



## Fact Sheet – Anchorage Benzene Monitoring Studies

### What is benzene?

Benzene has been determined to be a human carcinogen. Exposure to benzene in air is linked with an increase in the occurrence of a certain type of leukemia.

### Why did the Municipal Department of Health and Human Services (DHHS) want to monitor airborne benzene levels?

Previous studies in Anchorage suggested that the levels of benzene in outdoor air and inside homes with attached garages were higher than most of the U.S. The data indicated that the high benzene content of Anchorage gasoline was largely responsible for these high levels. New federal regulations are expected to cut the amount of benzene in our gasoline from about 5% to near 1% in 2012. DHHS is interested in determining how effective this will be in lowering the amount of benzene we breathe in the outside air and in our homes.

So far DHHS has completed Phase 1 of a planned two-phase study. Phase 1 of this EPA-funded study provide a “snapshot” of benzene levels in our air before the benzene content in gasoline is lowered. We hope to repeat these same measurements to determine how much the benzene in our air drops when the levels in gasoline are lowered.

### What did we find in our outdoor air?

Benzene was measured along with other volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and carbon monoxide (CO) at a monitoring station located in a typical east Anchorage neighborhood known as the Garden site. The ambient benzene concentrations measured there in 2008 and 2009 ranked among the highest 2% in the U.S. The average annual benzene concentration measured in Anchorage, 1.06 ppb (parts per billion), was similar to areas with large petrochemical industries like Houston, Texas.



Looking south from Garden Air Monitoring Station in east Anchorage

Benzene levels in Anchorage’s air were highly correlated with carbon monoxide (CO) concentrations indicating that, like CO, motor vehicles are the primary source of emissions. Anchorage is prone to high CO during winter temperature inversions. Benzene concentrations were high during these same periods.

A copy of the full report on Phase 1 of the outdoor benzene study can be found at [www.anchorageair.info](http://www.anchorageair.info).

### What did we find in the air inside our homes?

At the same time that outdoor benzene was being studied, DHHS collaborated with the University of Alaska on a companion study to measure concentrations inside Anchorage homes. Previous studies in Anchorage had shown that homes with attached garages, especially those with gasoline or gasoline-fueled equipment like lawnmowers and snow machines stored in their garages were likely to have the highest levels of benzene in the air of their homes. These studies found that the average benzene levels found in Anchorage homes with attached garages were typically three to five times higher than the ambient air outside.

The highest benzene was likely to be found in homes where there was an abundance of

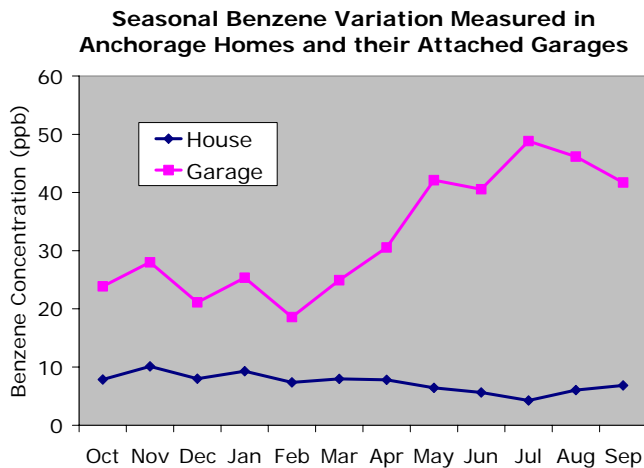
gasoline-fueled equipment. However, there was no statistical difference in the benzene levels in homes of those who parked a car in the garage and those that did not.



Homes with garages used to store multiple pieces of gasoline-fueled equipment have higher levels of benzene.

For this new study, DHHS recruited 67 households all of whom had volunteered in an earlier study. A one-week sample of the air in their homes and garages was taken every month for a one-year period. DHHS had never before performed long-term sampling inside a home to determine whether there were seasonal variations in the concentrations of benzene and other VOCs.

The figure below shows average monthly benzene concentrations measured inside the homes and garages of the households involved in the study.



The plot shows that benzene concentrations in garage air were considerably higher than

inside the home. In the garage, the levels of benzene and other VOCs “spiked” in the warmer summer months presumably because there was more use and fueling of gasoline-powered equipment like lawn mowers.

In contrast, benzene levels in the homes themselves tended to decline during warmer months because open windows and doors increased ventilation with relatively clean outdoor air. In the summer-time, the concentration of benzene in ambient air found outside was about *100 times lower* than the air in the attached garages sampled in this study.

A copy of the full report on Phase 1 of the indoor benzene study can be found at [www.anchorageair.info](http://www.anchorageair.info).

### What’s next?

DHHS hopes to obtain funding to complete Phase 2 of the outdoor and indoor studies described above. Although our analysis suggests that the new benzene-in-gasoline regulation should result in large reductions in the amount of benzene in the air we breathe in Anchorage, we’d like to measure how much benzene levels are reduced and whether the changes in gasoline composition required by the new regulation might change the levels of other pollutants besides benzene in the air.

### What can you do to reduce your exposure to benzene in the air?

For most of us in Anchorage, our greatest exposure to benzene occurs indoors. Here are some tips for reducing exposure if you live in a home with an attached garage:

- Move gasoline fuel cans and gasoline-powered equipment like lawn mowers, snow blowers, chain saws and snow machines to an outdoor storage shed.
- If outdoor storage isn’t possible, fuel your lawn mower and other equipment outside the garage in the open air. Allow it to cool before returning it to storage in the garage.
- Remember that the main source of benzene in your home is the garage. Keep the door between the house and garage weather-stripped and tightly closed. Seal any air gaps in the wall between the garage and home.