Coal and the Battle Against Smoke: The Early Days of A&WMA

by Bill Beck

Editor’s Note: As part of A&WMA’s centennial celebration in 2007, we are taking a look back at key moments in the Association’s history, as well as at the external forces that shaped its growth and development. This article, the first in a series, details how the heavy use of coal in the 1800s resulted in a serious smoke problem in major cities throughout North America, and how the need to address this problem led to creation of the International Association for the Prevention of Smoke.

The coal that fueled the Industrial Revolution shrouded much of 19th century Europe and America in thick, greasy smoke. The urbanization that accompanied industrialization exposed residents to ash, soot, and a host of respiratory illnesses. Smoke was the reason for the founding of the predecessor to the Air & Waste Management Association in the early 20th century. Cities such as Pittsburgh, Cincinnati, and St. Louis were often wreathed in acrid smoke that reduced visibility, covered buildings and vegetation with a layer of soot and ash, and turned noon into nightfall.

With the introduction in the 1700s of the steam engine, an internal combustion machine that converted heat energy from steam to mechanical purposes, coal became the fuel of choice for the Industrial Revolution. Thomas Newcomen and James Watt transformed England from an agrarian to an industrial society in little more than a generation. In the process, the inventors of the steam engine created an environmental problem that would bedevil society for much of the next two centuries.

Soft coal was ideal for burning in the steam engines of the 18th and 19th centuries. It was, first and foremost, abundant in Great Britain, Europe, and the United States. Britain had huge reserves in the Midlands, Wales, and Yorkshire. Coal deposits stretched across northern France and Belgium, the German states were rich in coal, and Poland mined coal as early as the 1600s. The United States was rich in coal, both anthracite and bituminous. Coal was already abundant in the 13 original colonies, easily stripped from surface deposits that ran from Pennsylvania to Alabama. As settlement pushed west across the Appalachians, massive coal deposits were discovered in the Northwest Territory states of Indiana, Kentucky, Illinois, and Iowa. Coal was also relatively cheap to mine.

Coal found new uses in the 19th century. Coal heated at high temperatures in the absence of oxygen made coke, a carbon product with almost no ash or volatile residues. Coke was ideally suited as a fuel for the recently invented Bessemer process, which revolutionized the manufacture of steel. Another 19th century industrial use that greatly increased the consumption of coal was
rail passenger and freight transportation. Coal-fired steam locomotives brought coal smoke to every nook and cranny of the world’s landscape.

Heating coal into coke also produced a low-BTU gas that was ideal for distribution to the residents of the rapidly growing urban areas of Europe and North America. In 1792, Scotsman William Murdock discovered a technique for storing coke gas. Within 20 years, a manufactured gas industry was providing gaslight to millions of people living in cities from London to New York. During the 1820s and 1830s, gas service spread up and down the East Coast of America. The Boston Gas Light Company organized in 1822, followed a year later by the organization of the New York Gas Light Company.

Philadelphia got gas service in 1836, and most communities of any size east of the Appalachian Mountains had at least rudimentary gas service by the mid-1840s. St. Louis became the first city west of the Mississippi River to have manufactured gas service when investors chartered a coal gas company in 1837.

The 1880s brought still another major use for America’s endless supply of coal. Thomas Edison’s development of a workable incandescent lighting system between 1879 and 1883 effectively began the electrification of American society, a process that would primarily be fueled by coal for the next century-and-a-quarter.

At the turn of the 20th century, coal dominated North America’s energy demand. By 1900, one of every 40 workers in the United States made his living either mining coal, hauling coal, or shoveling coal into industrial boilers. On any given day in 1910, nearly three-quarters of a million American miners blasted coal from underground mines. That same year, the nation’s railroads employed 75,000 firemen to feed coal into locomotive boilers.

In the early 1900s, there were bituminous coal mines in more than 20 U.S. states, which meant that most Americans at the time had easy access to soft coal supplies. Coal consumption early in the century was immense. In 1910, residents of Pittsburgh consumed more than 15 million tons of coal, an amount equal to 29 tons for each person living in the city. Across the United States, Americans consumed half-a-billion tons of coal in 1910, an amount that would reach its all-time peak of 650 million tons in 1918, when American industry hit production records in support of allied military efforts during World War I.

Coal supplied nearly 75 percent of America’s energy needs by the 1910s. There was little fear that U.S. coal supplies would be depleted soon. In 1913, U.S. coal deposits accounted for nearly one-third of the estimated world’s supply of 3 trillion tons.

All that coal created a thick, black, oily smoke that deposited sulfur, nitrogen, and carbon compounds on everything it touched. Coal smoke obscured the horizon almost everywhere Americans looked. Atop Michigan’s Brockway Mountain, a high point overlooking Lake Superior, a tourist in 1900 could see smudges of smoke miles out across the water. The smoke belched from the boilers of bulk freighters hauling iron ore and grain down from the Upper Lakes to the ore ports on Lake Erie and the huge grain elevators at Buffalo.

An increasing number of municipal reformers and medical researchers in 1900 suspected that coal smoke was as hazardous to humans’ health as it was a public nuisance. Beginning in the 1880s, a number of U.S. and Canadian cities had established smoke inspection departments charged with lessening the volume of smoke and soot deposited on urban streets. In 1907, a number of those municipal smoke inspectors formed an organization to share policies, plans, and tactics in the cities’ growing battle against coal smoke—the International Association for the Prevention of Smoke, the forerunner to A&WMA.

In Memory of Past-President

Milton Reizenstein

1911 – 2006

Milton Reizenstein, a past-president of the Air & Waste Management Association, died on July 15, 2006, in Baltimore, MD, following a bout with pneumonia. Reizenstein was a member of the Association for 55 years.

After graduating from Johns Hopkins University with a degree in mechanical engineering, Reizenstein spent most of his professional life as a smoke abatement engineer for the City of Baltimore. He retired in 1978.

A member of the Association since 1952, Reizenstein was active and served on many committees. He presented technical papers at annual meetings and was the general chairman of an exceptionally successful meeting in 1953 in Baltimore, his native city. He was elected to the Board of Directors in 1955 and served as Association President 1957–1958.

The Association awarded Honorary Membership to Reizenstein in 1972 in recognition of his generous service over the years. He was named a Fellow Member of the Association in 1990.