

CDC Summary of Lawrence Berkeley National Laboratory Final VOC Report

December 10, 2008

In the aftermath of Hurricane Katrina, the Federal Emergency Management Agency (FEMA) provided travel trailers and mobile homes to displaced Gulf Coast residents who had lost their homes in the hurricane. Residents of these trailers and mobile homes have raised concerns about air quality in the trailers and the occurrence of respiratory and other symptoms resulting from exposure to formaldehyde or other irritants among residents of the units. CDC has been working with FEMA and other agencies to investigate the health concerns and exposures of those living in the trailers and mobile homes and to take action to protect resident's health.

Lawrence Berkeley National Laboratory Interim VOC Report

Background:

To investigate possible volatile organic contaminants (VOCs) and aldehyde contamination in the indoor air of FEMA-supplied travel trailers, CDC contracted with scientists from Lawrence Berkeley National Laboratory (LBNL) to work with CDC scientists to directly measure indoor air concentrations of a range of VOCs and aldehydes in a sample of 4 unoccupied, FEMA-supplied travel trailers. Indoor air concentrations of 33 pollutants (VOCs and aldehydes) were measured in the morning and afternoon for each of the units. In addition, 45 small material samples of wood products from the 4 units were collected to measure their material-specific emission rates for 33 compounds to provide information on the source of possible indoor pollutants. These rates essentially measure how much of the contaminant is released by the wood product over a period of time.

Results:

Whole trailer air levels for most VOCs were similar to those from comparative housing in the US, with the exception of formaldehyde, acetic acid, TMDP-DIB (a plasticizer in vinyl products), and phenol. Of these three compounds, formaldehyde was the only one considered to be of possible human health significance at the observed concentrations (range: 310ppb to 780ppb).

The emission rate measurements showed that the highest formaldehyde material emissions were from the cabinet walls, subflooring, and bench materials. An important finding was that only one material of the 45 tested exhibited formaldehyde emissions in excess of the HUD standard. The measured formaldehyde emission factors from the various composite wood products appear to be well within the range found in previous, published research. All four trailers had relatively low ventilation rates ranging from 15% to 39% air exchanges per hour. Formaldehyde levels inside trailers decreased as the ventilation rates increased.

Interpretation:

The major findings from the LBNL investigation are that whole trailer formaldehyde air levels are high, ventilation rates are low, and the emissions from the tested wood products appear to be consistent with those found commonly in the building industry. These findings indicate that elevated formaldehyde levels are most likely due to a construction/design issue in the trailers (i.e. the cumulative effect of too much formaldehyde emitting material in too small a space with insufficient ventilation, even though construction materials individually meet standards generally used in the building industry).

Differences between these trailers and other housing, which may contribute to the elevated formaldehyde concentrations, include an extensive wood surface area in a relatively small space with low ventilation rates bringing less fresh air into these trailers. This investigation was limited to four travel trailers and was designed to assess indoor emissions of VOCs and aldehydes. These findings do not represent all of the FEMA-supplied travel trailers used during the Hurricane Katrina response. The findings cannot be used to draw conclusions about travel trailer manufacturers or brands.

Future Work:

Although the results of the LBNL investigation described in this report are not definitive, the results were very useful in helping to identify sources of VOC exposure in travel trailers. CDC is working with NASA scientists to evaluate the effectiveness of various technologies designed to reduce the concentrations of formaldehyde and other VOCs in travel trailers and mobile homes. Manufacturers of travel trailers and government agencies involved in their design should assess the effectiveness of using materials that emit lower levels of formaldehyde during construction and increasing the ventilation rates in their trailers.