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 (also called asphalt cement or bitumen) with crushed rock, gravel, and sand (collectively, aggregate) to create asphalt pavement mixtures for roadway paving.

A solid at ambient temperature, asphalt must be heated to become a pliable, viscous liquid. When manufacturing asphalt pavement mixtures, the aggregate must be totally dry, which is achieved by tumbling the aggregate through a series of drum flights and heating it using a large burner like in a furnace. The burner combusts fuel, such as natural gas, to reach a mixing temperature of approximately 300° F (historically known as hot-mix asphalt or HMA); newer technology allows mixing at lower temperatures of 200° to 250° F (called warm-mix asphalt or WMA).

Asphalt binder is a substance primarily derived from the refining of crude oil but is also naturally occurring and has been used since ancient times as a waterproofing agent.

During the aggregate tumbling and heating process, the majority of aggregate dust and fuel combustion byproducts are captured in a filtration control system (baghouse) with the remaining emissions vented to atmosphere through the dryer stack. Emissions from AMPs are well characterized and highly regulated by federal and state environmental agencies[1,2,3]. For example, in 2002, the USEPA reviewed AMP emissions and determined AMPs were **not a major source of hazardous air pollutants**[4]. In 2004, USEPA extensively measured HMA plant emissions at numerous sites, finding emission rates to be well controlled and low[5].

USEPA is required to assess risks associated with *major* industrial sources. AMPs, however, are considered *minor* sources under the Clean Air Act.

At the same time (2002–2007), federal and state agencies conducted extensive investigations into alleged community health impacts near HMA plants in operation across the country, concluding there were **no increased health hazards or risks** associated with emissions from AMPs compared to areas without AMPs[6,7,8]. In the 20 years since, AMPs have continued to improve operational efficiencies by adding emission control systems and technologies like WMA, all of which have lowered facility emissions even further.

For comparison, even emissions from very large asphalt processing and roofing manufacturing facilities, which are classified as 'major' industrial emission sources (compared to 'minor' AMPs), have been shown to pose no discernible risk. USEPA, based on actual emissions from 'major' asphalt processing facilities, showed that inhalation cancer risk was below one-in-a-million over a lifetime, finding **no hazards to humans living in the vicinity** of these very large 'major' industrial processing facilities[9].

Most visible emissions from an asphalt plant's stack are just steam resulting from the drying of aggregate[1,10].

AMPs employ multiple emission control systems, in accordance with local/national regulations, which may include monitoring to ensure compliance with the National Ambient Air Quality Standards (NAAQS) at the property boundary[3]. The small amount of emissions released from these control systems is closely monitored to make certain such emissions stay well below any permitted level set by regulators, and to ensure they pose **no health or environmental risk to nearby communities**[10]. Moreover, any odor associated with AMPs or asphalt pavement mixtures is due mainly to small amounts of sulfur and other volatile compounds in the asphalt binder, which are released at high mix temperatures, but are only present in miniscule concentrations that meet NAAQS and other state requirements.

In 2018, an updated review of emissions from AMPs compared certain air pollutant emissions from AMPs to other sources and to typical background ambient air concentrations[11]. For example, the estimated emissions from an AMP that produces 200,000 tons of asphalt mixture per year (typical AMP production) were compared to emissions generated by woodstoves and fireplaces, fast food restaurants, breweries, and gasoline-filling stations. Some results of that comparison, below, show that emissions of certain highly regulated compounds from AMPs, due primarily to the burner's fuel combustion to dry aggregate, are miniscule and well below typical background air concentration levels[11].

Substance	Modeled emission for APM ($\mu g/m^3$)	Background – outdoor air ($\mu g/m^3$)	Background – indoor air ($\mu g/m^3$)
Particulate Matter 2.5 [(a)]	0.3	8	<8 – 29[(c)]
Formaldehyde [(a)]	0.1	1.5	20
Polyaromatic hydrocarbons (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 1,000 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 3,000 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 pavement mixture per year were equivalent to the following annual emissions from other sources[11]:

- *Total Volatile Organic Chemicals:* 4 mid-size breweries, 20 residential fireplaces, or 5 gasoline-filling stations
- *Benzene:* 19 residential woodstoves or 1 gasoline-filling station
- *PAHs:* 21 fast food restaurants or 180 residential woodstoves
- *Formaldehyde:* 7 fast food restaurants or 150 residential fireplaces

The emissions estimates provided in the 2018 report were based on the emissions from a typical hot-mix AMP. Emissions associated with WMA production are further reduced as a result of lower temperatures and reduced energy use.

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.

1. Fact Sheet – Environmental Regulations for Hot Mix Asphalt Plants. 2014. Colorado Department of Public Health and Environment, Air Pollution Control Division, Small Business Assistance Program.
2. Standards of Performance for Hot Mix Asphalt Plants. Amended 1986. Code of Federal Regulations, Title 40, Part 60, Subpart I.
3. National Ambient Air Quality Standards, NAAQS Table. Undated. Environmental Protection Agency. Research Triangle Park, NC.
4. National Emission Standards for Hazardous Air Pollutants: Revision of Source Category List Under Section 112 of the Clean Air Act. Environment Protection Agency. Federal Register, vol. 67, no. 29, pp. 6521–6536.
5. AP-42: Compilation of Air Pollutant Emission Factors, Fifth Ed., Vol. 1, Chapter 11: Mineral Products Industry. 2004. Environmental Protection Agency, Research Triangle Park, NC.
6. Review of the Incidence of Cancer Cases among Residents of Rowan County, North Carolina, and Residents Living Near Industrial Facilities in Salisbury, North Carolina. 2006. U.S. Department of Health and Human Services. Atlanta, Ga.
7. Salisbury, NC Air Quality and Hot Mix Asphalt Plants Health Consultation. 2007. U.S. Department of Health and Human Services. Atlanta, Ga.
8. Campbell, D. 2006. "Cancer and Suicide Near Asphalt Distribution Facilities: Salisbury, North Carolina. A Report of a Six-Year Investigation." North Carolina Division of Public Health, Environment and Epidemiology Branch. Raleigh, NC.
9. National Emission Standards for Hazardous Air Pollutants: Asphalt Processing and Asphalt Roofing Manufacturing Residual Risk and Technology Review. Environmental Protection Agency. Federal Register, vol. 85, no 49, pp. 14526-14558. March 12, 2020.
10. The Environmental Impact of Asphalt Plants SR 206 2014-05. 2014. National Asphalt Pavement Association. Lanham, Md.
11. Emissions Comparison: Asphalt Pavement Mixture Plants and Select Source Categories. 2018. Sanborn, Head & Associates, Inc. Burlington, Vt.