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November 12, 2007

Ministry of the Environment
Standards Development Branch
40 St. Clair Avenue West, 7th Floor
Toronto, Ontario
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Attention: Scott Grant
Engineer, Air Pollution Control - Technology Standards Section

Re: Draft Document "Additional Guidance on Assessing Data Quality"

ORTECH Environmental agrees with the need to continuously improve the Procedure for preparing an Emission Summary and Dispersion Modelling Report and supports the efforts which the Ontario Ministry of the Environment continues to put forth in this regard. As Practitioner's who regularly submit ESDM Reports to the ministry, we appreciate the opportunity to comment on the Draft Document "Additional Guidance on Assessing Data Quality".

The draft document appears to force a 'one size fits all' approach and discourages professional judgment in selection of emissions calculations bases. Additionally, in confining this process, a number of decision as to the hierarchy of data quality have been made, some of which seem both arbitrary and contradictory.

ORTECH feels that more work should be done on the draft document including revisiting some of the decisions made about conservatism and data quality as well as clarification of the sample scenarios. To assist in this, we have attached a submission with a more detailed assessment of the draft document that includes specific suggestions for improvements and would be pleased to work with the MOE and the Ontario Air Practitioners Group to address these issues.

Yours Very Truly,

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Principal, Compliance & Permitting

cc: Neil Parrish, Approvals Branch

Comments on Draft Document
Additional Guidance on Assessing Data Quality

A Submission to:

Ministry of the Environment
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1. INTRODUCTION

This document provides comments by ORTECH Environmental (ORTECH) on the Ontario Ministry of the Environment (MOE) Draft Document "Additional Guidance on Assessing Data Quality, May 2007" (draft document - attached at end of this submission).

ORTECH recognizes the importance of data quality and conservatism in relation to emissions calculations that are used to demonstrate compliance. We submit the following comments addressing ORTECH's concerns with the document and with the overall process of emissions calculations.

2. CONSERVATISM VS ACCURACY

A critical element in calculating air emissions is the separation of accuracy from conservatism. There appears to be a focus on conservatism within the draft document. Although subsection 1.2 is titled Background - Assessing Data Quality, the subsection focuses on the selection of higher estimates of emission rates rather than addressing the selection of more accurate ones. The current "Procedure for Preparing an Emission Summary and Dispersion Modelling Report, Version 2 (July 2005)" (the Procedure) clarifies data quality as "the higher the quality of the data, the higher the accuracy and certainty of the emission estimates and therefore predictions of POI concentrations". There is little to no discussion of accuracy or uncertainty in the subsection. If this is the MOE's approach, subsection 1.2 would be more accurately titled Background - Assessing Data Conservativeness.

Favouring conservatism over accuracy can lead to the situation where emissions calculations for ESDM reports are inconsistent with other estimates where accuracy is preferred (e.g. emissions reporting programs such as O.Reg. 127 or NPRI reporting).

This approach seems particularly ill-suited to advanced dispersion modelling programs. The effect of the conservatism multiplies in this case, i.e. conservative emission calculations being used in a conservative dispersion model with conservative meteorological data sets to produce POI concentrations to compare with conservatively set standards and guidelines.

For example, the MOE approach to conservatism in the AERMOD model seems quite extreme since, instead of using a 98^{th} or 99^{th} percentile, or eliminating the worst 8 hours at all receptors, only the worst 8 hours at any receptor can be eliminated as meteorological outliers.

In addition, it is not unusual for significant factors of safety to be included in the standard setting process. For example, a factor of 10 has been used to extrapolate from a subchronic to chronic exposure, even though a review has suggested that the average differences between values are only 2-3.

The Procedure should be revised to specifically encourage professional judgement in the selection of the basis for emission calculations to suit specific circumstances. Suggesting a 'one size fits all' protocol may cause undue concern; may well erode public confidence and promote uncertainties where none may exist.

If accuracy is considered to be low, then the procedure suggests that judgement be used to add an element of conservatism to ensure that the final calculated emission rate is "at least as high as the maximum rate that the source is reasonably capable of". However if the accuracy of an emission rate is high, then Section 11(1)i. can reasonably be met without adding more conservatism.

If anything, the Procedure section 8.3 should be less prescriptive but include more information on the factors that should be used to make selections among available alternatives. With some clarification of their use, the 10 factors of the draft document would make a useful addition to section 8.3 of the Procedure.

3. GUIDANCE AND JUDGEMENT

The draft document as written is very prescriptive. For example, subsection 1.2 describes a situation and then states that "the higher emission rate must be used". Indeed, the document is written in such a manner as to suggest that there is little or no possibility for Practitioners or Approvals Reviewers to use professional judgement to make informed decisions. In fact, the word "judgement" does not appear in the draft document at all.

From section 2 of the draft document: "A detailed description should also be provided…including consideration of the following issues:" a ten item list follows this statement. It would be more clear if the documentation stated that not all 10 items need to be assessed if some of them clearly do not apply. None of the six sample scenarios which follow in section 3 take all ten items into consideration. This extensive list of issues also seems to place an unreasonable burden on industry to defend their emission calculations against AP-42, which may be unrealistically conservative.

The six sample scenarios of section 3 do not address data quality. A scenario is described and a conclusion is stated. Assessment of data quality should be clearly presented in these samples to improve the guidance. Some of the sample scenarios seem to contradict the general guidance, e.g. sample scenario 3 describes site specific data which, according to the procedure, is likely of "average" quality. It is compared to an AP-42 factor with a data rating of B which is considered "above average" data quality. However the draft document explicitly states that the "approach should not be used to compare or select lower emission estimates that are in different data quality classifications, as outlined in the Ministry's Procedure Document".

Section 11(1)(2) of Reg. 419/05 specifies that "testing must be conducted comprehensively across a full range of operating conditions". It would be helpful if the guidance clarified that this does not apply to sources that only have one clearly defined maximum operating condition.

Section 20(1)(7)(iii) of Reg. 419/05 states "an assessment of...how significant the overestimate or underestimate may be". The draft document does not provide guidance on this.

4. "MORE EQUAL THAN OTHERS"

The draft document appears to take the approach that, although things may be categorized as equal, some things are "more equal than others".

Section 1.1 of the draft document states "...emission estimating methodologies described in paragraph 2 and 3…also represent the end of the iterative or refinement process". This statement implies that site specific testing is subordinate to other estimating techniques and that other techniques (i.e. AP-42) have precedence.

It is ORTECH's position that validated site-specific testing should be **the** reference and considered of higher data quality relative to published emission factors (i.e. AP-42) since the results are specific to the site and are more representative of emissions that are actually produced at the facility.

ORTECH recognizes that facilities will have different emissions based on differing operating conditions, however; validated source testing has required MOE approval of a pre-test plan for many years. Concerns about testing under non-representative operating conditions should be addressed and resolved at this point.

Sample scenario 2 suggests that the highest of the individual test results should be used. This is not consistent with most compliance test programs which show the results of all individual tests and use the average emission rate for the purpose of dispersion modelling assessment. A consistent approach should be considered such as the "average of the three tests provided all tests are within 25% of the average" or "the average plus one standard deviation".

The guidance should indicate why calculations of emissions of contaminants with health based standards are less flexible than for non-health based standards.

The draft document states that when considering two estimates of equivalent data quality, the more conservative estimate prevails and "must" be used. This is justified by citing paragraph 1 of subsection 11(1) of the regulation. The statement directly implies that the lower estimate will always be less than "the maximum emission rate that the source of contaminant is reasonably capable of for the relevant contaminant" since only the higher estimate can be used. This may not be the case as the lower emission rate may in fact represent the maximum that the sources are reasonably capable of.

From Sample Scenario 5, although the emission factor appears to be inappropriate on the basis that both "the process and product are different", it takes precedence over site specific data. This appears to contradict Section 4 which states that "Improper or inappropriate source test methods" is insufficient documentation.

The mention of the baghouse 'general rule' in the Procedure as referenced in example 2 of subsection 1.2 of the draft document brings up an interesting issue. Based on the MOE documentation to date, the 20 mg/m^3 general rule would fall into the "Marginal" or "Uncertain Data Quality" category ("derived from calculations where the scientific/technical integrity of the approach is uncertain"). Since a significant database of fabric filter testing exists at SDB (i.e. all the compliance and other documented testing done in the province over several decades) the most rational way of improving the quality of the general rule would be to review this database using the 10 factors and develop an outlet loading concentration and basis that would have an "Above Average" or "Highest" data quality. This would not only increase the quality and usefulness of the general rule but would also minimize the feedback that the MOE continues to receive on the inappropriate conservatism of the rule for many processes and exhaust (e.g. sawdust and other materials with no potential for sublimation fume) and would also provide a technical benchmark for undertaking reviews using the 10 points.

For some source categories, the application of a 'general conservative rule' can not succeed in determining quality emissions data. The adoption of "best management practices plan" for fugitive dust emissions from stockpiles and roadways is a good example of acknowledging that sources will emit if not controlled and it is more prudent to concentrate on control technologies than to accurately quantify emission rates. This approach could be considered for fabric filter control of the many different types of particulate sources that require control.

5. CONCLUSIONS

More work should be done on the draft document including revisiting some of the decisions made about conservatism and data quality as well as clarification of the sample scenarios.

Attachment

MOE Draft Document
Additional Guidance on Assessing Data Quality

ADDITIONAL GUIDANCE on ASSESSING DATA QUALITY

1. Background

1.1 Background - Options for Emission Estimating

Following is an excerpt from Chapter 8.2 of the Ministry's July 2005 Procedure for Preparing an Emission Summary and Dispersion Modelling report (Ministry's Procedure Document), with excerpts from subsections 11(1) and 26(1) of Regulation 419/05:

"8.2 Emission Rate and Estimation Techniques

Subsection 11(1) of the Regulation states:

Source of Contaminant Emission Rates

"11. (1) An approved dispersion model that is used for the purposes of this Part shall be used with an emission rate for each source of contaminant that is determined in one of the following ways:

1. ***The emission rate is at least as high as the maximum emission rate that the source of contaminant is reasonably capable of for the relevant contaminant.***

2. ***The emission rate is derived from site-specific testing of the source of contaminant that meets all of the following criteria:***

    i. ***The testing must be conducted comprehensively across a full range of operating conditions.***

    ii. ***The testing must be conducted according to a plan approved by the Director as likely to provide an accurate reflection of emissions.***

    iii. ***The Director must be given written notice at least 15 days before the testing and representatives of the Ministry must be given an opportunity to witness the testing.***

    iv. ***The Director must approve the results of the testing as an accurate reflection of emissions.***

3. ***The emission rate is derived from a combination of a method that complies with paragraph 1 or 2 and ambient monitoring, according to a plan approved by the Director as likely to provide an accurate reflection of emissions."***

In summary, the emission-estimating must be either:

- "conservative"[1], as represented by paragraph 1 of subsection 11(1); or
- as accurate as possible, as represented by the methodologies set out in paragraphs 2 and 3 of subsection 11(1).

The concepts of accuracy and conservatism in emission estimating work together. For example, the need for conservatism in the estimating technique should be inversely proportional to the degree of accuracy of the technique. The greater the accuracy, the less there is a need for conservatism in the emission estimating method.

In many cases, emission estimating is an iterative process where estimates are refined to be more accurate and less conservative when earlier iterations result in a prediction of an exceedence of a MOE POI Limit. Although the emission estimating methodologies described in paragraph 2 and 3 of subsection 11(1) of the Regulation can be selected at any time, they also represent the end of the iterative or refinement process.

Paragraph 7 of subsection 26(1) of the Regulation requires that an ESDM Report contain:

Under Subsection 26(1) of the Regulation – Contents of ESDM Report:

"7. For each source of contaminant identified under subparagraph 3 ii as a source of contaminant that was considered, with respect to a contaminant listed under paragraph 4, when using an approved dispersion model for the purpose of this section,

i. an explanation, for each averaging period used with respect to that contaminant and source of contaminant, of the method used to estimate the emission rate for the contaminant and source of contaminant,

ii. a sample calculation illustrating each method explained under subparagraph i, and

iii. an assessment of how accurately each method explained under subparagraph i estimates the emission rate, including an assessment of whether the method is more likely to overestimate or underestimate the emission rate and an assessment of how significant the overestimate or underestimate may be."

[1] For the purpose of this Procedure Document the term "conservative" refers to an estimated emission rate that is certain to be higher than the actual emission rate.

1.2 Background - Assessing Data Quality

As noted above under subparagraph 7iii. of subsection 26(1), Regulation 419/05 requires "an assessment of how accurately each method" estimates the emission rate. However, the ministry's Procedure for Preparing an Emission Summary and Dispersion Modelling Report (July 2005) also provides guidance on four categories of "data quality" that may generally be used to assess the accuracy and conservatism of the emission estimating method.

When using emission estimates that satisfy paragraph 1 of subsection 11(1) of Regulation 419/05 (i.e., "The emission rate is at least as high as the maximum emission rate that the source of contaminant is reasonably capable of for the relevant contaminant") there may be occasions where:

i) the data quality of two different estimates may be classified, according to the categories identified in the ministry's procedure document as equivalent; and
ii) one estimate is higher than the other.

In this situation, to satisfy the requirement of paragraph 1 of subsection 11(1) of the regulation, the higher emission estimate must be used. Following are a couple of examples of this type of situation:

1. There is a U.S. Environmental Protection Agency (US EPA) "AP-42" average emission factor, rated by the US EPA as A or B quality, that results in an estimated emission rate of 1 gram per second (for the averaging period of the relevant air standard). However, validated source testing, at a single operating condition, results in an emission rate estimate of only 0.5 grams per second. In this example, both of these estimates would, according to the guidance in the ministry's procedure document (see pages 43-44), be rated as above-average data quality.

2. The baghouse general rule in the ministry's procedure document (see Table C-2 on page 77 of the ministry's procedure document) indicates that the outlet particulate concentration from a baghouse can be assumed to be 20 milligrams of per cubic metre (mg/m^3). However, for multiple baghouses the procedure document suggests that an average emission factor, of say 10 mg/m^3 , can be used for all but the largest or most significant contributor to the maximum point of impingement concentration. In this example, validated source testing (at one operating condition) on a baghouse resulted in an outlet particulate concentration measurement of only 2 mg/m^3. Both of these estimates would, according to the guidance in the ministry's procedure document be rated as above-average data quality.

In both of these examples the higher emission rate satisfies paragraph 1 of section 11(1) of Regulation 419/05. In general, there are a variety of reasons for this including the fact that US EPA emission factors that are rated A or B are more likely to be conservative in capturing a maximum emission rate than a source test at only one operating condition. It is also important to recognize that many emission factors were designed to represent an average condition.

However, emission estimates that satisfy paragraph 1 of s. 11(1) may be refined in accordance with s. 12 of the regulation (i.e., alternate emission estimates that satisfy paragraph 2 or 3 of s. 11(1) may be used instead of estimates that satisfy paragraph 1 of s. 11(1)).

2. Additional Guidance to Consider When Classifying Data Quality

The data quality classification system (e.g., Uncertain Data Quality; Average Data Quality; Above-Average Data Quality; and Highest Data Quality) outlined in the Ministry's Procedure document provides guidance on how to assess the accuracy of each emission estimating method used in an Emission Summary and Dispersion Modelling report. However, there may be situations where alternative or more precise classification of the data quality of an emission estimate, within one of the four classifications outlined in the Ministry's Procedure Document, is reasonable.

If there are more than one estimate with equivalent data quality and there is interest in selecting the lowest estimate for use in the dispersion modelling then both estimates must be presented in the ESDM report. A detailed description and explanation should also be provided to justify a more precise classification of the data quality and justify selection of the lower estimate, including consideration of the following issues:

1. A review of the toxicity of the contaminant and basis for the air standard.
2. Magnitude of the predicted point of impingement concentrations relative to the standards.
3. Frequency of anticipated exceedances of the relevant air standard using both emission estimates.
4. A review of any background documentation that is the basis of the emission estimates (e.g., background documentation to the US EPA "AP-42" emission factors).
5. The type of source tested and the anticipated variability of the process, the presence of air pollution control equipment; and any differences between the source being assessed and the processes on which the emission factors were based.
6. Any documentation on the validation (by a regulatory agency) of the results from site specific source testing.
7. Description of test results including: dates and results of all relevant tests, number and description of operating conditions tested and equipment maintenance status (i.e., was the process tested under optimal conditions only?).
8. A description of the facility operation and maintenance practices (including the presence of an Environmental Management System) that would minimize the possibility that actual emissions are greater than the lower emission estimate.
9. Any relevant performance guarantees from the manufacturer of air pollution control equipment including any assumptions/limitations/stipulations.
10. Any corroborating evidence of adverse effect. For example, a summary of information from the Ministry's local district office with respect to (depending upon the type and effects of the contaminant) public complaints and/or any results from phytotoxicological/soil investigations.

NOTES for the Application of the Above-Noted Additional Guidance to Consider When Classifying Data Quality:

i) The above-noted approach should not be used to compare or select lower emission estimates that are in different data quality classifications, as outlined in the Ministry's Procedure Document.

ii) The above-noted approach should not be used to select a lower emission estimate when use of the highest emission estimate (of equivalent data quality classification) would result in a prediction of exceedance of a standard that is intended to be protective of human health. The options for this type of situation are:

- **a. notification of exceedance and submission of an abatement plan, in accordance with s. 28 and 29 of the regulation, respectively; or**
- **b. "refinement" of the emission estimates in accordance with s. 12 of the regulation.**

iii) It is reasonable to expect that the Ministry will allow flexibility in accepting the justification of the use of lower emission estimates (for the same data quality classification) when:

- **a. there is more than one estimate within the same data quality classification and**
- **b. the standard is not health-based.**

iv) One possible outcome is for the Ministry to accept the justification of the use of a lower emission estimate within the same data quality classification. Another possibility would be for the use of conditions on a Certificate of Approval or within an Order to allow the use of the lower emission estimate with some form of verification (e.g., further site specific testing, testing in cooperation with a broader or sector-wide air emissions study and/or data gathering based upon a mass-balance approach).

3. Sample Scenarios

The following scenarios show examples of the situations described above. The appropriate response is described in italics at the end of each scenario.

1. A facility may have data quality control requirements based on controlled substances. They know from tracking the controlled substances that a realistic estimate of the maximum loss is 0.5%. They are required by federal authorities to perform annual reports and demonstrate that their loss never exceeds this limit. The AP42 emission factor for a similar facility may show a maximum loss of 2%. With a loss of 2% the facility cannot demonstrate compliance. *In this situation the facility data quality would take precedence over the AP42.*

2. A facility has triplicate validated stack testing for two different years which result in a conservative emission rate estimate of a contaminant (that is emitted from a number of sources where emissions from other sources is relatively certain) of 0.05 g/s… based on the highest of the individual test results (e.g., a test result is generally the average of three test runs). The AP42 emission factors vary over a range over 2 orders of magnitude with the maximum emission rate from the upper-end of the range of AP42 emission factors resulting in a maximum emission rate of 3 grams per second. The facility can demonstrate compliance up to a 1.8 g/s emission rate. *Although the highest estimate (from AP-42) satisfies paragraph 1 of s. 11(1), an assessment of compliance is reasonable since, in this specific situation, compliance is predicted up to a point of emission that is towards the higher end of the range of emission factors. This approach is acceptable, however further testing may be required through , for example a condition of approval, depending upon the significance of the contaminant and/or process specific considerations.*

3. The facility has installed a piece of control equipment worth $500K with a manufacturer guarantee of a minimum of 95% removal efficiency. The equipment is monitored through pressure sensors and as long as the pressure is within range, the equipment is assumed to be operating at optimum removal capacity. If the removal capacity is ever demonstrated to be less than 95%, the manufacturer will repair or replace the equipment. The equipment has not been tested at the facility though the manufacturer has un-validated testing records at similar facilities, all of which indicate removal efficiencies greater than 99%. In addition, the other facilities have been able to provide independent stack testing results that confirm the performance. The facility conservatively uses a 90% removal efficiency in their emissions estimates which result in an emission rate of 0.6 g/s. The corresponding AP42 emission factor with a data quality of B level provides for a controlled emission rate of 1.2 g/s. *In this situation the facility data quality would take precedence over the AP42 as site specific information is more detailed than the AP42.*

4. The facility operates 6 small baghouses that exhaust within the facility. The baghouses control sawdust from cutting operations. Any facility releases of particulate are through general ventilation. The MOE factor of 20 mg/m3 results in non-compliance at the property line if no consideration is provided for an exhaust venting inside.

Manufacturer's data suggests that a more appropriate outlet loading is 5 mg/m3, however, the manufacturer is unwilling to guarantee this performance but work-place measurements and supporting calculations suggest that baghouse outlet concentrations are less than 5 mg/m3. The facility has implemented operating and maintenance plans for significant processes as required by their basic comprehensive CofA and has identified particulate emissions as significant. *The approach would be acceptable in this case as the contaminant is not considered toxic.*

5. The facility operates an adhesive spray booth that uses isocyanates in the adhesive. The facility monitors the area for isocyanate emissions using industrial hygiene techniques and has not detected isocyanate emissions. The facility is in a commercial mall and must consider self contamination. The MOE emission factor for automotive spray booths predicts non-compliance with self contamination, however, the process and product are different. The manufacturer estimates that the emissions from the isocyanates are less than half of that of the MOE factor and cites the formation of residue in the stack as evidence. *The MOE factor would still take precedence over the site specific data as the provided background information is insufficient and the isocyanate has a health-based POI limit.*

6. An industry sector has expressed concern over a 20 year old AP42 for that sector and has funded their own private study of emissions from the sector. The study was not submitted to the MOE for validation (e.g., validation includes a three-stage approval by the Ministry… pre-test plan approval, an opportunity to witness and acceptance of the final test report), but does follow EPA methodologies. The sector study focussed on 4 different Ontario facilities and determined that emission factors by the AP42 are overly conservative and can lead to non compliance issues. The sector has provided full documentation of the study and the MOE has then accepted the results. The contaminants have POI limits that are not health-based. *The study results would be acceptable as satisfying paragraph 1 of s. 11(1) of Regulation 419/05.*

4. Examples of Insufficient Documentation

- Manufacturers brochures
- One-off industrial hygiene testing
- Un-validated stack testing with no operational data provided
- Improper or inappropriate source test methods used to determine emission rates.