ENVIRONMENTAL ISSUES
LOUISVILLE, KENTUCKY

ENVIRONMENTAL HEALTH

TOUR STOPS

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ENVIRONMENTAL HEALTH

Public health results from the intersection between people and their environment. For the first time in history, most of Kentucky's (and the world's) population is predominantly urban. Any effort to meaningfully improve public health via environmental interventions must acknowledge that environmental health is increasingly synonymous with urban health. Urban areas bring into focus the environmental degradations that potentially impact our health. Louisville's urban environment includes:

* Air toxics – highest potential health risk of any county in the southeast U.S.
* Air pollutants – nonattainment for ozone and fine particulates
* Asthma – one of the highest counts of mold and pollen in the U.S.
* Water contamination – no stream in the county meets body contact standards
* Contaminated soil – 25% of the downtown Louisville is classified as a "brownfield"
* Stress – potentially the single greatest cause of health impact
* Air contaminants – each day vehicles drive 24 million miles in Louisville, each emitting contaminants

In addition, urban areas serve as a model for the impact of global warming and its potential impacts on public health. Louisville has higher concentrations of carbon dioxide and reflects/generates heat (heat island) that make it warmer than surrounding areas. Urban areas like Louisville are ideal locations to study the impact of environmental degradation on human health. The infrastructure necessary to create an urban area has environmental health consequences. Impervious surfaces (roofs, parking lots, streets, sidewalks) result in degraded streams. Heating and cooling needs degrade air quality. Waste generation increases.

Striking differences in health outcomes such as cancer, birth defects, infant mortality, asthma, diabetes, and cardiovascular disease occur in urban areas. The key factors to address these disparities will involve more than just providing clean air, water and soil. What is also needed are:

- Safe and affordable housing;
- High quality schools;
- Living wage jobs;
- Access to affordable health care;
- Open space and recreational activities

Bourbon Stockyard

The Bourbon Stockyards were the oldest continuously operating stockyard in the United States (1864-1999). The surrounding area known as Butchertown has been associated with the meat industry since the 1830's. The force behind the development of Butchertown was the need of farmers in the Bluegrass to sell their pork and beef, and the desire of residents of the Deep South to buy it. Louisville was the obvious spot to slaughter

animals and ship their meat south on the Ohio River. Because herds entered Louisville on the old Frankfort Pike (now Frankfort Avenue), the town's butchers moved east -- presumably to get first crack at incoming animals. In 1834 the Bourbon House, a hotel for farmers located between Washington Street and Story Avenue in Louisville became the nucleolus of stockyards that located in the neighborhood. In 1864 a stockyard was built at Main and Johnson streets. It was incorporated as Bourbon Stock Yard Company in 1875. By the late 1800s it included a modern public market with docks, offices, and other services allowing the company to dominate the Kentucky cattle market for the next century. In the first half of the 20th century, the plant was

The Bourbon Stock Yards were founded in 1875 on the banks of Beargrass Creek. In 1920 it was the south's largest market.

expanded to correspond with the extension of the Louisville cattle market, but by mid-century the market declined due to a change from the railroad to trucking as the major mode of transportation. Early in its operation, all undesired parts of animals (hides, blood, guts, hooves) were disposed in the adjacent Beargrass Creek. Many butchers opened shops on Story Avenue because a fork of Beargrass Creek just south of there was convenient for dumping waste. The butchers were soon joined by tanners, coopers who made barrels used in shipping meat, and others. Soap makers and candle makers could scrape fat off the banks of the creek. At that time the Creek discharged into the Ohio River at 2nd Street. The entrails would be flushed to the downtown area where it would be caught on rocks and rot. The stench was overwhelming and the creek was diverted at the Stockyard due north to the Ohio River.

Beargrass Creek and Urban Streams

The Beargrass Creek Watershed is probably the most diverse watershed in terms of geographic area and land usage. The creek was an early source of drinking water with the creek fed by 8 major springs. It was also the site for several grist mills and one mill used in the manufacture of paper. The entire area covers approximately 61 square miles and is divided by three major sub-basins – the Muddy Fork, the Middle Fork and the South Fork. Land use percentages are shown in Table 1.

All three sub-basins flow from suburban areas that were developed — and continue to develop since the early 1960s. They flow through many older neighborhoods, such as the Highlands,

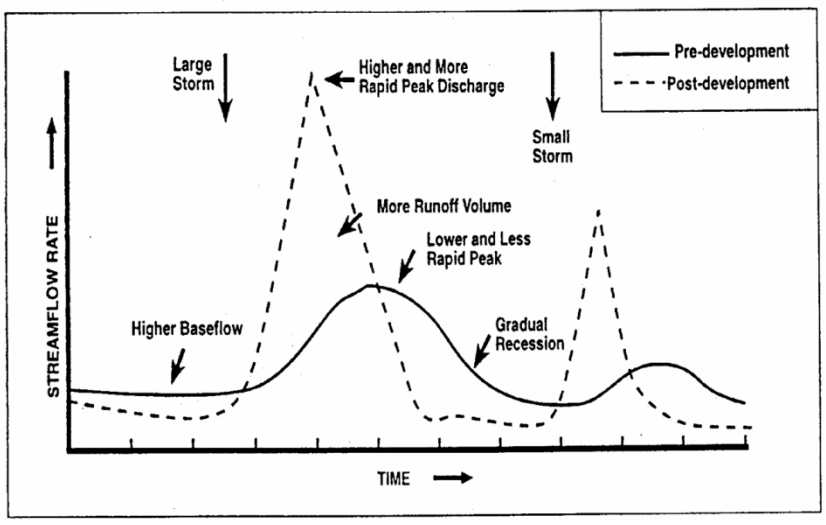
Germantown, Phoenix Hill and Butchertown before they come together and flow into the Ohio River just above the downtown Louisville areas.

Table 1. Beargrass Creek - Land Use Percentages (1998)

Sub-Watershed	Total Impervious	Undeveloped	Commercial	Parks	Public	Industrial	Residential
Middle Fork	39.00	11.87	13.28	3.91	15.94	2.81	52.19
Muddy Fork	35.00	9.36	19.10	3.37	16.48	4.12	47.57
South Fork	42.00	12.78	22.38	3.39	14.39	6.27	40.79
Averages	38.67	12.18	19.67	3.52	15.01	5.14	44.48

The Beargrass Creek Watershed represents a sampling of practically every water quality problem that can be imagined, including: combined and sanitary sewer overflows; package wastewater treatment plants; septic tank seepage; urban storm water run-off (non-point source pollution from streets, lawns and parking lots); erosion and sedimentation problems; and flood management. The entire watershed, including the piped sections in the City of Louisville, receives storm water and wastewater flow from residential, commercial and industrial customers. Approximately three miles of the open sections of the creek were piped or channelized from the 1930s to the 1960s.

Based on federal water quality standards, the Commonwealth of Kentucky's Division of Water sets the uses designated for Beargrass Creek and monitors its progress in meeting specific water quality standards. Based on these standards, the Kentucky Division of Water (KDOW) classifies all three forks of Beargrass Creek as not meeting the designated-use criteria for primary contact recreation (such as swimming and wading) or for aquatic life to live. Also contributing to the creek's decline, and harmful to human health, are vehicle emissions such as oil, antifreeze, benzene from exhaust and heavy metals including zinc, copper and lead. Other pollutants found in measurable quantities in Beargrass Creek are household chemicals including solvents, paints, pesticides and herbicides. Storm water runoff from poorly managed construction sites contributes tons of silt and sediment that suffocate aquatic habitat.



During the past 20 years, most of the package wastewater treatment plants along Beargrass Creek have been removed by MSD trunk sewer construction. The same trunk sewers have also eliminated almost all the septic tanks in the watershed, although a few still exist. Future water quality initiatives in the watershed will focus on combined sewer and sanitary sewer overflows;

flooding; non-point sources pollution and natural stream corridor restoration. There are currently 63 combined sewer overflows and approximately 32 sanitary sewer overflows in the Beargrass Creek Watershed. With more than 80 miles of open drainage channel, creeks and smaller tributaries, the access of non-point source pollution in the form of storm run-off is almost endless.

These issues will be harder to address; will take longer to correct; and will cost more. For instance, petroleum products that are deposited on roadways and parking lots will be much more difficult to collect and treat than the flow from a single pipe to a treatment plant. In addition, the use of herbicides and fertilizers is growing and increasing the negative impact on stream quality and aquatic life. Correcting these problems must begin with public education and participation in identifying the most cost-effective solutions.

Flood Control

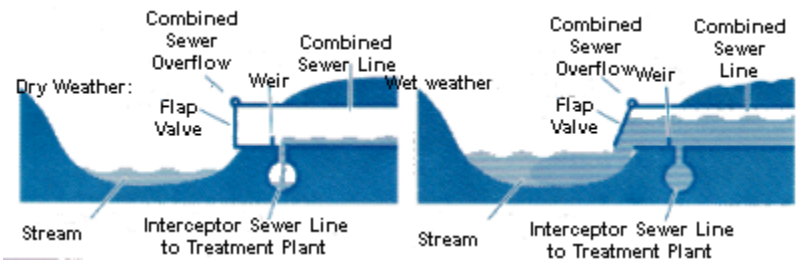
The Ohio River periodically will flood. The worst flood on record was in January 1937 when 75% of the city was under water (150 sq miles) and 230,000 people were forced out of their homes. Ninety people died, with $54.3 million in financial losses attributed to the flood. The Ohio River crested at a record 57.15 feet (27.15 feet above flood stage) after record rains of 19.17 inches during the month. After this flood the US Army Corps of Engineers was authorized to construct a levee to protect Louisville which was completed in 1957. A levee is an earthen dam that runs parallel to the river to prevent the river from expanding outward. Over the years the flood protection works are now 29 miles long. In the downtown area, in order to minimize the amount of land taken by the levee, a floodwall was constructed. A floodwall is constructed of concrete and has water-tight doors that are normally open to allow traffic to travel to the river, and which are closed during flood events. There are 52 street openings in the floodwall and over 150 valves and gates which must be closed when the Ohio River goes into flood stage. When these openings are closed, the city relies on a system of 16 flood-pumping stations to pump rain water inside the levee system up over the levees into the river. Buildings constructed between the river and levee must be designed for periodic flooding. Recent floods in the Mississippi River and other rivers around the US have demonstrated that levees are not a guarantee that flood damage will not occur. Levee failures or flood heights that overtop levees can result in astronomical monetary damage and loss of life. The current approach to flood protection focuses more on preventing the construction of homes and buildings in the floodplain.

Combined Sewer

The sewer system owned, operated and maintained by MSD has evolved for almost a century and a half into an extensive network of both sanitary and combined sewers, diversion structures, mechanical regulators and other flow control devices, wastewater treatment plants, and pump stations. Prior to 1850, sewers in the City of Louisville were built primarily of cut stone and brick. The sewers appear to have been intended mainly for the purpose of storm water disposal and usually flowed towards the Ohio River or nearest surface drain. In was not until sometime in the 1860's, with the introduction of a public water system, that the idea of constructing laterals to convey wastes directly from the houses into the sewers became adopted as common practice. The Metropolitan Sewer District was established in 1946 to provide sewer service and limited flood protection for the old City of Louisville and Jefferson County. At that time, Louisville had about 750 miles of combined sewer pipes that discharged, both sanitary and storm runoff, directly to the Ohio River and Beargrass Creek. It also had an Ohio River floodwall system that was still on the drawing board; no wastewater treatment plants; and, a post-World War II baby boom that was driving suburban growth into rural Jefferson County.

That massive suburban growth, framed by the 1950's through the early 1990's created, quite possibly, the most serious water pollution problems in our community…the proliferation of over 300 'package' (or portable) wastewater treatment plants and over 40,000 individual septic tank systems. To eliminate these constant sources of water pollution, MSD built and acquired over 1,000 miles of sewer lines; constructed two new regional wastewater treatment plants; and expanded four others. Today, the Louisville Metro sewer system includes over 3,000 miles of combined and sanitary sewers; over 300 sewerage pumping stations; and, six regional wastewater treatment plants that process over 160 million gallons of wastewater each day. Almost all of these advancements were made as an investment by the local community and its' citizens. MSD spent its last federal grant monies in 1987. Since then, it has received no funding from federal or state governments for sanitary sewer improvements. Consequently, MSD and its customers have invested over $1 billion during the past 15 years to improve local water quality.

Of our 3,000 mile sewer system, over 700 miles of the system are old, combined storm and sanitary sewer, with over 400 miles of the system at least a century old. Some sewers predate the American Civil War. There are currently 63 combined sewer overflows and approximately 32 sanitary sewer overflows in the Beargrass Creek Watershed. On average, the Louisville area experiences about 30 days each year that are wet enough to cause discharges from CSOs and SSOs. On the remaining 300 or so dry days, almost all wastewater is channeled to a treatment plant. On the wettest days, millions of gallons of diluted sewage is discharged to our streams. Only by relieving these overloaded sewers can we prevent sewage from backing up into homes and basements.



Weinberg Company - Trolley Barn Site

The former Louisville Street Railway Complex, or "Trolley Barn" is located at 1701 West Muhammad Ali Blvd. It is an example of a brownfield site, long abandoned due to environmental contamination at the site. Brownfields, are defined as "*abandoned, idled or underutilized industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived contamination.* Within Louisville's downtown area, 25% of the area can be classified as a brownfield. This site is the second pilot brownfield site prioritized by the City of Louisville for assessment and remediation under the city's National Brownfield Pilot Program. The Louisville Metro government has won 3 Phoenix Awards for brownfield cleanups: University of Louisville football stadium (old rail yard), the Home of the Innocents (150-year old stockyard), and the Louisville Waterfront (200-year old shipping port). The Trolley Barn building was constructed in 1879 and was used to store and maintain the city's mule-drawn trolley cars, and to stable the mules. The first mule-drawn trolleys were started in Louisville in 1864, and the first electric trolleys appeared in 1889 (Green Street line). By 1901, all mules had been replaced by electric cars. The building was later used as a warehouse, most recently by the Weinberg Co., who was in the business of blending and distributing janitorial cleaning supplies, including some pesticides and herbicides. During these operations, the soil floor was contaminated with a variety of chemicals and pesticides. The property was acquired by the Louisville Housing and Urban Development (HUD) Department as part of its urban renewal program for the Russell neighborhood in February 1997. The property was placed on HUD's acquisition list in 1995, but purchase negotiations were delayed due to concerns over the potential cost of environmental cleanup. The trolley barn site lies within one of Louisville's old industrial corridors, part of which is littered with abandoned and underutilized properties that cost the city $8.7 million annually in lost property tax revenues.

The property was thought to have unacceptable levels of hazardous substances in the soil based on a Level I environmental assessment and limited soil sampling conducted by a consultant to HUD in 1995. The consultant estimated the cleanup costs to be as high as $30 million to remove soil down to groundwater and for groundwater remediation. In early 1996, the City received $200,000 in federal funding for a pilot Brownfield Remediation program and placed the site on its list for further investigation and action. A Level II environmental assessment was conducted to further define the extent of contamination. Groundwater sampling revealed that the site was not contributing to groundwater contamination. Further soil samples showed that soil contamination was limited. This new data led to the conclusion that the extensive soil removal and groundwater remediation requirements suggested by the Level I assessment, would not be necessary. The estimated cleanup costs were revised to $80,000. HUD proceeded with the property acquisition, and soil cleanup initiated.

The property is proposed to house the $25 million, 50,000 square feet, African-American

Heritage Center to celebrate African-American culture and highlight the many struggles and major accomplishments of black Kentuckians from the earliest days to the present.. The centerpiece is the huge Trolley Barn, which, with its vaulted ceiling and wide-open spaces, would serve as a "Great Hall" for special events. Other buildings would feature a genealogical research center, a permanent exhibit on black history, an auditorium, traveling exhibits, studio space for artists and some retail space. The city has expended over $800,000 to buy the building and to study alternative uses for the property. The city received federal transportation funds ($1.5 million) in 1999 to renovate the building for a museum; an additional $12 million has been raised from private and local sources. The 1st phase to refurbish the buildings was completed in May 2001. During this phase the building's structure was shored up and lead paint was removed at a cost of $2.5 million . The 2nd phase ($7.8 million) of constructing the Great Hall will take 18 months to complete. The state was going to provide $3 million toward this phase; however, state budget cuts eliminated this source of funding delaying the project to 2005. Renovation is key to redevelopment of the Russell neighborhood. Nonprofit developers have invested more than $3 million in home construction and reconstruction in the neighborhood.

Distler's Warehouse

A tobacco warehouse once stood in this mostly residential Portland neighborhood. A public middle school is across the street from the site. In 1977, the warehouse was raided by the FBI investigating the illegal storage and disposal of hazardous waste by Donald Distler. They were investigating the illegal disposal of hazardous waste (hexachloropentadiene and octachlorocyclopentene used in making pesticides) down a manhole, into the city sewer system which had shut down the Morris Forman Treatment plant. For 90 days the plant was shut down to remove the chemicals while 100 million gallons of untreated wastewater were discharged directly into the Ohio River. It took another 2 years to clean the sewer lines. Mr. Distler was the owner and operator of a waste disposal company, Kentucky Liquid Recycling. He operated two illegal hazardous waste sites in Bullitt County, south of Louisville, and was being investigated for dumping hazardous waste into Louisville's sewer system. Aware of the ongoing investigation, Mr. Distler rented the warehouse and stored 2,500 barrels of hazardous waste at this site, many of them rusted and leaking. As a result of the FBI's investigation, Mr. Distler was convicted for criminal environmental crimes and in 1982 sentenced to two years in prison and fined $50,000 (at the time the most severe environmental sentence in the nation). The two sites in Bullitt County were eventually listed on the federal Superfund for cleanup. Distler's Brickyard, located in West Point, was placed on the federal Superfund list in 1982. Over $7.4 million was used to cleanup the site. Groundwater at the site is still being pumped and treated by the state. The other site, called Distler's Farm, was also placed on the Superfund list in 1982. Located on the Jefferson County/Bullitt County border, over $1.2

million were expended to clean up the site. Groundwater is also still being pumped and treated by the state.

After the raid at this warehouse, the state and federal government conducted an emergency cleanup to remove and properly dispose the barrels of hazardous waste. The site did not qualify as a federal Superfund site, and the state had inadequate resources to complete cleanup at the site. The warehouse owner, who was unaware of Mr. Distler's activities and was not involved in the waste business was unable to rent the warehouse due to the contamination. It was used briefly as a building supply warehouse which went bankrupt in 1994. On April 23, 1997, two young boys started a fire that burned the building to the ground.

The property owner, not able to sell or rent the property, stopped paying property taxes. The cost of cleaning up the site has fallen on the state and federal government. However it does not rank high on the federal list, and the state has over 700 other sites statewide with a budget less than $2 million a year for site cleanups. A contractor for the City of Louisville has cleared the remains of the warehouse and other debris from the site. The City initiated foreclosure action on the property for delinquent property taxes. The property was purchased by an individual at the courthouse and is currently for sale.

Ohio River & McAlpine Lock & Dam

(contact Mike Ryan 772-3492 Ext 7480 or 1)

Louisville owes its existence to the Ohio River. It was founded as people were force to get off the river and portage around the Falls of the Ohio, the only falls in the river from Pittsburgh to the Gulf of Mexico. Over this 3 mile stretch of the river the river falls approximately 26 feet. The site was not an ideal location for a city. The land adjacent to the gate in the levee providing access to the lock was once a slough that was filled in with municipal waste. The downtown area was a pond-dotted bottomland with poor drainage. As the city grew, poor drainage led to health problems. Its streets were muddy, and full of stagnant, stinking potholes. In 1822, a malaria epidemic resulted death to 25% of the population. Ditches were dug to drain the ponds and create land that was suitable for building. The same drainage ditches were used as sewers and to dispose of waste. In the late 1850's Beargrass Creek which emptied into the Ohio River at 4th Street was so polluted and smelly from sewage and animal waste from Butchertown, that a canal was dug to divert it north to drain into the Ohio River above downtown. The old stream bed was lined with bricks, covered over with dirt, and was used as one of Louisville's first sewers emptying directly into the Ohio River. It would not be until 1958 that sewage from the city was treated prior to discharge into the Ohio River.

The Ohio River is 981 miles long and flows from Pittsburgh, Pennsylvania, to the Mississippi River at Cairo, Illinois. Louisville is located approximately 600 miles downstream from Pittsburgh. More than 25 million people, or 10% of the US population, live in the Ohio River Basin. The River is an important highway for barge traffic. Over 250 million tons of cargo (35% of the county's inland waterborne commerce) are transported on the river each year. This is equivalent to the cargo transported through the Panama Cannel annually. Coal, oil, gas, and other energy products make up approximately 70% of the commerce traveling by barge. Almost 25% of the cargo on the Ohio River passes through Louisville (20 tows a day, 57 million tons, value =$11.7 billion). In 1830, the Louisville and Portland Canal Company completed a 1.9 mile long canal on the Kentucky side of the river to bypass the Falls of the Ohio. This allowed boats to float around the falls, avoiding the need to unload and reload in Louisville. In 1927, the McAlpine Dam was constructed at Louisville. The dam is 8,627 feet long, the longest on the Ohio River. Its primary function is to keep the water level in the river a minimum of 9 feet throughout the year, to allow the larger boats to use the river. The backwater from the dam stretch upriver for 75 miles to the next dam at Markland, Indiana (there are 20 locks and dams between Pittsburgh and the Mississippi River). Various locks were constructed to allow boats to pass the falls dating back to the early 19th century through 1921. The current lock was constructed in 1961 is 1,200 feet long and 110 feet wide and can raise or lower a boat 37 feet. The walls of the lock are 80 feet high and the entrance and exit are controlled through two 320 steel gates. Culverts 16 by 18 feet allow water to flow into the lock to raise boats, and to drain the locks to lower boats. Each foot raised or lowered requires 1,000,000 gallons of water and the lock can be filled or emptied in about 13 minutes. Barges provide an economic means of transporting material. The number of miles one ton of cargo can be transported per gallon of fuel is 514 miles by barge, 202 miles by rail, and 59 miles by truck. One 15-barge tow can transport 22,500 tons of coal. It would take 225 railroad cars or 900 trucks to transport the same amount. The construction of a second 1,200-foot lock is now under construction. The $420 million project was completed in 2009.

The Ohio River has long been both Louisville's source of drinking water and the means of disposing of its sewage and waste. As cities grew in the basin (Pittsburgh, Cincinnati, Huntington, Ashland, Evansville), its waters became very polluted. Aquatic life in the river was destroyed. In 1948, the 8 states in the basin entered into a compact to work together to clean up the river. Water quality standards were established jointly by the states and federal government through the Ohio River Valley Water Sanitation Commission, commonly referred to as ORSANCO. One of the first priorities was to have the cities treat their waste prior to discharging it into the river. Louisville was required to construct a plant that treats its sewage in 1958. Today all of the cities and industries along the river treat their sewage and waste, and water quality has dramatically improved. In 1989, no portion of the main stem of the Ohio met water quality standards. Today almost 30% of the river does meet water quality standards. But the river is far

from clean. Bacteria levels are still very high. The entire river is posted for “No Swimming” due to health concerns about the level of bacteria from sewers, septic tanks, and animal wastes. Kentucky has posted the river for “No Fishing” for certain types of fish (carp, catfish, white bass, and paddlefish), due to concern about potential pollutants. Pollutants may bioaccumulate in fish as they feed on smaller fish, invertebrates, algae and aquatic plants. Each of these consume pollutants from the water and sediment.

Why? What are the sources of these pollutants? They major source now is from nonpoint sources. These are sources that do not flow through a pipe, but rather are from areas where water flows across the surface directly into a stream or river (think of rainwater running off a large parking lot); or water that soaks into the soil and into the groundwater. Groundwater will eventually move into a tributary or into the river. Any contamination that is picked up on the surface or in the soil will eventually be deposited into the river. Researchers are now demonstrating that air pollutants also are a major nonpoint source. Air pollutants washed out of the sky by rain, or deposited on the ground and washed into a stream can add to the pollution load. Some of the major pollutants in the Ohio River today that are of concern are:

- pesticides
- heavy metals
- bacteria
- PCBs
- nutrients (nitrogen, phosphorus)

The largest sources of nonpoint water pollutants are urban areas like Louisville, agricultural areas, and areas that have been mined or heavily logged.

Most of Louisville’s streams have been severely impacted by urban runoff and development. As a result all surface streams are posted for “No Swimming.”The increase in impervious surfaces (roads, parking lots, roof tops, etc.) and modifications to “improve” drainage (ditches, storm sewers) result in flash flooding in urban streams. Flash floods can wash out aquatic insects that are the source of food for fish, and result in bank erosion, adding to the silt that smothers surviving organisms. As we construct more impervious surfaces, groundwater recharge is reduced, resulting in lower (or even no) stream flows during dry, summer months. Lower stream flows further stress aquatic life, reduced dissolved oxygen levels, and concentrate toxic substances in the water. Riparian vegetation that normally provides shade and acts as a source of food for aquatic life is removed, threatening the biologically integrity of streams.

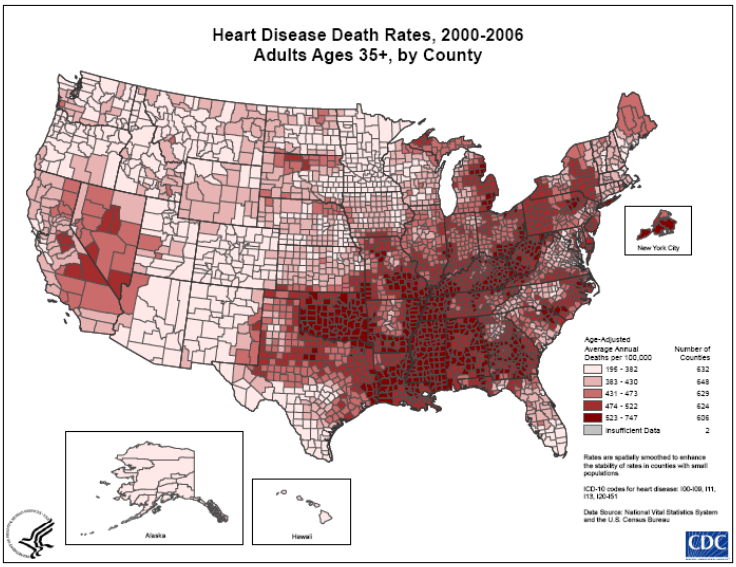
Gallagher Power Plant

The Gallagher Power Plant is a 560 MW (enough energy for 200,000 homes) power plant built in 1961 and now owned by the Duke Energy. At one time it was planned that the plant would be phased out with a nuclear power plant proposed by Indiana Power and Light (Marble Hill). The nuclear plant was not built and the plant has remained on line despite the fact that it has no scrubber system to reduce air emissions. A baghouse was added in 2008. The prevailing wind is from the southwest, blowing most of the air pollutants from the plant across state lines into

Kentucky. The plant is ranked the 62th highest emitter of SO_2 in the US with almost 50,000 tons per year in emissions. New plants are permitted to release 1.2 pounds of sulfur dioxide per million Btu's. Gallagher's emission rate is 3.22 pounds per million Btu's, or more than three times the rate of LG&E

plants. The plant releases approximately 7,000 tons of nitrogen oxides. The Jefferson County Air Pollution Control District estimates that 8-9% of the nitrogen oxides (a precursor to ozone) in the metropolitan area are attributable to the plant. New plants are permitted to release 0.15 pounds per million Btu's. Gallagher releases 0.44 pounds. In December 2009, Duke Energy reached a settlement agreement with the U.S. PA, the U.S. Department of Justice on a lawsuit involving this plant. As part of the settlement, the company can continue to operate the plant and has the option to either convert two of the units from coal to natural gas or retire the units. Duke Energy currently expects that it will convert the units to gas at a cost of $55 million, but no final decision is required to be made until Jan. 1, 2012. The company also will install additional pollution controls on the station's other two units and switch to using lower sulfur fuel at the plant. The plant overlooks Shawnee Park, one of the original Olmsted Parks in Louisville (there are a total of 19 parks designed by Olmsted, he also designed the wide parkways linking the parks which were constructed in 1915).

There are abundant experimental and epidemiological data showing that air toxics such as aldehydes, butadiene, vinyl chloride, and fine particles, have pronounced effects on cardiovascular function and disease. Kentucky's death rate per 100,000 from cardiovascular disease is the 6th highest in the nation at 332.2 (2007). Cardiovascular diseases affect a large proportion of the human population; consequently, even a small increase in risk could translate into a larger number of deaths than are caused by other diseases such as cancer or asthma. The susceptibility of the heart and the cardiovascular tissues to environmental pollutants is underscored by the spate of recent studies showing an association between air particulates and cardiovascular deaths. Although the mechanisms by which particulates affect heart disease are not known, it is likely that long-term mutagenic changes, which are key steps in carcinogenesis, are also relevant to the development and progression of cardiovascular disease. In addition, pulmonary effects of environmental



pollutants could indirectly impair cardiovascular health.

Kentucky appealed to the US EPA in the early 1980's under Section 126 of the Clean Air Act about the interstate pollution allowed by Indiana. The appeal was rejected. In 1999, eight northeastern states complained about interstate pollution from coal-fired power plants in the mid-west that prevented them from complying with national ambient air quality standards. EPA concurred and has ordered all plants in Indiana and Kentucky to reduce their NOx emissions by 65% by 2003. LG&E has proposed to install catalytic converters (total cost $700 million) to meet NOx reduction requirements. Cynergy plans to meet these reduction requirements at their Gibson Power Plant (3,000 MW) in Indiana, and take no action at Gallagher. In March 2000, Gallagher was one of 28 plants in the Midwest cited for violations of the Clean Air Act for making improvements without installing required air pollution-control equipment. Cinergy has challenged this violation.

Chickasaw Park Lake

This small pond is by local residents for recreational fishing. The lake covers 1.5 acres and is less than 6 feet in depth. In 1995 the state environmental protection agency tested the fish for dioxins (polychlorinated dibenzo-p-dioxin), a group of chemicals that are some of the most toxic man-made pollutants. Testing showed that the concentration in some fish exceeded standards. All of the fish were removed from the pond in 1996. The source of the dioxins is unknown. The water in the pond is from the public water supply system. Potential sources in the area such as the old Ashland Oil refinery across the road were removed a number of years ago. It was discovered that some of the fish were caught in the Ohio River and released into the pond (a state violation). Sediment samples showed that low concentrations of dioxin could be detected (124 to 358 ppt, background is 329 ppt). Air pollutants are the suspected transport media, but the source is not known. The pond was restocked in the fall of 1997 and the fish retested in 1998. The risk level from eating the fish is well below the one in a million risk standard adopted by the state. The lake is posted, however, for catch and release fishing.

Ford Automobile Assembly Plant

In 1925 Henry Ford constructed this plant on a 22.5 acre site at a cost of $1.5 million. The building was designed by Albert Kahn, responsible for almost all of the major industrial plants of the Big Three and other auto manufacturers in the US. His designs provided efficient and practical solutions to a growing industrial environment, and he was one of the first users of reinforced concrete. The plant was designed for 1,000 employees and production of 400 cars a day. The roof is glass to provide natural lighting throughout the facility. Ford Motor Co. also had a plant on the corner of 3rd Ave. and Eastern Parkway (1916). The plant was built to make Model T Fords, and then switched in 1927 to make the replacement Model A's. In 1937 the plant was flooded, and after the waters receded the plant disassembled 325 water-damaged vehicles. During WWII, the plant was converted to military production and assembled 93,389 military jeeps. From 1925 to 1955, the plant produced 1,608,710 vehicles. Ford Motor has three

manufacturing facilities in Jefferson County and more Ford trucks are manufactured in Louisville than any other place in the world.

Morris Forman Wastewater Treatment Plant

The Morris Forman Wastewater Treatment plant was constructed in 1958 and is the Metropolitan Sewer District's (MSD) largest treatment plant with a design capacity of 105 million gallons per day. The plant treats an average of 114 million gallons per day. Sewer lines in Louisville date back to the 1850's. The sewer lines carried storm water and household and industrial waste directly into the Ohio River and Beargrass Creek. In 1946, with Louisville's rapid growth the Kentucky General Assembly and Louisville Board of Alderman created MSD. In 1948 the eight states in the Ohio River Valley (IL, IN, OH, WV, PA, NY, TN, KY) entered into an interstate compact to clean up the river which had become a 981-mile open sewer. Under the compact, Louisville was required to build a wastewater treatment plant. It was not until 1958 that any treatment was conducted prior to discharge into the river. The cost of original construction was $12 million. Initially the plant only provided primary treatment capable of removing 65% of the solids in the wastewater, much more than the 45% required by state and federal laws at the time. Today the plant is capable of removing 97% of the solids with primary and secondary treatment processes. The secondary treatment process was constructed in 1976, but due to problems was not able to meet the secondary treatment requirements until 1985. The present connected population to the plant is 495,000, with a daily average flow of 114 million gallons per day, and daily storm flow of 338 million gallons. The plant is located on the lowest point of land in Jefferson County.

The plant uses activated sludge to treat wastewater. Wastewater passes through two complete stages of treatment and is then disinfected with sodium hypochlorite and de-chlorinated prior to discharge into the river. The major operating units of the plant are:

- Preliminary treatment—mechanical screens remove solids and grit is settled out
- Primary treatment – 4 primary settling tanks (1 million cu. ft.) allow solids to settle to the bottom and floatable materials to rise to the surface
- BioRoughing towers – wastewater flows over plastic media where biological slime growth is attached, the slime breaks down organic material in the wastewater
- Secondary aeration batteries – partially treated wastewater is mixed mechanically with pure oxygen (produced onsite) to further decompose organic material
- Secondary clarification – wastewater flows into 20 clarifiers where solids settle to the bottom and clear liquid flows to the next process
- Disinfection – sodium hypochlorite is added to kill pathogens remaining in the water, 30 minute contact time

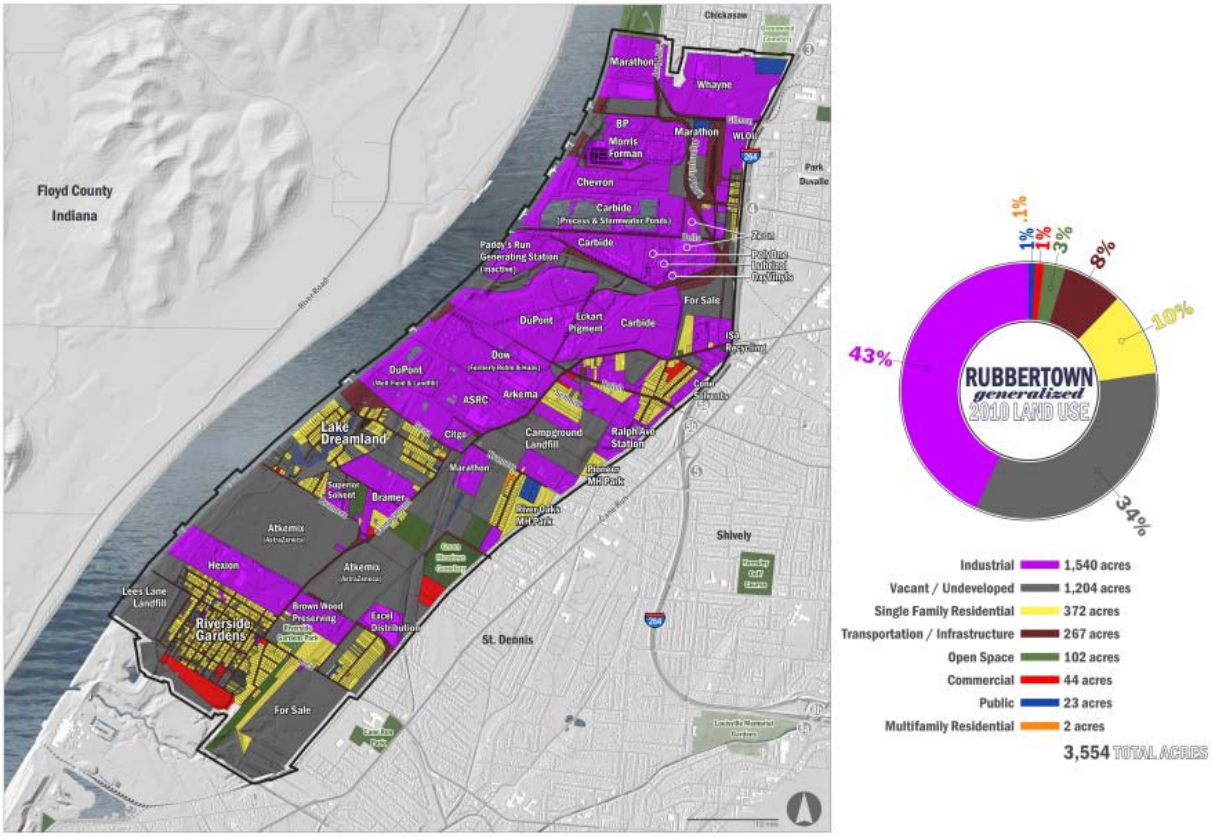
The plant had a history of creating odors, however, in October 2002 the initial phase of odor controls were installed. The solids processing system turns the sludge into dried biosolid pellets suitable as a fertilizer. Solids removed from wastewater are broken down in 4 giant oxygen-free anaerobic digesters. The solids from the digesters are dewatered in 5 centrifuges. Methane gas produced in the digesters is used to generate heat to dry the dewatered sludge. The 4 dryers each are capable of removing 18,000 pounds of water per hour and are the largest drying trains in use in the U.S. Any off-gasses are treated in a scrubber to remove particulates and by oxidizers to eliminate odors. The solids processing facility cost $82 million. MSD is currently installing aluminum covers over open areas of the treatment process to capture any odors.

Rubbertown

The petrochemical industrialization in west Louisville began in 1918 with the construction of the 2000 barrel/ day Standard Oil of Kentucky Refinery (now the Chevron Terminal and Tank Farm). Over the next two decades, two additional refineries were constructed (Aetna Oil and Louisville Refining) both were eventually purchased by Ashland Oil. With the outbreak of World War II, the demand for rubber became the impetus for the development of the Complex. A modern nation could not hope to defend itself without rubber. The construction of a military airplane used one-half ton of rubber; a tank needed about one ton and a battleship, 75 tons. Each person in the military required 32 pounds of rubber for footwear, clothing, and equipment. Tires were needed for all kinds of vehicles and aircraft. Recognizing the critical need for rubber, in June 1940 President Roosevelt formed the Rubber Reserve Company (RRC). The RRC set objectives for stockpiling rubber, conserving the use of rubber in tires by setting speed limits, and collecting scrap rubber for reclamation. Major world sources (90%) of natural rubber in southeast Asia were in Japanese control. The U.S. Office of Production Management eventually built 15 synthetic rubber plants nationwide using German technology. Ultimately, the nation spent as much on its rubber program as it did on the atomic bomb. All of the initial plants were constructed under the supervision of the U.S. Office of Production Management (who also considered Sheffield, Alabama as a potential site). The government either built the plants or purchased them from their original owners, investing $92.4 million in Louisville. The first plant to be built was National Carbide in 1941. The plant manufactured acetylene gas. LG&E constructed the Paddy's Run power plant to supply the electrical needs of National Carbide.

Although Paddy's Run is now closed, National Carbide is still the largest single user of LG&E produced power. The process of producing acetylene is relatively simple and has remained

unchanged since 1888: crushed limestone (abundant in central Kentucky) is mixed with petroleum coke (provided from the nearby refineries) and heated to 3800° F (using large electric



arc furnaces). This produces calcium carbide which when mixed with water produces acetylene gas, the same chemical process that fueled miners' old lamps.

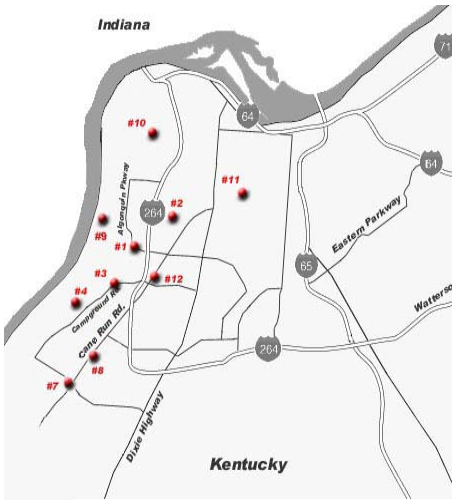
The acetylene gas was used as feedstock to for a neoprene synthetic rubber plant built by E.I. DuPont de Nemours & Co. that same year. The acetylene was piped over to the DuPont plant. DuPont manufactured a vinyl acetylene, which was then chlorinated to produce chloroprene. When polymerized, chloroprene is turned into Neoprene, which is a type of synthetic rubber.

BF Goodrich began construction also in 1941. They produced a synthetic rubber product called Koroseal. Koroseal is made from vinyl chloride. They also piped acetylene gas from National Carbide as feedstock for the manufacture of a vinyl chloride monomer. BF Goodrich was joined by Phillips Petroleum Corp. and Hycar Chemical Corp. to make various types of "nitrile" rubber from acrylonitrile, butadiene, and styrene.

With the outbreak of war in December 1941, the federal government confiscated the DuPont plant. DuPont was retained to manage the facility. The federal government constructed a plant to make butadiene from grain alcohol (the plant is now owned by Rohm and Haas). Grain alcohol was piped in from nearby distilleries on Dixie Highway. In 1943, the federal government opened that is now the American Synthetic Rubber plant to make styrene-butadiene rubber for tires. The

Federal government had selected this type of rubber to be the standard for the Department of Defense, and it is still the principal type of rubber used in tires today. National Synthetic Rubber, a consortium of five tire companies, managed the plant.

In 1941 there were an estimated 38,000 workers employed in Louisville by defense industries.



In one year industrial employment jumped 18% over 1940. Housing, schools, hospitals and public infrastructure was in critical shortage as rural Kentuckians moved to Louisville. Other plants in the metropolitan area included Curtis Wright (airplanes), Naval Ordinance (gun mountings), Westinghouse (naval guns), Howard Shipyards in Jeffersonville (L.S.T. crafts), and the Hoosier Ordinance Plant (munitions). By 1944 the number of industrial employees reached a peak of 80,000. The area around Rubbertown was primarily truck farms in 1940. By the end of the war the area had changed to residential land uses. Wartime wages and inflation are reflected in bank deposits in Louisville which soared from $160 million in 1938 to $368 million in 1043. Peak synthetic rubber production was reached in 1944 with 195,000 tons of rubber produced, employing 4,000 workers, and Rubbertown became the world's largest producer of synthetic rubber (21% of national production of 920,000 tons).

After the war, the federally owned plants were sold back to private operators. DuPont purchased their old plant and land in 1949. American Synthetic Rubber, a consortium of 20 companies purchased the National Synthetic Rubber plant from the government, in 1955.

The chief concern from the Rubbertown plants currently focuses on their release of over 3 million pounds of air toxics annually. The concern over air toxics is not new. Early public concern resulted in the Rubbertown industries commissioning a survey of the dust problem in west Louisville in 1952. Louisville was studied by the US Public Health Service in 1957-58 to determine the health impacts from air pollutants. The study showed air releases as high as 22 million pounds per month, much greater than the 5 million pounds annually today. Air toxic monitoring is being conducted through a collaborative effort of the Jefferson County Air Pollution Control District, the West Jefferson County Community Task Force, the University of Louisville, Kentucky Division for Air Quality, Rubbertown Industries and the US EPA. The partners above selected monitoring station locations and monitoring was initiated in May 1999. A total of 12 monitoring stations were established to monitor 78 volatile organic compounds (VOCs), 63 semi-volatile organic compounds, 20 metals, and 2 reactive aerosols (hydrogen fluoride and hydrochloric acid). EPA provided monitors for 6 of the stations and conducted all of the analyses from these six stations. After May 2000, only 7 monitoring stations were maintained by the University of Louisville to monitor for VOCs. Twenty-four hour samples are taken once every 12 days.

The data were analyzed by a contractor (Science International) to develop a risk assessment. The assessment showed for the 250 chemicals analyzed, none were at concentrations high enough to

have acute (immediate) health effects. However, all of the monitors showed ambient concentrations that are at levels where cancer risks exceed a probability of 1 in 10,000. For other health impacts the data showed a slightly elevated risk. The most significant chemicals posing potential health risks are:

Chemical of Concern	Health Effect	10^{-6} Risk
1,3 Butadiene	carcinogen	500
Acrylonitrile	carcinogen	130
Chloroprene	kidney, dermal	
Chloroform	liver, kidney	77
Chromium	neurotoxin	66
Formaldehyde	carcinogen	46
Perchloroethylene	carcinogen	39
Ethyl acrylate	carcinogen	33
Benzene	carcinogen	32

Carbide Industries

The Carbide Industries is a privately owned company that also owns a plant in Calvert City, KY. Originally the plant had 7 electric-arc furnaces and was built for $1 million. It currently operates one 50-megawatt furnace. Carbide Industries manufactures three products: calcium carbide, acetylene, and calcium hydroxide. Calcium carbide is used as an alternative energy source, providing improved furnace efficiency, increased furnace productivity, reduced costs and a lower carbon footprint of the steel-making process. They manufacture about two rail cars daily of calcium carbide. Acetylene gas is used as a feedstock for vinyl chloride and as a fuel in metal cutting and welding and for iron and steel desulfurization. The calcium hydroxide is a waste by-product. It is piped under Bells Lane and disposed in the 10-acre waste pile on the north side of the road. In 1963, the pile was significantly higher (100 ft). On February 25 of that year the pile sloughed off, covering Bells Lane and most of the parking lots on the south side of the road. The material is now being sold to LG&E for use in their air pollution control scrubbers. LG&E sells the material after it has been used to wall board manufacturers as a raw material. A fire in June 2009 damaged the plant, and a fire and explosion in March 2011 killed two people and destroyed the building. The plant has a annual revenue of $5-10 million and has 140 employees.

Lubrizol, Zeon, and PolyOne

These Louisville plants produce chlorinated polyvinyl chloride (CPVC) resins and compounds which are used in the manufacture of residential and industrial plumbing systems. The plant

originally was owned by B.F. Goodrich (up until 2001). Formulated first in 1835, from 1912 to 1950 vinyl chloride was produced from acetylene and hydrogen chloride using mercuric chloride as a catalyst. Currently the production of vinyl chloride consists of a series of well-defined steps. 1,2-dichoroethane is prepared by reacting ethylene and chlorine. In the very first study about the dangers of Vinyl Chloride, published in 1930, it was disclosed that exposure of test animals to just a single short-term high dose of VC caused liver damage. In 1970, Dr. P.L. Viola, reported that test animals exposed to 30,000 ppm of VC developed a rare sarcoma of the liver. In 1972, Dr. Cesare Maltoni, another Italian researcher for the European VC industry, found liver tumors (including angiosarcoma) from VC exposures as low as 250 ppm for four hours a day. Dr. John Creech from B.F. Goodrich discovered angiosarcoma in the liver of three workers at the B.F. Goodrich plant in Louisville, Kentucky. To date 26 former B.F. Goodrich workers have died from this disease. In May of 1974, the Occupational Safety and Health Administration (OSHA) proposed a maximum exposure level for vinyl chloride at a no detectable level, using equipment with an accuracy of 1 part per million.

In the 1972, the federal government imposed tighter emission standards and worker safety rules for vinyl chloride after it was linked to a fatal liver cancer associated with workers at the plant, which by 1997 the Center for Disease Control and Prevention found that worker exposure was “completely eliminated”. EPA's 2001 updated Toxicological Profile and Summary Health Assessment for VC in its Integrated Risk Information System (IRIS) database lowers EPA's previous risk factor estimate by a factor of 20 and concludes that "because of the consistent evidence for liver cancer in all the studies...and the weaker association for other sites, it is concluded that the liver is the most sensitive site, and protection against liver cancer will protect against possible cancer induction in other tissues.”

The plant also produces a number of vinyl and acrylic latex emulsions, which are used as coatings in industrial, and consumer products. The vinyl chloride monomer used in the plants formerly was produced in Louisville. The companies now purchase the vinyl chloride from Westlake Monomers in Calvert City, bringing it to Louisville by rail. One of the waste products of Lubrizol is hydrochloric acid. Prior to 1998, this waste by product was disposed as a hazardous waste. The company is currently transporting this waste to Carbide/Graphite Group, Inc. who uses the acid to treat wastewater from their calcium hydroxide storage piles. This beneficial use of a waste reduces costs for both companies while improving the environmental quality within the community.

Lubrizol (Cleveland) entered into a partnership with two separate companies, Zeon Chemicals (Japan) and PolyOne (Cleveland) who now operate portions of the original plant independently. Zeon Chemicals is engaged in the manufacture of nitrile rubber. The rubber is used in the manufacture of automotive parts, adhesive, plastic modification, wire and cable parts. Butadiene, acrylonitrile, styrene, and ethyl acrylate are feedstock into the manufacture of the specialty rubber. PolyOne produce polyvinyl chloride in a powder or pellet form which is used in the manufacture of vinyl house siding, PVC pipe, vinyl windows, wire and cable insulation.

DuPont

In 1955 the Louisville plant started manufacturing Freon-22® refrigerant and aerosol propellant. Freon 22 is used as a refrigerant in freezers and air conditioners. Thirty-three years later, plant managers began phasing-out of this product when DuPont decided to curtail production of ozone-depleting chlorofluorocarbon (CFC) products for U.S. markets. By 1992 Louisville was producing ozone-safe, non-CFC substitutes like Suva® refrigerants and Dymel® propellants. In addition to refrigerants, DuPont Flouroproducts produces Freon 23, DFE, vinyl fluoride, and hydrochloric acid. Freon 23 is used as an electronic gas and a fire-extinguishing agent. DFE is used in aerosols and as blowing agent for foams. Vinyl fluoride is used in the manufacture of a plastic (Tedlar) whose properties that include excellent resistance to weathering, outstanding mechanical properties, and inertness towards a wide variety of chemicals, solvents, and staining agents. It is used in the manufacture of aircraft, cars, graphic signs, and a variety of other uses. It is also used in the PV Solar industry. DuPont estimates that this market will expand 50% in each of the next 5 years and has announced it will invest up to $178 million to double production. The plant will be expanded 78,000 square feet (existing 300,000 sq. ft.) and create 47 new jobs in Louisville (payroll of $2.1 million). One of the byproducts in the manufacture of Freon is hydrochloric acid. The plant prior to 1992, disposed of this "waste" byproduct in two underground injection wells. In 1992, almost 30 million pounds of acid was disposed in this manner. Since then, the company has found markets to sell the acid for beneficial reuse.

The DuPont plant in the 1960's employed 2,400 workers and was one of Louisville's largest manufacturers. That number bottomed out in 2009 to 180 workers. The plant today is not even in the top 40 largest manufacturers.

Dow Chemical

Rohm and Haas Corp. (Philadelphia) purchased the old butadiene plant in 1960 to make acrylic plastics, emulsion products and plastic additives. The purchase price was $6.1 million which was recouped immediately by dismantling the obsolete butadiene instillations and selling them overseas. The plant is now a joint venture of Rohm and Haas and Atofina. Atofina recently (7/98) purchased the patent for Plexiglass from Rohm and Haas. The plant makes plastic additives for PVC pipe, house siding, and packaging; Plexiglas molding resins for car taillights, laser video disks, and medical supplies; and emulsions for acrylic house paint, floor polish, paper and over 150 other products. The plant closed its acrylic additives line (latex paints) in 2009, cutting 220 jobs. Although the plant in the 1990's employed over 800 employees, currently the company has 133 employees. The main chemical feedstock used at the plant is methyl methacrylate, which is brought by barge from their plant in Texas.

American Synthetic Rubber Corp.

Consortiums of rubber, chemical and tire companies for most of its history have run this plant. It is now wholly owned by Michelin Tire Co. (France) It's management and operation have improved dramatically as a result. The plant produces synthetic rubber which is sold in two forms: in a 75-pound bale and in a liquid form that is shipped out in tank trucks. The bales (styrene butadiene rubber) are shipped to tire manufacturing plants where they are mixed with other raw materials such as carbon black. The liquid rubber (polybutadiene-acrylonitrile-acrylic acid polymer) is shipped to Thiokol Space Operations where it is used as the binder for the solid fuel in the booster rockets for the Space Shuttle program. In December 2005 the company installed a $3 million thermal oxidizer to destroy 99.99% of the 1,3 Butadiene emissions from the plant. Data for 2006 shows an 80% reduction in ambient 1,3 Butadiene levels in west Louisville.

Lake Dreamland

Originally a dairy farm until 1931, lots for summer cottages were leased by the owner, Ed Hartlage to wealthy Louisvillians. Located on the Ohio River and a lake created by a dam on Bramer's Run, the area was a pleasant retreat from the city. Visitors would swim, fish and boat on the lake or ride horses along the shore. The dairy barn was converted into a dancehall for entertainment. The Ohio River flood of 1937 devastated the community. A floodwall cut through the development, and the remaining cottages were soon in poor repair. The neighborhood lacked public water, electricity and paved roads. The construction of nearby chemical plants and their air emissions ended the era as a resort.

After World War II, surrounded by chemical plants, the abandoned cottages were offered for sale or lease. Of the 120 lots only 5 were sold. The rest were leased for a nominal fee. Since the residents did not own the property, there were unable to obtain loans, or convince the government to provide utilities or paved roads. The homes were allowed to deteriorate. The dancehall was converted in the 1950's into a nightclub, El Rancho, which was a popular club. It featured a new type of music (Rock and Roll), but by the 1960's was taken over by motorcycle gangs, and burned down in 1967. Mr. Hartlage died in 1980 and his will specified that the property be sold. In 1987 the city purchased the land from his estate. With year-round residents, the city decided to sell individual lots for $1. Although the county will deed the land over to the residents, it has also imposed a death sentence of sorts on the community. Under county plans, current tenants will own their land but the deeds will stipulate that when the current owner or his family leaves, the land will revert to the county. The county plans to convert the community into a land trust.

Residents still have infrastructure problems in that they had no access to wastewater treatment since they were outside the floodwall. Sewage is disposed in “constructed pits”. The pits are filled with rock, and sewage is “filtered” through the rock before flowing into groundwater and eventually into the lake or Ohio River. Visible on the lake is a thick layer of green algae from nutrient loading. The City in 1997-98 initiated a program to install aerated septic tanks to manage waste water. The cost per household was estimated at $6,500, but costs overruns and loss of federal funding ended the program after only a few homes received new systems.

Stauffer Chemical

From 1953 to 1983, this plant produced chlorinated solvents, chloroform, and hydrochloric acid. When it was built, the $3 million plant was viewed as an economic boom for the community. The plant manufactured chloroform, which is manufactured by the chlorination of methane in a process which can be made to yield varying proportions of methyl chloride, methylene chloride, chloroform, and carbon tetrachloride. Chloroform is a probable human carcinogen. The site has extensive soil and groundwater contamination. The contaminants half life is estimated to be 100-200 years. It is now owned by ICI Americas and its affiliate Atkemix Tn. In 1961 a cloud of acrid gas floats over Lake Dreamland, resulting in the evacuation of 1,000 residents.

Hexion Specialty Chemicals

Hexion Specialty Chemicals (Columbus, Ohio) is the world’s largest producer of binder, adhesive, coating and ink resins for industrial applications. The plant was constructed to produce formaldehyde and phenolic resins in 1979. These products are used in a wide variety of automotive, foundry, adhesive, and wood manufacturing plants. Formaldehyde is used in the manufacture of herbicides and fungicides; fabric softeners; oil and gas applications; particleboard, plywood, and shingles; slow release fertilizers, melamine formaldehyde (MF), and phenol formaldehyde (PF) resins; and spandex fiber. The primary feedstock is methanol. The facility is the largest (2.6 million pounds of formaldehyde annually) and most modern foundry resin production facility in the world. The facility agreed in February 2007 in response to a class action suit filed by residents in the community to a $52 million settlement. The settlement includes payment to adjacent landowners for property devaluation, construction of a berm between loading docks and adjacent neighbors, and internal controls to reduce emissions. Hexion has a total of 223 employees on site and an annual payroll of $17 million per year.

Lee’s Lane Superfund Site

Lee’s Lane Landfill is a 112-acre landfill and junkyard that lies in the Ohio River floodplain. Portions of the site flood every year. The site was originally a sand and gravel quarry, with a pit over 120 feet deep. From the 1940’s to 1975, the site was operated as a landfill by Joseph Hofgesang and received over 2 million cubic yards of domestic, commercial, and industrial waste (estimated to be 212,400 tons). The landfill is located on 100 feet of porous alluvium.

Waste is in direct contact with groundwater and pollutants flow down gradient to the Ohio River. In 1975, residents living next to the site reported “blue sheets of flame” around their hot water heaters. Explosive levels of methane gas from the landfill were detected. Seven homes were evacuated and purchased by local authorities. The state closed the landfill the same year. In 1980, the state discovered 400 exposed drums of hazardous materials on the river bank. They identified more than 50 chemicals including phenolic resins, benzene, and a variety of heavy metals. Groundwater, soil, and surface water were contaminated with benzene, heavy metals including lead and arsenic, and inorganic chemicals. In 1982, the site was listed on the National Priority List for Superfund. Over $2.2 million was expended to clean up the surface of the site and it has been delisted for any further Superfund action. The property is owned by the Hofgesang Foundation (Joeseph Hofgesang died in 1972) which settled with US EPA to pay $2.6 million to clean up the site. The presence of methane and other toxic gases were detected in the residential neighborhood east of the site. An underground collection system was designed to vent the volatile gas safely so it would no longer seep into neighboring homes and yards. A cap was placed on the landfills and monitoring wells around the site were installed. A 2004 engineering consultant firm said the monitoring and gas collection system was beyond the typical useful life and needs to be updated. MSD has since 1991 maintained the site and conducted monitoring under a 29-year agreement (to 2020) with the US EPA, which alleged at the time that the sewer district was one of the parties dumping toxic waste there. The cost of fixing the methane gas collection systems was estimated to be in excess of $300,000. MSD took the case to court in 2007 but agreed to budget $350,000 to fix the system.

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