

# Air Matters



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## Air Vermont gives students hands-on experience



*Kimberly Hagan engages the attention of Montpelier High School students as she provides a briefing on the Air Vermont program.*

In the age of high-speed Internet communications, video games, satellite television, and multimillion dollar Hollywood budgets, it can be hard to engage teenagers in a discussion about air pollution. At least it was, but now Kimberly Hagen has a sophisticated gadget of her own with enough bells and whistles to compete with Tomb Raider and Stephen King. It's called an ACCESS Analyzer and it tests the air for a number of pollutants, including sulfur dioxide, ozone, nitrogen dioxide, carbon monoxide and carbon dioxide. The analyzer plays a big role in Hagen's program which is appropriately titled "Air Vermont."

From the moment Hagen opens the case holding the main unit students are busy setting up a stand that holds the monitor and plugging wires into sockets which attach the monitor to a laptop computer. Soon they will find

out that the air is full of things unseen, which, in turn, starts them thinking about ways to use the monitoring device.

"What if I go breathe right into monitor? Will it pick up a lot of CO<sub>2</sub>?" asks a student.

"Sure," says Hagen, who then goes on to warn that the data would be skewed because it would not give an accurate representation of CO<sub>2</sub> levels under normal circumstances.

Part of what makes the Analyzer so attractive is its ability to provide practical applications. Students can investigate real air quality problems and draw conclusions based on actual data. For instance, students have tested indoor air quality before and after buses idle in front of schools. Not surprisingly,

the data indicates air quality in the school building is worse while the buses are parked with the engines running. Students could bring this data to the school's administration and petition for a change in pickup and drop off procedure. Such change has in fact happened. While she strongly advocates for empowering students

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Montpelier High School student, Mike Gilpen, holds a stone up to the ACCESS Analyzer to see if it registers a reading of radioactivity.

with data (an important life lesson), her main priority is to make students aware that air pollution exists, even though you can't always see it.

"My goal is simply to get students aware. Air is pretty abstract. It's really hard to believe there is much going on when you can't see anything."

In another experiment, students tested the air next to a running snowmobile. Hagan related one of the student experiences.

"One kid, after he looked at the snowmobile data said, 'Yeah, I get really bad headaches whenever I go snowmobiling with my friends. I don't even like doing it anymore because I get such bad headaches. Now I know why.'"

The last two times students at Peoples Academy in Morrisville had the Analyzer they collected data on air pollutants at the intersection of Route

15 and 100. The school intends to continue monitoring at this location to build a base of data that may be able to identify trends in the future.

Hagan works for the Atlantic Center for the Environment, which owns the \$15,000 ACCESS Analyzer. Air Vermont got its start as a supplemental environmental project (SEP). A SEP is

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**"Air is pretty abstract. It's really hard to believe there is much going on when you can't see anything."**

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a n environmentally beneficial project which a company found in violation of state law undertakes in

addition to completing all measures necessary to come into compliance. An approved SEP can take the place of a traditional fine.

To keep the project going Hagan does a lot of fundraising on her own. Periodically, she sends program brochures to Vermont schools to try and generate interest. She charges \$400 to run a two-week program which requires

her to spend four days with the students. On days she is not present the Analyzer continues to collect data.

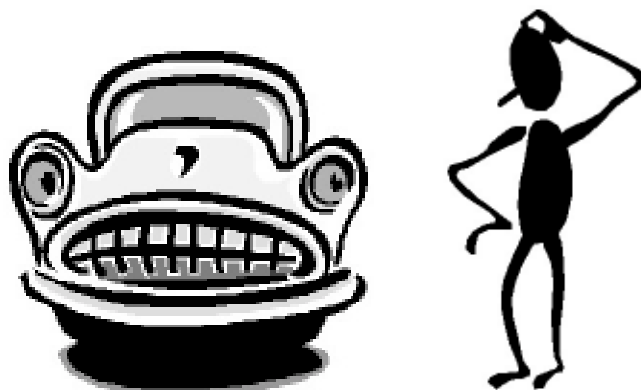
After traveling the state for two years Hagan has built an impressive list of experiments conducted by students. She has been to eight schools, some of them repeats. Her strong belief in the program and her desire to work with kids keep her going. She likes the idea of students doing actual hands-on work that provides real and useful data. "I think it would be very empowering for kids to take this information and go to the school principal and say 'Hey, we did this investigation and this is what we found' and then have the school make a decision for change."

Schools interested in the Air Vermont program should call the Atlantic Center for the Environment at (802) 229-0707.



See page 7 for more information on the Air Vermont Program.

# Is your car trying to tell you something?



Wouldn't it be nice if your car could simply tell you when there is something wrong with it. Well, it can. Thanks to technology known as on board diagnostics (OBD) your car can actually communicate with you and your repair technician. On board diagnostics constantly monitors key components of your vehicle and stores information any time something is not working right, which could cause your vehicle's emissions to be excessive.

Automobiles have become such a big part of our daily lives it is easy to forget they are also the largest source of air pollution in Vermont and the rest of the United States. Modern vehicles are getting cleaner due to newer engine management technology and emission control components. However, emissions are only kept low when all your vehicle's operating systems are in proper working order. A vehicle with a malfunction emits more air pollutants, wastes fuel and can result in high repair bills if not corrected in a timely manner. On board diagnostics will help cure these problems by providing vital information to the vehicle owner and the repair technician.

Automobile manufacturers have designed and installed a sophisticated second generation of on board

diagnostics technology known as OBDII on all passenger cars and light-duty trucks since model year 1996. OBDII monitors all components that make up the engine management system and can detect a malfunction well before you might otherwise become aware of it through symptoms such as a decrease in performance or mechanical damage. For example, a poorly performing spark plug can cause the engine to misfire. Gone unnoticed, this misfire could quickly degrade the performance of the catalytic converter and leave you with an expensive repair bill. With OBD detection you are alerted of a malfunction before damage to the catalytic converter occurs.

When OBD detects a problem with the operation of your vehicle that could



*Using a scan tool a technician can quickly diagnose engine problems.*

lead to a substantial increase in air pollution emissions, a dashboard warning light is turned on. This is your signal that there is a malfunction with your vehicle. Consult your vehicle owner's manual for the proper response should your "Check Engine" light come on. To understand what has caused the light to come on, a repair technician will connect a scan tool to your vehicle's diagnostic connector and retrieve the stored trouble code from your car's computer. By using this information, the technician can more quickly and accurately identify the problem and make the proper repair.

On board diagnostic checks on 1996 and newer vehicles were incorporated into Vermont's annual vehicle inspection program on July 1, 1999. Effective January 1, 2001, the program requires that malfunctions in a vehicle's emissions control system be repaired prior to the issuance of an inspection sticker.

The OBD systems on modern motor vehicles represent the natural progression of technology that will help us all save money and keep our air cleaner. When you see the warning light appear on your dashboard your car is trying to tell you something that is well worth listening to.

## Vermont Motor Vehicle Inspection Program On Board Diagnostic (OBD) Check

As of July 1999, on board diagnostic systems (OBD) on 1996 and newer vehicles are being checked as part of Vermont's annual vehicle inspection program. OBD technology benefits motorists, automotive service technicians and our environment. It's good for motorists because it monitors the vehicle's performance every time it is driven and identifies problems immediately, allowing repairs to be made before more serious problems develop. It's good for technicians because it helps them to accurately diagnose problems, allowing for efficient and proper repairs. And it's good for our environment and our health because it identifies problems that cause vehicle emissions to increase.

### What does the OBD check involve?

First, the vehicle is checked to see if the Malfunction Indicator Light (commonly called the "check engine" or "service engine soon" light) on the instrument panel illuminates when the ignition key is turned to the "on" position and then when the engine is running. Next, an electronic device known as a scan tool is connected to the vehicle and used to communicate with the vehicle's on board computer. The on board computer is checked to confirm that the vehicle is ready to be tested, to determine if the computer has attempted to turn on the Malfunction Indicator Light, and if applicable, to retrieve diagnostic trouble codes. The results are recorded, and the scan tool is disconnected from the vehicle. The entire OBD check typically takes less than five minutes.

### What if my vehicle fails the OBD check?

If your vehicle fails, it must be repaired in order to receive a new inspection sticker. Your vehicle should be repaired by a qualified, trained automotive service technician equipped with the appropriate diagnostic and repair tools. Depending on your vehicle's age and mileage, repairs may be covered by the vehicle manufacturer's warranty. Refer to your vehicle owner's manual for specific information on warranty coverage.

Following are the possible reasons for failing the OBD check:

- 1) The vehicle's OBD system connector has been removed or is otherwise not working properly. The OBD check cannot be completed if the connector is missing or is not working properly.
- 2) The Malfunction Indicator Light does not illuminate at all when the ignition key is turned to the "on" position. When the vehicle's OBD system detects a problem it turns on the warning light to alert the driver to a problem. However, if the light can not illuminate because the bulb has burned out or is otherwise not working, the driver would not be alerted to the problem.
- 3) The Malfunction Indicator Light on the instrument panel is on (and/or commanded on by the vehicle's on board computer) while the engine is running. This indicates that the OBD system has identified a problem which must be repaired. In this case, one or more diagnostic trouble codes will also be reported by the vehicle's OBD system. These diagnostic trouble codes will help your technician diagnose and repair your vehicle.

### What if my vehicle's OBD system is "not ready"?

If your vehicle's OBD system is not ready, the inspection of your vehicle's OBD system cannot be completed. While this does not necessarily mean that your vehicle has a problem, it does indicate that your vehicle's OBD system has not yet completed its tests, and problems may be present, but not yet identified. A recently disconnected or discharged (run down) battery, or recent servicing using a scan tool are the most likely reasons for a vehicle's OBD system being "not ready". Note that there are a few vehicles which should not be rejected as "not ready." Ask your inspection station or the Department of Motor Vehicles for further information about these exceptions.

### How do I get my vehicle's OBD system "ready"?

The vehicle should be driven under a variety of normal operating conditions in order for the OBD system to become ready. These operating conditions include a mix of highway driving and stop and go, city type driving, and at least one overnight-off period. Your vehicle owner's manual should provide more specific information on getting your vehicle's OBD system ready.

For more information: Ask your inspection station for a copy of the OBD brochure, or contact the Air Pollution Control Division at 888-520-4879.

# Is Vermont's air clean?

A seemingly simple question often asked of Vermont's air pollution control professionals is not really simple at all. Air pollution is not one thing. It is comprised of varying quantities of many different elements. The United States Environmental Protection Agency (U.S. EPA) requires each state to measure the air for six criteria pollutants: ozone, carbon monoxide, sulfur dioxide, nitrogen oxides, particulate matter and lead. These pollutants exist at some level almost everywhere in the country, and the U.S. EPA has defined levels at which they become unsafe to humans and the environment. Areas that exceed any of these levels are deemed "non-attainment" areas and are subject to sanctions by the federal government.

Vermont measures criteria pollutants at seven locations around the state: Burlington, Rutland, Bennington (two sites), Underhill, Barre and Brattleboro. Using sophisticated hi-tech equipment and lab analysis, technicians from Vermont's Air Pollution Control Division are able to determine the levels of each pollutant in Vermont's air.

Levels of air pollution in Vermont currently meet the federal standards. However, this has not always been the case. Vermont has worked hard to achieve compliance with the ozone and

particulate matter standards. The state has been able to maintain its attainment through vigilance in air pollution control and levels of ozone are in compliance by the slimmest of margins.

The six criteria pollutants do not

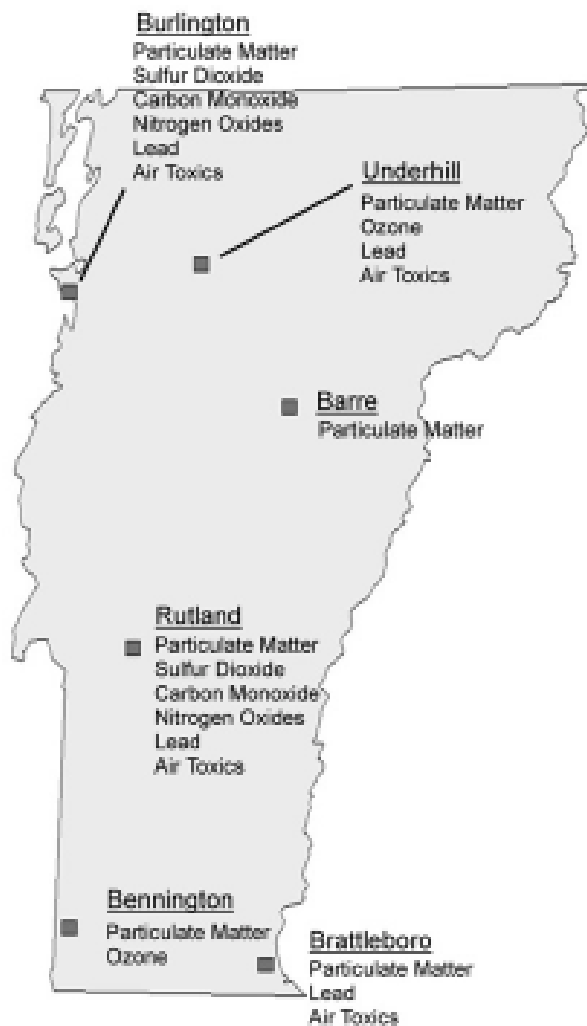
of substances numbering in the tens, if not hundreds, of thousands are emitted daily from industry, cars and homes. Many of these substances are toxic in nature.

Presently, there are no federal standards for toxic air pollutants. However, Vermont recognized these threats and developed its own standards based on scientific methodology that determines health risks of exposure. Levels of benzene, formaldehyde, 1,3-butadiene, carbon tetrachloride, methylene chloride, chloroform, tetrachloroethylene, methyl chloride and 1,2,4-trimethyl benzene exist above Vermont's current standards.

To protect public health and the environment, Vermont has implemented a series of programs designed to reduce air pollution. These programs include permitting to control industrial emissions, controlling the release of gasoline vapors at filling stations, requiring advanced pollution control devices on new automobiles and the annual inspection of automobile emission control systems. To learn more about Vermont's air pollution control programs, visit the Air Pollution Control Division (APCD) web site at:

[www.anr.state.vt.us/dec/air](http://www.anr.state.vt.us/dec/air) or call the APCD toll-free at (888) 520-4879.

## APCD Monitoring Network



begin to define the multitudes of substances that can be present in the atmosphere in modern society. A variety

# Considering a new wood stove?



It's that time of year. The winter winds are whipping and winding their way around your house looking for gaps in windows, under doors or any other nook and cranny they can find to enter your home. And maybe, like many other Vermonters, you are standing at the ready beside your wood stove to ward off the offending chill. And maybe it's time for you to upgrade to one to the new EPA-certified wood stoves that provide more heat and use less wood!

That's right, beginning in 1988 the EPA began certifying new wood stoves that meet stringent emissions standards. The new standards were developed to address the problem of particulate matter air pollution coming from an increasing number of wood stoves. Many people still use the older, non-EPA-certified, wood stoves. However, there are many good reasons to consider buying a new one that is EPA-certified.

First, the new stoves emit only a small fraction of the air pollution their predecessors did. This is good news for the lungs of friends, family, and neighbors. Second, their high efficiency means you burn less wood and obtain more heat. This reduces the amount of

wood you need for each heating season. High efficiency ratings also mean less soot in the chimney. So while the initial purchase price of a new wood stove may seem pricey, over time it will pay for itself and save you money.

The current wood stove market basically offers the consumer two

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**Achieving a high efficiency burn requires dry wood. Green wood contains moisture that must first be evaporated before it can burn.**

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choices; catalytic and non-catalytic. Stoves with catalytic converters burn more efficiently than those without, but they do require a little more maintenance. This usually includes replacing the catalytic converter every few years. Non-catalytic stoves achieve EPA efficiency ratings, but do not burn as clean as stoves with catalytic converters. The benefit of a non-catalytic stove is that there is no catalyst to replace. Both types of stoves come in models that burn for several hours without having to add wood.

While modern wood stoves are

designed to achieve high efficiency, stove operators need to understand their operation. Achieving a high efficiency burn requires dry wood. Green wood contains moisture that must first be evaporated before it can burn. This leads to low temperature burns and increased creosote build up in the chimney. Creosote buildup can lead to chimney fires.

Burning wood in a wood stove is a time honored tradition in many Vermont homes. The modern wood stove compliments this tradition by allowing wood to be burned more efficiently with fewer environmental impacts. If you are still burning an old stove, you may want to consider one of the newer, more efficient models. By doing so you will not only fight off the chill, you'll also significantly reduce the amount of air pollution leaving your chimney.

To learn more about air pollution from wood stoves, call Vermont's Air Pollution Control Division toll-free at (888) 520-4879.



# Air Vermont

## *A Way For Students To Learn About Air And Air Quality*

Clean air is important to our health, well-being and economy. While air quality in Vermont is generally good, it's not without its problems. We should not take our air quality for granted. Six out of 10 people in the U.S. live in areas that fail to meet minimum air quality standards set to protect human health.

It's often difficult to judge the effect of pollution on air quality in the same way that the effect of sewage discharge on water quality can be seen. Measuring air quality helps students develop sharp science, math and analytical skills. It motivates them to learn about the myriad effects of poor air quality - from lethargy to serious health threats such as respiratory illnesses and cancer.

The Air Vermont program utilizes an ACCESS environmental monitoring system to help students study air quality issues and develop math and science literacy. Working with their teachers and an AirVermont coordinator, students conduct experiments around indoor and outdoor air quality issues within the school's community.

ACCESS stands for "A Computerized Community-Based Environmental Sampling System." It measures a dozen air pollution factors, and can easily be linked to Macintosh or PC software to display, record and evaluate data against federal standards. The monitor is portable and easily set

up in a classroom or test site.

The ACCESS monitor makes air "tangible" for students. They are able to measure, quantify and analyze what before was invisible. Thinking of a water quality equivalent, it's as if they could dip a test tube into a stream to obtain a study sample.

Students develop answers to practical questions:

- What's in the exhaust of the buses idling outside the school? Does the exhaust get indoors?
- How clean is the air in our

work and discuss what they've learned.

The ACCESS monitoring system is at the center of an inquiry-based, hands-on, constructivist curriculum that engages grades 6-12 students in understanding the causes, consequences and complexities of air quality management. Activities are aligned with the Vermont Standards and integrate numerous disciplines, including science, math, technology, economics, and the social sciences.

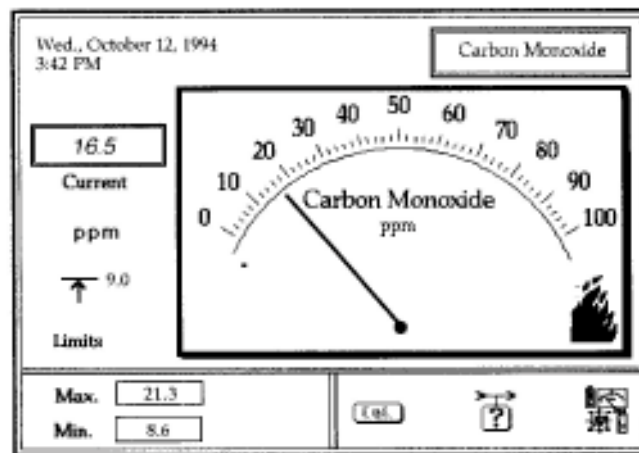
In the Air Vermont program, teachers are guides and facilitators, and students are active investigators and analysts. Students are encouraged to report their results to their community as a way of finding solutions to problems they've identified.

AirVermont is a project of the Quebec-Labrador Foundation (QLF)/Atlantic Center for the Environment. QLF supports the rural communities and environment of eastern Canada and New England. QLF programs emphasize community, trust-

building, long-term commitment and leadership development, and reflect our belief that the people of a community are crucial to solving both local and regional problems.

Contact the QLF/Atlantic Center for the Environment:

web address: [www.qlf.org](http://www qlf.org)  
phone: (802) 229-0707



classroom? How is air quality affected? How does it change over time?

- Does it really matter if a car doesn't have a catalytic converter?

An exciting part of the AirVermont program is the sharing of data through the Internet with other students in Vermont, New England and the rest of the country.

Students from around Vermont gather annually to present results of their

**Air Matters**

Vermont Agency of Natural Resources  
Air Pollution Control Division  
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Waterbury, VT 05671-0402

Log on the Air Pollution Control Division's web site!

[www.anr.state.vt.us/dec/air](http://www.anr.state.vt.us/dec/air)

