

Air Toxics monitoring in Klamath Falls

What are air toxics?

Air toxics are pollutants associated with more serious health effects such as increased risk of cancer or respiratory damage.

Why did DEQ monitor air toxics in Klamath Falls?

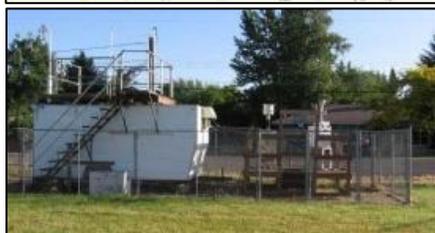
In 2011, DEQ performed air toxics monitoring in Klamath Falls because high monitored levels of particulate pollution made it likely that air toxics also pose health risks. Particulate pollution and air toxics share common sources, such as wood burning and vehicles. Additional specialized air monitoring allows DEQ to determine air toxics levels.

DEQ routinely assesses air toxics in communities statewide and has done air toxics monitoring in Portland, Beaverton, Salem, Medford and La Grande.

For more information about air toxics, please see <http://www.deq.state.or.us/aq/toxics/index.htm>

Where was the Klamath Falls air toxics monitor located?

The Klamath Falls air toxics monitor was located in the southwest part of the urban growth boundary of Klamath Falls. It was just outside the Klamath Falls city limits at the same location as the PM2.5 monitor, Peterson School off of Clinton Avenue, between Hope Street and Summers Lane.



Map and photo of Peterson School Monitor

What were the results of air toxics monitoring in Klamath Falls?

DEQ monitoring data showed that air toxics posing the most concern for public health in Klamath Falls are benzene, naphthalene and acetaldehyde. We are also concerned about the health effects of Polycyclic aromatic hydrocarbons or PAHs which are produced by the same sources, but there is a lack of technology to fully capture and analyze these pollutants.

What are the health effects of the air toxics DEQ monitored?

Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly. It is highly flammable and is formed from both natural processes and human activities. Long-term inhalation of benzene causes blood disorders. Benzene specifically affects bone marrow, the tissues that produce blood cells. Benzene may cause anemia (i.e., an insufficient number of healthy red blood cells), excessive bleeding, damage to the immune system and genetic damage. Increased incidence of leukemia (cancer of the tissues that form white blood cells) has been observed in people occupationally exposed to benzene. EPA has classified benzene as a known (Class A) human carcinogen.

Naphthalene is a white solid that evaporates easily. Fuels such as petroleum and coal contain naphthalene. Burning tobacco or wood produces naphthalene. It has a strong, but not unpleasant smell. Chronic exposure of workers and rodents to naphthalene has been reported to cause cataracts and damage to the retina. As of 1998, it was classified as a possible (Group C) carcinogen at that time and remains so at present.

Acetaldehyde is a colorless, flammable liquid that evaporates easily into the air. It is often a product of incomplete combustion of fuels and wood. Animal studies have shown that acetaldehyde caused nasal and laryngeal tumors. EPA considers acetaldehyde to be a probable (Class B2) human carcinogen.

How do monitored air toxics in Klamath Falls compare to levels in other parts of Oregon?

Levels of benzene in Klamath Falls in the winter months are comparable to the highest levels of benzene monitored in the Portland area. The source of benzene in Klamath Falls is most likely from wood stove emissions, in contrast to Portland benzene comes primarily from automobiles and trucks.

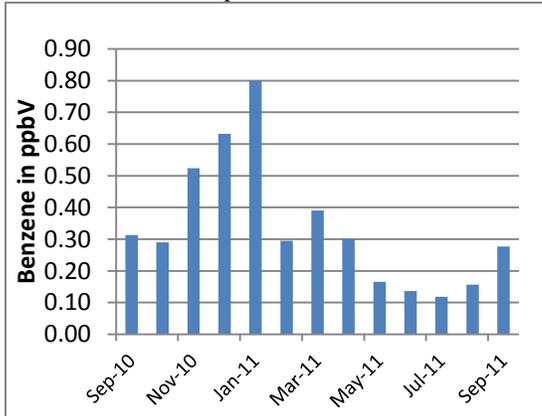


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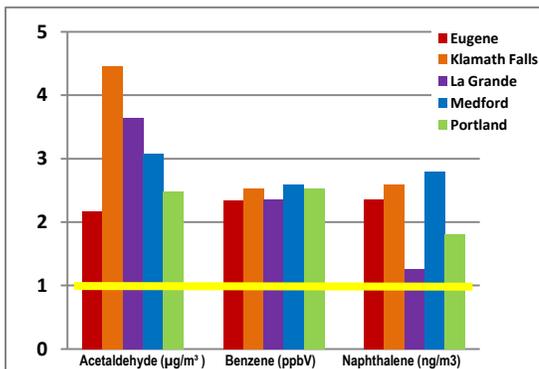
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During a 12 month monitoring period in 2011, benzene levels in Klamath Falls were 4 and a half times above the DEQ air toxics annual benchmark or clean air goal. Monitoring showed that benzene levels were highest between November and January. Below is a chart showing average monthly concentrations of benzene in the atmosphere in Klamath Falls.



Acetaldehyde and naphthalene levels monitored in Klamath Falls also have a higher concentration than in Portland and several other communities in Oregon. Below is a chart showing annual pollutant concentrations for acetaldehyde, benzene and naphthalene as a multiple above benchmarks using data from October 2010 to September 2011.



More detailed information about Klamath Falls air toxics monitoring data is available in DEQ's Air Quality Annual Report at <http://www.deq.state.or.us/aq/forms/2011AirQualityAnnualReport.pdf>

What causes higher levels of air toxics in Klamath Falls?

DEQ's analysis shows that benzene, naphthalene and acetaldehyde are produced primarily by wood burning in Klamath Falls.

These three toxic pollutants are most closely associated with wood combustion in Klamath Falls. There is an indication that the elevated benzene levels in Klamath Falls were not

associated with vehicle exhaust because the other chemicals associated with vehicle exhaust were not prevalent. In addition, there is a high correlation in the winter time between levels of PM2.5 and benzene, naphthalene and acetaldehydes. DEQ determined that 76% of the effective PM2.5 emissions in the design winter days are from woodstoves in Klamath Falls. As seen with PM2.5 emissions most of the three toxic emissions also increase significantly in the winter months. Because these toxic pollutants track closely with PM2.5, DEQ can conclude that most of these toxic pollutants are generated by wood stoves.

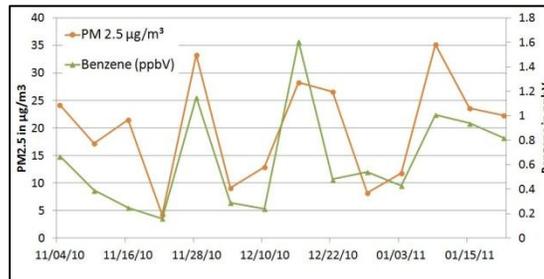


Chart showing how benzene tracks with PM2.5 emissions in the winter between November and January in Klamath Falls. Left scale is PM2.5 concentrations and right scale is Benzene concentrations.

Finally, DEQ estimates that woodstoves generate 8 tons of benzene emissions during the wood burning season in Klamath Falls non attainment area. These emissions coincide with unfavorable meteorological conditions which trap most of the pollution close to the ground level. Compared to other sources of heat, wood burning has the highest benzene emissions. For example, if all the wood burning appliances are changed to natural gas or distillate oil appliances, benzene emissions from residential heating would have near zero levels.

How can air toxics be reduced in Klamath Falls?

DEQ expects that particulate reduction strategies focused on residential wood heating in Klamath Falls will also reduce key air toxics including benzene, since the source of these pollutants is the same.

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