COMMONWEALTH OF PENNSYLVANIA
Department of Environmental Protection
Southwest Regional Office

TO AQ Case File TVOP-04-00059

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DATE November 7, 2023

RE RACT II equals RACT III Review memo for sources subject to § 129.114(i)(1)(i)
IPSCO Koppel Tubulars Corporation
Koppel Plant
Koppel and Big Beaver Boroughs, Beaver County

As part of the Reasonably Available Control Technology (RACT) regulations codified at 25 Pa. Code §§ 129.111—129.115 (relating to additional RACT requirements for major sources of NO_x and VOCs for the 2015 ozone NAAQS) (known as 'RACT III'), the Pennsylvania Department of Environmental Protection (Department) has established a method under § 129.114(i) (relating to alternative RACT proposal and petition for alternative compliance schedule) for an applicant to demonstrate that the alternative RACT compliance requirements incorporated under § 129.99 (relating to alternative RACT proposal and petition for alternative compliance schedule) (RACT II) for a source that commenced operation on or before October 24, 2016, and which remain in force in the applicable operating permit continue to be RACT under RACT III as long as no modifications or changes were made to the source after October 24, 2016. The date of October 24, 2016, is the date specified in § 129.99(i)(1) by which written RACT proposals to address the 1997 and 2008 8-hour ozone National Ambient Air Quality Standards (NAAQS) were due to the Department or the appropriate approved local air pollution control agency from the owner or operator of an air contamination source located at a major NO_x emitting facility or a major VOC emitting facility subject to § 129.96(a) or (b) (relating to applicability).

The procedures to demonstrate that RACT II is RACT III are specified in § 129.114(i)(1)(i), 129.114(i)(1)(ii) and 129.114(i)(2), that is, subsection (i), paragraphs (1) and (2). An applicant may submit an analysis, certified by the responsible official, that the RACT II permit requirements remain RACT for RACT III by following the procedures established under subsection (i), paragraphs (1) and (2).

Paragraph (1) establishes cost effectiveness thresholds of $7,500 per ton of NO_x emissions reduced and $12,000 per ton of VOC emissions reduced as ‘‘screening level values’’ to determine the amount of analysis and due diligence that the applicant shall perform if there is no new pollutant specific air cleaning device, air pollution control technology or technique available at the time of submittal of the analysis. Paragraph (1) has two subparagraphs.

Subparagraph (i) under paragraph (1) specifies that the applicant that evaluates and determines that there is no new pollutant specific air cleaning device, air pollution control technology or technique
available at the time of submittal of the analysis and that each technically feasible air cleaning device, air
pollution control technology or technique evaluated for the alternative RACT requirement or RACT emission limitation approved by the Department (or appropriate approved local air pollution control agency) under § 129.99(e) had a cost effectiveness equal to or greater than $7,500 per ton of NO_x emissions reduced or $12,000 per ton of VOC emissions reduced shall include the following information in the analysis:

- A statement that explains how the owner or operator determined that there is no new pollutant specific air cleaning device, air pollution control technology or technique available.
- A list of the technically feasible air cleaning devices, air pollution control technologies or techniques previously evaluated under RACT II.
- A summary of the economic feasibility analysis performed for each technically feasible air cleaning device, air pollution control technology or technique in the previous bullet and the cost effectiveness of each technically feasible air cleaning device, air pollution control technology or technique as submitted previously under RACT II.
- A statement that an evaluation of each economic feasibility analysis summarized in the previous bullet demonstrates that the cost effectiveness remains equal to or greater than $7,500 per ton of NO_x emissions reduced or $12,000 per ton of VOC emissions reduced.

Subparagraph (ii) under paragraph (1) specifies that the applicant that evaluates and determines that there is no new pollutant specific air cleaning device, air pollution control technology or technique
available at the time of submittal of the analysis and that each technically feasible air cleaning device, air
pollution control technology or technique evaluated for the alternative RACT requirement or RACT emission limitation approved by the Department (or appropriate approved local air pollution control agency) under § 129.99(e) had a cost effectiveness less than $7,500 per ton of NO_x emissions reduced or $12,000 per ton of VOC emissions reduced shall include the following information in the analysis:

- A statement that explains how the owner or operator determined that there is no new pollutant specific air cleaning device, air pollution control technology or technique available.
- A list of the technically feasible air cleaning devices, air pollution control technologies or techniques previously evaluated under RACT II.
- A summary of the economic feasibility analysis performed for each technically feasible air cleaning device, air pollution control technology or technique in the previous bullet and the cost effectiveness of each technically feasible air cleaning device, air pollution control technology or technique as submitted previously under RACT II.
- A statement that an evaluation of each economic feasibility analysis summarized in the previous bullet demonstrates that the cost effectiveness remains less than $7,500 per ton of NO_x emissions reduced or $12,000 per ton of VOC emissions reduced.
- A new economic feasibility analysis for each technically feasible air cleaning device, air pollution control technology or technique.

Paragraph (2) establishes the procedures that the applicant that evaluates and determines that there is a new or upgraded pollutant specific air cleaning device, air pollution control technology or technique available at the time of submittal of the analysis shall follow.

- Perform a technical feasibility analysis and an economic feasibility analysis in accordance with § 129.92(b) (relating to RACT proposal requirements).
- Submit that analysis to the Department (or appropriate approved local air pollution control agency) for review and approval.

The applicant shall also provide additional information requested by the Department (or appropriate approved local air pollution control agency) that may be necessary for the evaluation of the analysis submitted under § 129.114(i).

Facility details

IPSCO Koppel Tubulars, Corporation ("Koppel") owns and operates a steel mill located at 6403 Sixth Avenue in the Boroughs of Koppel and Big Beaver, Beaver County. The Koppel facility is dedicated to steelmaking and billet production, pipe heat treatment for more demanding applications and finishing operations where pipe undergoes non-destructive testing and inspection. The primary operations at Koppel are the melting and hot forming of alloy or carbon steels into solid steel "blooms". The facility includes a melt shop (#4) with four sources an electric arc furnace (EAF) (source ID 109), Charging (110), EAF Tapping (111), and Ladle Refining System (LRS) (112). Emissions from all four sources are routed to a common stack.

Koppel melts scrap steel and additives using a 100-ton capacity Electric Arc Furnace (EAF). Steel production at the facility limited to 598,000 tons in any consecutive 12-month period. On January 11, 2007, IPSCO Koppel Tubulars LLC was changed to IPSCO Koppel Tubulars Corporation.

Scrap handling, melting, and casting are conducted in and around the melt shop area on the south end of the main plant. Scrap is received at the facility by trailer truck and rail and is unloaded directly into the scrap bay located adjacent to the melt shop. Scrap received by rail is off loaded in the scrap yard located on the north portion of the plant. As needed, the scrap is transferred from the scrap yard to the melt shop scrap bay via the on-site rail transportation system. Major raw materials are purchased scrap and internally generated “revert” scrap. Revert scrap can be 0-20% of the furnace charge. Lime, carbon, and alloys are also added to the EAF charge. In general, approximately 94 tons of scrap and additives are charged in two charging buckets to the furnace to make 85 tons of steel. Approximately 5 tons of lime and 1 ton of carbon are added to the EAF per heat. Approximately 10 tons of slag are generated in each heat of steel and a hot heel is left in the furnace. Once melted in the EAF, the molten steel is transferred from the EAF to a ladle refining station (LRS) where final chemical adjustments to the metallurgical content of the steel are made. The Koppel Steel melt shop consists of furnace charging, a three electrode EAF, a LRS, and a four-stand continuous caster. Steel is transferred from the EAF to a ladle and taken to the LRS where alloys are added to make specification for each grade of steel. After meeting specification at the LRS, the ladle is taken to the continuous caster where either 9-inch x 9-inch square blooms or 5.5-inch “rounds” that are each approximately 20-feet in length are produced. Currently, when in production, the melt shop produces the smaller rounds and is bottle-necked by the continuous caster.

Steel “Blooms” are cut to the desired length in the “Steel Yard” and shipped. The cast blooms or rounds are considered semi-finished product, which can be sold for further processing. Slag removed from the furnace or the ladles is transferred to a reclaim area located immediately south of melt shop where the slag cools and is processed by Harsco for off-site reuse.
Ancillary operations that occur at the facility include quality control testing of the cast steel, ladle and tundish cleaning and relining, raw material storage, waste management, wastewater treatment, and facility maintenance. Ladles are bowl shaped containers, typically coated with refractory linings, which handle the transfer of molten metal. The ladle pours the molten metal into a tundish, a broad open container with one or more nozzles on the bottom. Quality control testing performed in the casting area involves cutting small cross sections of the steel bloom called “coupons” from the end of the cast steel shapes and preparing the coupons for metallurgical testing by subjecting the coupons to a hot hydrochloric acid solution. Quality control testing of steel tube includes a number of types of non-destructive testing.

All sources in the melt shop are exhausted to baghouse no. 3 and baghouse no. 4 (collectively Control ID C01). Baghouses 3 and 4 are aligned side by side as a duplex structure. Twenty (20) compartments are used to collect dust and fumes generated by sources in the melt shop. Adjoining compartments from baghouses 3 and 4 share single exhaust stack; ten “stub stacks” exhaust twenty compartments. Three forced draft fans, each rated at 220,000 SCFM, supply the exhaust gas for this system. Baghouses 3 and 4 are positive pressure and fume bearing air discharged from the fans enters the baghouses through an inlet manifold that distributes the untreated gases to each compartment. Each compartment in Baghouse 3 contains 204 bags and in Baghouse 4 contains 264 bags. The bags are made of woven polyester and are 31 feet in length and 11.75 inches in diameter. The bags are cleaned by periodically isolating a compartment with pneumatically operated dampers and air from a reverse air fan rated at 50,400 CFM. Dust is removed from collection hoppers with a screw-type conveyor system, discharged into covered trailers and sent off-site for metals reclamation.

The initial Title V Operating Permit was issued on October 19, 1999, with an expiration date of October 19, 2004. The third TVOP renewal and the RACT II Permit Modification was issued on March 16, 2020 with an expiration date of March 16, 2025. An Administrative Amendment was issued to the permit on December 22, 2021 to change the name of the Responsible Official.

Recent changes in the facility

No changes were made to any sources subject to RACT since October 24, 2016.

Table 1: List of sources(s) subject to § 129.114(i)(1)(i) - RACT II determination assures compliance with RACT III requirements

Source ID	Source	Rating	Emission limit	Pollutant	Installation Date	Source Type
109	This includes the EAF, Continuous Caster, AOD, and other sources in the melt shop.	Exhaust Vol. 500,765 scfm at 1,800°F	219.34 tpy 108.43 tpy	NO_x VOC	01/01/1985	Process
110	Charging: These are emissions relating to charging the EAF					Process
111	EAF Tapping: This relates to tapping the EAF				01/01/1985	Process
112	Ladle Refining System (LRS): Relates to any refining of the steel done in the ladle					Process

IPSCO Koppel Tubulars is a major source for both VOC and NOx emissions. The requirements § 129.112—129.115 apply Statewide to the owner and operator of a major NO_x or VOC emitting facility that commenced operation on or before August 3, 2018 for which a requirement or emission limitation, or both, has not been established in § § 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, 129.71—129.75, 129.77 and 129.101—129.107.

On December 31, 2022, the Department received an initial RACT III notification from IPSCO Koppel which also included proposal for sources 109-112 that the facility opt to comply with NOx and VOC RACT III requirements by demonstrating compliance with NOx and VOC RACT II requirements.

Table 2: Sources subject to § 129.114(i) - RACT II determination assures compliance with RACT III requirements:

Source ID	Melt Shop (#4)	RACT III provision
109,110, 111,112	EAF, Charging, Tapping, Ladle Ref Sys	§129.114(i)(1)(i)

The RACT II determination/requirements can be found at the following link: EPA Approved Pennsylvania Source-Specific Requirements | US EPA (https://www.epa.gov/sips-pa/epa-approved-pennsylvania-source-specific-requirements.)

SIP package proposed federal register citation for IPSCO Koppel 86 FR 41421 8/2/2021
SIP package final federal register citation for IPSCO Koppel 87 FR 3671 1/25/2022

IPSCO Koppel's proposed RACT II equals RACT III determinations:

It is important to note that while there is a presumptive standard (operate in accordance with GEP) for EAFs, the operator has evaluated the option of additional controls on Sources 109-112 as they are all exhausted to the same control device (C01). IPSCO Koppel has proposed that RACT II satisfies the requirements of RACT III since there have been no changes or modifications to the facility. The company relied on the comprehensiveness of their RACT evaluation and its detailed control technology historical overview for this type of facility as the basis for concluding that there are presently no new or updated control methods available. There is no economic evaluation due to the fact that there are no technically feasible add-on control options. That assertion was made, reviewed, and approved by DEP & EPA under RACT II and has been re-evaluated here. The company proposed that there have been no changes to the sources under consideration and no new technologies have become available (as described below), it is concluded that RACT II is equal to RACT III.

Melt Shop (Source 109 EAF, Continuous Caster and other sources, Source 110 Charging, Source 111 Tapping, and Source 112 Ladle Refining):

The EAF has an approximately 90-ton capacity and uses three electrodes for melting. The water-cooled burner injection oxygen lance and sidewall burners aids in the melting of the scrap charge. The lance system provides rapid preheating, melting, and cutting of scrap through the EAF slag door during the entire steel-making cycle. Carbon is injected into the molten bath to create homogeneous foaming early in the melt cycle and control the carbon content of the final product. Tap-to-tap times are approximately 70 minutes.

Since there is no presumptive RACT for sources 109 – 112, an alternative (case-by-case) RACT proposal is required under 25 PA Code §129.114. The emissions from melt shops at the IPSCO Koppel facility are controlled by a large positive pressure baghouse C01. All gaseous emissions from the plant exhaust through this baghouse. The sources 109, 110, 111 and 112 exhaust through the baghouses that control this process. The largest source of NO_x and VOC emissions at the facility come from the melt shop.

NO_x Emission Control:

NO_x emissions in a steel making melt shop are primarily thermal NO_x caused by the oxidation of atmospheric nitrogen. This mechanism is significant at temperatures greater than 2500°F in which they increase exponentially as the temperature increases. The applicant has determined that the highest NO_x formation occurs due to air ingress through the slag door and roof ring gap flowing into the high temperature regions of the furnace near the burners.

The applicant has indicated that controlling temperature is not an option for NO_x control as it would only lengthen the amount of time needed to complete a heat. Additional NO_x formation occurs from the combustion of CO gases that are formed in the furnace and are combusted in the fourth hole or outside of the furnace.

Considering all available technologies(as described below), the applicant has determined that an addition of control equipment is not technically feasible because of the nature of the exhaust as there are no stacks following the fabric filters where an add-on control device may be installed.

To comply with the RACT II and RACT III regulations for NO_x emissions, Koppel proposed that the reductions in NO_x emissions are achieved by controlling exhaust flows to limit air ingress, closing the slag door, and making sure that the oxygen supply is free of nitrogen in accordance with a case-by-case determination in accordance with 25 Pa Code §129.99 and 129.114.

VOC Emission Control:

VOC emissions in a steel making melt shop depend on the amount of organic material that is introduced into the EAF. NSPS and NESHAP requirements require a scrap management plan and proper operating practices. As described below, the applicant has rejected four add-on controls which could include thermal or catalytic oxidation because these controls have not been demonstrated for this type of industry and even if applied would have a significant likelihood of failure. It is noted that any possible controls would have to be installed downstream of the melt shop baghouse. Any type of add-on control would not be feasible with this unit having 10 roof monitor exhausts.

To comply with the RACT II and RACT III regulations for VOC emissions, Koppel proposed that the facility will continue to operate in accordance with good operating practices and to continue good operating practices with the required scrap management plan to minimize VOC formation in accordance with 25 Pa Code §129.99 and 129.114.

TOP-DOWN METHODOLOGY–Summarized from PADEP's RACT II analysis:

Case-by-case RACT involves conducting a "top-down" analysis as outlined in the US EPA Draft "New Source Review Workshop Manual". This was published in October 1990, but the procedures established are still followed to-date. 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). There are five (5) basic steps of the top-down RACT review which are used in determining alternative RACT requirements or limits for Temper Furnace (Source 103) and for the Melt-Shop (Source 109 - 112) of the RACT proposal.

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

The applicant has consolidated all the above steps as follows:

The largest source of NO_x and VOC emissions at the facility come from the Melt Shop.

Summary of NO_x RACT Analysis Completed for RACT II:

The following technologies were considered in establishing RACT for this Source:

NO_x Control Technologies:

1. Selective Catalytic Reduction (SCR);
2. Selective Non-Catalytic Reduction (SNCR); and
3. Operating Conditions

Each control technology is discussed below:

1. Selective Catalytic Reduction (SCR):

The applicant asserted that the outlet concentration of 7.9 ppm from the fabric filter is below the minimum inlet concentration for SCR to be effective. The temperature range of 172.4°F is also outside of what would be needed to apply this control. Additionally, the volume of gas that is handled would make SCR infeasible. The baghouse that controls the EAF is exhausted through compartment stacks which would have to be ducted together before going to a control device. The gas stream prior to the baghouse is also too dirty to make control prior to the baghouse feasible.

SCR is deemed to be not technically feasible because of the following reasons:

- The outlet concentration of 7.9 ppm is below where SCR is effective; and

- The outlet temperature is below where SCR can be applied

2. Selective Non-Catalytic Reduction (SNCR):

Koppel has evaluated the feasibility of installing NO_x controls on the EAF. As noted, SNCR is recommended for NO_x concentrations between 200 and 400 ppm. Because the inlet concentration of 7.9 ppm is so low, SNCR would not be an effective control for this operation. The temperature range of 172.4°F is also outside of the range needed for SNCR.

SNCR is deemed to be not technically feasible for the following reason:

- The outlet concentration of 7.9 ppm is below where SNCR is effective

3. Operating Conditions:

It is noted that NO_x emissions in a steel making melt shop are primarily thermal NO_x caused by the oxidation of atmospheric nitrogen. This mechanism is significant at temperatures greater than 2500^0F in which they increase exponentially as the temperature increases. The highest concentrations of furnace emissions occur when the furnace lids and doors are opened during charging, back-charging, alloying, oxygen lancing, slag removal, and tapping operations. It has been determined that the highest NO_x formation occurs due to air ingress through the slag door and roof ring gap flowing into the high temperature regions of the furnace near the burners. Additional NO_x formation occurs from the combustion of CO gases that are formed in the furnace and are combusted in the fourth hole or outside of the furnace. The applicant noted that controlling temperature is not an option since it would only lengthen the amount of time needed to complete a heat. Reductions in NO_x emissions are achieved by controlling exhaust flows to limit air ingress, closing the slag door, and making sure that the oxygen supply is free of nitrogen.

Table 3: Feasibility of Control Options in Order

Technology	Technically Feasible
Selective Catalytic Reduction (SCR)	No
Selective Non-Catalytic Reduction (SNCR)	No
Operating in accordance with GEP	Yes

RACT Determination for NO_x:

In accordance with a case-by-case determination in accordance with 25 Pa. Code 129.99; IPSCO Koppel Steel has determined that current operations of the EAF Shop in accordance with the current Permit limitations and in a manner consistent with Good Engineering Practices constitutes NO_x RACT III for the facility. Compliance is determined through source testing required in the current Title V Permit.

Summary of VOC RACT Analysis Completed for RACT II:

The following technologies were considered in evaluating VOC RACT III from the Melt Shop:

VOC Control Technologies:

1. Oxidation Processes (all);
2. Carbon Adsorption; and
3. Operating Parameters

Each control technology is discussed below:

1. Oxidation Processes:

The applicant submitted; that the inlet concentration of 1.5 ppm is below the effectiveness for all oxidation processes; that because of the outlet temperature of 172ºF, the exhaust would have to be heated to use an oxidation process. Due to the high exhaust volume (633,765 acfm) with 10 stub stacks it is not feasible to include an oxidizer of this size. The applicant has reviewed RBLC which does not reveal that oxidation processes are used to control VOC from an EAF Shop. For these reasons, Koppel has determined that all oxidation processes are not technically feasible.

2. Carbon Adsorption

The applicant identified an inlet VOC concentration of 1.5 ppm which is below the levels where carbon adsorption is considered effective. The applicant asserts that it would not be feasible to use carbon adsorption on this process, because of the large exhaust volume (633,765 acfm) passing through 10 stub-stacks. The applicant's review of the RBLC also does not reveal that adsorption processes have been used on an EAF Shop. For these reasons, Koppel has determined that the adsorption process is not technically feasible.

3. Operating in accordance with GEP

VOC emissions in a steel manufacturing melt shop depend on the amount of organic material that is introduced into the EAF. NSPS and NESHAP requirements require a scrap management plan and proper operating practices. Although not an oxidizer, VOCs are oxidized in the fourth hole where there are high temperatures. This must be managed to make sure that excessive NO_x is not formed.

RACT Determination for VOC:

In accordance with a case-by-case analysis, Koppel Steel evaluated that current operations represent RACT II for this source. Compliance is determined through source testing required in the current TV Permit and the following work practices adopted at the facility:

- Good engineering practices is routine inspection and maintenance that determines that the EAF is operating properly. This includes lid gap distances and temperatures etc.

- Maintain a scrap management plan that limits organics from the EAF scrap feed per 40 CFR Part 63.10685 Subpart YYYYY.

For the RACT III requirements under 25 Pa. Code §129.114(i)(1)(i)(A), the facility conducted a search for any new air pollution control devices, control technologies, or techniques available using the following sources of information:

1.) US EPA RACT/BACT (Best Available Control Technology)/LAER (Lowest Achievable Emission Rate) (Clearinghouse (RBLC)
2.) US EPA Clean Air Technology Center (CATC) Air Pollution Technology Fact Sheets (FS)
and Technical Bulletins (TB)
3.) US EPA CATC Air Pollution Technical Reports
4.) US EPA CATC/CTC Information Bulletins and Newsletters

BACT and LAER are determined on a case-by-case basis, usually by State or local permitting agencies. EPA established the RACT/BACT/LAER Clearinghouse, or RBLC, to provide a central data base of air pollution technology information (including past RACT, BACT, and LAER decisions contained in NSR permits) to promote the sharing of information among permitting agencies and to aid in future case-by-case determinations.

The most recent CATC Air Pollution Technical Reports listed on EPA's website is dated 2010. Thus, no new CATC Air Pollution Technical Report has been published since the facility was issued a RACT II permit on February 6, 2020.

The most recent CATC/CTC information bulletin and newsletter listed on EPA's website is dated back to 1998. Thus, no new CATC/CTC information bulletin and newsletter has been published since the facility was issued the RACT II permit.

The RACT for VOC from the melt shop is to continue to combine good operating practices with the required scrap management plan to minimize VOC formation in accordance with 25 Pa Code 129.114. Compliance with RACT requirements will be demonstrated as part of the current permit conditions.

Department's Independent Analysis:

The Department has reviewed source information, control technologies or measures, respective cost-analysis for each technology or measures evaluated Koppel. Based on the review, examination of information, Department's continuous review of permit applications since the applicability date of RACT II which have proposed various control methods, along with Department permitting staff participating in recent technical presentations by several vendors and manufacturers of pollution control technology, and engineering judgement, the Department concludes that there are no new or updated control technologies available that are applicable to controlling the nature of the sources and pollutants found at the IPSCO Koppel Tubulars Corporation, Koppel Plant and determines that RACT II requirements for sources 109 – 112 at the Koppel listed in the table assure compliance with requirement for RACT III for the § 129.111 - § 129.115.

Public discussion

No discussions occurred with the EPA, the company, or the public beyond the initial application, which materially impacted a decision to include one or more sources under the RACT II is RACT III umbrella.