pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

12/19/2022

Additional RACT Requirements for Major Sources of NO_x and VOCs

25 Pa Code § 129.114(i) - Demonstrating that compliance with § 129.99(e) assures compliance with § 129.114(a)-(c) and (e)-(h).

This form is intended to assist applicants in providing the information needed by the Department to evaluate whether a source or sources at a facility demonstrate that compliance with the alternative RACT requirement or alternative RACT emission limitation approved by the Department or the appropriate approved local air pollution control agency under § 129.99(e) (relating to alternative RACT proposal and petition for alternative compliance schedule) assures compliance with the provisions in subsections 25 Pa Code *§ 129.114(a)-(c) and (e)-(h)*, except for sources subject to § 129.112(c)(11) or (i)—(k).

This provision allows for RACT III compliance using an abbreviated analysis by providing the Department with the analysis done on the same source for RACT II.

This form must be submitted to the Department as soon as practicable, but no later than December 31st, 2022.

Please provide a list of sources that the owner or operator proposes to comply with RACT III through 129.114(i) in Table 1 using the instructions below.

The basic information requested here can be found in section A and H of the facility's operating permit.

If the source was evaluated for multiple control devices, please list the same source multiple times so that every source/control device combination is listed.

If one control device was evaluated to control multiple sources, please list all source ID's which the control device would control in the source ID section while skipping the source name, make, model, and location sections. Please treat the "source group" as a source for the purposes of the rest of this form.

Please choose one of the following provisions of 129.114(i) with which the source/evaluated control device combination will comply with:

a. 129.114(i)(1)(i) – Please choose this option if no new air pollution control device is available or if the cost analysis done for RACT II (129.99(e)) resulted in a cost-effectiveness equal to or greater than $7,500 for NOx or $12,000 per ton of VOC reduced. In addition, the owner or operator may choose this option if…

   i. A control option during RACT II evaluation was determined to be technically infeasible.

ii. No cost analysis was performed for another reason, such as a higher ranked control technology was installed.

b. 129.114(i)(1)(ii) – Please choose this option if the cost analysis done for RACT II (129.99(e)) resulted in a cost-effectiveness less than $7,500 for NOx emissions reduced or $12000 per ton of VOC emissions reduced.

c. 129.114(i)(2) – Please choose this option for any sources which have new or upgraded control device, beyond what was evaluated for RACT II (129.99(e)), which needs to be evaluated.

Table 1

Source ID	Source Name	NOx Control device evaluated	Cost per ton of NOx determined	VOC Control device evaluated	Cost per ton of VOC determined	Provision of 129.114(i) which the source/evaluated control device will comply with (a, b or c)
100A	Marine Loading	N/A	N/A	Thermal Oxidizer	$67,980	a
100	All Uncontrolled Loading Positions	N/A	N/A	Thermal Oxidizer	$17,665	a
100	Individual Uncontrolled Loading Position	N/A	N/A	Thermal Oxidizer	$44,377	a

For all source/control device combinations listed in Table 1 subject to 129.114(i)(1)(i), please provide the following:

- 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.

Kinder Morgan has reviewed the control options for Marine loading and uncontrolled loading positions at the facility. Based on review of USEPA RACT BACT LAER clearinghouse and other Kinder Morgan operations, there are no new control options that are reasonably available to VOC emissions. All other sources meet the presumptive RACT requirements in section 112 as shown in the attached document. Kinder Morgan has concluded that only thermal oxidation is technically feasible control has evaluated the economic feasibility. However, Kinder Morgan will accept a limit of 2.7 tons per 12-month rolling period for each uncontrolled loading position.

Technically Feasibility Evaluation

Thermal Oxidation

Thermal Oxidation is a process in which the hydrocarbons in a gas stream are combusted to basically form carbon dioxide and water at and elevated temperature. Thermal Oxidation is governed by temperature, time and turbulence. In order to achieve effective combustion the organic must be raised 100°F or more above its ignition temperature and held at that temperature for 0.3 to 1.0 seconds. In addition, the stream must be sufficiently mixed in order for good oxidation to occur. An auxiliary fuel is required to ensure the temperate is maintained for proper combustion.

There are essential two types of incinerators: thermal and catalytic. Each type is considered technically feasible for the marine loading operation. However, for cost analysis purposes, thermal incineration is being considered since the relative cost of the two are similar.

Kinder Morgan has existing thermal oxidation control units:

- The NAO Oxidizer controlling materials with a vapor pressure greater than 4 psia when loading tank truck and rail cars,
- A dedicated unit to control Methyl Methacrylate tank and loading emissions; and
- A thermal oxidation unit for controlling cumene and fuel grade ethanol vapors when loading marine vessels.

While oxidation is a feasible control the use of these control is either technically infeasible, or economically infeasible, or no longer requires and evaluation. The emission limit taken for marine loading during RACT II is cost ineffective under RACT III. The oxidizer control Methyl Methacrylate tank does not have additional capacity. The NAO Oxidizer is cost ineffective based on the RACT II evaluation. As a stated above, the Kinder Morgan is proposing that each uncontrolled loading position is limited to 2.7 tons of VOC per 12 month rolling period.

Carbon Adsorption

Adsorption is where gas molecules are passed through a bed of solid particles, then diffuses from the gas steam to the bed, and held on the media by attractive forces. Adsorptive capacity of the solid for the gas tends to increase with the gas phase concentration, molecular weight, diffusivity, polarity, and boiling point.

Typical adsorbents media in use include activated carbon, silica gel, activated alumina, synthetic zeolites, fuller’s earth, and other clays. This RACT analysis is oriented toward the use of activated carbon, a commonly used adsorbent for VOCs. Carbon adsorption is effective when materials have a molecular weight of 50 or greater.

Carbon Adsorption is considered technically infeasible for the operation since it would not be effective on all materials handled at the dock. A fair amount of ethanol and possibly other materials such as ketones are loaded into vessels, trucks and rail cars. The molecular weight of ethanol is 46, thus making carbon adsorption infeasible and ketones can cause fires in the carbon beds.

Bioreactor

There are several different types of bioreactors from soil beds or bio-filters to bio-trickling filters, and bio-scrubbers. Typically used for odor control, bioreactors can be used to oxidize VOC's. For a bioreactor to be effective, one needs a consistent stream and maintain temperature above 60°F. The loading operations at Kinder Morgan is intermittent and the climates average annual temperature is below 60°F (i.e., 54-56°F). While there are other factor to consider this control option is considered technically infeasible due the intermittent nature of the operation and the climate of the area.

Scrubbers

Scrubbers use a process called absorption to remove pollutants from an air stream to a liquid stream. The absorption process the organics in the air stream are dissolved in a liquid solvent. The limiting factors as a primary control technique deal with the availability of a suitable solvent and the solubility of the organic. In this case, the terminal would require different solvents to handle the varying material handled. Based on the organics in the air stream requiring different absorption media this control option is considered technically infeasible.

Condensation

Refrigeration units are basically "heat pumps," absorbing heat on the "cold side" of the system and releasing heat on the "hot side" of the system.

A refrigerated condenser is a viable control option if:

- the air stream is saturated with the organic compound
- the organic vapor containment system limits air flow
- required air flow does not overload a refrigeration system with heat
- only one organic compound is emitted

Since the loading operations are only considered to be 50 percent saturated and there are multiple organic compounds, this control option is considered infeasible.

Submerged Fill

Kinder Morgan does provide submerged fill for all organic materials that have a flash point less than 200 Degrees Fahrenheit into tank truck and rail cars. All Marine vessels are submerged fill. A study has shown that there is a direct correlation for pure organic compounds of the Flash to Vapor Pressure. The study has shown the inverse of the flash point is linear to the logarithm of the vapor pressure. Thus the high the flash point the lower the correlated vapor pressure would be.

- A copy of the final version of the cost analysis done for RACT II which was approved by the Department. If a copy of the final analysis is not available, you may submit a new cost analysis calculated consistent with the "EPA air pollution control cost manual" (sixth edition), EPA/452/b-02-001, January 2002, as amended.

Attached is a the RACT II submittal with cost analysis and a revised cost analysis for the marine loading as the facility would not need to purchase a new unit control emissions.

- A statement that an evaluation of each economic feasibility analysis summarized as required above 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.

The cost effectiveness of the controls is above $12,000 per ton VOC removed

Source ID	Source Name	Cost per ton of VOC determined
100A	Marine Loading	$67,980
100	All Uncontrolled Loading Positions	$17,665
100	Individual Uncontrolled Loading Position	$44,377

- If the owner or operator feels that the Department should have any additional information to assist them in evaluating their application, please provide it.

The control cost of the Marine Thermal oxidation unit was evaluated using the existing unit. Hence there is not capital expenditure necessary. The cost effectiveness was still well above the $12,000 per ton. Kinder Morgan is proposing that each uncontrolled loading position is limited to 2.7 tons of VOC per 12 month rolling period.

For all source/control device combinations listed in Table 1 subject to 129.114(i)(1)(ii), please provide the following:

- 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.

  This section is not applicable as the costs are all above $12,000 per ton removed

- A copy of the final version of the cost analysis done for RACT II which was approved by the Department. If a copy of the final analysis is not available, the owner or operator may submit a new cost analysis calculated consistent with the "EPA air pollution control cost manual" (sixth edition), EPA/452/b-02-001, January 2002, as amended.

  This section is not applicable as the costs are all above $12,000 per ton removed

- A new economic feasibility analysis for each source/control device combination.

  This section is not applicable as the costs are all above $12,000 per ton removed

- A statement that an evaluation of each economic feasibility analysis summarized as required above 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.

  This section is not applicable as the costs are all above $12,000 per ton removed

- If the owner or operator feels that the Department should have any additional information to assist them in evaluating your application, please provide it.

  This section is not applicable as the costs are all above $12,000 per ton removed

For all source/control device combinations listed in Table 1 subject to 129.114(i)(2), please provide the following:

- A technical feasibility analysis and an economic feasibility analysis in accordance with § 129.92(b) (this is a standard RACT analysis).

  See the above technical and economic feasibility analysis

- Submit the RACT analyses to the department or appropriate approved local air pollution control agency for review.

  See the above technical and economic feasibility analysis

- If the owner or operator feels that the Department should have any additional information to assist them in evaluating your application, please provide it below.

  Kinder Morgan believes is has provided all information necessary.