



# Hathmore Technologies, LLC

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PO Box 1157 - Blue Springs, MO 64013-1157



**Energy Audit for Gary & Bobbi Walker**

**March 18, 2008**

**Napoleon, MO 64074**



# Hathmore Technologies, LLC

Dear Mr. & Mrs. Walker,

Attached is a listing of the items we noted during our recent energy audit at your residence. Information has been included on materials to be used and how to do-it-yourself (if you are so inclined.) We depressurized your home with a blower door and located air leaks in your home. We found many areas that could be improved and believe that you will be able to derive benefit from air sealing and additional insulation.

In addition to explaining how to do much of the work yourself, we will mention companies to you that will be able to help you with almost all of this work. Of course, we can't guarantee their workmanship, and you should check them out for yourself before contracting with them. We would appreciate it if you would keep us informed of your experience should you choose to have another company help with any of the work. This helps us know who to recommend to our clients. We would also appreciate it if you would let these companies know that you heard about them through us. Please note: if you decide to purchase anything from [www.EnergyFederation.org](http://www.EnergyFederation.org) - be sure to use the coupon code "highbills" at checkout (in the "Coupons and Promotions" field) and you will receive 10% off of your purchase.

Please review the energy issues and improvement recommendations detailed and give me a call if you have any questions. Good luck with your energy improvements. We sincerely appreciate your business!

A handwritten signature in black ink, appearing to be 'Amy Walker', written in a cursive style.

Amy Walker, LEED AP  
Energy Consultant  
Certified Energy Rater  
Hathmore Technologies, LLC

## I. Exterior Envelope

	<p><b>Gutters and downspouts should be installed to direct water away from the home's exterior walls and foundation.</b></p>
	<p><b>The gaps and seams at the underside of the dining room cantilever should be sealed with caulk to keep unconditioned air from penetrating the wall cavities.</b></p>
	<p><b>The dryer vent is under the deck and not accessible to check for lint buildup. Lint buildup in the vent can cause the damper to stick open and can also become a fire hazard. The dryer duct should be removed from the interior and the vent cleaned regularly to prevent buildup of lint in the vent.</b></p>

## II. Upper Envelope (Attic)



The flue pipe for the furnace and water heater has been sealed with duct tape. Duct tape will become brittle over time and lose its adhesiveness. This flue pipe should be repaired and continued out the roof with properly sized flue pipe. This should be a priority fix as flue gasses can infiltrate the home through gaps and cracks in the ceiling and can cause illness.









Attic insulation is a 5" layer of fiberglass batt topped with drywall and 5-9" of blown fiberglass with an R-value of 27. An insulation value of R-49 is the recommended value for our region.

The sheet rock between the layers of insulation acts as an air barrier and could trap moist air against the thin layer of batt insulation below. The sheetrock should be removed.

Fiberglass insulation performs best when sealed on all six sides. In an attic, it tends to allow air to pass through and infiltrate through cracks and gaps in the ceiling. Recommendation is to rake remaining insulation smooth and blow a minimum of 6" of cellulose over the fiberglass. Cellulose will provide a better air seal and is not attractive to rodents.

	
	<p><b>Drywall has been installed as baffles at each eave vent to prevent wind washing of the insulation.</b></p>
	<p><b>Insulation above the entry area is layers of foam boards stacked on each other. This is not an effective method of insulating this area. Recommendation is to remove this foam board and insulate this area with blown cellulose insulation.</b></p>

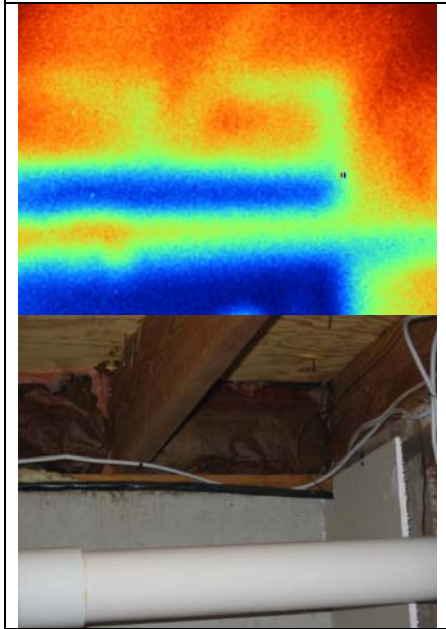
	<p>The ceiling above the stairway and the knee walls have fiberglass batts covered on the attic side by foil faced foam board insulation. This makes a good air barrier, however, some of the facing has been torn and the seams are not taped. Recommendation is to repair all tears and seal all seams with foil tape.</p>
	<p>New ventilation was added with the new roof, however the old vent holes were not covered. The tar paper that was put over the holes has become damaged. This means that if any water gets behind the roofing it has a large, open direct path into the attic. This tar paper needs to be repaired so that any water that gets behind the roofing will be directed to the lower roof edge, and it would be a good idea to seal the old vent holes with plywood to prevent future damage to the tar paper.</p>
	<p>There is debris in the insulation. This inhibits the homes energy performance as well as encourages mold, mildew and insect and rodent infestation. Debris should be removed prior to adding additional insulation.</p>
	<p>The attic access door in the master bedroom closet is un-insulated, has no weather-strip and is very leaky. The attic access should be insulated using both custom-cut foam board and weather-strip or install an attic access insulation kit. Information regarding attic access insulation kits can be found at: <a href="http://www.highenergybills.com">www.highenergybills.com</a></p>

	<p>The attic access door second floor bedroom closet has no weather-strip and is very leaky. The attic access should be insulated using both custom-cut foam board and weather-strip or install an attic access insulation kit. Information regarding attic access insulation kits can be found at: <a href="http://www.highenergybills.com">www.highenergybills.com</a></p>
	<p>The insulation in the upper attic is being blown around by the whole house attic fan. There are drifts of insulation and areas with very little insulation. This usually happens when there is not enough free ventilation area for the size of the attic fan. The air cannot get out of the attic fast enough, so it causes a lot of turbulence and blows the insulation away from the ceiling.</p>
	<p>Whole house attic fans are very leaky. If this unit is not going to be used it should be removed and the ceiling should be sealed and insulated. If it is going to be used, it should be insulated and additional ventilation area should be added to the attic. Information regarding attic fan insulation kits can be found at: <a href="http://www.highenergybills.com">www.highenergybills.com</a></p>

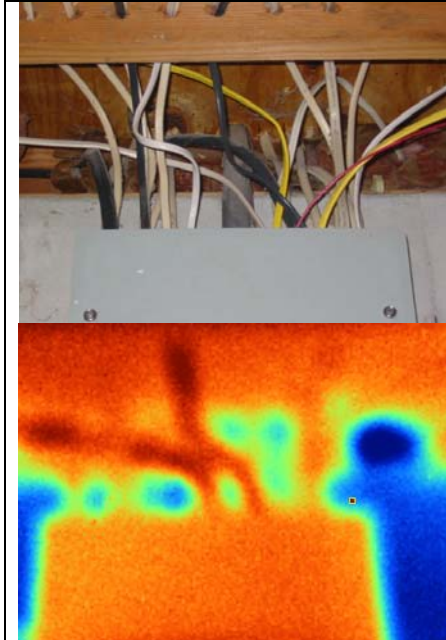
### III. Lower Envelope (Basement)



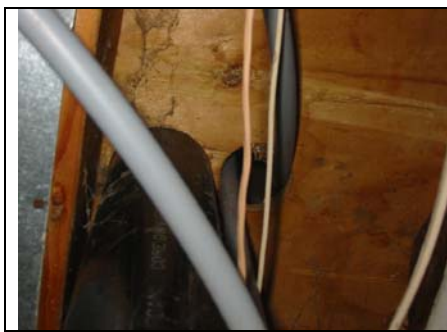
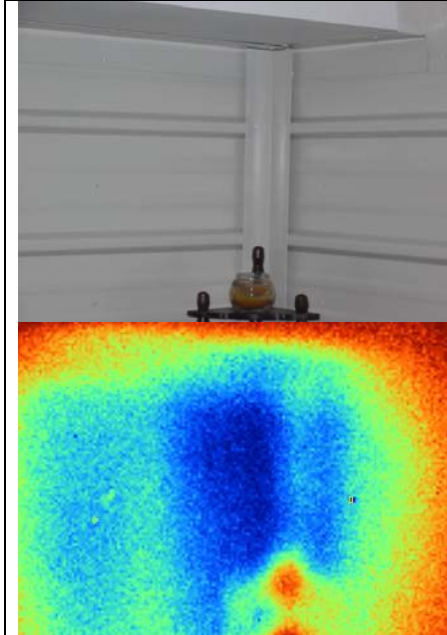

The rim joist is insulated with fiberglass batts but not well sealed. If improvement to this area is desired, recommendation is to remove all fiberglass insulation and seal the rim joist with expanding foam insulation. This will provide a complete air seal as well as insulate.






This photo shows air leaking in between the rim joist and the foundation.



The electrical penetrations into the rim joist should be sealed with foam.

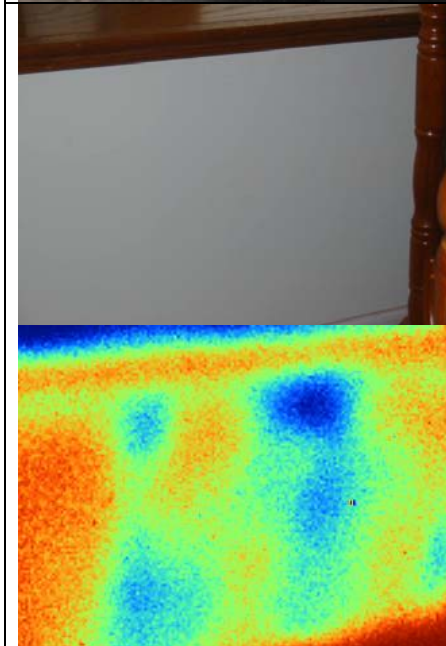
	<p>There are several basement-to-attic bypasses where wiring or plumbing stacks penetrate the basement ceiling and go up through to the attic. These openings should be sealed at both the basement and the attic with foam or caulk.</p>
	<p>The infrared photos show that there is probably no insulation behind the steel panels in the basement. If you decide to insulate the basement walls, we recommend a foam product such as spray foam or foam board. Fiberglass insulation installed in direct contact with concrete can promote mold growth.</p>
	<p>The floor of the master bedroom is not insulated. This area is above a very short crawlspace above a slab. It is highly likely that the band areas around the edge of this floor are also uninsulated. Recommendation is to blow this area full of cellulose insulation taking care not to shift or dislodge any of the ductwork that runs under this floor.</p>

#### IV. Interior Envelope

	<p><b>Windows are double pane with wood frames and for the most part are performing well. There were two windows with cracked glass that should be replaced.</b></p>
	<p><b>Some of the windows, especially the casements in the bay window in the Master bedroom have been painted shut.</b></p>
	<p><b>There are signs of condensation between the glass panes of the sash of one of the windows in the pink bedroom. This means that the seal between the panes of glass has been broken which reduces the insulating value of the window. The entire window can be replaced (costly) or the glass and seal can be repaired (less expensive).</b></p>



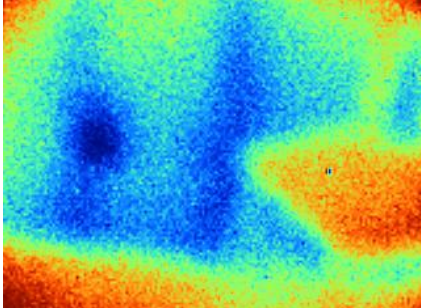

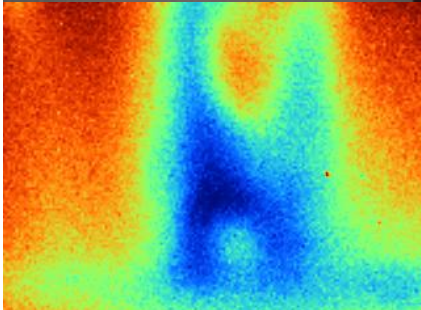

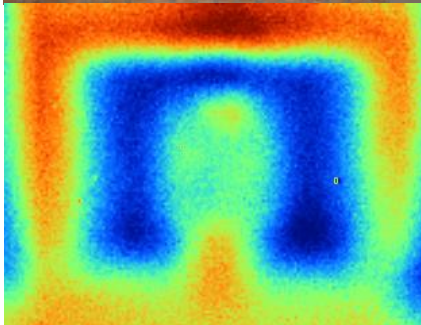
**The windows in the entry are leaking around the trim. Recommendation is to remove the trim and air seal and insulate with minimally expansive foam product approved for windows and doors or seal around the trim with a paintable caulk.**

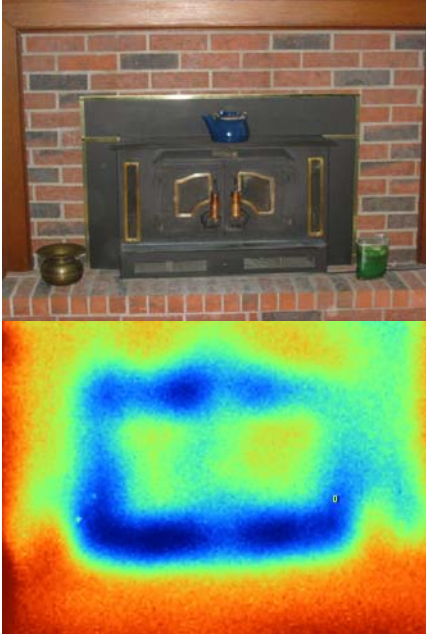




**The cantilever under the dining room window showed some leakage. The exterior should be sealed (as discussed above) and packed with cellulose insulation to reduce air flow and increase the insulation value.**







**Outlets were leaking some air. The infrared photos show air leakage through some outlets, coming up from the rim joist.**

	
 	<p><b>Same as above.</b></p>
 	<p><b>The wood stoves in the home do not seem to be leaking outside air into through the flue. As you can see, the brick around the woodstove in the basement is transferring heat to the foundation wall behind.</b></p>

	<p><b>There is some air leakage or heat loss through the frame around the wood burning stove on the main level.</b></p>
	<p><b>Plumbing penetration at the upstairs bathroom sink was leaking some of air and should be sealed.</b></p>
	<p><b>Daylight could be seen between the double doors to the deck. New weather strip should be installed.</b></p>

## V. Equipment

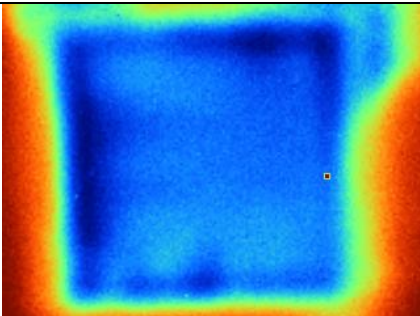

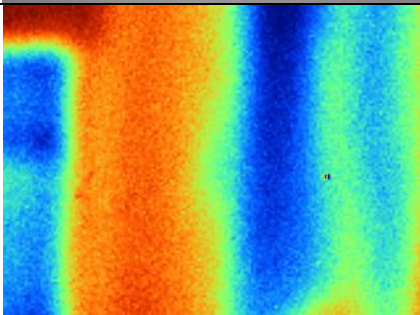

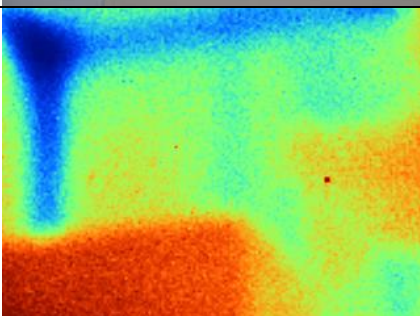
	<p>Furnace is a Trane, Model #BLU108F9368 with listed AFUE (Annual Fuel Utilization Efficiency) of 71% and an input of 108,000 BTUs. The unit is showing signs of age including rust. This furnace is a good candidate for replacement.</p>
	<p>Most installed heating and air-conditioning systems (even new systems) run at 50-60% capacity due to ductwork leakage and other system inefficiencies. If the unit is not going to be replaced, recommendation is to have the system professionally tested and 'tuned' and include annual maintenance procedures for both the furnace and the air conditioner. HVAC companies that perform this testing are listed below.</p>
	<p>The air conditioner is a Goodman, Model #CK36-1A with a seasonal Energy Efficiency Ratio of 9 SEER and a cooling capacity of 33,000 BTUs.</p>
	<p>In January 2006, the minimum allowed by law became 13 SEER.</p>
	<p>The coil fins are clean, which helps maintain the unit's efficiency, however, it was installed at the same time as the furnace and is showing signs of wear. The A/C unit should be replaced as well.</p>
<p>(sorry, no picture)</p>	<p>The thermostat is a manual set type. A programmable set-back thermostat, if used properly, could help save energy and money.</p>
	<p>Water heater is an AO Smith, Model #FSG 30 233. It has an Energy Factor of approximately .60, meaning that it is basically 60% efficient and \$0.40 of each dollar spent to heat the water is wasted heat. The tank and water lines could be insulated to help boost the overall system efficiency. You may benefit by installing a tankless water heater to reduce energy usage and costs. Tankless water heaters heat water as it is needed to practically eliminate standby losses.</p>


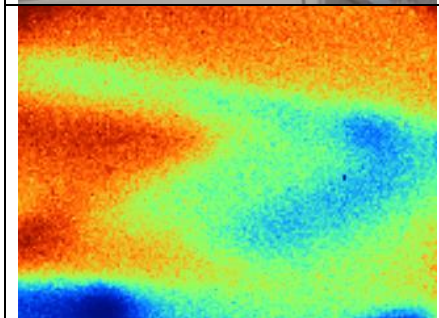

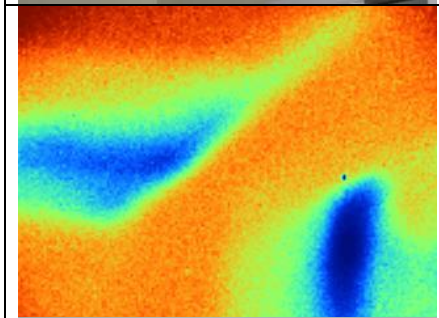

	<p><b>This gap around the flue pipe should be sealed with fire-rated caulk.</b></p>
	<p><b>The gaps around the duct risers should be foamed.</b></p>
	<p><b>This infrared shows how the open chase from the basement to the attic is pulling cold air into the conditioned space and cooling the ductwork and piping. Once these chases are sealed at the attic and basement the ducts and piping will be at interior temperatures and will not lose heat to the outside.</b></p>
	<p><b>These water and sewage lines penetrate the return cavity. The water lines or the return should be rerouted or, at minimum, the holes should be sealed with mastic or foil tape.</b></p>



**The flue for the water heater has a long horizontal run, sharp bends and enters the main flue line at a 90 degree angle. This combination can lead to backdrafting and spillage of carbon monoxide into the home. The water heater should be tested for carbon monoxide levels, spillage and draft, especially whether the water heater is able to establish draft if the furnace is already running and the water heater is cold. The “T” connection should be changed to be an angled “Y” entry to the combustion line in order to help ensure the exhaust gasses can enter the draft created by the furnace.**

## VI. Additional Infrared

 	<p><b>Air leakage and heat loss through the attic access in the Master Bedroom closet.</b></p>
 	<p><b>This photo shows a wall cavity with missing insulation next to a window in the master bedroom.</b></p>
	<p><b>This photos shows some air leakage at the band joist and outside corner.</b></p>

	
 	<p><b>This shows an area over the kitchen ceiling that is cold. The band joist area between the first and second floors is likely not insulated, or there is another exterior penetration near this area that should be sealed.</b></p>
 	<p><b>This corner over the kitchen cabinets is also cold. This again points to an uninsulated band joist area.</b></p>

## VII. Priorities

Generally, a comfortable and energy efficient home has 3 systems that work together.

- 1) Air Barrier**, (an air-leakage-barrier), to reduce outside air infiltration.
- 2) Complete Insulation**, (a heat-leakage-barrier), to reduce heat loss/gain to/from outside.
- 3) Efficient Heating/Cooling system**, (with sealed ducts) to efficiently generate and circulate air to control both temperature and humidity in every room in your home. Additionally, you may want to consider converting to high performance lighting and appliances.

Preventing conditioned air from rising, up and out through hidden pathways into the attic, is more important than you might realize. Most homes have large gaps in and around plumbing vents, wiring penetrations, flues, chimneys, and other chases hidden above your ceilings and behind your walls. In winter, the warm air flowing up and out through these cavities carries moisture, degrades insulation, could cause mold, and can cause wood rot in the framing. In addition to energy savings, air sealing at the boundary to the attic is a top priority for your health and the durability of your home. Sealing the attic “bypasses” will often reduce the air-leakage from a home by 10% to 40%.

Sealing the accessible perimeter near the top of the foundation is often the second priority for stopping the larger air-infiltration leaks. The highest and lowest places in your home are where pressure differences causing air-leaks are greatest. Weather-stripping windows and doors, sealing around their frames, and sealing electrical outlets will usually only reduce air-leakage by a few percent. These are relatively lower priorities.

Based on the analysis performed at your home, the following priorities are recommended:

- 1. Repair flue in attic**
- 2. Remove extra layer of drywall in attic**
- 3. Seal attic penetrations and basement-to-attic bypasses (including, attic access and whole-house attic fan)**
- 4. Seal and insulate rim joist**
- 5. Install additional insulation in attic**
- 6. Perform remaining work as detailed above**

Some companies that may be able to help you out with some (or all) of the work listed above are:

Do-it-yourself products and information can be found on our product website:

[www.HighEnergyBills.com](http://www.HighEnergyBills.com) and on the Energy Federation’s website at [www.EnergyFederation.org](http://www.EnergyFederation.org) - be sure to use the coupon code “highbills” at checkout (in the “Coupons and Promotions” field) and you will receive 10% off of your purchase.

Eric Kjelshus Energy (pronounced “Chelsus”) is a company that would be able to help you with almost all of this work. They are very focused on air sealing and energy efficiency. Eric is also an expert at troubleshooting, diagnosis, repair, installation and maintenance of HVAC equipment:

Eric Kjelshus Energy  
816-537-5100  
25001 E Outerbelt  
Greenwood MO 64034  
kjelshus@starband.net

Suburban Foam Insulation Company installs foam insulation and does an excellent job of air sealing, attic penetration sealing, rim joist sealing, sealing around windows, and insulating basement walls. This company has both open cell and closed cell foam so that the correct type can be used for the appropriate application:

Joe Phillips  
Suburban Foam Insulation  
(816) 694-8442  
723 SE London Way  
Lee's Summit, MO 64081  
joe2cat@earthlink.net

The Insulating Professionals are focused on air-sealing and do a good job with cellulose insulation installation:

Mike O'Connell, Owner  
TIP - The Insulation Professionals  
(816) 941-2510  
711 E. 98th St.  
Kansas City, MO 64131  
info@insulatekc.com