

Building Technology Research Unit 2011 Annual Report

State Farm Insurance Companies®

A. Overview and Organization

The Building Technology Research Unit (BTR) of State Farm® was organized in 1995 to investigate residential construction issues related to loss experiences. Insured losses may arise out of natural disasters, such as hurricanes, earthquakes, hail, and wildfires, as well as non-catastrophic events such as fire, water damage, and theft. The unit resides in the Technology Research Division of State Farm's Strategic Resources Department.

In mid-2011 the unit was consolidated at the research laboratory, renamed the Technology Research and Innovation Laboratory (TRAIL). Additional staffing from State Farm's Auto Technology Unit and Systems Ideas @ Work team were also moved to TRAIL in order to develop synergies around common technologies and to leverage advances in technology from the automotive side that have not yet made it into homebuilding (e.g. sensors, automation, etc.).

B. Research Projects & Activities

Water Loss Mitigation Testing – Engineers reviewed several new water loss mitigation devices that were marketed to detect leaks or burst pipes. Household fixtures and appliances were studied to acquire information regarding the risks, limitations, and advantages of the different types that are commonly available. Information obtained by this research is used to develop loss mitigation information messages for homeowners and State Farm associates. Informational videos on dishwashers and sump pumps, as well as a display on frozen water pipes, were produced to educate State Farm associates.

Cooking Fires – Laboratory staff conducted a preliminary study of electric turkey fryer safety. These devices appear to be safer than the gas fired versions available to consumers as they have no open flame, though they present similar hot oil burn risks. The unit also assisted State Farm's Public Affairs unit to create an online docudrama, the William Shatner Turkey Fryer safety video, which went viral and raised awareness about the dangers of improper turkey frying.

Roofing Material Study – Laboratory staff continue observation of roofing materials installed on permanent exposure racks for a long-term durability (weathering) study in Austin TX and Bloomington, IL. The Unit completed its assessment of roof covering systems at the 5-year interval. The assessment included tear-resistance and impact-resistance testing. We will continue to test the products, with the next interval at 10 years.

Wind Mitigation – BTR staff collaborated with IBHS (Institute for Business and Home Safety), the Foam Sheathing Coalition, NAHB RC, and the Vinyl Siding Institute to look at full scale testing of wind effects on siding and sheathing. This is essentially an extension of the research funded by State Farm at the University of Western Ontario (see below). Findings from IBHS

will be presented at the ATC-SEI Hurricane Engineering conference in October, 2012 in a jointly authored paper by the collaborators.

Seismic Research – BTR continues participation on and support of the Executive Committee of the New Madrid Earthquake Scenario Committee of EERI. The creation of a variety of earthquake scenarios (planned to commemorate the 1811-1812 New Madrid earthquake events) will assist in educating governmental leaders, business leaders and the public to the potential seismic risks.

C. Other Activities:

- **University Collaborations**

University of California, San Diego (UCSD) Jacobs School of Engineering. At year-end 2011, State Farm donated funds to UCSD to support research by Dr. Tara Hutchinson who is investigating seismic damage to non-structural components and systems in a test structure on the Englekirk Center shake table. State Farm also plans to collaborate with Dr. Hutchinson in 2012 as a participant in this research project. As of 2010 State Farm has held a position on the UCSD Englekirk Center Advisory Board and looks forward to future additional collaboration with the UCSD Structural Engineering faculty.

Texas Tech University (TTU). State Farm continues its relationship with Texas Tech University and will be making a presentation of one of our wind-related research projects in 2012 to an audience of university faculty, post-doctoral researchers, and doctoral candidates at TTU's Wind Science and Engineering Research Center.

University of Illinois (U of I). BTR works through the State Farm Research and Development Center at University of Illinois' Research Park. Students and faculty work alongside State Farm employees researching initiatives important to State Farm. This work together creates real-world educational opportunities allowing for collaboration on a variety of important research initiatives. Students from other universities are also able to be hired for research work through this venue.

University of Illinois (U of I) / (IFSI) Illinois Fire Service Institute. BTR members continue to engage with faculty and staff at the Illinois Fire Service Institute. Several attended the annual open house and toured the new research, library, and educational facility under construction.

University of Western Ontario. A paper delineating BTR sponsored research at the Insurance Research Lab for Better Homes (Three Little Pigs) testing lab at the University of Western Ontario has been accepted for publication in the ASCE Journal of Structural Engineering. The BTR Unit completed work at UWO including wind pressure tests on wall panels with foam sheathing with lightweight siding materials. The testing advanced our understanding of pressure equalization and "load sharing." This research will advise further research at the IBHS Research Center where testing will look at the effect of surface air flow on light-frame construction siding and sheathing materials.

- **Committee Work**

State Farm engineers and architects continue involvement in codes and standards organizations such as NFPA Fire Research Foundation, NIST, UL, ASTM, ANSI, ICC, as well as professional organizations, AIA, SEAIO, ASPE, etc.¹ Contributions include work on committee and technical panel level activities as well as facilitating discussion and learning opportunities (hosting meetings). Work also includes review of ICC code proposals, attending and testifying at the hearings.

BTR staff members serve on several UL Standards Technical Panels including: *Impact Resistance of Prepared Roof Covering Materials* (2218), *Household Electric Ranges* (UL 858), *Arc Fault Circuit Interrupters* (1699), *Ground Fault Circuit Interrupters* (943) and *Sustainability for Lightning* (ULE 106). BTR's electrical engineer is serving his third year on UL's Electrical Council and also serves on the Fire Protection Research Foundation's *Electrical Safety Research Advisory Council* and their technical committees on *Cooking Fire Prevention* and *Safety of Non-linear Electrical Loads*. Unit members serve on EERI's New Madrid Earthquake Scenario Executive Committee. State Farm BTR staff was invited to participate in the USDA Forest Products Laboratory's Solid Wood and Composites Research Liaison Meeting.

Committee participation also involved writing the new ANSI/FS 100-2012 (anticipated) Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies. The draft standard dated 12/2/2011 was distributed for Public Comment in accordance with ANSI process.

- **Public Outreach**

Severe Weather Video Production - TRAIL hosted Chief Meteorologist Dan Threlkeld of station KJRH (owned by Scripps Broadcast Group) for the filming of severe weather testing at the State Farm. BTR Staff was interviewed on camera about the weather related testing conducted. Various testing stations were shown and the benefits of impact resistant glass and impact resistant roofing were demonstrated. Additionally, the hail gun was used to dent the door of a vehicle and smash a glass patio table in order to show how hail damages common items we insure. KJRH also shot footage and talked about the testing State Farm conducted regarding installation of severe weather Safe Rooms.

It was anticipated that the Scripps Broadcast Group would also make footage available to stations, in: Phoenix, AZ, Tampa/West Palm Beach, FL, Lawrence, KS, Baltimore, MD, Detroit, MI, Kansas City, MO, Cincinnati/Cleveland, OH.

¹ NFPA (National Fire Protection Association), NIST (National Institute of Standards and Technology), UL (formerly known as Underwriters Laboratories, Inc.), ASTM (ASTM International, formerly known as the American Society for Testing and Materials), ANSI (American National Standards Institute), ICC (International Code Council), AIA (American Institute of Architects), SEAIO (Structural Engineers Association of Illinois), ASPE (American Society of Plumbing Engineers), and EERI (Earthquake Engineering Research Institute)

Consulting for “This Old House” – State Farm was contacted by the producers of This Old House seeking recommendations for an episode to be filmed in Philadelphia. BTR was queried for information regarding preferences and experiences with back-up sump pumps, particularly battery back-up models.

Holiday Safety - the CBS “Early Morning Show” videotaped a segment at the BTR lab on Holiday Safety. This videotaping was organized by the Electrical Safety Foundation International to promote electrical safety issues during the holiday and involved a Christmas tree fire.

Seismic Safety and Hazard Mitigation - TRAIL staff was contacted by CUSEC (The Central United States Earthquake Consortium) concerning an opportunity to participate in the design and construction of a home being built in Memphis to raise money for St. Jude Children’s Research Hospital. State Farm, along with IBHS, worked to ensure that the raffle house will be built to Fortified for Safer Living criteria. This home will be highlighted during the 2012 National Earthquake Conference for its seismic resistant features.

Plumbing System Education – TRAIL engineer delivered a Lunch & Learn webcast on PEX Plumbing Systems to the Central Illinois Chapter of the American Society of Plumbing Engineers. Over thirty ASPE members were in attendance.

- **Insurance Industry Research Update**

IBHS Multi-Peril Research Facility: In 2011 IBHS completed the construction and the calibration of its new research facility. This allowed State Farm / BTR to engage in the testing on full scale buildings to determine the wind effects on siding and sheathing. Others parties participating in this joint research were NAHB RC and the Vinyl Siding Institute. The IBHS research center has the have the ability to subject 1,800 sq. ft., 2-story home Category 3 hurricanes wind speeds.

Contact:

Rose Geier Grant, AIA, CPCU
Program Director
State Farm Insurance Companies
Strategic Resources Department,
Building Technology Research Unit
1 State Farm Plaza, D-3
Bloomington, IL 61710
Phone (309) 766-7044
FAX (309) 766-3662
rose.grant.gsxj@statefarm.com