Quality Assurance Project Plan (QAPP) for

Analysis of Data Received from Nine Hydraulic Fracturing (HF) Service Companies

A. PROJECT MANAGEMENT

This section addresses project management, including project background and purpose, roles and responsibilities, and key research questions and objectives.

A1. TITLE AND APPROVAL SHEET

QA Category: 1

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Signatures indicate approval of this QAPP and commitment to follow the applicable procedures noted:

/s/	8/19/2013
Susan Burden, Project Lead and HF Data Analysis Technical Research Lead	Date
/s/	8/19/2013
Jeanne Briskin, HF Study Coordinator	Date
/s/	8/19/2013
Stephen Watkins, Quality Assurance Manager, Office of Science Policy	Date
/s/	8/23/2013
Mimi Dannel, Deputy Director, Office of Science Policy	Date

Disclaimer

EPA does not consider this internal planning document an official Agency dissemination of information under the Agency's Information Quality Guidelines, because it is not being used to formulate or support a regulation or guidance; or to represent a final Agency decision or position. This planning document describes the overall quality assurance approach that will be used during the research study. Mention of trade names or commercial products in this planning document does not constitute endorsement or recommendation for use.

The EPA Quality System and the HF Research Study

EPA requires that all data collected for the characterization of environmental processes and conditions are of the appropriate type and quality for their intended use. This is accomplished through an Agency-wide quality system for environmental data. Components of the EPA quality system can be found at http://www.epa.gov/quality/. EPA policy is based on the national consensus standard ANSI/ASQ E4-2004 *Quality Systems for Environmental Data and Technology Programs: Requirements with Guidance for Use*. This standard recommends a tiered approach that includes the development and use of Quality Management Plans (QMPs). The organizational units in EPA that generate and/or use environmental data are required to have Agency-approved QMPs. Programmatic QMPs are also written when program managers and their QA staff decide a program is of sufficient complexity to benefit from a QMP, as was done for the study of the potential impacts of hydraulic fracturing (HF) on drinking water resources. The HF QMP describes the program's organizational structure, defines and assigns quality assurance (QA) and quality control (QC) responsibilities, and describes the processes and procedures used to plan, implement and assess the effectiveness of the quality system. The HF QMP is then supported by project-specific QA project plans (QAPPs). The QAPPs provide the technical details and associated QA/QC procedures for the research projects that address questions posed by EPA about the HF water cycle and as described in the *Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources* (EPA/600/R-11/122/November 2011/www.epa.gov/hydraulic fracturing). The results of the research projects will provide the foundation for EPA's 2014 study report.

This QAPP provides information concerning the **Water Acquisition**, **Chemical Mixing**, **Well Injection**, and **Flowback and Produced Water** stages of the HF water cycle as found in Figure 1 of the HF QMP and as described in HF Study Plan. Appendix A of the HF QMP includes the links between the HF Study Plan questions and those QAPPs available at the time the HF QMP was published.

A2. Table of Contents

A3. DISTRIBUTION

This QAPP will be distributed to the staff members of the US EPA as listed in Table 1.

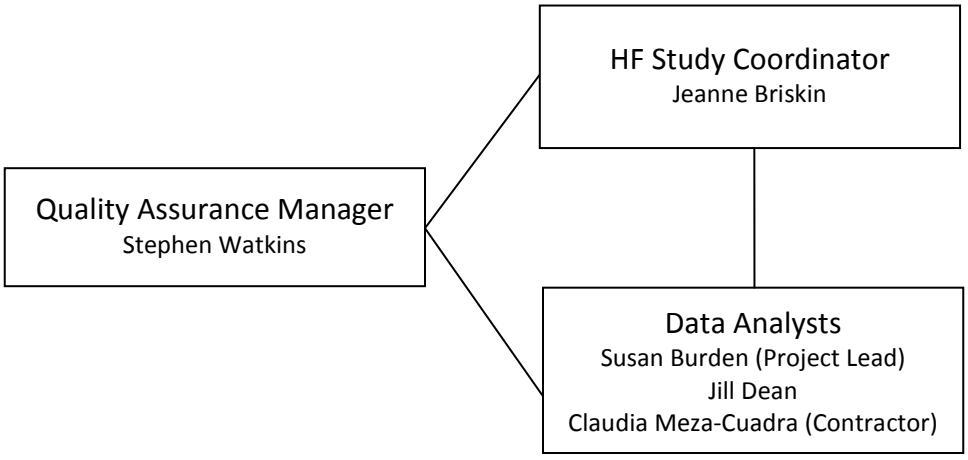
TABLE 1. QUALITY ASSURANCE PROJECT PLAN DISTRIBUTION LIST

Name	Title	Contact Information
Jeanne Briskin	Hydraulic Fracturing Study Plan Coordinator	(202) 564-4568 briskin.jeanne@epa.gov
Stephen Watkins	Office of Science Policy Quality Assurance Manager	(202) 564-3744 watkins.stephen@epa.gov
Susan Burden	Project Lead / Hydraulic Fracturing Data Analysis Technical Research Lead	(202) 564-6308 burden.susan@epa.gov
Jill Dean	Data Analyst	(202) 564-8241 dean.jill@epa.gov
Claudia Meza-Cuadra	Contractor / Data Analyst	(202) 564-4486 meza-cuadra.claudia@epa.gov

A4. PROJECT ORGANIZATION

Project organization for the data analysis is depicted below in Figure 1. Susan Burden, Jill Dean, and Claudia Meza-Cuadra will be responsible for the secondary data collection, analysis, and presentation, and will thus be responsible for ensuring that the quality of work meets the requirements of EPA's *Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*. They will also keep the Project Quality Assurance (QA) Officer, Stephen Watkins, advised of any quality problems that arise in this study. The Project QA Officer will be responsible for maintaining QA activities and the official, approved QAPP throughout the course of the project.

FIGURE 1. ORGANIZATION CHART FOR THE SERVICE COMPANY DATA ANALYSIS PROJECT



A5. Problem Definition and Background

A5.1. Background

Hydraulic fracturing (HF) is a technique used to increase production of oil and gas. Hydraulic fracturing increases the permeability of a geologic formation by pumping a pressurized fluid into the formation and creating fractures in the rock that allow gas to be extracted. Fracturing fluids typically contain a mixture of water, chemical additives, and proppants.

In response to the growing use of HF in the United States, Congress urged EPA to research the potential impacts of HF on drinking water resources. EPA responded to Congress' request by producing the *Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources* in February 2011. The draft plan was reviewed and commented on by EPA's Science Advisory Board (SAB), and the final *Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources* (EPA/600/R-11/122) was completed in November 2011. EPA released a *Progress Report*[1] (EPA/601/R-12/011) in December 2012 and expects to release a draft report of results in 2014.

In September 2010, EPA requested information from nine HF service companies on the chemical composition of HF fluids used from 2005 to 2010, standard operating procedures, impacts of chemicals on human health and the environment, and the locations of hydraulically fractured oil and gas wells fractured from September 2009 to September 2010 (Appendix A). The nine service companies are BJ Services, Complete Production Services, Halliburton, Key Energy Services, Patterson-UTI, RPC, Schlumberger, Superior Well Services, and Weatherford. EPA is analyzing the information received from the companies to better understand current HF operating practices and to answer research questions posed in the final study plan. This QAPP addresses the analysis of the service company data as it relates to four stages of the HF water cycle: Water Acquisition, Chemical Mixing, Well Injection, and Flowback and Produced Water. The following research questions are the focus of this data analysis:[2]

Water Acquisition

- How much water is used in HF operations, and what are the sources of this water?

Chemical Mixing

- What are the identities and volumes of chemicals used in HF fluids, and how might this composition vary at a given site and across the country?

Well Injection

- How effective are current well construction practices at containing gases and fluids before, during, and after fracturing?
- Can subsurface migration of fluids or gases to drinking water resources occur and what local geologic or man-made features may allow this?
- How might hydraulic fracturing fluids change the fate and transport of substances in the subsurface through geochemical interactions?

[1] The *Progress Report* is available at http://www2.epa.gov/sites/production/files/documents/hf-report20121214.pdf.
[2] Table 1 from the *Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources* (EPA/600/R-11/122).

Flowback and Produced Water

- What is the composition of HF wastewaters, and what factors might influence this composition?

A6. PROJECT DESCRIPTION

The company information was collected and organized in Microsoft Excel spreadsheets and a Microsoft Access database by EPA's contractor, Eastern Research Group, Inc. (ERG).[3] Queries and summary statistics will be performed on the information to describe HF operations reported by the service companies. The majority of the information received by EPA was claimed as confidential business information (CBI) under the Toxic Substances Control Act (TSCA). Therefore, the analyses described in this section will be performed using CBI procedures and the results will be considered CBI until appropriate determinations are made or until appropriate masking has been done to prevent release of CBI information.

A6.1. DATA SOURCES AND RATIONALE FOR DATA SELECTION

Water Acquisition. The following sections of the information request pertain to water acquisition:

- Section 1.i: For the water used, identify the quantity, quality and the specifications of water needed to meet site requirements, and the rationale for the requirements;
- Section 3.a: Please provide any policies, practices and procedures you employ, including any Standard Operating Procedures (SOPs) concerning hydraulic fracturing sites, for all operations including but not limited to: […] water quality characteristics needed to prepare fracturing fluid; relationships among depth, pressure, temperature, formation geology, geophysics and chemistry and fracturing fluid composition and projected volume […].

Chemical Mixing. EPA chose the following information collected from the service companies to analyze fluid formulations based on relevancy to the key questions and objectives of the analysis:

- Section 1.a: Chemical name
- Section 1.b: Chemical formula
- Section 1.c: Chemical Abstract Service number
- Section 1.d: Material Safety Data Sheets
- Section 1.e, j: Total quantity and concentration of each constituent in each fluid product
- Section 1.f: Manufacturer of each product and constituent
- Section 1.g: Purpose and use of each constituent in each fluid product
- Section 3.a: Standard operating procedures
- Section 4.a: Locations of hydraulic fractured wells

For the purposes of the data analysis, EPA defines a fluid formulation to be the entire suite of products and carrier fluid injected into a well during HF. A product is an additive that may be composed of a single chemical or several chemicals. A chemical constituent is an individual chemical included in a product.

Well Injection. EPA requested information regarding standard operating procedures for drilling, response plans to address unexpected circumstances (e.g. loss of drilling mud circulation), determinations of material choices for wells and appropriate pressures for fracturing in Section 3.a of the information request. Analysis of the

[3] ERG's Quality Assurance Project Plan for the Evaluation of Information on Hydraulic Fracturing (2013) is available at http://www2.epa.gov/sites/production/files/documents/org-data-qapp.pdf.

information improves EPA's understanding of well construction practices and maintenance of wells before, during, and after hydraulic fracturing.

EPA also received the locations of hydraulic fractured wells from September 2009 through September 2010 from the services companies (Section 4.a of the information request). EPA will use the well locations to consider local geologic conditions that may influence subsurface migration of fluids and the fate of any fluids that migrate outside of the intended zone.

Flowback and Produced Water. EPA did not directly request information relating to the composition of flowback and produced water.[4] However, EPA did request the following information:

- Section 3.a: Please provide any policies, practices and procedures you employ, including any Standard Operating Procedures (SOPs) concerning hydraulic fracturing sites, for all operations including but not limited to: […] determination of estimated volumes of flowback and produced waters; procedures for managing flowback and produced waters […].

For this analysis, EPA considered all documents and information received from the service companies that referenced "flowback" and "produced water."

A6.2. Data Analysis

Water Acquisition. The existing information described above will be combined into spreadsheets and a database to determine the quantities and qualities of water required for HF. The products of the analysis will include the following:

- *Table summarizing water use by hydrocarbon-producing formation*. The table will indicate the range and average of water volumes used per well based on the formation in which the well is located or in which a formulation is typically used (if known).
- *Table summarizing water use by well type and formulation type.* The table will indicate the range of water volumes used based on the type of formulation and the well type (horizontal vs. vertical).
- *Written summary of procedures and considerations relating to water acquisition and use.* A summary will be provided of any standard operating procedures, water quality requirements, water source preferences and use, factors affecting fluid volume and any decision processes described in the submissions from the nine service companies.

Chemical Mixing. The existing information described in Section A6.1 will be combined into spreadsheets and a database to determine the chemicals and products used in each hydraulic fracturing fluid formulation. If companies reported conditions or locations for formulation use, data will be compiled to indicate the criteria for selecting a fluid system and the prevalence of usage by geography. The products of the analysis will include the following:

- *Table summarizing formulations, conditions for use, products, and product function.* The table will illustrate the breadth of systems reported by the nine service companies in 2010 and the number and types of products used in those fluid systems.

[4] For this analysis, "flowback" is the fluid that returns to the surface after the HF procedure is completed and the injection pressure is released. "Produced water" is defined as the fluid that is produced when the well is put into production. Together, these fluids are referred to as "HF wastewaters."

- *Table summarizing products, chemical constituents of those products and concentrations, and manufacturer of each product.* The table will present the chemicals used in each product and may be used in conjunction with the formulations table (described in the previous bullet) to discern the chemicals used in each formulation. The manufacturer of each product will be displayed in the table.
- *Figure summarizing the number of products reported for a given product function and the frequency a product function is reported in the formulations data.* The figure will illustrate the product function with the greatest number of products and the product function is most often used in formulations.
- *Figure and table summarizing the number of products and chemical constituents for each type of formulation.* The figure will describe the number of chemicals and products for various types of formulations. A corresponding table will describe the average number of products and chemicals for each formulation type as well as the sample size for each population and common product functions for each formulation type.
- *Table summarizing the typical loadings for each group of products of a given product function and for each fluid formulation type.* The table will describe the typical proportion of a product in a formulation. Typical loading values (e.g. gallons per thousand gallons) indicate an amount or volume of a product added to a volume of fracturing fluids rather than an accurate representation of the concentration of a particular product or the chemical constituents of a product in a fluid formulation.
- *Written description of fluid systems used as a function of geology including criteria used to determine appropriate fluid system.* The nine service companies provided limited information on conditions for fluid system usage and locations of use. To the extent the information is available, correlations among fluid systems, site-specific conditions, and geology will be described. Assessing the fluid systems used by location provides a better regional understanding of the chemicals that may potentially impact local areas where hydraulic fracturing occurs.

Well Injection. The existing information described in Section A6.1 will be combined into a narrative description and a map to summarize information related to well injection. The products of the analysis will include the following:

- Narrative description of mechanical integrity tests, emergency procedures, surface line pressure testing, and monitoring of pressure, fluid density and fluid flow rate.
- Map of hydraulic fractured wells in the continental US during September 2009 through September 2010. The map will display the data as the number of wells fractured per county as reported by the service companies.
- Narrative description of any regional, temporal, or operator-specific patterns in the type or category of formulations used during September 2009 through September 2010. Data will be analyzed on a county level and play or basin level as appropriate using GIS software (ESRI ArcGIS v. 10).

Flowback and Produced Water. The existing information described in Section A6.1 will be combined into spreadsheets to summarize information received on spills of flowback and produced water and the composition of HF wastewaters. The products of the analysis will include the following:

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- *Table summarizing reported compositions of HF wastewaters.* This table will include information on the chemical and physical properties of HF wastewaters, such as the identities of analytes of interest and reported concentration ranges. To the extent possible, this information will be organized according to geologic and geographic location as well as time after the HF operation.
- *Written description of flowback and produced water management.* Where possible, EPA will describe the role of each company and the procedures it uses in handling flowback and produced water.

A7. Quality Objectives and Criteria

EPA does not make any claims on the quality or accuracy of the data or information received directly from the nine HF service companies as part of the information request. The goal of this QAPP is to ensure that the analyses described in Section A6 are conducted properly using the available secondary data. Table 2 summarizes the acceptance criteria considered during each analysis, ensuring that the relevant secondary data are of sufficient quality to accurately draw conclusions about the reported HF-related practices of the services companies.

TABLE 2. ACCEPTANCE CRITERIA FOR DATA ANALYSIS

Acceptance Criterion	Description/Definition	Specification
Completeness	Were the data reported by all or most of the nine service companies?	If data were not reported by all or most of the nine companies, are there enough data to adequately inform analysis?
Internal consistency	Do the data agree across datasets provided by the same company?	Are data sufficiently internally consistent to adequately inform analysis?
Comparability	Can the data be compared across datasets provided by different companies?	Can comparisons be made between and among different companies?

All project results will include documentation of data sources and the assumptions and uncertainties inherent with that data as well as computations and calculations made with secondary data.

A8. Special Training / Certifications

During the course of the analysis, all data analysts will access and analyze confidential business information (CBI) authorized under the Toxic Substances Control Act (TSCA). Data analysts will adhere to CBI procedures when handling CBI and will manage all reports, documents, and other materials developed in accordance with the procedures set forth in EPA's TSCA CBI Protection Manual.[5] Data analysts will maintain active TSCA CBI clearance, and all work involving TSCA CBI will be completed on the approved TSCA CBI computer assigned to the analyst.

A9. Documentation and Records

A final report will be submitted to the HF Study Coordinator, Jeanne Briskin. The final report will include a detailed description of the results and analytical methods used to produce all tables, figures, and written descriptions, and any assumptions or uncertainties inherent in those methods. Any modifications made to the original data will also be described and included in the final report.

All CBI documents will be handled in accordance with EPA's TSCA CBI Protection Manual.

B. Data Generation and Acquisition

This section addresses data acquisition and management activities, including the following elements identified by EPA:

- Element B5: Quality Control

[5] US EPA. 2003. TSCA CBI Protection Manual. Office of Pollution Prevention and Toxics (7407M).

- Element B9: Non-direct Measurements
- Element B10: Data Management

B5. Quality Control

All of the data used in this project will be examined to ensure the results accurately reflect the data reported to EPA by the nine service companies. Quality assurance and control of data during acquisition and manipulation of data into spreadsheets and databases was performed by ERG.[3] Data analysts will perform quality control during manipulation and analysis of datasets provided to EPA by ERG.

B9. Non-Direct Measurements

All data used in this project will be obtained from existing data reported to EPA in response to the information request sent to nine service companies in September 2010. ERG organized the information into spreadsheets and databases for EPA.[3] The specific data sources and their intended uses are listed in detail in Section A6.

B10. Data Management

The data under this task will be maintained both in Excel files and Access databases to allow for ease of analysis in both programs. Variable names will be created and managed to facilitate clear understanding of the data.

Some of the data used for this project will be TSCA CBI. All such data and products utilizing this data will be managed following the procedures set forth in EPA's TSCA CBI Protection Manual. The project lead and all data analysts will maintain active TSCA CBI clearance, and will use TSCA-compliant computers when working with TSCA CBI data.

C. Assessment and Oversight

This section describes the audits and other assessments needed to determine whether this QAPP is being implemented as approved and to increase confidence in the information obtained and produced as a result of this project.

C1. Assessment and Response Action

All work conducted for this project will be subject to technical review by EPA HF Study Coordinator Jeanne Briskin and the Data Analysis Technical Research Lead Susan Burden. Stephen Watkins will serve as the QA Manager for this project and will review this QAPP for completeness and applicability. He will be available to assist data analysts with QA issues as they arise and will periodically review compliance with this QAPP. This project will also undergo periodic data quality audits and a technical systems audit toward the start of the project to ensure appropriate models and methods are employed, as described below.

C1.1. Data Quality Audit

EPA does not make any claims on the quality or accuracy of the data or information received directly from the nine HF service companies as part of the information request. However, the products developed with these data will be reviewed by the Data Analysis Technical Research Lead and the Quality Assurance Manager to ensure that they accurately reflect the existing data submitted to EPA.

C1.2. Technical Systems Audit

A technical systems audit was conducted on August 28, 2012, by the QA Manager for the Office of Science Policy. The purpose of the audit was to evaluate the equipment, procedures, recordkeeping, and data management associated with this project and was focused on technical activities described in this QAPP. No deficiencies in operation or findings requiring corrective action were observed during the technical systems audit (Appendix 2).

Work performed by EPA's contractor, ERG, is subject to separate audits by EPA based upon the procedures described in ERG's QAPP.

C2. Reports to Management

A draft report on the results will be supplied to the HF Study Coordinator and Data Analysis Technical Research Lead for comment. Comments will be incorporated into a final report that will be given to the study team. The study team will be involved through weekly technical progress updates in which any problems encountered will be described and feedback will be solicited as necessary to ensure quality of the finished product.

D. Data Validation and Usability

This section addresses the quality of the completed final report to see if this product will conform to the objectives outlined in this QAPP, especially given this project's use of existing datasets.

D1-D2. Data Review, Verification, Validation, and Validation Methods

All data will be reviewed for completeness, representativeness, and statistical certainty. The data analysts will also examine the uncertainties of existing datasets to ensure that all data is of sufficient quality to adhere to the criteria outlined in this QAPP.

All final products will be examined to ensure the data is correctly and clearly displayed in tables and figures. In addition, all data sets, tables, and figures will be reviewed for apparent outlier values, which will be examined to determine whether these are indeed true values, the result of data entry errors, or have some other explanation. These outliers will be discussed in the final report, as they may either indicate data errors or may indicate the extraordinary circumstances.

D3. Reconciliation with User Requirements

The checks used to determine the consistency, completeness, and comparability of all existing data and final products are described in Section A7. The quality measures will be reported in all project deliverables, which will allow the HF study team and later data users to determine if the data are of sufficient quality for other uses.

Data analysts will work with the study team and the QA staff to determine to what extent the data that do not meet the specified data acceptance criteria listed in Table 2 may be used to support further study and how this determination will be documented. In addition to an evaluation of data quality, the data analysts will identify data sources, assumptions made, changes or modifications to data, and calculations used in their development in the draft and final formulations data analysis reports. These identifications will be sufficiently detailed and transparent although CBI procedures may not allow the reproducibility of the work by third parties unless TSCA CBI clearance is obtained through EPA.

REVISION HISTORY

Revision Number	Date Approved	Revision
0	7/19/12	New Document
1	8/19/13	• Updates to Table 1 and Figure 1 (project organization) • Updates to Section A6.2 to include regional, temporal, and operator-specific assessment of formulation types • Addition of Appendix 2: Technical Systems Audit

APPENDIX 1: INFORMATION REQUEST SENT TO NINE HYDRAULIC FRACTURING SERVICE COMPANIES IN SEPTEMBER 2010

QUESTIONS

Your response to the following questions is requested within thirty (30) days of receipt of this information request:

1. Provide the name of each hydraulic fracturing fluid formulation/mixture distributed or utilized by the Company within the past five years from the date of this letter. For each formulation/mixture, provide the following information for each constituent of such product. "Constituent" includes each and every component of the product, including chemical substances, pesticides, radioactive materials and any other components.

    a. Chemical name (e.g., benzene – use IUPAC nomenclature);

    b. Chemical formula (e.g., C_6H_6);

    c. Chemical Abstract System number (e.g., 71-43-2);

    d. Material Safety Data Sheet;

    e. Concentration (e.g., ng/g or ng/L) of each constituent in each hydraulic fracturing fluid product. Indicate whether the concentration was calculated or determined analytically. This refers to the actual concentration injected during the fracturing process following mixing with source water, and the delivered concentration of the constituents to the site. Also indicate the analytical method which may be used to determine the concentration (e.g., SW-846 Method 8260, in-house SOP), and include the analytical preparation method (e.g., SW-846 Method 5035), where applicable;

    f. Identify the persons who manufactured each product and constituent and the persons who sold them to the Company, including address and telephone numbers for any such persons;

    g. Identify the purpose and use of each constituent in each hydraulic fracturing fluid product (e.g., solvent, gelling agent, carrier,);

    h. For proppants, identify the proppant, whether or not it was resin coated, and the materials used in the resin coating;

    i. For the water used, identify the quantity, quality and the specifications of water needed to meet site requirements, and the rationale for the requirements;

    j. Total quantities of each constituent used in hydraulic fracturing and the related quantity of water in which the chemicals were mixed to create the fracturing fluids to support calculated and/or measured composition and properties of the hydraulic fracturing fluids; and

    k. Chemical and physical properties of all chemicals used, such as Henry's law coefficients, partitioning coefficients (e.g. K_{ow} $K_{OC,}$ K_d), aqueous solubility, degradation products and constants and others.

2. Provide all data and studies in the Company's possession relating to the human health and environmental impacts and effects of all products and constituents identified in Question 1.

3. For all hydraulic fracturing operations for natural gas extraction involving any of the products and constituents identified in the response to Question 1, describe the process including the following:

a. Please provide any policies, practices and procedures you employ, including any Standard Operating Procedures (SOPs) concerning hydraulic fracturing sites, for all operations including but not limited to: drilling in preparation for hydraulic fracturing including calculations or other indications for choice and composition of drilling fluids/muds; water quality characteristics needed to prepare fracturing fluid; relationships among depth, pressure, temperature, formation geology, geophysics and chemistry and fracturing fluid composition and projected volume; determination of estimated volumes of flowback and produced waters; procedures for managing flowback and produced waters; procedures to address unexpected circumstances such as loss of drilling fluid/mud, spills, leaks or any emergency conditions (e.g., blow outs), less than fully effective well completion; modeling and actual choice of fracturing conditions such as pressures, temperatures, and fracturing material choices; determination of exact concentration of constituents in hydraulic fracturing fluid formulations/mixtures; determination of dilution ratios for hydraulic fracturing fluids, and

b. Describe how fracturing fluid products and constituents are modified at a site during the fluid injection process.

4.

a. Identify all sites where, and all persons to whom, the Company:

   i. provided hydraulic fracturing fluid services that involve the use of hydraulic fracturing fluids for the year prior to the date of this letter, and

   ii. plans to provide hydraulic fracturing fluid services that involve the use of hydraulic fracturing fluids during one year after the date of this letter.

b. Describe the specific hydraulic fracturing fluid services provided or to be provided for each of the sites in Question 4.a.i. and ii., including the identity of any contractor that the Company has hired or will hire to provide any portion of such services.

For each site identified in response to Question 4, please provide all information specified in the enclosed electronic spreadsheet.