## Arizona Motor Fuel Supply & Distribution

- ***Motor Fuel*: Frequently Asked Questions**

**What is Motor Fuel?** Arizona Administrative Code currently defines motor fuel as petroleum or a petroleum based substance that is motor gasoline, aviation gasoline, number one or number two diesel fuel, or any grade of oxygenated gasoline typically used in the operation of a motor engine.

**Why are *motor fuels* so important?**
Gasoline powers much of our economy and supports our modern, mobile, lifestyle.

**What are Arizona's long-term goals concerning motor fuel supply?**
Arizona's long-term goals are to ensure a reliable, affordable, and environmentally sound supply of gasoline.

**Where does Arizona's motor fuels come from?**
Arizona's supply of motor fuels comes from two basic sources: 1) Southern California refineries; and 2) New Mexico and West Texas refineries. Gasoline may also be delivered to Southern California ports, for shipment to Arizona, via super tankers or barges from refineries in the Northwest and the East Coast, as well as from countries such as Venezuela, Finland, and Saudi Arabia.

**How do our motor fuels get here?**
Gasoline is pumped from the refineries or tank-storage facilities into the interstate gasoline-pipeline system. Arizona receives almost all of its gasoline through two pipelines owned and operated by Kinder Morgan, Inc. Kinder Morgan's "West Line" is a 20-inch diameter pipeline that originates in Watson, California, and travels down to Yuma, Arizona, then up to Phoenix. It takes a gallon of gasoline approximately seven days to make that journey. Kinder Morgan's "East Line," a smaller diameter pipeline, originates in El Paso, Texas, travels to Tucson, and then on to Phoenix. It takes a gallon of gasoline approximately six days to make that journey. There are large distribution terminals in Phoenix and Tucson, where the gasoline is stored in large, above-ground tanks. Gasoline trucks then fill up with gasoline, add in the additives blended for a specific gasoline, and distribute the final products to the local gas stations.

**How much gasoline do we use in Arizona?**
We consume approximately 4.6 MILLION gallons of gasoline (Arizona CBG) each day within Maricopa County. As a state, we consume approximately 2.8 BILLION gallons of gasoline each year!

**How much do Arizonans spend on gasoline each year?**
Arizonans spent approximately $6.9 billion on gasoline and other refined petroleum products in the year 2006. Almost 86% of this money left the state to pay for petroleum, refining, and distribution. For more information, please see the 2006 Energy Dollar Flow Analysis.

- ***Gasoline:* Frequently Asked Questions**

**What is Conventional Gasoline?**
Conventional gasoline is a volatile flammable liquid mixture of hundreds of species of hydrocarbons, obtained from the distillation of crude oil, and used as fuel for internal combustion engines. It is gasoline that has not been modified by adding an oxygenate and has not been chemically reformulated to meet any particular air quality standards. Conventional gasoline is used everywhere in Arizona except Metropolitan Tucson during the winter (October through March) and in Maricopa County (year-round).

**What is Oxygenated Gasoline?**
An oxygenate is an oxygen-carrying chemical compound. Oxygenated gasoline is a blend of gasoline to which an oxygenate, typically Ethanol or MTBE, has been added. Blending an oxygenate into gasoline promotes more complete combustion of the gasoline, which reduces emissions of carbon monoxide and volatile organic chemicals. In Arizona, oxygenated gasoline is generally used only in metropolitan Tucson during the winter (October through March).

**What is Ethanol and why is it blended into our gasoline?**
Ethanol is an alcohol made from renewable resources such as corn, other grains, food and beverage wastes, and forestry by-products. Ethanol, like MTBE, increases volume and octane levels and oxygenates gasoline.

**What is Octane Number (AKI)?**
The AKI is a measure of a particular gasoline blend's ability to resist engine knock. The stickers seen on gasoline dispensers describing the Regular, Midgrade, and Premium grades of gasoline as "87", "89", or "91" octane are commonly referred to as octane numbers. However, it is more accurate to refer to those numbers as the Anti-Knock Index value or simply the AKI. The AKI is determined in a laboratory by operating, under differing operating conditions, two separate single-cylinder engines: a "Research" engine, by which a Research Octane Number (RON) is determined and a "Motor" engine, by which the Motor Octane Number (MON) is determined. The AKI posted on gasoline dispensers is determined by the following mathematical equation: (RON+MON)/2 or (R+M)/2!

**What is Engine Knock?**
Within the combustion chamber of a spark-ignited, internal-combustion engine, a spark plug ignites the air-fuel mixture (atomized gasoline and air). As the resultant flame radiates away from the point of ignition it moves across the top of the piston, quickly and smoothly. If the last bit of air-fuel mixture ignites spontaneously before the flame front reaches it, there is a sudden jump in the pressure within the cylinder. It is that jump in pressure that causes the familiar pinging or knocking sound.

**Is Premium (91) gasoline better than Regular (87)?**
Not necessarily! A good rule of thumb is to follow the instructions in your vehicle's owner's manual. Your vehicle's engine was designed in such a way as to run on a specific grade of gasoline, so follow the manufacturer's recommendation.

- **Arizona's Motor Fuel Distribution System**

Getting motor fuel from refinery to the retail service station requires a complex distribution system that relies on a network of "just-in-time" inventories and deliveries involving five oil industry sectors: 1) refineries, 2) pipelines, 3) terminals, 4) tanker trucks, and 5) retail stations.

**Refineries** take crude oil and "refine" (i.e., convert, purify or blend) it into a wide variety of petroleum products including various gases for fuel and for the manufacture of chemicals, gasoline, jet fuel and kerosene, heating and diesel fuel, industrial fuel oil, waxes, lubricating oils, greases, petroleum coke, and asphalts.
Approximately 15 refineries produce the particular gasoline formula, known as Arizona CBG, which the federal government requires to help ensure the air quality in Phoenix stays within healthful levels. Most of these refineries are located in southern California, western Texas and New Mexico. Typically only a few of them blend Arizona CBG at any given time of the year.

**Refined products pipelines** are the safest, most efficient and reliable way of delivering large volumes of gasoline over great distances. Arizona receives its gasoline through two refined products pipelines, both of which are currently owned and operated by Kinder Morgan Energy Partners, LLC.

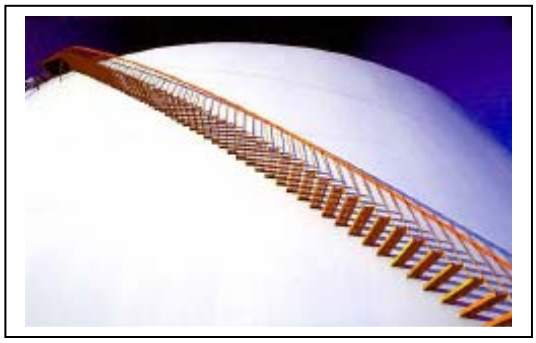
The West Line is a single 20-inch diameter pipeline originating near Los Angeles that runs through

southern California and Yuma, Arizona, before terminating in Phoenix.

The East Line consists of 8- and 12-inch lines running parallel to each other from El Paso, Texas, to Tucson. From Tucson, the East Line becomes a single pipeline that "telescopes" from 8 inches to 12 inches before it reaches Phoenix.
Currently about 60 percent of Arizona's gasoline comes through the West Line. It takes seven days for a gallon of gasoline to reach Phoenix via the West Line and six days through the East Line.

The Longhorn Pipeline, scheduled for startup in June 2004, proposes to link Gulf Coast refineries and suppliers to the Arizona marketplace. The pipeline runs from Houston to El Paso, where it connects with the Kinder Morgan East Line. It will take approximately 30 days for a gallon of gas to complete the 750-mile trip from Houston to Phoenix. Read a short history of petroleum products pipelines in Arizona

**Terminals**, located in Phoenix and Tucson, serve as fuel storage and distribution centers in their respective areas. The Phoenix Terminal, located southwest of Van Buren Street and 51st Avenue, is larger and comprises a number of smaller terminals owned and operated by the following companies: BP (ARCO), Caljet, ChevronTexaco, ConocoPhillips, and Kinder Morgan. These companies may also lease tanks or otherwise provide services and products to other oil companies, dealers, branded and unbranded distributors, and private brands.



The Phoenix Terminal has approximately 80 fuel storage tanks, though individual tanks vary in volume and content. The larger ones have volumes ranging from 60,000 to 100,000 barrels (2.5-4.2 million gallons). A 117,000-barrel (4.9 million gallon) tank is currently under construction.
Daily gasoline consumption in Maricopa County is estimated at 110,000 barrels, or 4.6 million gallons. While the aggregate volume of storage at the Phoenix Terminal may seem large, it actually holds about a three- to five-day supply given existing demand.

**Tanker trucks** are the workhorses of the Arizona gasoline distribution system, delivering large volumes of gasoline to retail stations every day, around the clock.

Loading racks at the terminals are used to fill tanker trucks with gasoline and other motor fuels. A typical tanker truck carries 7,500-8,000 gallons of motor fuel per load.

Most tanks are divided into several compartments to segregate the different fuels being loaded. Trucks configured for retail station deliveries may carry two or three grades of gasoline (87, 89, and 91), as well as diesel fuel, depending on the customer.

All gasoline that is delivered to retail stations in Maricopa County during the winter months (November through March) must be blended with ethanol (10 percent by volume) to help reduce carbon monoxide emissions for improved air quality.

The blending of ethanol into gasoline occurs at the terminal rather than at the refinery because ethanol cannot be delivered though pipelines. Ethanol is not delivered through pipelines because it attracts and absorbs water that may be present as condensation in the pipeline and thereby contaminate the gasoline. Ethanol is also a corrosive and continued transport of ethanol within pipelines could compromise a pipeline's physical integrity.

Winter season Arizona CBG that has not yet been blended with ethanol is referred to as *AZRBOB* (Arizona Reformulated Blendstock for Oxygenate Blending). Once a 10 percent volume of ethanol has been added to the *AZRBOB* it becomes Arizona CBG and can be distributed to retail stations.

During the summer season (June through October) Arizona CBG is not blended with ethanol and is delivered through the pipeline system as Arizona CBG.

**Retail stations** are the final point in the Arizona gasoline distribution system. There are approximately 2,400 retail stations within Arizona, about 1,000 of which are located within Maricopa County.