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Northwest Residential Infiltration Survey

A Study of Ventilation in New Homes

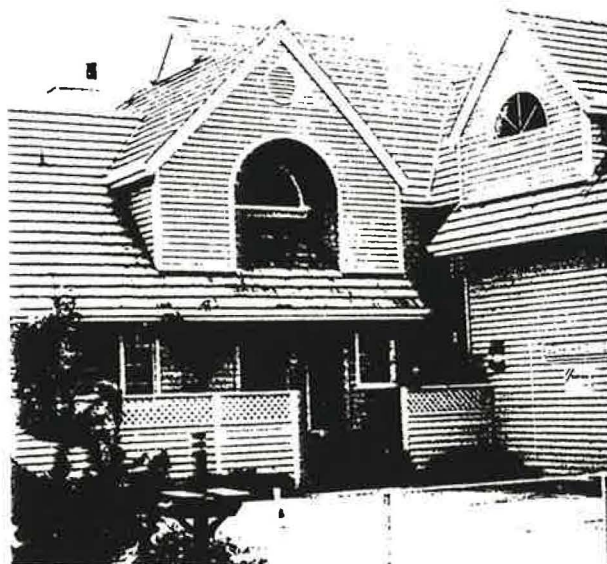
A study of housing ventilation—air movement from inside and outside a home—is generating information that will be used to develop energy conservation programs for Northwest homes. This flier provides basic information about the study.

What is the Purpose of the Study?

The study is designed to measure—and ultimately to better understand—ventilation rates in new, electrically heated homes. Information from participating residences will be combined and analyzed by researchers. The analysis will compare ventilation rates among the homes and determine possible reasons for variations.

Why is this Study Needed?

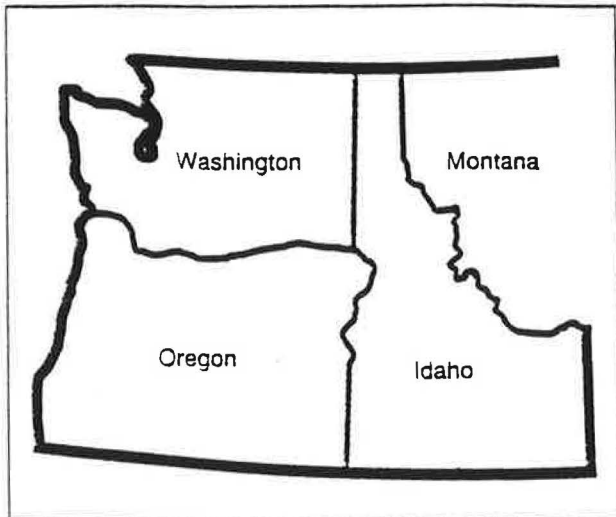
The Northwest Power Planning Council has proposed construction standards—called Model Conservation Standards—for making new homes more energy-efficient. In 1983, the Bonneville Power Administration initiated a program to encourage builders to use these standards in constructing homes in four Northwest states: Washington, Oregon, Idaho, and western Montana. Bonneville and the four state energy agencies that operated the program supervised the construction and evaluated the energy performance of 450 houses built to Model Conservation Standards as well as a control group of 450 houses built before 1984.



The objective of the study is to identify the average ventilation rate for homes constructed in the Northwest region since 1980.

Instruments were placed in both groups of houses—those built to Model Conservation Standards and the control houses—to record energy consumption as well as indoor and outdoor temperatures. Other types of measurements were taken to assess specific performance characteristics of various construction components in the houses. Two different types of equipment were used to measure the air tightness of the houses' shells. Fan pressurization (blower door) equipment was used in every new house; in 200 of both the new and older homes, perfluorocarbon tracer (PFT) equipment was also used to measure air tightness.





Over 200 homeowners in four states are participating in the ventilation study.

The study results revealed significant differences in estimates of ventilation rates as measured by the two types of equipment. Because government agencies rely on ventilation data to help establish policy and program directions for energy conservation, it was important to further investigate ventilation rates in new homes; in particular, to identify the factors that cause different measurement techniques to yield different results. To address these issues, a regionwide study has been carefully designed to expand our knowledge of residential ventilation.

Who is Conducting the Study?

The study is being carried out under a three-way partnership. With support from the region's State Energy Offices, two agencies sponsor and review the study: the State of Idaho's Department of Water Resources and the Bonneville Power Administration. Under contract with these agencies, Battelle Pacific Northwest Laboratories conducts the ventilation study.

How Will the Information Be Used?

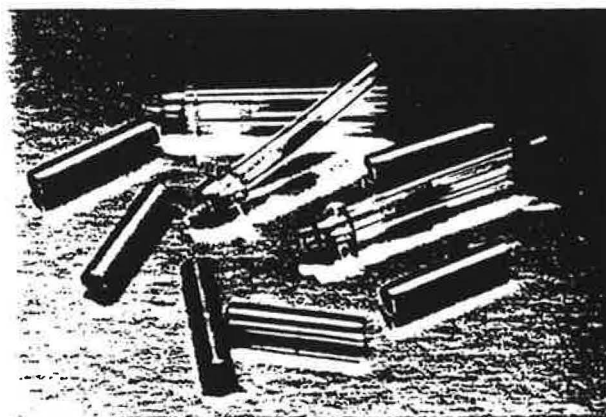
Bonneville Power Administration will use information from the study to plan and design energy conservation programs for new homes built in the Northwest. Data from the tests will help Bonneville evaluate the cost effectiveness of various conservation measures. Ultimately, the study will help Bonneville and regional power planners in making decisions about the management of the Northwest's electrical resources.

How Long Will the Study Last?

The study will be conducted during the 1987/1988 and 1988/1989 heating seasons. Ventilation-measuring equipment will be placed in homes for a 2- to 4-week period. Additional equipment will be placed in some of the homes for the entire heating season to measure ventilation changes over the winter.

How Many Homes Are Participating?

More than 200 homes are participating in this study. The houses are distributed within the Bonneville service area, which includes Washington, Oregon, Idaho, and western Montana. The wide distribution of homes ensures that various construction methods and climates throughout the region are represented in the study results.



PFT capsules and sample tubes are placed in homes to measure all contributions of fresh air flow over a period of time.

How Were Homes Chosen for the Study?

A random phone survey of homeowners in the study region was used to identify houses with the characteristics needed for the ventilation study. Important factors included year of construction, building techniques, architectural style, type of heating system, and the presence or absence of a whole-house ventilation system. Homeowners whose residences met the study criteria were asked to participate. From the volunteers, more than 200 homes were selected for the study.

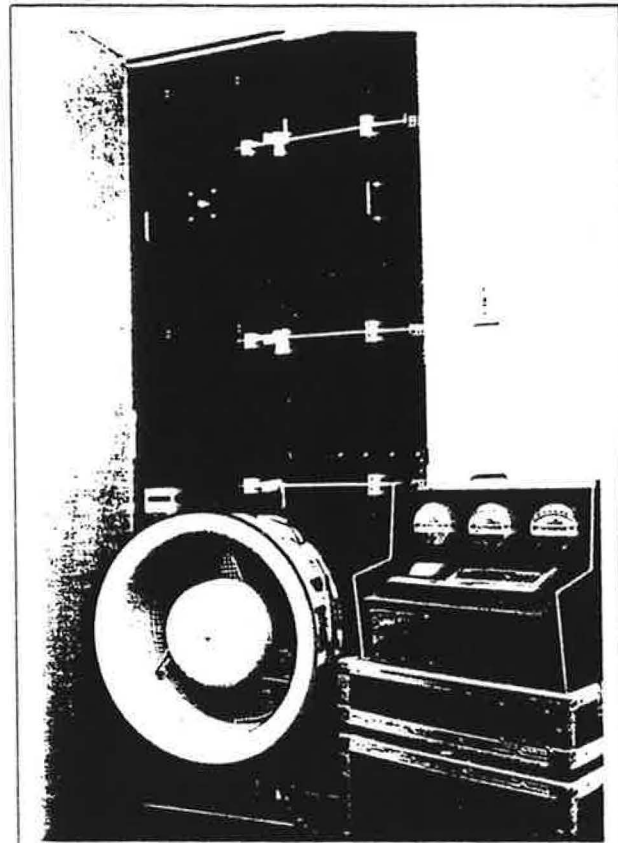
What Equipment Will Be Installed?

In each home, technicians install two devices commonly used to measure ventilation. The first is a blower door, which is a fan temporarily mounted in an outside door. The other is PFT equipment, which consists of several small containers that are placed in carefully selected locations in the home.

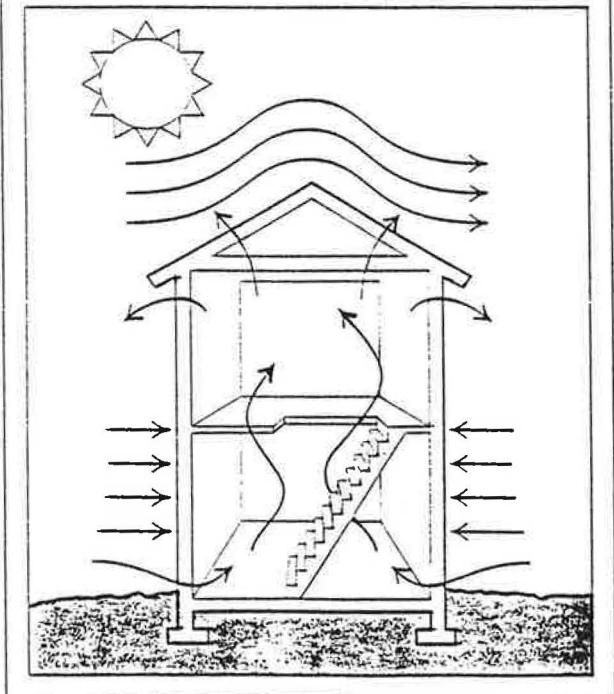
How Does This Equipment Measure Ventilation?

The blower door blows air into or out of a house to pressurize or depressurize it. While the blower door is operating, instruments on the blower door indicate the amount of air that is entering or escaping through tiny openings in the house's shell. The blower door measurement is like a snapshot because it provides a one-time measurement of ever-changing conditions.

The PFT measurement gives an estimate of the average ventilation rate of the entire house over a period of time. The PFT measurement includes all contributions to ventilation, such as kitchen and bath exhaust fans, open windows, opening and closing doors, and air leaks through the building shell.



The blower door is used to measure the amount of air that leaks, at one point in time, through tiny cracks or holes in the building's shell. (Photo courtesy of Retrotec Energy Innovations, Ltd.)





Information provided by homeowners will be used in conjunction with ventilation measurements to develop energy conservation programs for Northwest residences.

The PFT equipment is in place for at least 2 weeks. Small capsules (sources), about the size of a cap for a ball-point pen, slowly release a tiny quantity of harmless tracer into the home. Sample tubes, about the same size as the tracer capsules, measure the tracer concentration in the home. The tracer concentration gradually changes as outside air flows into the house over a period of time. Knowing the tracer concentration, researchers can calculate the amount of outside air that has entered the home.

About Battelle

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The Pacific Northwest Division includes the Battelle laboratories at Richland; the Marine Research Laboratory at Sequim Bay on the Olympic Peninsula; and the Human Affairs Research Centers on the campus of the Battelle Seattle Research Center, an advanced study and conference site.

Where Can I Get More Information?

If you have questions or comments, we would like to hear from you. For more information about the ventilation study, please call one of the following numbers:

Washington State Energy Office: (206) 586-5000

Oregon Department of Energy: 1-800-221-8035

Idaho Department of Water Resources: 1-800-334-7283

Montana Department of Natural Resources and Conservation: (406) 444-6697

Or write to:

**Graham Parker, Project Manager
Battelle/Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352**

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