



To the Citizens of Colorado:

The members of the Colorado Asphalt Pavement Association are proud to be a part of helping Colorado grow and prosper. Our work is essential to building and maintaining the state's transportation infrastructure - its roads, airport runways, parking lots, driveways - wherever asphalt pavement is needed.

Along with the work comes responsibility to protect our natural and manmade environments. It's a responsibility we take seriously.

In this packet of materials, you'll find information on the environmental impact of asphalt and asphalt plants here in Colorado.

When you consider the facts, we think you'll be surprised at the low impact our products and plants have. You'll also see that we're constantly working to lessen that impact even further.

If you have any questions about the enclosed information, please feel free to call our office. We promise to respond quickly. And further, if you have ideas or comments you'd like to share with us, contact us as well.

We're proud to call Colorado home. And prouder to be working to make it even better.

Sincerely,

Tom Peterson, P.E.  
Executive Director, CAPA

# CAPA Overview

The Colorado Asphalt Pavement Association (CAPA) was founded in 1983, by the hot mix asphalt producing industry of Colorado. CAPA represents 95 percent of Colorado's asphalt industry - approximately 26 asphalt producers and over 100 associate and affiliate members, who supply, specify or support the production and use of asphalt pavements. The association represents members' interests on issues involving the Colorado Department of Transportation (CDOT), the Colorado Department of Public Health and Environment (CDPHE) and other regulatory and specifying agencies throughout the state.

- As a partner of the CDOT, CAPA supports only the highest standards of engineering and construction. Members receive training in many areas, including environmental best practices.
- CAPA works closely with the National Asphalt Pavement Association (NAPA), located in Lanham, MD. CAPA members serve on a number of national task forces and committees, ranging from plant operations to legislative and environmental issues.
- CAPA members are proud to be the builders of Colorado's roads and are committed to the state and its overall quality of life. CAPA actively partners with the state Air Pollution Control Division (APCD) to promote the use of environmental best practices.
- CAPA has participated in two innovative efforts with the CDPHE - Air Pollution Control Division to improve air quality. The first a Compliance Assurance Pilot Project (Compass), is a voluntary program using non-regulatory approaches to achieve compliance assurance.

The second initiative, again a joint effort with the state Air Pollution Control Division and funded by the U.S. EPA, is to develop and implement a Comprehensive Measurement Tool (COMET). The COMET initiative will support the development and use of environmental best practices by the hot mix asphalt industry of Colorado.

- Colorado roads are resurfaced every 12 to 15 years, which means approximately 3,200 miles of roads are repaved annually. Approximately 12 million tons of asphalt are used in Colorado on an annual basis.
- Asphalt plants are located throughout the state near road construction sites to ensure the asphalt mixtures maintain the required temperatures during placement.

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# EMISSIONS STUDY SUMMARY

*How low are emissions from a typical asphalt plant? The answer: extremely low. In one of the most closely monitored emissions categories - volatile organic compounds (VOCs) - a single asphalt plant gives off in one year what two residential fireplaces do. Or about the same as an average commercial bakery does in only two days.*

*Those are among the findings of the respected independent Clayton Group Services in a study. Issued in December 2000, the study compared emissions from a hot mix asphalt plant with those from a number of other common sources.*

*For purposes of the comparison, the hot mix asphalt plant was defined as one with an annual production rate of 100,000 tons. The consumer-oriented sources tested for comparison included: residential fireplaces and wood stoves, bakeries, gasoline filling stations, barbeque grills and fast-food restaurants.*

*The sources were chosen for frequent occurrence in communities and the ready availability of emissions data for comparison. The Clayton Group study found that during the course of a year an asphalt plant gave off:*

- the VOCs for two residential fireplaces during the course of one year*
- the VOC emissions of a typical commercial bakery operating for two days*
- the total organic compounds (TOCs) emissions of three gasoline filling stations during the course of a year*
- the TOC emissions of five fast-food restaurants during the course of one year*
- the polycyclic aromatic hydrocarbons (PAH) emissions of 10 residential wood stoves over the course of a year*

- the benzene emission of a gas station operating for five months*

*Volatile organic compounds (VOCs) are carbon-containing compounds that readily evaporate at normal air temperature. Some examples include hair sprays, household cleaning products and dry-cleaning fluids, as well as from a variety of adhesives, copier fluids and other common chemicals. Trees, grasses and other kinds of vegetation also emit VOCs.*

*TOCs are any organic compounds, volatile or not, containing carbon atoms.*

*PAHs are found in wood smoke and diesel exhaust.*

*Benzene is a clear, colorless aromatic liquid used as a solvent in printing, paints, and dry cleaning. Benzene is released in the fumes and exhaust of gasoline, from other natural fuels, as a result of the combustion process, and in the manufacturing of other chemicals.*

*For a complete copy of the report "Emissions Comparison Between Asphalt Plants and Selected Sources Categories," contact the CAPA office at 303-741-6150.*

*For complete environmental information on the uses of asphalt, see [www.beyondroads.com](http://www.beyondroads.com)*

*Sources: Clayton Group Services, U.S. EPA, National Oceanic and Atmospheric*

# TERMINOLOGY

*The following is a short list of terms used in the asphalt industry. For a complete list of terms, visit the Asphalt Institute at [www.asphaltinstitute.org](http://www.asphaltinstitute.org).*

## **AGGREGATE**

*Hard, inert material, such as gravel, crushed rock, slag or crushed stone, used in pavement applications either by itself or for mixing with asphalt.*

## **ASPHALT CEMENT (AC)**

*A mixture of crude petroleum used for paving, roofing, industrial and other special purposes. Now more commonly referred to as asphalt binder.*

## **ASPHALT CONCRETE**

*A mixture on asphalt binder and aggregate thoroughly mixed and compacted into a mass.*

## **ASPHALT PAVEMENT**

*Hot mix asphalt over supporting courses such as asphalt concrete bases, crushed stone, slag, gravel, Portland Cement Concrete (PCC), brick or block pavement.*

## **ASPHALT PLANT**

*A manufacturing facility that produces hot mix asphalt paving mixtures*

## **ASPHALT RUBBER BINDER (AR)**

*Recycled ground tire rubber is added to conventional asphalt cement. Roofing shingles may also be added to the asphalt cement.*

## **CRUMB RUBBER**

*Asphalt rubber binder with a consistency ranging from coffee grounds to peanut butter*

## **HOT MIX ASPHALT (HMA)**

*High-quality, thoroughly controlled hot mixture of asphalt binder (cement) and well-graded, high quality aggregate, which can be compacted into a uniform dense mass.*

## **HOT MIX ASPHALT (HMA) OVERLAY**

*One or more courses of HMA over an existing pavement.*

## **MAINTENANCE MIX**

*A mixture of asphalt emulsion and mineral aggregate used in relatively small areas to patch holes, depressions and distressed areas in existing pavements.*

## **PAVEMENT BASE**

*The lower or underlying pavement course atop the subbase or subgrade and under the top or wearing course.*

## **RECLAIMED ASPHALT PAVEMENT (RAP)**

*Pulverized excavated asphalt that is used as an aggregate in the recycling of asphalt pavements. Factory-rejected roofing shingles can also be added to RAP.*

## **RECYCLED ASPHALT MIX**

*A mixture produced after processing existing asphalt pavement materials such as shingles and rubber.*

## **SHEET ASPHALT**

*A non-porous material used in reservoir liners and landfill caps.*

*Sources: Asphalt Institute, National Asphalt Pavement Association*

# ECONOMIC IMPACT/QUALITY

*Asphalt, a safe, economical and durable paving material, offers many benefits. When properly designed, built and maintained, asphalt pavement enhances vehicle safety by providing a smooth, stable and skid-resistant surface. It also saves wear and tear on vehicles. In colder climates like Colorado, black asphalt pavements will accelerate the melting of snow and ice as compared with lighter pigment pavements such as concrete.*

*Asphalt pavement is 100 percent recyclable, and its quality actually improves each time it is recycled as new materials are mixed with the used material. In fact, asphalt pavement is the most recycled product in the United States at 80 percent. That compares to 60 percent of aluminum cans, 56 percent of newsprint and 31 percent of glass beverage bottles. According to the EPA, 73 million tons of asphalt are recycled each year.*

*Thanks to cold milling and recycling, asphalt saves significantly - compared with concrete - on the readjustment of manholes, curbs and sewer drains when rehabilitating streets and roads. American taxpayers save over \$300 million per year from recycling asphalt. In addition, compared to concrete, asphalt reduces road construction time, resulting in fewer traffic delays.*

## **ECONOMIC IMPACT**

*The asphalt industry has a significant, positive effect on Colorado's economy. The industry is comprised of companies ranging from small drive-way-paving operations to multi-million dollar construction companies that produce and place hot mix asphalt on roads, airports, parking lots, etc.*

- *Approximately 5,000 people are directly employed by the asphalt industry in Colorado.*
- *Road construction provides employment for planners, civil engineers, construction management executives, equipment operators, laborers and many others.*
- *The Colorado Department of Transportation (CDOT) projects that the yearly construction program will be maintained at levels greater than 500 million per year into the future.*
- *Approximately 12 million tons of HMA are produced in Colorado on an annual basis.*

- *Approximately 2 million tons of HMA are placed on Colorado highways annually.*

## **QUALITY**

*While asphalt roads have provided smooth, safe travel for Colorado motorists since 1916, the Industry still has a strong commitment to continuous improvement.*

- *The asphalt industry has active partnerships with universities throughout the state to ensure that only the best design and engineering technology are used.*
- *CAPA members are advocates of Total Quality Management. They work hard to ensure that their product is of high quality and produces smoother, and longer-lasting roads for the people of Colorado, and that workers have the equipment and authority needed to accomplish their best work.*
- *CAPA and CDOT have partnered to train road technicians for certification, resulting in higher-quality, longer-lasting roads.*
- *As challenges arise, CAPA works closely with agencies to introduce new and emerging technology. For example, new long-lasting Stone Matrix Asphalt and Superpave have been developed for heavy-traffic, high performance pavements. High quality intersection mixes have been developed and guidelines for the design and construction of asphalt trails and paths are being used.*
- *Through the National Asphalt Pavement Association's (NAPA) Research and Education Foundation and Auburn University, the industry has established the National Center for Asphalt Technology (NCAT). NCAT is conducting state-of-the-art research to assist the asphalt industry in its effort to constantly improve its product.*
- *CAPA is actively involved with state and national agency representatives to ensure appropriate implementation of products from the \$50-million Strategic Highway Research Program (SHRP). The knowledge gained from SHRP research is resulting in longer lasting pavements.*

# FREQUENTLY ASKED QUESTIONS

**Q: WHAT IS ASPHALT?**

**A:** Asphalt, also known as hot mix asphalt (HMA), is made from dried crushed rock and asphalt cement, (binder) which is a mixture of petroleum compounds produced by oil refineries.

**Q: HOW IS ASPHALT MADE?**

**A:** Asphalt binder is heated and combined with crushed rock in a production facility to produce HMA. The materials are mixed and loaded immediately onto trucks for delivery to construction sites or kept in storage silos.

**Q: WHAT MAKES ASPHALT PAVEMENT SO SAFE FOR DRIVING?**

**A:** Safety is largely a function of maintaining tire contact with the pavement surface and skid resistance of the surfacing. Asphalt has micro texture, which aids in skid resistance. Asphalt roads are also quieter than concrete roads because they don't have expansion joints to create noise. Other safety features of asphalt:

- Asphalt is impervious to de-icing salts and chemicals and is unaffected by winter road safety maintenance.
- Asphalt pavements can be designed so that water drains through the surface layer of the pavement, thus reducing splash and tire spray, and increasing tire-road contact during wet weather.
- Asphalt retains heat better than other materials, so ice doesn't form as quickly and melts faster.

**Q: IS ASPHALT ENVIRONMENTALLY SOUND?**

**A:** Yes! Asphalt pavement is 100 percent recyclable and can be made to perform better the second or even third time around. In fact, it is the most recycled product in the United States at 80 percent. That compares to significantly lower percentages for aluminum cans, newsprint, plastic and glass beverage containers, and magazines. Asphalt roads are removed, recrushed, mixed with additional aggregate and fresh asphalt cement, remixed and placed back on the road. The hot mix asphalt industry also accepts the following materials: rubber from tires, slag from the steel-making process, roofing shingles and sand from metal-casting foundries.

- In a report to Congress, the Federal Highway Administration estimated that over 70 million tons of asphalt paving material is being recycled on a yearly basis.
- Recycling roads not only conserves natural resources and decreases construction time, it saves American taxpayers over \$300 million each year.
- Asphalt is not soluble or harmful in a water environment. Asphalt roads and stockpiles do not contribute pollutants to storm water runoff.
- Asphalt also prevents pollution from getting into water supplies and protects against disease from waste materials. It can be combined with aggregate to form a voidless and impermeable layer.
- Many states have tested discarded asphalt pavement and determined that it should be categorized as clean fill.

**Q: HOW ENVIRONMENTALLY SAFE ARE ASPHALT PLANTS?**

**A:** Asphalt plants in Colorado must meet rigorous environmental standards. The Colorado Department of Public Health & Environment has very stringent regulations and permitting requirements for air emissions, storm water runoff and storage of materials. CAPA members are dedicated to meeting the demands of those regulations and in working closely with the APCD in regulation conformity.

While production of HMA paving materials have increased by more than 250% over the past 40 years, total emissions from HMA plants have dropped by 97% or more in that same period.

**Q: WHY ARE SO MANY ASPHALT PLANTS NECESSARY?**

**A:** Colorado has over 9,000 miles of state maintained highways. These roads are resurfaced every 10 to 15 years, which means over 700 miles of roads are repaved annually. Over 12 million tons of hot mix asphalt are being produced in Colorado on a yearly basis. CDOT consumes approximately 2 million tons, cities/counties use approximately 3 to 4 million tons, 3 to 4 million tons are consumed on commercial and residential projects and another 2 to 3 million tons for tollway, airport and other facilities.

**Q: IS ASPHALT USED ONLY FOR ROADS?**

**A:** No. Asphalt has a variety of uses, including:

- Paving running tracks, airport runways, greenway trails, bicycle and golf cart paths, in addition to basketball and tennis courts.
- Paving cattle feed lots, poultry house floors, barn floors, and greenhouse floors.
- Lining fish hatcheries and industrial retention ponds.
- Serving as railbeds for transit systems.
- Creating sea walls, dikes and groins to control beach erosion. Asphalt's strength, water-proofing capability and inertness to seawater helps prevent the eroding action of tides and waves.

**Q: DO PAVING OPERATIONS PRODUCE HIGH LEVELS OF VOLATILE ORGANIC COMPOUNDS?**

**A:** No. The organic fume has been calculated to be 21.1 grams. To illustrate this, NAPA created a handout calculating and showing the daily amount of organic emissions emitted during hot mix paving operations. It's surprising how many people have the misperception that paving operations emit great quantities of VOC's. This is not the case at all! The handout takes into account a variety of assumptions. It assumes that 1500 tons of HMA are laid per day with a mix containing 5% asphalt yielding 75 tons of asphalt per day. It also takes into account the lane width and thickness, the amount of headspace, and the organic concentration of the mix. The amount of organic fume calculated is 21.1 grams, which yields an emission factor of only 0.00003 lb/ton of HMA. A very small number. Even if the emission factor was doubled, tripled, or quadrupled, the number would still be very very small.

**Q: DO CONSTRUCTION MATERIAL FACILITIES REDUCE ADJACENT PROPERTY VALUES?**

**A:** Many think so, however one study proved otherwise. During the re-zoning process before a Planning Commission or Board of County Commissioners involving a heavy industrial use such as a new quarry, there is often confusing and inadequate information regarding the potential impacts on adjacent property values. This issue surfaced during CAPA member, Asphalt Paving Co's attempt for Jefferson County approval of the proposed Rail Line Quarry. CAPA Affiliate member, Banks and Gesso, LLC was hired and developed a comprehensive study that concluded that subdivisions in Jefferson County, and those near active quarries, consistently maintained values and rates of increase in values at or above the area averages. Copies of the report are available by contacting the Colorado Asphalt Pavement Association at (303) 741-6150.

**Q: DOES PAVING A ROAD IMPROVE AIR QUALITY?**

**A:** Yes, Paving a gravel road eliminates fugitive dust from vehicle traffic. Due to a reallocation of federal Congestion Mitigation and Air Quality (CMAQ) funds, two sections of Telluride, Colorado streets were paved in asphalt. The CMAQ funds are allocated by the state Transportation Commission to rural areas in need of air quality improvement. The town of Telluride is currently listed by the State Department of Public Health and Environment, as a "non-attainment maintenance" area, or an area that has not been in compliance with the National Ambient Air Quality Standards. A primary contributor to poor air quality in the area is dust from dirt roads.

**Q: IS IT COMMON FOR AN ASPHALT PLANT TO EMIT STEAM DURING PRODUCTION?**

**A:** Yes, steam is produced during asphalt production from the moisture within the aggregate. Because of the visibility of steam during production, especially in the colder months, it is sometimes confused with volatile emissions.

