ENVIRONMENTAL LABORATORY

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Environmental Chemistry Laboratory

South Charleston Laboratory (MAIN)
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Big Chimney Laboratory
Environmental Chemistry Laboratory
4710 Chimney Drive Suite G
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Phone: 304-965-2694
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Kearneysville Laboratory
Bardane District Environmental Laboratory
1948 Wiltshire Road, Suite #7
Kearneysville, WV 25430
Phone: 304-725-5832
Fax: 304-725-3108
These standards are divided into two broad categories: Primary Standards (NPDWR) and Secondary Standards (NSDWR).

- Primary standards protect drinking water quality by setting analyte concentration limits to reduce possible health effects from exposure.

- Secondary standards were established as guidelines for cosmetic and aesthetics effects in drinking water.

The mission of the Environmental Chemistry Section is to provide the highest quality of analytical testing to identifying drinking water quality issues.
What should we test for?

The selection of the appropriate testing parameters depended upon several factors.

How does the water taste?

Does the water have an odor?

Are there any aesthetic problems?

Does the owner have any knowledge of the surrounding land usage?

How much are they willing to spend?

What has changed recently?
Initial Set of Test

An initial set of tests that private well owners can use to evaluate some common issues and determine whether further testing is necessary includes:

Initial (First Time)

- Total Coliform Bacteria ($20.00)
- Primary Regulated Metals Package ($60.00)
  - Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Mercury, Nickel, Selenium, Sodium, and Thallium
- Secondary Regulated Metals Package ($45.00)
  - Aluminum, Iron, Magnesium, Manganese, Silver and Zinc
- Combined Nitrate + Nitrite ($15.00)
- *Wet Chemistry Package ($30.00)
  - Alkalinity, Calcium, Calcium Hardness, pH, Total Dissolved Solids and Total Hardness
- **Lead and Copper - First Draw ($25.00)

* Recommended for the installation of a home water treatment system.
** Recommended for homes built prior to 1986, that have the original copper plumbing.
Yearly Testing

- Total Coliform Bacteria ($20.00)
- Combined Nitrate + Nitrite and Sodium* ($35.00)

* Individuals with restricted sodium intake should test their well water yearly.

Home Loans

- Total Coliform Bacteria* ($20.00)
- ?? Nitrate / Nitrite ($15.00 each)
- ?? Lead and Copper - First Draw ($25.00)

?? These depend on the lending agency.
* Coliform bacteria are normally found in the environment and are used as the indicator, to indicate the possible presence of Pathogens (disease causing organisms). Fecal coliform are a subgroup of Total Coliforms with E.coli being a member of the Fecal coliform group. A Total Coliform "absent" result does also indicate that E.coli is "absent" since E.coli is part of the Total Coliform group. This is where the testing stops, we do not perform the fluorescence test for E.coli, therefore it has always been the labs practice to not report E.coli "absent".
Oil and Gas Drilling Complaints

The timeframe for testing is short.

- Basic Oil and Gas Pre-Drilling Package;
  - Metals Regulator Package ($60.00)
    - Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Mercury, Nickel, Selenium, Sodium, and Thallium.
  - Metals Secondary Package ($45.00)
    - Aluminum, Iron, Magnesium, Manganese, Silver, and Zinc.
  - Wet Chemistry Package ($35.00)
    - Alkalinity, Calcium, Calcium hardness, pH, Total Dissolved Solids, and Total Hardness
  - Anions Package ($30.00)
    - Fluoride, Chloride, Nitrate, Nitrite, Ortho-Phosphate, and Sulfate.
  - Combined Nitrate + Nitrite ($15.00)
  - Total Organic Carbon ($40.00)
  - Turbidity ($15.00)
  - Chain-of-Custody documentation ($15.00)

Sample must be shipped for overnight delivery or hand delivered.
Key items regarding oil and gas pre-drilling package

• Samples should be taken before the water has passed through any water purification equipment that may be installed. Raw untreated sample must be collected.

• Samples that have a significant amount of suspended material present will not be tested for chloride and sulfate.

• Sampling kits should be hand delivered to prevent sample temperature exceedances.

• The sample should not be collected too early, but not too early.

• Customer should seek legal advice.

• The customer should be made aware that the sampling kit does not indicate that the water quality issues are directly linked to the Marcellus Shale fracking fluid. The testing only identifies changes in the homeowners’ water quality if analyzed before and after drilling.
Sediments and Stains

**Milky or Cloudy**
- Precipitation of carbonates / sulfates, excessive air, suspended solids, surfactants.

**Bluish Green – Green Precipitates (Jelly like substance)**
- Copper, hardness, corrosive / aggressive water.
- Aluminum Hydroxide, generated in hot water tanks when the aluminum anode rod is in contact with alkaline water conditions.

**Blackish Tint – Black Slime**
- Reactions with manganese and possibly iron.

**Reddish Brown Tint or Slime**
- Dissolved or precipitated iron.
Sample Collection Procedure

• Sample bottle must be furnished by the Office of Laboratory Services.

• Do not touch the inside of the sample bottle or cap.

• Collect from the cold-water kitchen tap.
  
  ? Removal of faucet aerator.
  ? Collecting before/after treatment unit.
  ? Air space allowed

• Allow water to run for 3 to 5 minutes before sampling.

• Do not overflow or rinse sample bottle (may contain preservatives).

• Replace the sample bottle cap securely.

Each kit contains Sampling Instructions and must be followed.
Bacteriological Sampling Instructions

DIRECTIONS FOR BACTERIOLOGICAL SAMPLING

COLLECTING THE SAMPLE

1. Use only sterile sample bottle furnished by state or county health departments. These sample bottles must be used before their expiration date.
2. Do not touch the inside of the sample bottle or cap or otherwise contaminate.
3. Do not collect from a storage tank, leaky faucet, aerators or purifiers.
4. Collect sample from the cold water tap.
5. Allow water to run for 5 minutes to clean service line before sampling.
6. Do not overflow or rinse sample bottle.
7. Fill sample bottle to the shoulder (above 100 mL mark) leaving about a 1 inch air space at the top.
8. Replace the sample bottle cap securely.

After Hours Drop Box

Bacteriological Preservatives: Sodium Thiosulfate
Sample Volume: 125 mL
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7. Fill sample bottle to the shoulder (above 100 ml mark) leaving about a 1 inch air space at the top.
8. Replace the sample bottle cap securely.

COMPLETING THE SAMPLE HISTORY – REPORT FORM

1. Complete all of the following information in INK – make sure all copies are legible.
2. Provide the following information:
   A. County of water sample origin.
   B. Public Water Supply (PWS) ID Number and name of water supply.
   C. Who is to be charged for the sample examination.
   D. Collector’s name, title, certification number, organization, and telephone number.
   E. To whom the final report of examination is to be mailed. (DO NOT WRITE “SAME AS ABOVE” – this information appears in a window envelope.)
   F. Bottle number.
3. Complete the following sample collection information:
   A. Sample type – Repeat Samples and Replacement Samples must have the complete lab number of the previous sample that they are a Repeat/Replacement for. (Repeat Samples are for samples that were previously Total Coliform Positive and must include their source: Original Location, Upstream, Downstream or Other. Replacement Samples are for samples that were previously Not Reported; Unsatisfactory, Laboratory Accident or Invalid.)
   B. Date and time of sample collection. COLLECTOR MUST INITIAL THE FORM.
   C. Specific description of the Sampling Point.
   D. Is the water supply chlorinated? Chlorine Residual.
   E. pH.
   F. How the sample is to be transported to the laboratory and the transportation condition.

MAILING – DELIVERY TO THE LABORATORY

1. Samples must be sent or brought for receipt to the laboratory in time for examination and within 30 hours of collection during the following hours: South Charleston Laboratory: 8:00 a.m. to 4:30 p.m., Monday through Friday. Kearneysville Laboratory: 8:00 a.m. to 4:00 p.m., Monday through Wednesday and 8:00 a.m. to 12:00 p.m., Thursday.
2. Check the departure schedule of mail or delivery service from your area and plan for collections to be readyed for shipment at that time.
3. Make sure postage is affixed to the outer mailer.

ALL FOUR COPIES OF THE COMPLETED HISTORY FORM MUST BE ENCLOSED WITH THE SAMPLE.

SAMPLING CONTAINERS ARE THE PROPERTIES OF THE STATE AND THEIR USE IS RESTRICTED ONLY FOR THE COLLECTIONS BY STATE AGENCIES OR THOSE DUTY AUTHORIZED BY THE STATE.

MICROBIOLOGICAL ANALYSIS RECORDS ARE DISPOSED OF AFTER 5 YEARS.
## WATER BACTERIOLOGICAL REPORT

### report to be charged to:

<table>
<thead>
<tr>
<th>Name:</th>
<th>Address:</th>
</tr>
</thead>
</table>

### county of origin:

<table>
<thead>
<tr>
<th>Name of water supply</th>
<th>P.W.S.I.D. #</th>
<th>code</th>
</tr>
</thead>
</table>

### collector:

<table>
<thead>
<tr>
<th>Collector's organization</th>
<th>title</th>
<th>certification #:</th>
</tr>
</thead>
</table>

### sample type:

- Compliance (IDWA) [☐]
- CWS [☐]
- NTWS [☐]
- TNWS [☐]
- Raw (turbidity required) [☐]
- Surface [☐]
- Ground [☐]
- Special purpose [☐]
- Replacement for lab [☐]
- Repeat for lab [☐]
- Repeat original [☐]
- Repeat downstream [☐]
- Repeat upstream [☐]
- Repeat other [☐]
- Individual household [☐]
- Well [☐]
- Cistern [☐]
- Spring [☐]
- Is supply protected [☐]
- Yes [☐]
- No [☐]
- Pool [☐]
- Beach [☐]
- Bottled water/ice [☐]
- Dairy farm [☐]
- Dairy plant [☐]
- Other [☐]

### report to be mailed to:

<table>
<thead>
<tr>
<th>name:</th>
<th>bottle number:</th>
</tr>
</thead>
</table>

### sample collection:

<table>
<thead>
<tr>
<th>date:</th>
<th>mm/dd/yy</th>
<th>time:</th>
<th>a.m./p.m.</th>
<th>initials:</th>
</tr>
</thead>
</table>

### chlorinated?

- Yes [☐]
- No [☐]
- Other [☐]

### sample transportation:

- US Mail [☐]
- UPS [☐]
- FedEx [☐]
- Hand delivered [☐]
- By collector [☐]
- Other [☐]

### transportation condition:

- Protected from sunlight [☐]
- Refrigerated (-10°C or 50°F) [☐]

### method of analysis:

- SM/232 COLILERT (18 HOURS) [☐]
- SM/232 COLILERT QT (18 HOURS) [☐]
- SM/232 B/F [☐]
- SM/231 B/F [☐]

### sample analysis:

<table>
<thead>
<tr>
<th>time received:</th>
<th>a.m./p.m.</th>
</tr>
</thead>
<tbody>
<tr>
<td>received by:</td>
<td>temp: °C</td>
</tr>
</tbody>
</table>

### laboratory results:

<table>
<thead>
<tr>
<th>total coliforms:</th>
<th>present [☐]</th>
<th>absent [☐]</th>
<th>per 100 mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>e. coli:</td>
<td>present [☐]</td>
<td>absent [☐]</td>
<td>per 100 mL</td>
</tr>
</tbody>
</table>

### heterotrophic plate count:

- [ ] [☐] CFU/mL

### sample completion:

<table>
<thead>
<tr>
<th>date:</th>
<th>time:</th>
<th>a.m./p.m.</th>
</tr>
</thead>
</table>

### analysts:

<table>
<thead>
<tr>
<th>analysts:</th>
<th></th>
<th></th>
</tr>
</thead>
</table>

[ ] [ ] [ ]
Lead Copper Sampling Instructions

Lead and Copper First Draw Sampling Instructions

14 Day Holding Time

Use the cold water faucet.

The sample must be taken after the water has stood motionless in the house plumbing system for at least six hours. Please record the date/time the water was last used on the Sample Submission Form along with the date/time the sample was collected.

Do not remove the aerator prior to sampling.

Fill the quart sample bottle with the water to be analyzed to within ½ inch of the top. Be sure the cap is tightened to prevent leakage during shipment to the laboratory.

RECORD BOTTLE NUMBER ON FORM

Lead and Copper – First Draw
Preservatives: Acidification at Laboratory pH<2 w/ Nitric Acid
Sample Volume: 1 Liter
Harmful Algae Blooms Sampling Instructions

**Cyanobacteria** can move throughout the water column. If a surface algae bloom has dissipated, the bloom may not have died, but moved to another area. Also, several factors can impact cyanobacteria movement in the water column. Strong winds, rainfall, currents, lighting conditions and available nutrients should be considered when collecting.

Collect a grab sample from the densest part of an algae bloom. 

**NOTE:** When collecting surface scum. Ensure one third of the bottle opening is below the water surface.

Fill sample bottle to the shoulder leaving about 1 inch of airspace at the top. Ensure the cap is tightened and place the bottle in the supplied Ziploc bag.

The sample must be kept cool and in the dark while being transported to the laboratory. The sample must be shipped frozen.

**RECORD BOTTLE NUMBER ON FORM**

Harmful Algae Bloom – Recreational Water
Preservatives: ICE
Sample Volume: 125 mL
Environmental Chemistry Laboratory

Organic Sampling Instructions

Volatile Organic Compounds
Preservatives: Maleic Avid / Ascorbic Acid / ICE
Sample Volume: 40ml

Total Organic Carbon (TOC) Sampling Instructions
Preservatives: Phosphoric Acid / ICE
Sample Volume: 250ml

VOC & TTHM Sampling Instructions
14 Day Holding Time
Overnight Delivery
Shipped Cold <10°C

Use the cold-water faucet. Remove any faucet attachments and the aerator prior to sampling. Also, avoid rubber hose attachments.

Allow the water to run for 3 to 5 minutes prior to taking the sample to flush the water lines. Decrease the water flow to the diameter of a pencil to reduce splashing.

Do not rinse the sample bottle prior to sampling; it contains a chemical preservative. Fill the sample vial completely full (zero headspace) without overflowing and flushing out the preservatives. Be sure the cap is tightened to prevent leakage during shipment to the laboratory.

Sample must be collected in duplicate.

Total Organic Carbon (TOC) Sampling Instructions
28 Day Holding Time
Overnight Delivery
Shipped Cold <6°C

Use the cold water faucet. Remove any faucet attachments and the aerator prior to sampling. Also, avoid rubber hose attachments.

Allow the water to run for 3 to 5 minutes prior to taking the sample to flush the water lines. Decrease the water flow to the diameter of a pencil to reduce splashing.

Do not rinse the sample bottle prior to sampling; it contains a chemical preservative. Caution: Phosphoric Acid (H₃PO₄) is corrosive. Fill the sample bottle completely full (zero headspace) without overflowing and flushing out the preservative. Be sure the cap is tightened to prevent leakage during shipment to the laboratory.
Drinking Water Contaminants Listing
An EPA listing of regulated contaminants and the potential health effects from exposures above the Maximum Contaminant Level and common sources of contaminants.

Information and Resources provided by the government agencies to educate owners of private drinking water wells.

Environmental Protection Agency (EPA)
https://www.epa.gov/privatewells

Center for Disease Control Prevention (CDC)
https://www.cdc.gov/healthywater/drinking/private/wells/index.html

United Stats Geological Survey (USGS)

CDC’s National Water Fluoridation Program
http://www.cdc.gov/fluoridation/index.htm
Thank you for your time and attention.

Gregory Young

Bureau For Public Health
Office of Laboratory Services