

January 19, 2001

MEMORANDUM

SUBJECT: BACT and LAER for Emissions of Nitrogen Oxides and Volatile Organic Compounds at Tier 2/Gasoline Sulfur Refinery Projects

FROM: John S. Seitz, Director (*signed by John S. Seitz*)
Office of Air Quality Planning and Standards (MD-10)

TO: Air Division Directors, Regions I-X

Background

On February 10, 2000, EPA issued new emissions standards (“Tier 2 standards”) for all passenger vehicles, including sport utility vehicles, minivans, vans, and pick-up trucks. As part of this program, EPA also set new standards to significantly reduce the sulfur content in gasoline. These standards require that most refiners meet a corporate average gasoline sulfur standard of 120 ppm and a cap of 300 ppm beginning in 2004. In 2005, most refiners will have to produce gasoline meeting a 30 ppm average sulfur level. By 2006, most refiners will need to meet a 30 ppm average sulfur level, and an 80 ppm cap.¹

In order to meet the new low-sulfur gasoline requirements, some refiners will have to make changes to their existing facilities. It is likely that some of these changes will be subject to the major new source review (NSR) preconstruction permitting requirements under either part C or D of the Clean Air Act, or both. The refiners subject to major NSR will be required to undergo a pollution control technology evaluation which calls for a level of control equivalent to the best available control technology (BACT) or the lowest achievable emission rate (LAER), depending on the applicable NSR program requirements.

¹Some exceptions apply for small refiners and gasoline produced for sale in parts of the Western United States. For a full description of the program, see the final rule published on February 10, 2000 (65 FR 6698).

To provide greater certainty and to help expedite the NSR permitting process for refinery projects undertaken to comply with the gasoline sulfur standards, EPA believes it would be beneficial to issue Federal guidance on what levels of control can be reasonably anticipated to represent BACT or LAER, as applicable, under the major new source review requirements. Specifically, this guidance is intended to set forth levels of control that, in our view, would generally be considered to satisfy the BACT or LAER requirements for certain emission units and pollutants associated with required refinery desulfurization projects. Accordingly, when a permitting authority makes a BACT or LAER determination consistent with the recommendations contained in this guidance, it is very unlikely that EPA would comment adversely on such finding. Thus, while State and local permitting agencies are not required to apply this guidance in establishing BACT or LAER, the guidance is designed to help add certainty about EPA's general perspective and expectations as to the applicable technology requirements for BACT or LAER for types of refinery emissions units identified herein.

The control technology information discussed in this guidance is based on information and analyses contained in the attached report titled "Petroleum Refinery Tier 2 BACT Analysis Report." A draft report was made available on the Internet for public review on March 20, 2000. Comments received as a result of that opportunity caused us to perform additional analyses for a number of issues. The results of these analyses have been taken into account in the recommendations contained in this guidance, as well as in the final report which accompanies this guidance memorandum.

It is important to note that applying this guidance for selecting BACT and LAER may not be appropriate in all cases because of unique circumstances that may exist at individual refineries. The NSR program requires a case-by-case analysis of BACT and LAER. This guidance is designed to provide information to permitting authorities in order to streamline that process. In specific cases, the unique site-specific circumstances at individual refineries may warrant a different level of control than that suggested by the analysis upon which this general guidance is based. For example, where additional or new information presented by the applicant or public becomes available, within the context of the processing of a specific permit application, it should also be considered when doing the BACT or LAER evaluation.

BACT and LAER for NO_x emissions from Refinery Heaters

Based on our review of the information in the attached report, it is EPA's belief that an emissions rate of 7 ppmv of NO_x should generally be considered as LAER for NO_x emissions from new refinery process heaters. Refiners can achieve this level of control through a combination of combustion controls (low-NO_x burners with internal flue gas recirculation) and selective catalytic reduction (SCR).

The emissions rate representing BACT, however, will tend to vary as a function of the size of

the new heater being installed at the refinery and whether the baseline heater design includes forced air (mechanical) draft rather than natural draft. Heater size and air draft design have been shown to significantly influence the cost-per-ton-removal calculations used for determining whether a NO_x control alternative is cost effective. If mechanical draft is not otherwise appropriate for the process heater, then its cost as part of the installation of SCR can make the incremental cost economically infeasible for smaller sized heaters.

Thus, using an upper cost effectiveness threshold of \$10,000 per ton of NO_x controlled, we believe that the following maximum emissions levels would generally represent BACT for the five sizes of new process heaters which we evaluated:

- a. 7 ppmv (0.0085 lb/MMBtu) of NO_x for new refinery process heaters –
 - 75 MMBtu/hr or greater, with a baseline design that includes mechanical draft, and
 - 150 MMBtu/hr or greater, with a baseline design that does not include mechanical draft.

The attached study shows that refinery process heaters can achieve a level of control equal to or better than 7 ppmv of NO_x with a combination of combustion controls (low-NO_x burners with internal flue gas recirculation) and SCR.

- b. 29 ppmv (0.035 lb/MMBtu) of NO_x for new refinery process heaters –
 - 50 MMBtu/hr or less, with a baseline design that includes mechanical draft, and
 - 150 MMBtu/hr or less, with a baseline design that does not include mechanical draft.

Available information indicates that refinery process heaters can achieve a level of control of 29 ppmv or better of NO_x by installing combustion controls (low-NO_x burners with internal flue gas recirculation).

As the attached report indicates, certain circumstances that could affect individual refinery projects may cause BACT analysis results to differ from EPA's recommendations. Consequently, such circumstances should be reviewed on a case-by-case basis by the permitting authority. For example, problems with fouling of the catalyst used in the SCR process may occur over a period of time when the sulfur content of the refinery fuel gas is higher than normal and other unique conditions within the process heater exist. (See related discussion of catalyst fouling on page 3-20 in the attached technical report.) To avoid the fouling problem, the refiner may need to purchase additional natural gas or take steps to remove some of the excess sulfur from the refinery gas. Either approach will likely produce additional expenses which could significantly alter the BACT cost analysis.

The EPA expects that refineries will likely be able to avoid the application of major NSR to individual or multiple new refinery process heaters of less than 50 MMBTU by controlling emissions to levels below the 40 tons per year significance level for a major modification of NO_x. Consequently, we do not believe it is appropriate to provide a position on BACT for such small refinery process heaters at this time. Should the need arise for Federal guidance on BACT for these small heaters within the context of permitting refinery gasoline desulfurization, we will consider issuing supplemental guidance on a later date.

BACT and LAER for VOC emissions from Refinery Equipment

After a review of the information contained in the attached report, it is EPA's belief that for VOC emissions from hydrotreaters and hydrogen units, at both large and small refiners, compliance with an equipment leak control program (equipment modifications, and leak detection and repair) equivalent to the Hazardous Organic National (HON) Emission Standards for Hazardous Air Pollutants (40 CFR Part 63 Subpart H) would generally represent BACT. This is the most stringent control level achievable for VOCs from these units. In evaluating whether compliance with requirements equivalent to the HON would generally represent BACT, EPA considered the incremental and average cost of the control strategy as well as any associated energy and environmental impacts. No adverse impacts were found to be associated with the most effective control option.

The control option represents the most stringent control level achieved or contained in a SIP, it therefore also represents LAER for those units.

Effect of Guidance

The statutory provisions and regulations described in this document contain legally binding requirements. This document does not substitute for those provisions or regulations, nor is it a regulation itself. The policies set out in this memorandum do not represent final Agency action, and are intended as guidance only. Thus, this document does not impose legally binding requirements on EPA, permitting authorities, or the regulated community, and it may not apply to a particular situation based upon the circumstances. The EPA and permitting authority decision makers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance. Any decisions regarding a particular facility will be made based on the statute and regulations. The analysis undertaken applies only prospectively and only to major NSR permit applications for gasoline desulfurization related projects that have been determined to be complete by the relevant permitting authority no later than 18 months from the date of this memorandum. The EPA may change this guidance at any time without public notice.

The EPA will continue to evaluate the need for further guidance on BACT and LAER

determinations for emission units and other pollutants (e.g., SO₂) associated with refinery desulfurization projects undertaken to comply with Tier 2 requirements and, as necessary, may issue additional guidance in the future.

Distribution/Further Information

We are asking Regional Offices to promptly send this memorandum with attachment to State and local permitting agencies within their jurisdiction. Questions concerning the application of this guidance to specific BACT or LAER determinations and cases should be directed to the appropriate EPA Regional Office. Regional Office staff may contact Dan deRoeck of the Integrated Implementation Group at 919-541-5593, if they have any questions. This document, including the referenced attachment, is also available on the Internet at <http://www.epa.gov/ttn/nsr>, under “What’s New on NSR.”

Attachment