

TEST PLAN

Storage Box Number: _____
(YYYY MM ##)

Facility: Johnson Controls

Source: CEMS on Various Sources

Permit #: 1040-0129

Id#: N/A

Type of Testing: CEMS RATAs

Location: Florence, SC

Plan Submittal Date: February 16, 2015



W. Marshall Taylor Jr., Acting Director

Promoting and protecting the health of the public and the environment

March 3, 2015

Ms. Lizzette Danner
Johnson Controls Battery Group, Inc.
1800 Paper Mill Road
Florence, SC 29501

RE: Annual CEMS RATA Test Plan Dated February 2015

Dear Ms. Danner:

The referenced site-specific test plan is approved by the Department. Any deviations from the plan, without prior approval from the Department, may be cause for rejecting the test results.

The CEMS one minute average readings during the test period shall be included in the final test report.

Your request to submit the test report 45 days after completion of the testing is approved.

If I can be of further assistance in this matter, please call me at (803) 898-3897 or e-mail me at fricklj@dhec.sc.gov.

Sincerely,

L. Jake Frick
Compliance Management Division
Bureau of Air Quality

ec: Michael Shroup, BAQ
Derek Brewster, TRC

cc: Compliance File: 1040-0129

Re: Johnson Control Test Plan - Annual Relative Accuracy Program

Frick, Jake

Tue 3/3/2015 2:19 PM

Sent Items

To:

Cc:

 1 attachment

JCI RATA Plan Approval.doc;

See attached copy of the approval letter.

Jake Frick
SC Dept. of Health & Environmental Control
Bureau of Air Quality
803.898.3897

From: Brewster, Derek <DBrewster@trcsolutions.com>
Sent: Monday, February 16, 2015 10:53 AM
To: Shroup, Michael
Cc: Frick, Jake; Lizzette Danner
Subject: Johnson Control Test Plan - Annual Relative Accuracy Program

Mr. Shroup,

Attached is the Test Plan for the annual relative accuracy testing program at the Johnson Controls, Florence Recycling Center, Florence, South Carolina facility. Test is schedule to occur over two weeks, the week of March 9 and 16, 2015.

Please feel free to contact me with any questions.

Derek Brewster
Project Manager

TRC Environmental Corporation



5540 Centerview Drive, Suite 100, Raleigh, NC 27606

T: 919.256.6233 | F: 919.838.9661 | C: 919.618.3198

Email: dbrewster@trcsolutions.com

[LinkedIn](#) | [Twitter](#) | [Blog](#) | [Flickr](#) | www.trcsolutions.com



Test Protocol

Annual Relative Accuracy Tests

Johnson Controls Battery Group, Inc.
Florence Recycling Plant
Florence, South Carolina

Prepared for:

Johnson Controls Battery Group, Inc.
Florence Recycling Plant
1800 Paper Mill Road
Florence, South Carolina 29501

Prepared by:

TRC Environmental Corporation
5540 Centerview Drive, Suite 100
Raleigh, North Carolina 27606

February 2015

TRC Project No. 223508

February 2015

TEST PROTOCOL

Annual Relative Accuracy Tests

**Johnson Controls Battery Group, Inc.
Florence Recycling Plant
Florence, South Carolina**

Prepared for

Johnson Controls Battery Group, Inc.
Florence Recycling Plant
1800 Paper Mill Road
Florence, South Carolina 29501

Prepared by

TRC Environmental Corporation
5540 Centerview Drive, Suite 100
Raleigh, North Carolina 27606
(919) 828-3150



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1.0 INTRODUCTION

TRC Environmental Corporation (TRC) of Raleigh, North Carolina has been retained by Johnson Controls Battery Group, Inc. (JCI) to conduct annual relative accuracy tests at the Florence Recycling Plant located at 1800 Paper Mill Road in Florence, South Carolina, SC Permit Number 1040-0129-CA.

Annual relative accuracy testing will be conducted for the nitrogen oxides (NO_x) and carbon monoxide (CO), where applicable, on Furnaces No. 1, No. 2 and No. 3 (Unit IDs 07, 08, 09 respectively), the Melter stack (Unit ID 06), the Refining Process stack (Unit ID 11A) and the Refining Combustion stack (Unit ID 11B). The relative accuracy will be calculated using comparative data reported as pounds per hour of each pollutant. All testing will be conducted while the unit is operating at greater than 50% of maximum normal load under steady-state conditions.

FACILITY CONTACT INFORMATION

Ms. Lizzette Danner
Environmental Manager
Johnson Controls Battery Group, Inc. – Florence Recycling Plant
1800 Paper Mill Road
Florence, South Carolina 29501
Telephone: 843-245-1720

TESTING FIRM INFORMATION

Derek Brewster
Project Manager
TRC Environmental Corp.
5540 Centerview Drive, Suite 100
Raleigh, NC 27606
Telephone: (919) 618-3198

2.0 PROJECT OVERVIEW

2.1 SCOPE OF WORK

Relative accuracy testing will be conducted at the Furnaces No. 1, No. 2 and No. 3, the Melter and Charge Prep, the Refining Process and the Refining Combustion stacks. Relative accuracy testing will consist of a series of a minimum of nine test runs for nitrogen oxides (NO_x) and carbon monoxide (CO).

The required measurement parameters and test methods to accomplish these objectives are:

40 CFR Part 60, Appendix A, EPA Methods

- Method 1 and 2 Volumetric Flow Rate Determination
- Method 3 or 3A Oxygen and Carbon Dioxide
- Method 4 Moisture
- Method 7E Oxides of Nitrogen
- Method 10 Carbon Monoxide

2.2 OPERATING SCHEDULE

Relative accuracy testing will be conducted while the units are operating at greater than 50% of maximum normal conditions throughout the test period.

3.0 FACILITY DESCRIPTION

Johnson Controls Battery Group, Inc. – Florence Recycling Plant operates several processes in which discarded lead-acid batteries are recycled.

3.1 SITE LOCATION AND SOURCE DESCRIPTION

Each emission unit in this test program is equipped with an individual, dedicated exhaust stack. The Melter and Charge Prep Area (Unit ID 06) consists of the charge preparation area and a rotary lead melting furnace rated at 6.32 MMBtu/hr fired on natural gas. The Melter and Charge

Prep Area is controlled by a baghouse system with HEPA filtration. The Smelting Furnaces No. 1, No. 2 and No. 3 (Unit IDs 07, 08 & 09) are identical rotary smelting furnaces rated at 19.15 MMBtu/hr each and fired on natural gas. Each individual furnace is controlled by a 6.13 MMBtu/hr afterburner followed by a baghouse with HEPA filtration and a wet scrubber. The Refining Kettles and Casting consist of nine (9) refining kettles each rated at 9.58 MMBtu/hr and the casting burner rated at 1.15 MMBtu/hr. The process gases are collected in the Refining Process (Unit ID 11A) and combustion-related emissions from the kettles are collected in Refining Combustion (Unit ID 11B). The process emissions are controlled by a baghouse with HEPA filtration.

Complete descriptions of each location will be documented in the final test report. The test report will include all EPA Method 1 parameters including stack diameter and upstream / downstream measurements as well as cyclonic flow determinations.

Johnson Controls Battery Group, Inc.
Florence Recycling Plant
Florence, South Carolina

3.2 PLANT PROCESS DATA

JCI personnel will be responsible for the documentation of facility operating conditions during the test program. Operating data will be collected to demonstrate the facility processes were operating at greater than 50% of normal operating conditions.

4.0 TEST METHODS AND PROCEDURES

4.1 OVERVIEW

This section describes the procedures that the testing contractor will follow during the field sampling program. Throughout the program, the testing contractor will follow EPA Reference Methods 40 CFR Part 60 Appendix A and Appendix B sampling protocols. The testing contractor project manager, the JCI project coordinator and South Carolina Department of Health and Environmental Control (SC DHEC) will approve deviations from the specified test methods. Modifications will be documented in the final report.

The remainder of this section is divided into the following subsections: Field Program Description, Pre-sampling Activities, and Onsite Sampling Activities.

4.2 FIELD PROGRAM DESCRIPTION

The following test methods will be used:

The test methods to be utilized in accordance with 40 CFR Part 60 will be as follows:

- EPA Method 1 Sample Velocity Traverse for Stationary Sources
- EPA Method 2 Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot tube)
- EPA Method 3 Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources
- EPA Method 3A Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)
- EPA Method 4 Determination of Moisture Content in Stack Gases

- EPA Method 7E Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)
- EPA Method 10 Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)

4.3 PRE-SAMPLING ACTIVITIES

Pre-sampling activities include equipment calibration and other miscellaneous tasks. Each of these activities are described or referenced in the following subsections. Other pre-sampling activities include team meetings, equipment packing, and finalization of all details leading up to the coordinated initiation of the sampling program.

4.3.1 Equipment Calibration

The testing contractor will follow an orderly program of positive actions to prevent the failure of equipment or instruments during use. Preventative maintenance and careful calibration help to ensure accurate measurements from field and laboratory instruments.

Once the equipment has gone through the cleaning and repair process, it is then calibrated. All equipment that is scheduled for field use is cleaned and checked prior to calibration. Once the equipment has been calibrated, it is packed and stored to ensure the integrity of the equipment. An adequate supply of spare parts is taken in the field to minimize downtime from equipment failure.

Inspection and calibration of the equipment is a crucial step in ensuring the successful completion of the field effort. All equipment is inspected for proper operation and durability prior to calibration. Calibration of the following equipment is conducted in accordance with the procedures outlined in EPA documents entitled "*Quality Assurance Handbook for Air Pollution Measurement Systems; Volume III - Stationary Source Specific Methods*" (EPA-600/4-77-027b) and 40 CFR Part 60 Appendix A. All calibrations will be performed prior to test program.

4.3.2 Source Sampling Equipment

Each sampling console dry gas meter is calibrated with critical orifices or by comparison to a reference gas meter. The resulting gas meter coefficient (γ or gamma) and the orifice pressure differential (ΔH) are clearly labeled on the meterbox as applicable. The pitot tubes are checked for conformance to the geometric specification in EPA Method 2 and are assigned a coefficient of 0.84. Thermocouples are initially calibrated by comparison with an ASTM-3F mercury-in-glass thermometer at three points. Each thermocouple will agree within 1.5 percent of the reference thermometer, expressed in Kelvin, throughout the entire calibration range. Digital temperature indicators are checked by comparing the indicator reading with a series of input signals from a digital readout calibrator.

4.4 ONSITE SAMPLING ACTIVITIES

4.4.1 Velocity Measurements

Velocity traverses will be conducted at each stack with an S-type pitot assembly in accordance with EPA Reference Methods 1 and 2. An S-type pitot tube with an attached inclined manometer will be used to measure the exhaust velocities at the sampling location. An attached Type-K thermocouple with remote digital display will be used to determine the flue gas temperature. During the test program, velocity measurements will be conducted during each test run while operating the isokinetic sampling train(s). The required number of velocity measurement points for each sampling location will be determined following EPA Method 1. During the relative accuracy testing one flow measurement will be conducted during each gas sampling run.

Cyclonic flow checks will be conducted in accordance with Section 2.4 of EPA Method 1. This procedure is referred to as the nulling technique. An S-type pitot tube connected to an inclined manometer will be used in this method. The pitot tube will be positioned at each traverse point so that the face openings of the pitot tube are perpendicular to the stack cross-sectional plane. This position is called the "0° reference". The velocity pressure (ΔP) measurement is noted. If the ΔP reading is zero, the cyclonic angle is recorded as 0°. If the ΔP reading is not zero, the pitot tube is rotated clockwise or counter clockwise until the ΔP reading becomes zero. This angle is then measured with a leveled protractor and reported to the nearest degree. After this

null technique is applied at each traverse point, the average of the cyclonic angles is calculated. If this average is less than 20°, the flow condition is acceptable to test.

4.4.2 Flue Gas Moisture

Moisture will be determined for each test run according to EPA Reference Method 4, "*Determination of Moisture Content in Stack Gases*". The principle of this method is to remove the moisture from the sample stream and determine moisture either volumetrically or gravimetrically. Relative accuracy testing will require moisture measurements to calculate the dry volumetric flow rates through the stack. A stand-alone moisture train will consist of four impingers. The first two impingers will contain water, the third will remain empty and the fourth will contain silica gel. Moisture samples will be collected from a single point for 30 minutes. Each moisture sample collected will be applied to two volumetric flow measurements.

4.4.3 Flue Gas Molecular Weight

Molecular weight will be determined for each test run according to EPA Reference Method 3 or 3A, "*Determination of Dry Molecular Weight*". The relative accuracy testing will utilize the instrumental method for determination of flue gas molecular weight. Details of the instrumental procedure are found in Section 4.4.5.

4.4.4 Instrumental Emissions Monitoring for O₂, CO₂, NO_x and CO

Relative accuracy testing will be conducted for oxides of nitrogen (EPA Method 7E) and carbon monoxide (EPA Method 10) at each of the exhaust stacks, as applicable. Oxygen (EPA Method 3A) and carbon dioxide (EPA Method 3A) will be measured to calculate stack gas molecular weight for flow rate determination.

The CEMS sampling train will start with a stainless-steel sampling probe. The sample stream will be then drawn through a glass fiber filter, heated (248°F ± 25°F) Teflon sample line, and a sample conditioner to remove the moisture and particulate from the gas stream. The sample will then be drawn through Teflon tubing by a leak-free Teflon double diaphragm pump to a stainless-steel sample manifold with an atmospheric by-pass rotameter. The O₂, CO₂, NO_x and CO analyzers will withdraw samples from this manifold.

Johnson Controls Battery Group, Inc.
Florence Recycling Plant
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CEMS data will be recorded as averages by a digital data logger designed to receive and log instrument signals. The results will be expressed in ppmvd for NO_x and CO, and in percent for O₂ and CO₂. Test runs will be a minimum of 21-minutes in length. A minimum of nine runs will be conducted at each test location. 40 CFR 60 Appendix B, Performance Specification 6 will be used to evaluate the reported NO_x and CO emissions.

5.0 CALCULATIONS

5.1 Emission Rate, pounds per hour

Concentrations, parts per million (ppm) and milligrams per dry standard cubic meter (mg/dscm) will be corrected to 7% oxygen using the following equation:

$$R_t \text{ (lb/hr)} = \frac{\text{ppmvd} \times 60 \times \text{fwt} \times Q_{sd}}{385.3 \times 10^6}$$

Where:

R _t	= Emission Rate, lb/hr
ppmvd	= Pollutant concentration measured, ppm volume dry
Q _{sd}	= Volumetric Flow Rate, DSCFM
Fwt	= Formula Weight of Pollutant, lb/lb-mole

6.0 QUALITY ASSURANCE

6.1 OVERVIEW

The testing contractor management will be fully committed to an effective Quality Assurance/Quality Control Program whose objective is the delivery of a quality product. That product is data resulting from field measurements, sampling and analysis activities, engineering assessments, and the analysis of gathered data for planning purposes. The Quality Assurance Program works to provide complete, precise, accurate, representative data in a timely manner for each project, considering both the project's needs and budget constraints.

This section highlights the specific QA/QC procedures to be followed on this Test Program.

6.2 FIELD QUALITY CONTROL SUMMARY

6.2.1 Calibration Procedures

Calibration of the field sampling equipment will be performed prior to the field sampling effort. Copies of the calibration sheets will be submitted to the field team leader to take onsite and for the project file. Calibrations will be performed as described in the EPA publications "*Quality Assurance Handbook for Air Pollution Measurement Systems; Volume III - Stationary Source Specific Methods*" (EPA-600/4-77-027b) and EPA 40 CFR Part 60 Appendix A.

The following EPA approved alternative will be used for thermocouple calibration:

Post-test thermocouple calibration will be performed in accordance with EPA ALT-011 using a single point calibration against an ASTM mercury-in-glass thermometer in addition to a continuity check of the thermocouple. The continuity check involves verifying that the thermocouple read-out trends in the appropriate direction when exposed to a temperature change. A complete copy of EPA ALT-011 is available from EPA from the EMC website at <http://www.epa.gov/ttn/emc/>.

6.3 DATA REDUCTION, VALIDATION, AND REPORTING

Specific QC measures will be used to ensure the generation of reliable data from sampling and analysis activities. Proper collection and organization of accurate information followed by clear and concise reporting of the data is a primary goal in all projects.

6.3.1 Field Data Reduction

Standardized forms will be used to record field sampling data. The data collected will be reviewed in the field by the Field Team Leader and at least one other field crew member. Errors or discrepancies will be noted in a field log.

6.3.2 Data Validation

The testing contractor supervisory and QC personnel will use validation methods and criteria appropriate to the type of data and the purpose of the measurement. Records of all data will be maintained, including that judged to be an "outlying" or spurious value. The persons validating the data will have sufficient knowledge of the technical work to identify questionable values.

Field sampling data will be validated by the Field Team Leader and/or the Field QC Coordinator based on their review of the adherence to an approved sampling protocol and written sample collection procedure.

The following criteria will be used to evaluate the field sampling data:

- Use of approved test procedures;
- Proper operation of the process being tested;
- Use of properly operating and calibrated equipment;
- Leak checks conducted before and after tests;
- Use of reagents conforming to QC specified criteria; and
- Maintain proper chain-of-custody.

6.3.3 Data Reporting

All data will be reported in standard units depending on the measurement and the ultimate use of the data. The bulk of the data will be processed following delivery of the laboratory results.

6.4 STATIONARY SOURCE AUDIT SAMPLES

Stationary source audit samples are not available for instrumental reference methods.

6.5 EXCEPTIONS

Any deviations from this test plan must be approved by the JCI project coordinator and SC DHEC. Deviations will be documented in the final report.

7.0 FINAL REPORT SUMMARY

This section will serve as an outline of the Final Reports for submittal to JCI. This test program is projected to occur the weeks of March 9th and 16th, 2015. The relative accuracy test report will be submitted within 45 days of completion of the test program. The volume of data to review for conducting six relative accuracy tests we are asking for some additional time to complete this effort. The report will follow the basic outline as described in the following sections.

7.1 INTRODUCTION

The introduction will include the following items:

- The overall goals of the test;
- The specific goals of the test;
- Names and locations of all businesses, contractors, and agencies involved in the tests;
- Dates and duration of the test period;
- A brief outline of the remainder of the report.

7.2 SUMMARY AND DISCUSSION OF RESULTS

This section will be a two-part discussion summarizing the results and conclusions drawn from the data.

7.2.1 Summary of Results

This section will provide an overview of the entire stack gas sampling effort. Emission rates and concentrations will be expressed in the units as noted in Section 6.3.

Process upsets and deviations from the Test Plan will be fully described. Events, whether field or laboratory, pertinent to this project that may have an impact on the quality of the data will be fully documented in this section.

7.2.2 Discussion of Results

In this section, the testing contractor will correlate the emissions data with pertinent process data to further explain the results. Explanations or justifications for data discrepancies will be given. Areas where the data may appear technically weak will be pointed out.

7.3 PROCESS DESCRIPTION AND OPERATION

This section of the report will be in two parts, the process description subsection and the process operation subsection.

7.3.1 Process Description

A complete step-wise description of the entire process will be documented in this subsection. Design capacities and all pertinent process parameters will be listed.

7.3.2 Process Operations

Actual process data relevant to the emissions testing will be provided by the facility for inclusion in an appendix.

7.4 SAMPLING LOCATIONS

This will be similar to Section 3.0 of this Test Plan. Any deviations will be addressed.

7.5 SAMPLING PROCEDURES

This section will describe the methods used and any deviations from the Test Plan. This section will include a full discussion of any problems encountered during sampling.

7.6 DATA REPORTING

The data generated from this test program will be organized into tables depicting the pollutant concentrations from the sampling locations. All data undergoes extensive QA/QC procedures

validating the results. All data will be reported in standard units depending on the measurement and the ultimate use of the data.

7.7 APPENDICES

The following appendices will be included in the Final Report:

- A. Summary of Results and Example Calculations
- B. Field Sampling Data Sheets
- C. Laboratory Analytical Data
- D. Equipment Calibration Sheets
- E. Qualified Individual Certification

7.8 REPORT APPROVAL

Senior staff members and QA personnel will review the final report for accuracy and completeness prior to submittal.