Murray Hill Water System
420 Murray Hill Drive
Montpelier, VT 05602
(802) 223-7154
jksenecal@comcast.net

TO: Montpelier and East Montpelier Landowners, Public Officials and Employees
RE: Source Protection Plan for the Murray Hill Water System
DATE: October 8, 2019

Enclosed is the Murray Water System Source Protection Plan, including a map showing the land area covered by the Plan. The Plan addresses protection of the quality of groundwater that Murray Hill residents share with 32 other property owners in Montpelier and East Montpelier. The Murray Hill Water System gets its water from two drilled wells. Ultimately though, whether the water comes from a spring, dug well or drilled well, all owners of land covered by this Plan are potentially affected by the quality of water we share.
Once groundwater is contaminated, it is expensive and very time consuming to clean up. We usually hear about groundwater contamination as a result of an accident or negligence, but contamination can also come from old or poorly designed and poorly maintained on-site sewer systems, leaks from buried household fuel tanks, and winter salting that keeps our roads safe. Contamination can also come from the misuse or improper disposal of common household paints, cleaners, pesticides and fertilizers.

Monitoring contaminant levels is an ongoing activity. For the past 35 years the Murray Hill Water System has been required to test the quality of the water that comes from its two source wells. It also performs annual tests on a neighboring well, a spring and some surface water locations. These tests show that contaminants, presumably from road salting, are present in drilled bedrock wells at Murray Hill and a neighboring well. Even though the groundwater in all of our tests, except for radionuclides, meets applicable standards, it is important to note that salt constituents used on roads are showing up deep within the aquifer from which you and I get our drinking water.

The enclosed Source Protection Plan includes a summary of samples taken from test wells and surface water springs within and adjacent to the large composting operation on the County Road. Tests also show that nitrate levels have risen in a drilled well on the compost operation's property, but there have been no increases in nitrate in water from the many other samples that we have tested from other locations. None of the nitrate or salt levels we have found violate drinking water standards.

Murray Hill water is not routinely chlorinated, but an ion exchange water softening system is required to reduce radionuclide levels. Radionuclides occur naturally in many in bedrock wells.

Contamination of groundwater can happen quickly, but most often is a slow process that may take many years. We test often so we can identify contaminant levels before they exceed safe drinking water levels. We are sending this letter to you, asking you communicate any knowledge or concerns about contamination you might become aware of to me as soon as they come to your attention. If the groundwater becomes contaminated, it is possible that you will become affected as much as we will.

Here are some of the contamination issues and sources of help that we would like share with you. The use of toxic chemicals in and around homes, businesses, on our roads or where activities on any property within the Source Protection Area involve possible surface or groundwater contamination is very problematic.

(1) Properly dispose of chemicals, paints, pesticides, and oil. Do not flush them down your toilet or spread them on the ground;

(2) Inspect or replace underground fuel storage tanks, especially if they are over 20 years old;

(3) Have septic tanks checked at least every two years and pumped at least every three years;

(4) Use the least amount of salt necessary to keep roads safe.

Sources of information, referrals and assistance include: the Central Vermont Solid Waste Management District at (802) 229-9383; the Montpelier Emergency Management at (802) 223-3445: and the Pollution Prevention Operator at the Vermont Department of Environmental Conservation at 1-800-974-9559.

Thank you for your help and cooperation in protecting the high quality of the groundwater we share. We would be pleased to hear from you by phone (802) 223-7154 or 522-7232 or by emailing me at jksenecal@comcast.net.

Thank you,

Ken Senecal

Kenneth Senecal
Operator, Murray Hill Water System

Enclosures. Source Protection Plan, Source Protection Area map, and Hoffer Consulting test reports

2019 Source Protection Plan Update 10/8/19

Murray Hill Water System (WSID 5601)
Murray Hill Home Owners' Association ("MHHOA"), Owner
Montpelier, VT 05602

A. IDENTIFICATION OF THE RESOURCE AND THREATS

1. Source Protection Area (SPA).

The Murray Hill Water System is located in Montpelier, Vermont. The SPA for 2 drilled bedrock source wells lies within the towns of Montpelier and East Montpelier, VT. An attached map, identified as "SOURCE PROTECTION AREA (SPA) and dated 10/3/2019, is attached hereto and incorporated herein by reference as a part of this 2019 Source Protection Plan Update.

The SPA has 3 zones:

Zone 1 is open meadowland within a radius of 200 feet from 2 approved source wells on land owned by the Murray Hill Home Owner's Association ("MHHOA"), owner of the Murray Hill Water System. Please note that the base map on which the boundaries of Zone 1 are shown appears to show an encroachment on property P-12, which is not correct. The MHHOA owns all the land in Zone 1.

Zone 2 is a mix of woodland, meadows, 15 single family residences served by the City of Montpelier manholes and sewer mains, 13 single family residences with on-site subsurface sewers, 1 composting/"farming" operation, 1 small cemetery, 1 community recreation area for 86 families with a large swimming pool and 2 tennis courts, approximately 2 miles of city owned paved roads, and about 2.5 miles of above ground power, phone and TV utilities.

The predominant land uses within Zone 2 are open meadows and woodlands, low density residential uses and a very large, intensively operated commercial farm/composting land use.

Zone 3 is predominantly undeveloped open and wooded property with a few scattered home sites.

2. Inventory of Land Uses, Potentially Threatening Activities, Uses and Property Identification Numbers.

There are 33 property owners within the SPA, including property P-3 which is owned by the MHHOA, owner of the Murray Hill Water System. A windshield survey was done of portions of the SPA which are visible from public places. Aerial photos and other public documents were also viewed.

Each property was assigned a unique number, as shown below and on the attached base map.

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Property ID, Use Codes and Owner Names and Addresses.

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a) Residential and open land use of lawn, meadow and garden fertilizers, pesticides and chemicals;
b) Residential storage of heating fuels, including basement and underground storage tanks;
c) Disposal of hazardous wastes, e.g., paint and cleaning chemicals, from residential and composting/farming;
d) Residential onsite subsurface sewage systems;
e) Residential public sewer system components such as sewer mains and manholes;
f) Heavy equipment oils, greases and fuels used in composting operation, field mowing, road and sewer and water system maintenance;
g) Large composting/farming operations at property P-18;
i) Road salt/chemicals and paving operations on highways (Main St & Murray Hill Drive);
j) MHHOA water system softening and sodium hypochlorite chemicals used and stored at property P-3;
k) A cemetery at property P 27; and,
m) MHHOA pool facility chemical storage and use at recreational facilities on a portion of property P-3.

4. Assessment of the Threats.

The development density within the SPA is low with one exception of property P-18 discussed below. In the absence of municipal sewers and changes in existing zoning regulations, no significant new development is expected. Only the homes within the Murray Hill development, which receive drinking water from the Murray Hill Water System, are connected to the City of Montpelier sewer system. All other residential properties in the SPA have onsite, sub-surface sewer systems.

The City of Montpelier has excess treatment capacity in its sewer treatment facilities. If the city were to expand sewer lines northerly along Main Street, it is likely that there would be an increase in development within the SPA. Such an extension would likely increase threats of contaminants within the SPA from additional development but would also enable existing household onsite subsurface sewer systems to be connected to the city sewer. Given the unknown condition of the existing onsite systems, and the fact that several homes that they serve are very close to Blanchard Brook and adjacent wetlands, it seems likely that an extension of public sewer lines would have the net impact of reducing the threat level to groundwater within the SPA.

It has been more than a decade since there was any residential construction in the SPA, other than remodeling and minor additions. There has been no commercial or industrial within the SPA for decades except for the composting/farming operations on property P-18.

Most of the land within the SPA is tree covered, open land without access to public water or sewer, and significant wetlands but the property P-18 composting/farming is significant both because it consists of very intensive operations involving more than 9 acres in area and because of its location in the heart of Zone 2 of the SPA.

The Murray Hill Water System existed at the time that the P-18 composting/farming operations were initiated. The MHHOA utilized its right to be a party to Act 250 proceedings to convince the District Commission to include a permit condition in the Land Use Permit being sought by the owner of P-18. That condition requires annual nitrate testing of a drilled well that serves a residence on P-18 property. The condition also requires annual surface water testing at several points in and adjacent to the composting/farming operations.

The MHHOA and the P-18 owner jointly retain a hydrogeologist who obtains annual water samples referenced above, has them tested, and interprets the results. Please refer to attached testing data and correspondence from the hydrogeologist.

To summarize the tests above, there is no indication of an increase in contaminants in surface water on or adjacent to P-18; however, the water from the P-18 drilled well has shown what may be a trend, though currently well below MCL limits, towards higher nitrate levels. This must continue to be monitored annually. Further, given major expansion of the composting/farming operations since the Act 250 permit was issued, the intensity of operations on property P-18 have not only increased greatly but have also been extended into portions of the adjacent 29+ acre property P-17. Given these facts, any further increases in nitrate levels in the P-18 drilled well should result in additional steps to ensure that the groundwater in the SPA does not become contaminated. Note, however, that to date there has been no increase in nitrate levels in Murray Hill source wells. It is not known whether drilled wells closer to the composting/farming operations have experienced any increases.

Hydrogeologic and water quality studies done for the Murray Hill Water System in 1983, 1984 and 2002 show slightly elevated salt contaminant levels in the groundwater underlying the SPA. The City of Montpelier has addressed this by reducing the frequency and quantities of salt used on roads. These studies show that water reaching Murray Hill wells has been in the ground for many years, yet water tests indicate that other contaminants associated with long term land uses, i.e., farming, roads and on-site wastewater disposal, are, with perhaps the exception of the property P-18 well nitrate levels, not detectable.

Buried gas and oil tanks and public sewer mains are another potential threat to SPA water quality. During 2007, a leaking fuel tank was discovered on property P-1. This contamination is downgradient from Murray

Hill source wells and 30 to 40 feet outside of the portion of the P-1 property that lies within Zone 2 of the SPA. The remediation of the contamination was under the jurisdiction of the Vermont Department of Environmental Conservation. No contaminants related to this incident have been found in Murray Hill source wells.

Please note that the MHHOA is actively negotiating with the City of Montpelier to connect to the city water system. An agreement between the MHHOA and the City of Montpelier has been negotiated and is now in draft form.

The cemetery within Zone 3 of the SPA is believed to pose a low threat to Murray Hill wells because it has existed for many years without having any identifiable impact on groundwater quality.

Threats from chemicals used for maintenance of Murray Hill's water system and swimming pool are also considered to be very low because only small quantities of chemicals are kept on hand and those are stored within locked facilities accessible only to trained personnel. The pool operations are overseen by the Operator for the Murray Hill Water System.

5. Management of the Risks, Present and Future:

Education appears to be the most effective way to manage threats at present. This includes issues such as the use of chemicals, heating products, fertilizers and lawn care products, and onsite subsurface sewer systems. Here are specific efforts to be undertaken:

a) communications with owner/residents within Zones 2 and 3 who have onsite sewer systems;

b) participation in Act 250 and Montpelier and East Montpelier permit proceedings on applications to change existing, or create new, subdivisions and developments;

c) monitoring and participating as necessary when planning and zoning changes are under consideration;

d) updating the inventory of buried household heating fuel tanks;

e) sending educational information to owners of land within the SPA and to Montpelier and East Montpelier officials;

f) annual nitrate tests for Murray Hill source wells and renewed efforts to gain permission to annually test water samples from drilled wells on properties P-19 and P-33 for TKN, nitrate, chloride, sodium, and alkalinity to expand the data base in light of a possible trend towards higher nitrate levels on property P-18;

g) continued annual testing of surface water on, as well as up and downstream from, property P-18 for TKN, nitrate, chloride, sodium and alkalinity;

h) expand annual water quality monitoring of Murray Hill source wells to include TKN, chloride, sodium and alkalinity as well as nitrate for comparison purposes with annual testing being done on the property P-18 well.

6. The Future of the Murray Hill Water System:

The Murray Hill Water System source wells have required periodic hydro-flushing and, in the case of source well 2, cleaning accumulations of ledge fragments. These efforts have taken place every 6 or 7 years since the early 1990's.

These maintenance efforts have never restored well yields to original levels, but have kept yields well in excess of peak day usage. The plan had been to undertake well maintenance efforts in 2018; however, before the maintenance was done there was a sharp decline in yields in August of 2018 to levels that were barely sufficient to meet peak day use. When the well maintenance was done in late August of 2018, well yields rose significantly but again, not to previous levels. This, for the first time, raised the likelihood that the existing source wells might not have sufficient yields during another prolonged drought to meet demand.

With input from Hydrogeologist Jeff Hoffer, the MHHOA hired an engineering firm and formed a "Water Committee" charged it with coming up with a plan for addressing potential issues with the existing water sources. The Committee explored drilling new wells on MHHOA common land, acquiring additional land on which to drill new wells, and connecting to the City of Montpelier Water System.

After considering the costs and risks involved in drilling additional wells, based on the Preliminary Engineering Report, the Water Committee explored all aspects of what would be involved in a connection to the city system as a water source. Discussions with city officials have progressed to a point where it is likely that the city will not just supply water to Murray Hill, but will become the owner of the entire water system, except for the wells which be abandoned and sealed with concrete.

Dated at Montpelier, VT, this 8th day of October 2019.

Kenneth Senecal

By: Kenneth Senecal
Operator, Murray Hill Water System

2019 Source Protection Plan Update 10/8/19

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h) expand annual water quality monitoring of Murray Hill source wells to include TKN, chloride, sodium and alkalinity as well as nitrate for comparison purposes with annual testing being done on the property P-18 well.

6. The Future of the Murray Hill Water System:

The Murray Hill Water System source wells have required periodic hydro-flushing and, in the case of source well 2, cleaning accumulations of ledge fragments. These efforts have taken place every 6 or 7 years since the early 1990's.

These maintenance efforts have never restored well yields to original levels, but have kept yields well in excess of peak day usage. The plan had been to undertake well maintenance efforts in 2018; however, before the maintenance was done there was a sharp decline in yields in August of 2018 to levels that were barely sufficient to meet peak day use. When the well maintenance was done in late August of 2018, well yields rose significantly but again, not to previous levels. This, for the first time, raised the likelihood that the existing source wells might not have sufficient yields during another prolonged drought to meet demand.

With input from Hydrogeologist Jeff Hoffer, the MHHOA hired an engineering firm and formed a "Water Committee" charged it with coming up with a plan for addressing potential issues with the existing water sources. The Committee explored drilling new wells on MHHOA common land, acquiring additional land on which to drill new wells, and connecting to the City of Montpelier Water System.

After considering the costs and risks involved in drilling additional wells, based on the Preliminary Engineering Report, the Water Committee explored all aspects of what would be involved in a connection to the city system as a water source. Discussions with city officials have progressed to a point where it is likely that the city will not just supply water to Murray Hill, but will become the owner of the entire water system, except for the wells which be abandoned and sealed with concrete.

Dated at Montpelier, VT, this 8th day of October 2019.

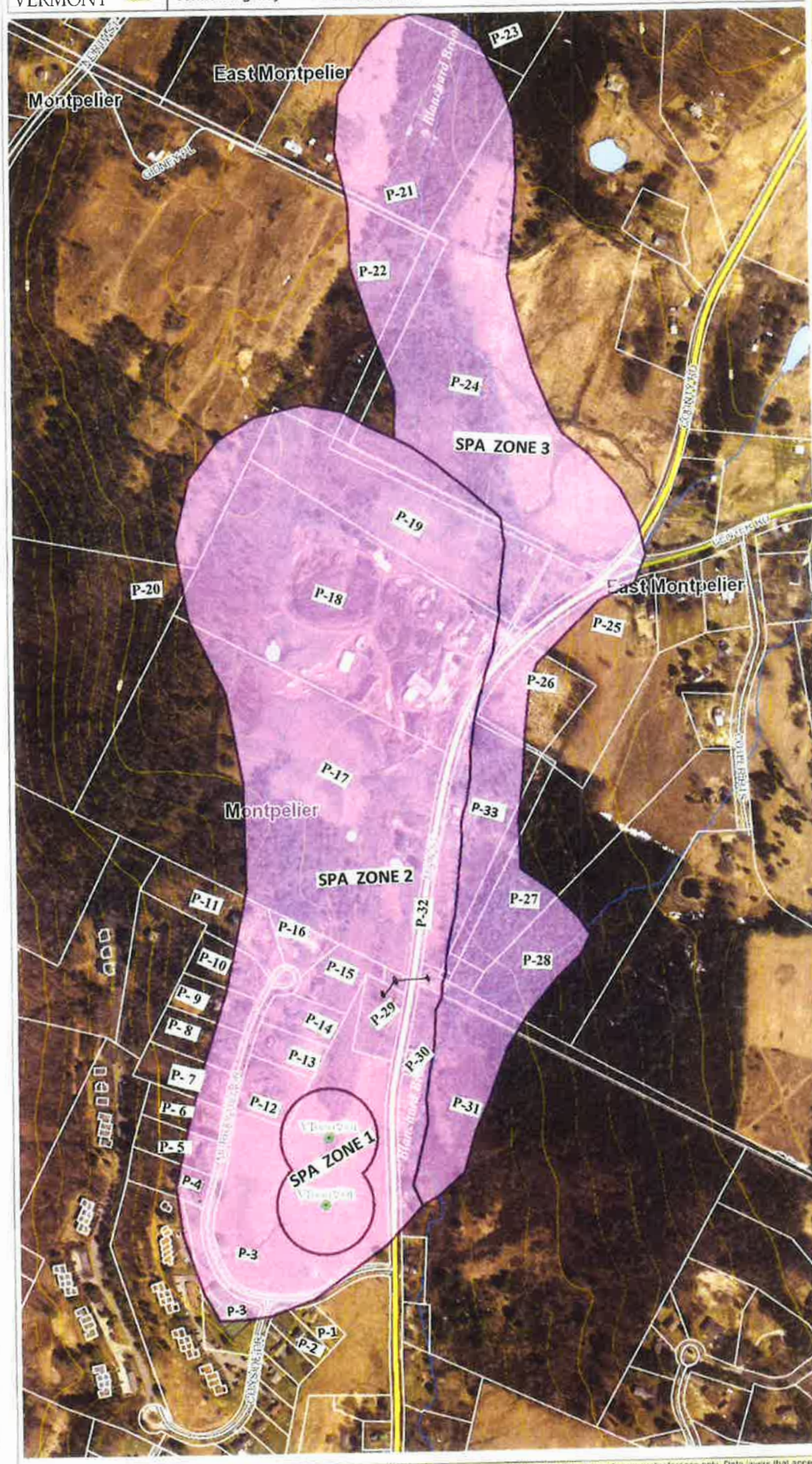
Kenneth Senecal

By: Kenneth Senecal
Operator, Murray Hill Water System

VERMONT

Natural Resources Atlas
Vermont Agency of Natural Resources

vermont.gov



LEGEND

Public Water Sources

Ground Water SPA

Parcels (standardized)

Parcels (non-standardized)

Roads

Waterbody

Stream

Town Boundary

Property labels, P-1 through P-33, added 10/3/2019 by water system Operator Ken Senecal to coincide with 2019 Source Protection Plan narrative for the Murray Hill Water System also dated 10/3/19.

SOUCE PROTECTION AREA ("SPA")

MURRAY HILL WATER SYSTEM (WSID 5601)
Murray Hill Home Owner's Association, Owner
Montpelier, Vermont 05602

Updated October 3, 2019

NOTES

Map created using ANR GIS mapping technology

254 0 0 127.00 254.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 417 Ft 1cm = 50 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

HOFFER CONSULTING INC.

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Jefferson P. Hoffer, PG
Groundwater Supply Development
Hydrogeologic Site Investigations
www.hofferconsulting.com

July 8, 2019

Kurt Ericksen
Vermont Compost Company
1996 Main Street
Montpelier, VT 05602
via email - <kurt@vermontcompost.com>

Re: Water Sampling Results, Vermont Compost Company, Montpelier, VT

Dear Kurt:

This letter summarizes the recent groundwater and surface water monitoring conducted at the Vermont Compost Company in Montpelier, Vermont. Water samples were collected on 10 June 2019 from the Hammer bedrock well, Vestuti spring, and three surface water sampling locations (see Figures 1 and 2). Groundwater samples from the Hammer bedrock well and Vestuti spring were analyzed for chloride and nitrate. The surface water samples were analyzed for chloride, nitrate, and total kjehldahl nitrogen (TKN). The surface water from the culvert that enters the Blanchard Brook drainageway on the east side of the road was not sampled due to a buildup of sediment and vegetation. The sample containers and the analyses were provided by ENDYNE, Inc., of Williston, Vermont. The laboratory report is enclosed, and the results are summarized on Table 1. Tables 2 – 4 provide summaries of historical data.

The 2019 results are generally similar to prior sampling events. Nitrate concentrations continue to increase slightly in the Hammer bedrock well, but the 10 June 2019 result of 1.8 mg/L is still far below the drinking water standard of 10.0 mg/L. The Vestuti spring shows a similar slightly increasing trend with time, although the concentration remains below 1.0 mg/L. Nitrate concentrations in Blanchard Brook do not show a discernible trend, and remain below 0.5 mg/L. The sample from "Study Point 1B" had a nitrate concentration of 3.0 mg/L, and this sampling location shows the most variability from year to year, with no discernable trend through time.

Chloride results for the 2019 sampling event were slightly lower or similar to the past few years of data. TKN results for the surface water sampling locations remain relatively stable.

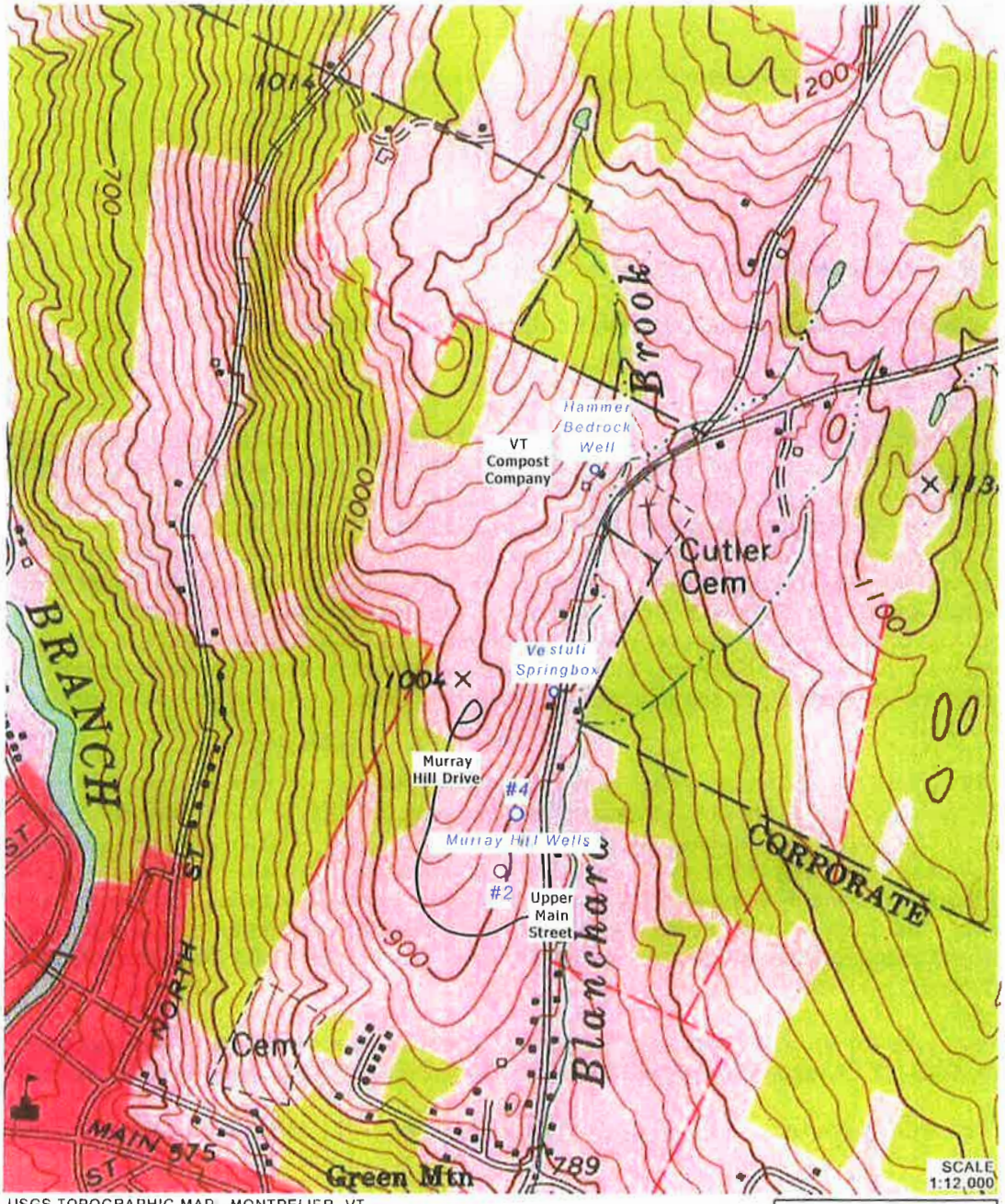
Please feel free to contact me at jeffhoffer@charter.net or (802) 738 - 9238 with any questions.

Sincerely,
HOFFER CONSULTING INC.

Jefferson P. Hoffer, PG
Senior Hydrogeologist

enc.

ec: Ken Senecal, Murray Hill Homeowners Association, jksenecal@comcast.net



USGS TOPOGRAPHIC MAP. MONTPELIER, VT

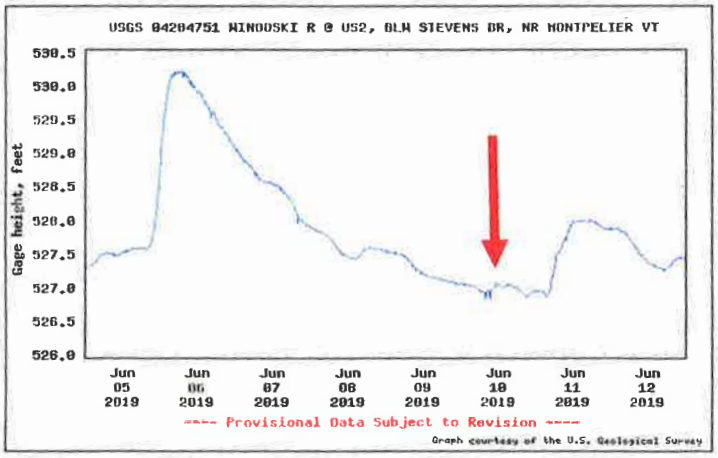
FIGURE 1
SITE LOCATION MAP
VERMONT COMPOST COMPANY / MURRAY HILL
MONTPELIER VERMONT

Figure 2
Sampling Locations for June 10, 2019 Sampling Event,
Vermont Compost Company, Montpelier, Vermont

TABLE 1
Results of Surface Water and Groundwater Sampling Analyses, June 10, 2019,
Vermont Compost Company, Montpelier, Vermont.

Parameter	Units	VT Drinking Water Standards*	Hammer Well	Vestuti Spring	Blanchard Brook Upstream, S/N 003	Blanchard Brook, S/N 002	Culvert Into Blanchard Brook, S/N 001	Study Point 1B
Chloride	mg/L	250	31	7.3	27	32	Not Sampled	61
Nitrate as N	mg/L	10	1.8	0.59	0.15	< 0.20		3.0
Total Kjehldahl Nitrogen (TKN)	mg/L	-	-		0.29	0.21		2.6
		Date						
		Time						
		Sample Location / Comment	sediment filter, no other treatment, sample from cold water kitchen tap	grab sample directly from springbox	grab sample	grab sample	-	from 6" culvert, ~ 0.5 1.0 gpm
		Well / Sample Type	groundwater - drilled bedrock well	groundwater - dug well/bedrock springbox (bedrock visible)	surface water	surface water	-	surface water

NOTES: Laboratory Analyses by Endyne, Inc., Williston, Vermont
< 2.5 = less than a detection limit of 2.5
* Vermont Drinking Water Standards - chloride is secondary standard (aesthetics), nitrate is a primary standard.

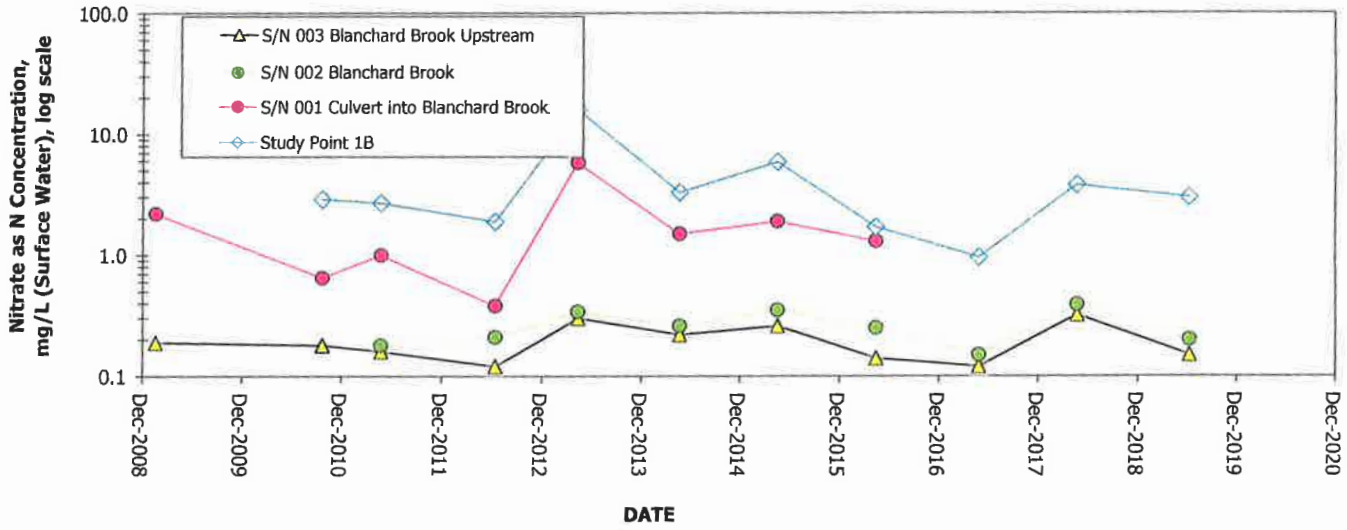


Hoffer Consulting Inc.
7/8/2019

TABLE 2
Historical Sampling Results for Nitrate,
Vermont Compost Company, Montpelier, Vermont.

NITRATE CONCENTRATIONS in mg/L N

SAMPLING DATE	Hammer Well	Vestuti Spring	S/N 003 Blanchard Brook Upstream	S/N 002 Blanchard Brook	S/N 001 Culvert into Blanchard Brook	Study Point 1A	Study Point 1B
06/13/01	0.36	0.24					
01/19/09	1.1	0.32	0.19		2.2		
09/23/10	1.6	0.31	0.18		0.65		2.9
04/26/11	1.4	0.28	0.16	0.18	1.0	1.3	2.7
06/15/12	1.4	0.35	0.12	0.21	0.38	0.02	1.9
04/14/13	0.96	0.41	0.30	0.34	5.8		16
04/23/14	0.9	0.44	0.22	0.26	1.5		3.3
04/20/15	1.1	0.42	0.26	0.35	1.9		5.9
04/15/16	1.3	0.41	0.14	0.25	1.3		1.7
04/27/17	1.3	0.48	0.12	0.15			0.96
04/24/18	1.4	0.86	0.32	0.39			3.8
06/10/19	1.8	0.59	0.15	0.20			3.0



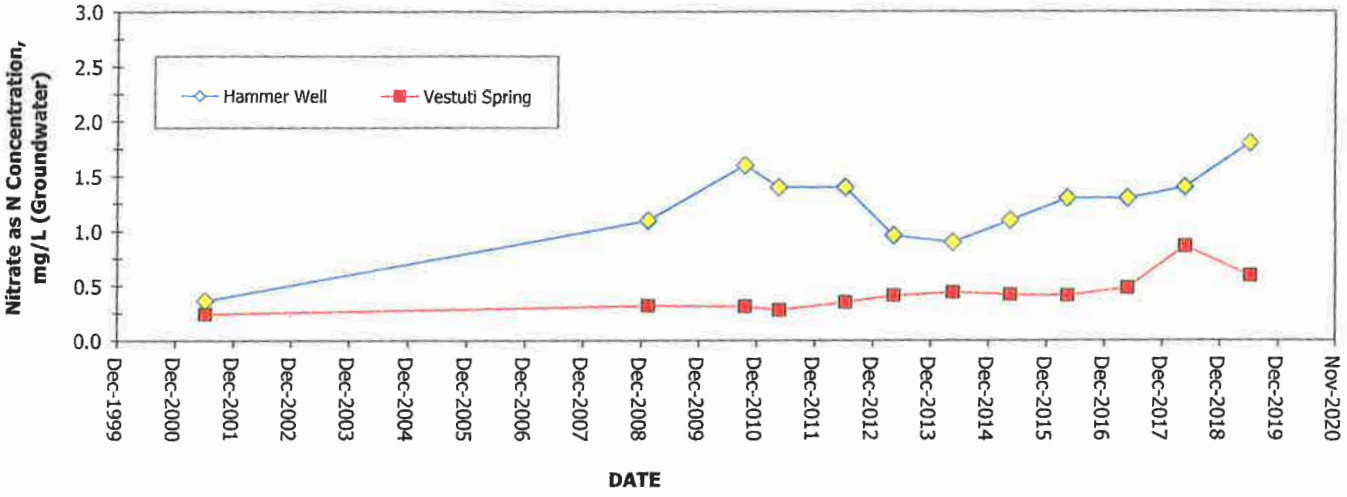
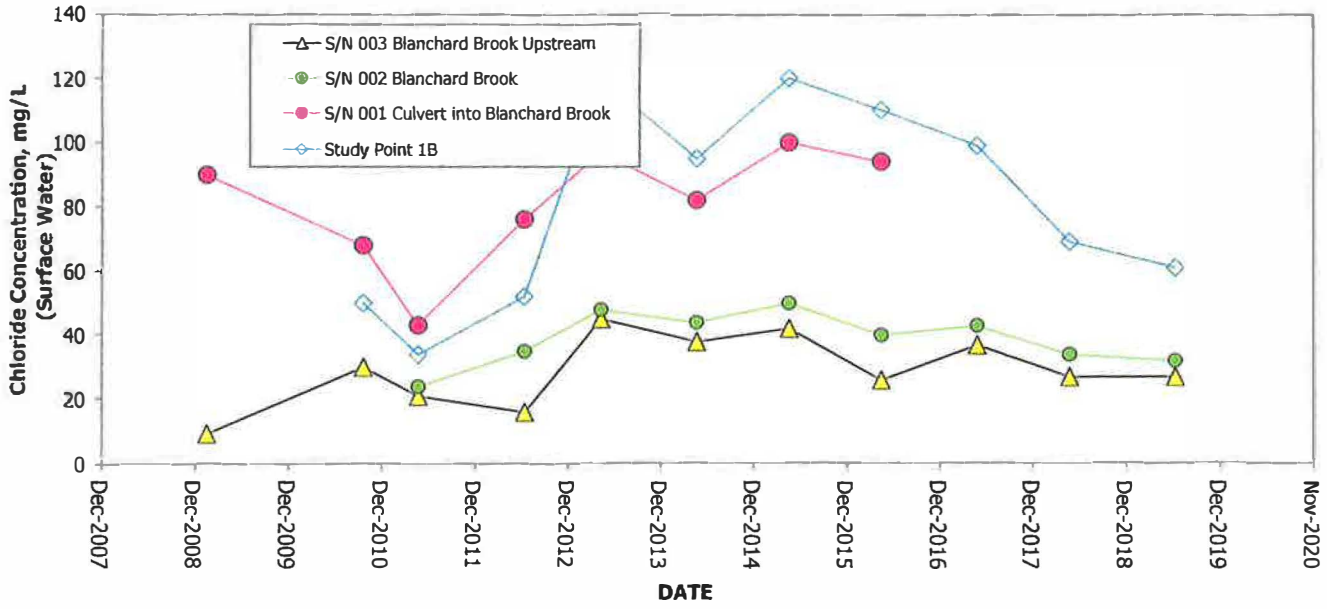


TABLE 3
Historical Sampling Results for Chloride,
Vermont Compost Company, Montpelier, Vermont.

CHLORIDE CONCENTRATIONS in mg/L

SAMPLING DATE	Hammer Well	Vestuti Spring	S/N 003 Blanchard Brook Upstream	S/N 002 Blanchard Brook	S/N 001 Culvert into Blanchard Brook	Study Point 1A	Study Point 1B
01/19/09	20	6	9.2		90		
09/23/10	30	9.5	30		68		50
04/26/11	33	3	21	24	43	46	34
06/15/12	33	7.1	16	35	76	59	52
04/14/13	31	6.9	45	48	97		120
04/23/14	25	5.3	38	44	82		95
04/20/15	55	7.6	42	50	100		120
04/15/16	40	7.6	26	40	94		110
04/27/17	38	6.4	37	43			99
04/24/18	36	7.2	27	34			69
06/10/19	31	7.3	27	32			61



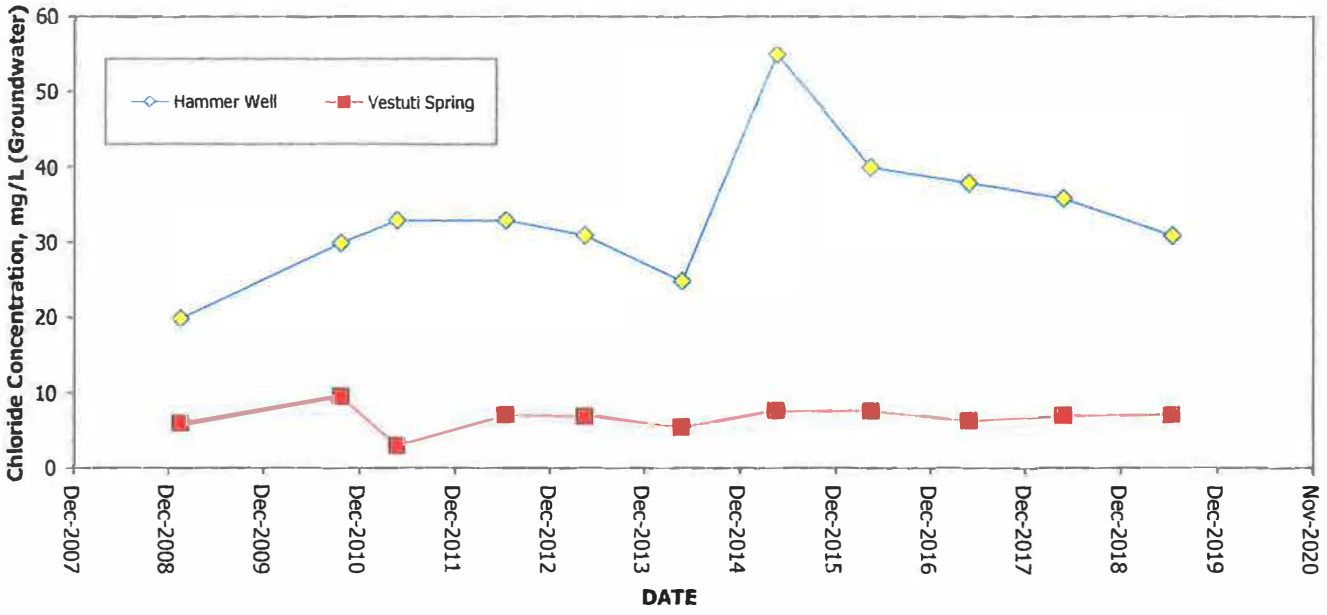


TABLE 4
Historical Sampling Results for TKN,
Vermont Compost Company, Montpelier, Vermont.

Total Kjehldahl Nitrogen CONCENTRATIONS in mg/L

SAMPLING DATE	S/N 003 Blanchard Brook Upstream	S/N 002 Blanchard Brook	S/N 001 Culvert into Blanchard Brook	Study Point 1B
04/26/11	0.3	0.63	0.62	0.62
06/15/12	0.28	0.55	0.79	0.42
04/14/13	0.44	0.32	4.1	6.3
04/23/14	0.44	0.36	1.6	2.4
04/20/15	1.2	0.31	1.8	4.9
04/15/16	0.28	0.26	1.3	1.7
04/27/17	0.26	0.32		5.1
04/24/18	0.28	0.30		2.8
06/10/19	0.29	0.21		2.6