



COLD CLIMATE HOUSING RESEARCH CENTER

CCHRC

*Promoting and advancing
the development of healthy,
durable and sustainable shelter
for Alaskans and other
circumpolar people.*

Home Ventilation: Using Traditional Methods in Modern Times

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The Sustainable Northern Shelter program (SNS) is developing energy-efficient and affordable homes that can withstand the extreme climatic conditions of Alaska while reflecting a community's lifestyle and culture. The program involves local residents in each project at all levels of design and construction. Building on this foundation of community participation, SNS is able to combine tradition, modern technology, and environmentally responsive building design. The SNS process results in comfortable, economical, and long-lasting houses that are a natural fit for the people who call them home. During the planning of the house in Anaktuvuk Pass ventilation was a central issue.

In early discussions with Tagiugmiullu Nunamiullu Housing Authority (TNHA) and Stakeholders regarding the Sustainable Northern Shelter house to be built in Anaktuvuk Pass, various building methods, materials, and technologies were examined. To ensure low energy use, this house



Qingok in the CCHRC test module

needed to be very well insulated and very air tight. From that requirement grew the need to regulate air exchange, allowing fresh air in and stale air out. The two options were considered sufficient in terms of performance and feasibility, a Heat Recovery Ventilator system and a traditional, passive-ventilation Qingok.

A Qingok is a "stove pipe" that created a stack effect in traditional subterranean houses. This effect was possible because traditional houses were not well sealed and the Qingok created a negative pressure by allowing hot air to leave thus pulling fresh air in from outside through any cracks.

When CCHRC hosted a design charrette with the residence of Anaktuvuk Pass, they decided to present both the HRV system and the Qingok as options. The people of Anaktu-



Sod dwelling in Anaktuvuk Pass. Photo by Ward G. Wells. Anchorage Museum of History and Art.

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vuk Pass were very enthusiastic about using a Qingok. In many of their opinions, the Qingok had always worked and the HRVs were not always reliable.

Typically, in cold climate construction, an HRV system is used to bring fresh air into the home. Through early conversations with the residents of Anaktuvuk Pass it was discovered that there was resistance to the use of HRVs in the village. This aversion is a result of the regular maintenance required for HRVs, such as changing air filters, and the difficulty in finding someone to make repairs on the systems, if necessary.

The TNHA had no experience with Qingoks and was concerned about using one in the Anaktuvuk Pass house design because a chimney design used in some of their houses in the late 1990's failed due to ice formation. While this chimney carried combustion gases instead of ventilation exhaust and was probably less insulated than the proposed Qingok, these concerns called for testing of the Qingok to ensure the suitability of the design.

As a result of the people's interest in using a Qingok in the new house design, CCHRC decided to install and test a Qin-

gok in a test module. The test module was designed to test and demonstrate, building techniques and materials that were to be used in the Anaktuvuk Pass home. CCHRC teamed with G.W. Scientific to monitor the test module. The goal was to monitor the structure throughout a cycle of freezing and thawing. During this period the test module was heated and humidified. Throughout this demonstration CCHRC monitored the Qingok for possible frost buildup, freezing, and amount of air change. Lacking natural leakiness, negative pressure was created in the tightly insulated test hut by supplying an air intake. Because this house was super insulated with 9 inches of spray applied soy-based foam insulation, the Qingok was in turn well insulated. As a result, the warm, moist air from inside did not cool before exiting the house, thus no ice built up on the Qingok. Air was allowed to leave from the house freely.

The TNHA, the residents of the village of Anaktuvuk Pass, the Stakeholders, and CCHRC are now all in agreement that the Qingok should be utilized in the Anaktuvuk Pass Prototype House to be built in June of 2009. The use of modern spray applied insulation has assisted in allowing the traditional Qingok to be used again in modern times.



CCHRC's SNS Test Module



The Test Module Qingok

SNS Partners Include:

Tagiugmiullu Nunamiullu Housing Authority, Canada Mortgage Housing Corporation, City of Anaktuvuk Pass, U.S. Dept. of Commerce, GW Scientific, Alaska State Museum, Alaska Housing Finance Corporation, Nunamiut Corporation, Ilisagvik College, Lifewater Engineering Company, Yukon River Inter-Tribal Watershed Council, Engineering and Environmental Internet Solutions, Demilec USA.