Pittsburgh
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ENGINEER

Quarterly Publication of the Engineers' Society of Western Pennsylvania

PITTSBURGH:
An Environmental Transformation

In This Issue:

Contrasting Views of Pittsburgh's Fifth Avenue corridor, both taken at 11AM on a mid-November morning. Cover photo is from 2006; insert is from 1945.

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Cover image: Larry Rippel. *Inset:* Library and Archives Division, Historical Society of Western Pennsylvania, Pittsburgh, PA

GUEST EDITORIAL

by **E. Joseph Duckett, PhD, PE**
SNC-Lavalin America, Inc.

Guess where the first U.S. sand filtration system to produce safe, typhoid-free, drinking water was built? Or where the first scrubber system to remove sulfur dioxide from a coal-fired power plant was installed? Or where the first Earth Day was held? Or where internationally recognized advancements in industrial pollution control were developed? Or where one of the earliest examples of "Brownfield" development occurred? Or where the first certified "Green" convention center is located?

If you guessed Pittsburgh to all of these questions, you would be 100% right. Our City and region have been the spawning grounds for environmental improvements that have not only transformed Pittsburgh, but have also helped clean up urban areas around the world. We are a long way from being "hell with the lid off" or the "smoky city" as we had been dubbed in the past.

"Our City and region have been the spawning grounds for environmental improvements that have not only transformed Pittsburgh, but have also helped clean up urban areas around the world."

Welcome to this environmental issue of Pittsburgh Engineer. We have assembled the articles of this issue both to highlight key environmental advancements in our town and to announce a special event that will occur here next Summer. The Centennial International Conference of the Air & Waste Management Association (A&WMA) will be held at the Pittsburgh Convention Center on June 26-29, 2007. It will be a large (3,000 +) gathering of environmental professionals from across the world. There will be big name speakers, lots of technical papers, a world premier movie and an exhibit hall filled with the latest and greatest environmental technology. It's open to anyone with an interest in air pollution control, waste management or environmental improvement. To find out more about the Conference and how you could participate as a registrant, speaker, sponsor or exhibitor, check the A&WMA website at www.awma.org.

"The Centennial International Conference of the Air & Waste Management Association (A&WMA) will be held at the Pittsburgh Convention Center on June 26-29, 2007."

All of the articles grouped into this issue of Pittsburgh Engineer cover environmental subjects, but they do so from several angles, reflecting the wide range of subjects under the environmental umbrella. A timeline prepared by Jayme Graham runs throughout the magazine, listing key dates and events in our region's environmental history. Our wastewater treatment history is traced in Nancy Barylak's piece on the Allegheny County Sanitary Authority (Alcosan), one of the largest treatment works in the country. Roger Westman, has edited a review of our remarkable history in controlling air pollution.

"Our area has been home to many advancements in industrial processes, energy production and pollution controls."

One of the keys to pollution control is developing technologies that are either fundamentally less polluting or that capture pollutants before they are discharged. Our area has been home to

Timeline: Environmental Progress in Western Pennsylvania

1804:
Town Burgess Neville called for higher chimneys to lessen smoke problems.

1815:
Local newspapers advocated a program of pollution control.

many advancements in industrial processes, energy production and pollution control. Joel Tarr tells us about the history of industrial gas production as both an environmental improvement over conventional coal combustion and a reminder that the by-products of even improved energy technologies can still be problematic. Tom Roberts describes a very recent major energy project in which circulating fluidized bed combustion is being used to generate electricity with low emissions while using waste coal as fuel. Bill Kubiak and Doug Boyea describe the progress made by the steel industry (much of it developed here) to reduce the environmental impacts of steel making.

"Environmental changes, improvements, regulations and technologies are works in progress."

In keeping with the Centennial of A&WMA, this issue emphasizes the history of our region. Environmental changes, improvements, regulations and technologies are works in progress. Harry Klodowski explains some recently proposed changes in air emission regulation (called New Source Review) that should be of interest to anyone concerned about the economic and environmental health of our region.

As our cover depicts, Pittsburgh has made an enormous transformation over the past century, most of it over the past 50 years. We hope this issue helps us to appreciate what has been done here and to motivate ourselves to keep it up.

Many thanks to each of the authors noted above who made this environmental issue of Pittsburgh Engineer possible. A special note of appreciation for Roger Dhonau, P.E. (Chief Environmental Engineer, SE Technologies Inc.) who assisted in every phase of putting this issue together.

To our readers, we hope you learn as much as we did and are as impressed with the remarkable environmental heritage of Pittsburgh! ■

Joe Duckett *is the Director of Environmental Engineering for SNC-Lavalin America, Inc. He is a Past President of ESWP and Past Chairman of the Allegheny Mountain Section of the Air & Waste Management Association.*

Timeline: Environmental Progress in Western Pennsylvania

1835:
Factories lined the Monongahela River wharf and steamboats traveled up and down the rivers. Pittsburgh's leaders in using steam were cotton factories, its third largest industry. Iron and iron products were the number one industry.
(Photo: courtesy of Carnegie Library)

ALCOSAN:
The Next Chapter in Environmental Stewardship

by **Nancy E. Barylak**
Allegheny County Sanitary Authority

In the early 1900s, area waterways were so polluted they not only caused a myriad of diseases, some fatal, but carried debris and other contaminants that choked the life around and under the water.

Fast forward to 2006, recreational uses of the rivers and streams are the focus of the region's transformation, fish once found in lakes are propagating locally and mixed use development along the three rivers has taken on a new significance.

Getting Started

Much of this change began when the Allegheny County Sanitary Authority (ALCOSAN) began primary treatment operations in 1959 removing sediment, floating debris and sewage that once emptied directly into creeks, streams and rivers. ALCOSAN is a unique institution in the Pittsburgh area. It is an example of inter-municipal coordination for environmental improvement. Serving the City of Pittsburgh as well as 82 neighboring municipalities, ALCOSAN is one of the 10 largest and most advanced wastewater treatment facilities in the U.S. The Authority was formed 60 years ago and broke ground for its plant along the Ohio River in the Woods Run area of Pittsburgh in 1956. For 50 years, ALCOSAN has played a pivotal role in cleaning the rivers.

Children sit along a littered streambed prior to ALCOSAN efforts to clean waterways

> **"...Allegheny County Sanitary Authority (ALCOSAN) began primary treatment operations in 1959..."**

By 1972, secondary operations, the biological process for sewage treatment, began discharging water cleaner than the Ohio river itself. Today, ALCOSAN's motto of Environmental Excellence Beyond Clean Water acts as a guide for all engineering, construction and operating activities.

Continuing the Improvement

For example, ALCOSAN creates an average 44,000 dry tons daily of biosolids, the sludge by-product of the wastewater treatment process. While the cheapest, and most convenient, method of disposing of the biosolids is landfilling, ALCOSAN has taken two approaches that are better for the environment. First, since 1991, 35,000 acres of the biosolids have been land applied in Western Pennsylvania and Eastern Ohio as a soil amendment for strip mined land and agricultural feed crops producing faster growth and reducing the need for synthetic fertilizers.

> **"It is an example of inter-municipal coordination for environmental improvement."**

Secondly, ALCOSAN also has two fluidized bed incinerators at its 56 acre wastewater treatment facility located on Pittsburgh's Northside. Almost 14,000 dry tons, or 32 percent of the biosolids produced last year were incinerated in these advanced combustion furnaces. Waste heat from the incinerators is recov-

Timeline: Environmental Progress in Western Pennsylvania

1850:
When wood became too scarce to be used for producing iron, Henry Clay Frick organized an industry to use coal instead of wood. By the 1850s regular editorials were appearing in the Pittsburgh Gazette complaining about air pollution.

'57 Belvedere is dwarfed by 10 foot diameter interceptor pipe (December 18, 1957) (Courtesy Alcosan)

ered in the form of 24,000 pounds per hour of steam which is used to heat on-site buildings. In addition, ALCOSAN has on-site power generation capabilities to create 2,750 KW maximum (enough to power 27,500 100-watt light bulbs) using the biosolids as fuel.

Ash from the incineration process has proven environmentally beneficial for several uses. The ash has been mixed with standard compost and is available commercially for the home gardener and landscaping companies. Another use, still in the preliminary investigation stages, involves mixing the ash with other materials for use in creating bricks or paving products.

Moving Forward

The next phase of work ALCOSAN will undertake is expected to be the largest public works program this region has ever faced. Aren't the waterways clean enough you ask? Appearances can be deceiving and in this case, the work of cleaning the waterways is not completed.

Since 1992, ALCOSAN has been planning and implementing steps to address revised federal Clean Water Act requirements that will benefit the public and impact the region's ecosystem.

"The next phase of work ALCOSAN will undertake is expected to be the largest public works program this region has ever faced."

Unfortunately, at a price tag of almost $3 billion – and higher sewer rates – ALCOSAN is challenged with educating the public about the problem and solutions.

Simply put, the 20 year program will reduce combined sewer overflows (CSOs) by 80%. These flows carry both sewage and stormwater. But when the lines fill to capacity, these flows, albeit dilute, empty into area waterways untreated. The discharges carry debris such as litter, grit, run-off containing pesticides, herbicides and other chemicals, and up to 17 billion gallons of sewage overflow yearly!

Another requirement is the total elimination of sanitary sewer overflows (SSOs) that occur when municipal owned and ALCOSAN sewer lines carrying only domestic and industrial wastes become filled to capacity and overflow untreated into area waterways.

Solutions include creating storage until capacity becomes available in the sewer lines, capturing more pollutants such as floatables (e.g. plastics) and heavier material (e.g. grit) at the point of discharge, installing more sewer lines to increase conveyance to the treatment facility and creating more treatment capacity at the plant.

Implementing the solutions will require a mix of unique and challenging engineering designs. Most options favor the reduction of CSOs versus eliminating SSOs. This is because eliminating SSOs would require both capture and secondary treatment.

Going Green

While designing additional capacity at the plant is on-going, preliminary engineering is under way to create ALCOSAN's first green building, a new Operations and Maintenance (O&M) Center. The current O & M facility will be torn down to make way for additional primary treatment capabilities to handle the increased flow from a current average of 200 million gallons per day (MGD) to a proposed 275 MGD dry weather and 800 MGD wet weather treatment capacity.

Other small, but significant, environmental actions ALCOSAN has implemented includes the purchase of hybrid fuel vehicles, as well as expanding its in-house recycling program beyond paper to include light bulbs, batteries, printer cartridges, metals, oil, antifreeze, and plastic and steel drums.

Timeline: Environmental Progress in Western Pennsylvania

1862:
Anthony Trollope declared that "Pittsburgh is, without exception, the blackest place I ever saw."

Late 1860s:
An ordinance passed prohibiting the use of bituminous coal in locomotives.

A day shot of the ALCOSAN plant looking towards the McKees Rocks Bridge. The 56 acre plant extends beyond the barges along the river (past the bridge).

"Significant progress in cleaning the rivers and streams in Allegheny County began over half a century ago when ALCOSAN began operations."

Significant progress in cleaning the rivers and streams in Allegheny County began over half a century ago when ALCOSAN began operations. ALCOSAN will continue to lead the region through the necessary and difficult changes which will improve public health and provide economic and environmental benefits for everyone. ■

Nancy E. Barylak *is the Manager of Public Relations of* ALCOSAN
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Timeline: Environmental Progress in Western Pennsylvania

1868:
Atlantic Monthly, January, 1868 in an article by James Parton entitled Pittsburgh, described the city as "hell with the lid taken off."

1875:
Andrew Carnegie's new Edgar Thomson works received its first order — 2,000 steel rails.

Air Pollution in Pittsburgh: A History

Edited by **Roger Westman, PhD**
Allegheny County Health Department

Phillips Power Station along the Ohio River across from Leetsdale, PA was the site of the first Flue Gas Desulfurization Scrubber on a Utility Power Plant in the U.S. The plant was owned at that time by Duquesne Light. The white plume from the stack is water vapor from the wet scrubber process. (Photo courtesy Reliant Energy)

The Fork of the Ohio

Since rivers were the superhighways of their time, the struggle to control the Ohio Valley focused on the fork of the river at the spot named after William Pitt, the King's First Minister. Here the Allegheny and Monongahela Rivers meet to form the Ohio River. The Colonists, the Indians, the French and the British all fought for the area. But by 1776 Pittsburgh's fame came only as a stopping place on the trip west. In the late 1700s James O'Hara, Pittsburgh's first industrialist, decided to change that by starting a glass manufacturing plant.

The Boom Times

By 1835 factories lined the Monongahela River and steamboats enabled travel both up and down the rivers. Pittsburgh's third largest industry was cotton. Iron was the number one industry by 1840. The cotton industry declined as the first railroad brought in cheaper cotton products, but the railroads also opened more markets for iron products, creating more jobs. In the 1840s the first wave of immigrants came to fill those jobs, including the family of William Carnegie. His son Andrew took a job at the age of ten in a cotton factory as a bobbin boy. He was promoted to engine tender, took a job as a telegraph messenger boy, became a telegraph operator, and then an office manager. When the Pennsylvania Railroad opened its own telegraph office, Andrew Carnegie moved there. Rising rapidly he became a successful railroad executive by the age 24.

Timeline: Environmental Progress in Western Pennsylvania

1880s:
H. J. Heinz, PPG, Dravo, Westinghouse and ALCOA start and succeeded in Pittsburgh. Allegheny Light, the forerunner of Duquesne Light, offered electric light to an otherwise dark city.

1890s:
Typhoid levels were highest in the country: over 100 cases per 100,000 persons, three times the average rate for U.S. cities. Among the causes were lack of public sewers and drinking water treatment.

When wood became too scarce to be used for producing iron, Henry Clay Frick organized an industry to use coal instead of wood. Just south of Pittsburgh extensive coal deposits became the center of the coke industry. However, by the 1850s regular editorials were appearing in the Pittsburgh Gazette urging action about the air pollution.

"In 1895 the City of Pittsburgh passed its first smoke control ordinance."

In 1872 while selling railroad bonds in England, Andrew Carnegie met Henry Bessemer who convinced him that his new steelmaking process would work in America. Andrew Carnegie returned home with a proposal to build the most efficient steel plant in the world. With the help of banker Judge Thomas Mellon, Carnegie built the Edgar Thomson Works on the Monongahela River in Braddock. These were boom times as the highly superior steel made new railroads, longer bridges and taller buildings possible. Both Carnegie and Frick turned to Eastern Europe to recruit immigrant workers to keep the mills going.

Pittsburgh also saw H. J. Heinz, PPG, Dravo, Westinghouse and ALCOA start and succeed. But the air was getting worse. Allegheny Light offered electric light to an otherwise dark city. In 1895 the City of Pittsburgh passed its first smoke control ordinance, but it had few penalties and the courts declared it invalid in 1902.

In 1903 Duquesne Light was formed to unify the many electric systems. George Westinghouse's inventions and belief in alternating current ended the control by the Edison electric companies. Just two years earlier the Frick and Carnegie interests consolidated to became United States Steel (USS), the world's largest corporation. With all this came pollution.

Growing Discontent

The people of Pittsburgh wanted a better, less polluted city. A new 1906 smoke control ordinance was also declared invalid by 1911. Andrew Carnegie, now retired and wealthy, gave the city a library and a museum, and endowed a technical school in his name.

World War I brought another boom to the steel industry, but its end brought the Great Steel Strike of 1919. It was not until 1935 that the Congress of Industrial Organizations (CIO) was able to succeed in organizing the workers. Just three years later, the Works Progress Administration (WPA) set up one hundred air sampling stations to measure SO_2 and dustfall.

Pittsburgh's Renaissance

In 1941 a commission chaired by Pittsburgh Councilman Abraham Wolk cited health, destruction of vegetation and the economy as reasons for taking action on air pollution. An ordinance was passed that relied on the Ringlemann Chart to regulate smoke, but also set an emission standard for fly ash, required smokeless solid fuel, and regulated new fuel-burning equipment.

"...a rebuilding which became known as Pittsburgh's Renaissance."

In 1945 David L. Lawrence was elected mayor of Pittsburgh and pledged to clear the air. Along with Richard K. Mellon, he also led Pittsburgh into effective flood control and a rebuilding which became known as Pittsburgh's Renaissance.

But smoke control had to wait for the end of World War II for enforcement. In 1947 all one and two family dwellings were required to use natural gas for home heating. Allegheny County joined the City in 1949 by adopting a County Smoke Control Ordinance. Diesels replaced coal-fired engines in locomotives and riverboats by 1952 and by 1956 about 90% of the homes had switched to natural gas. The days with streetlights on at noon due to the dark, polluted skies were coming to an end.

"The days with streetlights on at noon due to the dark, polluted skies were coming to an end."

The case for cleaner air was highlighted by an episode in a small town 28 miles south of Pittsburgh in an adjacent County. In October 1948, Donora experienced a severe stagnation for several

Timeline: Environmental Progress in Western Pennsylvania

1895:
The City of Pittsburgh passed its first smoke control ordinance. It had few penalties and was declared invalid by the courts in 1902.

Highland #2 Reservoir construction, 1898.
Credit: City of Pittsburgh Water Authority

days. Emissions from its steel and wire mill, zinc plant, and sulfuric acid plant blackened the air. Before it was over 43% of the population had become ill and 20 were dead.

Allegheny County Takes the Lead

The Allegheny County Health Department took over the duties of the City Smoke Control Bureau in 1957 and assumed responsibility for air pollution control throughout the County. The 1960 County ordinance had the strongest particulate control regulations in the nation. During the 1960s it became evident that air contaminants other than just dust and smoke were important. The County enacted new regulations, including ones on gaseous pollutants, in 1970.

Federal Legislation

The first federal Clean Air Act with real mandates and deadlines was passed in 1970. Congress allowed only five years, until July 1975, to reverse a hundred years of industrial pollution. Because of Allegheny County's long history of air pollution control, Pennsylvania granted the County authority to continue its own program. In response to the Clean Air Act, the County passed more comprehensive regulations in June 1972.

The Monongahela River Valley

Of specific concern was the 25-mile stretch of the Monongahela River within the County. Seven steel mills lined the riverbanks including the world's largest coke plant at Clairton, owned by USS. In Braddock, air quality exceeded the particulate standard about every third day. There were about a dozen high-air-pollution alerts a year requiring industrial curtailments.

"The area is now meeting ozone and the PM_{10} standards while working to attain the newest standards."

Major efforts were undertaken by USS to control its 21 coal-fired boilers and numerous steelmaking facilities in the valley. In the early 1970s, Duquesne Light stepped forward to pioneer SO_2 removal from power plants in the US with the installation of a 90% efficient scrubber on their Phillips Power Station. A second Duquesne Light power plant was equipped with a scrubber in 1978. Jones and Laughlin Steel also began a more vigorous clean up of its coke plant and steel facility in 1975.

Continued Improvement

By the mid-1970s, emissions of particulates and SO_2 had declined 65% and 57%, respectively. By the late 1970s the frequent air pollution alerts had ended. In June 1984, Pennsylvania implemented an automobile I/M program for Southwestern Pennsylvania under the threat of federal highway funds being withheld. Steel industry emission reductions, coupled with strict controls on other sources, helped dramatically improve air quality. The area is now meeting ozone and the PM_{10} standards while working to attain the newest standards.

The County also established a strict asbestos removal control program in 1983, and now regulates other hazardous pollutants per the 1990 Clean Air Act. In 1987 it began to regulate abrasive blasting operations to limit emissions of dust, lead and free silica.

The Future

Although the work is not finished, the people of Pittsburgh and Allegheny County are proud of their accomplishments in cleaning up the air and creating a beautiful and healthy community. Today they enjoy having major industries, universities, premier cultural institutions, and great natural resources along with blue skies. ■

Prepared by **Roger Westman**, *Allegheny County Health Department. The editor wishes to acknowledge the makers of the film,* **PITTSBURGH, An American Industrial City**, *produced for Duquesne Light for much of the material in this brief history. References include Clean Air, The Policies and Politics of Pollution Control by Charles O. Jones, University of Pittsburgh Press, 1975.*

Timeline: Environmental Progress in Western Pennsylvania

1903:
Duquesne Light was formed to unify the many electric systems. George Westinghouse's inventions and belief in alternating current allowed longer transmission lines and lower costs.

Manufactured Gas Plant, Buffalo, NY. (Photo courtesy of Joel Tarr)

Manufactured Gas plant in Seattle, Washington, constructed 1906. (Photo courtesy of Joel Tarr)

Pittsburgh and the Manufactured Gas Industry

by **Joel A. Tarr, PhD**
Carnegie Mellon University

Coal gasification is an energy-producing technology that is drawing increased interest today from various energy companies faced by declining reserves of petroleum and natural gas. Many of those exploring what they view as a new technology have little idea of the role that manufactured gas (or town gas) played in American history. Manufactured gas was one of the most critical energy sources and fuels that provided American cities, as well as other cities throughout the world, with light and energy during much of the 19th and into the 20th century. Demonstrations and applications of gas lighting began in the United States in 1802, based on European developments. The first city to develop a gas lighting system was Baltimore, which in 1816 granted the Gas Light Company a franchise to light the city streets with gas. Others cities quickly followed - the U.S. Census reported 30 manufactured gas plants in 1850, 221 in 1859, 390 in 1869, 742 in 1889, 877 in 1904, and 1,296 in 1909, although the actual number was probably considerably higher.

Timeline: Environmental Progress in Western Pennsylvania

1903:
United States Steel (USS) was formed with the consolidation of the Frick and Carnegie interests to become the largest corporation in the world.

1907:
A drinking water filtration system was put in place at the City Waterworks, providing immediate relief to the Pittsburgh typhoid crisis.

The history of manufactured gas in Pittsburgh began in 1827, when the city councils granted a William Griffiths "the exclusive right to provide the city with gas light." In 1837, after many delays, the Pittsburgh Gas Works began supplying gas for streetlights and residences. The company was operated as a joint-stock company first managed by a board of trustees appointed by the councils and later by a board half appointed by the stockholders. Over the next several decades other gas companies were given franchises, and by 1878 there were five in the city, the largest of which was the Pittsburgh Gas Company, with others located in the west, east, and north sides of the city.

"Coal gasification (Manufactured gas)...was one of the most critical energy sources that provided...light and energy during the 19th and into the 20th century."

These plants produced both coal gas and carbureted water gas (blue gas enriched with liquid hydrocarbons), using local and regional bituminous coal supplies that were among the best in the nation for gas production. The gas they produced was initially largely used for street lighting and domestic lighting as well as for cooking. Limited amounts, it appears (although the records concerning this are scarce), was used for industrial fuel, although in 1892 Andrew Carnegie invested in a mill in Bellefont, Pennsylvania to be run on manufactured gas. During the late 19th century the manufactured gas companies encountered increasing competition from regional natural gas wells and from electric lighting. By the 1880s, for instance, street lighting only accounted for 10% of national gas revenues and gas companies attempted to diversify into other energy markets such as heating and appliances. Brown's Directory of American Gas Companies lists few public lamps for the Pittsburgh manufactured gas firms in 1890. The South Side Gas Company serviced 400 public lamps in 1890, but by 1894 only had thirty-seven.

"...many firms and residences shifted back from natural gas to coal primarily in the late 1880s and 1890s."

Regional natural gas reserves of the region, however, were rapidly depleted, and many firms and residences shifted back from natural gas to coal primarily in the late 1880s and 1890s. The return to dirty coal as a fuel instead of clean natural gas resulted in a sharp deterioration of Pittsburgh's air quality. Some saw the possibility of substituting manufactured gas made from Pittsburgh coal for depleted natural gas supplies. George Westinghouse, for one, had experimented with a process of manufacturing gas from both anthracite and bituminous coal in the late 1880s. In 1894, the Philadelphia Company, the city's largest natural gas supplier, purchased Brunot Island in order to build a manufactured gas plant there. In 1899, Andrew Carnegie addressed the Chamber of Commerce and urged the use of manufactured gas as a solution to Pittsburgh's

smoke problem. (In 1891, though, he had rejected the use of manufactured gas rather than bituminous coal in his Pittsburgh mills.) Most of these plans were not implemented, however, largely because of costs. The Philadelphia Company built a coal-fired electrical power-house on Brunot Island in 1908 rather than a manufactured gas plant.

"Andrew Carnegie... urged the use of manufactured gas as a solution to Pittsburgh's smoke problem."

In 1900, the Philadelphia Company, which already owned several natural gas producers, took over control of the firms that produced manufactured gas and combined them in the Consolidated Gas Company of Pittsburgh. It constructed a new plant on the site that the Pittsburgh Gas Company had occupied since 1872 on the banks of the Monongahela River. The new plant produced both coal gas and water gas. The site later became the location of some of the facilities of the Jones & Laughlin Steel Company. The Philadelphia Company also controlled the Equitable Gas Company that sold combined natural gas and manufactured gas. In the late 1920s, the firm built an experimental combined water gas and producer gas plant at Elrama, 4 miles from Clairton, with a total capacity of 45 million cubic feet (cf) per day (20 million cf of water gas and 25 million cf of producer gas) to along with the 35 million cf capacity of its Pittsburgh plant. The Elrama plant was intended primary to handle extraordinary peak demands when natural gas supplies were low.

The heritage of Pittsburgh manufactured gas industry, however, involves more than its history. The various by-products of manufactured gas plants, if not captured and disposed in a safe manner or sold, could become environmental liabilities, damaging surface and groundwater quality, poisoning soils with toxic nuisances, and producing odors and smoke. As early as 1869 the Pittsburgh city councils passed a statute restricting the disposal of coal tar wastes in streams. Further ordinances prohibited the disposal of "any gas, tar, or any refuse matter" from gashouses in public waters or sewers or on the streets. Gases creating odors or that were "prejudicial to life or health" were also banned.

"...by-products of manufactured gas plants...could become environmental liabilities..."

The gas house wastes that had the most persistent characteristics and posed the most danger to the environment were tars (DNAPL's or dense non-aqueous phase liquids), a persistent group of pollutants that contaminated soil and groundwater. Gas house wastes were occasionally deliberately discharged onto the soil or used as landfill, as well as frequently leaking from storage facilities.

"The best known case in Pittsburgh in regard to pollution from gas house wastes involves what is now the Pittsburgh Technology Center..."

The best known case in Pittsburgh in regard to pollution from gas house wastes involves what is now the Pittsburgh Technology Center on Second Avenue. The site was purchased in 1983 from LTV Steel (originally Jones&Laughlin) for redevelopment as a brownfield site. When purchased, no one bothered to investigate the tenants previous to J&L. One of these tenants was the Consolidated Gas Company, which had sold its land to J&L in 1921. The site had been covered with fresh fill to a depth of several feet but pre-construction testing found traces of ferrous cyanide on the site, later identified as coming from a tar storage tank. This discovery resulted in delaying construction for more than two years, and Carnegie Mellon relocating its Research Institute to a site fifty feet downstream from the property line of the old gas plant.

"...past practices have frequently left a pollution burden for the present and for the future."

Thus, while the manufactured gas industry played an important role supplying cleaner energy for light and other uses in Pittsburgh and other American cities, it still left in hundreds of cities a heritage of persistent soil and groundwater contamination. This environmental damage has limited and delayed development on many sites, created possible health hazards, and costing many millions of dollars for remediation. It provides a striking example of how past practices have frequently left a pollution burden for the present and for the future. Hopefully, the new coal gasification technologies will not do the same. ■

Joel Tarr *is the Richard S. Caliguri Professor of History and Policy at Carnegie Mellon University. He is widely recognized as an expert on the environmental and industrial heritage of Pittsburgh.*

Timeline: Environmental Progress in Western Pennsylvania

1907:
The Smoke Prevention Association of America has its first meeting. This group would eventually become the Air & Waste Management Association.

1907:
Rachel Carson born.

1914:
A Pittsburgh anti-smoke ordinance was adopted.

Timeline: Environmental Progress in Western Pennsylvania

1919:
World War I brought another boom to the steel industry.

1926:
Typhoid epidemic over, with 2.6 deaths per 100,000, down from a high of well over 100 per 100,000.

1928:
The first commercial steel induction furnace in the US was installed in Pittsburgh by the Heppenstall Forge and Knife Company.

Innovations in Clean Coal Technology at the Reliant Seward Station

by **Thomas C. Roberts**
Reliant Energy

In 1921, the original 196 megawatt Seward Power Plant was built at the mouth of the Conemaugh No. 1 mine, 60 miles east of Pittsburgh, near Johnstown. It was the first mine-mouth, coal-fired facility in the United States. During its first 50 years of service, Pennsylvania coal production and electricity production at the original Seward plant were at its peak. After 82 years of service the coal-fired plant was retired and a new facility was built. The new plant produces two and one-half times as much electricity as the one it replaced, while significantly lowering emission rates.

Today, the legacy of King Coal lives on in the form of enormous mountains of unused low-grade coal. These waste coal piles – called "boney" or "gob" by Western Pennsylvanian natives – are a major source of acid runoff into rivers, streams and the ground water table.

On October 31, 2004, the $800 million Reliant Energy Seward project began to eliminate these boney piles by using them as fuel. Reliant Energy, owner and operator of the plant, estimates that there are 100 million tons of waste coal within 50 miles of the plant site in Indiana County's East Wheatfield Township and another 250 million tons across the state. This is more than enough to keep the new 521 megawatt plant supplied for decades to come. (Figure 1.)

Figure 1. *The Seward Station is the largest waste coal power station in the world and one of the world's largest circulating fluidized bed facilities. (Reliant Energy)*

Timeline: Environmental Progress in Western Pennsylvania

1936:
1930 census said 34 percent of population was engaged in manufacturing and mechanical industries.

1936:
Many of the larger cities of the United States based their smoke regulations or ordinances on Pittsburgh and requests for information were received from England, France, Australia and Japan.

Figure 2. *Unsightly mountains of low-grade coal and rocks, some as tall as 300 feet and thousands of feet long, are the fuel source for Seward Station. Boney piles are a major source of acid runoff into rivers and streams. (Reliant Energy)*

Seward is now the largest waste coal power station in the world. It was the first coal-fired power plant built in Pennsylvania in 20 years and is one of the largest circulating fluidized bed (CFB) facilities in the world. Benefits of the new Seward Power Plant include the production of low-cost electricity; disposal of millions of tons of former mine waste, (Figure 2.); significant reductions in air and water emissions; and removal of a major sources of acid mine discharge into the Kiskiminetas-Conemaugh watershed – all at no cost to the Commonwealth. (Figure 3).

Figure 3. *Typical acid runoff impacts to a stream. Seward Station's use of this fuel will improve water chemistry in the Kiskiminetas-Conemaugh watershed. (Reliant Energy)*

How It Works

The new Seward Plant was built on the site of the old plant. Prior to construction on the old site, Reliant remediated two million tons of waste coal on the property by mixing the acidic waste coal with nearly 2.2 million tons of alkaline ash from other plants nearby to neutralize it. But that was not all. The elevation of the new site was raised to avoid the 100 year flood plain, and then covered with topsoil and vegetation. After this was completed, Reliant built the new facility on the property making it one of the largest waste coal site remediation projects ever completed.

The Seward Plant is made up of two 50 percent capacity Alstom CFB combustors supplying a single turbine generator and is the only merchant electric generator of its kind. The steam at the plant is at 2600 psig and 1005F producing a main steam flow of 1.9 million lb/hr and a reheat flow of 1.7 million lb/hr resulting in 521 net MW. The designed heat rate is about 9700 Btu/kWh with an overall process efficiency of 86.25 percent. The boney fuel and limestone material from the material handling system feed the combustors. The use of limestone as a sorbent for S02 capture and the minimization of thermal $N0_x$ formation require the CFB combustion temperatures to be maintained between 1570 and 1590F. This is much lower than the 3000F temperature requirements of typical pulverized coal boiler technologies. About 70 percent of $S0_2$ formed during the combustion of sulfur in the process is captured in the combustor from the limestone addition. (Figure 4)

Timeline: Environmental Progress in Western Pennsylvania

1938:
Despite attempts to close them down, there are still about 900 privies (outhouses) within the City limits.

1941:
December 7th and Pearl Harbor. Pollution control would have to wait while all mills went to the war effort. Mayor Cornelius D. Scully and others travel to St. Louis to learn of their progress in Air Pollution and repeat it in Pittsburgh.

"Seward is now the largest waste coal power station in the world. It was the first coal-fired power plant built in Pennsylvania in 20 years and is one of the largest circulating fluidized bed (CFB) facilities in the world."

An assortment of other pollution control technologies has been incorporated to ensure that Seward meets Pennsylvania's strict air emission limits. (Table 1.) The pollution controls include a selective non-catalytic reduction (SNCR) system further reducing No_x emissions and a pulse-jet fabric filter or baghouse for particulate matter (PM) collection. Another control is one of the first U.S. applications of Alstom's patented fly ash dry absorber (FDA) system to polish $S0_2$ from the flue gas, while conserving the amount of limestone required to achieve at least 95% sulfur removal from the waste fuel combustion. A fraction of the fly ash collected in the baghouse is fed forward to the FDA. The FDA then re-humidifies the ash which in turn re-activates the calcined limestone. It is then re-injected into the flue gas stream and polishes out $S0_2$ and other acid gases.

Seward's fuel averages 51 percent ash. Typically, Seward will consume nearly 3.5 million tons of waste fuel and about 750,000 tons of limestone annually. This produces about 2.5 million tons of valuable ash. This byproduct is certified by Pennsylvania for beneficial use for soil remediation and mine

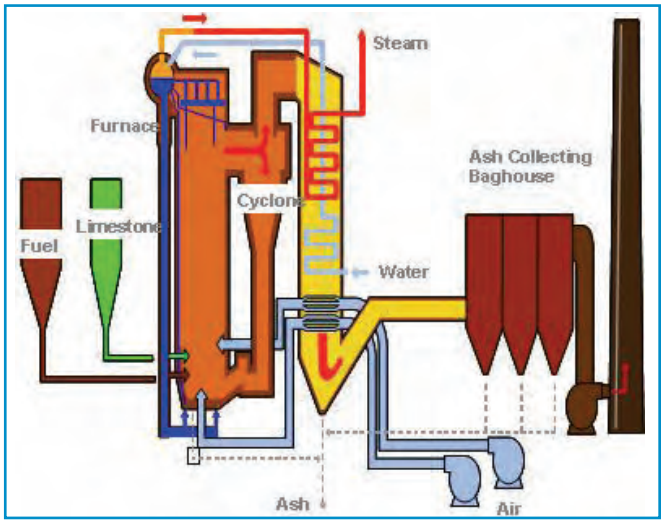

Figure 4. *Seward Station uses two 50%-sized Alstom Power Circulating Fluidized Beds to produce steam at 2,400 psig. Emissions are controlled by using limestone as a sorbent in the bed, maintaining the bed temperatures at around 1,570F to reduce thermal $N0_x$, and an assortment of back-end technologies such as selective non-catalytic reduction and fly ash dry absorber. (Reliant Energy)*

	Old Pulverized Coal-Fired Plant	New Circulating Fluidized Bed Plant
$N0_x$	0.57 lb/mmBtu	0.15 lb/mmBtu
$S0_2$	4.00 lb/mmBtu	0.60 lb/mmBtu
PM	0.10 lb/mmBtu	0.01 lb/mmBtu
C0		0.15 lb/mmBtu at 70 to 100% load 0.20 lb/mmBtu at 40 to 70% load
V0Cs		0.005 lb/mmBtu
NH_3		10 ppm

Table 1. Comparison of Emissions from New CFB Plant vs. Original Plant

Notes: $N0_x$ = nitrogen oxides, $S0_2$ = sulfur dioxide, PM = particulate matter, C0 = carbon monoxide, V0C = volotile organic compounds, NH3 = ammonia

Timeline: Environmental Progress in Western Pennsylvania

1945:
David L. Lawrence was elected mayor of Pittsburgh and pledged to clear the air. Along with Richard K. Mellon, who headed the Allegheny Conference on Community Development, he was to lead Pittsburgh into effective smoke control, flood control, slum clearance, and a rebuilding which became known as Pittsburgh's Renaissance.

Figure 5. *The old Seward Station is seen behind the new Station. The environmental and safety issues were addressed and the resources salvaged in an innovative no-cost demolition contract. (Reliant Energy)*

reclamation. The Seward product is transported to various abandoned mine sites and acid discharges where remediation occurs similar to the Seward remediation.

"The new Seward Plant includes a state-of-the-art 20 cell mechanical forced draft cooling tower that reduces thermal discharge by about 5 million BTU/hr, virtually eliminating thermal discharge."

Water resources were considered and conserved when the new Seward Plant was designed. The original facility had been a "once through" cooling water system. Water was pumped directly from the Conemaugh River, used as cooling water and then was discharged directly back into the river. The new Seward Plant includes a state-of-the-art 20 cell mechanical forced draft cooling tower that reduces thermal discharge by about 5 million BTU/hr, virtually eliminating thermal discharge. Within the plant boundaries, all waste, storm and various water streams are collected in a new central reservoir and used in the ash process thereby eliminating waste water treatment and discharge into the Conemaugh River.

The retirement of the old plant presented Reliant with both a challenge and an opportunity. Upon the final retirement, Reliant identified the existing environmental issues such as asbestos and lead-based paint, and the value in the structural steel, copper, and various specialty metals. Reliant developed a unique and innovative program in which the value of the salvageable metals and old equipment would offset the remediation cost of the identified environmental hazards – without funds changing hands. (Figure 5.) This no-cost contract to address environmental and safety issues of demolishing an old building while recycling the metal resources is a new model with enormous potential benefits to other brownfield locations in Pennsylvania and the U.S.

"Reliant developed a unique and innovative program in which the value of the salvageable metals and old equipment would offset the remediation cost of the identified environmental hazards..."

Reliant Energy believes that taking a holistic approach to business, the environment, safety and the community is the key to a successful company. The company is convinced that competitive markets provide the most innovative and efficient energy solutions. Seward is the proof. ■

Thomas C. Roberts *is the Technical Manager of the Reliant Energy's Seward Station Power Plant.*

Timeline: Environmental Progress in Western Pennsylvania

1947:
Smoke control had to wait for the end of World War II for enforcement. In 1947 all one and two family dwellings were made subject to the smoke control ordinances to end coal burning for home heating. Natural gas was piped to all neighborhoods and homes were required to switch over.

STEEL INDUSTRY ENVIRONMENTAL PROGRESS

by **Douglas P. Boyea** and **William S. Kubiak**

United States Steel Corporation

Environmental awareness became a growing political and social issue in the 1960s, prompting the passage of three milestone environmental laws. The Clean Air Act (CAA) was enacted in 1970, the Federal Water Pollution Control Act (commonly known as the Clean Water Act) was amended in 1972 and 1977, and the Resource Conservation and Recovery Act (RCRA) were enacted in 1976. These federal requirements significantly affected industry in the United States.

Timeline: Environmental Progress in Western Pennsylvania

1948:
In October, Donora, PA, a small town just 28 miles south of Pittsburgh, experienced a severe stagnation for several days. Emissions from its steel and wire mill, zinc plant, and sulfuric acid plant blackened the air. Before it was over 43% of the population had become ill and 20 were dead.

Air

Typical manufacturing processes in an integrated steel mill include coke production, iron production, steel production and ladle metallurgy, where the chemistry of liquid steel is changed to meet customer specifications. Liquid steel is cast into slabs which are then rolled into coils, acid cleaned, cold-rolled to further improve quality and then coated with tin, zinc or other materials depending on customer specifications. The coke production process involves heating coal in coke oven batteries to drive off volatile materials, leaving pure carbon (coke) for use as a fuel in the blast furnaces. Particulate emission control devices, such as baghouses and venturi scrubbers, collect and clean fugitive emissions generated during the removal of coke from the ovens at the end of each coking cycle. Volatile gasses that are driven from the coal inside the ovens are collected, cleaned and used as a high quality byproduct fuel to provide heat for the coking process and other downstream processes. The gas cleaning process can also include a step where sulfur compounds are removed from the gas to reduce SO2 emissions when the coke oven gas is burned. Organic vapors in the gas processing areas are either contained in closed-loop processes or collected and recycled.

"Process gasses, mainly carbon monoxide, generated during the iron-making process are collected, cleaned and used as a byproduct fuel."

The finished coke is charged into the blast furnaces along with iron-bearing materials and fluxes to produce liquid iron. Process gasses, mainly carbon monoxide, generated during the iron-making process are collected, cleaned and used as a byproduct fuel. Emissions generated when liquid iron and slag are removed from the furnace are collected and cleaned in a baghouse or inert gas shrouds are used to prevent the formation of iron oxide fumes. The liquid iron is then transported by rail car to the BOP Shop for further processing.

When the liquid iron arrives at the Basic Oxygen Process (BOP) Shop, it is chemically treated to reduce sulfur and the sulfur containing slag is skimmed off. The prepared liquid iron is the poured into the BOP furnace, along with a measured quantity of steel scrap. All of these steps are controlled by baghouse par-

Timeline: Environmental Progress in Western Pennsylvania

1952:
Diesel engines replaced coal firing in locomotives and river-boats by 1952, resulting in an improvement in air quality.

1956:
By 1956 it was estimated that 90% of the homes had changed to heating with natural gas. The days with streetlights on at noon due to the dark, polluted skies were coming to an end.

ticulate emission controls. Large volumes of high purity oxygen are then blown into the furnace, burning the carbon in the liquid iron and scrap, providing the heat required to sustain the chemical reactions required to convert the iron and scrap into liquid steel. Gasses and fumes generated within the BOP furnace are collected and cleaned, using either venturi scrubber or electrostatic precipitator particulate emission controls prior to being exhausted to the atmosphere.

The liquid steel is then chemically adjusted to proper metallurgical specifications at the Ladle Metallurgy Facility (LMF). Where the particulate air emissions are generally controlled using baghouses. The liquid steel is then cast into slabs at the continuous slab caster. Once the steel is solidified, the downstream process are generally not emissive and do not require dedicated emission control equipment. One exception is the continuous pickle process where the hot-rolled strip is drawn through a hydrochloric acid solution to remove oils and rolling scale. The acid solution tanks and rinse tanks are covered and acid fumes are collected and cleaned in a packed-bed wet scrubber prior to being discharged to the atmosphere.

Most steel mill emission sources were constructed prior to New Source Review (1977) permitting regulations. Therefore, BACT or LAER emission controls, which are required for new sources are not common at integrated iron and steel mills. One exception to this is the installation of galvanizing lines used to produce high-quality galvanized product for the automotive industry. These facilities utilize gas-fired continuous annealing furnaces to improve the ductility of the product and the more recent installations have been fitted with Selective Catalytic Reduction NOx controls.

Timeline: Environmental Progress in Western Pennsylvania

1956:
The BBC produced a movie "The City that Wouldn't Die" about the Pittsburgh Renaissance and pollution control.

1957:
The Allegheny County Health Department began January 1st, took over the duties of the City Smoke Control Bureau, and assumed responsibility for air pollution control throughout the County.

Water

The Clean Water Act (CWA) is a comprehensive law setting rules for wastewater dischargers and establishing basic parameters and regulations governing municipal and industrial discharges to any navigable surface water body in the United States. It covers point source discharges, stormwater discharges and nonpoint source discharges. A major part of the CWA is the National Pollution Discharge Elimination System (NPDES) permitting program.

"The typical NPDES permit...sets strict limits for the parameters associated with the process originating the discharge."

The NPDES program sets exact limits, sampling parameters, schedules and other controls on industrial effluents. The typical NPDES permit identifies each discharge point, the process that contributes water to that discharge point and sets strict limits for the parameters associated with the process originating the discharge. Many processes in an integrated steel facility have specific Effluent Limit Guidelines that link the amount of a given pollutant that can be discharged to the amount of daily production. Water Quality Based Effluent Limitations may be based on the quality of the receiving water.

The first step in integrated steelmaking is the production of coke from coal. Water is used to carry the organic compounds and trace metals from the process gas and through the by-product facility. Ammonia is stripped from the water in free and fixed ammonia stills, and then the water is treated biologically to remove organics. Finally there is pH adjustment and filtration to remove the metals.

The water used in the blast furnaces and steelmaking shops is largely cooling water, which is used to protect the equipment and to quench the hot off-gasses to reduce the volume of exhaust gas that will be treated further. Other water is used for scrubbing the air contaminants from the exhaust gas, and this scrubber water must be treated in clarifiers to remove solids and metallic constituents.

Cooling water is also used in the casting and hot rolling processes. Water is used to

Timeline: Environmental Progress in Western Pennsylvania

1959:
Allegheny County Sanitary Authority (ALCOSAN) begins wastewater treatment operations.

1962:
Rachel Carson publishes Silent Spring.

flush scale and oils from the steel and treatment of this water is required for removal of mill scale solids, oil and grease. Settling devices, scale pits, clarifiers, and filters are the common water treatment devices.

Cold rolling, pickling, and coatings processes require water treatment for mill scale, ph control, oil removal, metals precipitation, and solids separation and filtering.

Environmental Progress and Improvement

United States Steel Corporation and the steel industry in general have made remarkable strides in the improvement of the environment since the late 1960s. A significant part of this is attributable to more efficient energy use and to plant modernization. Between the late 1950s and the early 1990s, domestic producers phased out open-hearth furnaces, increased the usage of continuous casting and generally enhanced technologies to reduce energy consumption. In addition to the improvements achieved through plant modernization, air and water discharges have, according to industry sources, been reduced by 90 percent over the past 40 years. Since the implementation of the NPDES program, the reduction in the discharge of total suspended solids at a single plant can be measured in tons per day. Over the last 15 years, benzene and polycyclic aromatic hydrocarbon (PAH) air emissions decreased more than 75 percent. Nitrogen Oxide emissions have been reduced more than 35 percent and sulfur dioxide emissions more than 70 percent.

"United States Steel Corporation and the steel industry...have made remarkable strides in the improvement of the environment since the late 1960s."

According to the US EPA, air pollution in general has been reduced by 42 percent since 1970, while energy consumption in the United States increased by 42 percent over the same period. The domestic steel industry, however, decreased the amount of energy required to produce a ton of steel by 45 percent.

These reductions in energy consumption and in the discharge of air and water pollutants have come at a price. Pollution control systems amount to approximately 15 percent of total capital outlays for the steel industry in the U.S. Environmental costs per ton of steel range from $10 to $20.

"...air and water discharges have...been reduced by 90 percent over the past 40 years."

The steel industry has also taken the lead in mercury-reduction programs, pressuring other industries to eliminate the use of mercury in products that may later be recycled for steel content. This allows for cleaner recycling of scrap steel. Automobile recycling is a major source of scrap metal for steel making. Mercury switches are being phased out in the automotive industry in order to improve the recyclability of cars as scrap.

Steel Industry Commitment

Environmental stewardship has become one of the core values for steel companies, as reflected in reduced emissions, increased recycling and efficient use of energy. ■

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(Photos courtesy of United States Steel)

Timeline: Environmental Progress in Western Pennsylvania

1970:
U.S. Environmental Protection Agency (EPA) established.

1970:
First Earth Day in U.S. observed in Pittsburgh on April 15th, one week before the first national Earth Day on April 22nd.

1973:
First flue gas desulfurization scrubbers for utility boilers in US installed at Duquesne Light's 400 MW Phillips Power Station.

What's New in New Source Review?

by **Harry F. Klodowski, Jr., Esquire**
Law Offices of Harry Klodowski

Permitting construction of new sources of air pollution has been one of the most controversial topics in environmental regulation for 30 years. After 15 years of discussion, USEPA proposed a series of New Source Review ("NSR") reform interpretations and changes in these air construction permit rules from 2002 through 2006. Each state is required to adopt NSR provisions in state permit rules, and Pennsylvania is in a rulemaking procedure in which it proposes not to follow many part of the federal NSR reforms.

The rules apply to any source of air pollution and construction of new plants and changes at existing plants, called "modifications" in NSR rules. If the source is located in an area where the current air quality meets federal standards for various pollutants, the rules are called Prevention of Significant Deterioration ("PSD") permit regulations. If the source is in an area where the outside air does not meet federal air standards, a "nonattainment area", the "Nonattainment New Source Review" ("NNSR")rules apply, and impose additional control requirements such as emission offsets.

Timeline: Environmental Progress in Western Pennsylvania

1975:
Major efforts were undertaken by US Steel to control its coal-fired boilers and numerous steelmaking facilities in the Mon-Valley.

1985:
LTV Steel successfully installs a new desulfurization unit at its Hazelwood coke plant, finally bringing sulfur dioxide concentrations in the community within federal standards.

The NSR rules have worked fairly well for new plant construction, but their application to maintenance, equipment replacement, modifications or improvements at existing plants has created a morass of uncertainty and delay. The rules are not clear, and a couple of pages in the statute became a handful of pages in the regulations and thousands of pages of EPA interpretive letters. The interpretations by EPA and state agencies are not always consistent between agencies and some have changed over time. Agencies have changed positions 5 or 10 years after a project is completed. The major thrust of NSR reform is to define the rules, and reduce ad hoc decisions by permit applicants and permit writers, leading to faster decisions on permits.

Federal NSR Reform

EPA proposed 3 NSR reform packages from 2002 through 2006. In December 2002, EPA proposed "NSR Improvement" changes to the NSR and PSD rules, which were promptly challenged in court by the Democratic governors of northeastern states (including Pennsylvania), and inaccurately slammed in the press as a gutting of the Clean Air Act. The opinion in New York v. EPA, 413 F.3d 3 (D.C. Cir 2005) generally upheld EPA's rulemaking. The Court approved use of an "actual to future actual" calculus for estimating the increase in emissions from a modification, using a 10 year period to demonstrate existing capacity, and allowing for "demand growth exclusion" to account for unused capacity that existed prior to the project. The Court rejected EPA's approach on a special calculation of impact for "clean units" and an exemption from NSR review for Pollution Control Projects. Most of this rule is now effective at the federal level. Ohio and West Virginia adopted state rules following this federal rule in 2004 and 2005. Because Pennsylvania adopts the federal PSD rules by reference, the 2002 federal rules are now effective in Pennsylvania for PSD pollutants (using a 10 year look back to show existing capacity), but existing state rules apply to nonattainment NSR (5 year look back), and both must be analyzed for a Pennsylvania permit.

"The NSR rules... are not clear."

The second federal rule package attempted to define the Equipment Replacement Provision of "Routine Maintenance and Repair," ("RMR") an exemption to the NSR permitting process. EPA has defined RMR on a case by case basis, and uses a repair cost formula (that the IRS had abandoned in the early 1980's) to determine if a project is an exempt repair. The October 23, 2003 RMR rule used higher cost thresholds (20% compared to 2 to 18% under older practice) to define a regulated project. The northeastern states were successful in their legal challenge to this rule, and in NY v. EPA, 3/17/06, the court vacated the 2003 rule. The RMR exemption is still in the regulations and remains a major source of uncertainty.

"Pennsylvania Department of Environmental Protection (DEP)... rejected most elements of federal NSR reform."

In September 2006, EPA proposed a rule on: *1)* Debottlenecking (an increase in emissions from an air pollution source as a result of a project at a different source) *2)* Aggregation (when to count multiple small projects as one project) and *3)* Project Netting (should emissions increases and decreases be counted at the project level, or at the entire source level). A public comment period and public hearing were scheduled for the fall of 2006. It seems safe to assume the northeastern states will challenge this rule as well.

Pennsylvania NSR Reform

Pennsylvania's nonattainment NSR rules were last revised in 1994, and differ from federal rules and those of most other states. The key differences are use of a "Potential to Potential" test for estimating project emissions, use of a 2 year baseline for past emissions (could be any 2 years in most recent 5 years), annual, daily and hourly triggers for NSR, counting projects too small to be covered by federal rules, and a 1 year filing deadline for closed plants to file reactivation plans or emission credit applications.

The Pennsylvania Department of Environmental Protection (DEP) published its own proposed NSR rule in April 2006 for public comment. This proposal rejected most elements of federal NSR reform and tried to preserve the existing Pennsylvania rule, and, unfortunately, existing confusing language. DEP received 33 comments from entities including the Southwest PA Growth Alliance, the Independent Regulatory Review Commission, USEPA, industry and citizens groups. The major concerns were:

1. The language is unclear, confusing and contradictory.
2. DEP should follow the federal rules to the extent possible and had not explained why it needs a special rule for Pennsylvania.
3. DEP should use the 10 year baseline period. The proposed rule makes a complex system even more complex

Timeline: Environmental Progress in Western Pennsylvania

1989:
Three Rivers Rowing Assn, opens as first site on new Washington's Landing brownfield development, formerly Herr's Island. *(Photo: courtesy URA)*

Herr's Island

and expensive by requiring analysis of multiple pollutants from past operations for two years for fine particulates, five years for nonattainment New Source Review, ten years for Prevention of Significant Deterioration, and fifteen years for deminimus aggregation, all of which can apply to the same permit.

4. DEP should eliminate "de minimus aggregation" or counting federally exempt small projects. Federal law, and the law in each state surrounding Pennsylvania, is that "de minimis" emissions increases are not regulated until a major modification, (a single project resulting in emissions increases above PSD significance levels) occurs.
5. The 1 year deadline for maintenance plans and ERC applications should be extended.
6. The proposal will result in a competitive disadvantage because it is far more complicated and expensive compared to Ohio and West Virginia permit rules.

DEP has released a preliminary summary of comments and discussion points for additional revisions before the final rule is published, perhaps in early 2007. DEP intends to move and rewrite definitions, improve clarity, consider allowing a 10 year look back upon demonstration of cause, delete the fine particulate provisions, delete hourly and daily thresholds, and may extend the 1 year ERC deadline for particulates and SOx.

"Efforts to simplify the NSR construction permit rules have reached the opposite result in the short term."

Conclusion

Efforts to simplify the NSR construction permit rules have reached the opposite result in the short term. Pennsylvania's opposition to adopting any form of permit reform has created a mess where both federal and old Pennsylvania rules apply to any permit. Pennsylvania should adopt the federal rules to the extent possible to maintain its ability to attract new plants and plant expansions. We can hope that when the dust settles in a few years, the rules will be clarified. For now, facilities contemplating improvements should allow ample time to get air permits for their projects.

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Harry Klodowski has practiced environmental law in and around Pittsburgh since 1979. He is a Director of the Air & Waste Management Assn., past Chair of the Allegheny Co. Bar Assn. Environmental Law Section, and past Chair of the Southwest Pa. Air Quality Partnership, Inc.

The author acknowledges the support of the Southwest PA Growth Alliance and Greater Pittsburgh Chamber of Commerce in Pennsylvania NSR issues. ■

Timeline: Environmental Progress in Western Pennsylvania

1995:
First Industrial Site Recycling Conference (Brownfields Conference) sponsored by ESWP.

1998:
USS Clairton Coke Works becomes first in the coke industry to achieve ISO 14001 environmental standards.

1998:
3 Rivers Wet Weather Demonstration Project began addressing combined sewer overflows.

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Engineering The Future/ESWP Panel

by **Chriss Swaney**

What's the best way to recruit more women into the competitive engineering field? Ask those who already have a seat at the table, and they offer a combination of strategies to pique interest.

A panel of engineering experts discussed ways to address the shortage of women in the field and ways to attract younger females to engineering during a recent lunch at the Engineers' Society of Western Pennsylvania (ESWP).

Panel member Ruthann Omer grew up in an engineering environment because her father ran The Gateway Engineers, where she is now president and board member.

"It hasn't been easy to find qualified women," Omer said. She talked about times when male colleagues expected her to leave the business and raise a family, and meetings where other professionals assumed she was a secretary because she was a female.

But Omer is succeeding at the Green Tree-based civil engineering firm she says her brother simply did not want to run. About a quarter of her firm's 104 employees are female. "We have to get more women interested in engineering because it is engineers who make just about everything we use today," she said.

"It's an issue every country is wrestling with," said Pradeep K. Khosla, dean of the College of Engineering at Carnegie Mellon University who led the panel discussion.

Women comprise only about 9 percent of all engineers in the United States, according to American Society for Engineering Education in Washington, D.C.

At Carnegie Mellon, 25 percent of the undergraduate engineering students are female, while women account for about 22 percent of graduate engineering students, according to Khosla.

Gateway Engineers President Ruthann Omer meets with students following the panel discussion.

Timeline: Environmental Progress in Western Pennsylvania

2000:
Allegheny County achieves attainment of all 1977 and 1990 national ambient air quality standards.

Pittsburgh's new Convention Center

2002:
David L. Lawrence Convention Center opens as first certified LEEDS green Convention Center.
(Photo Courtesy: Visit Pittsburgh)

Panelist Nadine Aubry listens to a question posed by an audience member.

A key step in raising those percentages, the panelists agreed, is to expose more middle school students to what engineers do.

"Kids need to know engineering isn't boring; it's fun stuff," said Panel Member Jane Rudolph, vice president of business development for Lockheed Martin Transportation and Security Solutions in Rockville, Md. Rudolph, an Irwin native, earned her bachelor's degree in electrical and computer engineering and engineering and public policy from Carnegie Mellon in 1979.

"We probably don't celebrate the contributions of engineering enough," said Rudolph, whose career has included work on military systems for national defense as well as projects for the U.S. Census Bureau.

Joann Truchan, an air quality engineer with the Allegheny County Health Department and president of the Pittsburgh Chapter of the Society of Women Engineers, said more girls will consider engineering if they grow up believing that "math and science are not just for geeks."

When people ask Truchan, who holds a bachelor's degree in engineering and a master's in public policy from Carnegie Mellon, about her primary goal for the Society of Women Engineers, she sums it up like this: "To become obsolete."

But Beth A. Wolfe, coordinator of engineering outreach at Marshall University in Huntington, WVa., said the nation needs more outreach programs to entice females into science and engineering programs.

Wolfe was one of more than 40 attendees at the Nov. 8 "Women In Engineering" panel co-sponsored by Carnegie Mellon's College of Engineering and ESWP.

"Women, if they are good in math and science are pushed into medicine because it's a people field," said Sonya Narla, a 16-year-old senior from Winchester Thurston. Narla and dozen other high school students were looking for specific information about how to apply their math and science skills to engineering.

Panel Member Nadine Aubry, newly appointed head of Carnegie Mellon's College of Engineering, told the high school students to push the envelope and accept challenge, and to learn from those challenges.

"We simply need to communicate in a more dynamic way that women can be engineers; they can do it," said Aubry, who was also joined on the panel by Kirk H. Schulz, dean of the Bagley College of Engineering at Mississippi State University.

Schulz said that it is imperative that families learn to manage time if both spouses are working engineers. "We try to keep our family very structured so we map out the year's most important activities," he said. "It is challenging, but it is not impossible." ■

Moderator Pradeep Khosla addresses the audience at the November 8 "Women in Engineering" panel.

Timeline: Environmental Progress in Western Pennsylvania

2005:
CITGO Bassmaster Classic fishing tournament held on Pittsburgh's rivers.

2008:
Proposed opening of Three Rivers Park, 13 miles of waterfront green space.
(Photo courtesy: Visit Pittsburgh)

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Myths and Misunderstandings:

The acid from the mines was thought to be sufficient to protect the waters from Typhoid and Cholera.
The sulfur in the air was thought to be cleansing for those with lung cancer.
Cancer victims came to Pittsburgh to “clean their lungs”.

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ANNUAL CONFERENCE & EXHIBITION

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The city of Pittsburgh's three rivers converge at a site known as **"The Point."** In 2007, Pittsburgh is where the premier environmental education, networking, and solutions event comes together, as the **Air & Waste Management Association's 100th Annual Conference & Exhibition** returns to the city that has served as its home for decades.

For more information, visit www.awma.org/ACE2007.

2007 ESWP President's Reception

Friday, January 12, 2007
5:30 - 8:00 PM

Join us as we welcome the 2007 President, **Alex G. Sciulli, PE**, and honor the Engineers' Society Officers and Directors.

Alex Sciulli is currently a Senior Vice President with Mellon Financial Corporation and serves as the Director of Corporate Operations and Real Estate and is a member of Mellon's Senior Management Committee. He has 30 years experience in the engineering and construction industries. Prior to his affiliation with Mellon, Alex was a Senior Vice President with CDM, one of the largest civil and environmental consulting firms in the U.S. During his tenure at CDM, he was responsible for managing nine regional offices in the mid-Atlantic states with a gross revenue of $52M.

Please contact the ESWP offices to make reservations for this annual event.
Fee is $20.00 per person. *Guests are welcome!*

Seth L. Pearlman Installed as President of the Deep Foundations Institute Board of Trustees

PITTSBURGH, PA *(December 6, 2006)* Seth L. Pearlman, PE, president of DGI-Menard, a specialized ground improvement contractor, has been named president of the Deep Foundations Institute (DFI) Board of Trustees. DFI is an association of firms and individuals in the deep foundations and related industry, covering deep foundation construction and earth retention systems. Pearlman was installed as president at the organization's 31st Annual Conference in Washington, D.C.

"I have spent my career focused on designing and developing new solutions for geotechnical applications," says Pearlman. "I am honored and enthusiastic about my role as president of DFI, which is an organization that leads the deep foundations industry in educating people about new ideas, techniques and processes."

Pearlman has almost 30 years of experience in the geotechnical industry. He earned a BS and an MS in Civil Engineering from Carnegie Mellon University in Pittsburgh and is a registered professional engineer in Pennsylvania and Virginia. He is a member of the Geo-Institute, American Society of Civil Engineers (ASCE), American Concrete Institute (ACI), American Society of Highway Engineers (ASHE), Design Build Institute of America (DBIA), Engineers Society of Western Pennsylvania (ESWP), National Society of Professional Engineers (NSPE), Tau Beta Pi Engineering Society and The Moles. He serves on an Advisory Council to the Carnegie Mellon University Department of Civil and Environmental Engineering.

About DGI-Menard

DGI-Menard is headquartered in Pittsburgh, PA. The company offers a full range of ground improvement technologies. DGI-Menard is a part of the Freyssinet Group, which also includes the Reinforced Earth Company, the inventor and market leader of the Mechanically Stabilized Earth retaining wall industry and Freyssinet LLC, a specialist in prestressing, cable stayed structures and concrete repairs. Freyssinet, the world's leader in specialized civil engineering is a division of VINCI the world's leading construction group.

Astorino Staff Grows in Number and Experience

PITTSBURGH, PA *(October 17, 2006)* Astorino welcomes four new employees to its 195-member staff. The newest additions include:

- J. Robert Ellis, AIA – Project Architect
- Michael Bosco – Specifications Writer
- Scott Lizotte – Mechanical Engineer
- Kristin Goral – Architectural Intern

Since joining Astorino's K-12 Education / Justice / Public Housing studio as a Project Architect, J. Robert Ellis has been working hands-on with clients from Mercer State Correctional Institution, Pittsburgh Public Schools and the Housing Authority of the City of Pittsburgh. He brings more than 12 years of experience in the design and project management of education, banking, religion, industrial, retail, commercial and residential projects to Astorino. Mr. Ellis' portfolio includes projects throughout Louisiana and the Gulf Region and features extensive renovation and conversion work for Dillard department stores throughout the nation.

A resident of Oakmont, Pa., Scott Lizotte joins Astorino as a Mechanical Engineer and, since joining the firm, has dedicated his time to the UPMC Children's Hospital of Pittsburgh Medical Office Building project. Before joining Astorino, Mr. Lizotte was the Lead Engineer for the Ohio Valley Hospital's Willows Independent Living Center, Mitsubishi Electric Power Products' Corporate Headquarters and the University of Texas at Houston's Institute of Molecular Medicine.

A registered architect with over 32 years of experience, Michael Bosco joins Astorino as a Specifications Writer in the Quality Assurance/Quality Control studio. Mr. Bosco is currently working on the VA Pittsburgh University Drive Mental Health Building, part of the $190 million VA Pittsburgh Asset Realignment Program. His previous experience includes both K-12 and Higher Education facilities as well as numerous Healthcare projects with the University of Pittsburgh Medical Center (UPMC).

Originally from Cape Cod, Mass., Kristin Goral brings fresh and innovative ideas to her role as Architectural Intern in the firm's Design Studio. Since joining Astorino, she has been working on Usher Youth Camp and preliminary designs for Walnut Capital's "Bakery Square at Eastside" mixed-use development project, a renovation of the former Nabisco plant on Penn Avenue in Pittsburgh's Shadyside/East Liberty area. Mr. Goral's portfolio includes work on a satellite office for Boeing, located in Kansas, a new courthouse in Elyria, Ohio and a $60 million high school in Long Branch, New Jersey.

Founded in 1972, Astorino, with offices in Pittsburgh, Pa., West Palm Beach Fl., and Naples, Fl., is a full-service company with a strong team-based approach providing complete architectural, engineering, interior design and design-build services. With emphasis on quality design, innovative solutions and strong project management, this Pittsburgh-based firm is one of the fastest-growing architectural and engineering firms in the nation.

SAI is Growing into New Space!

PITTSBURGH, PA *(October 3, 2006)* SAI Consulting Engineers, Inc. is growing and expanding and pleased to announce the move of their Pittsburgh headquarters to its new location at 1350 Penn Avenue, Suite 300, Pittsburgh, PA. SAI's continued growth over the past several years has led to this much needed expansion of their local office space.

"This move to our new location signifies a significant period of growth and transformation for SAI and its local operations that in many ways is representative of the transformation of the Pittsburgh Region. We look forward to our continued presence as not only a local engineering design, inspection, and construction management firm, but as a partner in the continued growth and success of our region." (Don Gennuso, CEO of SAI)

Established in 1953, and now with a staff of over 150 engineers, technicians, and support personnel, SAI Consulting Engineers, Inc. (SAI) is a Pittsburgh-based civil and structural consulting/engineering firm that specializes in the design, inspection, and construction management of transportation, industrial, institutional, and commercial projects. SAI's offices are located in Pittsburgh and Harrisburg, Pennsylvania, and Morgantown, West Virginia.

Engineers' Society of Western Pennsylvania
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INTERNATIONAL BRIDGE CONFERENCE

June 4–6, 2007
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