

## **Attachment 11: Indoor Environmental Quality Test Protocol**

The M2M Green Initiative will result in many green elements being implemented in affordable housing projects undergoing rehab. Many of these elements are expected to result in improved indoor environmental quality, which will be beneficial to building occupants.

### **Background:**

While indoor environmental quality (IEQ) and its health effects has been a hot topic for several years and there are many testing devices available in the marketplace, this is a relatively new field and there are not well-developed testing protocols and standards for testing many of the IEQ elements. Due to the cost and complexity associated with testing IEQ, the common approach to dealing with IEQ is to take steps widely accepted as improving IEQ rather than rely on testing. According to EPA's website:

<http://www.epa.gov/iaq/pubs/insidest.html>

“For pollutants other than radon, measurements are most appropriate when there are either health symptoms or signs of poor ventilation and specific sources or pollutants have been identified as possible causes of indoor air quality problems. Testing for many pollutants can be expensive.

The energy saving components of Green affordable housing could in some cases result in “tighter” building envelopes, which in the absence of other measures could result in lower IEQ. Offsetting this, several green elements that may be implemented can result in lower levels of particular contaminants, thus improving IEQ. Even if the building envelope is unchanged by the rehab, independent variables can easily confound IEQ testing results; thus, tracking improvements in IEQ would be difficult due to the lack of control conditions independent of the greening.

It is expected, however, that the research community will want to take advantage of access to significant data gathering opportunities related to the implementation of Green elements in affordable housing units. As a condition of participation in the M2M Green Initiative, building owners should agree to fully cooperate with any such research endeavors sanctioned by HUD. Such research efforts are likely to focus on measuring indoor air quality indicators, such as volatile organic compounds (VOC's), and respirable particulate matter. Research efforts, in order to account for confounders (e.g., resident smoking, open windows) may involve tenant participation by collecting questionnaire and observational data and by enrolling a sufficiently large number of participants to lessen the impact of individual behaviors. Any such research efforts will be of modest scope, and would be subject to technical review by HUD staff prior to any request for the participation of the building owner and tenants.

Because of its significance as an indicator of indoor environmental quality as well as its importance with respect to avoiding mold problems, building owners will be expected to implement a testing program relating to temperature and relative humidity in some of the rental units, in accordance with the following protocols.

### **Temperature and Relative Humidity Testing Procedures:**

Testing will occur until such time as HUD determines that it is no longer needed. Testing must take place in at least 10% of all residential units on the subject property, although a larger number of units is preferred. The units to be tested should be selected randomly, and HUD will provide instructions for this selection process. Common areas should also be tested as appropriate.

For each unit selected for sampling, a testing device should be placed in the unit in a location that will allow for the free flow of air, and that is not on an exterior wall, typically near the thermostat. The device should be programmed to report its data with an identifier that is the building address and unit number. It is recommended that the HoBo U10-003 Data Logger or an equivalent device be used. The Data Logger should be programmed upon installation to take measurements once each hour. The specified Data Logger costs \$59.00 per unit, although significant discounts may apply with larger orders.

After a period of three months from installation of the measurement device, data should be downloaded using one of two methods.

- It is recommended that the HoBo U Shuttle (U-DT-1) be used to offload the data accumulated in the Data Logger for the previous 3 months. Once the data is offloaded, the measurement device should be reset, to ensure sufficient available memory for the next 3 months of data collection. The HoBo U Shuttle can handle up to 64 units worth of data at a time, so if more units are being tested, the Shuttle will need to be cleared before additional data can be collected. The HoBo U Shuttle costs \$249.00 per unit.
- Alternatively, a laptop computer can be used to offload the data from the Data Logger. This method is less convenient but depending on labor costs, potentially more cost effective to do.

The data should be offloaded for at least 3 years at 90 day intervals. If the U Shuttle is used for data offloading, the data should then be downloaded into a laptop computer, using HoBoWare Pro software. If the data is downloaded directly to a laptop computer, the computer should be equipped with the HoBoWare Pro software. The software costs \$99.00. Once the data is offloaded and is stored in a laptop equipped with the HoBoWare Pro software, the data should be saved as a file, and the file should be sent to a designated party at HUD.

The outputs of the HoBoWare Pro software include graphs, and other useful information. Building owners should be able to track with units are experiencing inappropriately high moisture content, which can lead to proliferation of mold. The occupants of units with significantly abnormal temperature and humidity readings may benefit from HVAC inspections, or perhaps tenant training on best practices for temperature and humidity control.