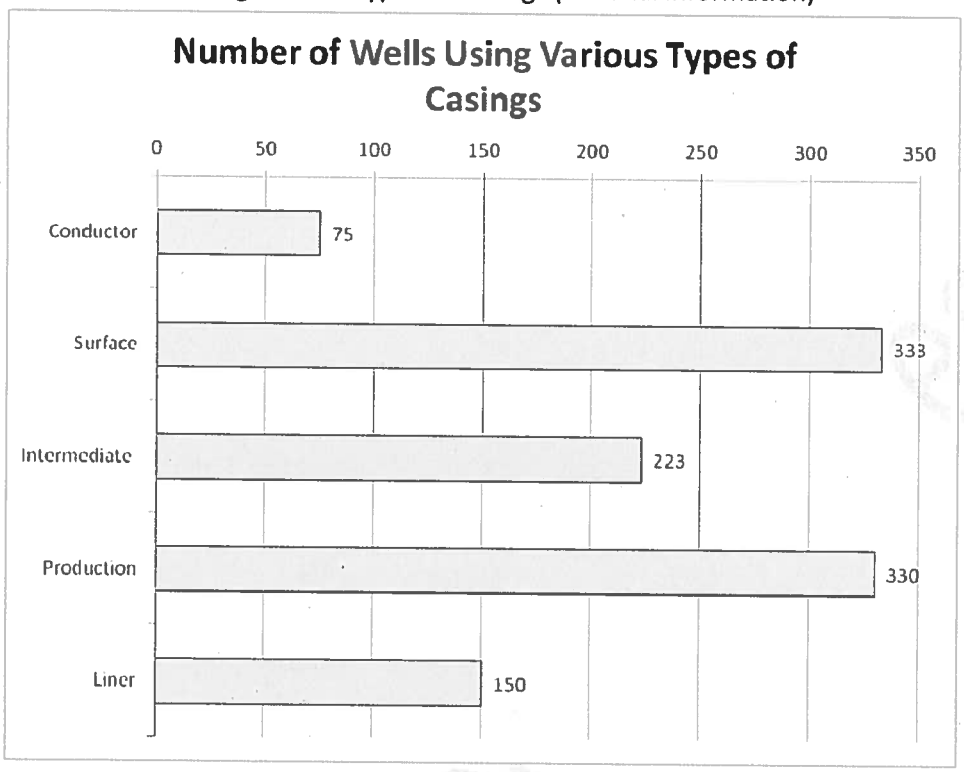


Figure T: Depth of Lowest Identified Drinking Water Resource (DWR) vs Measured Depth of Uppermost Treated Interval (fictional information)

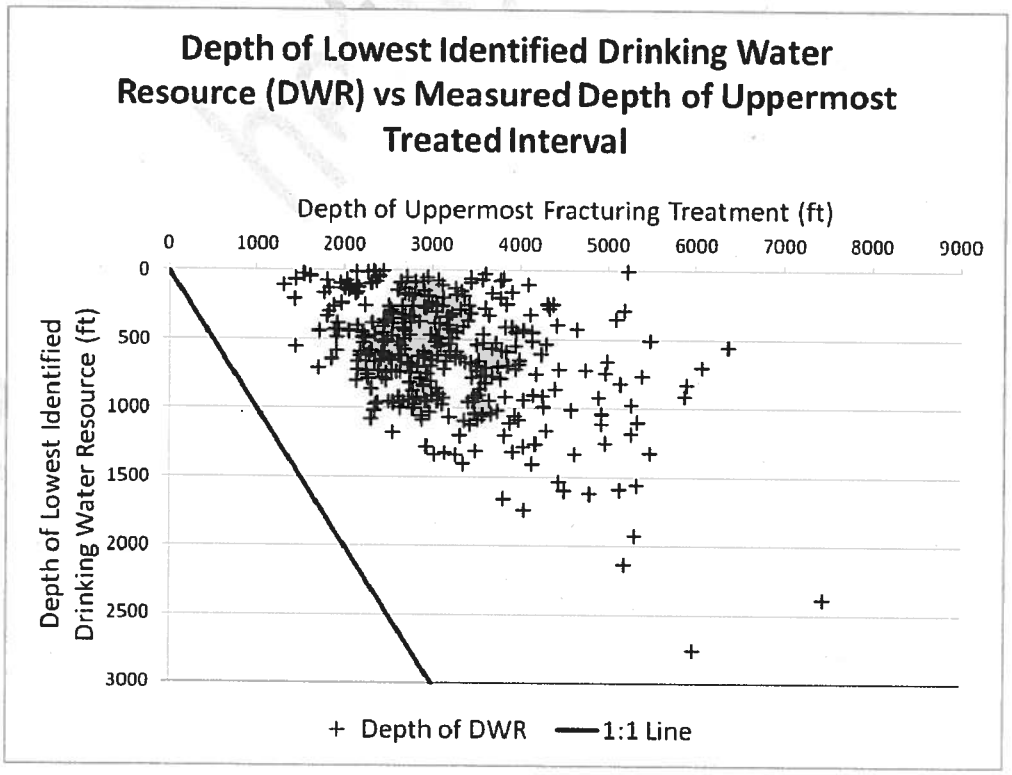
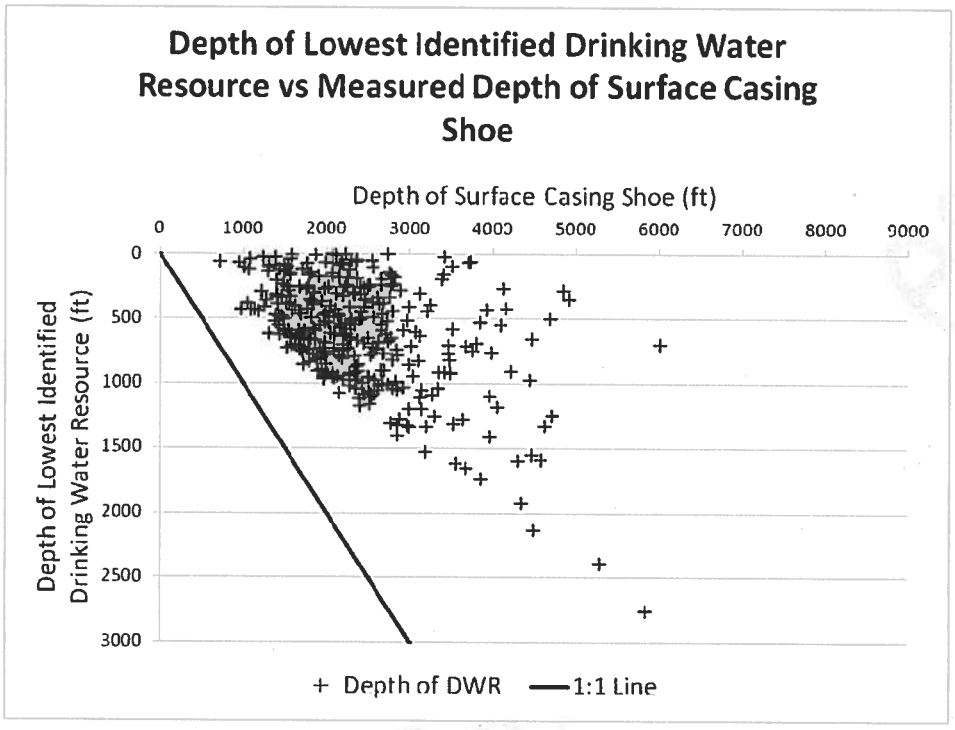


Figure U: Depth of Lowest Identified Drinking Water Resource (DWR) vs Measured Depth of Surface Casing Shoe (fictional information)



Note: For Figures V and W, EPA may use similar graphs substituting the y-axis value of pressure with slurry volume.

Figure V: Average Treatment Pressure per Treatment Stage vs Mid-Point Measured Depth of Hydraulically Treated Interval (fictional information)

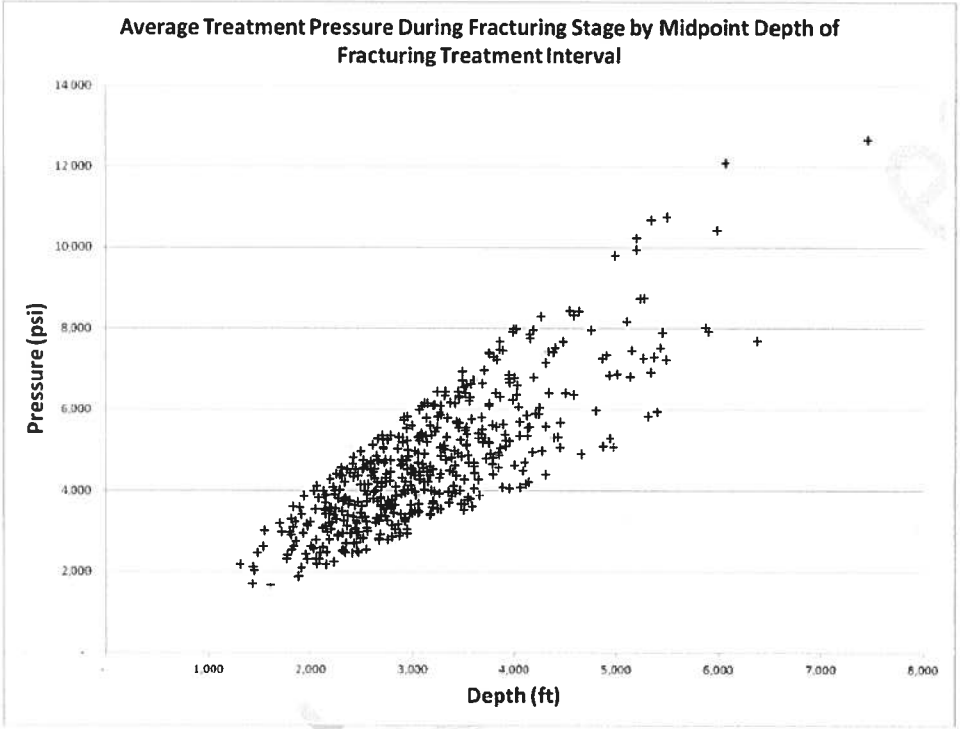


Figure W: By Well Type: Average Treatment Pressure per Treatment Stage vs Mid-Point Measured Depth of Hydraulically Treated Intervals (Shallowest Depth for Horizontal Well) (fictional information)

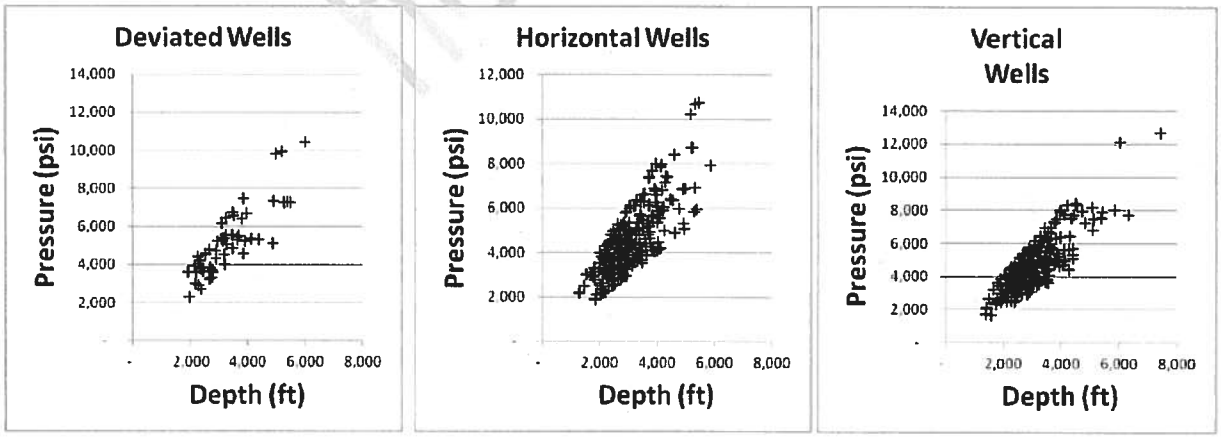


Figure X: Distribution of Slurry Volume used in Hydraulic Fracturing by Lithography (fictional information)

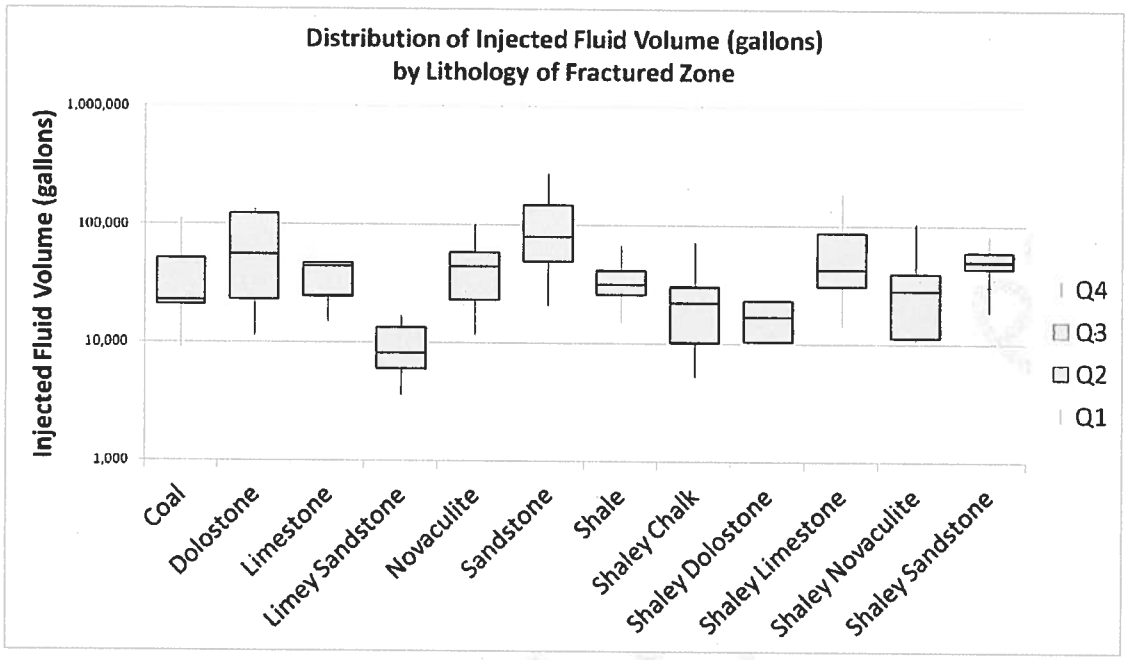


Figure Y: Distribution of Nearest Distance between Wellbore and Offset Fault (fictional information)

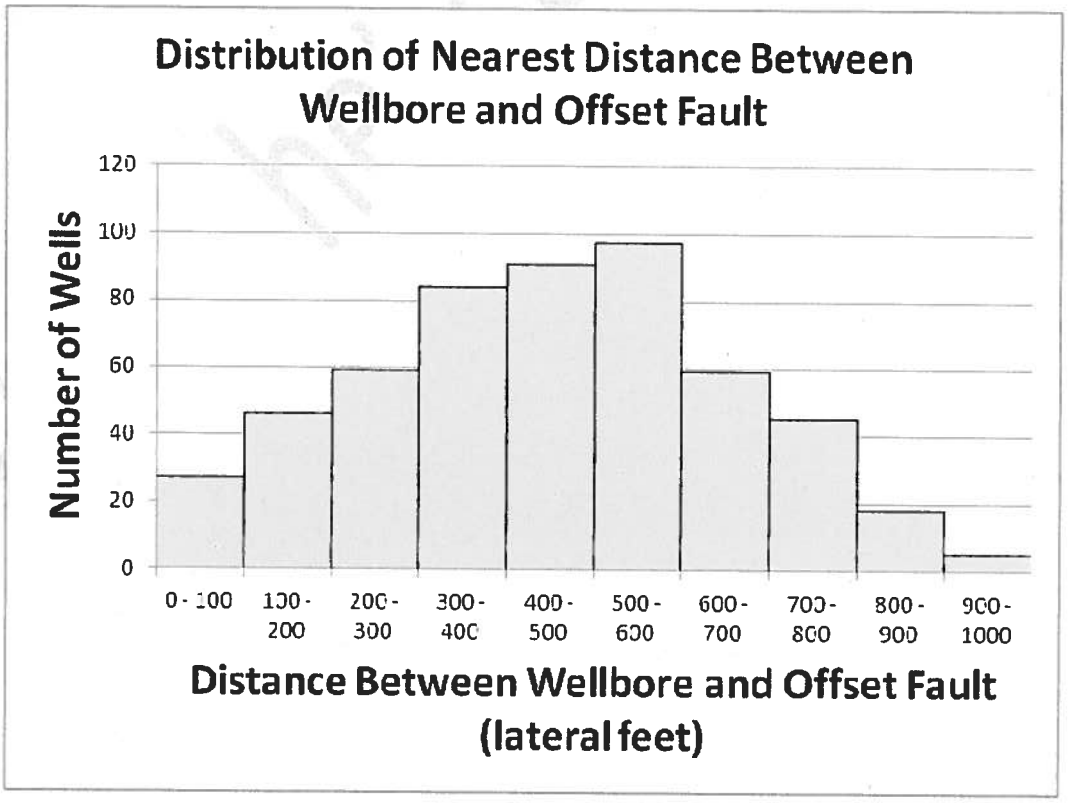


Figure Z: Distribution of Hydraulic Fracture Growth by Lithography and Well Completion Type (fictional information)

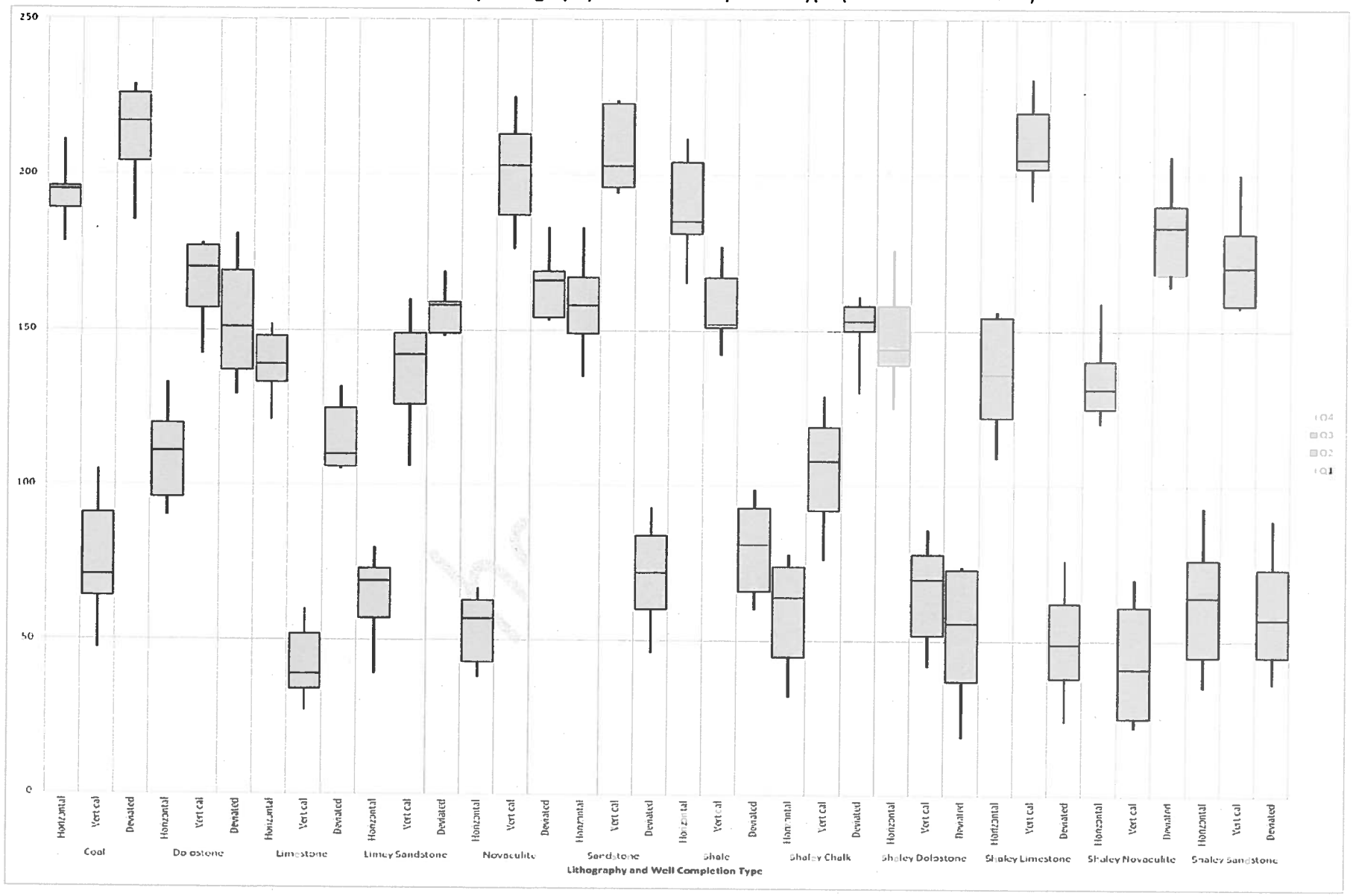


Figure AA: Availability of Water Data (fictional information)

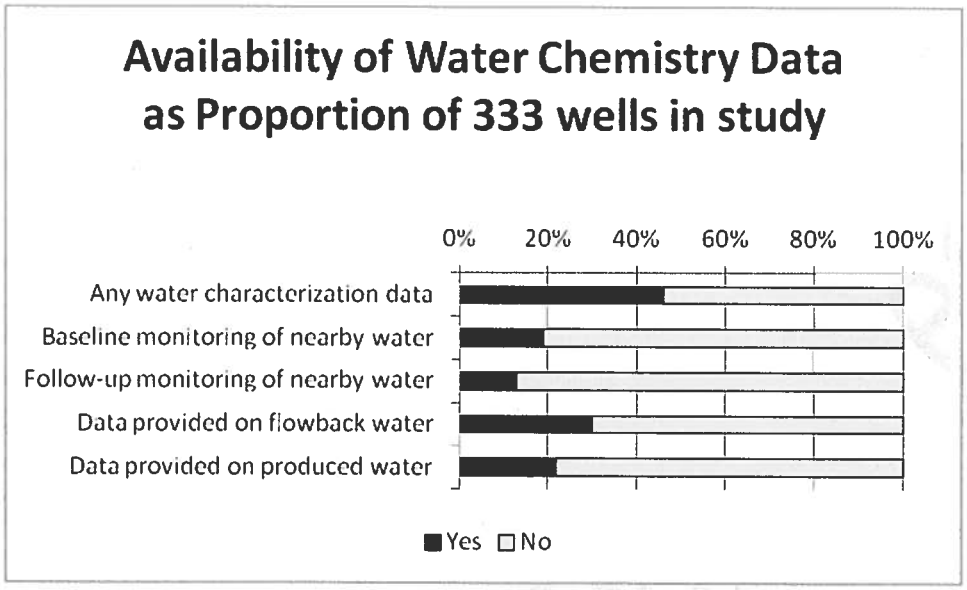


Figure BB: Availability of Water Data as Proportion of Wells with any Water Characterization Data (fictional information)

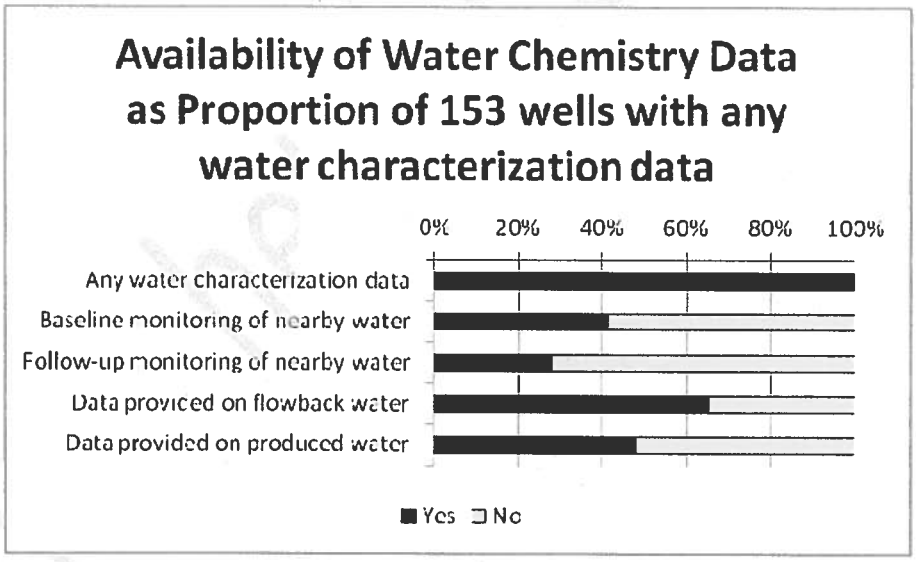


Figure CC: Disposition of Flowback waters (fictional information)

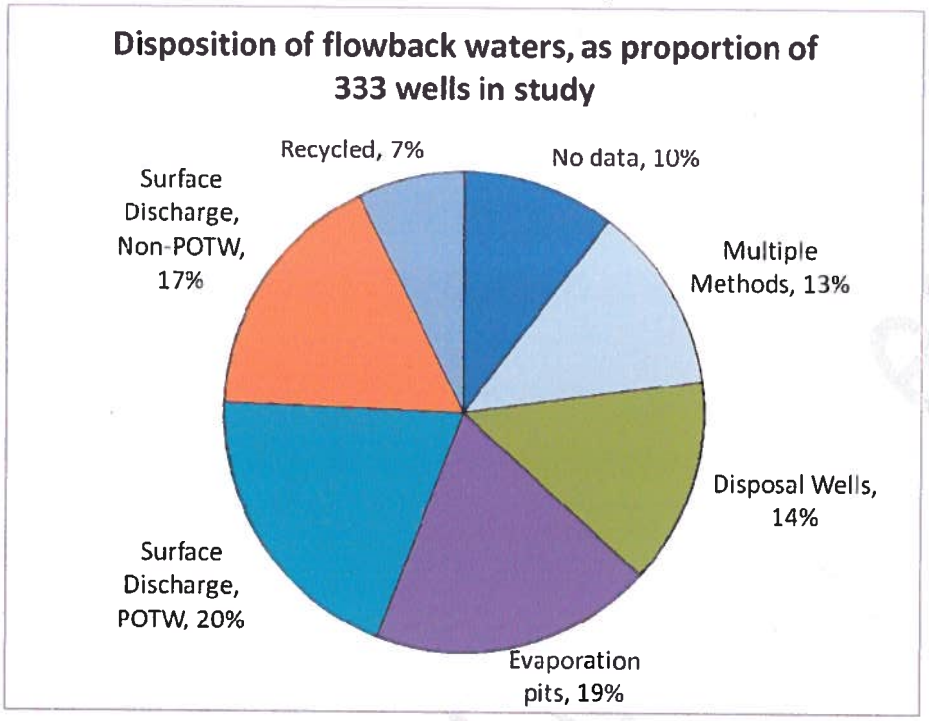


Figure DD: Depth of Uppermost Fractured Zone (fictional information)

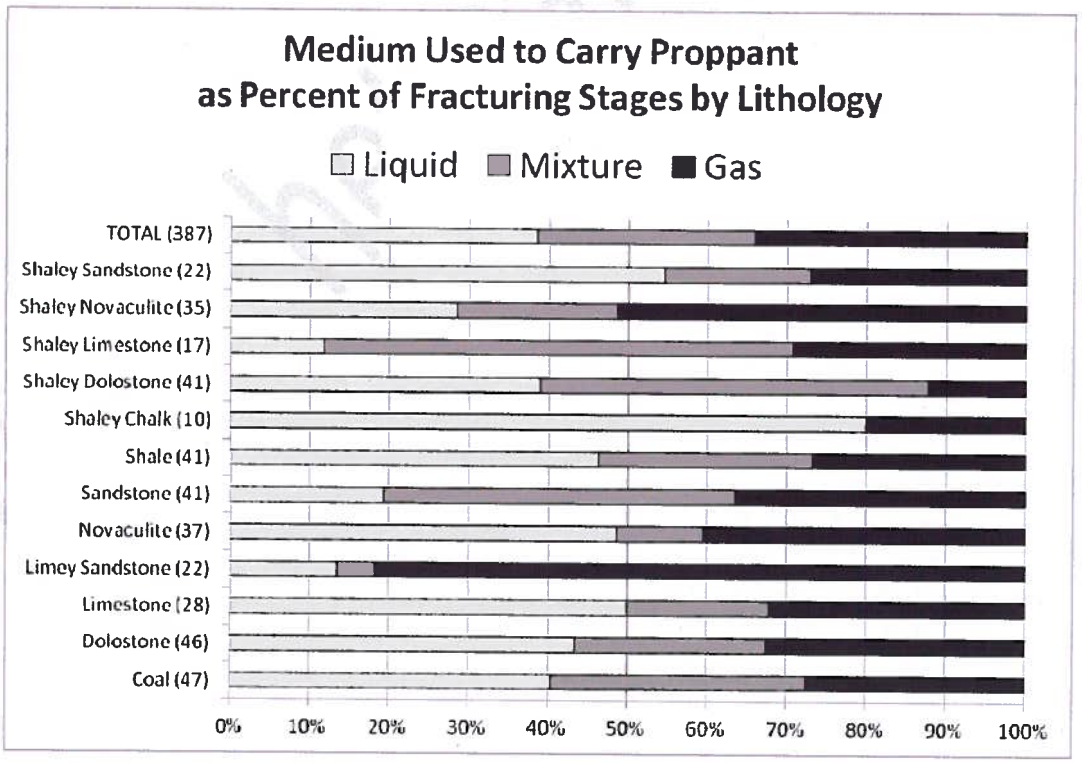


Figure EE: Days between Spud Date, First Fracturing Event, and Final Fracturing Event (fictional information)

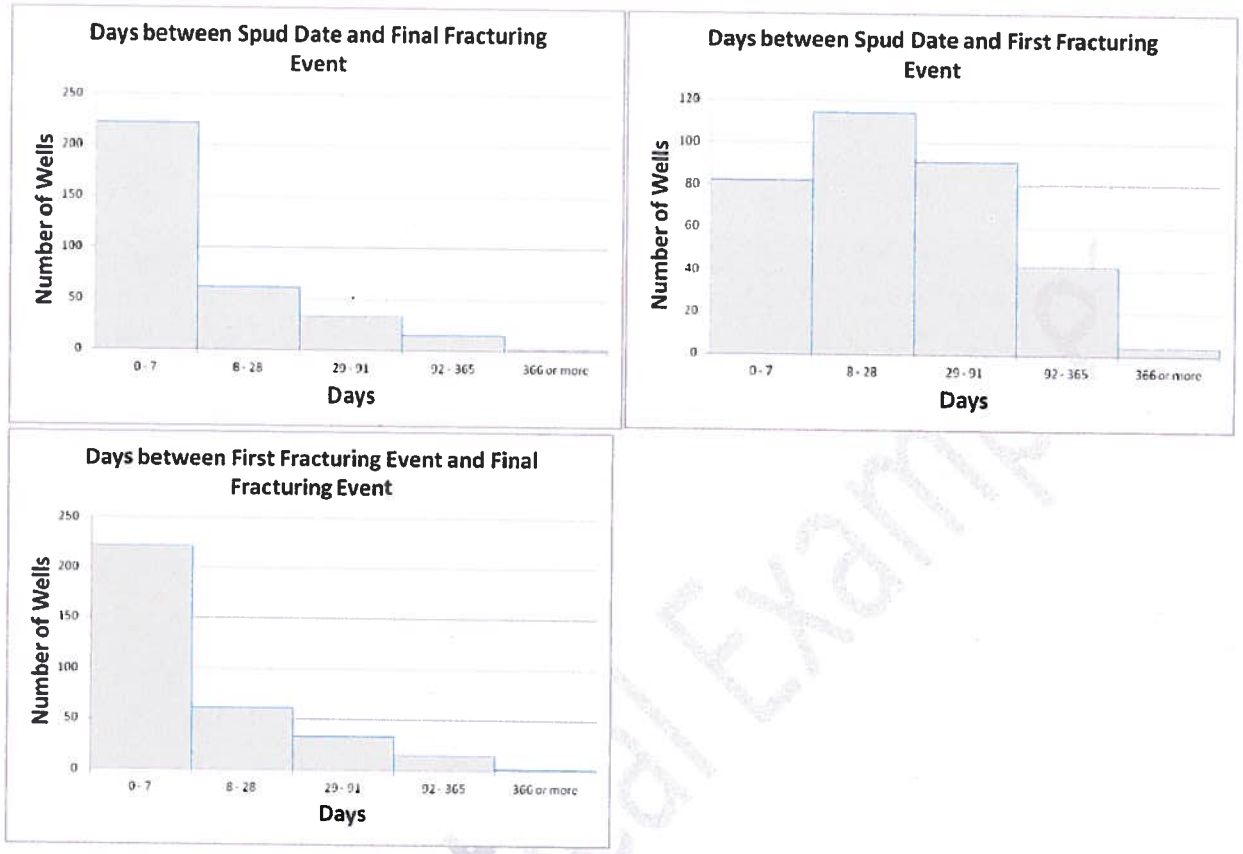


Figure EE: Maximum Treatment Pressure vs. Casing Test Pressure by Well (fictional information)

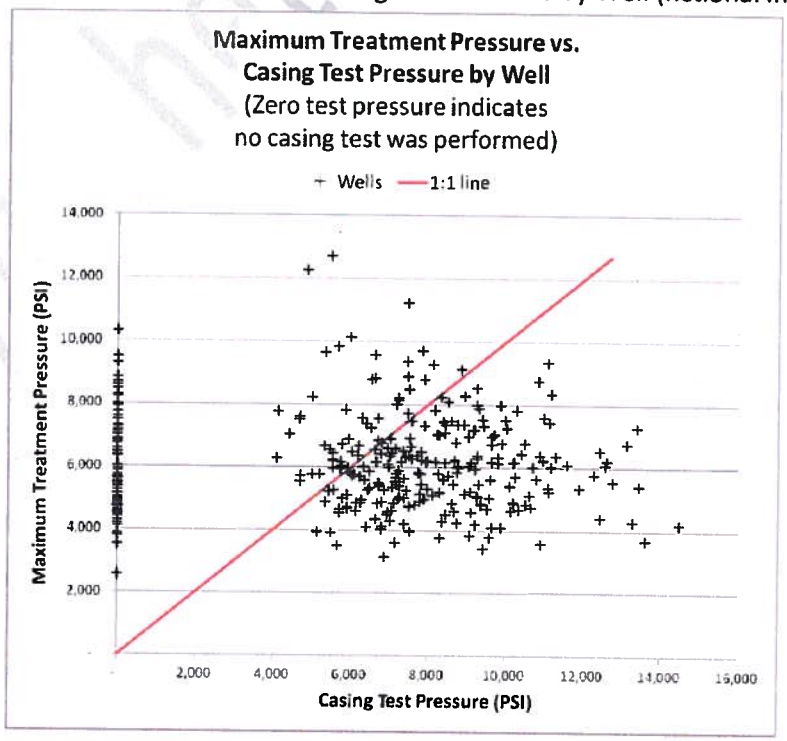


Figure FF: Number of Wells Using Various Additive Groups, by Basin (fictional information)

Number of Wells Using Various Additive Groups, by Basin															
	Anadarko	Appalachian	Arkoma	Bighorn	Denver	Fort Worth	Permian	Powder River	San Juan	TX-LA-MS Salt	Uinta-Piceance	Western Gulf	Williston	TOTAL	Percen
Total Wells	17	28	31	45	1	42	38	8	49	27	13	3	31	333	100%
Acid	1	1	1	1	0	1	0	0	1	1	0	0	0	7	2%
Biocide	7	7	6	12	1	0	5	0	11	6	1	0	8	64	19%
Breaker	6	6	14	28	0	13	13	4	18	13	7	0	6	128	38%
Clay Stabilizer	2	1	2	3	0	2	1	1	3	0	1	0	0	16	5%
Corrosion Inhibitor	2	5	12	7	0	13	8	0	10	8	1	0	4	70	21%
Crosslinker	8	10	6	12	1	6	12	4	7	5	5	2	8	86	26%
Friction Reducer	2	4	4	8	0	7	6	0	7	6	3	0	6	53	16%
Gelling Agent	4	8	6	13	0	7	9	1	15	9	4	2	9	87	26%
Iron Control	17	22	31	45	1	42	38	5	49	25	8	3	31	317	95%
Non-Emulsifier	10	24	6	21	1	29	23	2	21	10	7	1	19	174	52%
pH Adjusting Agent	8	7	14	24	0	20	21	2	22	11	9	2	9	149	45%
Scale Inhibitor	11	28	31	36	1	42	37	8	48	25	12	1	31	311	93%
Surfactant	2	1	1	5	0	2	1	1	5	1	2	0	2	23	7%

Hypothetical Example