Water Resources
ENVIRONMENTAL QUALITY

PAT MCCRORY
*Governor*

DONALD R. VAN DER VAART
*Secretary*

S. JAY ZIMMERMAN
*Director*

January 29, 2016

Ruffin Shackelford
2514 Fie Top Road
Maggie Valley, NC 28751

RE: Sample ID: **AC24435**
Sample Location Address: **2514 Fie Top Road**
Haywood County

Dear Mr. Shackelford,

Please find attached the analytical results for a water sample collected from your water supply well at the address above, on November 16, 2015. A water sample was collected because of an ongoing groundwater investigation along a portion of Fie Top Road. Your water sample was analyzed for chloride, sulfate, and various metals.

The following table summarizes the attached analytical results for samples collected on **November 16, 2015**. The results are shown in units of micrograms of contaminate per liter of water (ug/l) and are approximately equivalent to parts per billion (ppb).

| Analytes | USEPA Maximum Contaminate Level | | NC Groundwater Standard | | Concentration Detected In Your Drinking Water | |
|---|---|---|---|---|---|---|
| | Concentration | Units | Concentration | Units | Concentration | Units |
| Barium | 2,000 | ppb | 700 | ppb | 130 | ppb |
| Calcium | | | | | 6,300 | ppb |
| Chloride | | | 250,000 | ppb | 36,000 | ppb |
| Copper | 1,300 | ppb | 1,000 | ppb | 5.8 | ppb |
| Iron | | | 300 | ppb | 120 | ppb |
| Magnesium | | | | | 1,300 | ppb |
| Potassium | | | | | 1,100 | ppb |
| Sodium | | | | | 16,000 | ppb |
| Strontium | | | | | 110 | ppb |

The chloride and sodium concentrations do not exceed the applicable standards. The remaining metals are below the applicable standards and are fairly typical for groundwater quality in western North Carolina. Because chloride and sodium concentrations are present in your drinking water, a Health Risk Evaluation (HRE) of the water supply well was performed by toxicologist Dr. Ken Rudo with the North Carolina Department of Health and Human Services. The HRE, which is enclosed, states your drinking water, based on the available results, is safe for all household uses including drinking, cooking, washing, cleaning, bathing, and showering.

Please be aware that the groundwater investigation has transitioned to the North Carolina Division of Waste Management's Inactive Hazardous Sites Branch, which has jurisdiction over this type of

groundwater contamination. The new project manager is Catherine Jacobs. Her contact information is given below:

**North Carolina Department of Environmental Quality**
**Division of Waste Management, Superfund Section**
**Winston-Salem Regional Office**
**450 West Hanes Mill Road, Suite 300**
**Winston-Salem, NC 27105**

**Direct: (336) 776-9677**
**Fax: (336) 776-9797**
**catherine.jacobs@ncdenr.gov**

If you have questions concerning the Health Risk Evaluation, please contact Dr. Ken Rudo at (919) 707-5911. If you have any additional questions or concerns, please contact me at (828) 296-4681 or brett.laverty@ncdenr.gov.

Sincerely,

Brett Laverty
Water Quality Regional Operations
Asheville Regional Office

Attachment: Health Risk Evaluation by Dr. Rudo
DWR laboratory analytical results

cc: file
Haywood County Health Department w/ attachments
Catherine Jacobs – NC Division of Waste Management, Superfund Section

AC24435

# NC DWR Water Sciences Section-Chemistry Laboratory Results

County:
River Basin
Report To ARO

Collector: B LAVERTY
Region: ARO
Sample Matrix: SURFACEWATER
Loc. Type:
Emergency Yes/No
COC Yes/No

DWR
Division of Water Resources

**Final Report**

VisitID 2514 FIE TOP ROAD

Loc. Descr.: NO LOCATION CODE

Sample ID: AC24435
PO Number # 15W7375
Date Received: 11/18/2015
Time Received: 08:40
Labworks LoginID TASCENZO1
Final Report Date: 1/4/16
Report Print Date: 01/07/2016

| Location ID: | 1C442514FIETOP | Collect Date: | 11/17/2015 | Collect Time: | 11:31 | Sample Depth |
|---|---|---|---|---|---|---|

***If this report is labeled preliminary report, the results have not been validated. Do not use for Regulatory purposes.***

| CAS # | Analyte Name | PQL | Result/ Qualifier | Units | Method Reference | Analysis Date | Validated by |
|---|---|---|---|---|---|---|---|
| **LAB** | | | | | | | |
| | Sample temperature at receipt by lab | | 2.6 | °C | | 11/18/15 | MSWIFT |
| **WET** | | | | | | | |
| | Ion Chromatography | | _TITLE_ | mg/L | EPA 300.0 rev2.1 | 11/18/15 | CGREEN |
| | Fluoride | 0.4 | 0.4 U | mg/L | EPA 300.0 rev2.1 | 11/18/15 | CGREEN |
| | Chloride | 1.0 | 36 | mg/L | EPA 300.0 rev2.1 | 11/18/15 | CGREEN |
| | Bromide | 0.4 | 0.4 U | mg/L | EPA 300.0 rev2.1 | 11/18/15 | CGREEN |
| | Sulfate | 2.0 | 2.0 U | mg/L | EPA 300.0 rev2.1 | 11/18/15 | CGREEN |
| **MET** | | | | | | | |
| 7440-22-4 | Ag by ICPMS | 1.0 | 1.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7429-90-5 | Al by ICP | 50 | 50 U | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-38-2 | As by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-38-3 | Ba by ICP | 10 | 130 | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-70-2 | Ca by ICP | 0.10 | 6.3 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-43-9 | Cd by ICPMS | 0.50 | 0.50 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-47-3 | Cr by ICPMS | 5.0 | 5.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-50-8 | Cu by ICPMS | 2.0 | 5.8 | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7439-89-6 | Fe by ICP | 50 | 120 | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7439-97-6 | Hg 245.1 | 0.2 | 0.20 U | ug/L | EPA 245.1 | 12/10/15 | ESTAFFORD1 |
| 7440-09-7 | K by ICP | 0.10 | 1.1 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7439-95-4 | Mg by ICP | 0.10 | 1.3 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7439-96-5 | Mn by ICP | 10 | 10 U | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-23-5 | Na by ICP | 0.10 | 16 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-02-0 | Ni by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7439-92-1 | Pb by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7782-49-2 | Se by ICPMS | 1.0 | 1.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-24-6 | Sr by ICPMS | 10 | 110 | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-66-6 | Zn by ICPMS | 10 | 10 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |

North Carolina Division of Water Resources
**Central Laboratory** (Water Sciences Section)

# Water Sample Collection & Submittal Form

| | |
|---|---|
| Visit ID: (optional) | 1 |
| Tag ID | |

| | | | | | |
|---|---|---|---|---|---|
| Location Description: | Ruffin Shackelford - 2514 Fie Top Road Maggie Valley, NC | | | Location Code: | 1C442514FIETOP |
| County: | Haywood | Collector: | Brett Laverty | | |
| DWR Region: (based on county) | Asheville | DWR Office: (or agency name) | WQ Regional Operation | | |
| River Basin: | | Date: | 11/16/2015 | | |
| Notes: | | Time: | 11:31 AM | | |
| ☐ Chlorinated ☐ De-chlorinated in Field | | Sampling Method: | ☑ Grab ☐ Composite ☐ Other: | | |
| ☐ Filtered in Field | Dissolved analysis: Enter "DIS" in check-boxes for parameters | Sample Depth: | | | |

**Priority:** ☐ Ambient ☑ Routine ☐ Compliance ☐ COC ☐ Emergency ☐ QA

**Water Matrix:** ☐ Surface ☑ Ground ☐ Waste ☐ Blank ☐ Solution

**Location Type:** ☐ River/Stream ☐ Lake ☐ Estuary ☐ Canal ☐ Stormwater ☐ Monitoring Well ☑ Water Supply ☐ Effluent ☐ Influent ☐ Field Blank ☐ Filter Blank ☐ Trip Blank ☐ Other:

**Lab Use Only:**

| | |
|---|---|
| Laboratory Sample Number: | |
| Date Received: | |
| Time Received: | |
| Received By: | |
| Delivery Method: | ☐ State Courier ☐ Hand Delivery ☐ Other: |
| Temperature (°C) on Arrival: | |

**Collector's Comments:**

| | Microbiology Parameters: | |
|---|---|---|
| | Acidity, as CaCO3, to pH 4.5/8.3 | mg/L |
| | Alkalinity, as CaCO3, to pH 4.5/8.3 | mg/L |
| | BOD: Biochemical Oxygen Demand, 5-day | mg/L |
| | cBOD: Carbonaceous BOD, 5-day | mg/L |
| | Coliform: Fecal MF | /100ml |
| | Coliform: Total MF | /100ml |
| | Coliform: Tube Fecal | /100ml |
| | Coliform: Tube Total | /100ml |
| | Specific Conductance, at 25°C | umhos/cm |
| | TOC - Total Organic Carbon | mg/L |
| | Turbidity | NTU |
| | | |
| | **Wet Chemistry Parameters:** | |
| | Bromide | mg/L |
| X | Chloride | mg/L |
| | Fluoride | mg/L |
| X | Sulfate | mg/L |
| | Chlorophyll a | µg/L |
| | Color: ADMI | c.u. |
| | Color: Platinum Cobalt | c.u. |
| | COD: Chemical Oxygen Demand | mg/L |
| | Cyanide, Total | mg/L |
| | Formaldehyde | mg/L |
| | Hexavalent Chromium (Cr6+) | mg/L |

| | | |
|---|---|---|
| | MBAS (surfactants) | mg/L |
| | Oil and Grease, HEM, Total Recoverable | mg/L |
| | Phenols, Total Recoverable | µg/L |
| | Residue: Total (*Total Solids*) | mg/L |
| | Residue: Volatile/Fixed, Total | mg/L |
| | Residue: Suspended (*Suspended Solids*) | mg/L |
| | Residue: Volatile/Fixed, Suspended | mg/L |
| | TDS - Total Dissolved Solids | mg/L |
| | Silica | mg/L |
| | Sulfide | mg/L |
| | Tannin & Lignin | mg/L |
| | | |
| | **Other Parameters:** | |
| | pH | s.u. |
| | Hardness, Total as CaCO3 - by titration | mg/L |
| | | |
| | | |
| | **Nutrients Parameters:** | |
| | Ammonia as N (NH3-N) | mg/L |
| | Nitrate-Nitrite as N (NO3+NO2-N) | mg/L |
| | Total Kjeldahl Nitrogen as N (TKN) | mg/L |
| | Total Phosphorus as P (TP) | mg/L |
| | Nitrite as N (NO2-N) | mg/L |
| | Nitrate as N (NO3-N calculated) | mg/L |
| | Orthophosphate as P (PO4) | mg/L |

| | | |
|---|---|---|
| | **Metals Parameters:** | |
| X | Aluminum (Al) | µg/L |
| | Antimony (Sb) | µg/L |
| X | Arsenic (As) | µg/L |
| X | Barium (Ba) | µg/L |
| | Beryllium (Be) | µg/L |
| X | Cadmium (Cd) | µg/L |
| X | Calcium (Ca) | mg/L |
| X | Chromium (Cr), Total | µg/L |
| | Cobalt (Co) | µg/L |
| X | Copper (Cu) | µg/L |
| X | Iron (Fe) | µg/L |
| X | Lead (Pb) | µg/L |
| | Lithium (Li) | µg/L |
| X | Magnesium (Mg) | mg/L |
| X | Manganese (Mn) | µg/L |
| X | Mercury (Hg) | µg/L |
| | Molybdenum (Mo) | µg/L |
| X | Nickel (Ni) | µg/L |
| X | Potassium (K) | mg/L |
| X | Selenium (Se) | µg/L |
| X | Silver (Ag) | µg/L |
| X | Sodium (Na) | mg/L |
| X | Strontium (Sr) | µg/L |
| | Thallium (Tl) | µg/L |

| | | |
|---|---|---|
| | Tin (Sn) | µg/L |
| | Titanium (Ti) | µg/L |
| | Vanadium (V) | µg/L |
| X | Zinc (Zn) | µg/L |
| | | |
| | Boron (B), Total | µg/L |
| | Mercury 1631, low-level | ng/L |
| | | |
| | **Organics Parameters:** | |
| | Acid Herbicides | |
| | Organochlorine Pesticides | |
| | Organonitrogen Pesticides | |
| | Organophosphorus Pesticides | |
| | PCBs (polychlorinated biphenyls) | |
| | | |
| | Semi-Volatile Organics (BNAs) | |
| | TPH Diesel Range | |
| | | |
| | Volatile Organics (VOA) | |
| | | |
| | TPH Gasoline Range | |
| | | |
| | **Biological:** | |
| | Phytoplankton / Algae | |
| | | |

**LAB COMMENTS :**

| Field Parameters (optional): | Water Temp (°C) | | pH (s.u.) | | Dissolved Oxygen (ppm) | | Conductivity (µmhos/cm) | | Salinity (ppt) | |
|---|---|---|---|---|---|---|---|---|---|---|

Revision: 2/06/2015

N O R T H C A R O L I N A

dhhs
the department of health and human services

# Private Well Information and Use Recommendations

## *For Inorganic Chemical Contaminants*

County: Haywood

Name: Ruffin Shackelford

Sample ID #: AC 24935

Reviewer: Kim R

### TEST RESULTS AND USE RECOMMENDATIONS

1. ☒ Your well water meets federal drinking water standards ***for inorganic chemicals***. Your water can be used for drinking, cooking, washing, cleaning, bathing, and showering based on the ***inorganic chemical results only***. You may have other water sampling results that are not taken into account in this report.

2. ☐ The following substance(s) exceeded federal drinking water standards or the North Carolina 2L calculated health levels. The North Carolina Division of Public Health recommends that your well water not be used for drinking and cooking, unless you install a water treatment system to remove the circled substance(s). However, it may be used for washing, cleaning, bathing and showering based on the ***inorganic chemical results only***.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Arsenic | Barium | Cadmium | Chromium | Copper | Fluoride | Lead | Iron | |
| Manganese | Mercury | Nitrate/Nitrite | Selenium | Silver | Magnesium | Zinc | pH | |

3. ☐ a. Sodium levels exceed the U.S. Environmental Protection Agency's (USEPA) Health Advisory level for sodium of 20 mg/l. The North Carolina Division of Public Health recommends that only individuals on no or low sodium restricted diets not use this water for drinking or cooking. It may be used for washing, cleaning, bathing, and showering based on the ***inorganic chemical results only***.

☐ b. Levels over 30 mg/l may pose aesthetic problems such as bad taste, odor, staining of porcelain, etc.

4. ☐ Re-sampling is recommended in _____ months.

5. ☐ Re-sample for lead and /or copper. Take a first draw, 5 minute, and 15 minute sample inside the house (preferably the kitchen) and if possible a first draw, 5 minute and a 15 minute sample at the well head to determine the source of the lead and/or copper.

6. ☐ The following substance(s) exceeded federal drinking water standards. Your water can be used for drinking, cooking, washing, cleaning, bathing, and showering based on the ***inorganic chemical results only***, but aesthetic problems such as bad taste, odor, staining of porcelain, etc. may occur. You may want to install a household water treatment system to address aesthetic problems.

| | | |
|---|---|---|
| Fluoride | Iron | Magnesium |
| pH | Zinc | |

| Post-it® Fax Note 7671 | Date 1/25/16 | # of pages ▸ 4 |
|---|---|---|
| To Brett Laverty | From Dr. Ken Rudo | |
| Co./Dept. DWQ/ARO | Co. NC DHHS | |
| Phone # | Phone # 919 707 5911 | |
| Fax # 828-299-7043 | Fax # | |

*If the North Carolina Division of Public Health at 919-707-5900.*

Water Resources
ENVIRONMENTAL QUALITY

PAT MCCRORY
*Governor*

DONALD R. VAN DER VAART
*Secretary*

S. JAY ZIMMERMAN
*Director*

January 29, 2016

Bill Thompson
P.O. Box 224
Maggie Valley, NC 28751

RE: Sample ID: **AC25023**
Sample Location Address: **2375 Fie Top Road**
Haywood County

Dear Mr. Thompson,

Please find attached the analytical results for a water sample collected from your water supply well at the address above, on December 8, 2015. A water sample was collected because of an ongoing groundwater investigation along a portion of Fie Top Road. Your water sample was analyzed for chloride, sulfate, and various metals.

The following table summarizes the attached analytical results for samples collected on **December 8, 2015**. Please note that the **bolded** values indicate levels **above** the NC Groundwater Standard, 15A NCAC 2L .0202. The results are shown in units of micrograms of contaminate per liter of water (ug/l) and are approximately equivalent to parts per billion (ppb).

| Analytes | USEPA Maximum Contaminate Level | | NC Groundwater Standard | | Concentration Detected In Your Drinking Water | |
|---|---|---|---|---|---|---|
| | Concentration | Units | Concentration | Units | Concentration | Units |
| Aluminum | | | | | 520 | ppb |
| **Barium** | **2,000** | **ppb** | **700** | **ppb** | **1,300** | **ppb** |
| Calcium | | | | | 8,200 | ppb |
| Chloride | | | 250,000 | ppb | 190,000 | ppb |
| Copper | 1,300 | ppb | 1,000 | ppb | 210 | ppb |
| Iron | | | 300 | ppb | 180 | ppb |
| **Lead** | **15** | **ppb** | **15** | **ppb** | **49** | **ppb** |
| Magnesium | | | | | 1,500 | ppb |
| **Manganese** | | | **50** | **ppb** | **330** | **ppb** |
| Potassium | | | | | 4,400 | ppb |
| Sodium | | | | | 120 | ppb |
| Strontium | | | | | 100 | ppb |
| Sulfate | | | 250,000 | ppb | 2,300 | ppb |
| Zinc | | | 1,000 | ppb | 48 | ppb |

Barium, lead, and manganese concentrations exceed the applicable standards. The sodium concentration exceeds the North Carolina public health goals. Chloride is present at an elevated concentration but it does not exceed the applicable standard. The remaining metals are below the applicable standards and are fairly typical for groundwater quality in western North Carolina.

Because of a number metals are present in your drinking water above the applicable standards, a Health Risk Evaluation (HRE) of the water supply well was performed by toxicologist Dr. Ken Rudo with the North Carolina Department of Health and Human Services. The HRE, which is enclosed, makes specific recommendations for your water based on these results.

Please be aware that the groundwater investigation has transitioned to the North Carolina Division of Waste Management's Inactive Hazardous Sites Branch, which has jurisdiction over this type of groundwater contamination. The new project manager is Catherine Jacobs. Her contact information is given below:

**North Carolina Department of Environmental Quality**
**Division of Waste Management, Superfund Section**
**Winston-Salem Regional Office**
**450 West Hanes Mill Road, Suite 300**
**Winston-Salem, NC 27105**

**Direct: (336) 776-9677**
**Fax: (336) 776-9797**
**catherine.jacobs@ncdenr.gov**

If you have questions concerning the Health Risk Evaluation, please contact Dr. Ken Rudo at (919) 707-5911. If you have any additional questions or concerns, please contact me at (828) 296-4681 or brett.laverty@ncdenr.gov.

Sincerely,

Brett Laverty
Water Quality Regional Operations
Asheville Regional Office

Attachment: Health Risk Evaluation by Dr. Rudo
DWR laboratory analytical results

cc: file
Haywood County Health Department w/ attachments
Catherine Jacobs – NC Division of Waste Management, Superfund Section

# NC DWR Water Sciences Section-Chemistry Laboratory Results

| | | | |
|---|---|---|---|
| County: | Haywood | Sample ID: | AC25023 |
| River Basin | | PO Number # | 15G0312 |
| Report To | ARO | Date Received: | 12/10/2015 |
| Collector: | B LAVERTY | Time Received: | 08:50 |
| Region: | ARO | Labworks LoginID | MSWIFT |
| Sample Matrix: | GROUNDWATER | Final Report Date: | 12/31/15 |
| Loc. Type: | Water Supply | Report Print Date: | 01/07/2016 |
| Emergency Yes/No | | | |
| COC Yes/No | | | |

DWR Division of Water Resources

**Final Report**

VisitID

Loc. Descr.: BILL THOMPSON-2375 FIE TOP ROAD MAGGIE VALLEY, NC

| Location ID: | 1C442375FIETOP | Collect Date: | 12/08/2015 | Collect Time: | 14:29 | Sample Depth |
|---|---|---|---|---|---|---|

***If this report is labeled preliminary report, the results have not been validated. Do not use for Regulatory purposes.***

| CAS # | Analyte Name | PQL | Result/ Qualifier | Units | Method Reference | Analysis Date | Validated by |
|---|---|---|---|---|---|---|---|
| **LAB** | | | | | | | |
| | Sample temperature at receipt by lab | | 1.4 | °C | | 12/10/15 | MSWIFT |
| **WET** | | | | | | | |
| | Ion Chromatography | | _TITLE_ | mg/L | EPA 300.0 rev2.1 | 12/10/15 | CGREEN |
| | Fluoride | 0.4 | 0.4 U | mg/L | EPA 300.0 rev2.1 | 12/10/15 | CGREEN |
| | Chloride | 1.0 | 190 | mg/L | EPA 300.0 rev2.1 | 12/10/15 | CGREEN |
| | Bromide | 0.4 | 0.4 U | mg/L | EPA 300.0 rev2.1 | 12/10/15 | CGREEN |
| | Sulfate | 2.0 | 2.3 | mg/L | EPA 300.0 rev2.1 | 12/10/15 | CGREEN |
| **MET** | | | | | | | |
| 7440-22-4 | Ag by ICPMS | 1.0 | 1.0 U | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7429-90-5 | Al by ICP | 50 | 520 | ug/L | EPA 200.7 | 12/21/15 | ESTAFFORD1 |
| 7440-38-2 | As by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7440-38-3 | Ba by ICP | 10 | 1300 | ug/L | EPA 200.7 | 12/18/15 | ESTAFFORD1 |
| 7440-70-2 | Ca by ICP | 0.10 | 8.2 | mg/L | EPA 200.7 | 12/18/15 | ESTAFFORD1 |
| 7440-43-9 | Cd by ICPMS | 0.50 | 0.50 U | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7440-47-3 | Cr by ICPMS | 5.0 | 5.0 U | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7440-50-8 | Cu by ICPMS | 2.0 | 210 | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7439-89-6 | Fe by ICP | 50 | 180 | ug/L | EPA 200.7 | 12/21/15 | ESTAFFORD1 |
| 7439-97-6 | Hg 245.1 | 0.2 | 0.20 U | ug/L | EPA 245.1 | 12/15/15 | ESTAFFORD1 |
| 7440-09-7 | K by ICP | 0.10 | 4.4 | mg/L | EPA 200.7 | 12/18/15 | ESTAFFORD1 |
| 7439-95-4 | Mg by ICP | 0.10 | 1.5 | mg/L | EPA 200.7 | 12/18/15 | ESTAFFORD1 |
| 7439-96-5 | Mn by ICP | 10 | 330 | ug/L | EPA 200.7 | 12/21/15 | ESTAFFORD1 |
| 7440-23-5 | Na by ICP | 0.10 | 120 | mg/L | EPA 200.7 | 12/18/15 | ESTAFFORD1 |
| 7440-02-0 | Ni by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7439-92-1 | Pb by ICPMS | 2.0 | 49 | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7782-49-2 | Se by ICPMS | 1.0 | 1.0 U | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7440-24-6 | Sr by ICPMS | 10 | 100 | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7440-66-6 | Zn by ICPMS | 10 | 48 | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |

North Carolina Division of Water Resources
**Central Laboratory** (Water Sciences Section)

# Water Sample Collection & Submittal Form

| | |
|---|---|
| Visit ID: (optional) | |
| Tag ID: | 2 |

| | | | |
|---|---|---|---|
| Location Description: | Bill Thompson - 2375 Fie Top Road Maggie Valley, NC | Location Code: | 1C442375FIETOP |
| County: | Haywood | Collector: | Brett Laverty |
| DWR Region: (based on county) | Asheville | DWR Office: (or agency name) | WQ Regional Operation |
| River Basin: | | Date: | 12/8/2015 |
| Notes: | | Time: | 2:49 PM |
| ☐ Chlorinated ☐ De-chlorinated in Field | | Sampling Method: | ☑ Grab ☐ Composite ☐ Other: |
| ☐ Filtered in Field | **Dissolved analysis**: Enter "DIS" in check-boxes for parameters | Sample Depth: | |

**Priority:** ☐ Ambient ☑ Routine ☐ Compliance ☐ COC ☐ Emergency ☐ QA

**Water Matrix:** ☐ Surface ☑ Ground ☐ Waste ☐ Blank ☐ Solution

**Location Type:** ☐ River/Stream ☐ Lake ☐ Estuary ☐ Canal ☐ Stormwater ☐ Monitoring Well ☑ Water Supply ☐ Effluent ☐ Influent ☐ Field Blank ☐ Trip Blank ☐ Filter Blank ☐ Other:

**Lab Use Only:**

| | |
|---|---|
| Laboratory Sample Number: | |
| Date Received: | |
| Time Received: | |
| Received By: | |
| Delivery Method: | ☐ State Courier ☐ Hand Delivery ☐ Other: |
| Temperature (°C) on Arrival: | |

**Collector's Comments:**

| | Microbiology Parameters: | |
|---|---|---|
| | Acidity, as CaCO3, to pH 4.5/8.3 | mg/L |
| | Alkalinity, as CaCO3, to pH 4.5/8.3 | mg/L |
| | BOD: Biochemical Oxygen Demand, 5-day | mg/L |
| | cBOD: Carbonaceous BOD, 5-day | mg/L |
| | Coliform: Fecal MF | /100ml |
| | Coliform: Total MF | /100ml |
| | Coliform: Tube Fecal | /100ml |
| | Coliform: Tube Total | /100ml |
| | Specific Conductance, at 25°C | umhos/cm |
| | TOC - Total Organic Carbon | mg/L |
| | Turbidity | NTU |
| | | |
| | **Wet Chemistry Parameters:** | |
| | Bromide | mg/L |
| X | Chloride | mg/L |
| | Fluoride | mg/L |
| X | Sulfate | mg/L |
| | Chlorophyll a | µg/L |
| | Color: ADMI | c.u. |
| | Color: Platinum Cobalt | c.u. |
| | COD: Chemical Oxygen Demand | mg/L |
| | Cyanide, Total | mg/L |
| | Formaldehyde | mg/L |
| | Hexavalent Chromium (Cr6+) | mg/L |

| | | |
|---|---|---|
| | MBAS (surfactants) | mg/L |
| | Oil and Grease, HEM, Total Recoverable | mg/L |
| | Phenols, Total Recoverable | µg/L |
| | Residue: Total (*Total Solids*) | mg/L |
| | Residue: Volatile/Fixed, Total | mg/L |
| | Residue: Suspended (*Suspended Solids*) | mg/L |
| | Residue: Volatile/Fixed, Suspended | mg/L |
| | TDS - Total Dissolved Solids | mg/L |
| | Silica | mg/L |
| | Sulfide | mg/L |
| | Tannin & Lignin | mg/L |
| | | |
| | **Other Parameters:** | |
| | pH | s.u. |
| | Hardness, Total as CaCO3 - by titration | mg/L |
| | | |
| | | |
| | **Nutrients Parameters:** | |
| | Ammonia as N (NH3-N) | mg/L |
| | Nitrate-Nitrite as N (NO3+NO2-N) | mg/L |
| | Total Kjeldahl Nitrogen as N (TKN) | mg/L |
| | Total Phosphorus as P (TP) | mg/L |
| | Nitrite as N (NO2-N) | mg/L |
| | Nitrate as N (NO3-N calculated) | mg/L |
| | Orthophosphate as P (PO4) | mg/L |

| | Metals Parameters: | |
|---|---|---|
| X | Aluminum (Al) | µg/L |
| | Antimony (Sb) | µg/L |
| X | Arsenic (As) | µg/L |
| X | Barium (Ba) | µg/L |
| | Beryllium (Be) | µg/L |
| X | Cadmium (Cd) | µg/L |
| X | Calcium (Ca) | mg/L |
| X | Chromium (Cr), Total | µg/L |
| | Cobalt (Co) | µg/L |
| X | Copper (Cu) | µg/L |
| X | Iron (Fe) | µg/L |
| X | Lead (Pb) | µg/L |
| | Lithium (Li) | µg/L |
| X | Magnesium (Mg) | mg/L |
| X | Manganese (Mn) | µg/L |
| X | Mercury (Hg) | µg/L |
| | Molybdenum (Mo) | µg/L |
| X | Nickel (Ni) | µg/L |
| X | Potassium (K) | mg/L |
| X | Selenium (Se) | µg/L |
| X | Silver (Ag) | µg/L |
| X | Sodium (Na) | mg/L |
| X | Strontium (Sr) | µg/L |
| | Thallium (Tl) | µg/L |

| | | |
|---|---|---|
| | Tin (Sn) | µg/L |
| | Titanium (Ti) | µg/L |
| | Vanadium (V) | µg/L |
| X | Zinc (Zn) | µg/L |
| | | |
| | Boron (B), Total | µg/L |
| | Mercury 1631, low-level | ng/L |
| | | |
| | **Organics Parameters:** | |
| | Acid Herbicides | |
| | Organochlorine Pesticides | |
| | Organonitrogen Pesticides | |
| | Organophosphorus Pesticides | |
| | PCBs (polychlorinated biphenyls) | |
| | | |
| | Semi-Volatile Organics (BNAs) | |
| | TPH Diesel Range | |
| | | |
| | Volatile Organics (VOA) | |
| | | |
| | TPH Gasoline Range | |
| | | |
| | **Biological:** | |
| | Phytoplankton / Algae | |
| | | |

**LAB COMMENTS :**

| Field Parameters (optional): | Water Temp (°C): | | pH (s.u.): | | Dissolved Oxygen (ppm): | | Conductivity (umhos/cm): | | Salinity (ppt): | |
|---|---|---|---|---|---|---|---|---|---|---|

Revision: 2/06/2015

N O R T H C A R O L I N A

nc department of health and human services

# Private Well Information and Use Recommendations

## *For Inorganic Chemical Contaminants*

County: Haywood Name: Bill Thompson

Sample ID #: AC25023 Reviewer: [illegible]

### TEST RESULTS AND USE RECOMMENDATIONS

1. ☐ Your well water meets federal drinking water standards ***for inorganic chemicals***. Your water can be used for drinking, cooking, washing, cleaning, bathing, and showering based on the ***inorganic chemical results only***. You may have other water sampling results that are not taken into account in this report.

2. ☒ The following substance(s) exceeded federal drinking water standards or the North Carolina 2L calculated health levels. The North Carolina Division of Public Health recommends that your well water not be used for drinking and cooking, unless you install a water treatment system to remove the circled substance(s). However, it may be used for washing, cleaning, bathing and showering based on the ***inorganic chemical results only***.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Arsenic | Barium | Cadmium | Chromium | Copper | Fluoride | Lead | Iron | |
| Manganese | Mercury | Nitrate/Nitrite | Selenium | Silver | Magnesium | Zinc | pH | |

3. ☒ a. Sodium levels exceed the U.S. Environmental Protection Agency's (USEPA) Health Advisory level for sodium of 20 mg/l. The North Carolina Division of Public Health recommends that only individuals on no or low sodium restricted diets not use this water for drinking or cooking. It may be used for washing, cleaning, bathing, and showering based on the ***inorganic chemical results only***.

☒ b. Levels over 30 mg/l may pose aesthetic problems such as bad taste, odor, staining of porcelain, etc.

4. ☒ Re-sampling is recommended in ___/___ months.

5. ☒ Re-sample for lead and /or copper. Take a first draw, 5 minute, and 15 minute sample inside the house (preferably the kitchen) and if possible a first draw, 5 minute and a 15 minute sample at the well head to determine the source of the lead and/or copper.

6. ☐ The following substance(s) exceeded federal drinking water standards. Your water can be used for drinking, cooking, washing, cleaning, bathing, and showering based on the ***inorganic chemical results only***, but aesthetic problems such as bad taste, odor, staining of porcelain, etc. may occur. You may want to install a household water treatment system to address aesthetic problems.

| | | | | | |
|---|---|---|---|---|---|
| Barium | Cadmium | Chromium | Fluoride | Iron | Magnesium |
| Manganese | Selenium | Silver | pH | Zinc | |

***For more information regarding your well water results, please call the North Carolina Division of Public Health at 919-707-5900.***

Water Resources
ENVIRONMENTAL QUALITY

PAT MCCRORY
*Governor*

DONALD R. VAN DER VAART
*Secretary*

S. JAY ZIMMERMAN
*Director*

January 29, 2016

Ruffin Shackelford
2514 Fie Top Road
Maggie Valley, NC 28751

RE: Sample ID: **AC25022**
Sample Location Address: **3062 Fie Top Road**
Haywood County

Dear Mr. Shackelford,

Please find attached the analytical results for a water sample collected from an active groundwater spring on December 8, 2015. A water sample was collected because of an ongoing groundwater investigation along a portion of Fie Top Road. More specifically, a sample was collected from your spring to determine the background quality of groundwater in the shallow subsurface. Your water sample was analyzed for chloride, sulfate, and various metals.

The following table summarizes the attached analytical results for samples collected on **December 8, 2015**. The results are shown in units of micrograms of contaminate per liter of water (ug/l) and are approximately equivalent to parts per billion (ppb).

| Analytes | USEPA Maximum Contaminate Level | | NC Groundwater Standard | | Concentration Detected In Your Drinking Water | |
|---|---|---|---|---|---|---|
| | Concentration | Units | Concentration | Units | Concentration | Units |
| Calcium | | | | | 1,500 | ppb |
| Magnesium | | | | | 300 | ppb |
| Potassium | | | | | 390 | ppb |
| Sodium | | | | | 1,400 | ppb |
| Strontium | | | | | 21 | ppb |

The metals that are present do not exceed any applicable standard and are fairly typical for groundwater quality in western North Carolina. A Health Risk Evaluation (HRE) was not performed because this water source is not used for drinking water.

Please be aware that the groundwater investigation has transitioned to the North Carolina Division of Waste Management's Inactive Hazardous Sites Branch, which has jurisdiction over this type of groundwater contamination. The new project manager is Catherine Jacobs. Her contact information is given below:

**North Carolina Department of Environmental Quality**
**Division of Waste Management, Superfund Section**
**Winston-Salem Regional Office**
**450 West Hanes Mill Road, Suite 300**
**Winston-Salem, NC 27105**

**Direct: (336) 776-9677**
**Fax: (336) 776-9797**
**catherine.jacobs@ncdenr.gov**

If you have questions concerning the Health Risk Evaluation, please contact Dr. Ken Rudo at (919) 707-5911. If you have any additional questions or concerns, please contact me at (828) 296-4681 or brett.laverty@ncdenr.gov.

Sincerely,

Brett Laverty
Water Quality Regional Operations
Asheville Regional Office

Attachment: DWR laboratory analytical results

cc: file
Haywood County Health Department w/ attachments
Catherine Jacobs – NC Division of Waste Management, Superfund Section

AC25022

# NC DWR Water Sciences Section-Chemistry Laboratory Results

| | | | |
|---|---|---|---|
| County: | Haywood | Sample ID: | AC25022 |
| River Basin | | PO Number # | 15G0311 |
| Report To | ARO | Date Received: | 12/10/2015 |
| Collector: | B LAVERTY | Time Received: | 08:50 |
| Region: | ARO | Labworks LoginID | MSWIFT |
| Sample Matrix: | GROUNDWATER | Final Report Date: | 12/31/15 |
| Loc. Type: | Water Supply | Report Print Date: | 01/07/2016 |
| Emergency Yes/No | | | |
| COC Yes/No | | | |

DWR Division of Water Resources

**Final Report**

VisitID

Loc. Descr.: RUFFIN SHACKLEFORD-3062 FIE TOP ROAD MAGGIE VALLEY, NC

| Location ID: | IC443062FIETOP | Collect Date: | 12/08/2015 | Collect Time: | 13:56 | Sample Depth |
|---|---|---|---|---|---|---|

***If this report is labeled preliminary report, the results have not been validated. Do not use for Regulatory purposes.***

| CAS # | Analyte Name | PQL | Result/ Qualifier | Units | Method Reference | Analysis Date | Validated by |
|---|---|---|---|---|---|---|---|
| **LAB** | | | | | | | |
| | Sample temperature at receipt by lab | | 1.4 | °C | | 12/10/15 | MSWIFT |
| **WET** | | | | | | | |
| | Ion Chromatography | | _TITLE_ | mg/L | EPA 300.0 rev2.1 | 12/10/15 | CGREEN |
| | Fluoride | 0.4 | 0.4 U | mg/L | EPA 300.0 rev2.1 | 12/10/15 | CGREEN |
| | Chloride | 1.0 | 1.0 U | mg/L | EPA 300.0 rev2.1 | 12/10/15 | CGREEN |
| | Bromide | 0.4 | 0.4 U | mg/L | EPA 300.0 rev2.1 | 12/10/15 | CGREEN |
| | Sulfate | 2.0 | 2.0 U | mg/L | EPA 300.0 rev2.1 | 12/10/15 | CGREEN |
| **MET** | | | | | | | |
| 7440-22-4 | Ag by ICPMS | 1.0 | 1.0 U | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7429-90-5 | Al by ICP | 50 | 50 U | ug/L | EPA 200.7 | 12/21/15 | ESTAFFORD1 |
| 7440-38-2 | As by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7440-38-3 | Ba by ICP | 10 | 10 U | ug/L | EPA 200.7 | 12/18/15 | ESTAFFORD1 |
| 7440-70-2 | Ca by ICP | 0.10 | 1.5 | mg/L | EPA 200.7 | 12/18/15 | ESTAFFORD1 |
| 7440-43-9 | Cd by ICPMS | 0.50 | 0.50 U | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7440-47-3 | Cr by ICPMS | 5.0 | 5.0 U | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7440-50-8 | Cu by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7439-89-6 | Fe by ICP | 50 | 50 U | ug/L | EPA 200.7 | 12/21/15 | ESTAFFORD1 |
| 7439-97-6 | Hg 245.1 | 0.2 | 0.20 U | ug/L | EPA 245.1 | 12/15/15 | ESTAFFORD1 |
| 7440-09-7 | K by ICP | 0.10 | 0.39 | mg/L | EPA 200.7 | 12/18/15 | ESTAFFORD1 |
| 7439-95-4 | Mg by ICP | 0.10 | 0.30 | mg/L | EPA 200.7 | 12/18/15 | ESTAFFORD1 |
| 7439-96-5 | Mn by ICP | 10 | 10 U | ug/L | EPA 200.7 | 12/21/15 | ESTAFFORD1 |
| 7440-23-5 | Na by ICP | 0.10 | 1.4 | mg/L | EPA 200.7 | 12/18/15 | ESTAFFORD1 |
| 7440-02-0 | Ni by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7439-92-1 | Pb by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7782-49-2 | Se by ICPMS | 1.0 | 1.0 U | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7440-24-6 | Sr by ICPMS | 10 | 21 | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |
| 7440-66-6 | Zn by ICPMS | 10 | 10 U | ug/L | EPA 200.8 | 12/18/15 | ESTAFFORD1 |

North Carolina Division of Water Resources
**Central Laboratory** (Water Sciences Section)

# Water Sample Collection & Submittal Form

| | |
|---|---|
| Visit ID: (optional) | |
| Tag ID | 1 |

| | | | |
|---|---|---|---|
| Location Description: | Ruffin Shackelford - 3062 Fie Top Road Maggie Valley, NC | Location Code: | 1C443062FIETOP |
| County: | Haywood | Collector: | Brett Laverty |
| DWR Region: (based on county) | Asheville | DWR Office: (or agency name) | WQ Regional Operatior |
| River Basin: | | Date: | 12/8/2015 |
| Notes: | | Time: | 1:56 PM |
| ☐ Chlorinated ☐ De-chlorinated in Field | | Sampling Method: | ☑ Grab ☐ Composite ☐ Other: |
| ☐ Filtered in Field | Dissolved analysis: Enter "DIS" in check-boxes for parameters | Sample Depth: | |

**Priority:** ☐ Ambient ☑ Routine ☐ Compliance ☐ COC ☐ Emergency ☐ QA

**Water Matrix:** ☐ Surface ☑ Ground ☐ Waste ☐ Blank ☐ Solution

**Location Type:** ☐ River/Stream ☐ Lake ☐ Estuary ☐ Canal ☐ Stormwater ☐ Monitoring Well ☑ Water Supply ☐ Effluent ☐ Influent ☐ Field Blank ☐ Filter Blank ☐ Trip Blank ☐ Other:

**Lab Use Only:**

| | |
|---|---|
| Laboratory Sample Number: | |
| Date Received: | |
| Time Received: | |
| Received By: | |
| Delivery Method: | ☐ State Courier ☐ Hand Delivery ☐ Other: |
| Temperature (°C) on Arrival: | |

**Collector's Comments:**

| | Microbiology Parameters: | |
|---|---|---|
| | Acidity, as CaCO3, to pH 4.5/8.3 | mg/L |
| | Alkalinity, as CaCO3, to pH 4.5/8.3 | mg/L |
| | BOD: Biochemical Oxygen Demand, 5-day | mg/L |
| | cBOD: Carbonaceous BOD, 5-day | mg/L |
| | Coliform: Fecal MF | /100ml |
| | Coliform: Total MF | /100ml |
| | Coliform: Tube Fecal | /100ml |
| | Coliform: Tube Total | /100ml |
| | Specific Conductance, at 25°C | umhos/cm |
| | TOC - Total Organic Carbon | mg/L |
| | Turbidity | NTU |
| | | |
| | **Wet Chemistry Parameters:** | |
| | Bromide | mg/L |
| X | Chloride | mg/L |
| | Fluoride | mg/L |
| X | Sulfate | mg/L |
| | Chlorophyll a | µg/L |
| | Color: ADMI | c.u. |
| | Color: Platinum Cobalt | c.u. |
| | COD: Chemical Oxygen Demand | mg/L |
| | Cyanide, Total | mg/L |
| | Formaldehyde | mg/L |
| | Hexavalent Chromium (Cr6+) | mg/L |

| | | |
|---|---|---|
| | MBAS (surfactants) | mg/L |
| | Oil and Grease, HEM, Total Recoverable | mg/L |
| | Phenols, Total Recoverable | µg/L |
| | Residue: Total (*Total Solids*) | mg/L |
| | Residue: Volatile/Fixed, Total | mg/L |
| | Residue: Suspended (*Suspended Solids*) | mg/L |
| | Residue: Volatile/Fixed, Suspended | mg/L |
| | TDS - Total Dissolved Solids | mg/L |
| | Silica | mg/L |
| | Sulfide | mg/L |
| | Tannin & Lignin | mg/L |
| | | |
| | **Other Parameters:** | |
| | pH | s.u. |
| | Hardness, Total as CaCO3 - by titration | mg/L |
| | | |
| | | |
| | **Nutrients Parameters:** | |
| | Ammonia as N (NH3-N) | mg/L |
| | Nitrate-Nitrite as N (NO3+NO2-N) | mg/L |
| | Total Kjeldahl Nitrogen as N (TKN) | mg/L |
| | Total Phosphorus as P (TP) | mg/L |
| | Nitrite as N (NO2-N) | mg/L |
| | Nitrate as N (NO3-N calculated) | mg/L |
| | Orthophosphate as P (PO4) | mg/L |

| | Metals Parameters: | |
|---|---|---|
| X | Aluminum (Al) | µg/L |
| | Antimony (Sb) | µg/L |
| X | Arsenic (As) | µg/L |
| X | Barium (Ba) | µg/L |
| | Beryllium (Be) | µg/L |
| X | Cadmium (Cd) | µg/L |
| X | Calcium (Ca) | mg/L |
| X | Chromium (Cr), Total | µg/L |
| | Cobalt (Co) | µg/L |
| X | Copper (Cu) | µg/L |
| X | Iron (Fe) | µg/L |
| X | Lead (Pb) | µg/L |
| | Lithium (Li) | µg/L |
| X | Magnesium (Mg) | mg/L |
| X | Manganese (Mn) | µg/L |
| X | Mercury (Hg) | µg/L |
| | Molybdenum (Mo) | µg/L |
| X | Nickel (Ni) | µg/L |
| X | Potassium (K) | mg/L |
| X | Selenium (Se) | µg/L |
| X | Silver (Ag) | µg/L |
| X | Sodium (Na) | mg/L |
| X | Strontium (Sr) | µg/L |
| | Thallium (Tl) | µg/L |

| | | |
|---|---|---|
| | Tin (Sn) | µg/L |
| | Titanium (Ti) | µg/L |
| | Vanadium (V) | µg/L |
| X | Zinc (Zn) | µg/L |
| | | |
| | Boron (B), Total | µg/L |
| | Mercury 1631, low-level | ng/L |
| | | |
| | **Organics Parameters:** | |
| | Acid Herbicides | |
| | Organochlorine Pesticides | |
| | Organonitrogen Pesticides | |
| | Organophosphorus Pesticides | |
| | PCBs (polychlorinated biphenyls) | |
| | | |
| | Semi-Volatile Organics (BNAs) | |
| | TPH Diesel Range | |
| | | |
| | Volatile Organics (VOA) | |
| | | |
| | TPH Gasoline Range | |
| | | |
| | **Biological:** | |
| | Phytoplankton / Algae | |
| | | |

**LAB COMMENTS :**

| | | | | | |
|---|---|---|---|---|---|
| Field Parameters (optional): | Water Temp (°C): | pH (s.u.): | Dissolved Oxygen (ppm): | Conductivity (µmhos/cm): | Salinity (ppt): |

Revision: 2/06/2015

Water Resources
ENVIRONMENTAL QUALITY

PAT MCCRORY
*Governor*

DONALD R. VAN DER VAART
*Secretary*

S. JAY ZIMMERMAN
*Director*

January 29, 2016

Ruffin Shackelford
2514 Fie Top Road
Maggie Valley, NC 28751

RE: Sample ID: **AC23843 and AC24436**
Sample Location Address: **3062 Fie Top Road**
Haywood County

Dear Mr. Shackelford,

Please find attached the analytical results for water samples collected from your water supply well at the address referenced above, on October 28, 2015 and November 16, 2015. Water samples were collected because of an ongoing groundwater investigation along a portion of Fie Top Road. Your water samples were analyzed for chloride, sulfate, and various metals.

The following table summarizes the attached analytical results for samples collected on **October 28, 2015**. Please note that the **bolded** values indicate levels **above** the NC Groundwater Standard, 15A NCAC 2L .0202. The results are shown in units of micrograms of contaminate per liter of water (ug/l) and are approximately equivalent to parts per billion (ppb).

| Analytes | USEPA Maximum Contaminate Level | | NC Groundwater Standard | | Concentration Detected In Your Drinking Water | |
|---|---|---|---|---|---|---|
| | Concentration | Units | Concentration | Units | Concentration | Units |
| Aluminum | | | | | 97 | ppb |
| Barium | 2,000 | ppb | 700 | ppb | 230 | ppb |
| Calcium | | | | | 360,000 | ppb |
| **Chloride** | | | **250,000** | **ppb** | **960,000** | **ppb** |
| Copper | 1,300 | ppb | 1,000 | ppb | 6.4 | ppb |
| Iron | | | 300 | ppb | 160 | ppb |
| Magnesium | | | | | 67,000 | ppb |
| Potassium | | | | | 6,100 | ppb |
| Sodium | | | | | 160,000 | ppb |
| Strontium | | | | | 2,300 | ppb |
| Sulfate | | | 250,000 | ppb | 2,700 | ppb |
| Zinc | | | 1,000 | ppb | 14 | ppb |

The following table summarizes the attached analytical results for samples collected on **November 16, 2015**. Please note that the **bolded** values indicate levels **above** the NC Groundwater Standard, 15A NCAC 2L .0202. The results are shown in units of micrograms of contaminate per liter of water (ug/l) and are approximately equivalent to parts per billion (ppb).

| Analytes | USEPA Maximum Contaminate Level | | NC Groundwater Standard | | Concentration Detected In Your Drinking Water | |
|---|---|---|---|---|---|---|
| | Concentration | Units | Concentration | Units | Concentration | Units |
| Aluminum | | | | | 55 | ppb |
| Barium | 2,000 | ppb | 700 | ppb | 210 | ppb |
| Calcium | | | | | 330,000 | ppb |
| **Chloride** | | | **250,000** | **ppb** | **930,000** | **ppb** |
| Copper | 1,300 | ppb | 1,000 | ppb | 6.7 | ppb |
| Iron | | | 300 | ppb | 95 | ppb |
| Magnesium | | | | | 64,000 | ppb |
| Potassium | | | | | 5,800 | ppb |
| Sodium | | | | | 160,000 | ppb |
| Strontium | | | | | 2,100 | ppb |
| Sulfate | | | 250,000 | ppb | 2,300 | ppb |
| Zinc | | | 1,000 | ppb | 16 | ppb |

Chloride concentrations are above the applicable standard. Sodium concentrations exceed the North Carolina public health goals. Sulfate and the remaining metals are below the applicable standards and are fairly typical for groundwater quality in western North Carolina. Because elevated chloride and sodium concentrations are present in your drinking water, a Health Risk Evaluation (HRE) of the water supply well was performed by toxicologist Dr. Ken Rudo with the North Carolina Department of Health and Human Services. The HRE, which is enclosed, makes specific recommendations for your water based on these results.

Please be aware that the groundwater investigation has transitioned to the North Carolina Division of Waste Management's Inactive Hazardous Sites Branch, which has jurisdiction over this type of groundwater contamination. The new project manager is Catherine Jacobs. Her contact information is given below:

**North Carolina Department of Environmental Quality**
**Division of Waste Management, Superfund Section**
**Winston-Salem Regional Office**
**450 West Hanes Mill Road, Suite 300**
**Winston-Salem, NC 27105**

**Direct: (336) 776-9677**
**Fax: (336) 776-9797**
**catherine.jacobs@ncdenr.gov**

If you have questions concerning the Health Risk Evaluation, please contact Dr. Ken Rudo at (919) 707-5911. If you have any additional questions or concerns, please contact me at (828) 296-4681 or brett.laverty@ncdenr.gov.

Sincerely,

Brett Laverty
Water Quality Regional Operations
Asheville Regional Office

Attachment: Health Risk Evaluation by Dr. Rudo
DWR laboratory analytical results

cc: file
Haywood County Health Department w/ attachments
Catherine Jacobs – NC Division of Waste Management, Superfund Section

# NC DWR Water Sciences Section-Chemistry Laboratory Results

| | | | |
|---|---|---|---|
| County: | Haywood | Sample ID: | AC23843 |
| River Basin | | PO Number # | 15G0304 |
| Report To | ARO | Date Received: | 10/30/2015 |
| Collector: | B LAVERTY | Time Received: | 09:00 |
| Region: | ARO | Labworks LoginID | MSWIFT |
| Sample Matrix: | GROUNDWATER | Final Report Date: | 1/4/16 |
| Loc. Type: | Water Supply | Report Print Date: | 01/07/2016 |
| Emergency Yes/No | | | |
| COC Yes/No | | | |

DWR Division of Water Resources

**Final Report**

VisitID 1

Loc. Descr.: RUFFIN SHACKELFORD-3062 FIE TOP ROAD MAGGIE VALLEY, NC

| Location ID: | 1C443062FIETOP | Collect Date: | 10/28/2015 | Collect Time: | 12:53 | Sample Depth |
|---|---|---|---|---|---|---|

***If this report is labeled preliminary report, the results have not been validated. Do not use for Regulatory purposes.***

| CAS # | Analyte Name | PQL | Result/ Qualifier | Units | Method Reference | Analysis Date | Validated by |
|---|---|---|---|---|---|---|---|
| **LAB** | | | | | | | |
| | Sample temperature at receipt by lab | | 1.4 | °C | | 10/30/15 | MSWIFT |
| **WET** | | | | | | | |
| | Ion Chromatography | | _TITLE_ | mg/L | EPA 300.0 rev2.1 | 11/5/15 | CGREEN |
| | Fluoride | 0.4 | 0.4 U | mg/L | EPA 300.0 rev2.1 | 11/5/15 | CGREEN |
| | Chloride | 1.0 | 960 | mg/L | EPA 300.0 rev2.1 | 11/5/15 | CGREEN |
| | Bromide | 0.4 | 0.8 U,P | mg/L | EPA 300.0 rev2.1 | 11/5/15 | CGREEN |
| | Sulfate | 2.0 | 2.7 | mg/L | EPA 300.0 rev2.1 | 11/5/15 | CGREEN |
| **MET** | | | | | | | |
| 7440-22-4 | Ag by ICPMS | 1.0 | 1.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7429-90-5 | Al by ICP | 50 | 97 | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-38-2 | As by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7429-90-5 | B by ICP | 50 | 50 U | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-38-3 | Ba by ICP | 10 | 230 | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-70-2 | Ca by ICP | 0.10 | 360 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-43-9 | Cd by ICPMS | 0.50 | 0.50 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-47-3 | Cr by ICPMS | 5.0 | 5.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-50-8 | Cu by ICPMS | 2.0 | 6.4 | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7439-89-6 | Fe by ICP | 50 | 160 | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7439-97-6 | Hg 245.1 | 0.2 | 0.20 U | ug/L | EPA 245.1 | 11/4/15 | ESTAFFORD1 |
| 7440-09-7 | K by ICP | 0.10 | 6.1 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7439-95-4 | Mg by ICP | 0.10 | 67 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7439-96-5 | Mn by ICP | 10 | 10 U | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-23-5 | Na by ICP | 0.10 | 160 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-02-0 | Ni by furnace | 2.0 | 2.0 U | ug/L | EPA 200.9 | 12/29/15 | ESTAFFORD1 |
| 7439-92-1 | Pb by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7782-49-2 | Se by ICPMS | 1.0 | 1.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-24-6 | Sr by ICPMS | 10 | 2300 | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-66-6 | Zn by ICPMS | 10 | 14 | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |

*NC DWR Laboratory Section Results*

| Location ID: | 1C443062FIETOP | Sample ID: | AC23843 | Collect Date: | 10/28/2015 | Collect Time:: | 12:53 |
|---|---|---|---|---|---|---|---|

**MET**

| CAS # | Analyte Name | PQL | Result/ Qualifier | Units | Method Reference | Analysis Date | Validated by |
|---|---|---|---|---|---|---|---|

Sample Comments

WET: Bromide: adjusted PQL; used 1:2 sample dilution.

North Carolina Division of Water Resources
**Central Laboratory** (Water Sciences Section)

# Water Sample Collection & Submittal Form

| | |
|---|---|
| Visit ID: (optional) | 1 |
| Tag ID | |

| | | | |
|---|---|---|---|
| Location Description: | Ruffin Shackelford - 3062 Fie Top Road Maggie Valley, NC | Location Code: | 1C443062FIETOP |
| County: | Haywood | Collector: | Brett Laverty |
| DWR Region: (based on county) | Asheville | DWR Office: (or agency name) | WQ Regional Operation |
| River Basin: | | Date: | 10/28/2015 |
| Notes: | | Time: | 12:53 PM |
| ☐ Chlorinated ☐ De-chlorinated in Field | | Sampling Method: | ☑ Grab ☐ Composite ☐ Other: |
| ☐ Filtered in Field | Dissolved analysis: Enter "DIS" in check-boxes for parameters | Sample Depth: | |

**Priority:** ☐ Ambient ☑ Routine ☐ Compliance ☐ COC ☐ Emergency ☐ QA

**Water Matrix:** ☐ Surface ☑ Ground ☐ Waste ☐ Blank ☐ Solution

**Location Type:** ☐ River/Stream ☐ Lake ☐ Estuary ☐ Canal ☐ Stormwater ☐ Monitoring Well ☑ Water Supply ☐ Effluent ☐ Influent ☐ Field Blank ☐ Filter Blank ☐ Trip Blank ☐ Other:

**Lab Use Only:**

| | |
|---|---|
| Laboratory Sample Number: | |
| Date Received: | |
| Time Received: | |
| Received By: | |
| Delivery Method: | ☐ State Courier ☐ Hand Delivery ☐ Other: |
| Temperature (°C) on Arrival: | |

**Collector's Comments:**

| | Microbiology Parameters: | |
|---|---|---|
| | Acidity, as CaCO3, to pH 4.5/8.3 | mg/L |
| | Alkalinity, as CaCO3, to pH 4.5/8.3 | mg/L |
| | BOD: Biochemical Oxygen Demand, 5-day | mg/L |
| | cBOD: Carbonaceous BOD, 5-day | mg/L |
| | Coliform: Fecal MF | /100ml |
| | Coliform: Total MF | /100ml |
| | Coliform: Tube Fecal | /100ml |
| | Coliform: Tube Total | /100ml |
| | Specific Conductance, at 25°C | umhos/cm |
| | TOC - Total Organic Carbon | mg/L |
| | Turbidity | NTU |
| | | |
| | **Wet Chemistry Parameters:** | |
| | Bromide | mg/L |
| X | Chloride | mg/L |
| | Fluoride | mg/L |
| X | Sulfate | mg/L |
| | Chlorophyll a | µg/L |
| | Color: ADMI | c.u. |
| | Color: Platinum Cobalt | c.u. |
| | COD: Chemical Oxygen Demand | mg/L |
| | Cyanide, Total | mg/L |
| | Formaldehyde | mg/L |
| | Hexavalent Chromium (Cr6+) | mg/L |

| | | |
|---|---|---|
| | MBAS (surfactants) | mg/L |
| | Oil and Grease, HEM, Total Recoverable | mg/L |
| | Phenols, Total Recoverable | µg/L |
| | Residue: Total (*Total Solids*) | mg/L |
| | Residue: Volatile/Fixed, Total | mg/L |
| | Residue: Suspended (*Suspended Solids*) | mg/L |
| | Residue: Volatile/Fixed, Suspended | mg/L |
| | TDS - Total Dissolved Solids | mg/L |
| | Silica | mg/L |
| | Sulfide | mg/L |
| | Tannin & Lignin | mg/L |
| | | |
| | **Other Parameters:** | |
| | pH | s.u. |
| | Hardness, Total as CaCO3 - by titration | mg/L |
| | | |
| | | |
| | **Nutrients Parameters:** | |
| | Ammonia as N (NH3-N) | mg/L |
| | Nitrate-Nitrite as N (NO3+NO2-N) | mg/L |
| | Total Kjeldahl Nitrogen as N (TKN) | mg/L |
| | Total Phosphorus as P (TP) | mg/L |
| | Nitrite as N (NO2-N) | mg/L |
| | Nitrate as N (NO3-N calculated) | mg/L |
| | Orthophosphate as P (PO4) | mg/L |

| | | |
|---|---|---|
| | **Metals Parameters:** | |
| X | Aluminum (Al) | µg/L |
| | Antimony (Sb) | µg/L |
| X | Arsenic (As) | µg/L |
| X | Barium (Ba) | µg/L |
| | Beryllium (Be) | µg/L |
| X | Cadmium (Cd) | µg/L |
| X | Calcium (Ca) | mg/L |
| X | Chromium (Cr), Total | µg/L |
| | Cobalt (Co) | µg/L |
| X | Copper (Cu) | µg/L |
| X | Iron (Fe) | µg/L |
| X | Lead (Pb) | µg/L |
| | Lithium (Li) | µg/L |
| X | Magnesium (Mg) | mg/L |
| X | Manganese (Mn) | µg/L |
| X | Mercury (Hg) | µg/L |
| | Molybdenum (Mo) | µg/L |
| X | Nickel (Ni) | µg/L |
| X | Potassium (K) | mg/L |
| X | Selenium (Se) | µg/L |
| X | Silver (Ag) | µg/L |
| X | Sodium (Na) | mg/L |
| X | Strontium (Sr) | µg/L |
| | Thallium (Tl) | µg/L |

| | | |
|---|---|---|
| | Tin (Sn) | µg/L |
| | Titanium (Ti) | µg/L |
| | Vanadium (V) | µg/L |
| X | Zinc (Zn) | µg/L |
| | | |
| X | Boron (B), Total | µg/L |
| | Mercury 1631, low-level | ng/L |
| | | |
| | **Organics Parameters:** | |
| | Acid Herbicides | |
| | Organochlorine Pesticides | |
| | Organonitrogen Pesticides | |
| | Organophosphorus Pesticides | |
| | PCBs (polychlorinated biphenyls) | |
| | | |
| | Semi-Volatile Organics (BNAs) | |
| | TPH Diesel Range | |
| | | |
| | Volatile Organics (VOA) | |
| | | |
| | TPH Gasoline Range | |
| | | |
| | **Biological:** | |
| | Phytoplankton / Algae | |
| | | |

**LAB COMMENTS :**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Field Parameters (optional): | Water Temp (°C): | | pH (s.u.): | | Dissolved Oxygen (ppm): | | Conductivity (umhos/cm): | | Salinity (ppt): | |

Revision: 2/06/2015

# NC DWR Water Sciences Section-Chemistry Laboratory Results

County:
River Basin
Report To ARO

Collector: B LAVERTY
Region: ARO
Sample Matrix: SURFACEWATER
Loc. Type:
Emergency Yes/No
COC Yes/No

DWR
Division of Water Resources

**Final Report**

VisitID 3062 FIE TOP ROAD

Loc. Descr.: NO LOCATION CODE

Sample ID: AC24436
PO Number # 15W7376
Date Received: 11/18/2015
Time Received: 08:40
Labworks LoginID TASCENZO1
Final Report Date: 1/4/16
Report Print Date: 01/07/2016

| Location ID: | 1C443062FIETOP | Collect Date: | 11/17/2015 | Collect Time: | 12:21 | Sample Depth |
|---|---|---|---|---|---|---|

***If this report is labeled preliminary report, the results have not been validated. Do not use for Regulatory purposes.***

| CAS # | Analyte Name | PQL | Result/ Qualifier | Units | Method Reference | Analysis Date | Validated by |
|---|---|---|---|---|---|---|---|
| **LAB** | | | | | | | |
| | Sample temperature at receipt by lab | | 2.6 | °C | | 11/18/15 | MSWIFT |
| **WET** | | | | | | | |
| | Ion Chromatography | | _TITLE_ | mg/L | EPA 300.0 rev2.1 | 11/18/15 | CGREEN |
| | Fluoride | 0.4 | 0.4 U | mg/L | EPA 300.0 rev2.1 | 11/18/15 | CGREEN |
| | Chloride | 1.0 | 930 | mg/L | EPA 300.0 rev2.1 | 11/18/15 | CGREEN |
| | Bromide | 0.4 | 4.0 U,P | mg/L | EPA 300.0 rev2.1 | 11/18/15 | CGREEN |
| | Sulfate | 2.0 | 2.3 | mg/L | EPA 300.0 rev2.1 | 11/18/15 | CGREEN |
| **MET** | | | | | | | |
| 7440-22-4 | Ag by ICPMS | 1.0 | 1.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7429-90-5 | Al by ICP | 50 | 55 | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-38-2 | As by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-38-3 | Ba by ICP | 10 | 210 | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-70-2 | Ca by ICP | 0.10 | 330 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-43-9 | Cd by ICPMS | 0.50 | 0.50 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-47-3 | Cr by ICPMS | 5.0 | 5.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-50-8 | Cu by ICPMS | 2.0 | 6.7 | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7439-89-6 | Fe by ICP | 50 | 95 | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7439-97-6 | Hg 245.1 | 0.2 | 0.20 U | ug/L | EPA 245.1 | 12/10/15 | ESTAFFORD1 |
| 7440-09-7 | K by ICP | 0.10 | 5.8 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7439-95-4 | Mg by ICP | 0.10 | 64 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7439-96-5 | Mn by ICP | 10 | 10 U | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-23-5 | Na by ICP | 0.10 | 160 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-02-0 | Ni by furnace | 2.0 | 2.0 U | ug/L | EPA 200.9 | 12/29/15 | ESTAFFORD1 |
| 7439-92-1 | Pb by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7782-49-2 | Se by ICPMS | 1.0 | 1.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-24-6 | Sr by ICPMS | 10 | 2100 | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-66-6 | Zn by ICPMS | 10 | 16 | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |

*NC DWR Laboratory Section Results*

| Location ID: | 1C443062FIETOP | Sample ID: | AC24436 | Collect Date: | 11/17/2015 | Collect Time:: | 12:21 |
|---|---|---|---|---|---|---|---|

**MET**

| CAS # | Analyte Name | PQL | Result/ Qualifier | Units | Method Reference | Analysis Date | Validated by |
|---|---|---|---|---|---|---|---|

Sample Comments

WET: Br-P-adjusted PQL; used dilution due to interference from high chloride.

North Carolina Division of Water Resources
**Central Laboratory** (Water Sciences Section)

# Water Sample Collection & Submittal Form

| | |
|---|---|
| Visit ID: (optional) | 2 |
| Tag ID | |

| | | | |
|---|---|---|---|
| Location Description: | Ruffin Shackelford - 3062 Fie Top Road Maggie Valley, NC | Location Code: | 1C443062FIETOP |
| County: | Haywood | Collector: | Brett Laverty |
| DWR Region: (based on county) | Asheville | DWR Office: (or agency name) | WQ Regional Operation |
| River Basin: | | Date: | 11/16/2015 |
| Notes: | | Time: | 12:21 PM |
| ☐ Chlorinated ☐ De-chlorinated in Field | | Sampling Method: | ☑ Grab ☐ Composite ☐ Other: |
| ☐ Filtered in Field | Dissolved analysis: Enter "DIS" in check-boxes for parameters | Sample Depth: | |

**Priority:** ☐ Ambient ☑ Routine ☐ Compliance ☐ COC ☐ Emergency ☐ QA

**Water Matrix:** ☐ Surface ☑ Ground ☐ Waste ☐ Blank ☐ Solution

**Location Type:** ☐ River/Stream ☐ Lake ☐ Estuary ☐ Canal ☐ Stormwater ☐ Monitoring Well ☑ Water Supply ☐ Effluent ☐ Influent ☐ Field Blank ☐ Filter Blank ☐ Trip Blank ☐ Other:

**Lab Use Only:**

| | |
|---|---|
| Laboratory Sample Number: | |
| Date Received: | |
| Time Received: | |
| Received By: | |
| Delivery Method: | ☐ State Courier ☐ Hand Delivery ☐ Other: |
| Temperature (°C) on Arrival: | |

**Collector's Comments:**

| | Microbiology Parameters: | |
|---|---|---|
| | Acidity, as CaCO3, to pH 4.5/8.3 | mg/L |
| | Alkalinity, as CaCO3, to pH 4.5/8.3 | mg/L |
| | BOD: Biochemical Oxygen Demand, 5-day | mg/L |
| | cBOD: Carbonaceous BOD, 5-day | mg/L |
| | Coliform: Fecal MF | /100ml |
| | Coliform: Total MF | /100ml |
| | Coliform: Tube Fecal | /100ml |
| | Coliform: Tube Total | /100ml |
| | Specific Conductance, at 25°C | umhos/cm |
| | TOC - Total Organic Carbon | mg/L |
| | Turbidity | NTU |
| | | |
| | **Wet Chemistry Parameters:** | |
| | Bromide | mg/L |
| X | Chloride | mg/L |
| | Fluoride | mg/L |
| X | Sulfate | mg/L |
| | Chlorophyll a | µg/L |
| | Color: ADMI | c.u. |
| | Color: Platinum Cobalt | c.u. |
| | COD: Chemical Oxygen Demand | mg/L |
| | Cyanide, Total | mg/L |
| | Formaldehyde | mg/L |
| | Hexavalent Chromium (Cr6+) | mg/L |

| | | |
|---|---|---|
| | MBAS (surfactants) | mg/L |
| | Oil and Grease, HEM, Total Recoverable | mg/L |
| | Phenols, Total Recoverable | µg/L |
| | Residue: Total (*Total Solids*) | mg/L |
| | Residue: Volatile/Fixed, Total | mg/L |
| | Residue: Suspended (*Suspended Solids*) | mg/L |
| | Residue: Volatile/Fixed, Suspended | mg/L |
| | TDS - Total Dissolved Solids | mg/L |
| | Silica | mg/L |
| | Sulfide | mg/L |
| | Tannin & Lignin | mg/L |
| | | |
| | **Other Parameters:** | |
| | pH | s.u. |
| | Hardness, Total as CaCO3 - by titration | mg/L |
| | | |
| | | |
| | **Nutrients Parameters:** | |
| | Ammonia as N (NH3-N) | mg/L |
| | Nitrate-Nitrite as N (NO3+NO2-N) | mg/L |
| | Total Kjeldahl Nitrogen as N (TKN) | mg/L |
| | Total Phosphorus as P (TP) | mg/L |
| | Nitrite as N (NO2-N) | mg/L |
| | Nitrate as N (NO3-N calculated) | mg/L |
| | Orthophosphate as P (PO4) | mg/L |

| | | |
|---|---|---|
| | **Metals Parameters:** | |
| X | Aluminum (Al) | µg/L |
| | Antimony (Sb) | µg/L |
| X | Arsenic (As) | µg/L |
| X | Barium (Ba) | µg/L |
| | Beryllium (Be) | µg/L |
| X | Cadmium (Cd) | µg/L |
| X | Calcium (Ca) | mg/L |
| X | Chromium (Cr), Total | µg/L |
| | Cobalt (Co) | µg/L |
| X | Copper (Cu) | µg/L |
| X | Iron (Fe) | µg/L |
| X | Lead (Pb) | µg/L |
| | Lithium (Li) | µg/L |
| X | Magnesium (Mg) | mg/L |
| X | Manganese (Mn) | µg/L |
| X | Mercury (Hg) | µg/L |
| | Molybdenum (Mo) | µg/L |
| X | Nickel (Ni) | µg/L |
| X | Potassium (K) | mg/L |
| X | Selenium (Se) | µg/L |
| X | Silver (Ag) | µg/L |
| X | Sodium (Na) | mg/L |
| X | Strontium (Sr) | µg/L |
| | Thallium (Tl) | µg/L |

| | | |
|---|---|---|
| | Tin (Sn) | µg/L |
| | Titanium (Ti) | µg/L |
| | Vanadium (V) | µg/L |
| X | Zinc (Zn) | µg/L |
| | | |
| | Boron (B), Total | µg/L |
| | Mercury 1631, low-level | ng/L |
| | | |
| | **Organics Parameters:** | |
| | Acid Herbicides | |
| | Organochlorine Pesticides | |
| | Organonitrogen Pesticides | |
| | Organophosphorus Pesticides | |
| | PCBs (polychlorinated biphenyls) | |
| | | |
| | Semi-Volatile Organics (BNAs) | |
| | TPH Diesel Range | |
| | | |
| | Volatile Organics (VOA) | |
| | | |
| | TPH Gasoline Range | |
| | | |
| | **Biological:** | |
| | Phytoplankton / Algae | |
| | | |

**LAB COMMENTS :**

| Field Parameters (optional): | Water Temp (°C): | pH (s.u.): | Dissolved Oxygen (ppm): | Conductivity (µmhos/cm): | Salinity (ppt): |
|---|---|---|---|---|---|
| | | | | | |

Revision: 2/06/2015

N O R T H C A R O L I N A

dhhs
nc department of health and human services

# Private Well Information and Use Recommendations

## *For Inorganic Chemical Contaminants*

County: Haywood

Name: Ruffin Shackelford

Sample ID #: AC23843

Reviewer: Kayn

### TEST RESULTS AND USE RECOMMENDATIONS

1. ☐ Your well water meets federal drinking water standards ***for inorganic chemicals***. Your water can be used for drinking, cooking, washing, cleaning, bathing, and showering based on the ***inorganic chemical results only***. You may have other water sampling results that are not taken into account in this report.

2. ☒ The following substance(s) exceeded federal drinking water standards or the North Carolina 2L calculated health levels. The North Carolina Division of Public Health recommends that your well water not be used for drinking and cooking, unless you install a water treatment system to remove the circled substance(s). However, it may be used for washing, cleaning, bathing and showering based on the ***inorganic chemical results only***.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Arsenic | Barium | Cadmium | Chromium | Copper | Fluoride | Lead | Iron | Sodium |
| Manganese | Mercury | Nitrate/Nitrite | Selenium | Silver | Magnesium | Zinc | pH | |

3. ☒ a. Sodium levels exceed the U.S. Environmental Protection Agency's (USEPA) Health Advisory level for sodium of 20 mg/l. The North Carolina Division of Public Health recommends that only individuals on no or low sodium restricted diets not use this water for drinking or cooking. It may be used for washing, cleaning, bathing, and showering based on the ***inorganic chemical results only***.

☒ b. Levels over 30 mg/l may pose aesthetic problems such as bad taste, odor, staining of porcelain, etc.

4. ☒ Re-sampling is recommended in 1 months. for inorganics

5. ☐ Re-sample for lead and /or copper. Take a first draw, 5 minute, and 15 minute sample inside the house (preferably the kitchen) and if possible a first draw, 5 minute and a 15 minute sample at the well head to determine the source of the lead and/or copper.

6. ☐ The following substance(s) exceeded federal drinking water standards. Your water can be used for drinking, cooking, washing, cleaning, bathing, and showering based on the ***inorganic chemical results only***, but aesthetic problems such as bad taste, odor, staining of porcelain, etc. may occur. You may want to install a household water treatment system to address aesthetic problems.

| | | | | | |
|---|---|---|---|---|---|
| Barium | Cadmium | Chromium | Fluoride | Iron | Magnesium |
| Manganese | Selenium | Silver | pH | Zinc | |

***For more information regarding your well water results, please call the North Carolina Division of Public Health at 919-707-5900.***

Water Resources
ENVIRONMENTAL QUALITY

PAT MCCRORY
*Governor*

DONALD R. VAN DER VAART
*Secretary*

S. JAY ZIMMERMAN
*Director*

January 29, 2016

Jeffery Borick
2654 Fie Top Road
Maggie Valley, NC 28751

RE: Sample ID: **AC24439**
Sample Location Address: **2654 Fie Top Road**
Haywood County

Dear Mr. Borick,

Please find attached the analytical results for a water sample collected from your water supply well at the address above, on November 16, 2015. A water sample was collected because of an ongoing groundwater investigation along a portion of Fie Top Road. Your water sample was analyzed for chloride, sulfate, and various metals.

The following table summarizes the attached analytical results for samples collected on **November 16, 2015**. The results are shown in units of micrograms of contaminate per liter of water (ug/l) and are approximately equivalent to parts per billion (ppb).

| Analytes | USEPA Maximum Contaminate Level | | NC Groundwater Standard | | Concentration Detected In Your Drinking Water | |
|---|---|---|---|---|---|---|
| | Concentration | Units | Concentration | Units | Concentration | Units |
| Aluminum | | | | | 58 | ppb |
| Barium | 2,000 | ppb | 700 | ppb | 15 | ppb |
| Calcium | | | | | 49,000 | ppb |
| Chloride | | | 250,000 | ppb | 110,000 | ppb |
| Copper | 1,300 | ppb | 1,000 | ppb | 6.8 | ppb |
| Magnesium | | | | | 7,000 | ppb |
| Potassium | | | | | 1,700 | ppb |
| Sodium | | | | | 15,000 | ppb |
| Strontium | | | | | 260 | ppb |
| Zinc | | | 1,000 | ppb | 15 | ppb |

The chloride and sodium concentrations do not exceed the applicable standards. The remaining metals are below the applicable standards and are fairly typical for groundwater quality in western North Carolina. Because chloride and sodium concentrations are present in your drinking water, a Health Risk Evaluation (HRE) of the water supply well was performed by toxicologist Dr. Ken Rudo with the North Carolina Department of Health and Human Services. The HRE, which is enclosed, states your drinking water, based on the available results, is safe for all household uses including drinking, cooking, washing, cleaning, bathing, and showering.

Please be aware that the groundwater investigation has transitioned to the North Carolina Division of Waste Management's Inactive Hazardous Sites Branch, which has jurisdiction over this type of groundwater contamination. The new project manager is Catherine Jacobs. Her contact information is given below:

**North Carolina Department of Environmental Quality**
**Division of Waste Management, Superfund Section**
**Winston-Salem Regional Office**
**450 West Hanes Mill Road, Suite 300**
**Winston-Salem, NC 27105**

**Direct: (336) 776-9677**
**Fax: (336) 776-9797**
**catherine.jacobs@ncdenr.gov**

If you have questions concerning the Health Risk Evaluation, please contact Dr. Ken Rudo at (919) 707-5911. If you have any additional questions or concerns, please contact me at (828) 296-4681 or brett.laverty@ncdenr.gov.

Sincerely,

Brett Laverty
Water Quality Regional Operations
Asheville Regional Office

Attachment: Health Risk Evaluation by Dr. Rudo
DWR laboratory analytical results

cc: file
Haywood County Health Department w/ attachments
Catherine Jacobs – NC Division of Waste Management, Superfund Section

AC24439

# NC DWR Water Sciences Section-Chemistry Laboratory Results

County:
River Basin
Report To ARO
Collector: B LAVERTY
Region: ARO
Sample Matrix: SURFACEWATER
Loc. Type:
Emergency Yes/No
COC Yes/No

DWR
Division of Water Resources

**Final Report**

VisitID 2654 FIE TOP RD

Loc. Descr.: NO LOCATION CODE

Sample ID: AC24439
PO Number # 15W7379
Date Received: 11/18/2015
Time Received: 08:40
Labworks LoginID TASCENZO1
Final Report Date: 1/4/16
Report Print Date: 01/07/2016

| Location ID: | 1C442654FIETOP | Collect Date: | 11/17/2015 | Collect Time: | 14:02 | Sample Depth |
|---|---|---|---|---|---|---|

***If this report is labeled preliminary report, the results have not been validated. Do not use for Regulatory purposes.***

| CAS # | Analyte Name | PQL | Result/ Qualifier | Units | Method Reference | Analysis Date | Validated by |
|---|---|---|---|---|---|---|---|
| **LAB** | | | | | | | |
| | Sample temperature at receipt by lab | | 2.6 | °C | | 11/18/15 | MSWIFT |
| **WET** | | | | | | | |
| | Ion Chromatography | | _TITLE_ | mg/L | EPA 300.0 rev2.1 | 11/18/15 | CGREEN |
| | Fluoride | 0.4 | 0.4 U | mg/L | EPA 300.0 rev2.1 | 11/18/15 | CGREEN |
| | Chloride | 1.0 | 110 | mg/L | EPA 300.0 rev2.1 | 11/18/15 | CGREEN |
| | Bromide | 0.4 | 0.4 U | mg/L | EPA 300.0 rev2.1 | 11/18/15 | CGREEN |
| | Sulfate | 2.0 | 2.0 U | mg/L | EPA 300.0 rev2.1 | 11/18/15 | CGREEN |
| **MET** | | | | | | | |
| 7440-22-4 | Ag by ICPMS | 1.0 | 1.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7429-90-5 | Al by ICP | 50 | 58 | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-38-2 | As by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-38-3 | Ba by ICP | 10 | 15 | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-70-2 | Ca by ICP | 0.10 | 49 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-43-9 | Cd by ICPMS | 0.50 | 0.50 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-47-3 | Cr by ICPMS | 5.0 | 5.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-50-8 | Cu by ICPMS | 2.0 | 6.8 | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7439-89-6 | Fe by ICP | 50 | 50 U | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7439-97-6 | Hg 245.1 | 0.2 | 0.20 U | ug/L | EPA 245.1 | 12/10/15 | ESTAFFORD1 |
| 7440-09-7 | K by ICP | 0.10 | 1.7 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7439-95-4 | Mg by ICP | 0.10 | 7.0 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7439-96-5 | Mn by ICP | 10 | 10 U | ug/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-23-5 | Na by ICP | 0.10 | 15 | mg/L | EPA 200.7 | 11/24/15 | ESTAFFORD1 |
| 7440-02-0 | Ni by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7439-92-1 | Pb by ICPMS | 2.0 | 2.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7782-49-2 | Se by ICPMS | 1.0 | 1.0 U | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-24-6 | Sr by ICPMS | 10 | 260 | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |
| 7440-66-6 | Zn by ICPMS | 10 | 15 | ug/L | EPA 200.8 | 11/20/15 | ESTAFFORD1 |

North Carolina Division of Water Resources
**Central Laboratory** (Water Sciences Section)

# Water Sample Collection & Submittal Form

| | |
|---|---|
| Visit ID: (optional) | 5 |
| Tag ID | |

| | | | |
|---|---|---|---|
| Location Description: | Donna Borick - 2654 Fie Top Road Maggie Valley, NC | Location Code: | 1C442654FIETOP |
| County: | Haywood | Collector: | Brett Laverty |
| DWR Region: (based on county) | Asheville | DWR Office: (or agency name) | WQ Regional Operation |
| River Basin: | | Date: | 11/16/2015 |
| Notes: | | Time: | 2:02 PM |
| ☐ Chlorinated ☐ De-chlorinated in Field | | Sampling Method: | ☑ Grab ☐ Composite ☐ Other: |
| ☐ Filtered in Field | Dissolved analysis: Enter "DIS" in check-boxes for parameters | Sample Depth: | |

**Priority:** ☐ Ambient ☑ Routine ☐ Compliance ☐ COC ☐ Emergency ☐ QA

**Water Matrix:** ☐ Surface ☑ Ground ☐ Waste ☐ Blank ☐ Solution

**Location Type:** ☐ River/Stream ☐ Lake ☐ Estuary ☐ Canal ☐ Stormwater ☐ Monitoring Well ☑ Water Supply ☐ Effluent ☐ Influent ☐ Field Blank ☐ Trip Blank ☐ Filter Blank ☐ Other:

**Lab Use Only:**

| | |
|---|---|
| Laboratory Sample Number: | |
| Date Received: | |
| Time Received: | |
| Received By: | |
| Delivery Method: | ☐ State Courier ☐ Hand Delivery ☐ Other: |
| Temperature (°C) on Arrival: | |

Collector's Comments:

| | Microbiology Parameters: | |
|---|---|---|
| | Acidity, as CaCO3, to pH 4.5/8.3 | mg/L |
| | Alkalinity, as CaCO3, to pH 4.5/8.3 | mg/L |
| | BOD: Biochemical Oxygen Demand, 5-day | mg/L |
| | cBOD: Carbonaceous BOD, 5-day | mg/L |
| | Coliform: Fecal MF | /100ml |
| | Coliform: Total MF | /100ml |
| | Coliform: Tube Fecal | /100ml |
| | Coliform: Tube Total | /100ml |
| | Specific Conductance, at 25°C | umhos/cm |
| | TOC - Total Organic Carbon | mg/L |
| | Turbidity | NTU |
| | | |
| | **Wet Chemistry Parameters:** | |
| | Bromide | mg/L |
| X | Chloride | mg/L |
| | Fluoride | mg/L |
| X | Sulfate | mg/L |
| | Chlorophyll a | µg/L |
| | Color: ADMI | c.u. |
| | Color: Platinum Cobalt | c.u. |
| | COD: Chemical Oxygen Demand | mg/L |
| | Cyanide, Total | mg/L |
| | Formaldehyde | mg/L |
| | Hexavalent Chromium (Cr6+) | mg/L |

| | | |
|---|---|---|
| | MBAS (surfactants) | mg/L |
| | Oil and Grease, HEM, Total Recoverable | mg/L |
| | Phenols, Total Recoverable | µg/L |
| | Residue: Total (*Total Solids*) | mg/L |
| | Residue: Volatile/Fixed, Total | mg/L |
| | Residue: Suspended (*Suspended Solids*) | mg/L |
| | Residue: Volatile/Fixed, Suspended | mg/L |
| | TDS - Total Dissolved Solids | mg/L |
| | Silica | mg/L |
| | Sulfide | mg/L |
| | Tannin & Lignin | mg/L |
| | | |
| | **Other Parameters:** | |
| | pH | s.u. |
| | Hardness, Total as CaCO3 - by titration | mg/L |
| | | |
| | | |
| | **Nutrients Parameters:** | |
| | Ammonia as N (NH3-N) | mg/L |
| | Nitrate-Nitrite as N (NO3+NO2-N) | mg/L |
| | Total Kjeldahl Nitrogen as N (TKN) | mg/L |
| | Total Phosphorus as P (TP) | mg/L |
| | Nitrite as N (NO2-N) | mg/L |
| | Nitrate as N (NO3-N calculated) | mg/L |
| | Orthophosphate as P (PO4) | mg/L |

| | | |
|---|---|---|
| | **Metals Parameters:** | |
| X | Aluminum (Al) | µg/L |
| | Antimony (Sb) | µg/L |
| X | Arsenic (As) | µg/L |
| X | Barium (Ba) | µg/L |
| | Beryllium (Be) | µg/L |
| X | Cadmium (Cd) | µg/L |
| X | Calcium (Ca) | mg/L |
| X | Chromium (Cr), Total | µg/L |
| | Cobalt (Co) | µg/L |
| X | Copper (Cu) | µg/L |
| X | Iron (Fe) | µg/L |
| X | Lead (Pb) | µg/L |
| | Lithium (Li) | µg/L |
| X | Magnesium (Mg) | mg/L |
| X | Manganese (Mn) | µg/L |
| X | Mercury (Hg) | µg/L |
| | Molybdenum (Mo) | µg/L |
| X | Nickel (Ni) | µg/L |
| X | Potassium (K) | mg/L |
| X | Selenium (Se) | µg/L |
| X | Silver (Ag) | µg/L |
| X | Sodium (Na) | mg/L |
| X | Strontium (Sr) | µg/L |
| | Thallium (Tl) | µg/L |

| | | |
|---|---|---|
| | Tin (Sn) | µg/L |
| | Titanium (Ti) | µg/L |
| | Vanadium (V) | µg/L |
| X | Zinc (Zn) | µg/L |
| | | |
| | Boron (B), Total | µg/L |
| | Mercury 1631, low-level | ng/L |
| | | |
| | **Organics Parameters:** | |
| | Acid Herbicides | |
| | Organochlorine Pesticides | |
| | Organonitrogen Pesticides | |
| | Organophosphorus Pesticides | |
| | PCBs (polychlorinated biphenyls) | |
| | | |
| | Semi-Volatile Organics (BNAs) | |
| | TPH Diesel Range | |
| | | |
| | Volatile Organics (VOA) | |
| | | |
| | TPH Gasoline Range | |
| | | |
| | **Biological:** | |
| | Phytoplankton / Algae | |
| | | |

LAB COMMENTS :

| Field Parameters (optional): | Water Temp (°C) | pH (s.u.) | Dissolved Oxygen (ppm) | Conductivity (µmhos/cm) | Salinity (ppt) |
|---|---|---|---|---|---|
| | | | | | |

Revision: 2/06/2015

N O R T H C A R O L I N A

dhhs
ne department of health and human services

# Private Well Information and Use Recommendations

## *For Inorganic Chemical Contaminants*

County: Haywood

Name: Jeffrey Borich

Sample ID #: AC24939

Reviewer: KMR

### TEST RESULTS AND USE RECOMMENDATIONS

1. ☒ Your well water meets federal drinking water standards ***for inorganic chemicals***. Your water can be used for drinking, cooking, washing, cleaning, bathing, and showering based on the ***inorganic chemical results only***. You may have other water sampling results that are not taken into account in this report.

2. ☐ The following substance(s) exceeded federal drinking water standards or the North Carolina 2L calculated health levels. The North Carolina Division of Public Health recommends that your well water not be used for drinking and cooking, unless you install a water treatment system to remove the circled substance(s). However, it may be used for washing, cleaning, bathing and showering based on the ***inorganic chemical results only***.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Arsenic | Barium | Cadmium | Chromium | Copper | Fluoride | Lead | Iron | |
| Manganese | Mercury | Nitrate/Nitrite | Selenium | Silver | Magnesium | Zinc | pH | |

3. ☐ a. Sodium levels exceed the U.S. Environmental Protection Agency's (USEPA) Health Advisory level for sodium of 20 mg/l. The North Carolina Division of Public Health recommends that only individuals on no or low sodium restricted diets not use this water for drinking or cooking. It may be used for washing, cleaning, bathing, and showering based on the ***inorganic chemical results only***.

☐ b. Levels over 30 mg/l may pose aesthetic problems such as bad taste, odor, staining of porcelain, etc.

4. ☐ Re-sampling is recommended in _____ months.

5. ☐ Re-sample for lead and /or copper. Take a first draw, 5 minute, and 15 minute sample inside the house (preferably the kitchen) and if possible a first draw, 5 minute and a 15 minute sample at the well head to determine the source of the lead and/or copper.

6. ☐ The following substance(s) exceeded federal drinking water standards. Your water can be used for drinking, cooking, washing, cleaning, bathing, and showering based on the ***inorganic chemical results only***, but aesthetic problems such as bad taste, odor, staining of porcelain, etc. may occur. You may want to install a household water treatment system to address aesthetic problems.

| | | | | | |
|---|---|---|---|---|---|
| Barium | Cadmium | Chromium | Fluoride | Iron | Magnesium |
| Manganese | Selenium | Silver | pH | Zinc | |

***For more information regarding your well water results, please call the North Carolina Division of Public Health at 919-707-5900.***