Air in Fallon, Nev. has elevated levels of tungsten and cobalt

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The air in Fallon, Nev. has significantly higher levels of tungsten and cobalt than does the air in neighboring towns, according to a new research report. The research suggests that the metals in the air come from a point source within Fallon, a community of about 8,000 located in Churchill County about 60 miles east of Reno, Nev.

The finding that Fallon's air differs from nearby towns might have medical implications. Since 1997, 16 cases of childhood leukemia have been diagnosed in children who lived in the Fallon area for some time prior to diagnosis. In a 2003 U.S. Health and Human Services report (www.atsdr.cdc.gov/HAC/PHA/fallonair/finalair.pdf) investigating possible causes for the leukemia cases in Fallon, tungsten was mentioned as "a contaminant of concern because it was elevated in urine samples" collected from Fallon-area residents as part of the investigation.

The metal, a component of tungsten steel and tungsten carbide, is used in tools exposed to high temperatures, such as drill bits and the filaments of incandescent light bulbs. Tungsten is naturally present in soils and rocks in Churchill County and other parts of Nevada. The metal was mined in the region around Fallon at various sites, including Churchill Butte.

"There are more metals in the air in Fallon than in other towns around Fallon. These metals are tungsten and cobalt," said lead researcher Paul R. Sheppard, an assistant professor of dendrochronology at The University of Arizona in Tucson. "The biomedical ramifications of tungsten are not really all that well known." He added that occupational

exposure to cobalt has been implicated in lung and other cancers.

The February 2004 final report of an expert panel (health2k.state.nv.us/healthoff … xpertpanel022304.pdf) concluded that "the cause(s) of childhood leukemia, including those from Churchill County, Nevada, remain unknown," and recommended further research. The National Toxicology Program is planning studies to examine the effects of exposure to tungsten (www.cdc.gov/nceh/clusters/fallon/ntp_update.htm).

Sheppard and his coauthors Dr. Gary Ridenour of Fallon, Robert J. Speakman of the University of Missouri-Columbia and Mark L. Witten, a UA research professor of pediatrics, will publish their article, "Elevated tungsten and cobalt in airborne particulates in Fallon, Nevada: Possible implications for the childhood leukemia cluster," in the journal Applied Geochemistry. The Gerber Foundation and the Cancer Research and Prevention Foundation funded the team's research.

Sheppard and Witten will give a scientific presentation about the team's findings at 3 p.m. on Friday, Nov. 18, in room 218 of the Henry Koffler building on the UA campus.

Because heavy metals had been suggested as one possible environmental cause of cancers, the multidisciplinary research team tested for metals in the air of Fallon and the four nearby Nevada towns of Reno, Fernley, Yerington and Lovelock in the spring and fall of 2004.

The researchers placed portable air samplers at various sites in the towns. The samplers took in a known volume of air. Dust from the air was captured on filters and analyzed at the University of Missouri-Columbia for 19 different metals using a technique called acid-dissolution, inductively coupled plasma mass spectrometry. The team also analyzed wind speed and direction data from a weather station in

Fallon, because wind speed and direction can affect the amount of dust in the air.

The team found that compared with the other towns, Fallon's air had significantly more tungsten, and sometimes also cobalt. All five towns were similar for the amounts of other metals in the air.

The finding suggests the source is not a natural source outside of Fallon, write the researchers, because all the towns would likely have been similarly affected by a natural source. Moreover, "the temporal similarity of airborne tungsten and cobalt suggests a single source for these two metals," the researchers wrote in their article. "However, cobalt is not abundant naturally in west-central Nevada, and no specific deposits of both tungsten and cobalt are known near Fallon."

Moreover, the researchers wrote, if the tungsten came from a natural source outside Fallon, high winds would kick up tungsten-laden dust, increasing the amount of tungsten found in the air. "However," states their research report, "results in Fallon were exactly the opposite this: high winds resulted in lower tungsten loading in Fallon dust, suggesting that the source is within Fallon."

Sheppard said, "In Fallon, we got high amounts of tungsten with no wind and low amounts with high wind." He added, "There's no variability in the other towns. These data indicate that Fallon is environmentally distinctive."

Because the air samplers were placed at various sites throughout Fallon, the researchers could see if wind affected where tungsten was found in Fallon's air. The research team found that the amount of tungsten and cobalt in the air was highest near north-central Fallon and tapered off further away. According to a February 2003 U.S. Health and Human Services report (www.atsdr.cdc.gov/HAC/PHA/fallonair/finalair.pdf),

Fallon has a facility that "houses offices, a laboratory, and a tungsten carbide processing operation."

Sheppard said, "Our research found elevated levels of tungsten within a three-kilometer radius of the hard-metal facility."

Witten said, "There needs to be more research done to examine the relationship between these metals and the development of leukemia. We're doing that in my lab. It's another step to try and identify a possible environmental cause of leukemia."

Sheppard said, "We also need to learn more information about the biomedical consequences of airborne tungsten."

Sheppard is now looking at tree-ring cores from the area to see if the trees can reveal anything about the history of tungsten and cobalt in the air in Fallon. He said, "Trees incorporate metals from the environment and those metals show up in the tree rings. By analyzing the chemicals in tree rings, we can look back in time years, and even decades, to learn about metals in Fallon's environment."

Source: University of Arizona