COMMONWEALTH OF PENNSYLVANIA
Department of Environmental Protection
Southwest Regional Office

TO AQ Case File TVOP-65-00137

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DATE January 15, 2020

RE Review of Title V Operating Permit Renewal Application
Review of RACT II Modification
Vandergrift Facility
ATI Flat Rolled Products Holdings, LLC.
Vandergrift Boro., Westmoreland County

APS 958353 AUTH 1212333 PF 194932
APS 958353 AUTH 1293677 PF 194932

Background

The Vandergrift facility of ATI is a specialty metals finishing facility. The Vandergrift plant is a located in Vandergrift Boro., Westmoreland County. The finishing operations at this facility primarily include two annealing and pickling lines, two boilers and two cold reduction mills which collectively emit major source levels of oxides of nitrogen. As a result, this is a Title V facility.

The initial Title V Operating Permit (TVOP) was issued on July 31, 2002, with an expiration date of July 30, 2007. This is the third renewal Title V Operating Permit Application and was received on December 6, 2017. The major sources of Volatile Organic Compounds (VOC) and/or Oxides of Nitrogen (NOx) were required to submit a Proposal to achieve Reasonably Available Control Technology (RACT) on specified sources of VOC and/or NOx. 25 PA Code §129.99 required that a RACT II Proposal be submitted for certain sources in existence on or before July 20, 2012. The company submitted a RACT II Modification on October 21, 2016. A revision to RACT II Modification was submitted on August 12, 2019. Another revision to RACT II Modification was submitted on November 27, 2019.

Since the issuance of the last renewal on June 18, 2013, an Administrative Amendment was authorized to change the name of the company from Allegheny Ludlum, LLC. to ATI Flat Rolled Products Holdings, LLC. There was no other change in the facility.

Regulatory Analysis

Per Pa. Code Title 25 Section 127.402(a), a permit is required to operate a stationary air contamination source. The applicable emission limitations, monitoring, recordkeeping, reporting and work practice standard requirements of Pa. Code Title 25 Sections 121.7, 123.1, 123.2, 123.11, 123.13, 123.21, 123.22, 123.31, 123.41, 123.42, 123.43, 127.441, 127.442, 127.444, 129.14, 135.3, and 135.5 have been included in this TVOP renewal.

There are no NSPS or NESHAPs related to steel production that are applicable to this facility since no steel is produced at this location.

Various fuel tanks are at the site and they are below the applicable thresholds of Title 25 Pa. Code Ch. 129.57 and 40 CFR 60.110 Subpart Kb.

In accordance with the Air Quality Regulations of the Pennsylvania Department of Environmental Protection (PA DEP), major sources of Volatile Organic Compounds (VOC) and/or Oxides of Nitrogen (NO_x) are required to submit a Proposal to achieve Reasonably Available Control Technology (RACT) on specified sources of VOC and/or NO_x. 25 PA Code §129.99 requires that a RACT Proposal be submitted for certain sources in existence on or before July 20, 2012. Vandergrift is a major NOx emitting source and therefore the company submitted a RACT II Modification on October 21, 2016. The facility is not Major for VOC.

The Compliance Assurance Monitoring (CAM) provisions of 40 CFR 64 applies when all of the following are true:

The source is located at a Title V facility,
The source is subject to an emission standard,
The source uses a control device to achieve compliance with the emission standard, and
Emissions from the source, without the control device, exceed major source thresholds.

Vandergrift has identified the following sources and associated control devices to be subject to CAM:

SOURCE ID 103 – Z8 COLD ROLLING MILL / OIL MIST ELIMINATOR (C103)

SOURCE ID 114 – Z9 COLD ROLLING MILL / OIL MIST ELIMINATOR (C114)

SOURCE ID 120B – NO. 90 A&P LINE SHOT BLAST / BAGHOUSE (C120B)

SOURCE ID 120D – NO. 90 LINE HF-HN03 PICKLING / FUME SCRUBBER (C120D)

SOURCE ID 121E – NO. 91 LINE HF-HN03 PICKLING / FUME SCRUBBER (C121E)

ATI has proposed the use of existing testing, monitoring, and recordkeeping requirements as CAM. Appropriate conditions have been added to the TVOP.

Process, Emissions, Control and RACT II

Vandergrift is a specialty metals finishing facility. The principal products produced at this facility are finished specialty strip. In general, finishing operations include annealing, pickling and cold rolling. Annealing is the process of altering the properties of the product by subjecting it to controlled thermal cycles with moderate peak temperatures. Annealing relieves thermal and mechanical stresses induced by the rolling operations and softens the product to improve its formability. Mixed Acid Pickling is a cleaning process for specialty products; mixed acid (nitric and hydrofluoric acids) dissolve and chemically remove oxidized metal and other materials from the product.

The Vandergrift facility has two anneal and pickle lines designated as No. 90 and No. 91 Lines. No. 90 Line includes an anneal furnace (50.5 mmbtu/hr), shot blaster, one sulfuric (H_2SO_4) acid pickle tub, two mixed acid (HF/HNO_3) pickle tubs and a natural gas-fired strip dryer. The shot blaster is controlled by a 20,000 ACFM baghouse, the mixed acid pickling tubs are controlled by a three-stage packed bed chemical feed (NaOH & NaHS) scrubber system, and the sulfuric acid tub is controlled by a packed tower water wash scrubber. No. 91 Line includes an anneal furnace (42 mmbtu/hr), an ESS (electrolytic sodium sulfate) descale process, two mixed acid (HF/HNO_3) pickle tubs, and two strip dryers. The mixed acid pickle tubs are controlled by a four-stage packed tower chemical feed (NaOH & NaHS) scrubber system and the ESS process is controlled by a packed tower water wash scrubber. There are two Sendzimir cold reduction mills designated as Z8 and Z9; emissions from each mill are controlled by a mist eliminator system (prefilter and candle filter). Two natural gas-fired boilers each rated at 26.1 MMBtu/hr provide steam for the facility. Multiple natural gas fired space heaters (<10 MMBtu/hr each) are located throughout this facility; combined capacity of all space heaters is approximately 90 mmbtu/hr. Insignificant sources at this facility are listed in the Miscellaneous Section of this permit.

ATI FLAT ROLLED PRODUCTS, LLC. - VANDERGRIFT FACILITY PTE - NOVEMBER 2019						
DEP ID	**Source**	**PM10**	**SO2**	**CO**	**NOx**	**VOC**
103	Z-8 Mill	46.0				
114	Z-9 Mill	16.2				
120A	No. 90 A&P - Annealing Furnace (50.5 mmbtu/hr)	1.6	0.1	18.0	26.0	1.2
120B	No. 90 A&P - Shot Blast	5.1				
120C	No. 90 A&P - Sulfuric Pickling	0.5				
120D	No. 90 A&P - Nitric/HF Pickling	0.5			140.2	
120E	No. 90 A&P - Strip Dryer	0.04	0.003	0.5	0.6	0.03
121A	No. 91 A&P - Strip Dryer No. 1	0.04	0.003	0.5	0.6	0.03
	No. 91 A&P - Strip Dryer No. 2	0.04	0.003	0.5	0.6	0.03
121B	No. 91 A&P - Annealing Furnace (42 mmbtu/hr)	0.3	0.1	15.0	29.3	1.0
121C	No. 91 A&P - ESS Descaling	0.5				
121E	No. 91 A&P - Nitric/HF Pickling	0.5			74.3	
031	No. 1 Boiler	0.8	0.07	9.3	14.3	0.6
032	No. 2 Boiler	0.8	0.07	9.3	14.3	0.6
116	Misc Space Heaters	2.9	0.2	32.1	38.3	2.1
112	Cooling Tower No. 1	0.6				
115	Cooling Tower No. 2	0.8				
113	Paved Roads	2.5				
	*****insignificant units*****					
108	*66" Temper Mill*					
111	*Parts Cleaners (maintenance)*					*4.5*
MISC	*Lime Silo*	*0.05*				
MISC	*TSP /BS100 Silo*	*0.05*				
MISC	*AST 028A*					*0.8*
MISC	*Misc Paint Usage (maintenance)*					*9.5*
	TOTAL (tons/year)	**80.0**	**0.6**	**85.2**	**338.3**	**20.3**

The RACT II Regulation provides three options for compliance, as applicable:

- Presumptive RACT pursuant to 25 Pa Code §129.97;

- Facility-wide NO_x averaging pursuant to 25 Pa Code §129.98; and
- Alternative (case-by-case) proposal pursuant to 25 Pa Code §129.99

Case by Case RACT

RACT II Sources NOx Potential to Emit

Source ID	Description	Rated Capacity	Emission Rate (lb/hr)	Potential to Emit (TPY)
120A	No. 90 A&P Line Anneal Furnace	40 tons/hour	5.94 lb/hr	26 tons/year
120D	No. 90 A&P Line HNO3/HF Pickling	40 tons/hour	23.5 lb/hr	103 tons/year
121E	No. 91 A&P Line HNO3/HF Pickling	35 tons/hour	19.7 lb/hr	57.4 tons/year

Nos. 90 and 91 Anneal and Pickle (A&P) Lines NOx potential emissions are based on the permitted NOx emission rate in Title V Permit 65-00137 and in RACT Permit 65-000-137.

TECHNICAL AND ECONOMIC ANALYSES OF NO_x CONTROL OPTIONS

The principal methodology employed for case-by-case analysis is patterned after the "Guidance Document on Reasonably Available Control Technology for Sources of NO_x Emissions." This involves the use of the RACT/BACT/LAER Clearing house (RBLC), as well as the use of additional information available on the US EPA's website and information garnered from control device vendors.

The Department has outlined the required elements of a RACT analysis and determination in 25 Pa Code §129.99(d) and 129.92(b). The Vandergrift facility of ATI Flat Rolled Products Holdings, LLC is a major source for NOx, not for VOC. Three (3) sources of NOx are evaluated for top-down analysis in this RACT Proposal:

No. 90 Anneal and Pickling (A&P) Line Annealing Furnace
No. 90 A&P Line Mixed Acid Pickling
No. 91 A&P Line Mixed Acid Pickling

There are five (5) basic steps of the top-down RACT review which are used at Vandergrift facility.

STEP 1: Identification of Potential Control Technologies

STEP 2: Elimination of Technically Infeasible Control Options

STEP 3: Evaluate the next most stringent option, if the first option is either technically, economically, environmentally, or energy infeasible or inappropriate

STEP 4: Economic Analysis

STEP 5: Selection of an emission rate as RACT

First is a review of available control options to determine their feasibility for application to specific individual sources and the associated control effectiveness. Among the factors taken into consideration in determining technological feasibility are temperature requirements/limitations, potential for fouling, installation space limitations and creation of additional environmental liabilities such as secondary pollutants or new waste streams.

Only the control options that were determined to be technologically feasible were analyzed for economic feasibility. This was the second major phase of the top-down approach. The principal activities during this phase were estimating the capital and operating costs for incorporating each control option into each applicable source. Cost information was obtained from the technology references, budgetary vendor quotations were obtained for selected items of control equipment and detailed construction estimates were prepared.

Calculations of annualized total costs for control options were developed in accordance with the PA DEP Guidelines and the cost control manual of EPA's OAQPS. By dividing the annualized total costs by the estimated annual reduction in NO_X, the "total cost effectiveness" of each option was computed. Incremental cost effectiveness ratios were calculated and reported.

The calculated total cost effectiveness was compared with the regulatory cost effectiveness threshold to determine the economic feasibility of each option. In accordance with the PA DEP RACT II Document "Responses to Frequently Asked Questions" (question #41) the regulatory threshold for NOX is $3,500/ton. If the calculated cost effectiveness exceeded this threshold value, the control option was determined to be economically infeasible. The top-down process was continued until a control option was evaluated as both technologically feasible and cost effective or until no options were found to be feasible and cost effective.

Description of Available NOx Control Technologies

Technologies for controlling NOx emissions from various steel making processes can be divided into three basic categories: 1) combustion modifications; 2) post-combustion or post-process modifications; and 3) post-process controls.

1) Combustion Modifications:

- Low excess air (LEA) operation
- Low-NOx burners (LNB)
- Low-NOx burners plus flue gas recirculation (FGR)

2) Post-Combustion or Post-Process Modifications:

   - Selective catalytic reduction (SCR)
   - Selective non-catalytic reduction (SNCR)

3) Post-Process Controls:

   - Hydrogen-peroxide Injection
   - Absorption with chemical reaction
   - Absorption

Combustion Modifications

Low Excess Air (LEA) Operation

LEA operation inhibits NOx formation by reducing excess air levels. Since NOx formation at furnace conditions is strongly influenced by oxygen availability, reducing the local flame concentration of oxygen reduces NOx formation. LEA typically provides relatively low NOx reductions and is relatively easy to implement. It can be implemented alone but is almost always included when other combustion modifications are implemented. Some important factors which can affect applicability of LEA to a given combustion process include the condition and age of existing burners and control systems and variability of load swings.

Low-NOx burners (LNB)

LNBs control NOx formation by carrying out combustion in stages and either the air or the fuel can be added in stages. Compared to standard burners the combustion process is prolonged. The flame has a chance to radiate heat before combustion is complete which reduces NOX formation. The most commonly applied type of LNB is a staged air design with low turbulence, less-than-stoichiometric combustion in the primary zone. One or more zones of additional air introduction with the burner provide air staging within the flame envelope and complete combustion. The end result is generally an increase in flame length over that produced by a standard burner, so applicability is limited to furnaces with adequate dimensions. Staged air burners can be fitted with FGR connections or designed so furnace gases are induced into the flame.

In contrast, a staged fuel LNB applies all the air in the initial mixing zone with only part of the fuel, so that the initial flame is relatively cool and NOX formation is limited. After some heat has been absorbed by the furnace, the remaining fuel is added through high velocity nozzles positioned around the perimeter of the burner. This promotes rapid mixing and entrains furnace gases into the flame, which provides the benefits of FGR Staged fuel burners generally have a more compact flame than staged air types. One possible drawback is that in contrast to staged air burners, staged fuel burners are only applicable to installations using gaseous fuel because of the need for high pressure second stage fuel injection.

LNBs provide moderate NOx reductions. A negative side effect of low NOx burner combustion may be an increase in CO emissions due to low excess air levels, cooler flames and relatively lower turbulence.

Flue Gas Recirculation (FGR)

FGR decreases the peak flame temperature by increasing the inert gaseous components in the flame (i.e., by "diluting" the heat released from combustion) and reduces the oxygen availability in the flame both of which reduce thermal NOx formation. However, the reduction in flame temperature is dependent on the temperature of the recycled flue gas; this reduces the effectiveness of this control method as the flue gas temperature increases. It is implemented only as part of an LNB retrofit (since burners must be designed for FGR) and provides relatively small additional NOx reductions.

Post-Combustion or Post-Process NOx Reduction Technologies

Selective catalytic reduction (SCR) and Selective non-catalytic reduction (SNCR)

Post-combustion or post-process NOx reduction technologies involve injecting a chemical reagent into the flue gas stream to reduce the NOx that has already been formed. This contrasts with combustion techniques that are focused on controlling the initial formation of NOx. The chemical reaction between the reagent and the NOx selectively reduces NOx to molecular oxygen and nitrogen. These technologies have been most frequently applied to combustion processes, although they can be applied to other sources of NOx generation.

The reduction reaction can take place in the presence of a metal oxide or ceramic composite catalyst that promotes this reaction and is termed Selective Catalytic Reduction (SCR). SCR provides a relatively high potential for NOx destruction (up to 90% NOx removal). An aqueous ammonia solution or anhydrous ammonia is used as the reducing agent and is injected into the gas stream upstream of the catalyst grid, usually with compressed air as a carrier gas to assist in mixing and penetration. Major hardware components of the system include the catalyst grid, ammonia storage, flow control and metering station, and controls.

The optimal temperature range for the reduction reaction is 500 to 800 ^{O}F temperatures below this range do not provide enough energy to promote the reaction and lead to unreacted ammonia (or "slip") in the gas stream. If the flue gas exceeds the upper temperature limit, the chemical reactions can produce additional NOx and excessive temperatures can even destroy the catalyst. The other major issues of concern when considering SCR are the particulate concentration of the gas stream (which can foul the catalyst) and the additional pressure drop imposed by the catalyst bed (requiring additional fan capacity).

When a catalyst is not used, the process is termed Selective Non-Catalytic Reduction (SNCR). SNCR is accomplished in a combustion gas temperature range of 1,600 to 2,100 ^{O}F. Temperatures above and below this range cause the same effects as with SCR - ammonia slip at low temperatures and NOx formation at high temperature. NOx removal efficiency is typically lower, and either ammonia or urea (or a urea-based formulation) is used as the reagent.

The technical feasibility of SNCR depends on the availability of access to a zone that has a temperature within the previously stated working range over all normal operating conditions.

Suitable retention time at the optimal temperature range is also necessary to allow the reducing reactions to take place. SNCR is infeasible for application at a specialty steel pickling operation and ATI's annealing furnaces due to the temperature requirements necessary for SNCR. At the Vandergrift facility, the exhaust temperatures of the pickling operations are typically 100 to 150 °F; the exhaust temperature of the 90 Line annealing furnace is typically 800 to 900 °F. Also, according to USEPA's Air Pollution Control Technology Fact Sheet (EPA-452/F-03-031), SNCR is typically applied to industrial processes with uncontrolled NOx loading of 200 to 400 ppm. ATI's annealing furnace NOx loading is typically 30 to 50 ppm, which is well below the threshold for SNCR application. Finally, based on a review of the RBLC, no instances of an SNCR being installed on a specialty steel pickling process or annealing furnace were identified.

Hydrogen Peroxide Injection

Hydrogen peroxide injection is a means of reducing NOx emissions from a mixed acid (nitric/hydrofluoric) solution. During the pickling process, the nitric acid is converted to nitrous acid that is insoluble in the mixed acid solution and decomposes into mixed NOx that escapes to the atmosphere. Injecting hydrogen peroxide into the acid bath oxidizes the dissolved NOx back to nitric acid before it escapes out of the solution. The rate of peroxide injection is controlled by the oxidation-reduction potential of the acid bath. Although high in operating cost due to hydrogen peroxide consumption, the process would affect NOx reduction in deep-bath pickling.

Absorption with Chemical Reaction

Absorption with chemical reaction is a NOx reduction technique potentially applicable to the pickling line. It is a multi-stage, wet chemical mass transfer reduction process, designed to reduce N02 to molecular nitrogen and water. The reduction process is carried out in a packed column which is fed from a recirculation tank having chemical concentrations held to specific levels based on pH and reduction potential requirements.

According to the company, the results of the top-down analysis for NOx control alternatives reveal that no control option would be cost effect relative to the $3,500/ton cost effectiveness threshold. The following Tables list each source, the technologies evaluated, and the RACT II determinations:

Source 120A - NO. 90 A&P Line Annealing Furnace (50.5 MMBtu/hr)

Control Technology	Technical Feasibility	Total Cost ($/ton)
Selective Catalytic Reduction (SCR)+ Low-NOx Burners (LNB)	Yes (1)	70,257
Selective Catalytic Reduction (SCR)	Yes	145,486
Selective Non-Catalytic Reduction (SNCR)	No (2)	
Low-NOx Burners (LNB) +Flue Gas Recirculation (FGR)	Yes	25,120
Low-NOx Burners (LNB)	Yes (3)	

Notes:

1. LNB portion currently installed and operating.
2. Not demonstrated.
3. Currently installed and operating

Source 120D - 90 A&P Line - Mixed Acid Pickling

Control Technology	Technical Feasibility	Total Cost ($/ton)
Selective Catalytic Reduction (SCR)	Yes (1)	20,075
Hydrogen Peroxide Injection	Yes (2)	18946
Selective Non-Catalytic Reduction (SNCR)	No (3)	
Absorption (Wet Scrubber) plus Chemical Reaction	Yes (4)	
Absorption	Yes (5)	

Notes:

1. Temperature too low to apply this technology, auxiliary burner required.
2. 90L does not use "deep tank" design - this technology not feasible
3. Not demonstrated.
4. Currently installed and operating
5. This technology is not applicable - current technology (which includes chemical reaction) provides better NOX reduction

Source 121E 91 A&P Line - Mixed Acid Pickling

Control Technology	Technical Feasibility	Total Cost ($/ton)
Selective Catalytic Reduction (SCR)	Yes (1)	34,991
Hydrogen Peroxide Injection	Yes (2)	30,589
Selective Non-Catalytic Reduction (SNCR)	No (3)	
Absorption (Wet Scrubber) plus Chemical Reaction	Yes (4)	
Absorption	Yes (5)	

Notes:

1. Temperature too low to apply this technology, auxiliary burner required.
2. 91L does not use "deep tank" design - this technology not feasible
3. Not demonstrated.
4. Currently installed and operating
5. This technology is not applicable - current technology (which includes chemical reaction) provides better NOX reduction

Presumptive RACT

The following units have a rated heat input capacity <20 MMBtu/hr. These units are subject to the Presumptive RACT requirement to operate in accordance with manufacturer's specifications and good operating practices. Note that operating in accordance with manufacturer's specifications and good operating practices are existing Title V permit requirements.

Source ID	Description	Rated Heat Input Capacity
120E	No. 90 A&P - Strip Dryer	1.3 MMBTU/hr
121A	No. 91 A&P - Strip Dryer No. 1	1.3 MMBTU/hr
	No. 91 A&P - Strip Dryer No. 2	1.3 MMBTU/hr
116	Misc Space Heaters (<20 MMBtu/hr each)	97 MMBTU/hr (all units combined)

The following units have a rated heat input capacity equal to or greater than 20 MMBtu/hr and less than 50 MMBtu/hr. These units are subject to the Presumptive RACT requirement to perform a biennial RACT inspection or tune-up in accordance with 25 Pa Code §129.97(b)(1).

Source ID	Description	Rated Heat Input Capacity
121B	No. 91 A&P - Annealing Furnace	42 MMBTU/hr
031	Boiler No. 1	26.1 MMBTU/hr
032	Boiler No. 2	26.1 MMBTU/hr

RACT II Determinations

The Department has reviewed the economic analysis provided in this RACT II proposal and agrees that the above technologies are cost prohibitive. Source 120A is equipped with Low-NOx Burners (LNB). Both Source 120D and Source 121E are equipped with Absorption (Wet Scrubber) plus Chemical Reaction.

The results of the top-down analysis for NO_x control alternatives reveal that no control option would be cost effect relative to the $3,500/ton cost effectiveness threshold. The Department has reviewed the results of the economic analysis and does not dispute the results. A copy of the economic analysis performed is attached to this review. In accordance with a case-by-case determination in accordance with 25 Pa. Code Section 129.99; Vandergrift has determined that current operations of the sources in accordance with the current Permit limitations constitutes NO_x RACT II for the facility. A copy of the RACT I permit conditions for this facility has been attached to this review memo to demonstrate that permitted SIP emission limitations have not been relaxed. Compliance is determined through source testing required in the current Title V Permit. ATI is not proposing to add any specific new control equipment to demonstrate RACT. Consequently, not submitting Plan Approval Applications with this RACT Proposal.

Conclusions and Recommendations:

I have completed my review of the Vandergrift facility of ATI Flat Rolled Products Holdings, LLC (ATI)'s Title V Renewal and RACT II Modification Applications. ATI has met the regulatory requirements associated with this application submittal. The attached permit reflects terms and conditions as described in permit application. The RACT II determination was to comply with the existing equipment configurations and NOx emission limits in the existing permit. In addition, the company shall install, maintain, and operate the source per manufacturer's specifications and good operating practices and shall adopt good operational practices to minimize fugitive emissions, good housekeeping, using necessary equipment to curb the fugitive emissions, monitoring the emission sources, record keeping, and taking necessary required steps to minimize fugitive emissions. The most recent inspection was conducted on May 22, 2018. The inspection report indicated that facility was in compliance with all regulatory requirements. It is my recommendation to issue a Title V Operating Permit renewal and RACT II Modification for this facility as proposed upon completion of the public comment period. Notice of intent to issue this TVOP renewal will be published in Pa Bulletin and local newspaper. EPA, the company, states within 50 miles, Operations Environmental Group Manager, Air Quality

District Supervisor, and Air Quality inspector will be provided with this proposed TVOP renewal.