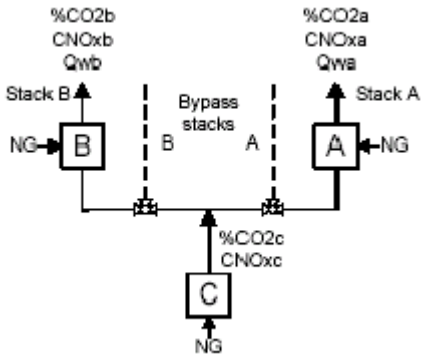
June 23, 2004

E.T. Gastenveld
Authorized Account Representative
Air Products and Chemicals, Inc.
Calvert City CoGen
7201 Hamilton Boulevard
Allentown, PA 18195-1501

Re: Petition to use low mass emission methodology for Calvert City CoGen, (Facility ID ORISPL 55308).

Dear Mr. Gastenveld:

EPA has reviewed your November 22, 2002 petition under §75.66(a) in which Air Products and Chemicals, Inc. (Air Products), requested to use low mass emissions (LME) methodology for monitoring nitrogen oxides (NO_X) at two natural-gas-fired boilers at Calvert City CoGen. EPA approves the petition with certain conditions, as discussed below.



Background

Calvert City CoGen has one natural-gas-fired combustion turbine integrated with two natural gas fired boilers as shown in Figure 1.*Figure 1. Plant Overview*

The combustion turbine and boilers are each treated as a distinct unit under Kentucky's regulations implementing the NO_X Budget Trading Program. Unit C, a combustion turbine, splits its exhaust between the two identical boilers, Units A and B. The observed exhaust split average during the past three ozone seasons between Units A and B was 52% to Unit A and 48%

to Unit B. Units A and B, while receiving combustion turbine exhaust flow, act as heat recovery steam generators that are sometimes supplemental fired and sometimes unfired. Each boiler is also capable of independent firing, in which case the combustion turbine exhaust is bypassed through the boiler's associated bypass stack. However, the most frequent operating scenario of the units is for the waste heat from Unit C to be recovered by Units A and B with supplemental firing. Units A and B are used to produce process steam and not for electricity generation.

As shown in Figure 1, the current monitoring equipment includes a continuous emission monitoring system (CEMS) at the combustion turbine exhaust ductwork (carbon dioxide (CO_2) % and NO_X concentration) and a NO_X CEMS at each of the main stacks (CO_2%, NO_X concentration and flue gas flow). The turbine and both boilers are also equipped with natural gas flow meters.

Air Products is requesting that Units A and B, which exhaust to stacks A and B, be considered LME units under §75.19. The two units meet most of the requirements of the LME methodology in §75.19, as described below:

- Units A and B each fire only pipeline natural gas and, according to Air Products, are not subject to the Acid Rain Program. Each unit emits no more than 50 tons of NO_X per ozone season as provided in §75.19(a)(1)(i).
- A certification application to use the LME methodology has been submitted as required under §75.19(a)(2). The basis for the certification is an estimate of the actual emissions for each of the previous three ozone seasons using procedures consistent with the long term fuel flow heat input methodology as required in §75.19(a)(2)(ii)(A).

However, both Units A and B simultaneously receive exhaust gas flow from the combustion turbine (Unit C). It is necessary to segregate the stack emissions of Units A and B from those of Unit C, which also exhausts through the main stacks. Therefore, the specific requests of the petition are as follows:

Issue 1. With regard to the demonstration that Units A and B qualify to use the LME methodology, Air Products requests:

(a) The use of Equation 1 in §60.46b(f)(1)(i) along with CEMS data to determine the 95th percentile NO_X emission factors Units A and B following the methodology in §75.19(c)(1)(iv)(G).
(b) The use of a subtractive method to determine some heat inputs values (i.e., the heat input from combustion of fuel in Units A and B) required by Equation 1.

Issue 2. Air Products seeks to only include hours for Units A and B when the units are fired to determine hourly emissions of NO_X in equation LM-8 as provided in §75.19(c)(3)(ii)(1).

EPA's Determination

EPA approves Air Products' petition to use LME methodology for the Calvert City CoGen with certain conditions, as discussed below.

Issue 1: Air Products proposes to use Equation 1 in §60.46b(f)(1)(i) along with CEMS data to determine NO_X emission rates (lb/mmBtu) for Units A and B. In using Equation 1, it is necessary to use a subtractive method to determine the heat input from fuel combustion in Units A and B, which receive both natural gas for combustion in each unit and waste heat from Unit C. The NO_X LME methodology allows for a facility to use default NO_X emission rates or determine a fuel-and-unit-specific NO_X emission rate based on a variety of methods as provided in §75.19(c)(1)(iv). Air Products proposes to determine a fuel-and-unit-specific NO_X emission rate for Units A and B based on three years of quality assured NO_X emission rate data, as provided in §75.19(c)(1)(iv)(G).

However, due to the configuration of Calvert City CoGen, the data collected by the CEMS at each of the two main stacks, over the required three-year period, includes a contribution from the turbine combustion exhaust. Therefore, the NO_X emission rate from this data is for both the combustion turbine and a boiler (Unit A or B). Air Products proposes to use Equation 1, in §60.46b(f)(1)(i) to determine the emission rate from Units A and B, subtracting out the combustion turbine component. This equation is generally used to subtract out emissions for duct burners used in combined cycle systems. Duct burners are fuel burning equipment used to add heat to the exhaust gas from a turbine or other fuel burning source, which is then fed into a heat recovery steam generating unit. Air Products suggests using the equation for Units A and B, which operate in a similar manner as duct burners in that turbine exhaust is used in conjunction with independent burners (here, burners in the boiler).

EPA approves the proposed methodology of determining the fuel-and-unit-specific NO_X emission rates of Units A and B with the following conditions:

1. The fuel-and-unit-specific 95th percentile NO_X emission rate for each boiler will be based on quality assured data from all modes of operation when the boiler is burning natural gas with or without any contribution from the combustion turbine.
2. Any future fuel-and-unit-specific NO_X emission rates, which must be determined in accordance with §75.19(c)(1)(iv) and this letter, shall be based on quality assured data and also reflect all modes of operation of the boiler, including when the boiler is burning natural gas with or without any contribution from the combustion turbine.

Issue 2: Air Products proposes to determine hourly, quarterly and annual heat input for Units A and B based on a long term fuel flow method as provided in §75.19(c)(3). Hourly heat input for each boiler will be determined using Equation LM-8 in §75.19(c)(3)(ii)(I) with some modifications. For each unit, heat input is used to calculate NO_X mass emissions.

The CEMS at Unit C exhaust ductwork monitors and reports all NO_X created in Unit C. The LME methodology will be used to report only additional NO_X created in Units A and B. In

$$HI_{hr} = HI_{qtr-total} \frac{ST_{hr-fired}}{ST_{qtr-forhoursfired}}$$

order to minimize the inclusion of NO_X from Unit C in the results of the LME methodology, the fuel-and-unit-specific NO_X emission rates developed for Units A and B (as described above) should be multiplied by the hourly heat input from fuel combustion in Units A and B respectively to yield hourly NO_X mass emissions. If the heat input for Units A and B from waste heat from Unit C were included in the calculation of NO_X mass for Units A and B, this would have the effect of double-counting the heat input from fuel combustion in Unit C, i.e., first in determining NO_X mass emissions for Unit C and second in determining NO_X mass emission for Units A and B. Consequently, only the heat input from fuel combustion in Units A and B should be reported as heat input for those units.

The issue is how to determine hourly heat input from fuel combustion in Units A and B. Each unit has a fuel flow meter that measures the natural gas combusted in the unit. Consequently, for purposes of determining heat input from natural gas, the units should be treated as not sharing a common fuel supply, and Equation LM-8 in §75.19(c)(3)(ii)(I), for apportioning quarterly heat input (here heat input from natural gas combusted at the unit) to each hour of unit operation, is applicable:

Equation LM-8

Where: HI_{hr} = hourly heat input to unit (mmBtu)
$HI_{qtr-total}$ = quarterly total heat input to unit (mmBtu)
ST_{hr} = hourly steam load for unit (klb of steam/hr)
ST_{qtr} = quarterly sum of all hourly steam loads for unit (klb of steam/hr)

$$HI_{hr} = HI_{qtr-total} \frac{ST_{hr}}{ST_{qtr}}$$

However, Equation LM-8 apportions the hourly heat input to the unit based upon the ratio of hourly to quarterly steam load of the unit. As noted earlier, Units A and B will occasionally generate steam purely from the combustion turbine exhaust heat recovery while not burning any fuel. Therefore, Air Products proposes to apportion the heat input using this formula but based on only steam generation for hours when Units A and B actually are burning fuel. The modified formula will be as follows:

Equation LM-8 (modified)

Where: HI_{hr} = hourly heat input to unit (mmBtu)
$HI_{qtr-total}$ = quarterly total heat input to unit (mmBtu)
$ST_{hr-fired}$ = hourly steam load for unit when unit is burning natural gas (klb of steam/hr)

$ST_{qtr\text{-}for\ hours\ fired}$ = quarterly sum of all hourly steam loads for unit when unit is burning natural gas(klb of steam/hr)

EPA believes that this modified apportion methodology is a reasonable means of determining the hourly heat input from natural gas for Units A and B. Including hourly steam generation from a unit when only the combustion turbine is being fired would misstate that hour's share of total fuel use. Heat input from natural gas would be attributed to that hour even though no natural gas was combusted in the unit and all the steam generation for that hour resulted from combustion turbine exhaust. Therefore, EPA approves the use of the modified Equation LM-8 to apportion the hourly heat input to Units A and B.

EPA's determination in this letter relies on the accuracy and completeness of the information provided by Air Products in the November 22, 2002 petition and can be appealed under Part 78. If you have any questions or concerns about this determination, please contact Manuel J Oliva, at (202) 564-0162.

Sincerely,

/s/
Sam Napolitano, Acting Director
Clean Air Markets Division

cc: Wilson Haynes, EPA Region III
Jerry Slucher, Kentucky DEP
Manuel J Oliva, EPA CAMD