

FACTSHEET

October 2022

Breathing Easy: Emissions from Asphalt Material Plants and Your Health



Asphalt Material Plants (AMPs) play a vital role in the maintenance of our nation's infrastructure and strive to be good neighbors in the communities they serve.

AMPs mix liquid asphalt binder (asphalt cement) with crushed rock, gravel, and sand to create asphalt pavement. Asphalt cement is also called bitumen, a substance derived from petroleum that contains sulfur and polycyclic aromatic compounds. It does not easily evaporate and must be heated to become liquid. It is used in a heated form to create asphalt for paving. At an AMP, it is added to the crushed rock ("aggregate") in batches to be used for paving. In the past, this has been done using high temperatures ("Hot Mix" Asphalt, "HMA") at 300° to 350° F but current practice uses more moderate temperatures ("warm mix asphalt", "WMA") of 200° to 250° F. Warm mix technology uses less energy to produce and creates fewer emissions.

Asphalt emissions have raised concerns in communities and these concerns have been investigated by state and federal agencies. When detailed health effects studies were undertaken around AMPs (specifically hot mix asphalt facilities), no health effects from the plants were identified. In a 6-year study performed in North Carolina in response to community concerns, **both state and federal agencies concluded that there were no increased health hazards or risks associated with emissions from AMPs as compared to areas without AMPs** ^(1,2,3). US EPA also stated that its analysis of inhalation risks from asphalt processing facilities based on actual emissions were below 1 in a million over a lifetime and found no hazards to humans living in the vicinity of such facilities ⁽⁴⁾.

Both state and federal agencies require that AMPs adhere to strict air, water, and waste requirements ^(5,6,8). The US EPA also regulates emissions from AMPs and requires close monitoring of emissions to ensure that they meet air regulation requirements. In 2002, the US EPA reviewed emissions from AMPs and determined that they were not a major source of hazardous air pollution. In 2004, US EPA measured HMA plant emissions extensively at 4 different sites and found emission rates to be low ⁽⁷⁾. In the 20 years since that EPA report, AMPs continued to improve operational efficiencies which included additional emission controls and technologies like WMA which has lowered emissions even further.



AMPs employ multiple emission control systems as directed by regulations and may include monitoring to ensure that emissions of particulate matter, carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead comply with the National Ambient Air Quality Standards (NAAQS) at the property boundary ⁽⁸⁾. The small amount of emissions released from these control systems are closely monitored to ensure they stay well below any permitted level set by regulators to ensure that they pose no health or environmental risk to nearby communities ⁽⁹⁾. Most visible emissions from an asphalt plant's stack are just steam resulting from the drying of aggregate ^(5,9). The odor associated with asphalt pavement is due mainly to the sulfur compounds and PAHs¹ in the bitumen, which are released only at concentrations that meet NAAQS and state requirements.

In 2018, an update to a review of emissions from AMPs was published, providing comparisons of emissions from AMPs to other sources of air pollutant emissions and typical background values ⁽¹⁰⁾. The estimated emissions from an AMPs that produces 200,000 tons of asphalt per year were also compared to those generated by woodstoves and fireplaces, fast food restaurants, breweries, and gas-filling stations. The results of the background comparison, below, show that emissions from asphalt mixture plants are below typical background concentrations ⁽¹⁰⁾:

¹ PAHs = polycyclic aromatic hydrocarbons

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Substance	Modeled emission for APM ($\mu\text{g}/\text{m}^3$)	Background - outdoor air ($\mu\text{g}/\text{m}^3$)	Background - Indoor air ($\mu\text{g}/\text{m}^3$)
Particulate Matter 2.5 ^(a)	0.3	8	<8 - 29 ^(c)
Formaldehyde ^(a)	0.1	1.5	20
PAHs ^(b)	0.00009 - 0.0003	0.008 - 0.13	0.015 - 0.26
Benzene ^(b)	0.005 - 0.02	0.3 - 1.4	1.3 - 9.5

a) Estimate at 1000 feet from facility, includes stack and fugitive emissions

b) Range of values indicating typical or low end to high end in background samples or modeled values at 250 feet and 3000 feet from APM facility

c) Per Sanborn-Head 2018, the upper value is PM2.5 levels in indoor air of homes heated by residential wood stoves

Further, the study found that the typical emissions from an AMP producing 200,000 tons of asphalt per year were equivalent to the following annual emissions:

- **Total Volatile Organic Chemicals:** 4 mid-size breweries, 20 residential fireplaces, or 5 gas refilling stations
- **Benzene:** 19 residential wood stoves or 1 gas refilling station
- **PAHs:** 21 Fast food restaurants or 180 residential wood stoves
- **Formaldehyde:** 7 Fast food restaurants or 150 residential fireplaces.

The estimates provided in the Sanborn report (2018) were based on the emissions from an AMP; the emissions when using warm mix asphalt are reduced as production and holding temperatures are lower.

Asphalt is a sustainable paving material that can be used for recreational paths, roads, highways, parking lots and driveways. Asphalt provides a smooth, quiet ride accessible to all types of vehicles and journeys.



References:

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4. USEPA 2020. Asphalt Processing and Asphalt Roofing Manufacturing Final Inhalation Risk Assessment Results, as published in the Federal Register, Vol. 85, No 49: 14526-14558. March 12, 2020.
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