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Gasoline Components in Blood After Refueling: Part B: Anchorage

During the winter of 1994 -1995, an oxyfuel containing 10% ethanol (E-10) was introduced in Anchorage to reduce winter carbon monoxide emissions. A previous *Bulletin* (No. 19, August 17, 1995) reported that no changes in symptom complaints were observed with the introduction of E-10 in Anchorage. In this report, preliminary results of the Anchorage Gasoline Exposure Study are provided.

Nonsmoking office workers were recruited for participation in the Anchorage Gasoline Exposure Study. Seventy-three volunteers provided a blood sample for analyses of volatile organic compounds (VOCs) after pumping regular unleaded gasoline on either the 5th or 6th of December 1994. Fifty-eight participants returned on either the 6th or 7th of February 1995 to provide a second blood sample after refueling their vehicles with E-10. Baseline levels of VOCs in blood before pumping gas were provided by 13 people in December and 12 people in February.

All study participants were nonsmokers, verified by laboratory analyses of 2,5,-dimethylfuran (a marker for smoking) concentrations in the participants' blood. Blood VOC concentrations prior to refueling were higher in December than in February (Figure). In addition, VOC concentrations after refueling with regular gasoline in December were higher than concentrations observed after refueling in February with the E-10 fuel. The magnitude of the increase in VOCs after pumping was similar for those who pumped regular and those who pumped E-10 fuel. The December testing took place during a period of decreasing air quality, while the February testing took place during a period of relatively good air quality.

The range in blood VOC concentrations was similar in the Fairbanks (*Bulletin* No. 26, December 22, 1992) and Anchorage Gasoline Exposure Studies, with median blood VOCs, for the most part, below 1 ppb. The median levels of benzene, ethylbenzene, m-/p-xylene, and o-xylene prior to pumping gasoline in December in Anchorage were comparable to the pre-pumping blood VOC levels observed in Fairbanks in February. The relatively higher levels of blood VOCs prior to and after pumping gasoline in Anchorage in December compared to February most likely reflect greater background exposures on the two days of monitoring in December. Background exposures could be altered by temperature, wind, wind speed, inversions, traffic density, and type of fuel in use. Moving away from the pump while refueling and plugging in automobiles on cold days may help reduce blood VOC concentrations while refueling and commuting.

The levels of VOCs observed in the Anchorage and Fairbanks Gasoline Exposure Studies are low. As found in the Fairbanks Gasoline Exposure Study, the use of an ethanol fuel did not significantly change gasoline exposures while refueling. In addition, no changes in symptom complaints were observed with use of E-10 in Anchorage and Fairbanks. Federal agencies have limited exposure to benzene in the workplace because a few individuals who have been exposed to very high levels of benzene over many years developed leukemia. However, low-level exposures, such as those experienced while driving and refueling, have not been associated with an elevated risk, and the benzene exposures associated with life-time heavy cigarette smoking has never been associated with excess leukemia.

Median Blood VOC Concentrations
Before and After Pumping Gasoline
Anchorage, Alaska

