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September 28, 2018

Mr. Mort P. Ames
Senior Counsel
Aviation, Environmental, Regulatory & Contracts Division
City of Chicago Department of Law
30 N. LaSalle St., Suite 1400
Chicago, IL 60602

Dear Mr. Ames:

Wood Environmental & Infrastructure Solutions, Inc. (Wood) (formerly Amec Foster Wheeler) was charged with investigating the source of odors from windows installed under the City's Residential Sound Insulation Program (RSIP) and assessing the potential for health impacts. Our investigation relied on multiple lines of evidence, both in our efforts to determine the source of odors and to determine the potential for health concerns.

By early fall 2017, approximately 60 homes had been confirmed to have odors. An early recommendation based on a "rule of thumb" was to conduct indoor air quality assessments on 10% of complaint homes to provide a meaningful assessment of the potential for health effects and basis for assessing a possible source for the odors. Since that time, the number of homes with confirmed odor complaints has increased significantly. The original strategy of conducting indoor air tests in representative homes was expanded to include evaluations of off-gas constituents from individual window components and short-term impacts of ultraviolet radiation exposure. Conclusions as to risks to human health from RSIP windows are based on:

- 1) Air quality test results from whole windows conducted in an isolated environmental chamber;
- 2) Results from air quality testing conducted in 13 homes that were evaluated both before and after window replacement;
- 3) Head space tests conducted to determine the potential for off-gassing from individual window components;
- 4) Evaluation of the influence of temperature on off-gas concentrations; and
- 5) Analysis for off-gasses resulting from short-term exposure to ultraviolet radiation.

The GC/MS analysis method used by the laboratories for analyzing air quality for this investigation has the capability of identifying (when present), more than 200,000 compounds. None of the compounds



associated with off-gassing from windows were found to be consistently above a health guideline in the indoor air of the homes tested.

Several potentially odorous compounds, particularly associated with screens from the windows, were identified to be present at low concentrations and below a health guideline. Several compounds identified during the course of these assessments are recognized as common indoor air contaminants present in homes nationwide and are commonly associated with home furnishings or household activities (carpeting, furniture, curtains, cooking, etc.).

It is recognized that it is never possible to completely “prove” a negative, and more data can always be collected. Nonetheless, based on the data collected to date, both in homes and from individual window components, and the apparent lack of difference when comparing in home test results from before and after window replacements, beyond nuisance conditions there is currently no evidence suggesting that compounds specifically associated with the windows are present in homes at concentrations that would pose a threat to health. We are confident that our results to date are accurate and provide the basis for a reasonable assessment of the health risk.

This conclusion is supported by the following assessments that have been performed to date.

- 1) To initiate the investigation, a preliminary evaluation was performed on three complaint windows that had been replaced. The windows were evaluated in an environmental chamber to look for possible odorous constituents contributing to air quality complaints and identify constituents that might be associated with a potential health risk. ***This investigation was used to confirm the in home sampling methods proposed.***
- 2) A comparison of indoor air quality results obtained both before and after windows were replaced was made using results from nine homes tested for air quality during 2017. This comparison looked for changes in the indoor air quality. ***None of the air quality constituents identified in homes were found to indicate that windows were a significant source. No significant differences in the overall air quality were noted when comparing results from before and after window replacement.***
- 3) Three odor screenings of window components were conducted with CMC Partners odor inspectors to determine the potential for individual components from the complaint windows to generate odors. ***The component with the strongest odor identification was the window screen. Vinyl from the window sash was identified as a potential secondary odor source, although odors identified from the vinyl window sash occurred at temperatures well above those typically experienced indoors.***
- 4) Individual pieces from window components including vinyl, sealant, screening, and other plastic items were placed in individual quart sized containers and heated to a temperature determined to be representative of a temperature a window might experience in direct sunlight on a hot summer day (149 deg F.). Constituents identified in the atmosphere from these “head space” tests represented “worst case” conditions as to what is possible for window components to



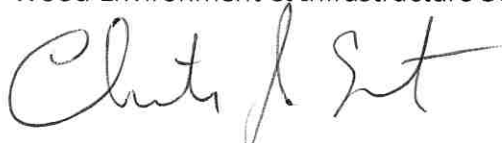
contribute to indoor-air. Constituents not found in the head space conducted for window components cannot be attributed to windows. **Off-gas concentrations identified under head space testing represent extreme conditions not present in any home. However, in most instances these concentrations were still below a health guideline. Under normal room conditions (large area, air exchanges, and lower room temperatures) concentrations would be well below any health guideline. Concentrations of off-gasses from window components decreased significantly (3 to 10-fold reduction) as material temperatures were decreased from 149 deg. F to 95 deg. F. closer to a typical room temperature.**

- 5) Off-gas constituents, identified from the extreme conditions represented by the “head space” with heated window components in a confined space, were compared with air quality results that were collected from the in-home air quality tests conducted at 13 homes. **Off-gas constituents that were identified from head space testing of window components were either not present at a detectable concentration in homes; or, if present, were found at a concentration below a health guideline**

- 6) The Indoor air quality testing conducted during 2018 used an expanded list of compounds that were explicitly reported and quantified. These compounds, when identified were identified as Tentatively Identified Compounds (TICs) for the 2017 indoor air test results. **No significant differences were found between the 2017 and 2018 indoor air test results.**

Sincerely,

Wood Environment & Infrastructure Solutions, Inc.



Christopher J. Events, P.E., Ph.D.
Principal Engineer

