

QAPP AMENDMENT FORM

EFFECTIVE DATE: 07/30/2014

QAPP Title: EPA Office of Research and Development, Office of Science Policy, National Hydraulic Fracturing Study – Evaluation of Existing Production Well File Contents

AMENDMENT #1

This amendment revises the above-referenced QAPP by describing a method for estimating the total number of newly-drilled oil and gas production wells hydraulically fractured during 2009 and 2010, and describing a sensitivity analysis that will be conducted using results from the well file review.

Estimating the Total Number of On-Shore Oil and Gas Wells Hydraulically Fractured in the Lower 48 States:

Purpose: To assess the representativeness of the data used in this study.

- a) Use the DrillingInfo database (2012) and the extrapolated values from the results of the well file reviews. The DrillingInfo database is the best known source containing a national listing of all oil and gas production wells that distinguishes well orientation, well production type, and producing reservoir type. It is a commercial database compiled from data maintained by individual state oil and gas agencies. We use the same methodology to estimate the total national number of hydraulically fractured oil or gas production wells as that described on pages A-173 and A-174 of the 2013 EPA greenhouse gas inventory annex (US EPA, 2014).
- b) Compare the production type (oil versus gas) and well orientation (vertical, directional, and horizontal) characteristics of the extrapolated number of wells from the well file review to those same characteristics of the wells in the DrillingInfo database, spanning the years 2009 and 2010, by doing the following:
 1. From the DrillingInfo database, use only wells whose year of completion or first production (First_Year) is 2009 or 2010.
 2. Separately sum wells whose drill type (Drill_Type) field is vertical, directional and horizontal.
 3. Separately sum wells whose well class (Prod_Type_Class) is oil or gas.

- c) Compare the summation results with the equivalent extrapolated results from the well file review, after the well file review results have been culled of any well exceeding one year of age.
- d) Conduct a t-test for statistical significance between the proportions of the wells from the well file review and the DrillingInfo database that fall into these characteristic categories: well orientation and well production type.

Sensitivity Analysis:

Purpose: To determine whether results from the well file review are applicable to different scenarios (e.g., nearly all wells are horizontal).

- a) Use the extrapolated values from the results of the well file review.
- b) Revise the rake weights for each of the 327 wells sampled to skew toward a characteristic of interest using an appropriate factor (e.g., 90% of the wells are horizontal or 80% are oil) provided under advisement from Westat, Inc.'s expertise in statistics.
- c) Re-perform other analyses of well file data using the rake weights adjusted in (b) above.
- d) Conduct a t-test for statistical significance between the proportions of the wells from the well file review analyses before and after adjusting rake weights as described in this section.

References:

DrillingInfo (2012). DI Desktop® August 2012 Download. DrillingInfo, Inc.

U.S. Environmental Protection Agency (US EPA). 2014. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2012. Available at <http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html#fullreport>. Accessed July 28, 2014.

Reason for Amendment:

This amendment has been created in response to concerns raised about preliminary observations from well file review results questioning (1) the extent to which the well file sample of 327 hydraulically fractured oil and gas production wells is representative of all hydraulically fractured oil and gas wells, and (2) the utility of reporting these practices from 2009 and 2010 when more recently there has been a shift toward horizontal well orientation and oil production type.

Sections of QAPPs Affected:

EPA Well File Review QAPP, August 19, 2013:
Section B.4 Analytical Methods

Date Implemented:

July 30, 2014