

BASELINE WATER QUALITY ASSESSMENT AND MONITORING

November 2014, Rio Grande International Study Center and Environmental Defense Fund

Baseline water quality assessment refers to sampling and analyses of “background” water quality before industrial activity begins, such as oil and gas development. Water contamination can occur from many sources, not just oil and gas development. Establishing an assessment of background water quality provides a baseline description of water quality that can be compared to follow-up monitoring samples taken after the industrial activity begins. This comparison can help demonstrate whether the water quality is impaired and can give indications of potential sources of contamination.

KEY CONSIDERATIONS

Key considerations for testing may include use of:

1. Sampling protocol and analytical methods
 - Federal: Environmental Protection Agency (EPA) standards for general analytical methods: [EPA Drinking Water Analytical Methods](#)
 - State: Railroad Commission “[Complaint Investigations](#)” sampling protocols for oil and gas-related suspected groundwater contamination
 - State: Texas Commission on Environmental Quality (TCEQ) sampling protocols for water contamination that may be related to influences other than oil and gas development:
 - [Surface Water Quality Monitoring Procedures](#)
 - [How to Sample Your Well Water and Understand the Results](#)
2. [NELAP Accredited Laboratory](#)
 - Generally required for TCEQ actions on public water supplies ([30 TAC §25.1](#))
 - Not explicitly required for Railroad Commission actions related to private water supplies, but should be used in case the contamination was not caused by oil and gas development
3. Chain of custody documentation
 - TCEQ: [Gathering and Preserving Information and Evidence Showing a Violation](#)

Hiring an independent consultant to collect and ship your samples may help to give the analyses credibility if they are used in a hearing process. If you hire an independent consultant, find out if they will provide you with a description, in layman’s terms, of what the laboratory results mean. Ask about how the information can be used in the future, and the level of certainty of the results.

Certainty of the results depends on a variety of factors including, but not limited to:

- Number of samples taken
- When the samples were taken (i.e. season, climate, etc...)
- Methods used to collect the samples
- Methods used to analyze the samples
- Where the samples were taken on the landscape (e.g. high point or low point on the terrain)

CHEMICALS AND CHARACTERISTICS

There are seven broad categories of chemicals that tend to occur in underground water found in oil and gas reservoirs, and that have been found in confirmed groundwater contamination cases related to oil and gas activities in Texas.¹

1. Salts
2. Metals
3. Liquid Hydrocarbons
4. Gas Hydrocarbons
5. Volatile Organic Compounds (VOCs)
6. Polycyclic Aromatic Hydrocarbons (PAHs)
7. Naturally Occurring Radioactive Materials (NORM)

¹ Texas Groundwater Protection Committee. (1990 – 2014). Joint Groundwater Monitoring and Contamination Report. Retrieved from: <http://www.tgpc.state.tx.us/AllPublications.php>

More specifically, Wyoming Oil and Gas Conservation Commission recommends specific EPA laboratory analytical methods for the following characteristics and chemical constituents when conducting baseline groundwater quality assessment and monitoring:²

- Specific Conductance
- pH
- Ignitability
- Total Dissolved Solids
- Iron
- Calcium
- Manganese
- Potassium
- Sodium
- Alkalinity (Carbonate)(Bicarbonate)
- Chloride
- Sulfate
- Sulfide (Hydrogen Sulfide)
- Total Petroleum Hydrocarbons
- Total Phenols
- BTEX (Benzene)
- Hydrocarbons
- TCLP
- Total Metals
- Mercury
- Radium-226

LABORATORY TESTING FEES

As an example, listed below are the laboratory testing fees offered by Guadalupe Blanco River Authority,³ though there are many NELAP accredited laboratories which conduct these types of tests and may offer different prices. These laboratory testing fees do not include the cost of hiring an independent consultant to collect or ship samples, which could cost approximately \$1500.

Alkalinity	\$23
Bromide*	\$44
Chlorides	\$22
Conductivity	\$12
Fluoride	\$26
Hardness	\$27
Heavy metals* (13 at \$25/each)	\$325
(Ar, Ba,B,Cd,Ca,Fe,Pb,Mg,Mn,K,Na,Se,Ag)	
Hydrogen sulfide-H2S*	\$60
Mercury	\$45
Methane and Ethane*(dissolved)	\$150
Nitrate-nitrogen	\$26
Oil and Grease (EPA 1664 Rev. B)	\$58
pH	\$12
Sulfate	\$22
Total Chromium	\$80
Total Coliform	\$21
Total Dissolved Solids	\$24
Total Petroleum Hydrocarbons-TPHs*	\$98
Uranium*	\$108
Volatile Organic Compounds-VOC's*	\$185

*subcontracted

Hydraulic Fracturing Individual Price:	\$1,668
Hydraulic Fracturing Discount Package:	\$1,400
Volume discounts are also available	

² Wyoming Oil and Gas Conservation Commission. (2013). Water Sample Guide: Sampling and Laboratory Data Control. Retrieved from <http://wogcc.state.wy.us/craig/watersample.htm>

³ Guadalupe-Blanco River Authority. (2012). Water Quality and Hydraulic Fracturing. Seguin, TX: Guadalupe-Blanco River Authority. Retrieved from <http://www.gbra.org/documents/WaterQualityAndFracking.pdf>