

LEHDER Environmental Services

Assessing Compliance with Dioxin and Furan Standards in Ontario

Newsletter

April 2012

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Introduction

If you are responsible for environmental compliance at an Ontario facility that emits dioxins and furans to atmosphere, you should be aware that two different means of calculating and reporting dioxin and furan emissions may apply to your facility.

Dioxin and Furan Emission Standards

During the period April 2001 to November 2003, the Canadian Council of Ministers of the Environment (CCME) endorsed Dioxin and Furan (D&F) Canada-Wide Standards (CWSs) for selected industrial processes, including selected waste incineration processes, iron sintering, and electric arc furnace steel manufacturing. Facilities in Canada that emit D&F compounds to atmosphere are obliged to comply with the CWS specific to their process. The D&F CWS is an *in-stack* concentration limit representing combined D&F emissions, based on a calculated toxic equivalency.

The Ontario Ministry of the Environment (MOE) enforces the CWS and has incorporated it into Certificates of Approval (Air) for D&F emitters. The MOE has also established *out-of-stack* point-of-impingement (POI) and Upper Risk Threshold (URT) ground-level concentration limits for D&F compounds, also based on toxic equivalency. Compliance with POI and URT limits must be demonstrated using approved air dispersion modelling techniques.

Calculating D&F TEQ Concentrations

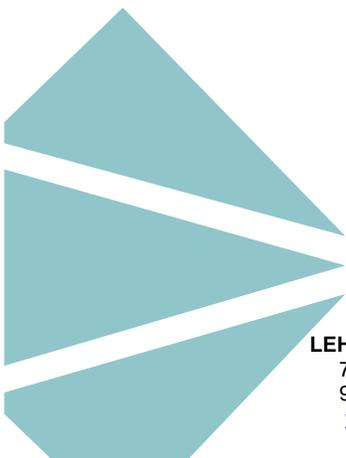
The D&F Toxicity Equivalent Concentration (TEQ) is an aggregate concentration value used to represent D&F emissions from a source. It is calculated by multiplying individual D&F congener concentrations by toxic equivalency factors (TEFs) relating the toxicity of each congener to the most toxic dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin). Several methods have been proposed for calculating TEQs, using different TEFs for the various D&F congeners, and/or including additional dioxin-like compounds in the aggregate.

The CWS stipulates the use of D&F TEFs developed and endorsed in 1988 by the North American Treaty Organization Committee on the Challenges of Modern Society (NATO/CCMS) to calculate TEQs. The NATO/CCMS methodology calculates an in-stack TEQ based on the measured concentrations of 17 selected D&F congeners. Most Ontario facilities' Certificates of Approval (Air) reference this methodology for demonstrating compliance with the CWS.

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Beyond the CWS requirements, Ontario Regulation 419: *Air Pollution – Local Air Quality* (O.Reg. 419/05) established ½-hour and 24-hour POI Guideline values for *chlorinated dibenzo-p-dioxins*. O.Reg. 419/05 used the same congeners and NATO/CCMS TEFs referenced in the CWS to calculate a TEQ concentration to assess compliance with the Guideline values.

In June 2011, the Province of Ontario promulgated new D&F POI and URT Standards (for both ½-hour and 24-hour emission periods) for *Dioxins, Furans and Dioxin-like PCBs*. These new POI / URT Standards employ the World Health Organization (WHO) list of dioxins, furans and dioxin-like polychlorinated biphenyls (PCBs), and their associated TEFs, to calculate a toxicity equivalent (WHO₂₀₀₅ TEQ). The WHO list includes the same 17 D&F congeners used in NATO/CCMS TEQ calculations, but also adds 12 dioxin-like PCB congeners to the calculation. The NATO/CCMS and WHO₂₀₀₅ TEQ concentrations use different D&F TEFs in their calculations. The new D&F POI Standards are not scheduled to come into effect until July 1, 2016; however, the URT limits were effective immediately upon promulgation.

Assessing Compliance in Ontario

Assessing compliance in Ontario requires sampling and analyses of the 17 D&F congeners common to the NATO/CCMS and WHO₂₀₀₅ TEQ calculations plus the 12 additional dioxin-like PCB compounds included in the WHO₂₀₀₅ TEQ list. The additional PCB compounds can be analyzed from the same samples used for D&F compliance sampling. Separate TEQ concentrations should be calculated using the NATO/CCMS and WHO₂₀₀₅ methods. The NATO/CCMS TEQ can be compared directly to the CWS to assess compliance. It can also be used in conjunction with an approved air dispersion model (specified in O.Reg. 419/05) to demonstrate compliance with Guideline values. The WHO₂₀₀₅ TEQ is used in conjunction with an approved air dispersion model to assess compliance with URT values. In 2016, the WHO₂₀₀₅ TEQ will be required to demonstrate compliance with POI Standards.

The following table summarizes the calculation methods and means of demonstrating compliance with Ontario dioxin and furan emission limits.

Dioxin and Furan Emissions Compliance	Canada Wide Standards	Ontario Regulation 419/05		
		Guideline Values	Point-of-Impingement Standards	Upper Risk Threshold Limits
Type of Limit	In-stack concentration	Ground-level concentration	Ground-level concentration	Ground-level concentration
Toxicity Equivalent (TEQ) Calculation Method	NATO/CCMS toxic equivalency factors applied to 17 dioxin and furan congener concentrations	NATO/CCMS toxic equivalency factors applied to 17 dioxin and furan congener concentrations	WHO ₂₀₀₅ toxic equivalency factors applied to 17 dioxin and furan congener and 12 dioxin-like PCB congener concentrations	WHO ₂₀₀₅ toxic equivalency factors applied to 17 dioxin and furan congener and 12 dioxin-like PCB congener concentrations
Demonstration of Compliance	Direct comparison of in-stack sampling results with Standards	Facility-specific air dispersion modelling of stack sampling results for comparison to Guidelines	Facility-specific air dispersion modelling of stack sampling results for comparison to Standards	Facility-specific air dispersion modelling of stack sampling results for comparison to Limits
Effective Dates	Currently applied	Currently applied	July 1, 2016	Currently applied

Helpful Web Links

Information regarding Canada-Wide Standards for Dioxins and Furans can be found here:

http://www.ccme.ca/ourwork/air.html?category_id=91

Information regarding changes to O.Reg. 419/05 made in 2011 can be found here:

http://www.e-laws.gov.on.ca/html/source/regs/english/2011/elaws_src_reqs_r11282_e.htm

How Can LEHDER Assist?

The LEHDER Emissions Testing Group (ETG) has a wealth of experience conducting dioxin and furan sampling and analysis programs to satisfy Canada-Wide Standard and specific jurisdictional requirements to meet your compliance testing needs. The LEHDER Industrial Services Group (ISG) provides expertise in air dispersion modelling and in assessing and demonstrating regulatory compliance. As a team, LEHDER can assist you with all aspects of air emissions compliance, management and reporting.

Questions?

For further information or questions regarding D&F sampling, analysis, calculations and reporting, please contact:

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About LEHDER

LEHDER is one of the largest Air Quality Management consulting companies in Canada. Our team of consulting professionals is built around our core strength in industrial environmental, health and safety management. LEHDER recognizes our clients' need to make decisions that provide for operational flexibility while meeting regulatory, economic and social requirements.

Visit our web pages at: www.lehder.com

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