



West Virginia Historical Society

Volume XVIII, No. 2, April, 2004

Visit our WEB PAGE – www.wvhistorical.com

WEST VIRGINIA'S CHEMICAL INDUSTRY

by Nathan Cantrell

(Nathan Cantrell is a Marshall University Senior who is majoring in Mathematics with a minor in History. He and his wife, an elementary teacher, have one daughter.)

In the heart of West Virginia lies one of the most recognized valleys in the nation, if not the world. Beginning in Gauley Bridge, where the New River and the Gauley River join forces to create the Kanawha River, and cutting through the mountains for 96 miles until it meets the Ohio River Basin at Pt. Pleasant, West Virginia's Kanawha Valley holds host to some of the most abundant and richest resources known to man. From Alloy to Nitro, the past century has seen a large number of chemical manufactures and related industries develop due to the local resources. This expansion has given the area the highest concentration of chemical manufacturers in the United States and has earned the upper Kanawha Valley the handle "Chemical Valley."¹ With Union Carbide standing at its core, West Virginia's

chemical industry has been one of world class production, from its infancy in the early salt furnaces to today's matured infrastructure, chemical manufacturing has played a vital role in the economy and remains crucial to the future development of the state.

Salty Beginnings

Chemical industries, who use chemical reactions to turn raw materials such as coal, oil, and salt into a variety of products, can be traced back to Middle Eastern artisans, who refined alkali and limestone for the production of glass as early as 7,000 B.C.² However, the beginnings of the chemical industry in West Virginia can be linked to the Native Americans, who first produced sodium chloride, or commonly known as salt. Before the settlement of Bulltown, the Delaware Indians were making use of the salt brines as early as 1770 along the Little Kanawha River.³ Soon after the settlers began entering the area, salt became a prime commodity sought after by other areas of the nation, and

commercial production of large quantities of salt became a necessity.

Elisha Brooks constructed the first salt furnace in the valley in 1797, and with this construction came a world of new possibilities. Elisha could not have foreseen the industrial center that would blossom from the very same resource that he commercialized. Yet, one man did see the future uses of salt, and in an 1876 Geological Report, John P. Hale predicted the future use of salts in the large scale production of "alkalines and other chemicals having salt as a basis or important constituent."⁴

While salt was the true predecessor to chemical manufacturing, as John Hale had predicted, the industry would have never fully developed without the abundance of West Virginia's other natural resources. Chemists had plentiful raw material, or feedstock, in the area from natural gas, coal, oil, and other mineral deposits, such as high quality limestone. Carbon from coal, oxygen and nitrogen from the air, and chlorine from the salt brine, hydrogen from water, and easy importation of sulfur, provided the "big six" main elements that are the base of all products.⁵

Following the Civil War, and due to the decline of the salt industry in the valley, simple chemical facilities began to develop bromides or potassium salts that were developed from the salt licks of salt families such as the McFarlands and Dickinsons.⁶ In 1868, Herman Stierer, a former pupil of the noted German chemist Julius von Liebig, produced bromine from salt bittern at his establishment just outside of Charleston.⁷ While some small scale experimentation and production had transpired in the mid to late 1800's, commercial production did not begin until the turn of the century.

Near the head of the Kanawha River, a company by the name of Willson Aluminum located at Glen Ferris in 1898.⁸ The company began producing ferro-metal alloys with ore from South Africa using the river as an energy source for the electric furnaces. In 1901, the Electro Metallurgical Company purchased Willson, and was then referred to as Electromet. The plant held the prestige of being the largest ferro-alloy manufacturer in the world by controlling more than 50% of the market share for alloys used in the production of finer grades steel.⁹ The Electromet Company began a couple of offshoot companies from products or ideas discovered at the site, such as acetylene. The company and its offshoots were to be the predecessor of the most influential chemical firm of the Kanawha Valley.

The War Years

Prior to the outbreak of World War I, Germany had been the leading worldwide producer of chemicals. America, as did the rest of the world, purchased most of its dyestuffs and chemicals from Germany with little need to look elsewhere. On 28 June 1914 however, Archduke Franz Ferdinand was assassinated by a Slav nationalist and through a chain of events, led to Britain declaring war on Germany in less than a week. Thus, within a short period, the world was thrust into an intercontinental conflict and a demand for chemical products such as chlorine and caustic soda, which could be obtained from salt brine, developed.¹⁰ Also, powder began to come into short supply due to a new type of warfare, trench, for which the Allies were not prepared. While the United States avoided involvement until April 1917, the Allies had turned to America early in the war for help in obtaining

these supplies. Before American intervention, DuPont had been the major powder producer for the war, but it was only half of what was needed when the United States entered the war in April 1917.¹¹

With the assistance of DuPont engineers and General William Crozier, the United States government began looking for other sources and studied a ten state region for the best sites to produce chemicals for the war cause. Inexpensive and plentiful salt, coal, oil, and natural gas feedstocks attracted the attention of officials to the Kanawha Valley. After a visit to Charleston by Secretary of War Newton Baker in 1917, approval was made for development of a location along the Kanawha River just outside of Charleston at the villages Lock Seven and Sattes. This site was to be the locality of an explosives plant, whereas further up the valley, the United States government planned the construction of a Naval Ordnance plant at South Charleston, and a mustard gas plant at Belle.¹² This choice marked a key point in Kanawha Valley development and foreshadowed the growth of the suburbs, revitalization of the salt industry, and the solid establishment of the chemical industry.

Lock Seven and Sattes later become known as Nitro, named not for nitroglycerine rather for the chemical term relating to the gun powder process "Nitro-cellulose". In 1918 Nitro became home of a smokeless powder plant, known as Explosives Plant "C". In eleven months, the United States government built the plant and surrounding town with the aid of 12,000 men, and with more than \$70 million being spent on the plant and 3,400 other public structures. The Armistice, signed November 11, 1918, returned the country to peacetime before Explosives Plant "C" was completed.¹³

Meanwhile, while the United States government was constructing a Naval

Ordnance Plant at South Charleston, two other chemical manufacturers had already set up in town to meet the chlorine demand. There is some debate over what was the first formal chemical company to form in the valley, but it is safe to say that the Warner-Klipstein Chemical Company and Rollins Chemical both established plants beside each other at South Charleston at relatively the same time at the outset of the war.¹⁴ The Rollins Chemical Company planned to produce chlorine, barium peroxide, and various barium salts, among other things, but never opened due to the end of the war.

The Armistice did not stop the development of the chemical industry in the valley; on the contrary, it gave the area the push it needed to develop a solid industrial infrastructure that the economy could rely on for years. The capital that the United States government had invested in the region during the war allowed numerous chemical companies to take advantage of the equipment that was already in place. During the years following, many companies opened and closed shop in the Kanawha Valley, but the present structure of the powerhouse chemical firms began to take shape.

The Pickering Chemical Co receives the honor of being recognized as the first chemical company to locate at Nitro with operations running from 1920 to 1924.¹⁵ Just across the river on the west side of St. Albans, the Roessler and Hasslacher Chemical Company began production until it closed in the early 1920's.¹⁶ Other small chemical producers came and went in the area including: Seydel Chemical Company, Federal Chemical Company, and the Viscose Corporation, which had purchased Nitro Pulp Mills in 1921 and

reorganized as the American Viscose Corporation in 1937.

Two gentlemen, Carl N. Hand and C. Olin North, have been attributed as the true organizers behind the development of the chemical industry in Nitro. In 1922, the two came to Nitro from Akron, Ohio, after leaving Goodyear Chemical Company. They soon set up the Rubber Service Laboratories Company that same year to manufacture specialty chemicals for rubber. The company absorbed Southern Dyestuffs Co. and reorganized under the name Elko Chemical Company, which sold out to Monsanto in 1929.¹⁷ When Monsanto purchased Elko Chemical, North ventured on his own to create Kavalco Products Company. By 1934, the company restructured and became known as the Apex Chemical Company only to change its name the following year to Ohio Apex Company. Not only was Nitro a hotbed for chemical company activity, the first official non-profit organization related to chemical production formed in 1918 under the name the Science Club of Nitro. DuPont, Carbide, and Nitro chemists, joined ideas and skills and within ten years became recognized as a section of the American Chemical Society.¹⁸

On the other end of the valley the same type of development was occurring at the Belle site where the mustard gas plant was to be constructed by the government during the war. The Belle Alkali Company purchased the partially completed mustard gas plant in 1920 and began producing chlorine, hydrogen, and caustic soda.¹⁹ Several other companies set up near, or at, the same location and implemented technologies that allowed them to share resources and by-products with each other such as the Sharples Solvents Corporation and the Occidental Chemical Corporation who were running pipelines to each other's facilities.²⁰ Just next door in 1924, E. I. Du Pont De

Nemours & Co., Inc. began construction of a plant that when completed in 1926, became the first plant to produce synthetic ammonia.²¹ DuPont Belle Works soon acquired world recognition by producing the first modern plastic polymers in the 1930's. That same decade saw an attempt by the United Miners Workers Association to unionize the plant, but the attempt was in vain with the DuPont plant retaining its "company union."²² Throughout the years, DuPont's Belle Works plant has been a pioneer of the chemical industry including being one of few facilities to ever use coal in commercial operation and production of petro-chemicals, producing the first synthetic urea for fertilizers and synthetic plastics, developing more than 120 chemical processes, and producing more than 75 products used in every basic industry.²³

The center of the valley at South Charleston was not exempt from these transformations. After the deaths of both founding fathers in 1925, Warner-Klipstein reorganized as Westvaco Chlorine Products Corp. By the end of the 20's, it had become the largest chlorine manufacturer in the world, and as of 1928, became known as the Westvaco Corporation.²⁴ 1917 observed the formation of a company that took on the name Union Carbide and Carbon Corporation, with the merger of The Union Carbide Corporation, Electromet, Linde Products, Prest-o-Lite, and National Carbon Co. With the merger, the company now owned the Alloy site and began production of petro-chemicals at the former Clendenin Gasoline Company facility located just outside of Charleston in 1920. The Clendenin site led to the production of propane, or Pyrofax, from natural gas in 1924. Soon the company had outgrown this facility

and began to look for a site to construct a facility that would allow them to mass produce a new product that kept dynamite from freezing.²⁵ In 1925, Union Carbide purchased the Rollins Chemical site and began producing this new product, ethylene glycol. Earning the company international recognition, the new product led directly to the development of Prestone, a well known antifreeze used in automobiles.²⁶ Union Carbide's first Research and Development laboratory in the valley was established in 1926, along with expansion of the site that eventually extended across the Kanawha River to Blaine Island.

Overall, the chemical industry in the valley continued to grow in the years after the war, and unlike much of the nation, the industry experienced expansion throughout the Great Depression. Petroleum based chemicals from natural gas, oil, and coal started to make a greater presence in the market place due to a demand for carbon black to be used in automobile tires. The employment of the chemical industry in 1928 is estimated to have been 4,800 people.²⁷

The most prominent event in the chemical sector at that time was a mishap that happened just outside of Gauley Bridge. In 1930, Union Carbide began construction on a mile long tunnel through Gauley Mountain that would provide hydroelectric power to its new project in Alloy. The new project consisted of a new Electromet facility at Alloy and the construction of a town, Falls View, for its employees. Once construction of the tunnel was under way, realization had come that the material that was being drilled through was dangerous, but valuable, silica. The workers of the tunnel had been breathing in the particles that saturated the air and by the time the tunnel was finished in 1936, approximately 500 workers had died from silicosis, and over 1,500 workers were disabled.²⁸ The Hawks Nest Tunnel

disaster is still one of controversy after the surfacing of some records that suggest negligence on the part of Union Carbide.

The onset of another world war led to another urgent demand for products that the Kanawha Valley could provide. When Japan took control of the island nations of the coast of Southeast Asia, many raw materials that America used became inaccessible. The largest impact came from the inability to acquire natural rubber. The demand for rubber and the inability to import natural rubber sent the United States government in search of synthetic rubber. The search for synthetic rubber led to the BUNA-S program. BUNA-S is a chemical reaction of butadiene with styrene to form "rubber", and to the advantage of West Virginia, both reactants were already being produced in the valley.

The main resource needed for the manufacturing of the synthetic rubber is natural gas, in which, West Virginia has the largest reserves east of the Mississippi and are usually free from unsaturated and sulfur compounds.²⁹ So, as in World War I, the federal government directly contributed to the economy with the construction of a synthetic rubber plant in Institute. By late 1944, a number of these plants were in operation, most either located in West Virginia or in Texas near abundant supplies of natural gas from which butane could be extracted.³⁰

The defeat of the Third Reich and Japanese Imperialism required the participation of every American citizen. Every local firm in Kanawha Valley became enlisted in the war cause and some outside firms were brought in to assist the classified project. Once production of the synthetic rubber began

at Institute, under the direction of Union Carbide and US Rubber Company, now UniRoyal, the valley was producing half of what was needed for the war cause.

DuPont's Belle Works shared much of the research, experimentation, and development of the synthetic wonder fiber "Nylon" in the 1940's, which was used during the war in parachutes and other products. Also, many local chemists and engineers, mainly from Union Carbide, relocated to Oak Ridge to participate in the Manhattan Project.³¹ The Westvaco Corporation provided a synthetic rubber process, DDT, and products used in incendiaries and smoke screens.

By the end of World War II, the chemical industry had a solid foothold at the base of the Kanawha Valley's economy. The federal government's direct contribution to the local economy and industry allowed the area to emerge as an industrial center. In the years following, the industry continued to grow into the 1950's expanding the range of products, companies, and influence the Kanawha Valley's chemical industry had to offer the world.³²

"Miracle Valley"

By 1943, Union Carbide had commercialized over 100 chemical products since its first operations in South Charleston in 1925, and the rest of the chemical industry in the Kanawha Valley experienced the same continued growth until it reached its zenith in the 1950's. Throughout the decades following World War II, as after World War I, the local firms experienced continual mergers, buyouts, and expansions of facilities.

At the heart of the valley, South Charleston and Institute have become the center of the industry's development. The Institute site that was so essential to the synthetic rubber program came into the hands of B.F.

Goodrich until Union Carbide obtained full control of the facility. The exact years that each company directed the plant are difficult to pinpoint, and depending on the source, the information can be contradicting. Dow claims this plant was purchased by Union Carbide in 1947, but other sources state the plant remained in B.F. Goodrich's possession until 1956. Regardless, both companies were operating inside the site after the war and Union Carbide was in full control by 1960. Union Carbide remained sole owner of the plant until the site became a public relations problem; so in 1986, the facility was sold to the French chemical manufacturer Rhone-Poulenc, but Union Carbide retained ownership of some of the onsite equipment. Rhone-Poulenc continued to operate the plant until it merged with Hoechst AG of Germany in December 1999 and changed its name to Aventis CropScience.³⁴ The company produced insecticides using methyl isocyanate as the raw material, as well as, a poultry feed additive. Aventis' Institute facility, which was the company's largest American crop science production facility, also provided site support to the Bayer Corporation and Dow Chemical Co., both of whom operated units at the site. Today Bayer CropScience wholly owns the facility after Bayer paid roughly \$6.6 billion for Aventis CropScience in late 2001.³⁵

South Charleston's Westvaco Corporation became FMC in 1948 when Westvaco Chlorine Products merged with Food and Machinery Corporation. The 1950's brought complete modernization of the FMC South Charleston plant and became the design engineers used to build their new plants in Italy, Germany, and Argentina.³⁶ It was during this time that the South Charleston Ordinance Center was acquired by FMC and went on to

produce military vehicles during the Vietnam Conflict.³⁷

Led by Union Carbide, industrial research and development felt the same expansion throughout the mid to late 20th century. In 1949, Union Carbide constructed the Technical Center at South Charleston. The facility was enlarged in 1959 and 1962, and added a computer center in 1977.³⁸ Union Carbide's Tech Center came to encompass 651 acres containing close to 400 labs, 1700 employees with over 200 of them having their PhDs, and the Tech Center has allowed Union Carbide to produce and perfect over 300 chemicals and processes.³⁹ Other companies in the area have come to use the Tech Center for their own research and development. Tech Center is the local industry's leading research center and has allowed Union Carbide to drive the entire regional production complex. Union Carbide's research and development, and other firms in the area, helped to create the College of Graduate Studies in 1956, extend local university curriculums to include opportunities for chemical-related professions, and attract scientist and engineers who enhance the local educational environment. Union Carbide was the matriarch of the chemical industry in the Kanawha Valley and when in 2001 it announced an \$11.6 billion merger to create the world's second-largest chemical company, to be known as The Dow Chemical Company, the community became very uneasy.⁴⁰ Union Carbide, through the chemical leaks and asbestos lawsuits, had been in the community for seventy-five years, and people could count on them providing stable high paying jobs, but the merger left many uneasy about the future. Since then, however, Dow has shown their commitment to the area with new construction at the South Charleston site, local school funding, and heavy community involvement. The South Charleston facility

produces more than 500 different chemicals and plastics, and provides staffing, services and utilities to Bayer, who owns and operates their Polyols Production Unit on site.⁴¹

While many of the other facilities up and down the valley have changed hands at one point or the other over the years, the DuPont plant at Belle has remained a stable and reliable facility since its first production in 1926. In the 1950's and 1960's, fertilizers were produced along with ammonia from natural gas, and the company followed with modern agricultural chemicals in the 1970's and 1980's, all the while the facility continued expanding its capacity. The Belle location no longer produces ammonia, but the end of the 20th century brought an upgraded infrastructure and automated manufacturing processes aided by computerized digital control systems. At different times the plant has had cut backs and slow downs, but DuPont has proven its loyalty to West Virginia and the Belle community. Next door, Diamond Shamrock Corporation purchased the former World War I mustard gas plant that Belle Alkali controlled, in 1953. In 1986, OxyChem obtained the facility and manufactured multi-product chloromethanes from chlorine until the plant was shutdown, and the site cleared, in October 1994.⁴² DuPont now remains the lone chemical manufacturer at the site.

In 1953, approximately thirty miles downriver at Nitro, two former Monsanto employees, Elmer Fike and Harold Bruner, established Roberts Chemical at the former Sydel Company site. In 1969, Fike left Roberts Chemical to form Fike Chemical, Inc. and later grew large enough to purchase his former company, Roberts Chemical, in 1971.⁴³ Allegations

of the owner disposing of hazardous materials by burying them in the ground or placing them in one of the three on-site lagoons led to the plant's purchase by Artel Chemical in 1986, and was subsequently abandoned in 1988.⁴⁴

By the 1950's, The American Viscose Plant located at Nitro held the title of the largest stable fiber plant in the world, but in 1963 sold the facility to FMC.⁴⁵ The FMC Corporation continued production at the site until 1976 when it was sold to Avtex due to a downturn in the textile industry.⁴⁶ By 1980, Avtex realized the plant could no longer compete and halted all production at the site.

C. Olin North, who died in a laboratory accident in 1936, did not get to see his Ohio Apex Company sold to a division of FMC in 1951. The acquisition brought the name FMC-Ohio Apex Division with it. As of August 1999, the facility belongs to Great Lakes Chemical Corporation after GLCC purchased the FMC Process Additives Division for \$162 million. Monsanto and Akzo Nobel joined assets in 1995 to form a limited partnership by the name of FLEXSYS America. In 1997, Monsanto spun off of the partnership to become Solutia, Inc. and began producing an animal nutrition chemical along with rubber chemicals.⁴⁷

With continued expansion into the 1950's, the industry has had a gradual downturn and in the late 70's, early 80's, the area industry had its first downsizing. In the 1980s, United States chemical corporations faced expanding competition from foreign producers, including some third world oil producers who have set up their own oil refining and petro-chemical industries.⁴⁸ This becomes apparent when considering the acquisition of an Olin facility, which had been purchased from FMC at South Charleston in 1985, by Israel Chemicals

Group and began operating under the name Clearon in 1995.

From January 1, 1975 to June 30, 1997, chemical, petro-chemical, and plastics patented 1992 products and processes in West Virginia.⁴⁹ Even though the industry has become a breeding ground of acquisitions, takeovers, and reorganizations, and the number employed by chemical manufacturing has declined, the firms and employment has remained relatively stable. At the crest, West Virginia chemical and related-industries employed 38,000 people in 1954.⁵⁰ In 1976, the industry employment was estimated to be 25,200 people, and in 1991, 17,500.⁵¹ Census data shows chemical and allied products included with rubber and plastics manufacturing employed approximately 16,200 in 1997, and the Bureau of Labor Statistics illustrated a small rebound in 1999 with the employment growing slightly to 17,200 people.⁵² The exact number employed today by the chemical industry is difficult to determine due to the other manufacturing that is closely akin such as paper mills, glass making, and refinery services, nevertheless Senator Jay Rockefeller recently boasted that the industry accounts for more than 22,500 jobs in the state.⁵³

"Cancer Valley"

Since the 1950's, toxic waste releases have become an increasing concern to some and led to the development of the United States Environmental Protection Agency in 1972. Shortly after the development, the EPA began to study twenty toxic chemicals that were being emitted in the valley. In the Kanawha Valley, similar groups were beginning to appear including the Kanawha Industrial Emergency Planning Council in 1952,

Citizens for Environmental Protection, and Campaign Clean Water, with the later two both appearing in 1970 and later converged to form the West Virginia Citizen Action Group.

December 2, 1984 became the most recognized day the history of the chemical industry when roughly 52,000 pounds of methyl isocyanate (MIC) leaked from a Union Carbide facility in Bhopal, India. The leak was finally contained the following day, but not before reaping havoc on the local community. In Mimi Pickering's production of Chemical Valley, Rajesh Tandon, a member of the Society for Participatory Research in Asia, estimates the death toll at 5,000, with over 50,000 feeling the consequences.⁵⁴ Every person associated with the chemical industry became affected, but shortly after the incident a bomb shell was dropped on the Institute community when it learned that the only other place in the United States producing the poisonous gas was at Union Carbide's Institute plant. A public outcry followed that turned the Kanawha Valley into national news story. The area's fear was overwhelming to some who wanted the company out of the area, but the company and its employees started a large public relation campaign to combat local resistance complete with picnics, parades, and "Support Carbide" bumper stickers, and T-shirts. In the end, Union Carbide remained, halted MIC production only to resume on May 14, 1985 after implementing some additional safety features, and the communities' awareness of the potential risk heightened. August 11, 1985 provided no reassurance in Union Carbides estimated \$5 million worth of added safety features when approximately 5,000 pounds of aldcarb oxime leaked into the valley's air. The plant operators generated a map of the infected area and indicating that the toxic cloud would not drift past the plant's property line.

Reassured, the operators waited nineteen minutes before warning authorities about the release. But by that time, the gas cloud had already engulfed a nearby golf course and a residential neighborhood sending 135 people to hospitals with eye, throat, and lung irritation.⁵⁵

The Bhopal accident and the Institute leak, drove the local citizens to confront the industry wanting more information, community involvement, and responsibility taken by the companies. Numerous non-profit organizations starting appearing in the valley and across the nation as a result including Citizens, or People, Concerned about MIC, the National Institute of Chemical Studies, and the Responsible Care program. People began to ask how the companies in the areas where going to assure that accidents would never occur here, what chemicals were producing the odor that was so common in the area, and what toxins were being released in the valley. The companies attempted to provide answers where it could and began to cooperate with local organizations that were becoming powerful lobbying powers. Many changes have occurred in the local chemical industry as a result of the local involvement, but to this day it is believed that tens of thousands of pounds of MIC are still stored in an underground tank at the Institute site.⁵⁶

In 1985, The National Institute for Chemical Studies (NICS) was formed by a group of Kanawha Valley community leaders with joint funds from the chemical industry and the EPA. The NICS claims its purpose is to seek "ways to reduce risks posed by chemical plant operations while preserving jobs and supporting economic growth."⁵⁷ Annually, the NICS releases the WV Scorecard for public record. The report

informs the state citizens about the amount of toxic chemicals that West Virginia companies released into the air, land, and water for a past period. However, local companies are required to report what they are releasing at their facilities but not what they are transporting over the highways, and since 1993, hazardous materials have increased by more than 50% traveling through the valley.⁵⁸ Also, the companies information regarding what they are releasing is self regulated, meaning that they provide the numbers themselves with no third party oversight.

Responsible Care is the most recognized program that chemical firms participate with across the globe. The program is an idea that the Canadian Chemical Producers Association developed that took off in the 1980s. In 1988, the American Chemistry Council launched Responsible Care to respond to public concerns about the manufacture and use of chemicals. Through Responsible Care, member companies are required to continually improve their health, safety, and environmental performance, while listening and responding to public concerns, assisting each other to achieve optimum performance, and reporting their goals and progress to the public.

Most residents have a positive view of the industry and go about their daily lives without thinking about the great risk that emanates from the area chemical facilities. All jobs are dangerous in some ways, but very few have the potential to affect the over 250,000 people that live and work in the range of a possible chemical reach. Either citizens deny that such a danger exists to quell their own fears, or they accept the potential dangers as a part of the Kanawha Valley way of life. Whether you choose to accept or deny the risks, one cannot ignore that the facilities are in the area. Constant reminders are all around such as the odor

that hangs in air in the vicinity of the facilities on some days, the closing of the interstate due to a truck overturning and “unknown” substances leaking from them, or the less subtle increased risk of cancer and respiratory diseases.⁵⁹

Cancer and other related diseases have come to cause concern for some area residents. 1996 emissions data, the National Air Toxics Assessment released May 30 puts Kanawha County in the top 10 percent of counties with regard to the risk of getting cancer or other health problems.⁶⁰ More than twenty years earlier, the authors of Knockin’ On Heaven’s Door explained that Kanawha County ranked among the top 10% of all counties in the United States when it came to mortality rates due to leukemia and cancers of the lung and endocrine glands. So, even though environmental groups and regulations focused on cleaning up the chemical atmosphere, the general health of the area doesn’t seem to have improved much, if any. However, the authors went on to point out that most of the cancers which are recognized today were caused by exposure to carcinogens fifteen, twenty, or thirty years ago. The cancers, which will appear years from now, will be due to exposures today.⁶¹ With every year comes new information concerning products that flew off of the shelves to every American home, now cause health problems and may potentially cause death.

Unfortunately, social and economic pressures that are put on scientific developments require the products to be put on the market before the outcomes or potential risks of the product are explored and fully realized. Consumers choose to ignore the effects that the products they use or buy may have on others, until it directly affects them. When businesses

produce a product that benefits lives, it is usually taken for granted and goes unnoticed; but, if an error is made in the production or the product has harmful results, the company quickly becomes enemy number one. Warren Anderson, Chairman of the Union Carbide Corporation, stated sometime after the increased pressures on the chemical producers' safety practices, "Someone has sold the bill of rights that this is a zero risk world, and I don't want to take risks. Life is not that way. It can't be that way. I think in today's environment you couldn't invent the pencil. It has a sharp point, children use it, and you can stick it in your eye or ear. I doubt you could get the pencil introduced in today's market."⁶²

West Virginia, has once again become involved in safety and security issues with the renewed foreign threats. September 11, 2001 showed the United States that it is not exempt from attacks on its own soil and that impending dangers are still viable. Following the attacks the national leaders scrambled to find other vulnerabilities that may be exploited. Soon the focus turned to the chemical manufactures of the nation where plants and oil refineries may be inviting targets. The government began to study the security practices of facilities that a chemical release or leak would affect more than 10,000 people.⁶³ Such sites exist throughout the state, but most important at the footsteps of the state Capitol. At this point, no uniform security standards exist for some 15,000 facilities identified by the Environmental Protection Agency as potential hazards.⁶⁴ However, NICS and local firms have begun to focus on the potential threat, and with the West Virginia Chemical Industry Committee of the West Virginia Manufacturing Association, NICS will verify industry security measures that are to be implemented over the next three years.

"Advantage Valley"

The chemical industry as of late has experienced much of what other industries throughout the country have felt, the shift of industrial dependence from natural resources to labor and social systems. Continuing de-industrialization after the early century boom has caused the American, and West Virginian, economy to focus on other sources of income. While there has been some expansion in other regions of the state, cheap labor, lax environmental regulations, and newer facilities have driven chemical producers to invest in other areas of the nation and globe. High technology, biometrics, and service industries have become promising and the center of attention for most of the state legislatures; nevertheless, some state leaders are still committed to the chemical attraction. For decades, the chemical industry has been vital to the economic and educational structure of West Virginia. The industry is responsible for 46% of West Virginia's gross state product and provides good paying jobs to the citizens of our state.⁶⁵ The area's community leaders realize the importance of chemical manufacturing to the state and have spent the last five to ten years creating initiatives and incentives in an attempt to lure new firms to the state, but due to today's stiff competition from European and Asian manufacturers, attracting new businesses to develop in the area has become a hard sell for the state leaders.

Development projects such as the Chemical Alliance Zone, Polymer Alliance Zone, the eleven member Science and Technology Advisory Council, Governors Office of Technology, The Technical Advisory Committee with the Business and Industrial Development

Corporation (BIDCO), West Virginia Roundtable, and the proclaimed Advantage Valley, which follows Interstate 64 from Charleston to Huntington, work to draw new firms to the area. April 21, 2002, Bob Wise took a trip to Japan to promote West Virginia's job development in chemicals, technology, and the automobile sector. Over the summer, Senator Jay Rockefeller hosted a trade mission that included a delegation of chemical and polymer manufacturing companies from Germany, Brazil and Spain, that resulted in one of the companies from Spain, Gaiker, signing an agreement with the Polymer Alliance Zone and West Virginia University to establish a center for polymer research at West Virginia University's campus in Parkersburg.⁶⁶

The Kanawha Valley has many wonderful advantages to offer prospective businesses including location, developed servicing businesses, strong workforce, and one thing that had not emerged until the later part of the 20th century, a great transportation system. According to the 2000 census the US population center east of the Mississippi is located in "Advantage Valley". This prime locale provides Kanawha Valley firms one day shipping proximity to over 60% of the United States population, one third of the Canadian population, 20 of the nation's 100 largest metropolitan areas, 74% of the drug market, and 63.5% of the industrial organic and inorganic market.⁶⁷ The Kanawha River has always allowed good barge travel to other markets throughout the state and with the advancement of the locks and dams continues to become easier. The river provides natural access to Pittsburgh, Cincinnati, the Gulf Coast, and the rest of the globe. Interstate 77, 79, and 64 completion in the 1970's provided great convenience to the northern, southern, and eastern markets of the United States, and the train rails that line both sides of the river through the valley, CSX on the south line

and Norfolk-Southern system on the north line, provide yet another means of transporting products.

Another major, and possibly the most attractive, benefit West Virginia has to chemical manufacturers is the equipment that is already in the area. Companies have less risk by advancing an already semi-developed facility with investments in improvements and devices that would meet their specific needs rather than locating and investing in a new plant, town, and people. The valley provides all the things a facility would need: support from the community and leaders, developed infrastructure based on the industry, resources, and qualified chemical industry workers who, according to the US Bureau of Economic Analysis, produce \$7,900 more annually than the national average.⁶⁸

The Kanawha Valley has been the foundation of the chemical and related industries; however, since the early 1940's, chemical manufacturers have begun to develop elsewhere in the state. Chemical complexes have taken shape in the Chester, Hancock County area, the New Martinsville, Wetzel County area, the Parkersburg, Wood County area, and the Huntington, Cabell County area, with some continued development in the Kanawha Valley. Plastic manufacturing has become the most promising area of expansion throughout the state's chemical industry, with plastics providing 7,900 jobs, and \$3.3 billion state exports in 2000.⁶⁹ The Polymer Alliance Zone, a public-private partnership among the plastics industry, education, and government and is funded by public and private sector sources, was created by Governor Caperton March 8 1996 to focus on polymer manufacturers. An industrial "zone" has been established in

Jackson, Mason, and Wood counties, and currently the Zone holds host to seventy five members and is the highest concentration of production of high-technology, specialty and engineering polymers in the world.⁷⁰ These other areas of chemical activity shows potential for continued chemical production in the state, and Senator Rockefeller's optimism can be seen with his claim that "West Virginia has the potential to become the Silicon Valley of the chemical and polymer industry."⁷¹

With the birth at the turn of the century, chemical manufacturing has continued to grow and mature throughout the state and today remains one of the chief industries. Charleston, at the heart of the Kanawha Valley, became the governmental and commercial hub of the state, but the chemical industrial sites that bloomed throughout the surrounding suburbs provided the region's residents with a solid blue collar job base. The area, and in part the entire state, owes the development of the area to the federal government who invested so heavily during the two world wars, and to Union Carbide whose research and development facilities provided the area an ability to attract and develop new firms and product lines. While the chemical industry provided so much for the Kanawha Valley, the area repaid the nation by producing, or processing, tens of thousands of everyday household items, or some part within them. The chemical industry is vital to the continued development of the Kanawha Valley and the state throughout the 21st century, and it can provide what King Coal's mechanization and mountain top removal have taken away from the state's workforce.

Notes

¹—United States, "Huntington Environmental Response Operations Plan," The National Response Team, 24 October 2002, 4 December 2002

<http://www.nrt.org/production/nrt/home.nsf/ba1c0a482258334785256449000567e2/ff0109292995cfa08525668600724a4a?OpenDocument>.

²—"Chemical Industry," The Columbia Encyclopedia Online, Sixth Edition, 2001, 4 December 2002 <<http://www.bartleby.com/65/ch/chem-ind.html>>.

³—Roy Bird Cook, "Chemical Industry in West Virginia," The West Virginia Encyclopedia (First Ed. 1929) 139.

⁴—Charles Carpenter, "Coming of the Chemical Industry to Middle Appalachia," West Virginia History a Quarterly Magazine (April 1969) 538.

⁵—Cook 138.

⁶—Dean Jay Gattrell, "Localized innovation: A Geography of the Petro-Chemical Industry in the Kanawha Valley of West Virginia," (Diss. West Virginia University, 1999) 87. 4 December 2002 <<http://etd.wvu.edu/templates/showETD.cfm?recnum=752>>.

⁷—Carpenter 535.

⁸—Franklin Johnson, A Brief History of Chemistry in the Kanawha Valley (Kanawha Valley Section of the American Chemical Society, October 1997) 35.

⁹—Charles H Ambler, West Virginia the Mountain State (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1958) 425.

¹⁰—Jane R. Eggleston, "History of WV Mineral Industries - Salt," West Virginia Geological & Economic Survey, April 1997, 4 December 2002 <<http://www.wvgs.wvnet.edu/www/geology/geoldvsa.htm>>.

¹¹—William D. Wintz, Nitro: The World War I Boom Town, (South Charleston, WV: Jalamap Publications Inc., 1985) 40.

¹²—Wintz 40-41.

¹³—Otis K. Rice, Charleston and the Kanawha Valley (Woodland Hills,

CA: Windsor Publications Inc., 1981) 76.

¹⁴ The Salt Industry in the Kanawha Valley (Nitro and South Charleston, WV: FMC, 1976) 29.

¹⁵ Wintz 89.

¹⁶ Johnson 10.

¹⁷ Wintz 89.

¹⁸ Johnson 50.

¹⁹ Rice, Charleston and the Kanawha Valley 78.

²⁰ United States, Environmental Protection Agency, "West Virginia RCRA Corrective Action Baseline Facilities EPA Region 3," Baseline Facilities - West Virginia, 2002, 12 November 2002
<<http://www.epa.gov/reg3wcmd/ca/wv.htm>>.

²¹ Graham D. Taylor and Patricia E. Sudnik, DuPont and the International Chemical Industry (Boston: G. K. Hall & Company, 1984) 57.

²² Taylor 150.

²³ "Belle Plant Business Park 2002," DuPont, 2002, 4 December 2002
<http://www.cazwv.com/dupont_cd/location_and_history/>

²⁴ The Salt Industry in the Kanawha Valley 29.

²⁵ Johnson 20.

²⁶ Joyce Goldstein and Michael Parsons, Knockin' on Heaven's Door: Health and the Chemical Industry Kanawha Valley, WV (n. pub., June 1979) 5.

²⁷ Cook 143.

²⁸ Goldstein 14.

²⁹ Gatrell 72.

³⁰ Gatrell 114.

³¹ Gatrell 75.

³² Gatrell 114.

³³ "West Virginia Operations," The Dow Chemical Company, 1995-2002, 4 December 2002
<<http://www.dow.com/facilities/namerica/westvir/index.htm>>.

³⁴ "West Virginia Operations,"
<<http://www.dow.com/facilities/namerica/westvir/index.htm>>.

³⁵ Jim Balow, "Bayer Purchase of Aventis Leaves Institute Workers Hanging," The Charleston Gazette, 3 October 2001, 4 December 2002
<[http://www.appalachianfocus.org/abor2/000008a.htm](http://www.appalachianfocus.org/labor2/000008a.htm)>.

³⁶ The Salt Industry in the Kanawha Valley 31.

³⁷ Goldstein 5.

³⁸ Johnson 24.

³⁹ Gatrell 111.

⁴⁰ Patrick Gregg, "The Dow Chemical Company: Transforming West Virginia and the Industry," West Virginia Roundtable, 24 July 2001, 4 December 2002
<<http://www.wvbrt.org/economy.asp>>

⁴¹ "West Virginia Operations,"
<<http://www.dow.com/facilities/namerica/westvir/index.htm>>.

⁴² United States, Environmental Protection Agency, "West Virginia RCRA Corrective Action Baseline Facilities EPA Region 3,"
<<http://www.epa.gov/reg3wcmd/ca/wv.htm>>.

⁴³ Johnson 32

⁴⁴ United States, Environmental Protection Agency, "Region 3: Mid-Atlantic Region Hazardous Site Cleanup Division," West Virginia Superfund Sites, July 16 2002, 4 December 2002
<<http://epa.gov/reg3hwmd/super/WV/fike-chem/pad.htm>>.

⁴⁵ Wintz 89.

⁴⁶ Johnson 37.

⁴⁷ United States, Environmental Protection Agency, "West Virginia RCRA Corrective Action Baseline Facilities EPA Region 3,"
<<http://www.epa.gov/reg3wcmd/ca/wv.htm>>.

⁴⁸ "Chemical Industry,"

⁴⁹ Gatrell 208.

⁵⁰ Ambler 425.

⁵¹ Otis K. Rice and Stephen W. Brown, West Virginia: A History (Lexington, KY: The University Press of Kentucky, 1993) 201.

⁵² United States, Department of Commerce, "Industry Quick Report," United States Census Bureau 1997 Economic Census, 2002, 4 December 2002

<http://factfinder.census.gov/servlet/IQRBrowseServlet?_ts=56847822790>

⁵³ Dianne Bady and Rick Bady, "Air Pollution," A History of Environmental Issues in West Virginia, (n. pub.) 1 December 2002
<<http://webpages.marshall.edu/~bady/envi/CHAIR.TXT>>.

⁵⁴ Chemical Valley, Prod., Dir., and Ed. by Mimi Pickering and Anne Lewis Johnson, 1991.

⁵⁵ Chemical Valley.

⁵⁶ Ken Jr. Ward, "Bhopal Activists Turn to Dow," The Sunday Gazette Mail, 2 December 2001, 4 December 2002
<http://www.ban.org/ban_news/bhopal_activists.html>.

⁵⁷ "NICS History," The National Institute for Chemical Studies, 2002, 4 December 2002
<<http://www.nicsinfo.org/HISTORY.htm>>.

⁵⁸ "Annual Report FY 2002," The National Institute for Chemical Studies, 2002, 4 December 2002
<<http://www.nicsinfo.org/ARFY02D.pdf>>.

⁵⁹ Bady
<<http://webpages.marshall.edu/~bady/envi/CHAIR.TXT>>.

⁶⁰ Brian Bowling, "Study Says State's Air is Worse than Average, Doctor Says EPA Report Doesn't List Enough Chemicals," Charleston Daily Mail, 11 July 2002, 4 December 2002
<<http://www.dailymail.com/news/News/2002071127/>>.

⁶¹ Goldstein I.

⁶² Chemical Valley.

⁶³ Plastic Data Source, "Plastics in West Virginia," The Society of Plastics Industry, Inc., 2002, 4 December 2002
<<http://www.plasticsdatasource.org/facts/wv.pdf>>.

⁶⁴ Ledyard King and Beth Gorczyca, "Chemical Plants Tighten Security," The Herald Dispatch, 26 September 2002, 4 December 2002
<http://www.herald-dispatch.com/2002/September/26/LNs_pot.htm>.

⁶⁵ The Chemical Alliance Zone, 2002, 4 December 2002.
<<http://www.cazwv.com/>>.

⁶⁶ Jay Rockefeller, "Advancing One of West Virginia's Core Industries," 15 July 2002, 4 December 2002
<<http://rockefeller.senate.gov/speeches/chemicalcolumn071502.htm>>.

⁶⁷ "Charleston West Virginia, Big City Opportunities... Small City Advantages!" Business and Industrial Development Corporation, 2002, 4 December 2002
<<http://www.charleston-wv.com/index.html>>.

⁶⁸ "Welcome to Advantage Valley," Advantage Valley, Inc., 2002, 4 December 2002
<<http://www.adval.org/>>.

⁶⁹ "Plastics in West Virginia," The Society of Plastics Industry, Inc., 2002, 4 December 2002
<<http://www.plasticsdatasource.org/facts/wv.pdf>>.

⁷⁰ The Polymer Alliance Zone of West Virginia, 21 April 2000, 4 December 2002
<<http://www.pazwv.com/index.html>>.

⁷¹ Rockefeller,
<<http://rockefeller.senate.gov/speeches/chemicalcolumn071502.htm>>.