



U.S. Environmental Protection Agency Applicability Determination Index

Control Number: 0300105

Category: NSPS
EPA Office: Region 10
Date: 09/08/2003
Title: Gas Turbine Definition and Modification Issues
Recipient: Jordan Jacobson
Author: Jeff KenKnight

Subparts: Part 60, GG, Stationary Gas Turbines

References: 60.14(e)(2)
60.15
60.2
60.330
60.331(a)

Abstract:

Q1: What is the affected facility for purposes of Subpart GG where the source has a package unit that consists of separate gas and reactor equipment components?

A1: The gas turbine affected facility for purposes of Subpart GG is the "Mainline Unit Package", which is comprised of a gas component that produces the high-energy exhaust gas flow and a reaction component that receives the exhaust gas flow and is made up of the diffuser/bladed wheel and shaft.

Q2: If the gas component of the "Mainline Unit Package" turbine is removed routinely for maintenance and replaced by an identical model, does this rotation constitute a modification of the affected facility?

A2: If the rotation of the gas components increases emissions, the source must review the replacement to determine if the Mainline Unit Package is subject to Subpart GG pursuant to the modification provisions. The source also must review the rotation of the gas components to determine whether the replacement of a gas component exceeds 50% of the fixed capital cost of the "Mainline Unit Package" which would constitute a "reconstruction" under 40 CFR 60.15.

Q3: Does the addition of rim cooling to a "Mainline Unit Package" result in a modification that would make the turbine an affected facility under NSPS Subpart GG?

A3: Based on the information presented by the source, the addition of rim cooling does result in an increase in emissions of air pollutants, but this increase occurs as a result of an increase in production rate. Under the NSPS modification provisions, increases in production rate that increase emissions will trigger applicability only if the increased production rate requires a capital expenditure. EPA believes that in this case a capital expenditure may have occurred, but the source may evaluate and provide further documentation to show that no capital expenditure was required.

Letter:

Reply To
Attn Of: OAQ 107

Jordan E. Jacobson
Counsel
Alyeska Pipeline Service Company
1835 South Bragaw Street
Anchorage, Alaska 99512

Re: NSPS Subpart GG Applicability Determination for the Alyeska Pipeline Service Company; Rim Cooling

Dear Mr. Jacobson:

The purpose of this letter is to respond to your letter of March 18, 2002, regarding the applicability of New Source Performance Standard (NSPS) Subparts A (General Provision) and GG (Standards of Performance for Stationary Gas Turbines) to certain sources associated with the operation of the Trans-Alaska Pipeline System (TAPS). NSPS Subpart GG applies to all stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules (10 million Btu) per hour, based on the lower heating value of the fuel fired, that commenced construction, modification or reconstruction after October 3, 1977. See 40 CFR 60.330. Based on new information provided by Alyeska, this applicability determination supersedes the applicability determination issued by EPA to Alyeska on August 1, 2002 (Control Number 0300006).

Your March 18, 2002, letter correctly states that the State of Alaska does not have federal delegation of NSPS Subpart GG, and you therefore appropriately directed your applicability determination to EPA. Authority to issue determinations pertaining to applicability of a source to 40 CFR Part 60 has been delegated to the Unit Managers in EPA Region 10's Office of Air Quality.

Background

TAPS is a pipeline that transports crude oil from the North Slope of Alaska to a port (Valdez Marine Terminal) near the community of Valdez, Alaska. Alyeska operates the TAPS pipeline on behalf of the pipeline owner companies. The crude oil is transported through the pipeline by pumps that are associated with pumping stations. Turbines are used to power the pumping stations. According to the March 18, 2002, applicability determination request from Alyeska, there are two types of "turbines" employed at the TAPS pumping stations, a "Rolls Royce MK-1533 Avon Turbine" (Avon Gas Component) and a "Cooper Bessemer Reaction Turbine" (Cooper Bessemer Reaction Component). The two components make up what Alyeska refers to as a "Mainline Unit Package." The Avon Gas Component produces the high-energy exhaust gas flow which is then routed via ducting to the Cooper Bessemer Reaction Component, which is made up of the diffuser/bladed wheel and shaft. According to Alyeska's March 18, 2002 applicability determination request, there are seven active pump stations, six of which have one or more Mainline Unit Packages.

In the March 18, 2002, applicability determination request, Alyeska states that the Avon Gas Component can be removed from its associated Mainline Unit Package for maintenance or may be relocated to a Mainline Unit Package at another location. Alyeska claims that since each Avon Gas Component is the same model, the movement of the Avon Gas Component does not affect the peak load of the Mainline Unit Package. Alyeska also states that several of the Mainline Unit Packages have been modified with the addition of a cooling configuration referred to as "rim cooling." Rim cooling involves routing a small volume of air from the Avon Gas Component to the Cooper Bessemer Reaction Component wheel, which cools the wheel such that the unit can operate at a higher rpm with an increased production rate. According to Alyeska, the addition of the rim cooling allows a Mainline Unit Package to increase its maximum capacity from 7500 rpm to 7900 rpm.

In the course of reviewing Alyeska's request, EPA contacted the company and requested additional information regarding the cost for adding rim cooling to Mainline Unit Package. Alyeska provided EPA preliminary cost information during a site visit to a pump station in Prudhoe Bay on June 25, which was followed up with correspondence from Alyeska to EPA Region 10 dated July 18, 2003. The July 18 correspondence also included additional information which EPA has considered in the preparation of this response.

Questions Presented

The questions posed by Alyeska's letter of March 18, 2002 are as follows: Does the addition of "rim cooling" to a Mainline Unit Package result in a "modification" to the Avon Gas Component of the Mainline Unit Package such that the Avon Gas Component is subject to NSPS Subpart GG? If there is such a modification, does the Avon Gas Component remain subject to NSPS Subpart GG when it is removed from servicing a Mainline Unit Package that has been modified with rim cooling and rotated to another Mainline Unit Package that has not been modified with rim cooling?

Based on further discussions between Alyeska and EPA at a meeting on May 14, 2003, EPA believes that the following issues must be addressed to determine the applicability of 40 CFR Part 60, Subpart GG to the Mainline Unit Packages: 1) What is the "affected facility;" 2) Does the rotation of the Avon Gas Components among Mainline Unit Packages affect the applicability of Subpart GG; and 3) Does the installation of rim cooling affect the applicability of Subpart GG.

Defining the Affected Facility

NSPS Subpart GG applies to all "stationary gas turbines" with a heat input at peak load equal to or greater than 10.7 gigajoules (10 million Btu) per hour, based on the lower heating value of the fuel fired, that commenced construction, modification or reconstruction after October 3, 1977. See 40 CFR 60.330. Based on the information provided by Alyeska in the March 18, 2002, applicability determination request, and from EPA's on site observations at Pump Station 1, Prudhoe Bay, Alaska on June 25, EPA has determined that the Mainline Unit Package (and not the individual components) is a "stationary gas turbine." As that term is defined in 40 CFR 60.331(a), a stationary gas turbine means "any simple cycle gas turbine, regenerative cycle gas turbine or any gas turbine portion of a combined cycle steam/electric generating system that is not self propelled. It may, however, be mounted on a vehicle for portability."

EPA describes a stationary gas turbine as being composed of three major components: compressor, combustor, and power turbine (Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Vol. I: Stationary Point and Area Sources, Chapter 3.1, Stationary Gas Turbines). AP-42 expands this description and how it is used in industrial applications, stating, "Energy from the hot exhaust gases, which expand in the power turbine section, are recovered in the form of shaft horsepower. More than 50 percent of the shaft horsepower is needed to drive the internal compressor and the balance of recovered shaft horsepower is available to drive an external load." (Emphasis added.) Instructional training materials prepared by the California Air Resources Board (CARB) further support the position that, in the case of a stationary gas turbine, the turbine includes the power turbine component that is necessary to produce usable energy. CARB Course Number 272, Gas Turbines, June 1996, pages 200-31; 200-48; 200-61, and 200-69. As used by Alyeska, the Avon Gas Component serves as the power turbine and combustor, and the Cooper Bessemer Reaction Component serves as the power turbine. Thus, the combination of the two components makes up the stationary gas turbine. The Avon Gas Component is not a stationary gas turbine in and of itself, but rather, a component of the stationary gas turbine.

As discussed above, NSPS Subpart GG applies only to stationary gas turbines. Before addressing the issue raised by Alyeska in its March 18, 2002, request, EPA first considered the date of commencement of construction of the Mainline Unit Packages. As discussed above, the fabrication of a Mainline Unit Package includes installation of the Avon Gas Component, the Cooper Bessemer Reaction Component all associated duct work and electrical components. We have therefore determined that the relevant inquiry is on what date the Mainline Unit Package "commenced construction," not the date that the Avon Gas Component and/or the Cooper Bessemer Reaction Component "commenced construction." Therefore, Alyeska should ascertain the dates upon which each Mainline Unit Package "commenced construction," to determine if the Mainline Unit Package was constructed prior to October 3, 1977, the effective date of Subpart GG. The definitions of "commenced" and "construction" in 40 CFR Section 60.2 should be considered when addressing when each Mainline Unit Package "commenced construction." Any modifications, as described in 40 CFR Section 60.14, made to the Mainline Unit Package other than those described in the March 18, 2002 letter, should also be considered.

In response to a letter from Alyeska dated December 18, 2001, relating to the applicability of NSPS Subparts A and GG to turbines used in the operation of the TAPS pump stations, EPA issued an applicability determination dated August 1, 2002 (Control Number 0300006). Alyeska's December 18, 2001, letter referred to the equipment in question as a "turbine," which EPA assumed included a compressor, combustor, and a power turbine. In EPA's August 1, 2002, response, EPA stated that "In the case of stationary gas turbines that are mass-produced and purchased in completed form, EPA considers the manufacturer as the original owner or operator." See Letter from Edward E. Reich, EPA, to David L. Milliken, December 29, 1980. EPA further stated that the turbines described by Alyeska in the December 18, 2001, letter appear to fit the description of "turbines that are mass-produced and purchased in completed form." Based on additional new information provided by Alyeska in the March 18, 2002, applicability determination request, a May 14, 2003, follow-up meeting with the Office of Air Quality Planning and Standards, and Alyeska's follow-up letter of July 18, 2003, it now appears, however, that the "turbines" referred to in Alyeska's December 18, 2001, letter, are not in fact turbines, but instead are the Avon Gas Component of the Mainline Unit Package. Therefore, as discussed above, EPA believes that the relevant inquiry is on what date the Mainline Unit Package "commenced construction," not the date that the Avon Gas Component "commenced construction."

In addition to providing cost information for rim cooling projects, Alyeska's July 18, 2003, letter expressed concern that, if EPA determined that the Mainline Unit Package is the affected facility under subpart GG, then EPA would have to determine the applicability determination issued by EPA to Alyeska on August 1, 2002 (Control Number 0300006), as well as letters EPA wrote to Alyeska on October 16 and 30, 1997. As discussed above, EPA's applicability determination dated August 1, 2002 was issued based on incomplete information and is superseded by this letter. The EPA letters dated October 16 and 30, 1997 respond to requests for alternative monitoring and emission test waivers, and do not address what constitutes the affected facility for purposes of NSPS subpart GG.

Rotation of the Avon Gas Component

Based on the information provided by Alyeska in its letter of March 18, 2000, and the meeting on May 14, 2003, Alyeska has numerous Avon Gas Components that it rotates in and out of service among the Mainline Unit Packages. In other words, the Avon Gas Components are removed from their operating locations at Mainline Unit Packages periodically for maintenance and an Avon Gas Component from the TAPS inventory of the same component family is substituted as a replacement. The Cooper Bessemer Component and the pump powered by the Mainline Unit Package remains in place. Alyeska has not indicated that there would be an change in emissions as a result of the rotation of the Avon Gas Components. If, however, Alyeska finds that the rotation of an Avon Gas Component results in an increase in emissions from a Mainline Unit Package, Alyeska must review the replacement to determine if the Mainline Unit Package is subject to Subpart GG pursuant to the modification provisions. Alyeska must also review the rotation of the Avon Gas Components to determine whether the replacement of an Avon Gas Component exceeds 50% of the fixed capital cost of the Mainline Unit Package which would constitute a "reconstruction" under 40 CFR 60.15.

Addition of Rim Cooling Mechanism

As discussed above, Alyeska has installed "rim cooling" at some of the Mainline Unit Packages and desires to do the same at other Pump Station locations. Whether the installation of rim cooling triggers applicability of NSPS Subpart GG depends on whether it constitutes a "modification," as defined in 40 CFR 60.2 and 60.14, of a stationary gas turbine that occurred after October 3, 1977. A modification is defined as "any physical change in, or change in the method of operation of, an existing facility which increases the amount of any air pollutant (to which a standard applies) emitted to the atmosphere by that facility or which results in the emissions of any air pollutant (to which a standard applies) into the atmosphere not previously emitted." Based on information provided by Alyeska in its letter of March 18, 2002, rim cooling allows a Mainline Unit Package to increase production capacity from 7500 rpm to 7900 rpm. Alyeska's March 18, 2002, request states that the addition of rim cooling to one turbine unit increased emissions at Pump Station 12, and that the facility's air permit was modified to account for and to limit the emissions increase from that and other turbine units to no more than 39 tons/yr of NOx to avoid triggering PSD. During the May 14, 2003, follow-up meeting, Alyeska also indicated that there is an increase in the emissions to the atmosphere as a result of the increase in production capacity.

Under 40 CFR 60.14(e)(2), however, an increase in the production rate of an existing facility shall not, by itself, be considered a modification "...if that increase can be accomplished without a capital expenditure on that facility." Based on preliminary information submitted to EPA during a site visit on June 25, 2003, and in your July 18, 2003 letter, we believe that the addition of rim cooling may have resulted in a capital expenditure as defined in 40 CFR Section 60.2. If Alyeska believes that the addition of rim cooling did not result in a "capital expenditure," as defined in 40 CFR 60.2, please submit the documentation supporting that determination to EPA for review.

If the addition of rim cooling did result in a "capital expenditure," then the addition of rim cooling to a Mainline Unit Package would be a modification. All Mainline Unit Packages modified with rim cooling after October 3, 1977, would be subject to NSPS Subpart GG. Applicability of the NSPS Subpart GG requirements to the Mainline Unit Packages would not be affected by the rotation of the Avon Gas Components.

Please note that this applicability determination is limited to the information provided in the March 18, 2001, applicability determination request as well as at the meeting of May 14, 2003, our site visit on June 25, 2003, and Alyeska's July 18, 2003, letter. Any additional information made available to EPA or any changes made to the turbine operations from that described in the March 18, 2002 applicability determination request, may cause this determination to no longer be valid. Please also note that the responses in this letter are limited to questions presented under NSPS Subparts A and GG. Other CAA requirements may apply to these kinds of changes, such as major New Source Review or Prevention of Significant Deterioration.

As you know, in preparing this response, Region 10 worked closely with the Office of Enforcement and Compliance (OECA), as well as the Office of Air Quality Planning and Standards (OAQPS). If you have any further questions or concerns, please feel free to John Pavitt of the Region 10 Alaska Operations Office staff, at (907) 271-3688. Mr. Pavitt will coordinate with OECA and OAQPS on EPA's behalf in responding to your questions and concerns.

Sincerely,

Jeff KenKnight, Unit Manager
Federal And Delegated Air Programs Unit Office of Air Quality

cc: John Pavitt, EPA Region 10, Office of Air Quality John Kuterbach, ADEC, Juneau bcc: Julie Vergeront, EPA Region 10, Office of Regional Counsel Mamie Miller, Office of Compliance Sims Roy, Office of Air Quality Planning and Standards Rich Biondi, Office of Regulatory Enforcement Andrew Gordon, Office of General Counsel