

Formaldehyde Levels in FEMA-Supplied Trailers
Preliminary Findings from the Centers for Disease Control and Prevention
February 14, 2008

Background

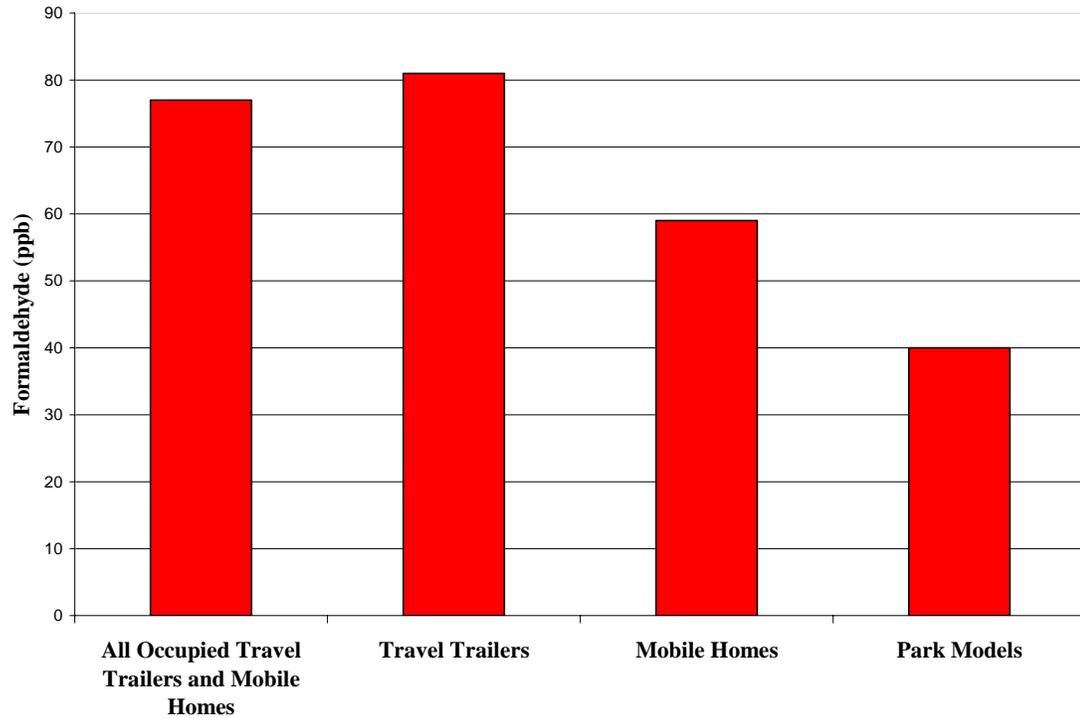
From December 21, 2007, to January 23, 2008, the Centers for Disease Control and Prevention (CDC) conducted testing to assess levels of formaldehyde in indoor air of occupied travel trailers, park models, and mobile homes supplied by the Federal Emergency Management Agency (FEMA) as temporary housing for displaced residents of the US Gulf Coast Region following Hurricanes Katrina and Rita.

The testing was one of several actions CDC initiated in response to a request from FEMA to investigate concerns about formaldehyde in occupied FEMA trailers in Louisiana and Mississippi. CDC randomly selected 519 trailers for testing from FEMA's database of all existing occupied trailers. These results represent only that group. These 519 trailers represent a cross-section of the most frequently used trailer types and manufacturers. CDC has done preliminary analysis of the data from the testing and has identified preliminary findings with significant implications for public health.

Key Findings

- In many trailers, mobile homes, and park models tested, formaldehyde levels were elevated relative to typical levels of US indoor exposure.
- Average levels of formaldehyde in all units was about 77 parts per billion (ppb). This level is higher than US background levels. Levels measured ranged from 3 ppb to 590 ppb.
- These measured levels are likely to under-represent long-term exposures since formaldehyde levels tend to be higher in newer travel trailers and mobile homes and during warmer weather.
- Indoor temperature was a significant factor for formaldehyde levels in this study independent of trailer make or model.
- Formaldehyde levels varied by model (mobile homes, park homes, and travel trailers), but all types of trailers tested had some high levels.
- At the levels seen in many trailers, health could be affected.

Geometric Mean Formaldehyde Levels in Occupied FEMA Travel Trailers and Mobile Homes



Interpreting Formaldehyde Levels in Indoor Air

1000		If your reading falls into the higher range , you need to place a high priority on lowering your exposure to formaldehyde. This is especially important if residents of your trailer are elderly, young children, or have health conditions, such as asthma.
100		If your reading falls into the intermediate range , your risk of irritation from formaldehyde exposure is lower, but it is still important to take steps to reduce your formaldehyde exposure. This is especially important if residents of your trailer are elderly, young children, or have health conditions such as asthma.
10		If your reading falls into the lower range , these levels are found on the streets of many cities and in many buildings. The risk of health problems at these levels is low.
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Note: Levels are expressed at parts per billion (ppb). To convert to parts per million (ppm), divide by 1000.

Recommendations for Public Health Officials

- These conclusions support the need to move quickly to relocate trailer residents before the warmer weather of summer, placing highest priority on those who are symptomatic and/or especially vulnerable.
- Appropriate follow-up will require multi-agency collaboration including FEMA, HUD, CDC, and others, to achieve safe, healthy housing for people displaced by Hurricanes Katrina and Rita who continue to live in FEMA-supplied travel trailers and mobile homes.
- FEMA should consider necessary assistance to Louisiana and Mississippi Health Departments to ensure adequate follow-up, including medical needs, for trailer residents with health and medical concerns resulting from residence in FEMA-supplied travel trailers or mobile homes and formaldehyde exposure.
- FEMA should consider establishing a registry and long-term health monitoring of children and others who resided in FEMA-supplied travel trailers and mobile homes in the Gulf Coast Region.

Recommendations for Residents

- Families who live in FEMA-supplied travel trailers and mobile homes should spend as much time outdoors in fresh air as possible.
- Open windows as much as possible to let in fresh air.
- Try to maintain the temperature inside travel trailers and mobile homes at the lowest comfortable level.
- Do not smoke, and especially do not smoke indoors.
- If you have health concerns, see a doctor or another medical professional.
- Families that include children, the elderly, and those with chronic diseases such as asthma should make a special effort to get as much fresh air as possible, and these families should make relocating to permanent housing a priority.

Further CDC Action

- A team composed of a U.S. Public Health Service (USPHS) Commissioned Corps officer and a FEMA representative will begin notifying participants in the study on February 21, 2008, with personal visits and a hand-delivered letter. The Commissioned Corps took on this work at the request of CDC.
- CDC will conduct public availability sessions in both Louisiana and Mississippi to provide information to other concerned and interested individuals.
- CDC's 24-hour, toll-free hotline will continue to respond to health-related questions from residents.
- Other factors may affect formaldehyde levels, and CDC continues to analyze the data to assess these factors. A final report on this exposure assessment is expected later in the spring.
- CDC is continuing several studies of unoccupied trailers to assess formaldehyde levels across different models and types and to identify factors that reduce or raise those levels. This also involves identifying cost-effective ways to reduce formaldehyde levels and concentrations in trailers.
- CDC is developing a protocol for a long-term study of children who resided in FEMA-supplied travel trailers and mobile homes in Mississippi and Louisiana.
- CDC is providing educational materials and information to trailer residents about their risk of exposure to formaldehyde and ways to improve indoor air quality and health.
- CDC will reconvene the panel of experts to identify and advise on health issues that could be associated with long-term residence in temporary housing units, such as travel trailers.



Related Information:

[RV Owner Survey](#)

[An Introduction to Indoor Air Quality: Formaldehyde](#)

[An Update on Formaldehyde](#)

[Asbestos](#)

Information on Motor Homes:

[Motorhomes or Motor Homes...?](#)

[Matters of Size: A Bigger RV Isn't Always Better](#)

[Five "Musts" For Buying Used](#)

Information on Towables:

From our Archives:

[Will Four Slideouts Open a Pandora's Box?](#)

Formaldehyde Fallout in FEMA Trailers

Formaldehyde is in the air, literally, in the wake of Hurricane Katrina. Some residents of the trailers provided by FEMA to house disaster victims in Louisiana and Mississippi have reported symptoms typical of formaldehyde poisoning. The Sierra Club, in an April, 2006 testing of air quality in occupied FEMA trailers found formaldehyde levels to be as high as 0.34 parts per million in all but four of the trailers tested. The EPA has given 0.1 parts per million as the maximum acceptable level—beyond which runny nose and eyes and other cold-like symptoms begin to appear. Noticeable odors begin at 0.05 ppm. Reports of health problems among FEMA trailer inhabitants has led to the filing of a class-action suit against six RV manufacturers who, taken together, make up a large percentage of the trailer-building industry.

No standards for the RV industry

While the Department of Housing and Urban Development has set air-quality standards for manufactured homes regarding formaldehyde-emitting products, no such standards exist for recreational vehicles. The reason for this is that the vast majority of travel trailers and motor homes are not designed and built for extended live-in use.

Short-term construction and quality for long-term use

The trailer brands provided by the manufacturers who won FEMA contracts are primarily vacation-class trailers that are generally used for weekend trips or for vacations of, at most, two weeks at a time. Some of the FEMA trailers have now been continuously occupied for nearly a year. Therefore, many people would have had opportunity for maximum exposure to the formaldehyde gas that is a common byproduct of the glues and resins used in the manufacture of walls, floors, carpets, and other surfaces inside the RV. Ideally, a new trailer should be aired for at least 90 days before its owners take occupancy. This was not possible for Katrina victims, who needed immediate shelter. It is also likely that many of these trailers were slapped together in a hurry to meet the emergency demands.

What is formaldehyde?

The chemical compound formaldehyde (also known as methanal) is a gas with a very pungent smell. It has many uses in industry (as adhesives) and the biomedical fields (primarily as a preservative and disinfectant). In combination with urea or phenol it produces a hard resin used in adhesives for composite wood materials such as particleboard, plywood, and medium-density fiberboard. Among other uses, it is also found as a coating for permanent-press clothing fabric, carpeting, and draperies. Some types of foam and fiberglass insulation may also contain formaldehyde. Although formaldehyde for practical usage is synthesized in the laboratory, it is found in nature as a byproduct of combustion—from forest fires, cigarette smoke, and in minute, non-toxic amounts resulting from the digestive processes of living organisms, including humans.

When does formaldehyde become a gas?

Formaldehyde is released at room temperature or above as a pungent-smelling, colorless gas. Here's how it becomes relevant to trailer owners. The composite wood products built into a structure begin to "age" as soon as walls, cabinets, and any other formaldehyde-containing products are set in place. This is when the process of "outgassing" begins. As one new FEMA trailer occupant put it when taking possession of her new home, "It smells bad in here." That's formaldehyde. New trailers must be continually ventilated because concentrations of the gas will then be at their highest level. It could take as long as a year for the gas to dissipate to a negligible concentration level. We cannot overstate the importance of excellent ventilation—especially in a new RV. We recommend testing for formaldehyde levels (kits below \$50 - search Internet).



Symptoms of formaldehyde poisoning

Concentrations of formaldehyde gas in the air of 0.1 parts per million or more may cause watery eyes; a burning sensation in the eyes, nose, and throat; headaches; difficulty breathing; and hive-like skin rashes. Long-term exposure may cause cancer, but the jury is still out on that. Some FEMA residents in Louisiana and Mississippi began to report these symptoms early on -- well before formaldehyde was suspected as the culprit.

FEMA trailer occupants interviewed in relatively dry West Texas reported no symptoms. However, both a spokesman for the RVIA and an industrial hygienist who has studied the formaldehyde issue agree that high heat along with the higher humidity in Louisiana and Mississippi probably aggravated the problem in those states.

FEMA says the trailers are safe

In spite of mounting evidence to the contrary, FEMA maintains the trailers are safe and that there is no need for them to perform their own tests of air quality. They claim to have received "only 20 complaints" from a total of 115,000 trailers. How many do they need? Hundreds? Thousands? And how many people may be affected who may not recognize the source of the problem?

Who is responsible?

A suggestion was made by one authority that RV manufacturers may have cut corners in the haste of sudden demand for their trailers and used inferior composite wood materials in which excess formaldehyde fumes had not been "pre-baked" out. RVIA's spokesman denies this, claiming that manufacturers purchase their plywood and particleboard materials already certified as "low-emission".

Two questions arise. Did suppliers for the RV industry ship inferior building materials to manufacturers who, in their haste to meet FEMA's needs, may have looked the other way? Because of the pending lawsuit, manufacturers are not talking at this time.

Did FEMA neglect to aerate the trailers placed in holding areas prior to occupancy, allowing for the buildup of formaldehyde to toxic levels, possibly accelerated by heat and humidity? There is some evidence to support that possibility. Air quality testing at a FEMA trailer-holding location on the Gulf Coast revealed levels as high as fifty times greater than the EPA safety limits. On the other hand, we do know that they alerted new residents to thoroughly air out their trailers. Yet some people are more susceptible than others, and they developed health problems even though they did as instructed.

Hurricane Katrina caused death and misery for thousands. Formaldehyde poisoning, as a result of hurried attempts to house the bereaved, caused further misery for some of those victims. Most of us are all too eager to point the finger of blame. In the chaos of catastrophic events, mistakes are often made. Perhaps the best solution is to take care of the affected people and move on. Nevertheless, the issue of formaldehyde in RVs will still be with us. It falls upon the shoulders of manufacturers to make certain that this potential health hazard is eliminated before their products are made available to the public.

Postscript:

In response to an MSNBC.com article of July 23, 2006, Homeland Security Chief Michael Chertoff ordered air-quality testing of FEMA trailers to determine whether or not formaldehyde gas is present in concentrations that could be toxic to occupants. FEMA, in a complete about face, announced that the EPA will perform the tests. According to one FEMA spokesman, the agency maintains its confidence in "the travel trailer program". It also continues to downplay the number of complaints of illness versus the number of trailers in use. Nevertheless, the actual number of complaints has risen since FEMA's last interview on the subject. Information gleaned from another FEMA spokesman indicated that they are already aware that primarily "two or three brands" of the trailers in question had "elevated formaldehyde levels" - the brand names were not revealed. Are FEMA and the RV industry trying to sweep the formaldehyde issue under the carpet (pun intended), hoping it goes away?

We will keep you posted on further developments.