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Via Email and U.S. Mail

March 24, 1999

Margaret Sheppard
U.S. Environmental Protection Agency
Acid Rain Division
401 M Street, S.W.,
Mail Code 6204J
Washington, DC 20460

Subject: Output Based Emission Limitations Issues Under the Energy, Clean Air and Climate Change Federal Advisory Process

Dear Ms. Sheppard:

Texaco is pleased to submit several comments on steam flow measurements, which the U.S. EPA has solicited during the conference call of February 18 of the Updating Output Based Emission Limitations Work Group, convened under the Energy, Clean Air and Climate Change federal advisory process.

In general, Texaco has expressed support for fuel-neutral, output-based performance standards for electric utilities in two recent EPA rulemakings: NSPS Subparts Da and Db standards; and the NOx SIP Call rulemaking. However, Texaco has also expressed specific concerns about applying output based emissions limitations to industrial boilers, which will have significant additional complications that need to be addressed. At the same time, as these issues will likely have precedent-setting impact on any potential regulatory regime under the Kyoto Protocol, Texaco is therefore very interested in providing the Agency with factual information that can form a sound basis for considering future output-based emissions limitations.

1. Texaco recommends that 100% of the steam output and electric output from cogeneration facilities be creditable under an output-based emission limitation.

The product of cogeneration is often steam and electricity. As such, both

products are measured quantities that have value to the cogeneration facility and the customer of the steam and electricity. Any arbitrary discounting of the credit given to steam or electric output would not reflect the actual value of these two products.[1] Therefore, Texaco recommends that both the steam output and the electric output be 100% creditable.

2. The heat of the steam is valuable to customers and the steam flow can be measured with different devices.

Texaco has ownership interest in many cogeneration facilities that supply steam for enhanced oil recovery (EOR) in the United States and around the world. The steam is used by the EOR facilities to heat low viscosity oil in the ground so it can be pumped to the surface. The EOR facilities purchase steam from the cogeneration plants based on the heat content of the steam. The Enthalpy (i.e., heat content) of the steam is determined using standard Steam tables and measuring the mass flow of the steam, the steam pressure, and the differential pressure of the steam across an orifice plate.

There are different devices for measuring steam flow. For example, two types of (flow) transmitters are used at two cogeneration facilities in Nevada which Texaco has ownership interests. One measures steam flow based on vortex shedding, a characteristic property of the fluid dynamics of the steam that relates to flow rate. Another (flow) transmitter measures steam flow based on the pressure drop through a flow meter or an orifice plate.

3. The heat content of the exhaust gas from the cogeneration facilities can also be useful to third-party manufacturers.

At two cogeneration facilities in which Texaco has ownership interests, the heat content of the exhaust gas from the cogeneration facilities is further used by wallboard manufacturers in their operations. In one case, the gas turbine exhaust is used to calcine the gypsum ore and to dry the wallboard or sheet rock made at a Georgia-Paciific plant. In the other case, the gas turbine exhaust is used for the same purposes at a Pabco plant. In either case, the heat content of the exhaust gas is measured because the sensible heat of the exhaust gas has value and is exported to a third-party manufacturer. An annubar measurement device is used to measure the mass flow rate of the exhaust gas. Enthalpy (i.e., heat content) of the gas is measured via typical temperature measurement devices. With these two measurements, heat flow to the third party manufacturer can be calculated.

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a letter of comments from Arthur Lee, October 3, 1997, Texaco opposed the arbitrariness of setting 50% cre the steam output from cogeneration boilers in the subpart Da and Db proposed rulemakings. The comment taining to the arbitrary discounting of the steam output is hereby incorporated by reference. These comment e also emailed to you on January 20.

4. Several cogeneration facilities are briefly described here.

Texaco is one of the world leaders in cogeneration. Altogether, Texaco has over 1,100 megawatts of current cogeneration capacity and over 1,000 megawatts of cogeneration capacity under development worldwide.

As stated earlier, Texaco has ownership interests in cogeneration facilities that generate steam for enhanced oil recovery in the United States and around the world. In the 1980 s, Texaco and our partners built two cogeneration plants in the Kern River oil field in California. Both of these plants burn natural gas to produce steam for the steam-flooding used in enhanced oil recovery as well as generating 600 megawatts of electric power. Since Texaco needs only 27 megawatts to run the various facilities and production equipment at the Kern River field, the rest is sold into the Southern California power grid, providing enough power to light 600,000 homes

In an additional example, Texaco has ownership interests in two cogeneration facilities in Nevada, which are described here. The following descriptions are available publicly via the web site of the Nevada Cogeneration Associates, http://www.nevcogen.com/ . Material from the web site states, in part:

The Garnet Valley cogeneration plant uses clean-burning natural gas to make two products: electricity for the Nevada Power Company, and thermal energy for the Georgia-Pacific plant. At the site, three General Electric (GE) LM2500 gas turbines and a GE steam turbine produce 85,000 kilowatts (kW) of electricity. This is enough power to supply the needs of approximately 60,000 homes in the Las Vegas area.

Unlike most cogeneration facilities, which send steam to their thermal hosts, this facility sends hot turbine exhaust gas to the wallboard plant. The gas turbine exhaust is used to calcine the gypsum ore and to dry the wallboard or "sheet rock" made at the Georgia-Pacific plant. In addition, NCA #1 uses steam extracted from the steam turbine to make chilled water, which is also exported and used in the manufacture of the wallboard.

The Garnet Valley plant has an operating efficiency of over 50% and an average plant heat rate of 8,500 Btu/kWh. These efficiencies are better than typical utility efficiencies because NCA #1 uses both gas and steam turbines in a "combined cycle" application, and a portion of the waste heat is utilized for the thermal process.

The Black Mountain cogeneration plant uses clean-burning natural gas to make two products: electricity for the Nevada Power Company, and thermal energy for the Pabco plant. At the site, three General Electric (GE) LM2500 gas turbines and a GE steam turbine produce 85,000 kilowatts (kW) of electricity. This is enough power to supply the needs of approximately 60,000 homes in the Las Vegas area.

Unlike most cogeneration facilities which send steam to their thermal hosts, this facility

sends hot turbine exhaust gas to the wallboard plant. The gas turbine exhaust is used to calcine the gypsum ore and to dry the wallboard or "sheet rock" made at the Pabco plant. In addition, NCA #2 uses steam extracted from the steam turbine to make chilled water, which is also exported and used in the manufacture of the wallboard.

The Black Mountain plant has an operating efficiency of over 58% and an average plant heat rate of 9,000 Btu/kWh. These efficiencies are better than typical utility efficiencies because NCA #2 uses both gas and steam turbines in a "combined cycle" application, and a portion of the waste heat is utilized for the thermal process.

Texaco s success in boosting production at the Kern River field and in contributing to the energy-efficient manufacturing of our customers exemplifies the way we manage resources throughout our operations and the way we help our customers do the same. We hope that this information is useful for your efforts in developing guidelines for considering a potential output basis for emissions limitations. As the Agency proceeds in its deliberations of energy, clean air, and climate change issues, Texaco stands ready to provide factual information and comments to contribute to these deliberations.

Very truly yours

Arthur Lee