Investigation of Indoor Air Quality in LEED Certified Buildings

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In an attempt to lessen the adverse effects of construction practices on the environment and human health, many green initiatives have been offered since the 1970s (Kubba, 2009). In the United States, the first green rating system was launched in 1998 by the U.S. Green Building Council (USGBC), which is referred as Leadership in Energy and Environmental Design (LEED) certification. The purpose of the LEED certification is to provide a method of standardization system that focuses on the key development areas including sustainable site, water and energy efficiency, material selection and indoor environmental quality for new and existing commercial, institutional and residential buildings (Richards, 2012). Indoor air quality is monitored as part of the indoor environmental quality section; and according to LEED version 2009, 11 out of 15 possible indoor environmental quality credits are related to indoor air quality (USGBC, 2009). There are various mitigation techniques that were suggested by USGBC to improve indoor air quality (e.g., provide adequate ventilation, limit materials that have high emission rates, etc.).

One of them aims to reduce to indoor air quality issues by removing the contaminants from buildings before occupancy. This credit, namely EQc3.2: Construction Indoor Air Quality Management Plan: Before Occupancy can be received either by conducting a building flush out (1 credit) or by performing an indoor air testing (2 credits). The building flush-out can be done by providing 14,000 cubic feet of outdoor air per square foot of floor area while maintaining an internal temperature of at least 60° F (15° C) and relative humidity no higher than 60%. On the other hand, indoor air testing must be done by a certified laboratory using EPA Compendium and ISO methods. While it is expected to get reliable results from indoor air testing, the effectiveness of the building flush-out has not been investigated in the literature. Therefore, the real extent of the indoor air quality remains unknown for most of the LEED certified buildings that were flushed out before occupancy.

The ultimate purpose of this study is to evaluate the effectiveness of the flush-out procedure that is suggested by USGBC for receiving "EQc3.2: Construction Indoor Air Quality Management Plan: Before Occupancy" credit. This study will be conducted in two phases. In Phase I, an indoor air testing will be conducted to identify the contaminant levels (Formaldehyde, Particulate matter (PM10), Total Volatile Organic Compounds (TVOCs), 4-Phenylcyclohexene, and Carbon monoxide) in the air during the construction of a building right before performing a building flush out for a selected project zone. In Phase II- another indoor air testing will be conducted to identify the air contaminant levels after the building flush out is conducted for the same zone. Consequently, the results of pre and post flush out tests will be compared and the effectiveness of the "flush out" protocol will be investigated.

The building that is selected for this project is still under construction and the flush out procedure will be conducted in early summer 2018. The researchers are expecting to evaluate the effectiveness of the flush out protocol as a result of this study. Based on the results, the proposed research might include policy and managerial considerations such that suggesting elimination of flush-out protocol from LEED certification system and requiring indoor air testing to get certified.

Keywords: Indoor Air Quality, Leadership in Energy and Environmental Design, Flush out

References

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