

As tellurium demands rise, so do contamination concerns

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Credit: American Chemical Society

As technology advances, demands for tellurium, a rare element, are on the rise. Some forms of tellurium are toxic, so as the element finds applications in solar panels, rubber production, electronics and more, researchers are becoming concerned about possible environmental contamination. Now, one group reports in ACS' *Environmental Science & Technology* that by studying lake sediments they can construct a history of tellurium as it was deposited in the environment.

According to the U.S. Geological Survey, Canada is the leading supplier



of <u>tellurium</u> to the U.S. While tellurium can be found naturally at low concentrations in the Earth's crust and oceans, it is frequently released into the environment as a by-product of metal production, as well as from the mining and burning of coal and oil. Since some forms of tellurium can be harmful, Johan A. Wiklund, Jane L. Kirk and colleagues wanted to find out how widespread tellurium was in the environment.

The team collected and dated sediment cores from lakes in Canada near metal smelting operations, coal mining facilities, oil sands mining sites, rural locations and remote natural sites. The concentrations of tellurium in rural Alberta, near <u>oil sands</u> were mostly steady and low, but a remote site in eastern Canada showed a modest rise during the 20th century. In a remote location in Ontario, modern tellurium deposition rates were seven-fold higher in the 20th century and compatible with tellurium <u>concentration</u> measurements in precipitation, leading the group to conclude that the atmospheric deposition history of tellurium was documented through the lake sediments. In lakes near the coal mining sites, the tellurium concentrations were only above the detection limits after coal-fired electrical generation began in the area around 1910. In lakes near the copper smelting operations, the tellurium concentrations increased over 100 times after the opening of the smelter in 1930. As tellurium is growing in popularity, the researchers say that this study is a first step toward understanding how the element, a potential pollutant, can build up in the environment.

More information: Johan A. Wiklund et al. Widespread Atmospheric Tellurium Contamination in Industrial and Remote Regions of Canada, *Environmental Science & Technology* (2018). DOI: <u>10.1021/acs.est.7b06242</u>

Abstract

High tech applications, primarily photovoltaics, have greatly increased



demand for the rare and versatile but toxic element tellurium (Te). Here we examine dated lake sediment Te concentration profiles collected near potential point sources (metal smelters, coal mining/combustion facilities, oil sands operations) and from rural regions and remote natural areas of Canada. Te contamination was most prevalent near a Cu/Zn smelter where observed deposition infers 21 g Te released per metric ton (t) of Cu processed. Globally, 9,500 t is predicted to have been atmospherically deposited near Cu smelters post-1900. In a remote area of central Canada (Experimental Lakes Area; ELA), preindustrial Te deposition rates were equivalent to the estimated average global mass flux supplied from natural sources; however more surprisingly, modern Te deposition rates were 6-fold higher and comparable with Te measurements in precipitation. We therefore suggest that sediment cores reliably record atmospheric Te deposition and that anthropogenic activities have significantly augmented atmospheric Te levels, making it an emerging contaminant of potential concern. Lake water residence time was found to influence lake sediment Te inventories among lakes within a region. The apparent settling rate for Te was comparable to macronutrients (C, N, P), likely indicative of significant biological processing of Te.

Provided by American Chemical Society

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