March 1, 2007

David J. Toombs
General Manager
Authorized Account Representative
Citizens Thermal Energy
366 Kentucky Avenue
Indianapolis, Indiana 46225-1165

Re: Petition for an Alternative Fuel Flowmeter Quality Assurance Methodology for Units 11, 13, and 14 at the C.C. Perry K Steam Plant (Facility ID (ORISPL) 992)

Dear Mr. Toombs:

The United States Environmental Protection Agency (EPA) has reviewed the April 28, 2005 petition submitted by Citizens Thermal Energy >s (CTE) under ' 75.66, in which CTE requested approval of an alternative quality-assurance methodology for the V-cone fuel flowmeters installed on Units 11, 13, and 14 at the C.C. Perry K Steam Plant. EPA approves the petition in part, with conditions, as discussed below.

Background

CTE owns and operates the C.C. Perry K Steam Plant (Perry K), located in Indianapolis, Indiana. The facility consists of six boilers, three of which are coal-fired (Units 12, 15, and 16) and three of which are gas-fired (Units 11, 13, and 14). All six boilers are subject to the NO_x Budget Trading Program under 326 I.A.C., and Unit 11 is also in the Acid Rain Program. The NO_x Budget Program regulation requires CTE to continuously monitor and report the units' nitrogen oxides (NO_x) mass emissions and heat input in accordance with 40 CFR Part 75. To satisfy the Acid Rain Program requirements, CTE must also continuously monitor and report Unit 11's sulfur dioxide (SO_2) mass emissions, carbon dioxide (CO_2) mass emissions, and NO_x emission rate according to Part 75.

Units 11, 13, and 14 combust coke oven gas (COG) and natural gas. In 1998, CTE installed V-cone fuel flowmeters manufactured by McCrometer, Inc. on Units 11, 13, and 14 to continuously monitor the flow rates of coke oven gas and natural gas to each unit. The measured fuel flow rates are used in conjunction with gross calorific values (GCVs) obtained from fuel sampling and analysis to quantify the heat input to each unit.

The V-cone flowmeter is a differential pressure device that determines the fuel flow rate by constricting the cross-sectional area of the fuel pipe and measuring the difference in pressure

upstream and downstream of the constriction. This measurement principle is similar to that of an orifice meter. CTE believes that particularly when COG is combusted in Units 11, 13, and 14, the design of the V-cone flowmeter offers a distinct advantage over an orifice meter, in that it minimizes the likelihood of organic matter and particulate matter build-up on the primary element (cone) by directing these heavier materials to the high-velocity path between the circumference of the cone and the pipe wall.

The Part 75 requirements for the initial certification and ongoing quality assurance (QA) of fuel flowmeters are found, respectively, in sections 2.1.5 and 2.1.6 of Appendix D. The basic procedure for initial certification consists of calibrating the meter with a flowing fluid at three evenly-spaced points covering the range of fuel flow rates to be measured at the affected unit. This 3-level calibration is generally performed in a laboratory, although, as an alternative, a field calibration may be performed by temporarily installing a certified "master meter" in-line with the candidate flowmeter and comparing the readings from the two meters.

For ongoing QA, the 3-level calibration must be repeated annually, unless the QA test deadline can be legitimately extended. A one-quarter extension of the test deadline may be claimed for each calendar quarter in which: (1) the type of fuel measured by the flowmeter is combusted for less than 168 hours; or (2) the owner or operator is able to demonstrate the continued accuracy of the flowmeter by means of a data analysis, known as the "fuel flow-to-load ratio test" (see Part 75, Appendix D, section 2.1.7). However, there is a limit to how far the QA test deadline may be extended. The maximum allowable interval between successive calibrations of a fuel flowmeter is five years (20 calendar quarters).

Sections 2.1.5 and 2.1.6 of Appendix D provide one exception to the basic fuel flowmeter certification and QA methodology described immediately above. For an orifice-, nozzle-, or venturi-type flowmeter that meets the design criteria of American Gas Association Report No. 3 (AGA3), the owner or operator may certify the meter by performing a visual inspection of the primary element (e.g., the orifice plate) and calibrating the transmitters that are used to measure total pressure, temperature, and differential pressure. For the purposes of ongoing QA, transmitter recalibration is required annually and a primary element inspection (PEI) is required once every three years. Limited extensions of these QA test deadlines are available, as described in the preceding paragraph.

American Gas Association Report No. 3 applies only to orifice-, nozzle-, or venturi-type flowmeters and does not include design specifications and QA procedures for V-cone meters. Therefore, unless EPA approves a petition under §75.66 to use alternative certification and QA procedures, a V-cone meter must undergo the initial 3-level calibration with a flowing fluid and the periodic recalibrations described above to satisfy the requirements of Appendix D. In view of this, on April 28, 2005 CTE submitted a petition to EPA requesting approval of an alternative certification and QA methodology for the V-cone flowmeters installed on Perry K Units 11, 13, and 14.

CTE requested that EPA classify the V-cone as a differential pressure flowmeter to be certified by design. For ongoing QA of the V-cone meters, CTE proposed to follow the alternative QA procedures that are allowed for AGA3 orifice meters (i.e., periodic transmitter

calibrations and PEIs). According to CTE, these QA procedures are appropriate for the V-cone meter because its measurement principle is basically the same as that of an orifice meter. The alternative QA procedures would be performed annually. Periodic three-level laboratory calibrations of the flowmeters with a flowing fluid would still be required, but the frequency of these calibrations would be reduced from annual to once every 20 "QA operating quarters" or 5 years (whichever is sooner).

CTE further requested that EPA allow the annual visual inspections of the primary element (cone) to be performed with a boroscope or endoscope. Finally, CTE asked the Agency to confirm that any one of the following three methods is acceptable for the 3-level laboratory calibrations of the V-cone meters: ASME MFC-9M, ASME MFC-7M, and API 5.7.

To support the proposed alternative QA methodology for the V-cone flowmeters, CTE provided the results of laboratory calibrations of the meters, performed several years apart. The test data consistently show that after 3 to 6 years of measuring COG and natural gas flow rates at Perry K, the V-cone meters' discharge coefficients remained constant to within 2 percent. According to CTE, these results demonstrate that annual out-of-pipe calibration of the V-cone meters is unnecessary and that reducing the calibration frequency to once every five years is justified.

EPA's Determination

EPA denies CTE's request to allow V-cone meters to be certified by design. As previously noted, the design criteria in AGA Report No.3 apply only to orifice-, nozzle-, and venturi-type flowmeters. EPA is unaware of any similar consensus standards for the design of V-cone meters, and no such information was provided by CTE with the April 28, 2005 petition. Therefore, for the initial certification of a V-cone flowmeter, a 3-level calibration with a flowing fluid is still required. The following methods are acceptable for the 3-level calibrations: ASME MFC-7M-1987 (Reaffirmed 2001); and API Chapter 22, Section 2 (August 2005) (previously known as API 5.7). CTE may also use ASME MFC-9M-1988 (Reaffirmed 2001), provided that the Reynolds numbers used for the liquid calibration are equal to typical Reynolds numbers for low, medium, and high gas flow rates through the fuel pipe at the affected unit.

EPA approves CTE's request to perform annual transmitter calibrations and PEIs of the V-cone meters installed on Perry K Units 11, 13, and 14, in accordance with sections 2.1.6.1 through 2.1.6.4 of Part 75, Appendix D. These tests shall be done once every four "fuel flowmeter QA operating quarters" (as defined in §72.2). The PEIs may be done with a baroscope or endoscope. The Agency also approves CTE's request to reduce the frequency of 3-level laboratory calibrations of the V-cone meters. The approved frequency for the 3-level calibrations is once every five years (20 calendar quarters). EPA denies CTE's proposed alternative calibration frequency of once every 20 QA operating quarters, as this is not consistent with the maximum allowable interval between flowmeter accuracy tests specified in section 2.1.6(a) of Appendix D.

EPA's approval of these alternative QA procedures for the V-cone flowmeters is based on the following considerations. The supplementary flowmeter calibration data provided by CTE

with the April 28, 2005 petition show that after exposing the V-cone meters to normal process operating conditions at Perry K for an extended period of time (3 to 6 years), the discharge coefficients of the meters remained constant to within 2 percent over a wide range of Reynolds numbers. Thus, it appears that for this application, V-cone meters are highly resistant to particulate buildup, pitting, and other factors that can adversely impact flow rate measurements, and that the meters are capable of holding calibration for several years at a time. In view of this, the Agency is persuaded that performing 3-level laboratory calibrations of the V-cone meters once every five years should be adequate, provided that, during the time interval between successive 3-level calibrations, meaningful supplementary QA checks are performed to provide assurance of continued flowmeter accuracy.

One way of assessing V-cone flowmeter performance in-between the 3-level out-of-pipe calibrations would be to perform quarterly fuel flow-to-load ratio or gross heat rate (GHR) tests, as described in section 2.1.7 of Appendix D. However, the results of a recent study have shown that the manner in which the Perry K units are operated and the unusual mixture of fuels combusted in the units makes the quarterly flow-to-load ratio or GHR test infeasible[1]. The study found that a "least squares" modification of the GHR procedure could provide some useful QA information for the Perry K flowmeters, but even the modified procedure was not able to account for a number of significant, temporary shifts of the GHR away from its baseline value. In view of this, EPA rejects the flow-to-load ratio or GHR test as a viable QA tool for the Perry K V-cone flowmeters and instead is requiring the annual transmitter calibrations and visual inspections proposed by CTE.

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1. Shigehara, Roger T; "Technical Evaluation of Alternative Fuel Flow Meters"; Emission Monitoring, Inc.; Raleigh, NC; January 2006

EPA=s determination relies on the accuracy and completeness of the information provided by CTE in the April 28, 2005 petition and is appealable under Part 78. If you have any questions regarding this determination, please contact Louis Nichols at (202) 343-9008. Thank you for your continued cooperation.

Sincerely,

/s/
Sam Napolitano, Director
Clean Air Markets Division

cc: Constantine Blathras, EPA Region V
Dave Cline, IDEM
Louis Nichols, CAMD