Source Testing Report Evaluations

A Study of the Potential for a Cursory Review Program

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Introduction

The Source Evaluation Section is responsible for managing the process of conducting air pollution emissions testing on regulated stationary sources in South Carolina. Regulated sources can be located at any number of different types of commercial or industrial enterprises which conduct operations that generate and emit air pollution. Air pollution can take many forms; solid, liquid, gaseous, or any combination of these. The constituents of the pollution emanating from these sources can be one or many, and vary widely. Some common varieties include particulate matter including PM, PM10, PM2.5, and condensable particulate matter; specific solids including lead, mercury, or other metals; gaseous pollutants include sulphur dioxide, oxides of nitrogen, carbon monoxide, carbon dioxide, and acid gasses just to name a few. Each separate pollutant may require a different testing approach.

Once a source is designated to conduct required testing through a South Carolina Department of Health and Environmental Control Bureau of Air Quality ("Department") issued permit and/or applicable regulations, the responsible officials at the facility are required to initiate a process with the Source Evaluation Section which consists of several required steps. The steps include preparing and submitting for Department approval a detailed plan to conduct the required testing, notifying the Department of the date, time, and other required information relating to the testing

event, conducting the test according to the approved plan, and submitting a detailed final test report which documents the details of the test.

The Source Evaluation Section reviews for approval, the source test plans. The plan review process includes verifying the proposed test meets the minimum standards necessary to meet the requirements of the permit, the applicable regulations for each source being tested, and the appropriate test methods for each pollutant at each source. Once approved the Department sends the facility an approval to conduct the source test according to the plan. Test notifications are tracked along with other dates and important information relating to each source and test event. Source Evaluation Section personnel observe high priority tests to be sure the test is conducted appropriately, and meets the minimum standards set forth in the approved plan. Once the test is completed, the facility or its contractor submits for approval the final source test report. The source test report documents a huge amount of raw data from the test equipment, pollution control equipment, process and operating parameters, laboratory data, calculations and results. Reviewing and approving these test reports is one of our two most critical functions, the other being the test plan approval process.

Project Overview

The project consisted of studying the source test reports that were submitted by regulated facilities in South Carolina to determine if there are specific subsets of reports that can be evaluated in a more cursory way without compromising the integrity of the underlying regulatory program. The source test reports contain a variety of technical data that must be measured, evaluated and compiled in very specific ways to validate the results. The results are ultimately used to determine the facilities compliance with

regulatory and permit limits. Because of this, it is critical that any identified subset of tests that could be considered for cursory evaluation must be of the highest quality consistently.

Data collected included two distinct types, descriptive categories and ratings assigned to those categories. Categories included basic test identification information relating to the facility, source, equipment being tested, pollutants, test methods, and testing contractor. Ratings were assigned to the various categories during the review and validation process by the staff evaluating the test program. Criteria were established to use to promote consistency of the evaluation process and subsequent ratings. The staff was briefed on methodology to rank the quality of various elements of the testing process and any questions or discrepancies were arbitrated by the project manager.

The rating methodology was designed to be simple to understand and easy to apply to a myriad of different scenarios. This was necessary because in many respects each different testing project presents its own unique challenges. Additionally, the rating of each project is somewhat subjective. The rating scale ranges from 1 to 3. The definitions of the ratings for each rated element will be explained below but in general terms, 1 is poor, 2 is average, and 3 is excellent. As will be evident from the detailed definitions below, nothing short of excellent would be acceptable for consideration in any cursory review program. The ratings were to be assigned immediately at the completion of each source test project based on a fresh review and recollection of the project as a whole.

During the data collection phase of the project, the section collected data on nearly 400 individual source test projects. Data collection occurred from September 1, 2017 through December 31, 2017. After data collection was complete, the project manager analyzed the raw data. A considerable number of entries were missing information or otherwise were substandard and were omitted from the study. This is unfortunate due to the already small sample size. Where appropriate, the project manager standardized the entries to allow differently worded entries to be compared within a meaningful group. For example, there were numerous entries with specific descriptive types of boilers. These were simplified into “boilers”.

Data Overview

Data collected was from 325 individual tests which included 65 facilities, 19 general facility types,17 test companies, 19 general equipment types, and 32 different pollutants. Data from general equipment, facility types, and pollutants were consolidated into groups that were similar based on the professional judgment of the project manager. While the total number of equipment and facility types are the same, the individual tests are sometimes but not always the same. This consolidation will allow a more meaningful evaluation of the data considering the small sample size.

Data Evaluation

For purposes of evaluating the data, an acceptance criterion needed to be established. Average is not nearly good enough to exclude a project from full review. In most cases the standard deviation was so high that using one standard deviation above average made it impossible for any test to qualify for potentially being included in a cursory review program. Using half a standard deviation seemed to be restrictive

enough but still allow for some tests to be included when evaluated from a strictly statistical perspective. Other factors must also be considered which will be discussed within the appropriate section of this document. The following equation is used for the evaluation of all data sets as described herein.

$A = Avg^R + (0.5 \times StDev^R)$

Where:

A is the minimum acceptable rating

Avg^R is the average of the classification as defined for each element

$StDev^R$ is the standard deviation of the averages of the classifications defined for each element.

Facilities

Source testing data was gathered on 65 facilities. A facility, for the purposes of this study could be either a single physical plant location that functions independently regardless of any common ownership; or groups of plants that operate with a common environmental department responsible for interacting with the Source Evaluation Section. This grouping allows us to evaluate the collective quality of the operating unit interfacing with the Department. Otherwise, some of the units may be evaluated more favorably than others for no clearly quantifiable reason. One such company is Santee Cooper, which operates numerous units in South Carolina. All of Santee Coopers testing related activities are coordinated through one small group in its environmental department.

Ratings in the facility element are based on the facilities willingness and ability to provide timely and accurate responses to concerns directly related the operation of the

facility and its associated process and pollution control equipment. This is information that ordinarily should be included with the original test report submittal. Ratings are defined as follows: A rating of 1 is assigned to a facility that is unresponsive to facility related questions, is unable to respond due to lack of knowledge or understanding of its own operations, or must be asked for the same information repeatedly. A rating of 2 is assigned to facilities that respond within a timely manner but information provided may be incomplete, incorrect, or disorganized. A rating of 2 may also be assigned to a facility that provides complete and correct information but takes an excessive amount of time to do so. A rating of 3 would be assigned to a facility that includes all necessary information within the original submittal or responds to information requests quickly and completely.

The arithmetic mean of the general facility rating was 2.57 with a standard deviation was 0.63. Any facility with a rating below the sum of the arithmetic mean plus half a standard deviation (2.57+(0.5*0.63)), or 2.89, would not qualify to be considered for a cursory review program. Thirty seven of sixty-five facilities, or 57% were rated above that minimum standard.

Facility Type

The project manager contends that this data point is inappropriate to be used to determine a facilities suitability for a cursory review program. The classifications are so broad and cannot possibly take into account such things as corporate culture and level of technical expertise which are a huge impact on a facilities testing program. It is interesting, however, to evaluate the facility data from the perspective of the general industry classification. Doing so yields the following results. The arithmetic mean of the

facility rating when grouped by general classification was 2.44 with a standard deviation was 0.55. If we were to apply the same standard used above, any classification with a rating below the sum of the arithmetic mean plus half a standard deviation (2.44+(0.5*0.55)), or 2.72, would not qualify to be considered for a cursory review program. Nine of nineteen or 47% were rated above that standard. Only one major industry group met that standard, metals processing. When evaluated individually only three of four facilities in that grouping would qualify on an individual facility basis. This adds credence to the project manager's assertion that the facility classification is an inappropriate indicator of suitability for cursory review.

Testing Contractor

Source testing data was gathered on 17 source testing contractors. Seventy-seven of the tests were conducted by facility personnel. This practice is allowed so long as they meet the same training and experience standards required of any other testing contractor. These tests were included in the sample and analysis and evaluated on the exact same criteria. The project manager contends that it would never be acceptable to allow a cursory review of these test projects due to the potential for abuse since these testers have a vested interest in the outcome of the test. Being excluded from a cursory review process would not impact any facility in a negative way.

Ratings in the testing contractor element are based on the contractors' willingness and ability to provide timely and accurate responses to concerns directly related the conduct of the test, all supporting data, and analysis. It also includes an evaluation of the contractors' ability to correctly conduct the test according to the approved plan and all underlying standards. Finally, it is an evaluation of the quality

and completeness of the final report which is normally prepared by the contractor. Ratings are defined as follows: A rating of 1 is assigned to a testing contractor that is unresponsive to testing related questions; or provides information that is incomplete, incorrect, or unorganized; or the contractor must be asked for the same information repeatedly. This test report will likely require multiple revisions. A rating of 2 is assigned to testing contractor that responds within a timely manner but information provided may lack depth or otherwise be missing some necessary details not specifically requested indicating a superficial understanding of the problem being address or testing requirements. A rating of 2 may also be assigned to a testing contractor that provides complete and correct information but takes an excessive amount of time to do so. A rating of 3 would be assigned to a testing contractor that includes all necessary information within the original submittal or responds to information requests quickly and completely.

The arithmetic mean of the testing contractors average rating was 2.47 with a standard deviation was 0.51. Any testing contractor with a score below the sum of the arithmetic mean plus half a standard deviation (2.47+(0.5*0.51)), or 2.73, would not qualify to be considered for a cursory review program. Five of seventeen testing contractors, or 29% were rated above that minimum standard.

Equipment

This classification is designed to evaluate if specific groups of equipment types would meet a standard for being acceptable for cursory review outside of each individual units association with a facility or testing contractor whose overall performance did not meet the criterion. For example, a facility or contractor may test an

engine and meet the acceptance criteria but when conducting other testing not meet the acceptance criteria. If viewed only from the facility or testing contractor standpoint the unit may be excluded but when evaluated separately may be included from possibly being included in a cursory review program.

The arithmetic mean of the average facility rating based on equipment type tested (equipment^{F}) was 2.56 with a standard deviation was 0.50. Any equipment^{F} with a rating below the sum of the arithmetic mean plus half a standard deviation (2.56+(0.5*0.50)), or 2.81, would not qualify to be considered for a cursory review program. Eight of nineteen equipment^{F}classifications, or 29% were rated above that minimum standard.

The arithmetic mean of the average testing contractors rating based on equipment type tested (equipment^{C}) was 2.76 with a standard deviation was 0.28. Any equipment^{C} with a rating below the sum of the arithmetic mean plus half a standard deviation (2.76+(0.5*0.28)), or 2.90, would not qualify to be considered for a cursory review program. Ten of nineteen equipment^{C} classifications, or 53% were rated above that minimum standard.

When the results from both evaluations in the Equipment section are reviewed in detail and cross compared vaporizers, ovens, generators, crushers, and coating operations were the only equipment types that rated acceptable on both lists. The vaporizers are unique to one source and test once every four years. These are not a good candidate for cursory review. Ovens, generators, crushers and coating operations exist at a number of facilities but only two or three different tests were conducted on these types of equipment during the data collection phase of this project. Basing a

decision to include these units in a cursory review process on such a small sample size is not prudent.

Pollutant

Tests were conducted for thirty-two different pollutants. Those were combined into fourteen different groups based on substantially similar testing requirements. This will allow for more meaningful statistical analysis. Ratings in the pollutant element are based on the average of up to five elements directly related to measuring the specific pollutant including process information, laboratory data, quality assurance/quality control, revisions/corrections, and other. The averages rating for each test is then averaged into the respective pollutant group. Ratings are defined as follows: A rating of 1 is assigned to a test that has poor or unsupportable data documentation, broken or questionable chain of custody for samples, failed laboratory audit samples, or other demonstrably poor field craft. A rating of 2 is assigned to a test that is missing essential test or lab data that can be supplied and is verifiable, field craft that is passable but not great. A rating of 3 would be assigned to a test that includes all necessary information within the original submittal or missing supplemental information is provided quickly and is verifiable.

The arithmetic mean of the pollutant rating was 2.49 with a standard deviation was 0.28. Any facility with a rating below the sum of the arithmetic mean plus half a standard deviation (2.49+(0.5*0.28)), or 2.62, would not qualify to be considered for a cursory review program. Four of fourteen pollutant groups, or 29% were rated above that minimum standard. Those four were volatile organic compounds, opacity, flow, and

carbon dioxide. This is not surprising since these are some of the easier pollutants to test for.

Results Discussion

Regardless of the element being evaluated, the ratings spanned the entire range of possible results. Additionally, there was no consistency from test to test when you held one variable constant searching for some pattern of excellence in testing. While there were a number of individual evaluations that indicate that certain specific tests might meet the acceptance criteria for inclusion into a cursory review program there are no candidates that consistently stand out. Because of this lack of consistency, the project manager cannot recommend instituting any kind of cursory review program at this time.

Next Steps

Had the data revealed opportunities for developing and implementing some type of expedited review process, the project manager envisions it taking the following form. Individual tests that fall into the projects acceptance criteria would be flagged by the section manager and assigned to staff experienced with the test type. The staff assigned to review the test would review the reported data to see if it passes the "laugh test", then validate high level calculations, verify that field data sheets are complete, verify parametric monitoring values, check the reported emissions compared to the applicable limit, and generate a summary report indicating that the review was cursory. Depending on the frequency of the test, a full review would be conducted on every third or fourth test. Additionally, if the cursory review revealed a substandard report, the test project would be removed from the cursory process and given a full review. Cursory

test projects would be periodically reviewed independently by the project manager or senior staff to ensure that the cursory reviews are conducted appropriately.

The success of the project would be tracked based on the number and type of tests that enter and successfully complete the program. Rough time estimates for processing various test reports can be used to estimate time saved and by extension payroll dollars saved. Equally important, time saved in the review process can be devoted to increasing our presence in the field which would further enhance the overall quality of our air pollution testing program.