

APPENDIX E-7
CMS/CEMS Quality Control Plan

1.0 Introduction

The objective of this Quality Control Plan (QCP) is to document quality assurance/quality control (QAIQC) procedures for the Continuous Monitoring Systems (CMS) installed on the Trane 1 and Trane 2 incinerators required to demonstrate compliance with applicable Hazardous Waste Combustor MACT standards at the TAPI Puerto Rico, Inc. facility in Guayama, Puerto Rico. The plan has been prepared in accordance with the requirements set forth at 40 CFR §63.1209 and §63.8.

The QCP will ensure that CMS equipment is maintained and operated according to the relevant calibration and maintenance standards as presented in the MACT rule. The plan ensures that vendor recommendations, good engineering practices, or TAPI's Good Manufacturing Practices and Standard Operating Procedures (GMP SOPs) are followed and implemented.

The QCP also outlines the facility's approach to complying with the requirements set forth in the General Provisions to the NESHAP (i.e. 40 CFR §63.8 (c)) including:

- initial and subsequent calibration of the CMS
- determination and adjustment of the calibration drift of the CMS
- preventive maintenance of the CMS, including spare parts inventory
- data recording, calculations and reporting
- accuracy audit procedures, including sampling and analysis methods
- program of corrective action for a malfunctioning CMS.

The Quality Assurance and Quality Control (QA / QC) procedures described in this document will help ensure that high quality, representative data are obtained.

2.0 Affected Equipment

The provisions of this plan apply to those CEMS and CMS that are necessary to demonstrate compliance with applicable Hazardous Waste Combustor MACT standards. The CMS and CEMS covered by this Plan are listed in Tables 1 and 2, for the Trane 1 and Trane 2 Incinerators, respectively. Figure 1 depicts the location of these instruments on a conceptual flow diagram.

2.1 Continuous Parameter Monitoring Systems

Each incinerator is equipped with a number of sensors (temperature, gas flow, pressure differential, pH, level, etc.) to continuously monitor operating conditions at various points in the system. Signals from these sensors are transmitted to an I/O controller using 4-20 ma transmitter mounted close to the sensors. The signals received at the I/O controller are monitored and recorded by a central computer. The central computer constantly compares the operating conditions to preset operating conditions and makes appropriate adjustments to the incinerators, as required.

Each incinerator is equipped with an automatic waste feed cut-off (AWFCO) system, which will be activated when certain operating conditions are exceeded or when key monitoring devices fail. Flame out and power failure will also shut off waste feed. The emergency waste feed cut-off system will then be initiated, ensuring that the incineration of hazardous waste will cease and that the incinerator will operate in a "fail safe" mode. In the event of equipment malfunction and the AWFCO system fails to stop the hazardous waste feed, the operator can manually stop the hazardous waste feed.

2.2 Continuous Emission Monitoring Systems

Exhaust gas from Trane 1 and Trane 2 incinerators is vented to a common stack which is equipped with a continuous emission monitoring system (CEMS) for monitoring CO and O₂ emissions. The CEMS installed is a SICK MAIHAK Model S710.

The SICK MAIHAK Model S710 Continuous Emissions Monitoring System is a modular gas analyzer designed for emission measurements. The equipment is supported by an intelligent microprocessor control that provides fully automatic and low maintenance operation. The system integrates fully automatic calibration with test gas and self diagnostic and internal watch-dog functions. A large LCD integrates a menu-driven operator interface which allows the CEMS operator to access and view multiple screens showing real-time data and system calibration data. Operator prompts and a HELP screen that guides the operator through set-up, configuration, operation and system maintenance.

The system includes two analyzers identified as UNOR and OXOR-P respectively. The module UNOR uses the NDIR-absorption principle of operation to determine the concentration of CO in a gas sample. The module OXOR-P is a precision oxygen analyzer that operates on the principle of a rotating diamagnetic dumbbell, which is suspended in an inhomogeneous magnetic field. The paramagnetic characteristic of oxygen exerts torque on the dumbbell which is proportional to the concentration of oxygen in the sample gas.

Consistent with 40 CFR §63.1209(a)(2), the CEMS is installed, calibrated, maintained and continuously operated in compliance with the quality assurance procedures provided in Appendix to Subpart EEE of Part 63 - Quality Assurance Procedures for Continuous Emissions Monitors Used for Hazardous Waste Combustors and in Performance Specifications 4B (40 CFR Part 60, Appendix B). The CEMS has a dual span range for CO low range with a span of 200 ppmv and high range of 3000 ppmv and a maximum span of 25% for O₂, consistent with the requirements provided in Appendix to Subpart EEE of Part 63.

2.3 Manufacturer's Specifications of CMS and CEMS

The relevant manufacturers' manuals for all CMS equipment and the CEMS required to demonstrate compliance with the HWC MACT standards are included in the facility's "Operation and Maintenance Manual: Continuous Monitoring Systems." These manuals contain information on equipment specification, installation, calibration, maintenance and troubleshooting, as appropriate, for all CMS components.

A cross-reference table is included for each incinerator to allow easy access to appropriate manufacturers' manuals. Each cross-reference table includes the equipment tag number and description of each CMS as well as the tab or tabs in which the corresponding manufacturers' manuals can be found.

The "Operation and Maintenance Manual: Continuous Monitoring Systems" is incorporated by reference. The plan will be updated whenever a CMS component is replaced by a component from the same or a different manufacturer. The procedures that establish how to manage these manuals and how to implement the manufacturer's calibration procedures into the TAPI's preventive maintenance program are summarized in SOP FU-041 and SOP FU-042, included herewith as Appendix A.

3.0 Quality Control Requirements

3.1 Initial and Subsequent Calibration of the CMS

3.1.1 Continuous Parameter Control Monitoring Systems

Prior to placing a new CMS equipment into service, initial calibrations are conducted by the vendor or TAPI's instrumentation personnel to ensure the equipment is operating properly and within the appropriate manufacturer's specifications. Some instruments, such as magnetic or vortex flow meters, are initially calibrated at the factory before shipment. Certification of factory calibration is reviewed and maintained by TAPI.

Facility instrumentation engineers, technicians and specialists based upon either regulatory requirement, a vendor recommended schedule or facility experience with the equipment and GMP SOPs, calibrate CMS equipment. TAPI has established a procedure in SOP-001I for calibration and certification of CMS, include herewith as Appendix B.

During calibration, instrument drift will be determined and adjusted as necessary. Drift will be considered acceptable within a specified percentage of the full instrument span. If the instrument drift exceeds the pre-determined threshold, then corrective action will be undertaken, including repair or replacement of the CMS equipment.

CMS instrument calibration will be performed in accordance with manufacturer's recommended procedures. TAPI has established procedures for verification of CMS and calibration following manufacturer's specification, included herewith as Appendices C and D respectively. Table 3 and Table 4 list for every CMS and CEMS the corresponding verification SOP number and calibration procedure number.

3.1.2 Continuous Emission Monitoring Systems

TAPI has established a procedure for initial and subsequent calibration, zero and drift adjustment, and verification of continuous emissions monitoring system, included herewith as Appendix E. In conformance with Appendix to 40 CFR Part 63 Subpart EEE, and with respect to the CEMS:

- Calibration checks are conducted daily in conformance with manufacturer's specifications
- Calibration drifts (CD) and zero drifts (ZD) are checked, recorded and quantified at least once a day in accordance with the method prescribed by the manufacturer. The CEMS calibration is adjusted whenever the daily CD and ZD exceeds the limits in the Performance Specifications 4B specified in Appendix B to 40 CFR Part 60.

- Daily system audits include a review of the calibration check data, an inspection of the recording system, an inspection of the control panel warning lights, and an inspection of the sample transport and interface system, as appropriate.
- All measurements from the CEMS will be retained in the operating record for at least five years.
- An absolute calibration audit (ACA) must be conducted quarterly and a relative accuracy test audit (RATA) must be conducted yearly. An interference response test (IRT) must be performed whenever an ACA or a RATA is conducted. All ACAs, RATAs and IRTs will be conducted following the corresponding test procedures described in Performance Specifications 4B;
- If the relative accuracy from the RATA or the calibration error from the ACA exceeds the criteria established in Performance Specifications 4B, hazardous waste incineration must cease immediately until corrective measures are taken and the CEMS is audited with a RATA to document that the CEMS is performing within specifications.

3.2 Preventive Maintenance of the CEMS, Including Spare Parts Inventory

TAPI has established guidance for the implementation of corrective and preventive maintenance activities through a manual Maintenance System and is currently implementing the use of a computer software known as **Pro Cal V**. Said guidance is captured in SOP FU-030-01 "Preventive Maintenance Program for Plant Equipments" and SOP FU-024-01 "Work Orders Program" included herewith as Appendix F.

TAPI maintenance program for CMS and CEMS is scheduled based on predefined instrument / equipment frequencies and, in certain occasions, semi-annual activities during programmed plant shutdowns. For this purpose the Maintenance develops work orders for equipment requiring maintenance as recommended by the vendor, as required to comply with regulatory requirements, or as dictated by TAPI's GMPs and SOPs. The records maintained per equipment / instruments include (among others) the following information:

- Instrument information, manufacturer, model/serial number, tag number, location, etc.
- next and last calibration date
- Calibration frequency
- Calibration data, range reference

- Calibration procedure number or SOP number

The following are the considerations taken by the Maintenance Department to manage the maintenance requirements:

- Calibration frequencies are based on manufacturers' recommendations, operational history and other factors.
- Calibration procedures follow manufacturer specifications.
- Work orders (WO) are generated periodically for all instruments that require preventive maintenance according to date and frequency. The corresponding SOP or calibration procedure is attached to the WO.

To comply with the monitoring provisions for the MACT rule (i.e., continuous monitoring of specified parameter levels), TAPI maintains adequate spare parts inventory to ensure the repair or replacement of CMS parts to correct routine or predictable CMS malfunctions. During qualification of equipment, including qualification of instrumentation, TAPI determines the spare parts requirement. If new types of instruments are being installed for which the facility does not have an inventory of spares, or spare parts in the storeroom, a request is generated to order the equipment or parts deemed necessary to be maintained in the storeroom.

3.3 Data Recording, Calculations and Reporting

At the facility, the individual responsible for conducting the required calibration or maintenance records the relevant details regarding such activity, which is subsequently filed at the Engineering Department files. If the repair or replacement of CMS equipment is conducted at the facility as a result of a malfunction, such action will be reported in the in the subsequent periodic report for the time period as part of the SSM Plan report. Records of calibration checks and maintenance will be documented for the relevant CMS equipment.

CMS and CEMS maintenance history is based on two data record systems:

- Filled and signed "Work Order" and "Instrument Calibration Alert." These documents are stored in the Engineering's file cabinets.
- The instrument operator records the calibration data in order to the CMS data calibration history.

3.4 Accuracy Audit Procedures, Including Sampling and Analysis Methods

Accuracy audits are conducted on CMS and CEMS components as necessary to ensure proper operation of the systems. The need for, and frequency of, an accuracy audit for a given CMS component is evaluated by maintenance personnel based on such considerations as manufacturer's

recommendations, frequency of calibration, calibration results, equipment reliability, operational history, etc.

TAPI has SOPs for auditing and calibrating differential pressure transmitters, flow meter transmitters, pH transmitters, and gas analyzers (Appendix C). Depending on the case, different methods are applied. For pressure and flow meter transmitters, TAPI has in-field and metrology lab audits. During in-field audits, the instrument is challenged by comparing its reading with a known fluid flow rate. During metrology lab audits, the instrument's reading is compared with the reading of a certified audit instrument. These audit instruments are calibrated using standards traceable to the National Institute of Standards and Technology; pH transmitters are verified and calibrated by testing the CMS with a known concentration of audit media (buffer solutions) at a three upscale points.

The CEMS has a daily auto calibration using three different gas calibration medias for zero, low range and high range respectively. The operator audits the CEMS by daily printing out the auto calibration results and comparing them with regulatory limits.

Accuracy audits are to be performed periodically. Should the results of the accuracy audit exceed a specified percentage, then the appropriate corrective action will be implemented, including recalibration, repair or replacement of the CMS equipment.

3.5 Program of Corrective Action for Malfunctioning CMS

If during normal operation, a CMS monitored value is not within the typical range, facility personnel investigate the incinerator operation to determine if the monitored value is a result of a process operation malfunction, as specified in the SSM Plan. The Maintenance's supervisor or manager is notified of the out-of-range CMS value and initiates a step-wise approach to evaluate relevant incineration process equipment for potential malfunctions. If following the investigation of the incineration process operation, it is concluded that process equipment is operating according to approved procedures, and that the CMS equipment is malfunctioning, maintenance personnel will evaluate the equipment to identify if the CMS equipment can be repaired, or if it must be replaced. Any corrective action performed is documented.

During calibration, if the accuracy of measurement is not within an acceptable range, the calibration procedure is repeated until acceptable accuracy results are achieved. When there are problems during the calibration process an "Instrument Calibration Alert" document is generated. Maintenance Department personnel take the corresponding actions to solve the problem. In the event that acceptable accuracy results cannot be achieved, the equipment is either repaired or replaced. Upon completion of repairs or replacement of the CMS equipment, a calibration is once again performed.