



# CCHRC QUARTERLY REPORT

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## CCHRC

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## CCHRC: This Quarter in Review

CCHRC has begun a capital campaign to raise private state & local funding for the construction of the Cold Climate Building and Infrastructure Research and Test Facility (RTF). We are very fortunate to have Karen Lidster, an experienced local fundraiser, join us in this campaign effort. Karen is an enthusiastic supporter. Please see page 3 for more on her efforts thus far.

CCHRC held its 4th Annual General Membership meeting in Homer, Alaska, on October 29th, in conjunction with the Alaska State Homebuilders Convention. Incumbents on the CCHRC Board of Directors retained their seats for another year. We were joined by Dr. Theresa Weston, an ex-officio board member and a building science technology leader at DuPont. Her advise on developing corporate relationships was extremely helpful in our operational planning for the RTF.

The current issue and archive issues of the CCHRC Quarterly Report are always available at our website [www.cchrc.org](http://www.cchrc.org). In the hope that it will be even easier to access for the 900 members of the Alaska State Home Builders Association (ASHBA), we plan to send an email friendly version to the ASHBA locals who will then send it out to their members.

Membership is very important to a nonprofit organization like CCHRC. Not only does it give us credibility with our funding agencies, but membership funds are the only unrestricted funding we receive. Thank you for your support. A renewal form will be sent to you when your current membership has lapsed. Please renew and help CCHRC continue to provide useful, up-to-date Cold Climate building information. Membership information is also available at our website.

## Message from the President/CEO

*Dear homebuilders, building scientists, supporters and Alaskans,*

A great deal of effort has been made this quarter to further develop CCHRC's relationship with the University of Alaska. The Cold Climate Building and Infrastructure Research and Testing Facility (RTF) will be located on land adjacent to and leased from the UA Fairbanks Campus for a number of reasons beneficial to both CCHRC and the University. The complexity of developing this formal relationship while maintaining CCHRC's clear autonomy has not been a simple process. It is worth the effort.

Our organization will have access to the intellectual and student resources of the statewide University system. This pool of talent will be necessary to accomplish the

ambitious research goals and agenda we have committed to. Identifying and prioritizing the research needs of the building industry and Alaskan communities (through statewide Research Advisory Committees) is a fundamental activity at CCHRC. Creating research projects from those identified needs results in developing solutions to real problems related to cold climate shelter and infrastructure. This is a very attractive approach to many grant funders and truly defines "applied research". Collaborations with research faculty will strengthen proposals for both of us.

The University of Alaska's Institute of Northern Engineering will be leasing one of the RTF labs for structural testing. This

*(Continued on page 4)*

## Remediation of Smoke Particles in Fairbanks Homes - June-August 2004 by William Reynolds

**Contributors:** Dr. Catherine Cahill, UAF and Dr. James Conner, FNSB Air Quality Specialist

**Funding:** Cold Climate Housing Research Center and Alaska Housing Finance Corporation

**INTRODUCTION** - The Alaska forest fires in the summer 2004 produced airborne particulates in the vicinity of Fairbanks that were categorized as hazardous by the EPA. These fine particles are known to exacerbate asthma and allergies. A previous study by William Reynolds of *Solutions to Healthy Breathing* and Dr. Catherine Cahill of the Geophysical Institute of the University of Alaska Fairbanks showed that different ventilation and filtration strategies resulted in significantly different levels of particulate infiltration. In this study we evaluated the ability of HEPA air filtration units made by Fantech to reduce the level of fine particulates in the indoor air.

The particle size range measured in this study is referred to as PM 2.5, which means particles that are 2.5 microns in diameter or less. Although there is no established indoor air quality standard, the EPA has set an allowable outdoor standard for PM 2.5 of 65 micrograms per meter cubed ( $65 \mu\text{g}/\text{m}^3$ ) for a 24-hour average. Outdoor PM 2.5 levels in Fairbanks exceeded  $1000 \mu\text{g}/\text{m}^3$  during the summer of 2004. The objective of this study was the reduction of interior PM 2.5 and a comparison of this reduction in pressurized versus non-pressurized homes.

**METHODS** - *Solutions to Healthy Breathing* purchased 20 Fantech 300 HEPA Filter Systems and made them available to the public at cost with the provision that CCHRC could monitor the indoor particulates. Homes were selected on a first come, first served basis, without consideration of size, age, tightness of construction, location, or ventilation presently installed. All respondents reported some form of respiratory distress.

The Fantech filter system used in this study has a pre-filter to remove larger particles, a carbon filter to reduce VOCs (volatile organic compounds) and a true HEPA filter (99.97% removal of all particles down to 0.3 microns). The unit is designed to work with an existing forced air system, an HRV system or to be stand-alone filtration. It came with a single speed fan that delivers air at a maximum rate of 240 cfm. *Solutions* added an electronic fan speed control for more flexibility in air movement. Fantech supported the research effort with technical information and free filter element replacements.

The Fantech Filter systems were placed in 19 homes during the time period of July 10 through July 20. The test homes were divided into two groups with systems installed in a pressurized and non-pressurized configuration. In the first group of 9 homes filtration was a supply-only system to pressurize the house to prevent ingress of particulates via natural infiltration. The pressurized configuration of this group was achieved by blocking an open door or window with a sheet of rigid insulation. A hole was cut in the insulation and a collar was installed and connected to the intake of the Fantech filter system with a flexible duct. In the second group of 10 homes, filtration of interior air was achieved through recirculation of in-

door air only. In both groups, doors and windows were closed during sampling periods. Due to constraints of time and resources, blower door testing was not conducted in any of the homes.

Sampling was conducted from mid July through the end of August during times of elevated outdoor particulates. Due to occupant traffic, construction of the dwelling and varied existing ventilation penetrations, the initial outside to inside particulate ratio varied greatly house to house. Any active or passive ventilation installed was turned off during testing. All systems had been in operation in excess of 24 hours prior to sampling. At each home the indoor and outdoor air was sampled at least once. Sampling time varied between a minimum of one hour and a maximum of eight hours. Two homes, one recirculation only and one pressurized, were resampled at 1-hour intervals for 7 hours with PM 2.5 particulate levels commencing at natural infiltration levels for each dwelling.

**RESULTS** - The improvement of indoor air quality that resulted from filtering the air was remarkable. In the first group of 9 homes with a supply of filtered outdoor air to pressurize the house the net reduction of PM 2.5 inside the home was 87-92% compared to outside. In the pressurized homes, the rates of air exchange varied between 2 and 4 air changes per hour (ACH) depending on the size and integrity of the dwelling. Interior pressures during fan operation measured 0.7-1.4 Pa above outside atmospheric pressure. In the second group of 10 homes with recirculation of indoor air only, the net reduction of PM 2.5 inside the home was 76-87% compared to outside. In follow-up interviews, all recipients of the Fantech HEPA Filter Systems reported beneficial health improvements as a result of this study. Improvements were rated from "better to "very substantial".

### Current Project List

**Building America II**  
**Healthy House Initiative**  
**Regional Housing Authority Consultation**  
**REMOTE Study**  
**Combustion Air/CO Study**  
**Infrared Thermography Study**  
**Strawbale House Monitoring Project**  
**Health House VOC Monitoring**  
**Kenai Indoor Air Quality Study**  
**South Central Ventilation Study**  
**Frost Protected Shallow Foundation Study**  
**Smoke Study**  
**Housing Needs Survey**  
**Permafrost Monitoring Study**

Information on all projects available at: [www.cchrc.org](http://www.cchrc.org)

## Capital Campaign in Progress

Karen Lidster has been working with CCHRC since September 20th to help conduct our RTF capital campaign. She began sending out capital campaign packets to local businesses in mid-October. Karen will follow-up on these requests in a continuing effort to reach out to the community to secure \$500,000. These funds are important in CCHRC securing an anticipated matching \$500,000 from the Rasmuson Foundation.

Capital campaign packets have been sent to oil companies, banks, title insurance companies, labor and trade unions and native corporations. The initial personal contact with Presidents and CEOs sharing the CCHRC mission has been well received and we are expecting a successful campaign.

Karen also joined our Annual General Membership meeting in Homer to update the Board of Directors on the campaign effort and to secure their donations. The board approved the idea of naming rooms in the RTF after those corporations that contribute a specified amount. The board has also agreed to make contact with their business associates and invite them to make an investment in the RTF. Such an investment benefits their company by providing a tax deduction, increasing name recognition for their business, and improving the homes of their Alaskan employees.

If you know some Alaskan business that should be contacted to join in this campaign please contact Karen at our office or at [klidster@gci.net](mailto:klidster@gci.net).

We hope to garner support from many Alaskan businesses and from all over the state.

## RTF Update

by Mike Musick

The site for the CCHRC Research and Testing Facility is covered in a thick fluffy white blanket of insulating snow. This bodes well for an early start next year since the ground will not freeze deeply if at all this winter under the proposed building site. Driving vehicles and snowmachines on the roadway will compact the snow reducing the insulation effect. This will likely allow the ground to freeze thereby providing support for heavy road building equipment before breakup next spring.

Exclusive Landscaping and Paving completed the storm water retention pond excavation and surcharge placement over the footprint of the RTF on Thursday, October 14, 2004. The resulting dirt pile is 15 feet high by 160 ft. square over the lab area and 6 feet high over the office area. The storm water pond is about 100 feet wide by about 250 feet long by about 11 feet deep. Exclusive also installed two culverts to accommodate melt water runoff next spring at breakup.

A gate was installed across the pioneer access road to keep unauthorized vehicles off the site.

We anticipate completing road construction early next spring while the ground is still frozen. We will move the dirt pile surcharge and begin excavation for the basement as soon as the ground is thawed assuming completion of long-term lease negotiations with UAF.

The land surveying is complete and property corners set. Test wells will soon be drilled to monitor water level and thermistors are going to be placed in strategically located dry wells to record soil temperatures at different depths and locations. The met station continues to record weather data which can be read on the CCHRC web site.

Structural and mechanical design work continues and should be available for review in the next week or two. We will begin consultation on the electrical design next week.



## ASTHMA & ALLERGIES

Asthma and allergies may be caused or made worse by things in the air you breathe. Pets, tobacco smoke, cockroaches, and damp living areas can all pollute the air and make asthma worse. There are lots of steps you can take to improve the air in your home.

- First, if you smoke, do it outside and away from children.
- Regular housekeeping can reduce dust and protect your family's health:
- Wipe windowsills with a damp cloth often
- If you have carpets, clean them often. Use a vacuum cleaner with a special filter called a "HEPA" (High Efficiency Particulate Air) filter. These vacuums can reduce air quality problems.
- If you have hard floors, clean them often with a damp mop.
- Keep mildew and mold from growing in your home by:
- Getting rid of standing water anywhere in your house
- Fixing leaks right away.
- Making sure rainwater drains away from your house.
- Using your ventilating fan when bathing, showering, or cooking.

← One page from:

### Help Your Family To A Healthy House

*A booklet compiled by Alaska Building Science Network for CCHRC's Alaska Healthy Homes Initiative. Booklets will be sent to Housing Authorities throughout Alaska.*



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leaseback will provide immediate income for maintaining and operating the facility while providing the only “strong- floor” in the state. The University’s Rural College will be looking for ways of developing studies and partnerships to improve the lives of rural Alaskans through joint research projects with CCHRC. The School of Management will be exploring ways of creating product and intellectual property agreements that will generate ongoing revenue streams to CCHRC from CCHRC/UA projects. The Co-operative Extension Service (CES) will have a home in the facility and provide outreach and educational functions. The School of Natural Resources and Agricultural Sciences will join with us in pursuing studies to identify and develop local sources of sustainable building materials. The Arctic Energy Center may be involved with experimenting with on site co-generation systems in the RTF. Information Technology (IT) support, grant writing, library and super computer resources will become available to CCHRC in our collaborations with the University. These are just some of the exciting activities that will be possible as our relationship with the University of Alaska matures.

At our core CCHRC is and will remain a builders research center as the founders envisioned. This sets us apart from most research institutions. However, we as Alaskans stand to gain from a strong and enduring relationship with our University. I believe our organization will benefit immeasurably from this partnership.

Best to all of you on these beautiful early winter days,

*The CCHRC Quarterly Report is sent to members, funding agencies and to those requesting information about CCHRC. Response to this report is welcome.*

*The RAC is appointed by the Board of Directors to advise CCHRC on research projects. Contact a committee member in your area with your input and concerns.*

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**Regional Chairs**

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