

Health Concerns Regarding Burning Gilsonite

In June 2017, the Environmental Epidemiology Program (EEP) at the Utah Department of Health (UDOH) received a request for technical assistance from the TriCounty Health Department regarding potential health effects of exposure to burning Gilsonite. The request was the result of a brush fire east of Bonanza in Uintah County that ignited a Gilsonite deposit.

Gilsonite, or uintaite (also uintahite), is a naturally occurring, solid hydrocarbon found in commercial quantities in the Uinta Basin of Utah and Colorado, and Kermanshah in Iran. It is used in paint, ink, oil well drilling fluid, asphalt modifiers and cements. It is a dark brown to black crystalline solid that contains 84% carbon, 10% hydrogen, 3% nitrogen, 1% oxygen and <1% sulfur, and consists primarily of asphaltenes (80%) and resins (19%) (American Gilsonite, 2017; Nciri et al., 2014; NOAA, 2017).

Studies of the health effects of Gilsonite exposure are limited in part due to the few places where it can be found. Most exposures to high concentrations are occupational, causing skin and eye irritation, and dust may produce mild upper respiratory problems (American Gilsonite, 2013). Studies show that it is not carcinogenic or mutagenic; however, high temperatures may alter Gilsonite's hydrocarbon structure and produce carcinogenic compounds (American Gilsonite, 2013). In addition, depending on the conditions, especially temperature, the actual composition and concentration of emissions when it burns are uncertain, and have not been studied.

Gilsonite is easily combustible and emits toxic fumes when it burns (NOAA, 2017). Emissions may include water vapor, particulate matter, and oxides of nitrogen and carbon (ATSDR, 2017). Particulate matter (PM) is made up of small pieces of liquids or solids that include soot, dirt, dust and smoke. Exposure to PM is linked to trouble breathing, eye, throat and lung irritation, as well as lung cancer and coronary heart disease (CDC, 2013). High levels of nitrogen oxides can cause swelling of upper respiratory tract tissues, fluid build-up in the lungs and death (ATSDR, 2002). Acute carbon monoxide exposure causes nausea, dizziness, headaches, chest pain, tachycardia, hypotension, cardiac and respiratory arrest and coma as a result of tissue hypoxia (ATSDR, 2012).

There is a lack of information on the specific health effects of exposure to burning Gilsonite. However, there are some substances that are similar in composition and have been better studied, such as asphalt (Toxnet, 2003). In order to be used for paving, asphalt is heated up to 752°F, and several volatile components are released. Asphalt fumes and vapors from paving and roofing are associated with eye, nasal and throat irritation. Occupational exposures can also cause nausea, skin irritation, stomach pain, headaches and fatigue. In addition, studies report acute lower respiratory tract problems (NIOSH, 2000).

Polycyclic aromatic hydrocarbons (PAHs) are formed as a complex mixture during the incomplete combustion of organic material, and many are known to be carcinogenic. Other effects include problems in the gastrointestinal, pulmonary, dermatologic and renal systems

(ATSDR, 2009). PAHs have been identified in asphalt fumes; however, data is not sufficient to link exposure to asphalt fumes during paving and lung cancer (NIOSH, 2000). In 2007, a wooden train trestle caught fire in Sacramento, California. There was a concern about creosote, a tarry material containing PAHs that was used to treat the wood in the trestle. The Union Pacific Rail Road ordered an analysis of air quality and found that concentrations of particulate matter, hydrocarbon gas and semi-volatile compounds did not reach levels of concern (OEHHA, 2007).

In the case of a Gilsonite fire, the EEP recommends the use of proper personal protective equipment (PPE). Based on safety data sheets, fire fighters/first responders are recommended to wear NIOSH approved self-contained breathing apparatus (American Gilsonite, 2013).

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