HOME WEATHERIZATION AND INDOOR AIR POLLUTANTS
THE BONNEVILLE POWER ADMINISTRATION'S PREFERRED ALTERNATIVE
INFORMED CONSUMER CHOICE

Michael Piper
Bonneville Power Administration

In October 1984, the Bonneville Power Administration (Bonneville) began offering free radon monitoring to participants of its regionwide Residential Weatherization Program. The purpose of the radon monitoring is to provide information to participating homeowners or consumers on the average radon concentrations within their residences. This radon concentration information and other information on indoor air quality (IAQ) is provided to assist homeowners on their decision to install "house-tightening" weatherization measures.

Initially in 1981, Bonneville offered a limited weatherization program which restricted the installation of house tightening measures to only those residences which met specific criteria. An Enviromental Assessment of Bonneville's program at that time showed that occupants of dwellings could be exposed to increased concentrations of indoor air pollutants and the increase risk of adverse health effects.

After implementation of the limited program, Bonneville began preparation of an Environmental Impact Statement (EIS) or implementation of an expanded program. In October 1984, Bonneville expanded the weatherization program which made house-tightening measures available to all electrically heated homes in the Bonneville service area and adopted mitigation strategies provided for in Bonneville's Preferred Alternative.

The mitigation strategy adopted by Bonneville includes the following elements:

- Program participants are given information on indoor air pollutant sources and practical steps for reducing concentrations.
- Participants are provided the option of free radon monitoring prior to or after the installation of house-tightening measures; and
- Bonneville will assist in the payment for the installation of air-to-air heat exchangers (AAHX) in homes which exceed Bonneville's action level of 5 picoCuries/liter (pCi/l). The AAHX are sized to mitigate only the estimated incremental increase of radon concentration due to the specific house-tightening measures installed.

Bonneville's decision to adopt an action level of 5 pCi/l is an attempt to provide for the public welfare, while at the same time allowing the agency to pursue its energy conservation goals. The action level balances the estimated health effects against the cost and benefits of weatherization and mitigation.

RADON MONITORING PROCEDURES

1. The Energy Analyst or Auditor generally installs a radon detector at the time of the energy audit if the homeowner has selected to monitor before weatherization. A passive nuclear track radon detector is used in Bonneville's Residential Weatherization Program.

2. Each radon detector is deployed in a centralized living space on the first floor completely above grade.

3. For each radon detector installed, information is collected which allows Bonneville to locate the source of the monitoring and provides for the mapping of the radon results by range and township on U.S.G.S. maps.

4. The radon detectors must remain in the residence for at least 3 winter months, but not longer than 12 months. After which the radon detector is retrieved by the utility or program operator and returned for analysis.

5. The radon results are provided to Bonneville and to the utility or program operator. The utility or program operator in turn must provide the homeowner or consumer with the radon results. Along with the results, the homeowner or consumer receives a histogram of radon distribution for the region which may be used for comparison purposes.

6. If radon results indicate a radon concentration greater than 5 pCi/l, Bonneville's action level, the homeowner is then offered assistance with the purchase of an AAHX. If radon monitoring was completed before house-tightening, a composite radon concentration is determined by estimating the increase in radon concentration that might occur as a result of the installation of specific house-tightening measures.

MONITORING ACTIVITY

As of June 1986, Bonneville had provided approximately 35,000 radon detectors to program operators for use in the Weatherization Program. At this same time it was estimated that approximately 25,000 of these were installed in residences and awaiting the prescribed exposure time before being submitted for analysis. Bonneville has received results from approximately 14,000 residences in the Pacific Northwest.

RADON RESULTS

With nearly 14,000 results received to date, 3.0% exceed Bonneville's Action Level of 5 pCi/l. Utility service areas vary widely. Generally, utilities west of the Cascades have low radon levels, while utilities located in eastern Washington, Idaho, Montana, and Wyoming have higher than average levels. Current program data suggests that most utilities (47%) can expect to have some homes which exceed Bonneville's Action Level.

FUTURE DIRECTION

Bonneville is currently looking at correlating the radon results with geology. This geological analysis may allow the elimination of certain areas from the radon monitoring requirement and may be useful for the siting of new homes. Also, Bonneville will begin incorporating new radon mitigation technologies such as sub slab depressurization and pressurization, basement pressurization, and active crawl space ventilation. Future research will continue to look at new mitigation technologies and may reconsider assumptions on the effect of house-tightening and/or house doctoring on radon levels.

Table I. Summary of regionwide radon results, June 1986.

No. of Sites	Highest Reading	No. Readings Over 5 pCi/l	Arithmetic Mean	Percent Over 5 pCi/l
13,985	92.41	420	1.15	3.0%

Table II. Summary of regionwide radon distribution.