GeoInsight
ENVIRONMENTAL STRATEGY & ENGINEERING

June 18, 2021 GeoInsight Project 11310-000

John Jackson-Marsh and Alan Marsh
c/o Jonathan Sistare
Law Office of Jonathan Sistare, PLLC
PO Box 213
Dublin, New Hampshire 03444

Re: Town of Temple-Conceptual Settlement Agreement

Dear Mr./Mr. Marsh:

As requested by your attorney, Jonathan Sistare, GeoInsight, Inc. (GeoInsight) prepared this follow up letter report describing sampling activities on your property at 32 West Road in Temple, New Hampshire (the Property). Sampling activities were recommended in letter report dated May 27, 2021 to evaluate a drain located in your barn.

In summary, data suggesting a release of oil or hazardous materials was not identified during our sampling. Arsenic was found in soil and in your drinking water supply well which represents a background condition unrelated to management practices associated with your antique construction equipment collection. This letter reviews background for the sampling activities, procedures used to collect samples, and discusses sampling results. Photographs of sampling activities and laboratory data sheets are included.

BACKGROUND

The Town of Temple (the Town) requested a review of best management practices (BMPs) regarding the storage and use of regulated materials at your property in association with collection of antique construction equipment at your property. It is our understanding that the Town would like to evaluate whether your property may represent a potential contaminant source (PCS) and whether mismanagement of regulated materials has the potential to adversely affect the town's stratified drift aquifers. The Town issued a conceptual settlement agreement with conditions for the storage of antique construction equipment on the property. In connection with that conceptual approval, GeoInsight was retained to conduct a site reconnaissance of your property, review applicable BMPs for groundwater protection, and to assist you with addressing the Town's concerns.

GeoInsight's report dated May 27, 2021, concluded the floor drain located where automotive fluids are stored is inconsistent with BMPs to safeguard groundwater quality. Oil staining was not observed around the drain. GeoInsight recommended that the discharge point for the drain be identified and that soil samples be collected for waste oil constituents to evaluate whether regulated materials have been discharged through the drain.

Inconsistencies with other BMPs were not observed during site reconnaissance. Antique vehicles appeared to be stored and maintained responsibly. Oil pans, spill kits, and speedy dry use were documented during the site reconnaissance consistent with practices utilized by commercial enterprises involving vehicle maintenance. Maintenance activities are reportedly infrequent as the antique collection is not a commercial enterprise and vehicles are not dismantled for parts, or resale.

The area of the property used for construction equipment storage is located on a hill outside the Town's Aquifer Protection Overlay District and away from surface water bodies or wetlands. The environmental sensitively is considered as low based on these factors.

GeoInsight's report dated May 27, 2021, recommended the following:

- Verifying the discharge location of the drain as determined by the property owner;
- Soil sampling at the assumed drain discharge location, characterizing the samples for oil/fluid impacts & soil type, and analyzing these soil samples for waste oil constituents;
- Comparing soil sample results to soil remediation criteria in New Hampshire Department of Environmental Service (NHDES) Contaminated Site Management Rules (Env-Or 606.19); if results are below remediation criteria the drain should be sealed using concrete, cement or other sealers to preclude potential impacts to the ground from possible spills where fluids are stored; and
- Evaluating the location of the property's private supply well and collect a sample from the private supply well for standard constituents for private supply well recommended by the NHDES as well as for volatile organic compounds as a check on overall groundwater quality.

FIELD INVESTIGATIONS AND SAMPLING

The floor drain in the barn was excavated by the property owner and was found to discharge to a buried area of pea stone just outside the southern barn wall. GeoInsight visited the excavation on May 26, 2021 to evaluate soils for signs of oil impacts and to screen soils for the presence of volatile organic compounds using a photoionization detector. The soils in the excavation did not have apparent staining or odors. A calibrated photoionization detector did not detect volatile organic vapors in the excavation above background readings.

GeoInsight collected a soil sample of native material at the bottom of the pea stone at a depth of approximately 3.5 to 4 feet below ground surface. The soils were described as a light brown fine to coarse sand with a little silt and a trace of gravel. Photos 1 and 2 in Attachment A show the excavation.

GeoInsight also collected a sample of the water from the pressure tank in the private well system. This location is prior to where the well water enters a water softener system. The exact location of the well is not known.

LABORATORY TESTING RESULTS

Laboratory testing of both the soil sample from the floor drain discharge area or the water sample from the supply well, did not reveal evidence of impact by petroleum compounds or waste discharges. Testing of soil samples for each of the 73 volatile organic compounds tested by EPA method 8260 were below detection limits. The following metals test below method detection limits in the soil sample: cadmium, mercury, selenium, and silver. The following metals were detected in the soil sample: arsenic at 19 ug/g (remediation soil standard [RSR] of 11 ug/g), barium at 34 ug/g (RSR 1000 ug/g), chromium at 9.9 ug/g (RSR 1000 ug/g) and lead at 29 ug/g (RSR 400 ug/g). While arsenic tested above the RSR, further action or remediation is not needed because arsenic is not related to release of oil or hazardous materials but is a natural background constituent of the soil.

Testing of the water sample for each of the 71 volatile organic compounds in the NHDES "full list" were below method detection limits. Primary water quality parameters were below their respective drinking water standards with the exception of arsenic detected at 0.030 mg/L vs a standard of 0.010 mg/L. Secondary water quality parameters were below their respective standards except for manganese detected at 0.074 mg/L vs a standard of 0.050 mg/L. It should be noted that private drinking water wells are not regulated by NHDES or the EPA.

Arsenic detected in soil and groundwater is naturally occurring in this area. The United Stated Geological Survey (USGS) has conducted studies of naturally occurring arsenic in southern New Hampshire. USGS Fact Sheet 051-03 *Arsenic Concentrations in Bedrock Wells in Southeastern New Hampshire* (2003) found that from 20 percent to more than 30 percent of bedrock wells in Temple had arsenic concentrations above the standard of 0.010 MG/L.

Complete laboratory reports are given in Attachment B. A copy of the USGS fact sheet concerning arsenic, including links to further information, is included as Attachment C.

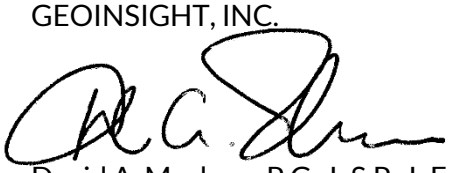
CONCLUSIONS AND RECOMMENDATIONS

Laboratory testing of soil and water samples at the property did not indicate impact from petroleum products or hazardous wastes. Arsenic found in soil and groundwater represents a natural condition not associated with equipment management activities at the site; information on background arsenic is attached to this letter. The floor drains have been sealed with cement as shown in photographs 3 and 4 in Attachment A. BMPs in use during the site inspection on May 12, 2021, should be sustained to reduce the chances of a release of oil and hazardous materials and to safeguard groundwater quality. While private drinking water supplies are not regulated in New Hampshire, it would be prudent to evaluate (and possibly upgrade) the water treatment system currently in use to verify that dissolved arsenic is treated to safe levels.

GeoInsight's services and its conclusions, and recommendations are subject to the limitations and exceptions included as Attachment D of this letter.

If you have questions or concerns regarding this matter please contact me at 978-679-1600.

Sincerely,
GEOINSIGHT, INC.



David A. Maclean, P.G., L.S.P., L.E.P.
Senior Associate/Senior Hydrogeologist

cc: Jonathan Sistare

List of Attachments:

A	Photographs
B	Laboratory Results
C	USGS Arsenic fact sheet
D	Limitations and Exceptions

N:\11310 Temple Sistare GW BMP evaluation\11310_2021-06-18_final report.docx

ATTACHMENTS

NEW HAMPSHIRE | MASSACHUSETTS | CONNECTICUT | MAINE
GEOINSIGHT.COM | INFO@GEOINSIGHT.COM | 800.271.1953

SITE PHOTOGRAPHS
32 WEST ROAD
TEMPLE, NEW HAMPSHIRE

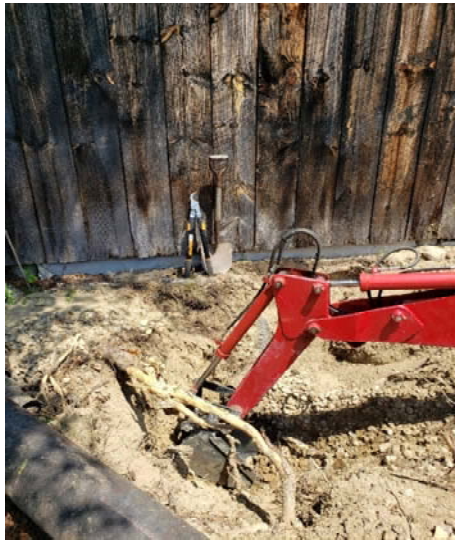


Photo # 1: Area of drain discharge

Photo # 2: Close-up of drain discharge.

Photo # 3: Floor drain sealed with cement

Photo # 4: Floor drain sealed with cement

Laboratory Report

Absolute Resource associates
124 Heritage Avenue Portsmouth NH 03801

David Maclean
GeoInsight, Inc.
186 Granite Street
3rd Floor, Suite A
Manchester, NH 03103

PO Number: None
Job ID: 57161
Date Received: 5/26/21

Project: 32 West Rd 11310

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

Alex Alterisio
Authorized Signature

Date of Approval: 6/3/2021
Total number of pages: 9

Absolute Resource Associates Certifications

New Hampshire	1732	Massachusetts	M-NH902
Maine	NH902		

Project ID: 32 West Rd 11310
Job ID: 57161
Sample#: 57161-001
Sample ID: Drain-1
Matrix: Solid Percent Dry: 85.2% Results expressed on a dry weight basis.
Sampled: 5/26/21 13:00

Parameter	Result	Reporting Limit	Units	Instr Dil'n Factor	Analyst	Prep Date	Batch	Analysis Date	Time	Reference
dichlorodifluoromethane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
chloromethane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
vinyl chloride	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
bromomethane	< 0.35	0.35	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
chloroethane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
trichlorofluoromethane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
diethyl ether	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
acetone	< 3.5	3.5	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,1-dichloroethene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
methylene chloride	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
carbon disulfide	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
methyl t-butyl ether (MTBE)	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
trans-1,2-dichloroethene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
isopropyl ether (DIPE)	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
ethyl t-butyl ether (ETBE)	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,1-dichloroethane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
t-butanol (TBA)	< 3.5	3.5	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
2-butanone (MEK)	< 0.42	0.42	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
2,2-dichloropropane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
cis-1,2-dichloroethene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
chloroform	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
bromochloromethane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
tetrahydrofuran (THF)	< 0.69	0.69	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,1,1-trichloroethane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,1-dichloropropene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
t-amyl-methyl ether (TAME)	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
carbon tetrachloride	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,2-dichloroethane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
benzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
trichloroethene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,2-dichloropropane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
bromodichloromethane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,4-dioxane	< 3.5	3.5	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
dibromomethane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
4-methyl-2-pentanone (MIBK)	< 0.63	0.63	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
cis-1,3-dichloropropene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
toluene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
trans-1,3-dichloropropene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
2-hexanone	< 0.69	0.69	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,1,2-trichloroethane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,3-dichloropropane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
tetrachloroethene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
dibromochloromethane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D

Project ID: 32 West Rd 11310
Job ID: 57161
Sample#: 57161-001
Sample ID: Drain-1
Matrix: Solid Percent Dry: 85.2% Results expressed on a dry weight basis.
Sampled: 5/26/21 13:00

Parameter	Result	Reporting Limit	Units	Instr Dil'n Factor	Analyst	Prep Date	Batch	Analysis Date	Time	Reference
1,2-dibromoethane (EDB)	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
chlorobenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,1,1,2-tetrachloroethane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
ethylbenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
m&p-xylenes	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
o-xylene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
styrene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
bromoform	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
isopropylbenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,1,2,2-tetrachloroethane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,2,3-trichloropropane	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
n-propylbenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
bromobenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,3,5-trimethylbenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
2-chlorotoluene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
4-chlorotoluene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
tert-butylbenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,2,4-trimethylbenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
sec-butylbenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,3-dichlorobenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
4-isopropyltoluene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,4-dichlorobenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,2-dichlorobenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
n-butylbenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,2-dibromo-3-chloropropane (DBCP)	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,2,4-trichlorobenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,3,5-trichlorobenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
hexachlorobutadiene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
naphthalene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
1,2,3-trichlorobenzene	< 0.14	0.14	ug/g	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
Surrogate Recovery		**Limits**								
dibromofluoromethane SUR	**108**	78-114	%	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
toluene-D8 SUR	**97**	88-110	%	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
4-bromofluorobenzene SUR	**106**	86-115	%	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D
a,a,a-trifluorotoluene SUR	**133***	70-130	%	1	LMM	5/27/21	13913	5/29/21	10:09	SW5035A8260D

**** This surrogate is above the acceptance criteria. Since no targets were detected above the quantitation limit, there is no impact to the data.***

Project ID: 32 West Rd 11310
Job ID: 57161
Sample#: 57161-002
Sample ID: Trip Blank
Matrix: Solid
Sampled: 5/26/21 0:00

Parameter	Result	Reporting Limit	Units	Instr Dil'n Factor	Analyst	Prep Date	Batch	Analysis Date	Time	Reference
dichlorodifluoromethane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
chloromethane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
vinyl chloride	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
bromomethane	< 0.25	0.25	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
chloroethane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
trichlorofluoromethane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
diethyl ether	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
acetone	< 2.5	2.5	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,1-dichloroethene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
methylene chloride	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
carbon disulfide	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
methyl t-butyl ether (MTBE)	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
trans-1,2-dichloroethene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
isopropyl ether (DIPE)	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
ethyl t-butyl ether (ETBE)	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,1-dichloroethane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
t-butanol (TBA)	< 2.5	2.5	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
2-butanone (MEK)	< 0.30	0.30	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
2,2-dichloropropane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
cis-1,2-dichloroethene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
chloroform	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
bromochloromethane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
tetrahydrofuran (THF)	< 0.50	0.50	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,1,1-trichloroethane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,1-dichloropropene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
t-amyl-methyl ether (TAME)	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
carbon tetrachloride	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,2-dichloroethane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
benzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
trichloroethene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,2-dichloropropane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
bromodichloromethane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,4-dioxane	< 2.5	2.5	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
dibromomethane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
4-methyl-2-pentanone (MIBK)	< 0.45	0.45	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
cis-1,3-dichloropropene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
toluene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
trans-1,3-dichloropropene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
2-hexanone	< 0.50	0.50	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,1,2-trichloroethane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,3-dichloropropane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
tetrachloroethene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
dibromochloromethane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D

Project ID: 32 West Rd 11310
Job ID: 57161
Sample#: 57161-002
Sample ID: Trip Blank
Matrix: Solid
Sampled: 5/26/21 0:00

Parameter	Result	Reporting Limit	Units	Instr Dil'n Factor	Analyst	Prep Date	Batch	Analysis Date	Time	Reference
1,2-dibromoethane (EDB)	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
chlorobenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,1,1,2-tetrachloroethane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
ethylbenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
m&p-xylenes	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
o-xylene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
styrene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
bromoform	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
isopropylbenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,1,2,2-tetrachloroethane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,2,3-trichloropropane	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
n-propylbenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
bromobenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,3,5-trimethylbenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
2-chlorotoluene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
4-chlorotoluene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
tert-butylbenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,2,4-trimethylbenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
sec-butylbenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,3-dichlorobenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
4-isopropyltoluene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,4-dichlorobenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,2-dichlorobenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
n-butylbenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,2-dibromo-3-chloropropane (DBCP)	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,2,4-trichlorobenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,3,5-trichlorobenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
hexachlorobutadiene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
naphthalene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
1,2,3-trichlorobenzene	< 0.10	0.10	ug/g	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
Surrogate Recovery		**Limits**								
dibromofluoromethane SUR	**106**	78-114	%	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
toluene-D8 SUR	**98**	88-110	%	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
4-bromofluorobenzene SUR	**106**	86-115	%	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D
a,a,a-trifluorotoluene SUR	**118**	70-130	%	1	LMM	5/27/21	13913	5/29/21	4:55	SW5035A8260D

Project ID: 32 West Rd 11310
Job ID: 57161

Sample#: 57161-001
Sample ID: Drain-1
Matrix: Solid Percent Dry: 85.2% Results expressed on a dry weight basis.
Sampled: 5/26/21 13:00

Parameter	Result	Reporting Limit	Units	Instr Dil'n Factor	Analyst	Prep Date	Batch	Analysis Date	Time	Reference
naphthalene	< 0.54	0.54	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
2-methylnaphthalene	< 0.54	0.54	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
acenaphthylene	< 0.54	0.54	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
acenaphthene	< 0.54	0.54	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
dibenzofuran	< 0.54	0.54	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
fluorene	< 0.54	0.54	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
phenanthrene	< 0.54	0.54	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
anthracene	< 0.54	0.54	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
fluoranthene	< 0.54	0.54	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
pyrene	< 0.54	0.54	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
benzo(a)anthracene	< 0.54	0.54	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
chrysene	< 0.43	0.43	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
benzo(b)fluoranthene	< 0.54	0.54	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
benzo(k)fluoranthene	< 0.54	0.54	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
benzo(a)pyrene	< 0.43	0.43	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
indeno(1,2,3-cd)pyrene	< 0.54	0.54	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
dibenzo(a,h)anthracene	< 0.43	0.43	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
benzo(g,h,i)perylene	< 0.54	0.54	ug/g	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
Surrogate Recovery		**Limits**								
2-fluorobiphenyl SUR	**98**	43-116	%	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E
o-terphenyl SUR	**106**	33-141	%	1	CL	5/27/21	13906	5/27/21	21:34	SW3550C8270E

Sample#: 57161-001
Sample ID: Drain-1
Matrix: Solid Percent Dry: 85.2% Results expressed on a dry weight basis.
Sampled: 5/26/21 13:00

Parameter	Result	Reporting Limit	Units	Instr Dil'n Factor	Analyst	Prep Date	Batch	Analysis Date	Time	Reference
Diesel Range Organics (DRO) C10-C28	< 110	110	ug/g	1	DBV	5/27/21	13909	5/28/21	5:33	SW3550C8015E
Surrogate Recovery		**Limits**								
2-fluorobiphenyl SUR	**78**	40-140	%	1	DBV	5/27/21	13909	5/28/21	5:33	SW3550C8015E
o-terphenyl SUR	**92**	40-140	%	1	DBV	5/27/21	13909	5/28/21	5:33	SW3550C8015E

Project ID: 32 West Rd 11310
Job ID: 57161
Sample#: 57161-001
Sample ID: Drain-1
Matrix: Solid Percent Dry: 85.2% Results expressed on a dry weight basis.
Sampled: 5/26/21 13:00

Parameter	Result	Reporting Limit	Units	Instr Dil'n Factor	Analyst	Prep Date	Batch	Analysis Date	Time	Reference
Arsenic	**19**	2.7	ug/g	5	EEB	5/28/21	13916	5/29/21	0:41	SW3051A6020A
Barium	**34**	5.3	ug/g	5	AGN	5/28/21	13916	6/2/21	0:49	SW3051A6020A
Cadmium	< 0.53	0.53	ug/g	5	EEB	5/28/21	13916	5/29/21	0:41	SW3051A6020A
Chromium	**9.9**	5.3	ug/g	5	EEB	5/28/21	13916	5/29/21	0:41	SW3051A6020A
Lead	**29**	2.7	ug/g	5	EEB	5/28/21	13916	5/29/21	0:41	SW3051A6020A
Mercury	< 0.15	0.15	ug/g	1	EEB	6/1/21	13917	6/1/21	17:06	SW7471B
Selenium	< 5.3	5.3	ug/g	5	EEB	5/28/21	13916	5/29/21	0:41	SW3051A6020A
Silver	< 2.7	2.7	ug/g	5	EEB	5/28/21	13916	5/29/21	0:41	SW3051A6020A

Absolute Resource associates

124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001
absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57161

Company Name: GeoInsight
Company Address: 186 Granite st Manchester, NH
Report To: David Mclean
Phone #:
Invoice to: David Mclean
Email: Damclean@geoinc.com
PO #:

Project Name: 32 west Rd
Project #: 11310
Project Location: (NH) MA ME VT
Accreditation Required? N/Y:
Protocol: RCRA SDWA NPDES MCP NHDES DOD
Reporting Limits: QAPP GW-1 S-1 EPA DW Other
Quote #
❑ NH Reimbursement Pricing

ANALYSIS REQUEST

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix: WATER	Matrix: SOLID	Matrix: OTHER	Preservation: HCl	Preservation: HNO_3	Preservation: H_2SO_4	Preservation: NaOH	Preservation: MeOH	Sampling: DATE	Sampling: TIME	Sampling: SAMPLER	☑ VOC 8260 ❑ VOC 8260 NHDES ❑ VOC 8260 MADEP	❑ VOC 624.1 ❑ VOC BTEX MtBE, only ❑ VOC 8021VT	❑ VPH MADEP ❑ GRO 8015 ❑ 1,4-Dioxane	❑ VOC 524.2 ❑ VOC 524.2 NH List ❑ Gases-List:	❑ TPH ☑ DRO 8015 ❑ EPH MADEP ❑ TPH Fingerprint	☑ 8270PAH ❑ 8270ABN ❑ 625.1 ❑ EDB	❑ 8082 PCB ❑ 8081 Pesticides ❑ 608.3 Pest/PCB	❑ O&G 1664 ❑ Mineral O&G 1664	❑ pH ❑ BOD ❑ Conductivity ❑ Turbidity ❑ Apparent Color	❑ TSS ❑ TDS ❑ TS ❑ TVS ❑ Alkalinity ❑ Acidity	❑ RCRA Metals ❑ Priority Pollutant Metals ❑ TAL Metals ❑ Hardness	❑ Total Metals-list: As, Ba, Cd, Cr, Pb, Hg, Se, Ag	❑ Dissolved Metals-list:	❑ Ammonia ❑ COD ❑ TKN ❑ TN ❑ TON ❑ TOC ❑ Ferrous Iron	❑ T-Phosphorus ❑ Bacteria P/A ❑ Bacteria MPN ❑ Enterococci	❑ Cyanide ❑ Sulfide ❑ Nitrate + Nitrite ❑ Ortho P ❑ Phenols	❑ Nitrate ❑ Nitrite ❑ Chloride ❑ Sulfate ❑ Bromide ❑ Fluoride	❑ Corrosivity ❑ Reactive CN ❑ Reactive S- ❑ Ignitibility/FP	❑ TCLP Metals ❑ TCLP VOC ❑ TCLP SVOC ❑ TCLP Pesticide	Subcontract: ❑ Grain Size ❑ Herbicides ❑ Asbestos ❑ PFAS				Grab (G) or Composite (C)
57161-01	Drain-1	3		X						X	5/26/21	13:00	cl	X				X	X						X												G
-02	Trip Blank	1		—						—	—																										

TAT REQUESTED
Priority (24 hr)* ❑
Expedited (48 hr)* ❑
Standard (10 Business Days) ☑
*Date Needed

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

REPORTING INSTRUCTIONS ❑ PDF (e-mail address)
❑ HARD COPY REQUIRED ☑ EDD

RECEIVED ON ICE ☑ YES ❑ NO
TEMPERATURE \ °C

CUSTODY RECORD

QSD-01 Revision 11/08/18

Relinquished by	Date	Time	Received by	Date	Time
Relinquished by Sampler: [illegible signature]	5/26/21	15:00	Received by: Geo Cold Storage	5/26/21	15:00
Relinquished by: Emy / Cah	5-26-21	15:30	Received by: [illegible signature]	5-26	15:30
Relinquished by: [illegible signature]	5-26	6:00pm	Received by Laboratory: [illegible signature]	5/26/21	1800

Sample Receipt Condition Report

57161

Absolute Resource Associates **Job Number:**

Samples Received from: ☐-UPS ☐-FedEx ☐-USPS ☒-Lab Courier ☐-Client Drop-off ☐-_____

Custody Seals - present & intact: ☐-Yes ☐-No ☒-N/A CoC signed: ☒-Yes ☐-No

Receipt Temp: 1 °C Samples on ice? ☒-Yes ☐-No ☐-N/A Sampled < 24 hrs ago? ☒-Yes ☐-No

PFAS-only real ice? ☐-Yes ☐-No ☒-N/A Any signs of freezing? ☐-Yes ☒-No

Comments:_____

Preservation / Analysis	Bottle Size/Type & Quantity					
HCl	40mL(G)	250mL(P)	500mL(P)	1L(G)		
HNO_3	125mL(P)	250mL(P)	500mL(P)			
H_2SO_4	40mL(G)	60mL(P)	125mL(P)	250mL(P)	500mL(P)	
NaOH	125mL(P)	250mL(P)				
$(NH_4)_2SO_4$	60mL(P)	125mL(P)	250mL(P)			
ZnAc-NaOH	125mL(P)	250mL(P)				
Trizma	125mL(P)	250mL (P)				
NH_4Ac	125mL(P)	250mL (P)				
NaS_2O_3	40mL(G)	120mL(P)				
MeOH	20mL(G)	40mL(G) 1				
None (solid)	2oz(G)	4oz(G) 2	8oz(G)	Syringe	21 TESS 5/27/19	
None (water)	40ml (G)	60mL(P)	125mL(P)	250mL(P)	500mL(P)	

Check pH for ALL applicable* samples and document:

*pH ✓by analyst:VOC, PFAS, TOC,O&G

Residual Cl not present:

ABN625____Pest608____

Bacteria ResCl ✓by analyst

PC Dry applicable? (Y) N

1L(G) 1L (P)

Mold	Cassette	Bulk	Plate	Tape Lift
Asbestos	Cassette	Bulk		
Lead	Cassette	Bulk	Wipe	

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	X			
Analyses marked on COC match bottles received?	X			
VOC &TOC Water-no headspace? VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	X			
PFAS: Lab specific bottles? QC received, if required?			X	
Bacteria bottles provided by ARA?			X	
Samples within holding time?	X			
Immediate tests communicated in writing: NO_3, NO_2,o-PO_4, pH, BOD, Coliform/*E. coli* (P/A or MPN), Enterococci, Color Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624			X	
Date, time & ID on samples match CoC?	X			
Rushes communicated to analyst in writing?			X	
Subcontract note on login board?				
Pesticides EPA 608 pH5-9?				
Compliance samples have no discrepancies/require no flags?				(Or must be rejected)
Log-in Supervisor notified immediately of following items:				Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: _____ Date/Time: 5/27/19 9:54

Peer Review Checklist

☐ Client ID/Project Manager	☐ On Ice, Temperature OK?	☐ Sample IDs	☐ Analyses in Correctly
☐ Project Name	☐ PO# (if provided)	☐ Matrix	-references
☐ TAT/rushes communicated	☐ Sub samples sent? Shipping Charge?	☐ Date/Time collected	-wastewater methods
☐ Received Date/Time	☐ Issues noted above communicated?	☐ Short HTs communicated	☐ Notes from CoC in LIMS

Reviewed By: _____ Date: _____

Notes: (continue on back as needed)

	Initials	Date	What was sent?
Uploaded / PDF	_____	_____	Report / Data / EDD / Invoice
Uploaded / PDF	_____	_____	Report / Data / EDD / Invoice
Uploaded / PDF	_____	_____	Report / Data / EDD / Invoice

QSD-04 Rev8 01/06/21 JVG (Page 1 of 1)

490 East Industrial Park Drive
Manchester, NH 03109
www.nelsonanalytical.com
(603)622-0200
NH ELAP Accreditation #NH1005

NELSON ANALYTICAL LAB

RP210528059

Maine State Certification #NH01005
Vermont State Cerfication # VT1005
Maine Radon Certification # ME17500
Massachusetts State Certification #M-NH1005

Report of Analysis

Customer: GeoInsight, Inc.
Client Sample ID: Temple, NH #11310
Laboratory ID: 121052727.01
Sample Matrix : Drinking Water
Sample Location: 32 West Road, Temple, NH

Date Collected: 05/26/2021 01:15 PM
Collected By : CMG
Date Received : 05/26/2021 03:50 PM
Temperature Rec'd °C: #18

Parameters	Results	Acceptable Level	Units	Date Analyzed	Test Method	Test Type	Test Remarks
Total Coliform Bacteria	Absent	Absent	/100mL	05/26/2021 17:10	SM 9223B	Primary	Within EPA Standard
E. coli Bacteria	Absent	Absent	/100mL	05/26/2021 17:10	SM 9223B	Primary	Within EPA Standard
Nitrate-N	<1.0	10	mg/L	05/26/2021 17:15	SM 4500 NO3 D	Primary	Within EPA Standard
Nitrite-N	<0.01	1.0	mg/L	05/26/2021 17:00	SM 4500 NO2B	Primary	Within EPA Standard
Fluoride	1.8	4.0	mg/L	05/27/2021 10:17	SM 4500F-C	Primary	Within EPA Standard
Arsenic	**0.030**	0.010	mg/L	05/27/2021 15:09	EPA 200.8	Primary	**Outside EPA Standard**
Lead	0.008	0.015	mg/L	05/27/2021 15:09	EPA 200.8	Primary	Within EPA Standard
Copper	0.053	1.30	mg/L	05/27/2021 15:09	EPA 200.8	Primary	Within EPA Standard
Chloride	<6	250	mg/L	05/26/2021 16:18	SM 4500Cl-B	Secondary	Within EPA Standard
pH	7.95	6.5-8.5	SU	05/26/2021 16:55	SM 4500H B	Secondary	Within EPA Standard
Iron	0.249	0.300	mg/L	05/27/2021 15:09	EPA 200.8	Secondary	Within EPA Standard
Manganese	**0.074**	0.050	mg/L	05/27/2021 15:09	EPA 200.8	Secondary	**Outside EPA Standard**
Conductance	180	N/A	umhos/cm	05/27/2021 15:42	SM 2510B	N/A	No EPA Limit
Alkalinity	70	N/A	mg/L	05/27/2021 12:37	SM 2320B	N/A	No EPA Limit
Sodium	14	N/A	mg/L	05/27/2021 15:09	EPA 200.8	N/A	No EPA Limit
Total Hardness	52	N/A	mg/L	05/27/2021 15:09	SM 2340B	N/A	No EPA Limit
Uranium	<1	30	ug/L	05/27/2021 15:09	EPA 200.8	Primary	Within EPA Standard
Bromodichloromethane	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Bromoform	<0.8	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Chloroform	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Dibromochloromethane	<0.8	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Total Trihalomethanes	<2.6	80	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
Acetone	<50	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Benzene	<0.5	5.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
Bromobenzene	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Bromochloromethane	<1.0	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Bromomethane	<2.0	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
n-Butylbenzene	<0.8	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
sec-Butylbenzene	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Tert-Butylbenzene	<0.8	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Carbon disulfide	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Carbon tetrachloride	<0.5	5.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
Chloroethane	<1.0	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Chloromethane	<0.8	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
2-Chlorotoluene	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
4-Chlorotoluene	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Dibromomethane	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
1,2-Dichlorobenzene	<0.5	600	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
1,2-Dibromoethane (EDB)	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
1,3-Dichlorobenzene	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit

Notes: mg/L=ppm; ug/L=ppb; ng/L=ppt, "<" denotes "less than". This report of analysis may not be modified in any way, or reproduced except in full, without written approval from Nelson Analytical, LLC. Results reported above relate only to samples as submitted, unless specifically noted otherwise. Nelson Analytical, LLC is currently accredited by the New Hampshire Environmental Lab Accreditation Program, the Vermont Laboratory Accreditation Program, the Massachusetts Laboratory Certification Program, and the Maine Laboratory Accreditation Program. For a list of current accredited tests, please visit the websites listed below. Sampling performed by the lab is according to the lab document "Water Sampling Instructions". EPA standards list pH & Chlorine as field parameters which should be tested immediately upon sample collection. Samples tested for pH after submission are beyond the hold time. Samples will be analyzed as quickly as laboratory operations allow. Metals samples may be analyzed the same day they are received. #-Sample(s) received at laboratory do not meet method specified temperature criteria.
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http://des.nh.gov/organization/divisions/water/dwgb/nhelap/
http://healthvermont.gov/enviro/ph_lab/PublicHealthLaboratory.aspx
https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml
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Date Reported: 05/28/2021

490 East Industrial Park Drive
Manchester, NH 03109
www.nelsonanalytical.com
(603)622-0200
NH ELAP Accreditation #NH1005

NELSON ANALYTICAL LAB

RP210528059

Maine State Certification #NH01005
Vermont State Cerfication # VT1005
Maine Radon Certification # ME17500
Massachusetts State Certification #M-NH1005

Report of Analysis

Customer: GeoInsight, Inc.
Client Sample ID: Temple, NH #11310
Laboratory ID: 121052727.01
Sample Matrix : Drinking Water
Sample Location: 32 West Road, Temple, NH

Date Collected: 05/26/2021 01:15 PM
Collected By : CMG
Date Received : 05/26/2021 03:50 PM
Temperature Rec'd °C: #18

Parameters	Results	Acceptable Level	Units	Date Analyzed	Test Method	Test Type	Test Remarks
1,4-Dichlorobenzene	<0.5	5.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
Dichlorodifluoromethane	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
1,1-Dichloroethane	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
1,2-Dichloroethane	<0.5	5.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
1,1-Dichloroethylene	<0.5	7.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
cis-1,2-Dichloroethylene	<0.5	70	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
trans-1,2-Dichloroethylene	<0.5	5.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
1,2-Dichloropropane	<0.5	5.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
1,3-Dichloropropane	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
1,1-Dichloropropene	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
cis-1,3-Dichloropropene	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
trans-1,3-Dichloropropene	<0.5	5.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
Diethyl Ether	<1.0	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Diisopropyl ether	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Ethyl tert-Butyl Ether	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Hexachlorobutadiene	<0.8	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Isopropylbenzene	<0.8	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
4-Isopropyltoluene	<0.8	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Chlorobenzene	<0.5	100	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
Ethylbenzene	<0.5	700	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
MEK	<5.0	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Methylene chloride	<2.4	5.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
MIBK	<5.0	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
MTBE	<0.5	13.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
Naphthalene	<0.8	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
n-Propylbenzene	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
2-Hexanone	<5.0	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Styrene	<0.8	100	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
1,1,1,2-Tetrachloroethane	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
1,1,2,2-Tetrachloroethane	<0.8	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
tert-Amyl Methyl Ether	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
tert-Butyl Alcohol	<50	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Tetrachloroethylene	<0.5	5.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
Tetrahydrofuran	<10	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Toluene	<0.5	1000	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
1,2,3-trichlorobenzene	<0.8	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
1,2,4-Trichlorobenzene	<0.8	70.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
1,1,1-Trichloroethane	<0.5	200	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
1,1,2-Trichloroethane	<0.5	5.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
Trichloroethylene	<0.5	5.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard

Notes: mg/L=ppm; ug/L=ppb; ng/L=ppt, "<" denotes "less than". This report of analysis may not be modified in any way, or reproduced except in full, without written approval from Nelson Analytical, LLC. Results reported above relate only to samples as submitted, unless specifically noted otherwise. Nelson Analytical, LLC is currently accredited by the New Hampshire Environmental Lab Accreditation Program, the Vermont Laboratory Accreditation Program, the Massachusetts Laboratory Certification Program, and the Maine Laboratory Accreditation Program. For a list of current accredited tests, please visit the websites listed below. Sampling performed by the lab is according to the lab document "Water Sampling Instructions". EPA standards list pH & Chlorine as field parameters which should be tested immediately upon sample collection. Samples tested for pH after submission are beyond the hold time. Samples will be analyzed as quickly as laboratory operations allow. Metals samples may be analyzed the same day they are received. #-Sample(s) received at laboratory do not meet method specified temperature criteria.
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NELSON ANALYTICAL LAB

Maine State Certification #NH01005
Vermont State Cerfication # VT1005
Maine Radon Certification # ME17500
Massachusetts State Certification #M-NH1005

RP210528059

Report of Analysis

Customer: GeoInsight, Inc.
Client Sample ID: Temple, NH #11310
Laboratory ID: 121052727.01
Sample Matrix : Drinking Water
Sample Location: 32 West Road, Temple, NH

Date Collected: 05/26/2021 01:15 PM
Collected By : CMG
Date Received : 05/26/2021 03:50 PM
Temperature Rec'd °C: #18

Parameters	Results	Acceptable Level	Units	Date Analyzed	Test Method	Test Type	Test Remarks
Trichlorofluoromethane	<0.5	5.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
1,2,3-Trichloropropane	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
1,2,4-Trimethylbenzene	<5.0	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
1,3,5-Trimethylbenzene	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
Vinyl Chloride	<0.9	2.0	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
xylenes (total)	<1.5	10,000	ug/L	05/28/2021 04:14	EPA 524.2	Primary	Within EPA Standard
1,3,5-Trichlorobenzene	<0.5	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit
1,1,2-Trichloro-1,2,2-trifluoroeth	<1.0	NA	ug/L	05/28/2021 04:14	EPA 524.2	N/A	No EPA Limit

'

Test Types: EPA Primary: Regulated by the EPA as a health related parameter
EPA Seconday: Aesthetic parameter - not regarded as a health concern

Respectfully Submitted

Andrew Nelson, Laboratory Director

Notes: mg/L=ppm; ug/L=ppb; ng/L=ppt, "<" denotes "less than". This report of analysis may not be modified in any way, or reproduced except in full, without written approval from Nelson Analytical, LLC. Results reported above relate only to samples as submitted, unless specifically noted otherwise. Nelson Analytical, LLC is currently accredited by the New Hampshire Environmental Lab Accreditation Program, the Vermont Laboratory Accreditation Program, the Massachusetts Laboratory Certification Program, and the Maine Laboratory Accreditation Program. For a list of current accredited tests, please visit the websites listed below. Sampling performed by the lab is according to the lab document "Water Sampling Instructions". EPA standards list pH & Chlorine as field parameters which should be tested immediately upon sample collection. Samples tested for pH after submission are beyond the hold time. Samples will be analyzed as quickly as laboratory operations allow. Metals samples may be analyzed the same day they are received. #-Sample(s) received at laboratory do not meet method specified temperature criteria.
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http://healthvermont.gov/enviro/ph_lab/PublicHealthLaboratory.aspx
https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml
https://www.mass.gov/certified-laboratories

Date Reported: 05/28/2021

490 E. Industrial Park Dr. Manchester, NH 03109
info@nelsonanalytical.com (603) 622-0200 phone

NELSON ANALYTICAL LAB

SAMPLE SUBMISSION FORM

12105-2727

CUSTOMER INFORMATION Sample Submitted by:	
Company Name	GeoInsight
Address	186 Granite St Manchester, NH
Contact Person	David Mclean
Phone / email	DAMclean@geoinc.com
PROJECT/SITE	11310 Temple, NH 32 west Rd.

SAMPLE TYPE

DW – Drinking water
WW – Wastewater
SW - Surface water
S - Soil
F – Food Product
Swab
Sponge swab
O - Other

Sample Date	Sample Time	Sample Description / Identification	Sampled by Initials	SAMPLE TYPE	REQUESTED TESTING: Metals - As, Pb, Cu, Na, iron, manganese	Hardness, PH	Chloride, Fluoride, nitrate, nitrite	Bacteria	Uranium	VOC's NH full list		LABORATORY SAMPLE I.D. NUMBER
5/26/21	13:15	32 west Rd	CMG	DW	X	X	X	X	X	X		
		Trip Blank		—						X		

(LAB USE)

Relinquished By (signature)	Date	Time	Received By (signature)
	5/26/21	15:37	

Rec'd at Laboratory by: MEM @ FC | Temp | Date 5/26/21 | Time 15:

NOTES: 1-min 1-fc 2-HCL 1-TB

The laboratory reserves the right to subcontract testing at their discretion

RP210528059

In cooperation with the
U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA NEW ENGLAND), NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES, NEW HAMPSHIRE ESTUARIES PROJECT, and NEW HAMPSHIRE DEPARTMENT OF HEALTH AND HUMAN SERVICES

ARSENIC CONCENTRATIONS IN PRIVATE BEDROCK WELLS IN SOUTHEASTERN NEW HAMPSHIRE

MAJOR FINDINGS:

- ***Nearly one-fifth (19 percent) of randomly selected private bedrock wells tested in southeastern New Hampshire contain concentrations of arsenic that exceed 0.010 milligrams per liter, the U.S. Environmental Protection Agency's maximum contamination level for public water supplies.***
- ***An estimated 41,000 people in Hillsborough, Rockingham, and Strafford Counties may have private bedrock wells with concentrations of arsenic that exceed 0.010 milligrams per liter.***
- ***Arsenic concentrations are similar in all three counties; however, the spatial distribution of arsenic concentrations that exceed 0.010 milligrams per liter is variable and relates to geology.***
- ***Although most of the well owners (90 percent) reported that they use the water from their bedrock well for drinking, less than 14 percent had tested for arsenic prior to this study.***

INTRODUCTION

Southeastern New Hampshire is a rapidly growing region that has been identified as having moderate to high concentrations of arsenic in drinking water from ground-water sources (Ayotte and others, 2003; Ayotte and others, 1999; Peters and others, 1999). Southeastern New Hampshire, comprised of Hillsborough, Rockingham, and Strafford Counties (fig. 1), has grown in population by more than 84,500 or 12 percent over the past decade to more than 770,400 (U.S. Census Bureau, 2000). These counties contain 62 percent of the State's population, but encompass only about 22 percent of New Hampshire's land area. More than 37 percent of the population in New Hampshire uses private wells as a source for drinking water (U.S. Census Bureau, 1990).

Previous studies have indicated that arsenic in ground water from bedrock wells is more prevalent in southeastern New Hampshire than in other areas of the State (Ayotte and others, 2003; Ayotte and others, 1999; Peters and others, 1999). These studies also indicate that the arsenic in ground water probably has geologic origins, but acknowledge that in some areas, arsenic occurrence may be related to present or past land-use practices.

Arsenic concentration in public drinking-water supplies is regulated by the U.S. Environmental Protection Agency (USEPA) because of the associated health risks. In 1999, the National Academy of Sciences concluded that the standard of 0.050 milligrams per liter (mg/L, equivalent to parts per million) for arsenic in drinking water did not sufficiently protect the public from long-term exposure. In response to this conclusion, the USEPA revised the public drinking-water standard from 0.050 to 0.010 mg/L (U.S. Environmental Protection Agency, 2001). The revised standard of 0.010 mg/L will be fully enforceable for public drinking-water supplies by the year 2006.

The quality of drinking water obtained from private wells in New Hampshire is not regulated; consequently, private wells are often not sampled for arsenic unless individual well owners choose to do so. To provide private well owners and Federal and State environmental and health officials with accurate information on arsenic concentrations from private wells in this region, the U.S. Geological Survey (USGS) conducted an arsenic occurrence and distribution study, in cooperation with the U.S. Environmental Protection Agency (EPA New England), New Hampshire Department of Environmental Services (NHDES), New Hampshire Estuaries Project, and with

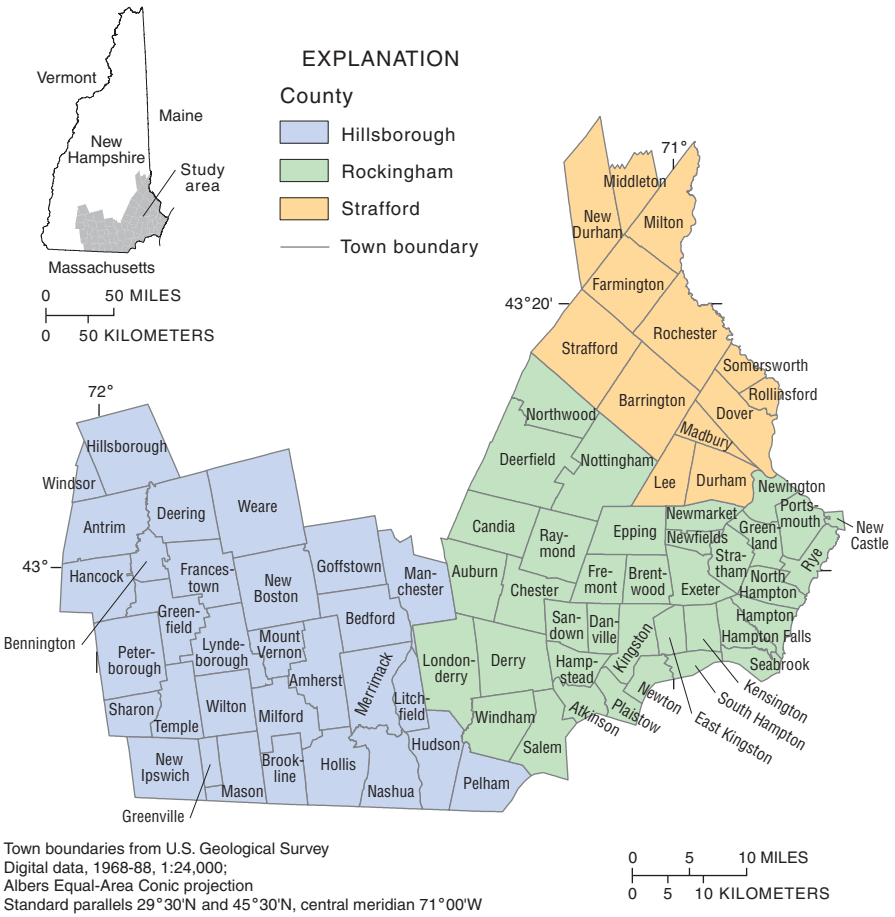

Figure 1. Locations of towns in Hillsborough, Rockingham, and Strafford Counties in the southeastern New Hampshire study area.

the New Hampshire Department of Health and Human Services (NHDHHS). This report describes the results of this study to determine the range of arsenic concentrations from ground water in the three counties of southeastern New Hampshire by analyzing water samples collected by a randomly selected group of well owners from this area.

Sampling Strategy

A database maintained by the NHDES containing information on private bedrock wells was used to randomly select wells from within the three-county study area. Sampling instructions and sample bottles were mailed to well owners. Samples were received from 353 participants—approximately 50 percent of all the well owners who received a sample packet. To obtain an unbiased representation of the ground-water quality in the study area, a computerized equal-area, random-well-selection approach was used (Scott, 1990). This random-well-selection approach ensured that the entire study area was represented, and that the number of samples received from each of the three counties was proportional to the size (area) of the county rather than its population. Study participants were asked to collect untreated water samples. Most of the water samples (56 percent) were collected from the kitchen faucet, 19.8 percent were collected from an outside spigot, and the remaining samples were collected at a spigot either before or after the pressure tank, or from the bathroom faucet. Samples were analyzed for total arsenic according to USEPA method 200.8 (U.S. Environmental Protection Agency, 1994) at either the NHDES Laboratory or the EPA New England Laboratory. The minimum reporting level for both laboratories was 0.001 mg/L. To assure the quality of the data obtained from this study, a quality-assurance project plan (QAPP) was developed. Quality-control samples represented 5 percent of the total samples collected for the study. The quality-control samples included duplicate, inter-laboratory split, and performance-evaluation samples. Results from the analysis of the quality-control samples indicated that there was no measurable bias or significant variability from either laboratory or between the two laboratories.

The Range of Arsenic Concentrations

Arsenic concentrations from the 353 ground-water samples received ranged from <0.001 to 0.215 mg/L. The median concentration (the value where 50 percent of the samples were higher and 50 percent were lower) of arsenic in each county is near the 3-county median of 0.002 mg/L (table 1). Over 30 percent of all the samples had at least

Table 1. Summary of arsenic concentrations and percent of wells with concentrations greater than 0.005, 0.01, and 0.05 milligrams per liter, by county

[No., number; <, less than]

County	No. of samples	Arsenic concentrations (milligrams per liter)			Percent of wells with arsenic greater than (milligrams per liter)		
		Minimum	Median	Maximum	0.005	0.01	0.05
Hillsborough	158	<0.001	0.002	0.075	32	21	3
Rockingham	125	<0.001	0.001	0.215	26	14	2
Strafford	70	<0.001	0.003	0.090	37	21	1
Overall	353	<0.001	0.002	0.215	31	19	2

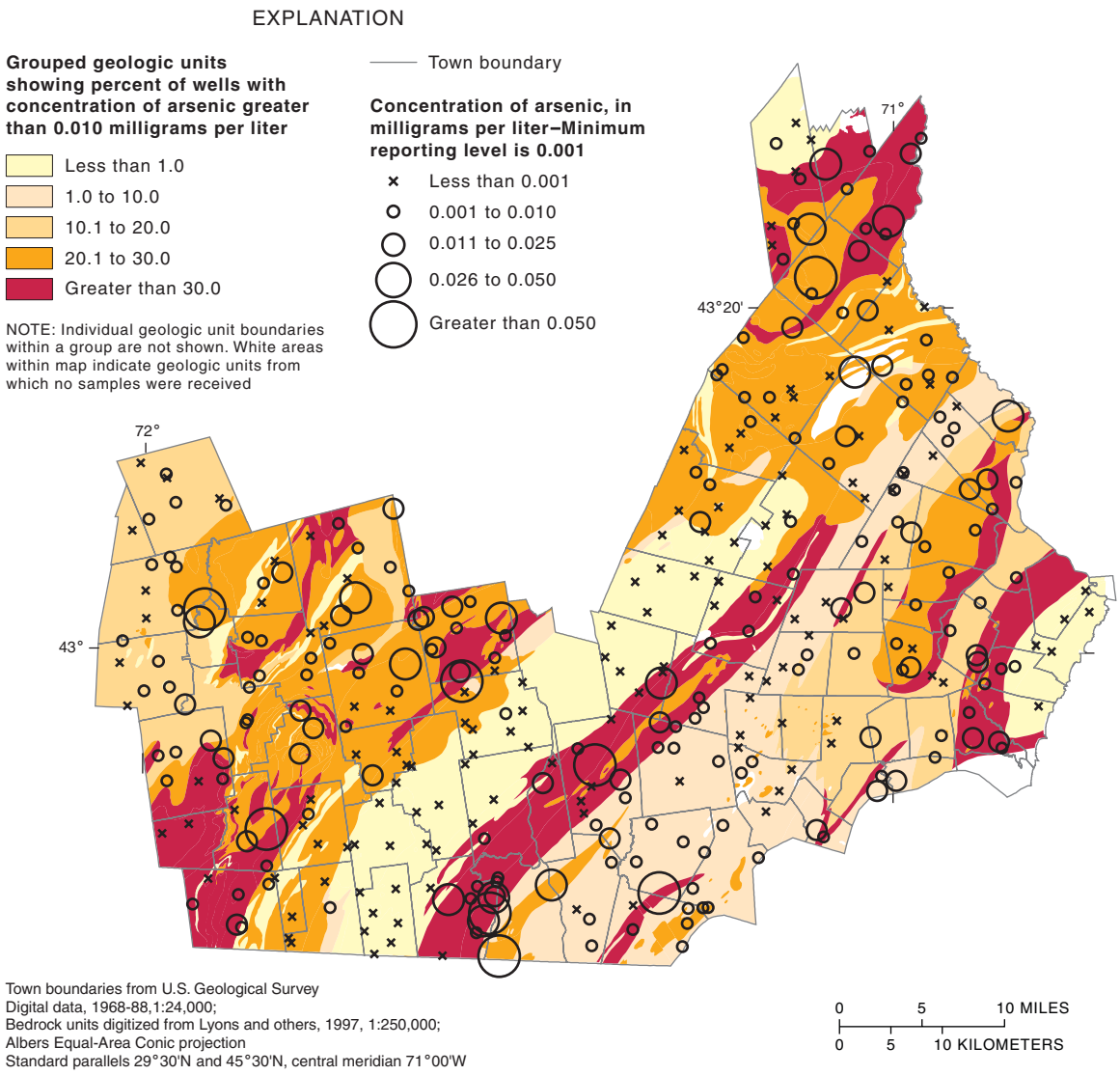

Figure 2. Concentrations of arsenic in private bedrock wells, and grouped geologic units showing percent of wells with concentrations of arsenic greater than 0.010 milligrams per liter. (For information on the individual geologic units in each group, see table 2.)

0.005 mg/L of arsenic in the water. The maximum concentration was 0.215 mg/L, but only eight samples (2 percent) were greater than 0.050 mg/L. Overall, 19 percent of the samples exceeded 0.010 mg/L. Twenty-one percent of the ground-water samples from Hillsborough and Strafford Counties had arsenic concentrations that exceeded 0.010 mg/L, whereas 14 percent of the samples from Rockingham County exceeded 0.010 mg/L. Although private bedrock wells are not required to meet Federal drinking-water standards, analytical results from the well samples are discussed for comparison purposes in terms of the recently approved public drinking-water standard of 0.010 mg/L.

Arsenic Occurrence in Relation to Geology

Although median concentrations of arsenic in water from private bedrock wells in each of the three counties are similar, there are distinct spatial patterns of arsenic concentrations greater than 0.010 mg/L within the study area (fig. 2). Data were analyzed in relation to mapped bedrock geologic units (referred to hereafter as geologic units in this report) identified on the State geologic map of New Hampshire (Lyons and others, 1997). Geologic units (also commonly referred to as formations, members, and groups) are rock types that have unique characteristics and thus, are defined based on factors such as processes of rock formation, mineral composition, and age. Arsenic data from the ground-water samples were grouped according to the geologic unit in which the well was located. This information was determined with geographic information system (GIS) analysis, using a digital version of the State geologic map of New Hampshire and the location of the wells. The GIS analysis identified 25 geologic units that were represented by these ground-water samples. The number of samples per geologic unit ranged from 1 to 54 and is related to the size (aerial extent) of the geologic unit in the study area (table 2). The percent of wells in each geologic

Table 2. Summary of the geologic units grouped by percent of samples with concentrations of arsenic greater than 0.010 milligrams per liter in ground water from private bedrock wells in southeastern New Hampshire

[fig., figure; No., number; mg/L, milligrams per liter; <, less than; geologic units from Lyons and others (1997). Color shading identifies the geologic units that compose the groups shown in figure 2]

Groups of geologic units (fig. 2)	Geologic unit	No. of samples	Percent of samples with concentrations of arsenic greater than 0.01 mg/L	Percent of study area underlain by geologic unit
Greater than 30 percent of samples				
	Ayer Granodiorite	2	50	<1
	Eliot Formation, Calef Member	2	50	<1
	Kittery Formation	11	46	3
	Rangeley Formation, lower part	16	31	4
	Rangeley Formation, upper part	16	31	5
	Berwick Formation, unnamed member	32	31	6
20.1 to 30 percent of samples				
	Spaulding Tonalite	40	28	10
	Exeter Diorite	11	27	3
	Littleton Formation	4	25	2
	Concord Granite	28	25	7
	Two-mica granite of northern and southeastern New Hampshire	4	24	2
	Perry Mountain Formation	21	24	6
10.1 to 20 percent of samples				
	Eliot Formation	20	20	8
	Kinsman Granodiorite	28	11	8
1 to 10 percent of samples				
	Berwick Formation	54	7	16
Less than 1 percent of samples				
	Smalls Falls Formation, undivided	3	0	1
	Massabesic Gneiss Complex	32	0	10
	Rangeley Formation, upper part, pink to green calc-silicate and purple biotite granofels	1	0	<1
	Madrid Formation, undivided	1	0	<1
	Rangeley Formation, undivided	3	0	<1
	Berwick Formation, Gove Member	3	0	<1
	Rye Complex	4	0	2
	Breakfast Hill Granite of Novotny (1964)	3	0	<1
	Mesoperthitic granite	3	0	1
	Gray biotite granite	11	0	3

unit with an arsenic concentration that exceeded 0.010 mg/L was computed. Geologic units with similar percents were then grouped together, as shown in figure 2 and table 2. The likelihood of having a well with arsenic at concentrations of concern for human health is shown in figure 2. Results of this analysis indicate that the number of groundwater samples with arsenic concentrations greater than 0.010 mg/L can vary between adjacent or nearby geologic units.

Specific geologic units stand out with respect to arsenic concentrations that exceeded 0.010 mg/L (table 2). Discussion in this section of the report is generally limited to geologic units that had at least 15 water samples. The Massabesic Gneiss Complex, for example, had no ground-water samples with concentrations of arsenic that exceeded 0.010 mg/L. In contrast, 25 and 28 percent of the ground-water samples from wells in the Concord Granite and the Spaulding Tonalite, respectively, had arsenic concentrations that exceeded 0.010 mg/L. Ten geologic units out of 25 had 25 percent or more of the wells with concentrations of arsenic greater than 0.010 mg/L.

Ground water from wells in different members or subdivisions of a geologic unit can have markedly different concentrations of arsenic greater than 0.010 mg/L. For example, the Berwick Formation consists of the main Berwick Formation and its two members—the Berwick Formation, Gove member; and the Berwick Formation, unnamed member (Lyons and others, 1997). Ground-

Table 3. Summary of reported problems with water quality and reported water-treatment methods used by private well owners in southeastern New Hampshire

[No., number; (34), number in parentheses is percent of problems or water-treatment methods; Note: more than one water-quality problem may have been reported per well]

No. of participants	Type and number of reported water-quality problems							
	Staining: Iron/manganese	Sediment	Taste/odor	pH	Radon			
353	120 (34)	88 (25)	43 (12)	6 (2)	2 (<1)			
	Type and number of reported water-treatment methods							
No. of participants	Sediment filters	Ion exchange (Softeners)	Combinations: any two or three of the methods below: (Softeners/carbon filters/reverse osmosis/birm)	Oxidizing filters (Potassium permanganate/birm/aeration)	Reverse osmosis	Carbon filter	Other	
353	63 (18)	46 (13)	18 (5)	11 (3)	5 (1)	5 (1)	16 (5)	

water samples from the main Berwick Formation had concentrations of arsenic greater than 0.010 mg/L in 7 percent of the samples, whereas, the Berwick Formation, unnamed member had concentrations that exceeded 0.010 mg/L in 31 percent of the samples. None of the three samples received from wells located in the Berwick Formation, Gove member had concentrations that exceeded 0.010 mg/L. Previous regional and local studies (Ayotte and other, 2003; Ayotte and others, 1999; Peters and others, 1999) also had identified frequent arsenic concentrations greater than 0.010 mg/L in several of these geologic units based on data from public and private wells.

The apparent relation of arsenic occurrence to geology provides a useful measure for predicting where arsenic concentrations in ground water are likely to exceed 0.010 mg/L. The data collected for this study, however, are of limited use in explaining why arsenic concentrations vary between and(or) within geologic units. Therefore, the concentration of arsenic in ground water for any given well cannot be accurately predicted; individual testing is necessary.

Water Use

Ninety percent of the study participants reported that they use the water from their private wells as drinking water. The remaining 10 percent (37) of the participants indicated that they do not drink the water from their well because of water-quality problems. The most frequently described problems were iron and(or) manganese staining (34 percent) and sediment (25 percent) (table 3). Only 13 percent of well owners reported that their well water had been previously tested for arsenic. Therefore, few private well owners were aware of the concentration of arsenic in their water. Of the 353 individuals who participated in the study, 46 percent (164) reported the use of some type of treatment or filtering system. Sediment filters were the most commonly reported system, followed by water softeners (18 and 13 percent, respectively). Only two participants specifically reported treating for arsenic. In general, water-treatment systems should be designed for the specific contaminant of interest, even though some systems may work for several contaminants. Treatment systems not specifically designed to remove arsenic, such as sediment filters or water softeners, may be ineffective and unreliable for removal of arsenic (Bernard Lucey, N.H. Department of Environmental Services, Water Division, oral commun., 2003).

Human Health Implications

The presence of arsenic in drinking water has been associated with adverse health outcomes, primarily cancers, and currently is regulated by Federal and State standards for public water supplies (U.S. Environmental Protection Agency, 2001). Although all public drinking-water supplies must meet the new arsenic standard by 2006, private drinking-water supplies are largely unregulated and are not required to meet this new standard. To show the effect on the population in southeastern New Hampshire, an estimate of the number of people with private wells with an arsenic concentration greater than 0.010 mg/L is presented.

Based on the population of the three-county region (U.S. Census Bureau, 2000) and water-use data from 1990 (U.S. Census Bureau, 1990), more than 285,000 people are estimated to use private water supplies. Water-use information tables for New Hampshire (U.S. Census Bureau, 1990) indicate that about 75 percent of people on private water supplies use bedrock wells rather then some other type of private source. Results from this study indicate that 19 percent of bedrock wells in the 3-county region have concentrations of arsenic greater than 0.010 mg/L; therefore, it can be estimated that approximately 41,000 people in the region have bedrock wells with arsenic at concentrations of concern for human health. This estimate may be conservative because recent well data from the State of New Hampshire indicate that from 1991 to 2000, approximately 95 percent of the wells constructed for private use in the three-county study area were bedrock wells (Rick Chormann, State of New Hampshire Geologic Survey, written commun., 2003).

Who to contact for more information:

The New Hampshire Consortium on Arsenic was formed in 2001 to better facilitate communication to the public of information related to all aspects of arsenic, and is a valuable source of arsenic information. The Consortium includes the USGS, USEPA, Dartmouth College, and agencies from the State of New Hampshire. The Consortium members can provide information to the public on treatment technologies, health effects, and occurrence of arsenic. Contact information is listed as the following:

Water testing and treatment guidelines:

New Hampshire Department of Environmental Services, Public Information Officer, Tim Drew (603) 271-3306, E-mail at tdrew@des.state.nh.us.

Health-related questions:

New Hampshire Department of Health and Human Services, Chief, Bureau of Environmental and Occupational Health, Neil Twitchell (603) 271-5870, E-mail at ntwitche@dhhs.state.nh.us.

Research on toxic effects of arsenic on ecosystems and human health:

Center for Environmental Health Sciences at Dartmouth, Associate Director for Outreach, Nancy Serrell (603) 650-1626, E-mail at nancy.serrell@dartmouth.edu.

Federal research on occurrence and sources of arsenic:

U.S. Geological Survey, Outreach Coordinator, Debra Foster (603) 226-7837, E-mail at dhfoster@usgs.gov.

Federal regulation guidelines:

U.S. Environmental Protection Agency, Toxicologist, Maureen McCelland (617) 918-1517, E-mail at mcclelland.maureen@epa.gov.

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References Cited

Ayotte, J.D., Montgomery, D.L., Flanagan, S.M., Robinson, K.W., 2003, Arsenic in ground water in eastern New England: Occurrence, controls, and human health implications: Environmental Science and Technology, v. 37, no. 10, p. 2075-2083.

Ayotte, J.D., Nielsen, M.G., Robinson, G.R., Jr., Moore, R.B., 1999, Relation of arsenic, iron, and manganese in ground water to aquifer type, bedrock lithogeochemistry, and land use in the New England Coastal Basins: U.S. Geological Survey Water-Resources Investigations Report 99-4162, 61 p.

Lyons, J.B., Bothner, W.A., Moench, R.H., and Thompson, J.B., Jr., 1997, Bedrock geologic map of New Hampshire: U.S. Geological Survey Special Map, 2 map sheets, scale 1:250,000.

National Research Council, 1999, Arsenic in drinking water: Washington, D.C., National Academy Press, 263 p.

Peters, S.C., Blum, J.D., Klaue, Bjoern, and Karagas, M.R., 1999, Arsenic occurrence in New Hampshire drinking water: Environmental Science and Technology, v. 33, no. 9, p. 1328-1333.

Scott, J.C., 1990, Computerized stratified random site-selection approaches for design of ground-water quality sampling network: U.S. Geological Survey Water-Resources Investigations Report 90-4101, 109 p.

U.S. Census Bureau, 2000, Municipal populations 1960-2000—Arranged by county: U.S. Census Bureau, accessed March 21, 2003, at http://www.state.nh.us/osp/sdc/Munipop60-00.doc

———1990, Historical census of housing tables—Sources of water: U.S. Census Bureau, accessed February 10, 2003, at http://www.census.gov/hhes/www/housing/census/historic/water.html

U.S. Environmental Protection Agency, 2001, National primary drinking water regulations; Arsenic and clarifications to compliance and new source contaminants monitoring; Final rule: Federal Register Part VIII, 40 CFR, Parts 9, 141 and 142, p. 6981.

———1994, Methods for the determination of metals in environmental samples, supplement I: U.S. Environmental Protection Agency/600/R-94/111, rev. 5.4.

NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES RECOMMENDS THAT ALL PRIVATE WELLS BE TESTED

Private wells in New Hampshire are not regulated as water supplies, and are often not tested for health-related contaminants such as arsenic, a common contaminant found in bedrock wells in New Hampshire. The State of New Hampshire recommends that all private wells be tested for arsenic and a number of other naturally occurring health-related contaminants.

Information on the State of New Hampshire's recommendations for testing and guidance on water treatment options of private wells is available at http://www.des.state.nh.us/ws.htm

Fact Sheet WD-WSEB-2-1: Suggested Water-Quality Testing for Private Wells

Fact Sheet WD-WSEB-3-2: Arsenic in Drinking Water

FOR ADDITIONAL INFORMATION:

The data for this study are available at:

U.S. Geological Survey
New Hampshire/Vermont District
361 Commerce Way
Pembroke, NH 03275
(603) 226-7800 Phone
(603) 226-7894 FAX

Copies of this report can be purchased from:

U.S. Geological Survey
Branch of Information Services
Box 25286
Denver Federal Center
Denver, CO 80225-0286

Visit USGS Web sites at URL:
http://nh.water.usgs.gov
http://www.usgs.gov

NAWQA Program:
http://water.usgs.gov/nawqa

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ATTACHMENT D: LIMITATIONS AND EXCEPTIONS

The findings presented in this report are based upon the scope of services performed, information obtained through the performance of the services, and other conditions as agreed upon by GeoInsight and the original party for whom this report was originally prepared. This report is an instrument of professional service and was prepared in accordance with the generally accepted standards and level of skill and care under similar conditions and circumstances established by the environmental consulting industry. To the extent that GeoInsight relied upon information prepared or provided by other parties, GeoInsight makes no representation as to the accuracy or completeness of such information. Only the party for whom this report was originally prepared, and other specifically named parties, may make use of and rely upon the information in this report, in its entirety.

The findings presented in this report apply solely to Property conditions existing at the time when GeoInsight's assessment was performed. It must be recognized, however, that assessment services rendered were intended for the purpose of evaluating the potential for impact through limited research and investigative activities, and in no way represents a conclusive or complete characterization of the Property. Conditions in other parts of the Property may vary from those at the locations where data were collected. GeoInsight's ability to interpret investigation results is related to the availability of the data and the extent of the investigation activities. As such, 100 percent confidence in conclusions provided cannot reasonably be achieved. Therefore, GeoInsight does not provide guarantees, certifications, or warranties (express or implied) that a property is free from environmental impacts. Furthermore, nothing contained in this document shall relieve other parties of its responsibility to abide by contract documents and all applicable laws, codes, regulations, or standards.