

Mon Valley Works
Clairton Plant
Operations and
Environmental
Report

2019



United States Steel

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Message from the Plant Manager



Michael S. Rhoads
Plant Manager
Mon Valley Works – Clairton Plant

U. S. Steel has been a part of the Mon Valley for 120 years, providing the steel to build America made by generations of proud United Steelworkers and U. S. Steel management employees. We know that to be a good neighbor, we must also continuously improve our environmental performance.

While I am proud of the environmental progress and achievements described in this report, under U. S. Steel's commitment to its Continuous Improvement to the Environment (CITE) program, we will never waver in our efforts to improve. Not only do we employ a formal CITE program in our training, we have embedded our CITE program in our day-to-day operations, as a commitment to environmental stewardship.

Our successes are a result of our resolve to always follow our S.T.E.E.L. principles – Safety First, Trust and Respect, Environmentally Friendly Activities, Ethical Behavior, and Lawful Business Conduct, which will be discussed in more detail in this report.

In 2019, U. S. Steel's Clairton Plant reached many environmental milestones, which I am deeply proud of, and the pages ahead summarize some of our major successes during the year.

Most remarkable, at the conclusion of 2019, employees at the Mon Valley Works' Clairton Plant closed out the decade with a big reason to celebrate – they achieved three record-setting environmental performance metrics for battery combustion stack compliance.

Thanks to the consistency and focus of Clairton Plant employees, the Plant achieved a monthly (December 2019), quarterly (Fourth Quarter 2019), and annual (Calendar Year 2019) compliance record for battery combustion stack performance. Stack compliance at the Clairton Plant in December 2019 was a near-perfect 99.9%. Fourth quarter 2019 saw a new quarterly record for combined stack performance as well, recording a combined stack compliance rate of 99.83%. Finally, Clairton Plant's 2019 performance of 99.67% compliance rate was the best-ever recorded, surpassing 2018's previous record-setting performance compliance rate of 99.56%. To reach the level of performance the Clairton Plant team achieved, many days in 2019 all ten batteries recorded a compliance rate of 100%.

Stack performance is considered a key indicator of the overall environmental performance of the coke batteries both by the company and by U. S. Steel's regulating agency. That is why there is a strong emphasis placed on this compliance rate and why this record-breaking performance is so important.

These achievements, as well as other environmental progress, are in no small part a result U. S. Steel's implementation of the CITE program and continued commitment to environmental stewardship. U. S. Steel values our shared environment, employees and the communities in which we operate. Safety and environmental performance remain our top priorities, now and into the future.

U. S. Steel—S.T.E.E.L. Principles

Our successes are a result of our resolve to always follow our S.T.E.E.L. Principles – Safety First, Trust and Respect, Environmentally Friendly Activities, Ethical Behavior, and Lawful Business Conduct:

S SAFETY FIRST ▶ *Our Unyielding Dedication to Safety*

We believe that safe companies are sustainable companies, and that belief is helping to drive our quest for world-class safety performance. By building trust and empowering employees to always put safety first, we are making significant strides to ensure that every employee returns home from work safely at the end of the day.

T TRUST ▶ *Our Commitment to Trust and Respect*

The success of our company depends on all of us working together to achieve our common goals. We must build strong relationships with one another that are rooted in trust. Building and maintaining trust requires all employees to operate with unwavering integrity, continually improve their personal and professional capabilities, and demonstrate their loyalty by always acting in the company's best interests. Treating others with dignity and respect is critical to sustaining and enhancing relationships rooted in trust, which means embracing the strengths and unique differences each of us brings to our work. We must understand and appreciate the importance of diversity and inclusion, fostering a high-performance environment of accountability, fairness, and respect that values individual differences and encourages every employee to reach his or her full potential at our company.

E ENVIRONMENT ▶ *Our Commitment to Environmentally Friendly Activities*

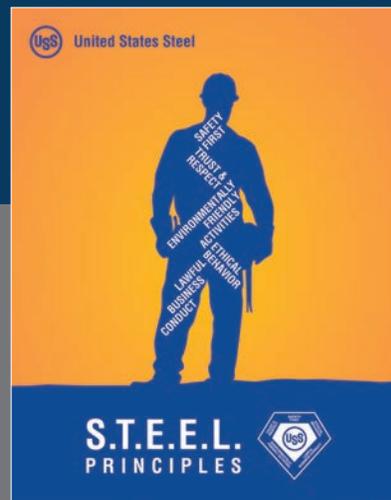
Environmental stewardship is a core value of our company that is incorporated into our day-to-day operations, as well as our strategic corporate decisions. We must operate our facilities in an environmentally responsible manner and take steps to protect and preserve our shared natural resources. Doing what's right for the environment is also doing right for our business. Our commitment to innovation, which has been a hallmark of U. S. Steel for more than a century, is key to the sustainable operation of our facilities and the delivery of sustainable products and solutions for our customers. Indeed, some of our most recent innovations are already contributing to efforts to create a more sustainable world, such as our lightweight advanced high-strength steels that can help meet automobile fuel efficiency standards and our high-efficiency electrical steel that enhances electric motor efficiency. We are committed to being environmental stewards in the communities in which we live and operate. We consistently strive to increase our energy efficiency, reduce emissions, and conserve energy and other resources, while prioritizing the reuse and recycling of materials into our products so that our environmental footprint is minimized.

E ETHICAL BEHAVIOR ▶ *Our Commitment to Ethical Business Practices*

We measure our corporate conduct by asking a simple yet demanding question: "Is it the right thing to do?" U. S. Steel was founded on principles of ethical business practices that foreshadowed the code of conduct we follow today.

L LAWFUL BUSINESS CONDUCT

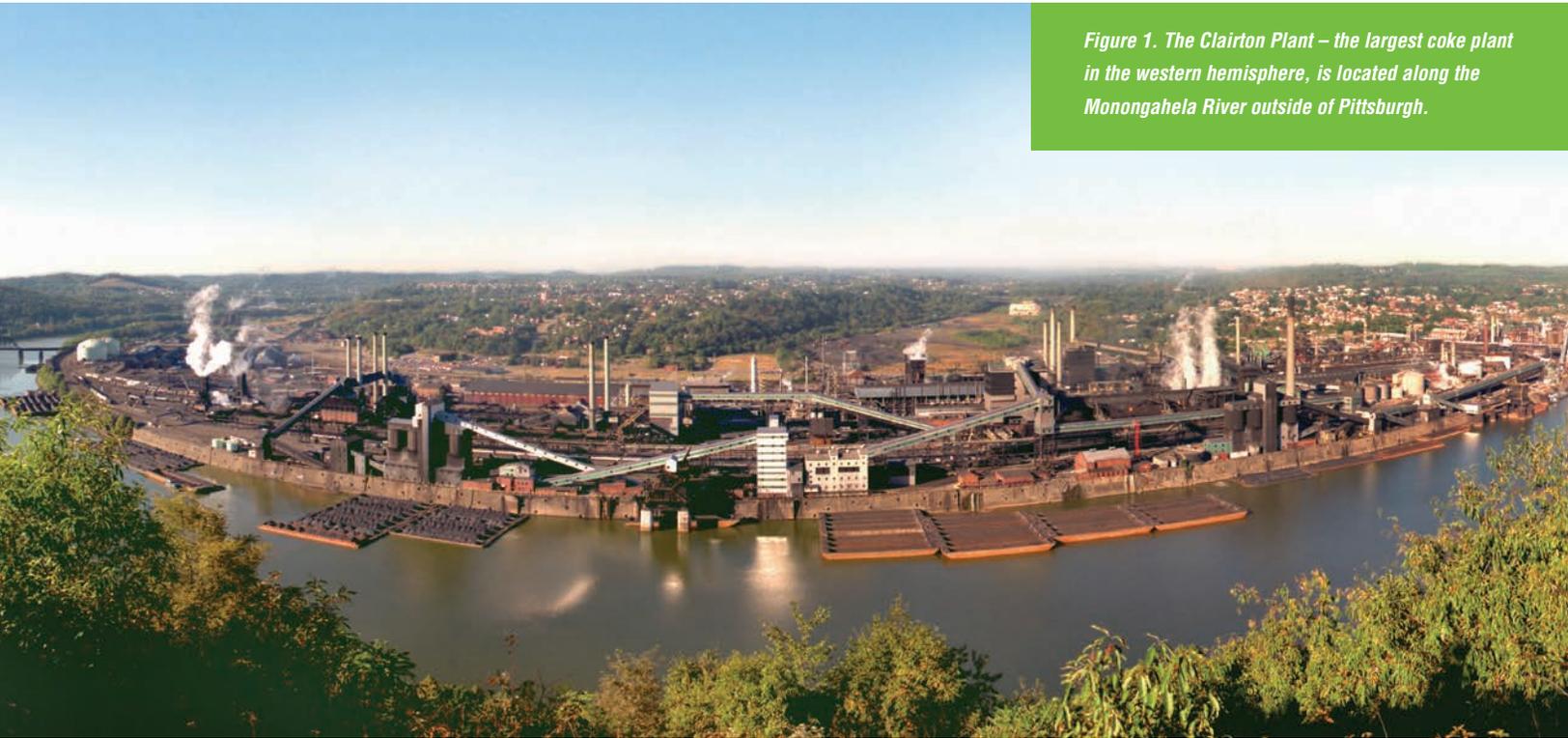
U. S. Steel was the first company in the United States to hold an annual meeting of stockholders and to publish an annual report. Business has grown more complex since the beginning of our company, but the principles by which we do business have never changed. Each employee has the duty to conduct business fairly and in compliance with all applicable laws and regulations.



These S.T.E.E.L. principles are the foundation on which we operate; and are reflected in the environmental progress by the Clairton Plant operations as follows.

Overview of the Clairton Plant and the Mon Valley Works

Figure 1. The Clairton Plant – the largest coke plant in the western hemisphere, is located along the Monongahela River outside of Pittsburgh.



The Clairton Plant of the Mon Valley Works is located 20 miles south of Pittsburgh on 392 acres along 3.3 miles of the west bank of the Monongahela River.

The Plant has the capacity to produce approximately 4.3 million tons of high-grade metallurgical coke per year in 10 coke batteries comprised of 708 ovens. The Clairton Plant is the only remaining U. S. Steel coke-producing plant in the United States. This plant supplies coke needed for iron and steel production at the Mon Valley Works' Edgar Thomson Plant and other steel-producing locations. The Clairton Plant is the largest producer of high-grade metallurgical coke in the western hemisphere.

The significance of the Clairton Plant, including its products and by-products, goes well beyond its geographical footprint. Clairton

Plant's products are used as the raw material feed to other steel plants throughout the United States. In addition, its products are used in chemical and manufacturing operations of many corporations.

The Clairton Plant operations have a tremendous impact on the local, regional, and national economy. The Clairton Plant employs approximately 1,400 highly skilled United Steelworker union-represented and non-represented employees. Since the Clairton Plant is the nation's largest producer of coke and coal chemicals, its operations have a multiplier effect in supporting thousands of additional steel plant, chemical, energy, transportation, and supplier jobs, not only in the Clairton area in Allegheny County, and Southwestern Pennsylvania region, but also across the United States. In fact, the Clairton Plant is an integral part of the three-plant steelmaking complex U. S. Steel calls the Mon Valley Works.



Figure 2. U. S. Steel's operations and offices in Allegheny County, Pennsylvania, plus the Clairton Community Advisory Panel communities.

The Mon Valley Works consists of:

- 1) **Clairton Plant** – which, as explained, produces coke and coke by-products;
- 2) **Edgar Thomson (ET) Plant** – produces hot iron in blast furnaces, which is then converted into steel at the Basic Oxygen Shop
- 3) **Irvin Plant** – finishes and processes steel slabs; and
- 4) **Fairless Plant** – includes a finishing mill, located outside of Philadelphia, Pennsylvania

The Edgar Thomson Plant and Irvin Plant rely on the Clairton Plant for its metallurgical coke (which is used as a raw material in ET's blast furnaces) and coke oven gas which is used throughout the facilities as a clean fuel.

The economic impacts of the Mon Valley Works are significant locally, as well as nationally. Steel is a critical foundation for the nation's economy, security, infrastructure, energy independence, and downstream manufacturing capabilities. The United States must

maintain the ability to mine, melt, and make the steel needed to defend, build, and power this country.

In 2018, the Federal government determined that domestic steelmaking is necessary for the nation's security production requirements and without domestic steel production, there is a risk of not being able to adequately respond to a national emergency. Furthermore, the U. S. Department of Homeland Security has designated steelmakers like U. S. Steel, including its Clairton coke Plant, to be a vital component of the nation's critical manufacturing sector, which is necessary for the economic prosperity, security, and continuity of the United States.

While the Clairton Plant has been producing coke for over 100 years, it has evolved, and continues to evolve, into a state-of-the-art manufacturing facility with a proven track record of environmental performance like no other coke plant in the world. The Plant has experienced significant milestones over the last century, including, more recently, many that are environmentally related, as highlighted on right:

History of Clairton Plant

Significant Milestones

YEAR	TIMELINE OF EVENTS
1901	Built by St. Clair Steel Company
1904	Purchased by U. S. Steel
1918	Construction of 12 Koppers batteries with total of 768 ovens
1948	Maximum capacity of cokemaking achieved (approximately 8 million tons/year with 22 batteries and 1,482 ovens)
1973	Coke Oven Gas Desulfurization Plant installed
1977	Coke capacity reduced to approximately 5 million tons/year
1982	B battery commissioned
1988-1990	Pushing Emissions Controls installed
1991	By-Products Plant upgrades
2001	Pushing Emissions Control Baghouse improvements
2005-2008	B battery through-walls replaced
2008	12 batteries with 816 ovens in operation
2009	3 batteries permanently shut down – 624 operating ovens
2010-2020	Batteries 13-15 major refractory upgrades
2010-2020	Batteries 19-20 through-walls replaced
2011-2020	Batteries 1-3 endflues replaced
2012	C battery Start-up: 10 batteries with 708 ovens with capacity of approximately 4.3 million tons of coke/year
2013	2 additional Low Emissions Quench Towers constructed and commenced operation in December (Reductions: 1,107 tons of TSP, 301 tons of PM10, 812 tons PM2.5)
2018	Coke Oven Gas Desulfurization Vacuum Carbonate upgrades
2020	New High-Efficiency Bags installed on Pushing Emissions Control Baghouses – <i>completed in May 2020</i>

Safety

Safety Policy

U. S. Steel continues to develop and implement innovative ideas to improve the Safety & Industrial Hygiene processes and management systems which are the drivers of a sustainable culture. This culture incorporates a framework for setting and reviewing objectives and targets, which, like its commitment to environmental stewardship, go beyond mere compliance with applicable laws and regulations. Such programs require management to communicate pertinent job-related

Safety & Industrial Hygiene requirements to an engaged and highly skilled workforce, who are empowered with capabilities and resources needed to assess, reduce, and eliminate workplace risks and hazards.

The following values guide the development of the Safety & Industrial Hygiene processes and programs and the Safety Management System:



Safety Values

- “Safety First” is a Core Value at U.S. Steel.
- We believe that ALL incidents and injuries can be prevented.
- Safety is a personal responsibility. Management is accountable for results.
- Employee engagement and training is essential.
- Hazardous exposures can be eliminated or safeguarded.
- Prevention of incidents and injuries is the right thing to do and is good business.



All employees are empowered to STOP work for conditions that endanger individuals, equipment or our work environment. Please engage, STOP, and involve others when you have concerns. Employees and supervisors must work in partnership and resolve any STOP work issues that arise.

DAVID B. BURRITT
President & Chief Executive Officer



Figure 3. A copy of a wallet-sized “Stop and Act” card (left), a photo of Clairton employees performing a safety huddle prior to work (center-top), a photo of an employee signing Clairton’s Safety Banner (center), and a photo of Family Safety Day at Clairton (right).

Employee Engagement

U. S. Steel encourages, promotes, and recognizes that employee engagement is a key factor in the success of the Safety Management System. We establish, implement, and maintain processes for consultation and participation of employees at all levels and functions.

Some of the in-plant safety engagement initiatives over the last year include:

- **STOP & ACT**

Every U. S. Steel employee is empowered to STOP work for conditions that endanger individuals, equipment, or the work environment.

- **Annual Safety Commitment**

At the beginning of every year, all U. S. Steel employees are invited to give their commitment to safety by signing the plant safety banner.

- **Safety Conversations**

A process has been established in which all members of the organization can engage with one another about work practices, conditions, and/or safety concerns about a job in a non-threatening and collaborative way.

- **Safety Baseball**

This is an engagement competition to encourage safety communication and the identification and elimination of hazards throughout the plants.

- **Safety Huddle Photo Contest**

This is an engagement activity focused on conducting quality safety huddles and communicating the participation throughout the plants.

- **Family Safety Day**

This is an engagement activity to involve families and loved ones. Activities include plant tours, food, and other festivities.

State-of-the-Art Facility

As explained in the Overview section, while the Clairton Plant has been a vital part of Allegheny County, Pennsylvania for over 100 years, it is and continues to evolve into a state-of-the-art facility. While the fundamentals of cokemaking have not changed, the ancillary operations

and the technologies used have significantly evolved to be more environmentally friendly and efficient. The diagram below provides a high-level summary of the Clairton Plant's operations:

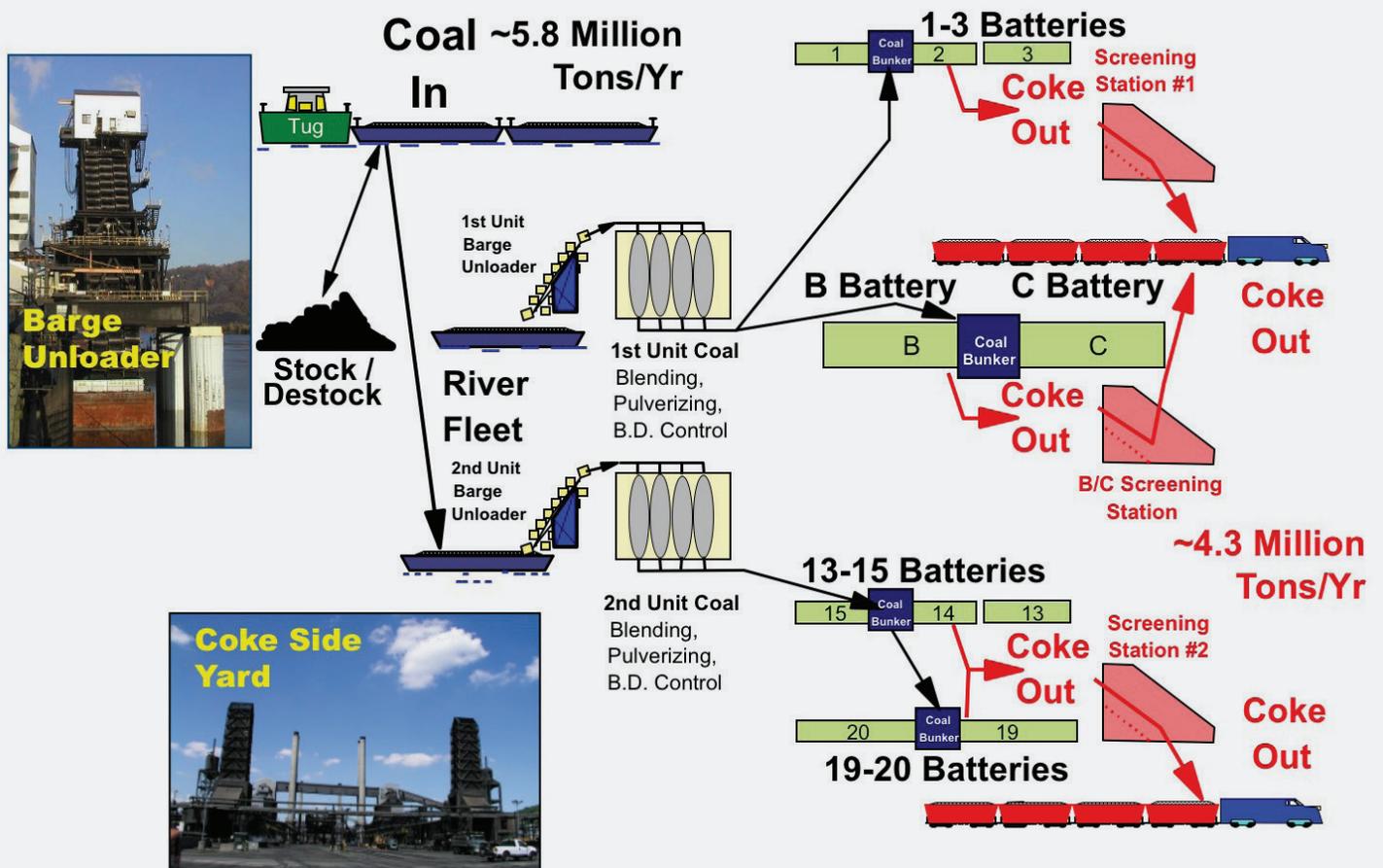


Figure 4. Clairton Plant – General Plant Process Flow Diagram: showing from left to right; the coal being brought by barge to the plant, coal blending & pulverizing operations, coal being charged to the batteries, and coke produced, screened, and loaded into railcars for customer delivery.

A. COKE BATTERIES

Coal is a mineral consisting mainly of sedimentary fossilized carbon with smaller amounts of other elements, such as sulfur, hydrogen, oxygen, nitrogen, and more. Coal is found under the earth's crust as lignite, or brown coal (the lowest-ranking coal), bituminous coals, and anthracite. It is extracted either from underground by shaft mining or at ground level by open-pit mining. The bituminous coals are used at the Clairton Plant to produce the coke.

Coal is the largest source of energy for the generation of electricity worldwide and is also used in the production of metallurgical coke for

blast furnace fuel. Some smaller blast furnaces can utilize charcoal as a carbon source, but larger blast furnaces require the strength and durability of coke. U. S. Steel operates a number of blast furnaces throughout the corporation. The coke supplied by the Clairton Plant is a key ingredient that fuels these blast furnaces to produce the iron that is refined to steel at the basic oxygen process (BOP) shops. The steel is molded into steel slabs at its continuous caster operations and sent to various finishing facilities to be rolled and coated into the final customer-specific products.

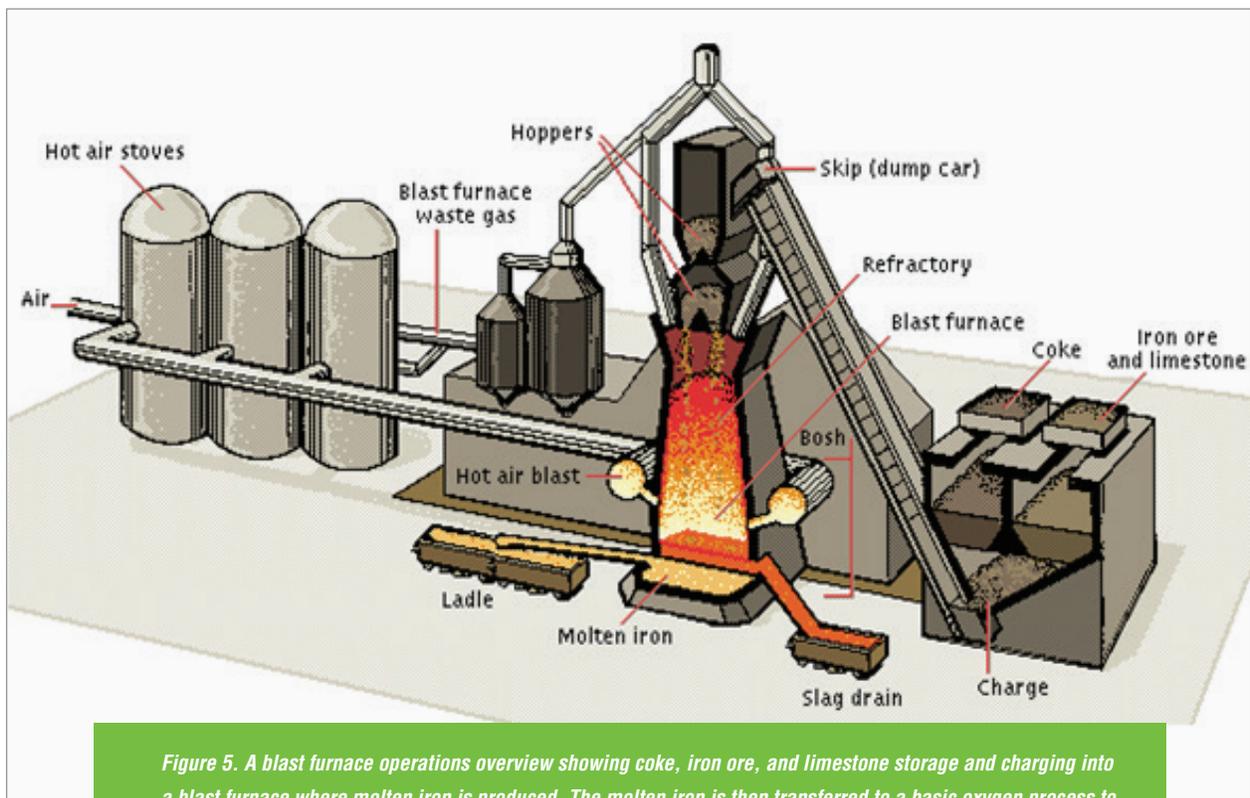


Figure 5. A blast furnace operations overview showing coke, iron ore, and limestone storage and charging into a blast furnace where molten iron is produced. The molten iron is then transferred to a basic oxygen process to be converted from iron to steel.

COKE

...is a **fuel** to supply heat and a **reductant** to reduce the iron ore to elemental iron.
...**permeability** lets wind, hot blast air, travel up through the furnace.
...**supports the burden, or layer** of iron ore and limestone in the furnace.

To produce the coke needed to directly reduce iron, bituminous coal is superheated under reduced oxygen conditions in oven batteries specially designed for this process. A coke battery is made up of multiple ovens. Coal is crushed and blended prior to being moved to the coal storage bunkers located on each battery unit. The coal is transferred from the coal storage bunker to each oven by a coal charging railcar called a larry car. A larry car is a specially designed railcar that transports the coal from the coal storage bunker to each oven and also includes specially designed chutes to “charge” each oven with the blended coal. Coal is dropped into the ovens through four coal charging holes. The coal is heated, or baked, at approximately 1,900 degrees F for 18 hours in the ovens. During that time, gases, including the volatiles of the coal, are driven off by the heat into the

offgas piping system to be further processed downstream. The pure carbon that remains in the oven is called “coke”.

Once the coke is produced, the pusher side and coke side doors of the oven are removed. A “pusher” machine is then positioned in place where the pusher machine ram “pushes” the coke through an 18-inch wide slot into a rail mounted catch, or quench, car. When the coke is pushed from the oven into the quench car, it is quickly moved to the battery unit’s quench towers to cool the coke and stop the burning process. The cooled coke is then dumped onto a coal wharf where it is taken to a facility to be screened and sized prior to being charged into the blast furnace. Figures 6 and 7 show a typical layout of a coke plant and the current coke battery configuration at the Clairton Plant:

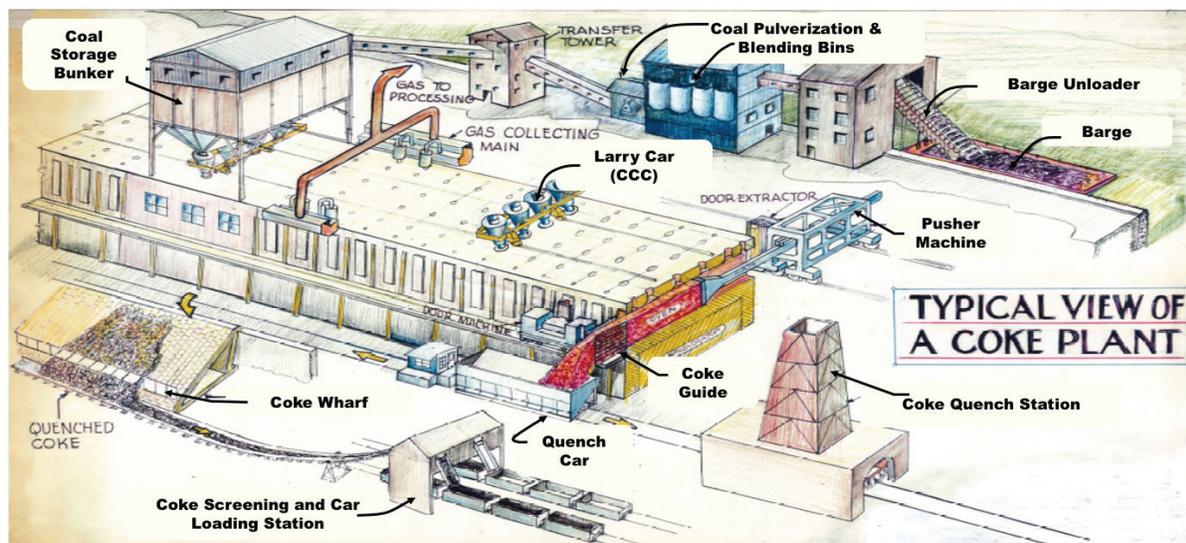


Figure 6. Overview of a typical coke plant with a side view of an oven cut-out.

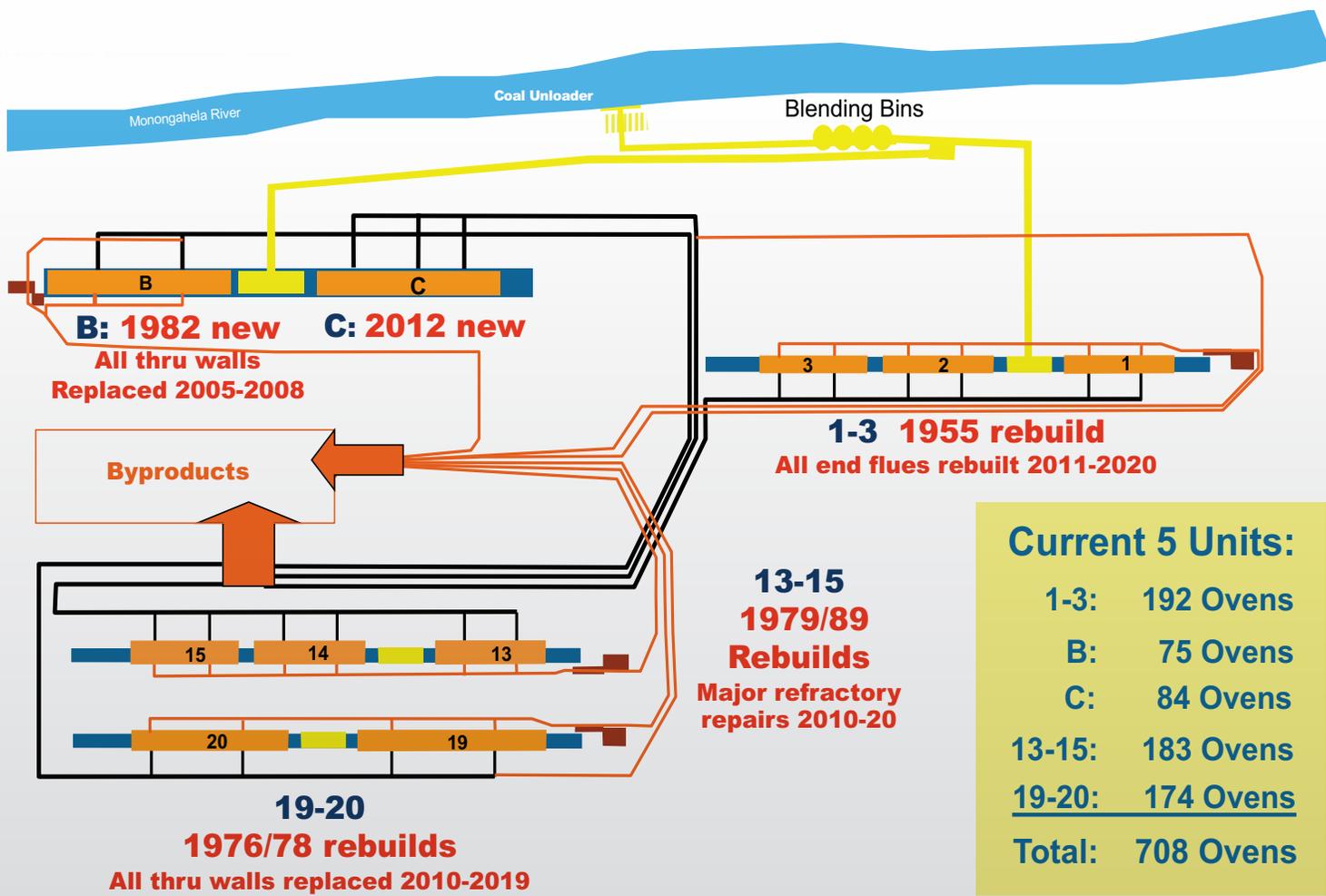


Figure 7. Clairton Plant – Battery Configuration in 2019.

B. ENVIRONMENTAL CONTROLS – HIGHLIGHTS

As indicated earlier, the Clairton Plant coking facility consists of 10 batteries ranging in height from 3.6 to 6 meters, which have an annual coke capacity of 4.3 million tons. There are several potential emission points throughout the coking process that U. S. Steel and the regulating agencies monitor. Specifically, emissions are monitored during the process of charging coal into the ovens, during the pushing of the coke out of the oven and into the quench car, during the travel of the coke-filled quench car to the quench tower, at the doors on each side of each oven, at the lids that cover the charging port the coal enters the oven through, at the offtake piping on each oven that carries the offgases to be processed, and at the combustion stacks from which the by-products of combustion from natural gas and coke oven gas exit the batteries after the heat is used to bake the coal. While each battery is unique, air emissions are minimized at each potential emission point either through the installation of control equipment, such as the Pushing Emissions Control Baghouses, or the implementation of advanced employee work practices.

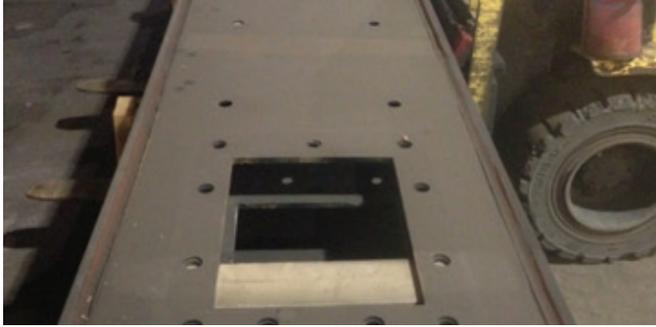
Stage Charging - Batteries 1-3, 13-15, 19-20 and B

Gravity-discharge larry cars and screw-conveyor larry cars have been installed to more evenly charge the coal into the ovens. Larry cars operate on top of the batteries delivering coal to each oven. The coal is brought over to each of the batteries via conveyor systems. The act of delivering coal into each of the ovens is called “charging”.

Stage charging involves the planned sequential release of fixed amounts of coal from the hoppers of the larry car in conjunction with high-pressure steam aspiration and leveler bar operation. Stage charging is a detailed charging procedure that evenly distributes the coal into the oven, aimed at reducing charging emissions, reducing the number of passes made by the leveler bar, and keeping the tunnel head open to the gas collecting main. Without a clear path for the offgases to travel, the oven pressure increases, and the gases may escape out of the lids or the doors, providing for a higher likelihood of emissions. To complete the charge properly, lidmen, who are trained to remove and replace oven charging hole lids, replace the lids as soon as the coal charging hopper runs empty to minimize air infiltration and visible charging emissions.

Figure 8. Lidman replaces the lid after the coal has been charged into the battery.





Coke oven door design and improved operating and maintenance techniques continue to improve, with the Clairton Plant being a leader in innovation. Coke oven doors are taken off and put back on each oven after a coking cycle is complete. The Clairton Plant has its own door repair shop onsite with the expertise to repair doors more efficiently than taking them offsite for repair. Door coordinators continually stop door leakage and make door adjustments to minimize door leakage around the clock.

Clairton Innovative Coke Battery Door Design Project

U. S. Steel has worked with a third party to design and trial an innovative adjustable door seal technology for use at its Clairton Plant. A unique adjustable door seal has been designed for the coke side and pusher side doors of 1-3 batteries, 13-15 batteries, 19-20 batteries and B battery. The design includes an improved new seal arrangement and new seal components made of more durable and flexible material. The new design allows the door to seal better than the current door design.

Automatic door and jamb cleaners are installed on the coke side of all batteries to further reduce emissions. The door and jamb cleaners will remove any buildup or debris where the face of the door mates with the battery. This ensures proper seating. The positioners, or locators, on the door machines ensure that the doors are placed back in the proper place for each oven.

Heating effects the quality and quantity of the coke produced from the destructive distillation of the coal, but also impacts potential emissions. Even and controlled heating through each oven and each battery is essential. The Clairton Plant has been a leader in developing flue temperature monitoring to ensure consistent heating.

Due to the fluctuations of extreme temperatures (thermal shock) over time, there are occasions when the refractory brick will need to be patched/repaired. Again, the Clairton Plant has been a leader in the



Top: Figure 9. A picture of the new door seal that is adjustable, seals better, and allows for better maintenance. Middle: Figure 10. Central Door Repair Shop where doors are repaired and the new design is implemented. Bottom: Figure 11. New Door Plug. Door plugs fit into the oven and are used to reduce emissions while lowering heat losses from the oven chamber through the door.

development of advanced patching practices including wet slurry, dry gunning, fused silica dry gunning, and ceramic welding patching techniques.

Cryogenic Coke Oven Gas Process

Based upon available information, the Clairton Plant has the only cryogenic coke oven gas (COG) separation facility in the world. While many coke plants throughout the world do not employ any COG desulfurization, the Clairton Plant has enhanced the cryogenic process. Per the Association for Iron and Steel Technology (AIST), the desulfurization process at the Clairton Plant provides the lowest hydrogen sulfide, clean COG on the North American Continent. The hydrogen sulfide gas content of the cleaned COG is well under half the hydrogen sulfide content of those coke plants that desulfurize COG through other processes and is approximately 90% lower than those that do not desulfurize COG.

As discussed below in the by-products section, the cryogenic process produces much cleaner and consistent COG, which is a benefit for the combustion users including the battery heating.

Pushing Emissions Control Systems

Once the coking cycle is complete, the coke is “pushed” out of the oven via a “pusher” machine. Emissions from the pushing process are captured by the Pushing Emission Control Systems (PECs). PECs are installed on all 10 batteries. PECs on 9 of the batteries use a traveling canopy hood over the coke cars to capture pushing emission and a baghouse to control emissions. The pushing emissions on B battery are captured and controlled by a fixed coke-side shed and baghouse, as opposed to the traveling canopy hood.



Figure 12. PEC Baghouse for #1 Unit (Batteries 1-3).



Figure 13. PEC Baghouse Infrastructure and PEC Baghouse batteries 13-15 showing the coke guide enclosure, PEC hood and 13-15 & 19-20 PEC, or second unit, baghouse.

As noted, the Clairton Plant has five PEC Baghouses to capture and control particulate matter emission from “pushing” the coke out of the battery ovens after the coal-to-coke oven cycle is complete. These five baghouses capture and control the pushing emissions from all 10 batteries.

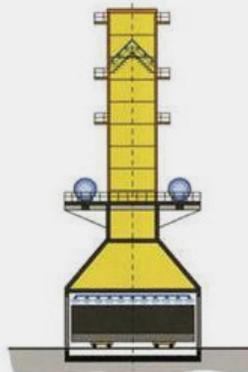
U. S. Steel Clairton Plant has committed to improving the emissions control performance of all five PEC Baghouses by installing new cages and upgrading the systems by using high-control efficiency bags, and expect to complete these upgrades in 2020. The high-control efficiency bags are expected to be at least 92% efficient at removing the particulate matter 2.5 microns or less (PM2.5). The existing baghouse bags are approximately 80% efficient at removing PM2.5. This is a 15% increase in capture at all five baghouses, resulting in a significant emissions reduction of PM2.5.

C. LOW EMISSIONS QUENCH TOWERS

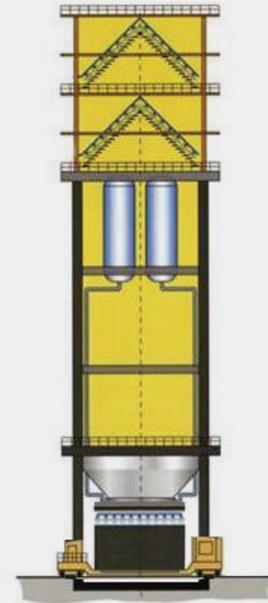
Once the coke is pushed out of the oven, the coke is quenched at quench towers to stop the coke from burning. While the coke from all batteries is quenched, Low Emissions Quench Towers (LEQTs) have been installed for C battery, batteries 13-15, and batteries 19-20. As shown to the right, LEQTs are much higher, have a much larger cross-sectional area, and have a state-of-the-art, double-baffle configuration that leads to significant reductions of particulate emissions during the coke quenching operation. A photo of the new LEQTs for batteries 13-15 (Quench Tower 5A) and batteries 19-20 (Quench Tower 7A) is provided below. Quenching coke from C battery is also conducted in an LEQT.

New Low Emissions Quench Tower

Conventional Quench Tower



Emission of more than 50 grams per ton of coke



Emission of less than 10 grams per ton of coke

Figure 14. Comparison of Conventional Quench Tower and Low Emissions Quench Tower.



Figure 15. 5A and 7A LEQT – installed in 2013.

D. C BATTERY

C battery is the most advanced by-product battery in the United States. It was installed and commenced operation in November 2012. It consists of 84 large ovens with dimensions of 6 meters in height x 18 inches wide (average) x 16.7 meters in length. Each oven is made with specially designed refractory brick. The brick is designed to withstand temperatures as high as 2,650 degrees F.

Charging emissions are reduced by using a screw-feed larry car to allow for more controlled charging of coal into the ovens. C battery is the only battery in the United States equipped with the state-of-the-art Pressure Oven Regulated system or PROven® technology. PROven® is an electronic control system that individually controls the pressure in each oven depending on the stage of coking that oven is experiencing. The collector main is maintained at a negative pressure to draw the offgases released during charging and coking, thus reducing emissions, and high spikes in oven pressure are reduced significantly. In addition, a low NOx heating system reduces

the amount of coke oven gas per ton of coal charged as compared to traditional batteries.

The Pushing Emission Control (PEC) system consists of a hood that is integral to the door machine to reduce pushing fugitive emissions whenever a door is opened. U. S. Steel has also installed a Low Emissions Quench Tower to significantly reduce particulate emissions during the coke quenching operation.

C battery replaced three older batteries (batteries 7-9 which were permanently idled) and resulted in reductions of hundreds of tons of particulate matter.

E. BY-PRODUCTS PLANT AND EMISSIONS CONTROLS

The Clairton Plant maintains and operates a state-of-the-art by-products plant that recovers tar, ammonia, light oil (benzene,

toluene, and xylene), and elemental sulfur from the coke oven gas (COG). The general process flow diagram provides a high-level summary of the by-products plant.

The by-products plant utilizes axial compressors to draw the raw COG into the battery topside collecting mains and through the primary coolers where tar, naphthalene, and water are recovered.

The raw COG is drawn through the #1 Control Room axial compressors and then

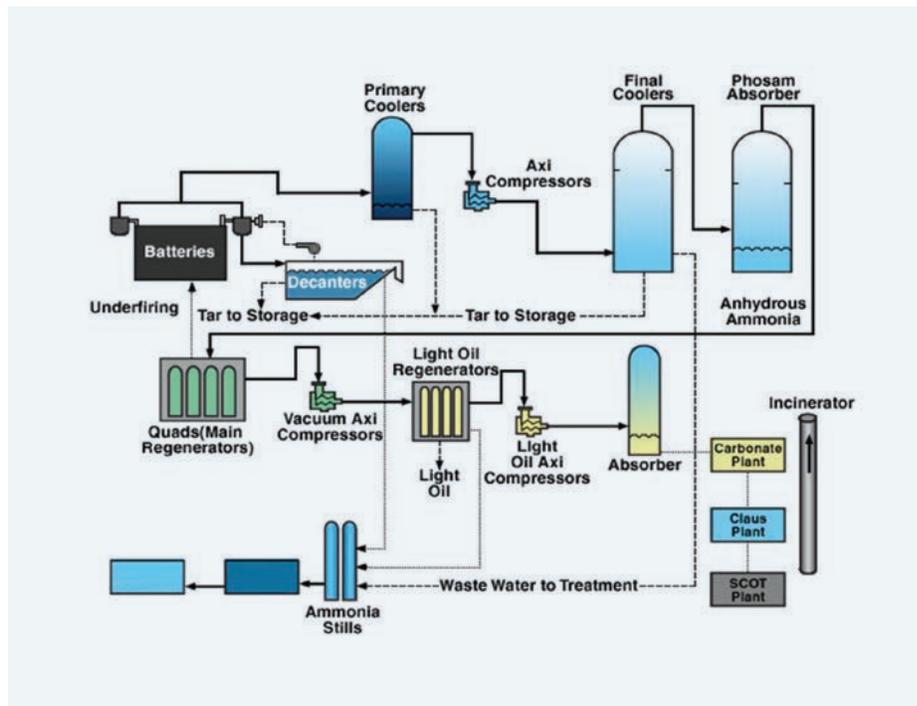


Figure 16. Clairton Plant By-Products Process Flow Diagram.

pushed through the U. S. Steel patented PHOSAM process to recover ammonia before being processed at the #2 Control Room cryogenic gas separation plant.

The cryogenic gas separation plant utilizes vacuum compressors to pull and push the raw COG through the main regenerators, which removes and concentrates the hydrogen sulfide and light oil from the raw COG. The light oil is recovered in a separate heat transfer, separation and cryogenic process at #2 Control Room.

The #5 Control Room desulfurization plant converts the concentrated hydrogen sulfide through catalytic technology into elemental sulfur in molten form.

The contaminated water treatment plant is responsible for processing all contaminated water generated by the COG cleaning process. Here it is treated to meet technological and water quality-based effluent limitation limits before discharging into the Monongahela River.

A few facts about the Clairton by-products facility:

The cryogenic gas separation facility for COG is the only one of its kind in North America and, based on available information, in the world providing a high-quality gaseous fuel. The facility is capable of removing significantly more light oil than traditional by-products facilities.

The Clairton by-products facility, especially the desulfurization facility, is capable of removing more hydrogen sulfide than traditional by-product desulfurization units. At the Clairton Plant's state-of-the-art desulfurization plant, the COG hydrogen sulfide content is reduced by over 90 percent and achieves the lowest hydrogen sulfide content of any COG in the industry. The process removes hydrogen sulfide to a level that is well less than half of traditional desulfurization

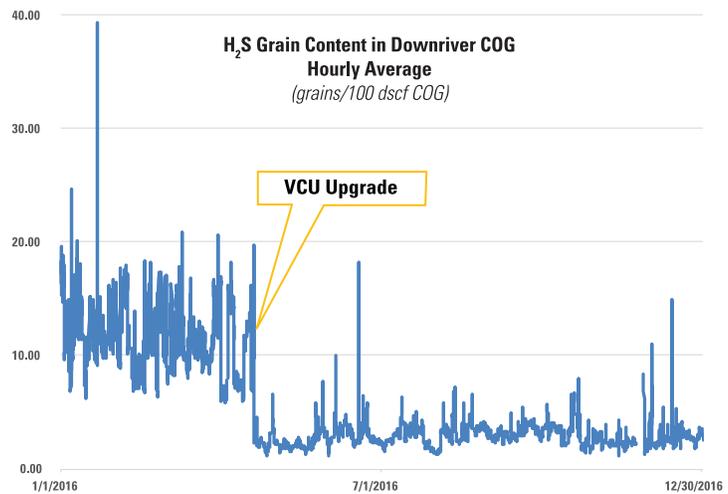


Figure 17. The above figure, as depicted in the September 2017 Allegheny County Health Department (ACHD) State Implementation Plan (SIP) Revision shows hourly H₂S grain content in COG in 2016, before and after the desulfurization process upgrades. The upgrades were completed on April 20, 2016, leading to significant decreases in sulfur content in COG that continue to be realized today. We continuously monitor the results to demonstrate continuous efficient operation of the desulfurization process.

processes and well over 90 percent less than the majority of coke plants which do not desulfurize COG.

Recently, upgrades were made to Clairton Plant's COG desulfurization process, specifically an innovation at the Vacuum Carbonate Unit (VCU) that reduces the concentration of hydrogen sulfide (H₂S) in the coke oven gas. Within the VCU, the COG passes through a soda ash solution in a trayed absorber column. The H₂S is absorbed by the soda ash, and the desulfurized gas exits the absorber column as a desulfurized fuel. The COG processed through the desulfurization process is combusted across multiple units throughout the Mon Valley Works plants (Clairton, Edgar Thomson, and Irvin).



In addition to its superior efficiency and hydrogen sulfide removal, the state-of-the-art Clairton desulfurization process includes redundancy, which allows maintenance to be performed without losing the ability to desulfurize COG, whereas traditional by-product facilities require a two- to three-week maintenance outage at which time such facilities are not desulfurizing COG.

In North America, according to the most recent AIST data, there are 12 coke plants operating. Of the 12 metallurgical coke plants in the United States, only four of them currently desulfurize COG. Of the four that desulfurize, USS Clairton has the highest efficiency from an H₂S removal standpoint.

Products from Coke Batteries and By-Products Plant

While the by-products Plant provides a significant environmental benefit by cleaning the COG, which reduces emissions when the COG is combusted, the materials recovered in the Clairton by-products facility are sold as product and not disposed of as solid waste, providing a benefit to the environment. The quantity of coal charged and each of the by-products recovered is shown in Table 1.

- **Metallurgical Coke** is a fuel and reducing agent in blast furnaces.
- **Coal Tar** is a feedstock for producing electrode binder pitch, roofing pitch, road tar, and numerous basic chemicals.

- **Light Oil** is an important source of aromatic chemicals, principally benzene, a chemical essential to the production of materials such as polystyrene and ABS plastics.
- **Anhydrous Ammonia** is a high-quality agricultural fertilizer and a chemical feedstock.
- **Sulfur** is a basic industrial chemical commodity.
- **Coke Oven Gas** is a high-quality fuel similar to natural gas at half the heating (MMBtu/scf) value.

	Daily	Annual	Units
Coal Charged	15,918	5,810,204	Tons
Coke Produced	11,700	4,270,500	Tons
Tar Recovered	119,388	43,576,531	Gallons
Light Oil Recovered	44,571	16,268,571	Gallons
Anhydrous Ammonia Recovered	44	15,978	Tons
Elemental Sulfur Recovered	42	15,397	Tons
Coke Oven Gas Recovered	192,612	70,303,469	MCF

Table 1: Coke Batteries and By-Products Plant Recoveries

By producing these products, the advantages of employing a state-of-the-art by-products facility are not only realized locally, but these benefits are also felt throughout the country.

Environmental Training



Figure 18: U. S. Steel Clairton Plant's current ISO 14001 Certificate of Registration.

U. S. Steel invests significant resources to ensure that its employees are properly trained in all aspects of their responsibilities to be certain, among other things, that environmental compliance is achieved. This is conducted in many different ways, including one-on-one training, as well as more comprehensive training programs, such as those related to ISO14001.

A. ISO 14001 CERTIFIED ENVIRONMENTAL MANAGEMENT SYSTEM (2015)

The Clairton Plant is firmly committed to environmental compliance, beginning with the incorporation of International Organization for

Standardization (ISO) 14001 into its environmental management systems.

ISO 14001 standards seek to assist a company or an organization to “minimize harmful effects on the environment caused by its activities, and to achieve continual improvement to its environmental performance.”

The Clairton Plant is certified in compliance with this standard and has been since 1998, having become the first coke plant in the country to get certified.



CONTINUOUS IMPROVEMENT TO THE ENVIRONMENT

Figure 19: Clairton Plant's Environmental Policy.

B. CONTINUOUS IMPROVEMENT TO THE ENVIRONMENT (CITE)

The Clairton Plant's road to environmental responsibility and excellence begins by focusing on people and encouraging each employee to participate fully. This is being achieved through a comprehensive training approach – the Continuous Improvement to the Environment (CITE) training program.

CITE training is a classroom program with the addition of practical field training focused on environmental practices and improvement at the Clairton Plant. The training program is an 11-part program that touches on all aspects of the coking process, their environmental impact, procedures, and best-practices to mitigate environmental impacts from each potential emission point in the cokemaking process. This program consists of environmental impact awareness training, learning relationships between processes and equipment, and the ways specific workers' actions and operating conditions affect upstream and downstream operations. Environmental regulations are reviewed, as well as the role of the employee in maintaining the plant in compliance with the regulations

The CITE programs includes, but is not limited to the following:

- Environmental Awareness for Air, Water, and Waste regulations and permits

- Coal Handling Operations and Procedures, including coal crushing, screening, blending, and transport
- Larry Car Operations and the charging of batteries
- Lidman Procedures and other top-side battery operations
- Pusher Machine Operations for pushing the coke out of the ovens into the quench cars
- Door Machine Operations for removing doors, cleaning the door and door jambs, and replacing the doors
- Heating Procedures to review proper battery heating techniques
- Patching Procedures for minor oven wall repairs
- Repair and Maintenance of the various process and ancillary cokemaking equipment
- And other miscellaneous equipment and procedure reviews

This program reiterates to employees that the environment is everybody's responsibility and that procedures must be followed for U. S. Steel to meet its environmental requirements. Implementation of this program has helped Clairton workers improve their environmental awareness and work practices which results in a culture of environmental awareness. In 2019, U. S. Steel continued and expanded the deployment of its CITE program to all employees/ workers assigned to work at the coking operations at the Clairton Plant.

Environmental Performance – Air

The Clairton Plant is subject to federal, state, and local (Allegheny County Health Department (ACHD) air regulations). The ACHD regulates and closely monitors the environmental compliance of the Plant. In addition to periodic monitoring, U. S. Steel continuously monitors many of its sources for environmental performance and compliance at the Plant. These monitors include continuous opacity monitors (COMS), continuous emissions monitors (CEMs), and various continuous parametric monitoring systems throughout the Plant, which read and record thousands of compliance monitoring data values every day. The ACHD regulates and closely monitors the environmental compliance of the plant. In addition to reviewing the plant's reports and compliance records, ACHD maintains two coke oven battery inspectors at the Plant five days per week. These certified inspectors conduct daily visible emission observations of plant operations.

The ACHD has hired a third-party visible emissions observation contractor to implement the USEPA required Method 303 opacity readings (for which U. S. Steel reimburses ACHD) to monitor visible emissions from every battery on a daily basis at the Plant, to determine compliance with Federal Maximum Achievable Control Technology (MACT) Standards pursuant to Method 303, as well as to provide ACHD with data to determine compliance with Article XXI standards.

Method 303 is the USEPA method to determine visible emissions from by-product coke oven batteries.

U. S. Steel focuses on continuously improving environmental performance. One of the more significant sources of emissions that environmental performance has been continuously improving at the Clairton Plant are the combustion stacks. Combustion products generated by Clairton Plant's batteries during the cokemaking process are directed to coke battery combustion stacks. Each coke battery combustion stack is equipped with a COMS, which continuously measures the degree to which smoke, dust or other particles block light at any given time. Any combustion issue with the batteries can

result in visible emissions from these stacks. According to the ACHD, environmental violations occur anytime this opacity is greater than 20% for more than three minutes in aggregate any given hour, or any instantaneous reading over 60%. Stack performance is calculated daily for all 10 coke batteries in the plant, and just one three-minute period in an hour could cause a 20% stack violation and put that battery at a 97.9% performance for the day. Because each hour, on every battery stack, there exists the opportunity for one or both violations to occur, each year sees the potential for 175,200 violations with the stack opacity requirements.

The Clairton Plant achieved a monthly (December 2019), quarterly (Fourth Quarter 2019), and annual (Calendar Year 2019) compliance record for battery combustion stack performance. Stack compliance at Clairton Plant in December 2019 was a near-perfect 99.9%. Fourth quarter 2019 saw a new quarterly record for combined stack performance as well, recording a combined stack compliance rate of 99.83%. Finally, Clairton Plant's 2019 performance of 99.67% compliance rate was the best-ever recorded, surpassing 2018's previous record-setting performance compliance rate of 99.56%. To reach the level of performance the Clairton Plant team achieved, many days in 2019 all ten batteries recorded a compliance rate of 100%. This increase is shown in Figure 20, below.

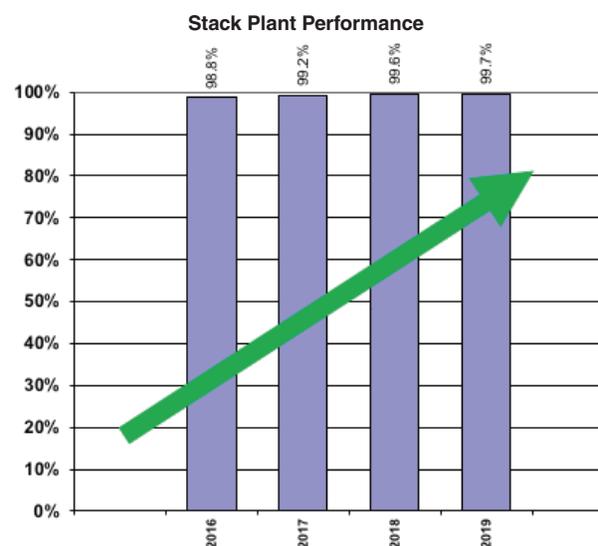


Figure 20: 2016 through 2019 Clairton Plant facility-wide combustion stack performance.

Stack performance is considered a key indicator of the overall environmental performance of the coke batteries both internally and by U. S. Steel's regulating agency. That is why there is a strong emphasis placed on this compliance rate, and why this record-breaking performance is so important.

A. NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

National Ambient Air Quality Standards (NAAQS) were developed for pollutants considered, in certain amounts, harmful to sensitive populations and the environment. EPA has set NAAQS for several pollutants, including particulate matter (including PM10, and PM2.5), SO₂, NO₂, ozone, CO, and lead. These standards are developed to be protective of public health for the most sensitive populations. USEPA air monitors operated by ACHD and located in the Liberty/Clairton area measure the ambient air quality, which accounts for emissions attributable from a variety of background sources, mobile sources, and the Clairton Plant. The Clean Air Act requires EPA to set NAAQS, and to periodically review the science upon which the NAAQS are based, as well as the NAAQS themselves. Reviewing the NAAQS is a lengthy undertaking and generally takes years for each individual NAAQS. While the air quality continues to improve, EPA has recently lowered the NAAQS further for certain pollutants, including PM2.5, ozone, and SO₂.

EPA continues to lower the NAAQS levels, but U. S. Steel has a history of success. While the air quality improves and the Clairton Plant continues to reduce emissions, the NAAQS continue to become more stringent. In response, each

time a standard gets lowered, U. S. Steel, with its commitment to environmental progress and innovation of its employees, rises to the challenge.

PM10, NO₂, CO, and Pb NAAQS

The Liberty ambient air quality monitor, which measures the ambient air quality in the Liberty/Clairton area, has attained the PM10 NAAQS for 24 consecutive years; the NO₂ NAAQS for 35 years (including unclassifiable/attainment with the 2010 100 ppb NAAQS); the carbon monoxide (CO) standard for 31 consecutive years; and the lead (Pb) standard since its latest promulgation in 2008.

PM2.5 NAAQS

The following figure depicts how the PM2.5 NAAQS has become more stringent over time. In 2006, the 24-hour standard was reduced from 65 µg/m³ to 35 µg/m³. In 2012, the annual standard was reduced from 15 µg/m³ to 12 µg/m³. Attainment of the annual standard had been achieved in 2012 before the limit was reduced in December of 2012.

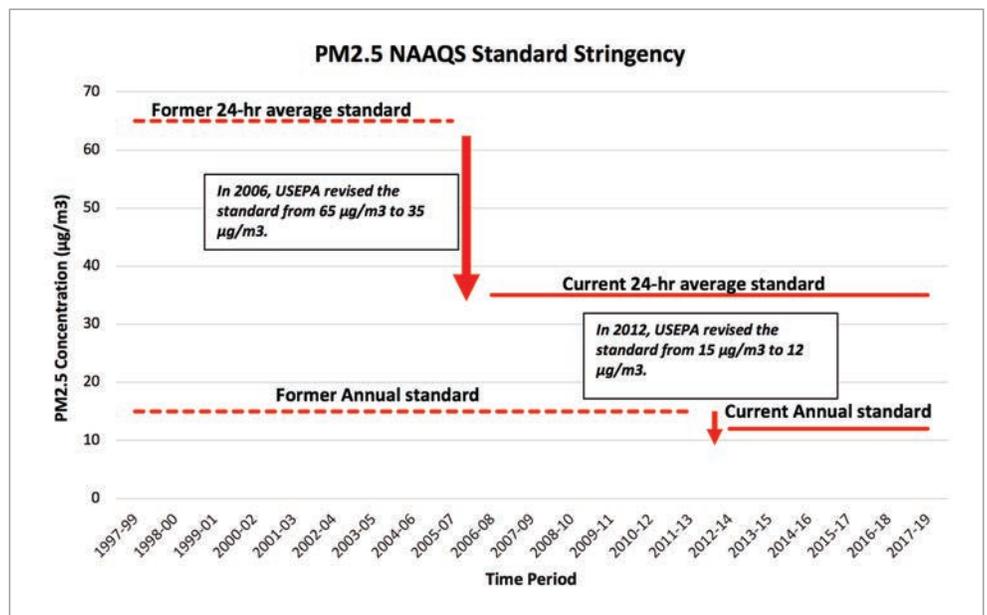


Figure 21: History of PM2.5 24-hour average NAAQS.

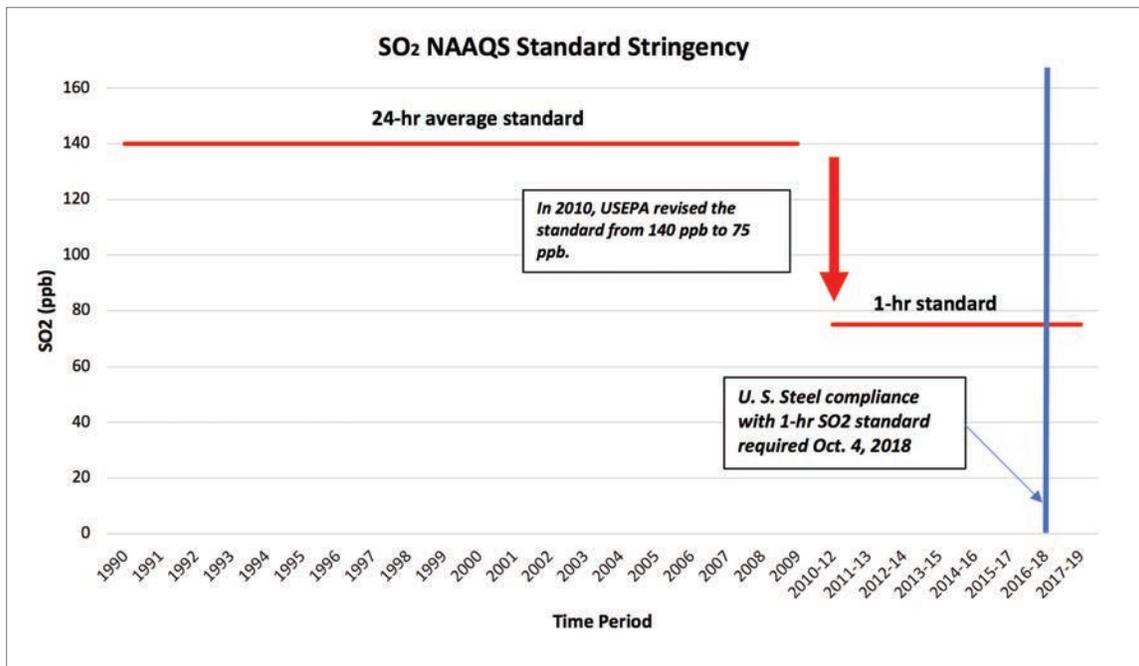


Figure 22: History of SO₂ NAAQS demonstrating change from a 24-hour average to a much lower 1-hour standard.

While the Liberty/Clairton monitor has met the PM_{2.5} hourly standard based on recent monitor data, it is currently designated as nonattainment with the 2012 PM_{2.5} annual NAAQS. On September 11, 2019, the ACHD Board of Health unanimously approved the PM_{2.5} State Implementation Plan (SIP) for Allegheny County. A SIP is a state plan created for a pollutant nonattainment area (i.e., PM_{2.5}) intended for complying with the Federal Clean Air Act (CAA) by containing new rules to reduce emissions. In this case, ACHD created the SIP, and then shared it with the Pennsylvania Department of Environmental Protection (PADEP) for approval. The PM_{2.5} SIP was then submitted to the USEPA. To date, no action has been taken by USEPA on the SIP.

As part the ACHD’s SIP submittal, U. S. Steel installed new Low Emissions Quench Towers (LEQTs) 5A and 7A as the main quench

towers for batteries 13-15 and batteries 19-20, respectively, replacing the older Quench Towers 5 and 7 that now serve as emergency/ backup quench towers. The new LEQTs were instrumental in demonstrating attainment with the standard for Allegheny County.

SO₂

The figure above depicts how the SO₂ NAAQS has become more stringent over time. In 1971, the SO₂ standard was 140 ppb for 24-hour. In 2010, a new 1-hour standard of 75 ppb was promulgated, and the 24-hour standard was revoked. Attainment had been reached for 10 consecutive years prior to the new 2010 primary 1-hour NAAQS. The Liberty area is currently designated in nonattainment based upon pre-2010 ambient air quality data, although the controls currently in place have been shown to demonstrate attainment.

USEPA approved the ACHD SO₂ SIP, sending the proposed rule out for public comment on the Federal Register. The public comment period ended on December 19, 2018. USEPA agreed to take final action on the SO₂ SIP by April 30, 2020. The EPA approved ACHD's SO₂ SIP in late April 2020, with the final rule becoming effective on May 26, 2020.

U. S. Steel implemented the following projects and restrictions to reduce SO₂:

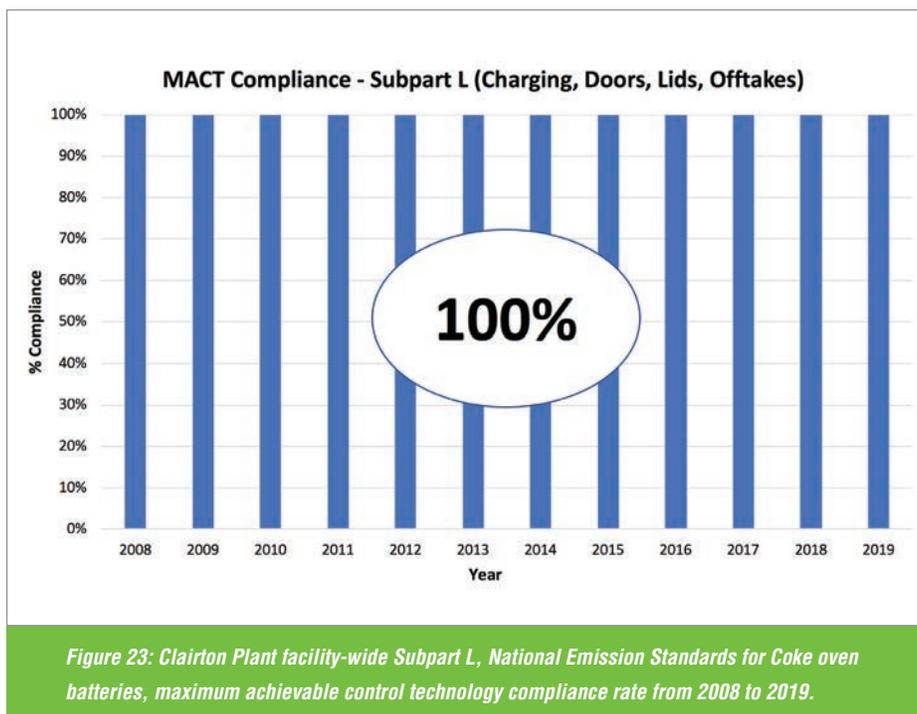
- Installation of VCU trays – direct reduction of SO₂ emissions from coke oven gas
- Reroute of Shell Claus Offgas Treatment (SCOT) Plant Tail gas – eliminates a source of high SO₂ coke oven gas during planned/unplanned SCOT Plant outages
- Required to be and were in compliance with SO₂ emission limits throughout the Mon Valley operations by October 4, 2019

B. NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS/MAXIMUM ACHIEVABLE CONTROL TECHNOLOGY (NESHAP/MACT) REQUIREMENTS

The Federal Clean Air Act (CAA) requires USEPA to regulate emissions of hazardous air pollutants for listed sources via National Emission Standards for Hazardous Air Pollutants (NESHAP). Hazardous air pollutants are also known as toxic

air pollutants or air toxics. They are pollutants that have been found to cause or may cause cancer or other serious health effects or adverse environmental and ecological effects. USEPA is required to control 187 hazardous air pollutants, or HAPs.

40 CFR Part 63 Subpart L is a NESHAP entitled “National Emission Standards for Coke Oven Batteries” and is applicable to the Clairton Plant. In 1992, the USEPA proposed national emission standards for the control of emissions from new and existing coke oven batteries. This action promulgated the national emission standards and visible emissions observation standards, Method 303, for the determination of visible emissions from by-product and nonrecovery coke oven batteries. U. S. Steel is 100% compliant with the requirements of Subpart L.



40 CFR Part 63 Subpart CCCCC is a NESHAP entitled “National Emission Standards for Hazardous Air Pollutants for Coke Ovens: Pushing, Quenching and Battery Stacks” and is applicable to the Clairton Plant. The USEPA issued a final rule to reduce emissions of toxic air pollutants from coke oven batteries in 2003. This rule applies to each new or existing coke oven battery at any coke plant that is considered a major source of toxic air emissions.

Major sources are those that emit 10 tons per year or more of a single toxic air pollutant, or 25 tons or more of a combination of toxic air pollutants. The CAA requires USEPA to identify categories of industrial sources that emit one or more listed 188 toxic air pollutants, of which coke oven emissions is one. U. S. Steel is 100% compliant with the requirements of Subpart CCCCC.

The CAA requires USEPA to assess the risk remaining after application of the final air toxics standards. This is known as a residual risk assessment, Risk and Technology Review (RTR). Based on the completion of this risk assessment, including available health information and associated uncertainties, EPA determines whether the risks from the source sector are acceptable or not and whether the current standards provide an ample margin of safety to protect public health. During the residual risk assessment and as required by the CAA, the EPA will review and revise the maximum achievable control technology (MACT) standards as necessary, considering developments in practices, processes and control technologies since the standards were first issued in 2003.

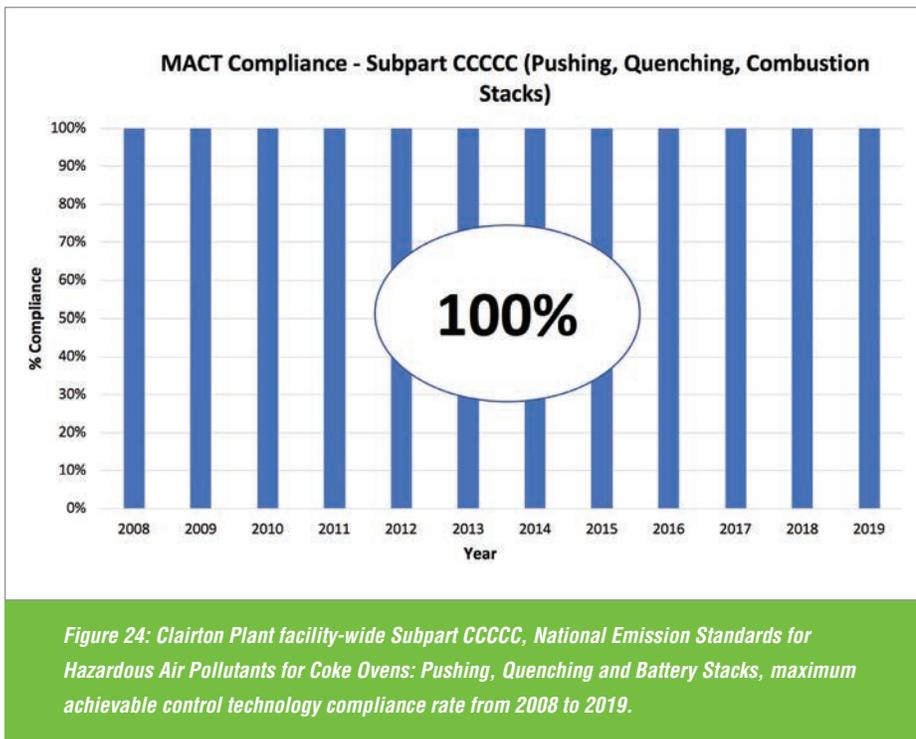


Figure 24: Clairton Plant facility-wide Subpart CCCCC, National Emission Standards for Hazardous Air Pollutants for Coke Ovens: Pushing, Quenching and Battery Stacks, maximum achievable control technology compliance rate from 2008 to 2019.

In August 2015, the USEPA began an Information Collection Request (ICR) for the RTR for 40 CFR Part 63 Subpart CCCCC, otherwise known as the Coke MACT, which includes the residual risk assessment from Pushing, Quenching and Battery Stacks. USEPA continues to work on the risk and technology analysis.

40 CFR Part 61 Subpart L is a NESHAP, not to be confused with Part 63 Subpart L, entitled “National Emission Standard for Benzene Emissions from Coke By-Product Recovery Plants” and also applicable to the Clairton Plant. These standards are applicable to the equipment associated with the by-products recovery plant (tar decanters, tar storage tanks, light-oil condensers, light-oil sumps, etc.) including pumps, valves, exhausters, pressure relief devices, sampling connection systems, open-ended valves or lines, flanges or other connectors, and control devices.

40 CFR Part 61, Subpart FF for Benzene Waste Operations, is also applicable to the Clairton Plant because the Plant operates a coke by-product recovery plant with benzene-containing hazardous waste.

C. ALLEGHENY COUNTY HEALTH DEPARTMENT (ACHD) STANDARDS

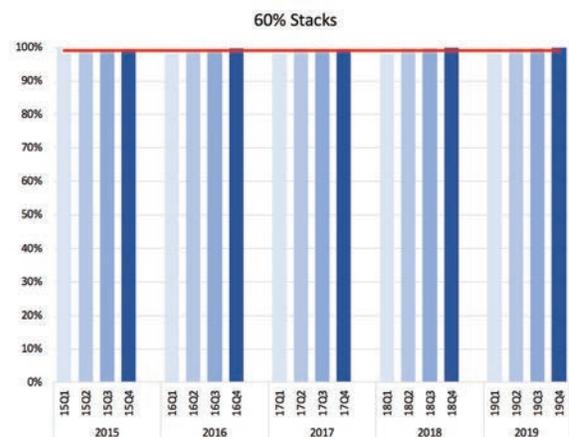
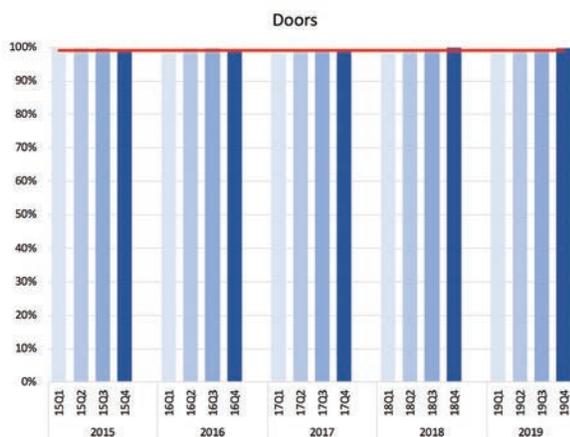
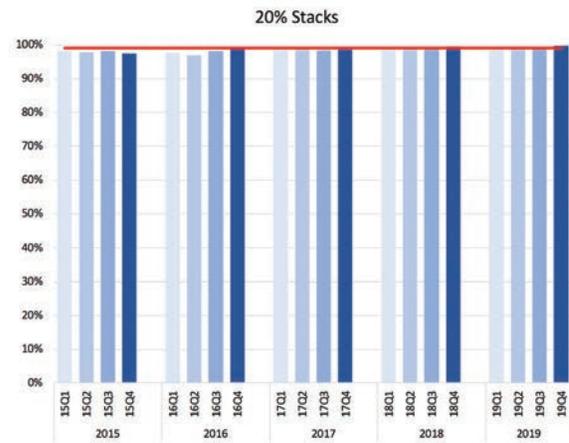
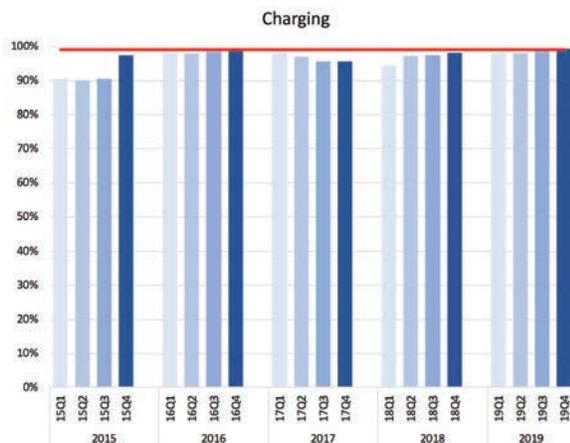
In addition to certain federal regulations, the Clairton Plant is subject to Allegheny County Health Department (ACHD) requirements, which include performance metrics that, in most instances, are much more stringent than the corresponding federal standards.

ACHD has recognized that it has promulgated the most stringent air regulations for coke plants in the country. The regulations, found in Article XXI, in most cases, are much more stringent than corresponding USEPA regulations and are enforceable by ACHD as well as USEPA as part of the State Implementation Plan. The regulations apply to various coke plant operations, including:

- **Charging** – any visible emissions when charging coal into an oven.
- **Doors** – any visible emissions from the door areas during the coking process. In addition, during ACHD inspections, each

emission's opacity is read. Opacity is read because there is a “high opacity door” limit of 30% or 40% depending on the battery.

- **Charging ports** – any visible emissions from the charging ports or charging seals on the battery top.
- **Offtakes** – any visible emissions from the offtake piping on the battery top.
- **Pushing** – any visible fugitive pushing emissions or emissions from the pushing emission control device outlet.
- **Traveling** – any visible emissions from the transport of hot coke from the oven to the quench tower.
- **Combustion stacks** – all 10 battery stacks have Continuous Opacity Monitors (COMS) used to record opacity. There is a 20% aggregate opacity limit and an instantaneous 60% opacity limit.
- **Soaking** – any uncombusted emissions from a standpipe.
- **Quenching** – emissions must be vented through baffles to control PM and water must be equivalent or better



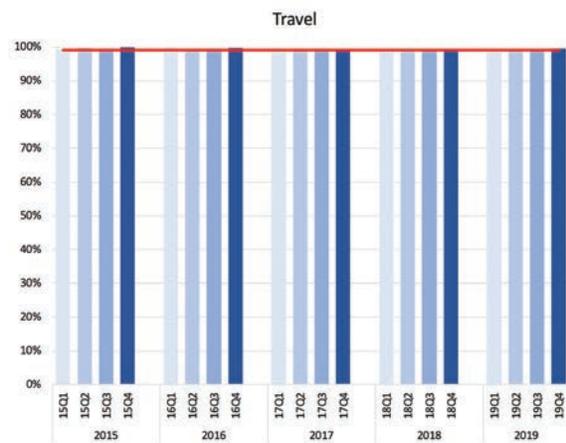
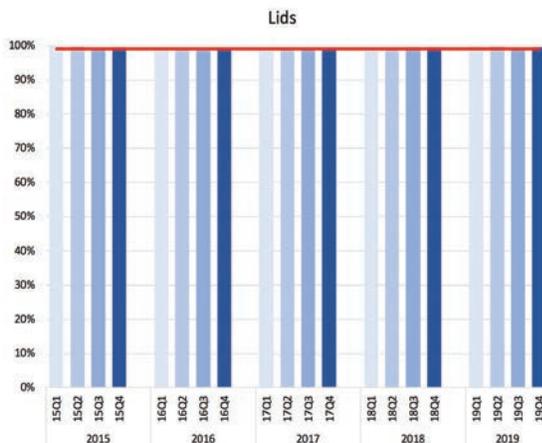
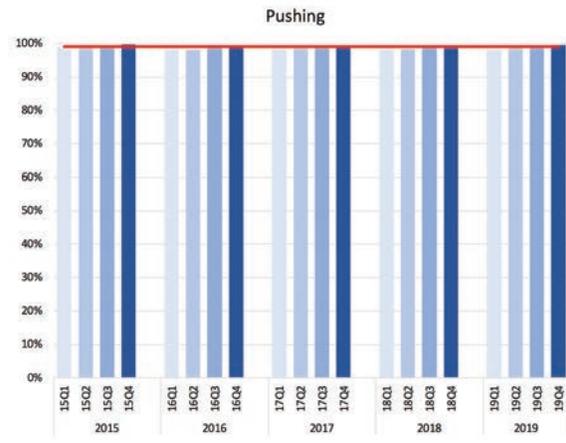
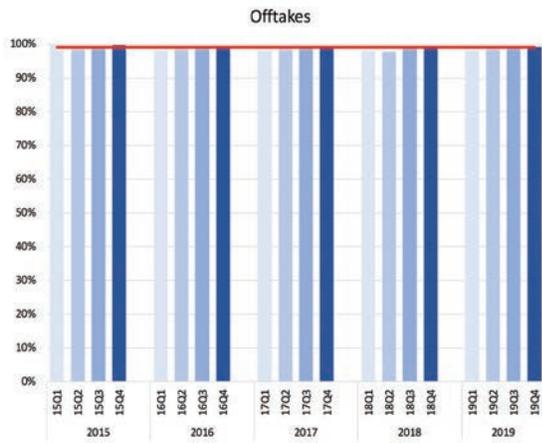
than the water quality standards established for the Monongahela River.

The Clairton Plant was issued a Title V operating permit from the ACHD. Title V permits are required for larger facilities by Title V of the Clean Air Act (CAA). The permit is enforceable by ACHD and USEPA. The Title V permit is unique to the Clairton Plant, is comprehensive, and includes “all applicable requirements” under the CAA and underlying regulations that apply to the Clairton Plant. The permit, issued on March 27, 2012, is voluminous, consisting of 259 pages, and includes emissions limits, standards, and work practice requirements, as well as air pollution control equipment, stack testing, monitoring, recordkeeping, and reporting requirements. U. S. Steel is required to provide periodic monitoring reports to the ACHD and USEPA and certify

compliance at least annually, identifying any deviations from any of the applicable requirements.

The current Title V permit is administratively extended because U. S. Steel submitted a Title V Permit Renewal Application to ACHD on September 26, 2016. ACHD continues to work on updating the Title V Permit.

U. S. Steel's Clairton Plant has maintained nearly 100% compliance rate with the Federal Standards, and has demonstrated an unprecedented high compliance rate with the ACHD standards that apply to charging emissions, door leaks, battery combustion stack opacity (20% and 60%), offtakes, lids, pushing (cannot exceed 10% at any time), and travel (cannot exceed 10% at any time). U. S. Steel's compliance with these standards are highlighted in these eight charts.



Environmental Performance – Water

A. NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES PERMIT) AND PERFORMANCE

The quality of water discharged into the Monongahela River and Peters Creek is governed by a National Pollutant Discharge

Elimination System

(NPDES) Permit which was issued on September 28, 2012. An application for renewal was submitted in March of 2017, which administratively extends the permit until the

Pennsylvania Department of Environmental Protection (PADEP) can reissue it. There are eight (8) outfalls at the Clairton

Plant that discharge a combination of process and noncontact cooling water. These outfalls are sampled once a week at all of the outfalls associated with the processes. There are also six (6) outfalls associated with emergency overflows, with a sample frequency of twice per discharge event. The Clairton Plant has achieved greater than 99% compliance since 2015 with the NPDES permit limits.

Process Water

Clairton Plant's raw material, coal, contains a significant amount of natural moisture that is removed during the process. Additional water is generated by chemical reactions, by-products recovery, and other operations. The Clairton Plant is continuously upgrading its technology and improving operating practices with the goal of minimizing impacts from plant discharges. All the water treatment additives used in water and wastewater treatment are subject to PADEP approval before they are used.

The Contaminated Water Treatment Plant (CWTP) utilizes free and fixed ammonia distillation stills to remove ammonia and acid gases and a biological oxidation system to further treat the water. The biological treatment occurs in two aeration basins.

This type of treatment utilizes microbiological organisms to consume and eliminate toxic chemicals in the wastewater. The microorganisms utilize these chemicals as sources of food and energy. Solids are then settled out in the clarifiers and the treated water is then discharged to the Monongahela River.

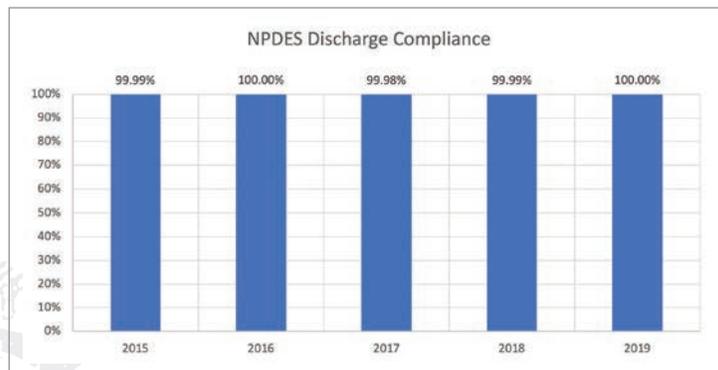


Figure 25: 2015 through 2019 Clairton Plant NPDES discharge compliance percentages.



Figure 26: Biological Plant Ammonia Stills and Clarifier.



Figure 27: Clairton Plant's Coal Storage Area storm water collection and treatment system include solids and metals removal and pH adjustment prior to discharge to the Monongahela River.



B. STORM WATER MANAGEMENT

All storm water discharges at the Clairton Plant are regulated under their NPDES Permit. The NPDES permit, which was issued on September 28, 2012 by the PADEP, requires monitoring at 11 storm water-only outfalls twice per month during precipitation events. The NPDES Permit also requires that the Clairton Plant maintain a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP identifies potential pollutant sources, as well as best management practices (BMPs) to mitigate those sources. A comprehensive site compliance evaluation is done annually, in addition to quarterly inspections.

In addition to BMPs, the Clairton Plant also has a storm water treatment plant that treats all storm water from the coal storage area prior to discharge to the Monongahela River. The storm water is first collected in two sedimentation basins to allow the majority of solids to drop out. The storm water is then pumped to a secondary treatment system that consists of pH adjustment, polymer addition,

and clarification to remove both suspended solids and metals. The treated water is then discharged to the Monongahela River. The solids that are removed during this process (mostly coal fines) are recycled and become part of the metallurgical coal used to make coke at the Clairton Plant.

Quench Water

The water used for the quenching of the hot coke comes directly from the Monongahela River. This water is recycled and normally there is no discharge due to the high evaporation rates associated with this process. The evaporated steam is vented through quench towers. In the event of a discharge, all of the cooling water must meet stringent discharge limits that are set by the PADEP and permitted through our NPDES.

Environmental Performance – *Recycling*

A. UTILIZATION OF CLEAN COKE OVEN GAS

We reduce the amount of waste generated and emissions produced by reusing the by-product gas produced at our coke batteries. This reuse is good for the environment and good for business.

By using coke oven gas generated by our coke batteries, over 135 million MMBtu from 2015-2019, we have avoided consuming enough natural gas and other fuels to heat nearly 1 million households each year from 2015 to 2019.

Mon Valley Works as an “Alternative Energy System”

U. S. Steel Mon Valley Works is one of the most energy-efficient, integrated Iron and Steel facilities in the world. The Mon Valley Works reuses gases from the blast furnaces and coke ovens to support combustion processes at Clairton, Edgar Thomson, and Irvin, as well as to generate electricity at the Edgar Thomson and Clairton Plants.

The Mon Valley Works is a certified Alternative Energy System recognized by the Pennsylvania Department of Environmental Protection (PADEP).

The generation of electricity at the Clairton and Edgar Thomson facilities allows the Mon Valley Works to purchase less electricity, thus reducing its carbon footprint.

Working with one of our largest electricity suppliers, U. S. Steel has been able to secure Emission Free Energy Certificates to meet all of its purchased power needs through December 2024 for the three Pittsburgh-area Mon Valley facilities (Clairton, Edgar Thomson, and Irvin).

B. RECYCLING PROJECTS

The Clairton Plant generates process residues from the recovery of coal tar and light oil in the by-products recovery plant. Rather than dispose of these residues, the Clairton Plant recycles the materials by blending them with the coal feedstock to the coke ovens for recovery in the by-products plant.

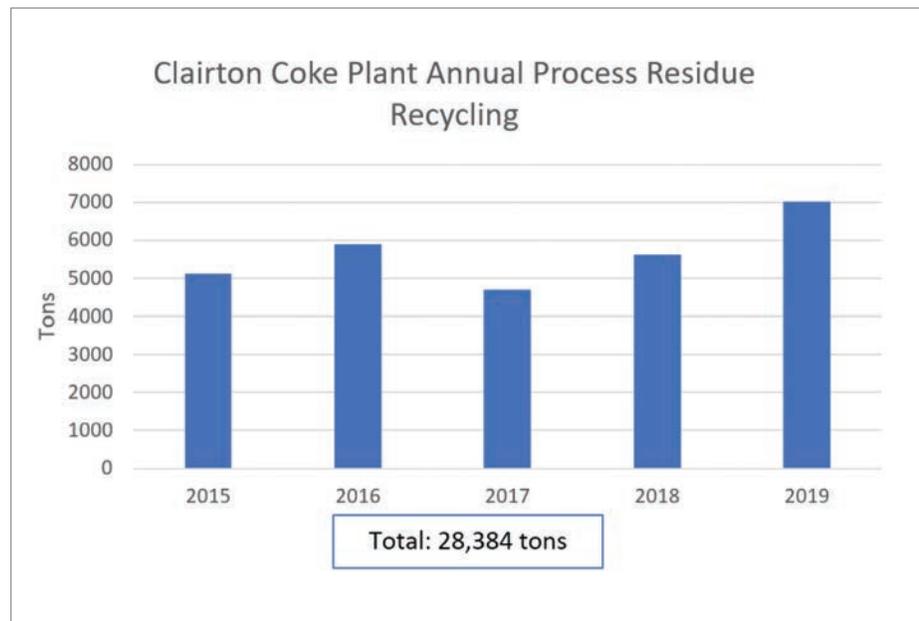


Figure 28: 2015 through 2019 tons per year of process residue recycling.

Commitment to Community Involvement

Community is important to U. S. Steel, as is taking pride in being a part of the Clairton community. From employees' volunteer work to corporate contributions providing support for important projects, U. S. Steel is engaging and supporting neighbors and employees while strengthening the communities in which it works.

A. COMMUNITY PROJECTS

In 2019, U. S. Steel demonstrated its commitment to the communities it operates by providing volunteer and financial support to a variety of projects and local organizations benefitting education, recreation and families.

U. S. Steel's employees were very involved with community projects, providing hundreds of volunteer hours and materials to projects including cutting trees and grass, mulching, painting, trash removal and community cleanups, assisting at local food banks, and providing assistance in preparation of numerous community events. Truckloads of coke also were provided to the Rivers of Steel Carrie Blast Furnaces.

2019 Community Areas and Programs Impacted by the Clairton Plant Employee Volunteers

<i>Clairton Community Playground</i>	<i>Clairton 5K Run</i>
<i>Delaware Playground</i>	<i>American Legion Banners</i>
<i>Read & Mitchell Playground</i>	<i>Rivers of Steel</i>
<i>N 3rd & Division Playground</i>	<i>St. Clair Street Garden</i>
<i>Jefferson Playground</i>	<i>Grounded Door Park</i>
<i>Farnsworth Playground</i>	<i>Surprise Park</i>
<i>Clairton Park Playground</i>	<i>Clairton Food Bank</i>
<i>Worthington Playground</i>	<i>Clairton Memorial Hill</i>

Funding also was provided for many community projects. A few examples include improvements at parks in City of Clairton and Liberty Borough, equipment/materials for the City of Clairton and Lincoln Borough Police Department, recycling containers for Port Vue, and refurbishing the Veteran Memorial bronze plaques in the City of Clairton.

Highlighting Community Parks Projects

In summer 2019, Clairton Plant employees volunteered their time to help rebuild three popular community parks in the Clairton area.

A team of volunteers made structural and cosmetic repairs to the wood pavilion at Alderson Park and Playground, pressure-washed and stained the pavilion and picnic tables, and painted the swings in the playground.

Volunteers also worked on the KABOOM Playground on North Third Street, where volunteers cleaned and stained wooden picnic tables and planters. Their efforts extended to Farnsworth Park, where volunteers painted and stained playground equipment and picnic tables.



Figure 29/30: Top: Volunteers spruce up planters at Clairton's KABOOM Playground. Above: Volunteers brought ladders and equipment to Farnsworth Park to clean up well-loved playground equipment.



Figure 31: Former Pittsburgh Steeler Quarterback Charlie Batch, U. S. Steel Clairton Plant Manager Mike Rhoads and Pittsburgh Steelers mascot Steely McBeam attend a STEM event at Clairton High School in Clairton, Pennsylvania.

Highlighting USS – Steelers STEM Partnership

In fall 2019, U. S. Steel and the Pittsburgh Steelers announced a new multi-year partnership agreement to unite two legendary Pittsburgh-based organizations in an effort to support education and community pride. The organizations teamed to launch the first Steelers-themed STEM (Science, Technology, Engineering and Mathematics) education program, with initiatives being integrated into schools in the Mon Valley area. Learners have interactive lessons with content that develop and reinforces key STEM skills including, but not limited to, online training modules, feedback and support from Steelers and USS job boards. The goal is to have 20 schools active in the program by the end of the 2019-2020 school year. As of May 1, 2020, over 3,200 students had participated in the program, with over 10,900 total training modules completed. A kickoff event was held at Clairton High School in fall 2019.

Highlighting Junior Achievement Project Clairton Schools

Highlighting Junior Achievement Project Clairton Schools – Members of U. S. Steel’s Employee Resource Groups partnered with the Junior Achievement organization for a community outreach event

at the Clairton City School District. Each employee was given the opportunity to help build a bridge from the classroom to the future by encouraging students from kindergarten through eighth grade to make smart academic and economic choices. Volunteers paired together to teach up to five lessons to students, centered upon three concepts; apply entrepreneurial thinking to the workplace; create jobs which make their communities more robust; and generate wealth and effectively manage it.

B. COMMUNITY ADVISORY PANEL (CAP)

In June of 2018, Clairton Plant established a Community Advisory Panel (CAP). A CAP is commonly defined as a group of representatives from area communities who meet periodically with representatives from a major employer to discuss issues of common interest. The purpose of the CAP is to proactively communicate, to foster a collaborative relationship, and to facilitate an understanding of community expectations and concerns. The Clairton Plant CAP meets quarterly. The meetings have included tours of the Plant, discussions of current events, Plant compliance, and content/information requested by the communities.



Figure 32: An employee teaches a first-grade lesson on “Junior Achievement and Our Families.”

C. COMMUNITY BENEFIT TRUST

In early 2020, U. S. Steel established a Community Benefit Trust as part of an agreement with the Allegheny County Health Department (ACHD) to resolve the company's appeal of enforcement orders issued by ACHD against the Company. As part of the settlement, it was of the highest importance for U. S. Steel to represent the voices of the local communities where many of its employees live and work. At U. S. Steel's urging, 90% of the disputed penalty and 90% of any future stipulated penalties are placed into the Trust to directly benefit the following localities: Clairton, Liberty, Lincoln, Glassport, and Port Vue.

Per the terms of the Trust, distributions from the Trust must benefit the localities or the local environment through supplemental projects, and the projects must be anticipated to improve, protect, or reduce the risk to public health or the environment. Such projects may include providing funding to improve physical community infrastructure (such as the creation or renovation of parks, green spaces, or playground spaces), or fostering the creation or expansion of programs that are aimed at directly improving the well-being of residents, and need

not be air-quality related, as long as an environmental and/or public health benefit can be recognized. Any project proposals submitted must demonstrate a reasonable probability that the project will be successful.

The trustee, Smithfield Trust Company, is totally independent from U. S. Steel. The trust instrument requires that the trustee administer investments, issue funds for projects by the Trust Distribution Board (which is a board made up of members representing the five community beneficiaries) and prepare periodic reports and financial documents. U. S. Steel nor the trustee has any role in screening or approving projects, as that role is the sole responsibility of the Trust Distribution Board.

No funds have been issued from the trust for such beneficial projects because the trust has been recently established. However, U. S. Steel strongly believes the communities will benefit from the Trust, and look forward to reporting on successful projects in future reports.

Commitment to the Environment and Community – Now and in the Future

As shown throughout this 2019 report, U. S. Steel is strongly committed to environmental stewardship and to serve the communities in which it operates.

Moving into 2020, U. S. Steel remains committed to:

- ▶ S.T.E.E.L. principles
- ▶ Developing and implementing innovation projects to improve environmental performance
- ▶ Providing support to the communities in which we operate
- ▶ Assisting the company in achieving the Corporate GHG Reduction Goal to reduce its global greenhouse gas emissions intensity by 20%, as measured by the rate of carbon dioxide (CO₂) equivalents emitted per ton of finished steel shipped, by 2030 based on 2018 baseline levels.



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