

July 13, 2011

Mike Meyers
Alternate Designated Representative
Brazos Electric Power Cooperative, Inc.
2404 La Salle Avenue
PO BOX 2585
Waco, Texas 76702-2585

Re: Petition to Use an Alternative Natural Gas Fuel Flowmeter Calibration Procedure for Units CT-3 and CT-4 at the Jack County Generation Facility (Facility ID (ORISPL) 55230)

Mr. Meyers:

This is in response to your May 25, 2011 petition in which Brazos Electric Power Cooperative, Inc. (BEPC) requested to use an alternative procedure to certify an ultrasonic natural gas fuel flowmeter at the Jack County Generation Facility. EPA approves the petition, for the reasons discussed below.

Background

The Jack County Generation Facility (Jack County) is a natural gas-fired combined-cycle power plant located near Joplin, Texas. The facility has a nominal capacity of 1,240 MW, and consists of four natural gas-fired combustion turbine generators (CT-1, CT-2, CT-3, and CT-4), four heat recovery steam generators (HRSGs), two steam turbine generators, and other assorted equipment. The plant is designed to operate in a two-on-one configuration, with Units CT-1 and CT-2 connected to a single generator (ST-1), and Units CT-3 and CT-4 connected to another generator (ST-2). However, the plant is also capable of operating in a one-on-one configuration with a single combustion turbine supplying steam to a single generator. Supplemental duct burners in the HRSGs are used to boost the facility's electrical output, as well as to adjust ("swing") electrical output, as needed. For control of nitrogen oxides (NO_x) emissions, the gas turbines use dry low NO_x technology and selective catalytic reduction (SCR).

According to BEPC, the turbines are subject to the Acid Rain Program (ARP) and the Clean Air Interstate Rule (CAIR) SO₂ and NO_x annual programs. These regulations require BEPC to continuously monitor and report sulfur dioxide (SO₂), NO_x, and carbon dioxide (CO₂) emissions and heat input for Units CT-1, CT-2, CT-3, and CT-4, in accordance with 40 CFR Part 75.

To meet the NO_x monitoring and reporting requirements of Part 75, BEPC has installed and certified a NO_x-diluent continuous emission monitoring system (CEMS). BEPC uses the alternative methodology in Appendix D of Part 75 to account for SO₂ emissions and unit heat input and the

methodology in Appendix G to Part 75 to account for CO₂ emissions.

If an affected unit meets the definition of “gas-fired” or “oil-fired” in 40 CFR 72.2, the Appendix D methodology may be used instead of CEMS, for certain parameters (i.e., for SO₂ mass emission rate and heat input rate). The Appendix D methodology requires continuous monitoring of the fuel flow rate and periodic sampling of the fuel characteristics, such as sulfur content, gross calorific value (GCV), and density. The measured fuel flow rates are used together with the results of the fuel sampling and analysis to determine the SO₂ mass emission rate and the unit heat input rate. Appendix D requires either a certified fuel flowmeter or a commercial billing meter to be used to continuously measure fuel flow rates. To certify a fuel flowmeter, its accuracy must be established using one of the methods¹ specified in section 2.1.5.1 of Appendix D.

In most cases, the certification test procedure consists of calibrating the meter with a flowing fluid, at three flow rates covering its normal operating range. Generally, this requirement is met by calibrating the flowmeter in a laboratory, although the flowmeter may be calibrated at the affected facility, by comparison against an in-line “master meter” that has been tested for accuracy within the past 365 days using one of the methods in section 2.1.5.1 of Appendix D. Section 2.1.5 of Appendix D requires each fuel flowmeter to meet an accuracy specification of 2.0% of the “upper range value” (i.e., the full-scale of the instrument).

The fuel flowmeters installed on Jack County Units CT-3 and CT-4 are ultrasonic meters, manufactured by GE Infrastructure Sensing. The model number of both flowmeters is SEN-8-1-60-2-AX-S, and the serial numbers are 3360M971 and 3361M972, respectively. Part 75 requires this type of flowmeter to be calibrated, with a flowing fluid, at a minimum of three evenly-spaced flow rates covering its normal operating range.

Section 2.1.5.1 of Appendix D lists several acceptable methods for calibrating fuel flowmeters. To obtain permission to use a method other than those listed, the owner or operator may petition EPA under §75.66(c). Any such alternative calibration procedures must use equipment that is traceable to National Institute of Standards and Technology (NIST) standards.

The ultrasonic fuel flowmeters installed on Units CT-3 and CT-4 were calibrated on July 23, 2009, by the Colorado Engineering Experiment Station, Inc. (CEESI). The calibrations were performed in a test medium of natural gas, at 6 different flow rates covering the full-scale range of the flowmeters. CEESI used a turbine-type reference flowmeter to calibrate the ultrasonic flowmeters. The turbine flowmeter had been previously calibrated against a primary flow system using NIST-traceable standards for mass and time. The calibrations of the ultrasonic flowmeters were done according to the procedures outlined in American Gas Association (AGA) Report No. 9. All properties of the natural gas were calculated in accordance with AGA Report No. 8. The reported results of the calibrations indicated an uncertainty in the flowmeter readings for both flowmeters of 0.23%, at the 95 percent confidence level.

Since the calibration method used by CEESI is not one of those listed in Appendix D of Part 75, BEPC submitted a petition to EPA under §75.66(c) on May 25, 2011, requesting approval of the alternative methodology.

¹ These methods represent consensus standards established by various organizations, e.g., ASME, API, AGA, and ISO.

EPA's Determination

EPA is familiar with the protocol used by CEESI to calibrate fuel flowmeters, having reviewed the protocol in reference to a previous petition for an alternative flowmeter calibration method. The CEESI protocol is well-conceived, commencing with an inspection of the flowmeter for any external or internal damage that may have occurred during shipping. The protocol provides a detailed outline of the procedures used for: (1) installing the flowmeter in the test section; (2) verifying that the flowmeter and its electronics are communicating appropriately; (3) performing pre-flow checks of the data acquisition system; (4) performing the actual calibrations against reference turbine flowmeters; (5) processing the data; and (6) reviewing the test results.

The ultrasonic flowmeters were calibrated at 6 flow rates, which exceeds the minimum of 3 flow rates required by section 2.1.5 of Appendix D. The calibration medium was natural gas, which is appropriate, since the intended use of the meters is to measure the flow rate of pipeline natural gas to Jack County Units CT-3 and CT-4. The results of the calibrations show an uncertainty of 0.23% for both flowmeters in the readings at the individual calibration points. This exceeds the Part 75 accuracy specification of 2.0% of the flowmeter's upper range (full-scale) value. CEESI also provided a Certificate of Calibration along with the test results, stating that the calibrations were performed in accordance with AGA Reports No. 8 and 9 and that the calibration standards used are traceable to NIST.

In view of these considerations, EPA approves the alternative procedures that were used to calibrate the ultrasonic fuel flowmeters. Therefore, the GE Infrastructure Sensing ultrasonic fuel flowmeters (model number SEN-8-1-60-2-AX-S) installed on Jack County Units CT-3 and CT-4, with serial numbers 3360M971 and 3361M972, respectively, have met the certification requirements of Part 75, Appendix D, section 2.1.5, and are approved for use at the Jack County facility.

EPA's determination in this letter relies on the accuracy and completeness of the information provided by BEPC in the May 25, 2011 petition and subsequent e-mails (of June 1 and 8, 2011) and is appealable under Part 78. If you have any questions about this determination, please contact Travis Johnson, at (202) 343-9018. Thank you for your continued cooperation.

Sincerely,

/s/

Sam Napolitano, Director
Clean Air Markets Division

cc: John Smith, Texas CEQ
Joyce Johnson, EPA Region VI
Travis Johnson, CAMD