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Methods	Provinces								
	Alberta	British Columbia	Manitoba	New Brunswick	Newfoundland & Labrador	Nova Scotia	Ontario	Quebec	Saskatchewan
<b>U.S. EPA 29:</b> Determination of metals emissions from stationary sources	Not specified		X	X	X	Not specified	X	X	Not specified
<b>U.S. EPA 101A:</b> Determination of particulate and gaseous mercury emissions from sewage sludge incinerators	Not specified	X				Not specified			Not specified

### 11.3 Methods Used at Forest Products Manufacturing Facilities

#### 11.3.1 EPA Method 29: Determination of Metals Emissions from Stationary Sources

In addition to Hg emissions, EPA Method 29 is applicable to the determination of antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), cadmium (Cd), chromium (Cr), cobalt (Co), copper (Cu), lead (Pb), manganese (Mn), nickel (Ni), phosphorus (P), selenium (Se), silver (Ag), thallium (Tl) and zinc (Zn) emissions. This method may also be used to determine particulate emissions if the prescribed procedures and precautions are followed.

Method 29 uses a filter and a series of impingers for sample collection, and cold vapour atomic absorption spectroscopy (CVAAS) for analysis of total Hg. The gas sample is extracted isokinetically from the stack using a sampling train, which consists of the following primary components:

- (a) A probe connected to a heated out-of-stack filter.
- (b) A condensing system to collect gaseous metals and moisture, and consisting of seven chilled impingers connected in series: The first and fourth impingers are left empty; the second and third impingers contain a HNO<sub>3</sub>/H<sub>2</sub>O<sub>2</sub> (5%/10% v/v) absorbing solution; the fifth and sixth impingers contain a KMnO<sub>4</sub>/H<sub>2</sub>SO<sub>4</sub> (4%/10% v/v) absorbing solution; and the seventh impinger contains silica gel.

A vacuum pump pulls the gas through the sampling train, and Hg is captured on the filter and in the impinger solutions. The nitric acid solutions collect the various forms of oxidized Hg, but do not typically collect the elemental form<sup>33</sup>. The permanganate solution oxidizes the elemental Hg and retains it (in oxidized form) in solution (Kramlich and Sliger 2000). Leak checks are performed prior to and after the test run. Samples recovered for analysis are the following:

- (a) Sample 1: Particulate filter.
- (b) Sample 2: Rinse from washing the front half of the sampling train with acetone.
- (c) Sample 3: Rinse from washing the front half of the sampling train with a nitric acid solution.

<sup>33</sup> It has been reported in the literature that some of the elemental Hg present in the source gas may be captured in the HNO<sub>3</sub>/H<sub>2</sub>O<sub>2</sub> absorbing solution specified in Method 29 (Laudal 1999).

- (d) Sample 4: Contents of the first three impingers together with rinse from washing these impingers, the filter support, the back half of the filter holder, and connecting glassware with a nitric acid solution.
- (e) Sample 5: Contents of fourth impinger together with rinse from washing that impinger with a solution of nitric acid.
- (f) Sample 6: Contents of fifth and sixth impingers together with rinse from washing these impingers and connecting glassware with an acidified permanganate solution, and then with water.
- (g) Sample 7: If, after the water rinse, visible deposits still remain on the surface of the fifth and/or sixth impingers, these impingers are washed with a solution of hydrochloric acid and water, and the rinse is collected.

Sample 1 is desiccated, weighed, digested with concentrated hydrofluoric acid and nitric acid. Sample 2 is evaporated to dryness, and the resulting residue weighed, dissolved in concentrated nitric acid, and combined with Sample 3. The resultant sample is acidified to pH=2 with concentrated nitric acid (if necessary), evaporated to near dryness, digested with concentrated hydrofluoric acid and nitric acid, and combined with the acid digested Sample 1. The resultant combined sample is filtered and water diluted, and used for the determination of front half Hg (Analytical Sample 1).

An aliquot of Sample 4 is used for the determination of Hg captured in the  $\text{HNO}_3/\text{H}_2\text{O}_2$  absorbing solution (Analytical Sample 2). An aliquot of Sample 5 is used for the determination of Hg captured in the rinse from the fourth (initially empty) impinger (Analytical Sample 3). Sample 6 is filtered and the filtrate is used for the determination of Hg captured in the  $\text{KMnO}_4/\text{H}_2\text{SO}_4$  absorbing solution (Analytical Sample 4). The precipitate is digested with hydrochloric acid and filtered, and the resulting filtrate is combined with that generated from filtering Sample 7. The resultant solution (Analytical Sample 5) is used for the determination of Hg that may still be present in the  $\text{MnO}_2$  precipitate formed in the permanganate impingers. Analytical Samples 2 through 5 contain back half Hg.

All analytical samples are separately digested with acid and potassium permanganate at  $95^\circ\text{C}$  for two hours to dissolve inorganics and to remove organic constituents that may create analytical interferences, and then analyzed for Hg by CVAAS. The total train Hg catch is calculated by summing individual Hg determinations.

Depending on the CVAAS analytical instrument used, the analytical detection limit for Hg (on the resultant volume of the digestion of aliquots taken for analysis) can vary between 0.02 and 0.2 ng/mL. The primary disadvantage with Method 29 is that it is a time-consuming process.

***Note on Ontario Hydro Mercury Speciation Method (ASTM D6784 - 02(2008) Standard Test Method for Elemental, Oxidized, Particle-Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources)***

The Ontario Hydro method provides Hg speciation measurement data for coal-fired boilers. This method was developed by researchers at Ontario Hydro Technologies in 1994, with the primary objective of overcoming the apparent limitation of EPA Method 29 to selectively capture oxidized Hg. The Ontario Hydro method attempts to selectively capture  $\text{Hg}^{2+}$  by substituting three impingers containing aqueous potassium chloride (KCl) solutions for one impinger containing the  $\text{HNO}_3/\text{H}_2\text{O}_2$  absorbing solution. The method also specifies an additional permanganate impinger and no empty impingers as part of the sampling train. Recovered samples primarily include the particulate filter as well as the contents of the KCl,  $\text{HNO}_3/\text{H}_2\text{O}_2$ , and  $\text{KMnO}_4/\text{H}_2\text{SO}_4$  impingers. All samples are digested and analyzed by CVAAS or fluorescence spectroscopy (CVAFS). The fraction captured by the KCl

solution is reported as  $\text{Hg}^{2+}$ , while the sum of the Hg measured in the  $\text{HNO}_3/\text{H}_2\text{O}_2$  and  $\text{KMnO}_4/\text{H}_2\text{SO}_4$  impingers is reported as elemental Hg. The Hg measured on the filter is defined as particulate-bound mercury. To NCASI's knowledge, this method is not currently applied at Canadian forest products manufacturing facilities. In Ontario, regulations concern total, and not speciated, Hg.

### **11.3.2 EPA Method 101A: Determination of Particulate and Gaseous Mercury Emissions from Sewage Sludge Incinerators**

Method 101A measures total Hg gaseous emissions from sewage sludge incinerators and drying plants. Like Method 29, Method 101A can be used to measure total particulate matter.

In this method, the gas stream is sampled isokinetically from the source and the gaseous Hg is captured in an acidic potassium permanganate solution. The collected Hg is reduced to its elemental form, aerated into an optical cell where it is measured by an atomic absorption (AA) spectrophotometer. The sampling train consists of the following primary components:

- (a) A heated probe that may be connected to a heated out-of-stack glass fibre filter, if the gas stream is expected to contain high concentration of particulate matter.
- (b) Four chilled impingers connected in series, with the first three impingers containing a  $\text{KMnO}_4/\text{H}_2\text{SO}_4$  (4%/10% v/v) absorbing solution, and the fourth impinger containing silica gel.
- (c) An acid trap, following the last impinger.

A vacuum pump pulls the gas through the sampling train, and Hg is captured in the impingers' permanganate solution. Samples recovered for analysis are the following:

- (a) Sample 1: Contents of first three impingers together with rinse from washing these impingers and the front half of sampling train with a fresh permanganate absorbing solution, and then with water.
- (b) Sample 2: If, after the water rinse, visible deposits still remain on the surface of the first three impingers, the impingers are washed with a solution of hydrochloric acid and the rinse is also collected.
- (c) Sample 3: If a filter was used, it is removed from the filter holder and combined with a fresh permanganate absorbing solution.

Samples 1 and 2 are separately filtered to remove the manganese dioxide precipitate ( $\text{MnO}_2$ ). Sample 3 is heated and digested with concentrated nitric acid. The resulting digested solution is filtered, and the filtrate is combined with that generated from Filtering Sample 1. The combined filtrates are water diluted and thoroughly mixed (Analytical Sample 1). The filter used to remove  $\text{MnO}_2$  from Sample 1 is digested with a hydrochloric acid solution, and the digestate is filtered. The resulting filtrate is combined with that generated from Filtering Sample 2. The combined filtrates are water diluted (Analytical Sample 2).

Both analytical samples are quantified in identical manner. The sample is mixed in a closed container with a sodium chloride-hydroxylamine solution to remove excess  $\text{KMnO}_4$ , and then with a stannous chloride solution ( $\text{SnCl}_2$ ) to reduce the Hg to its elemental form and release it, as vapour, from the solution. The closed container is subjected to aeration with nitrogen, and then both nitrogen and the Hg vapour flow through a heated optical cell connected to an AA spectrophotometer for analysis.

Excessive oxidizable organic matter may be an interferent, as it depletes the potassium permanganate solution thereby preventing further collection of Hg. Condensation of water vapour on the optical cell windows causes a positive interference.

Depending on the degree to which the analytical sample aliquot is diluted, the range of this method can vary between 20 and 800 ng Hg/mL.

### 11.4 Synthesis of Test Methods for Hg

This subsection of the report provides a synthesis of the sampling train configuration as well as sample recovery and analysis principles behind the test methods used in Canada to measure Hg. The intent is to help the reader pin down the most important similarities and/or differences between methods using similar principles. Method schematics are conceptual and grouped according to the principle used to collect and analyze the sample. Relevant characteristics associated with each method are noted on the conceptual diagram.

All the methods approved in Canada for measuring Hg are indirect; i.e., the sampling and measurement of Hg are not performed continuously as sample recovery and analysis are performed off-line. The schematic comparison between these methods is shown in Figure 16. All methods rely primarily on absorbing solutions to capture Hg emissions. Differences between methods are essentially associated with the type and number of absorbing solutions used and the way samples are recovered and prepared for analysis (see Figures 17 and 18).

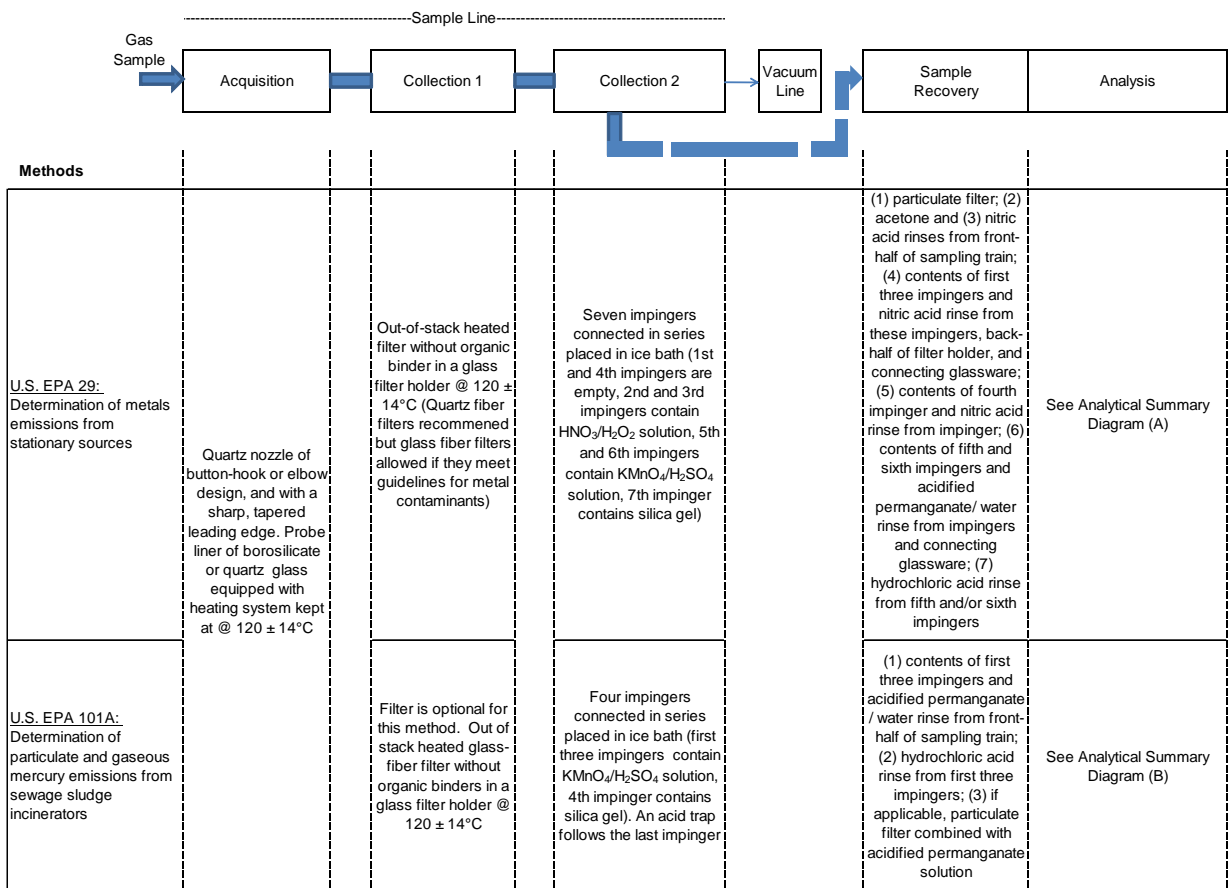


Figure 16 Indirect Hg Methods

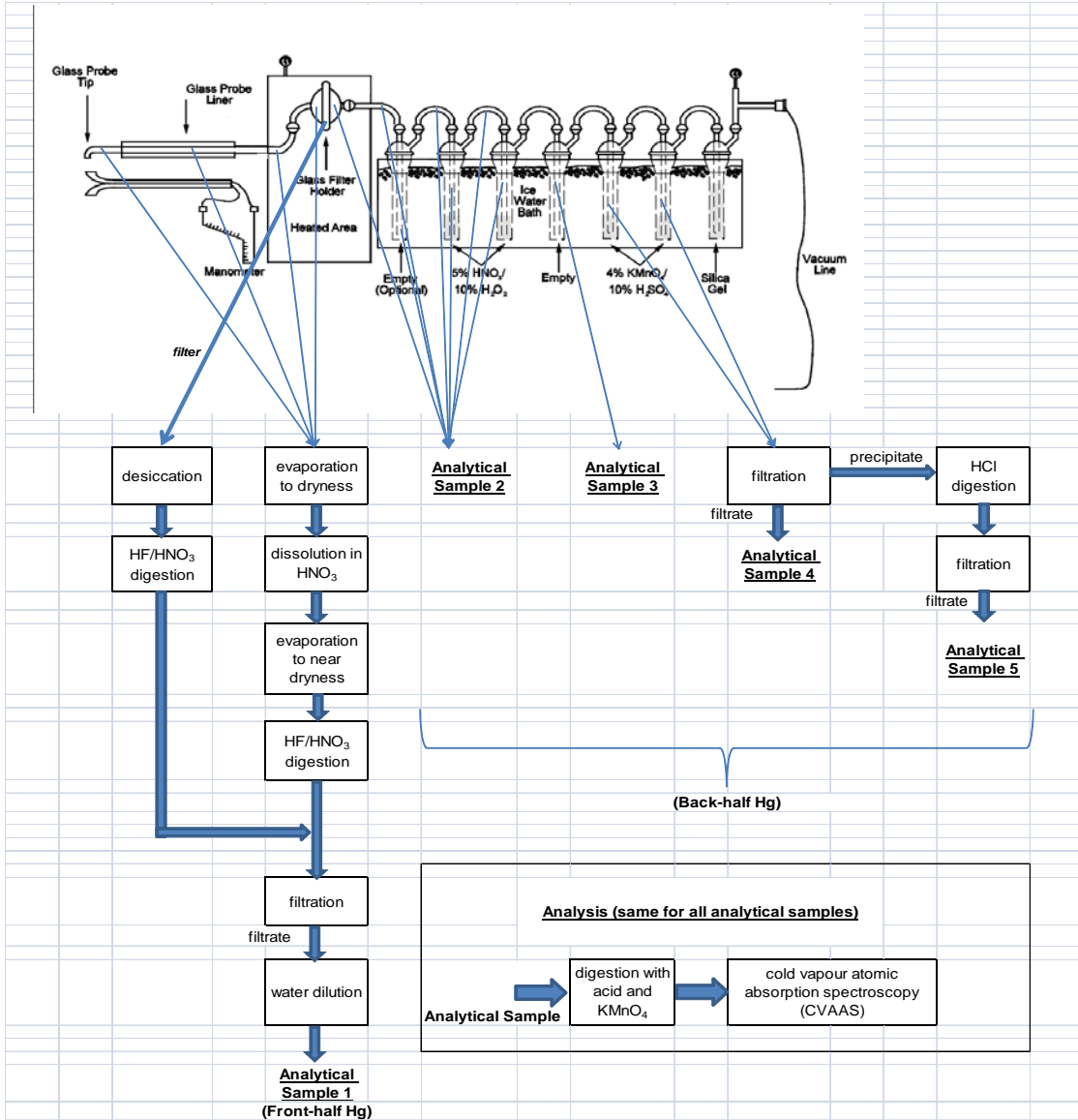


Figure 17 Analytical Summary Diagram A – EPA Method 29

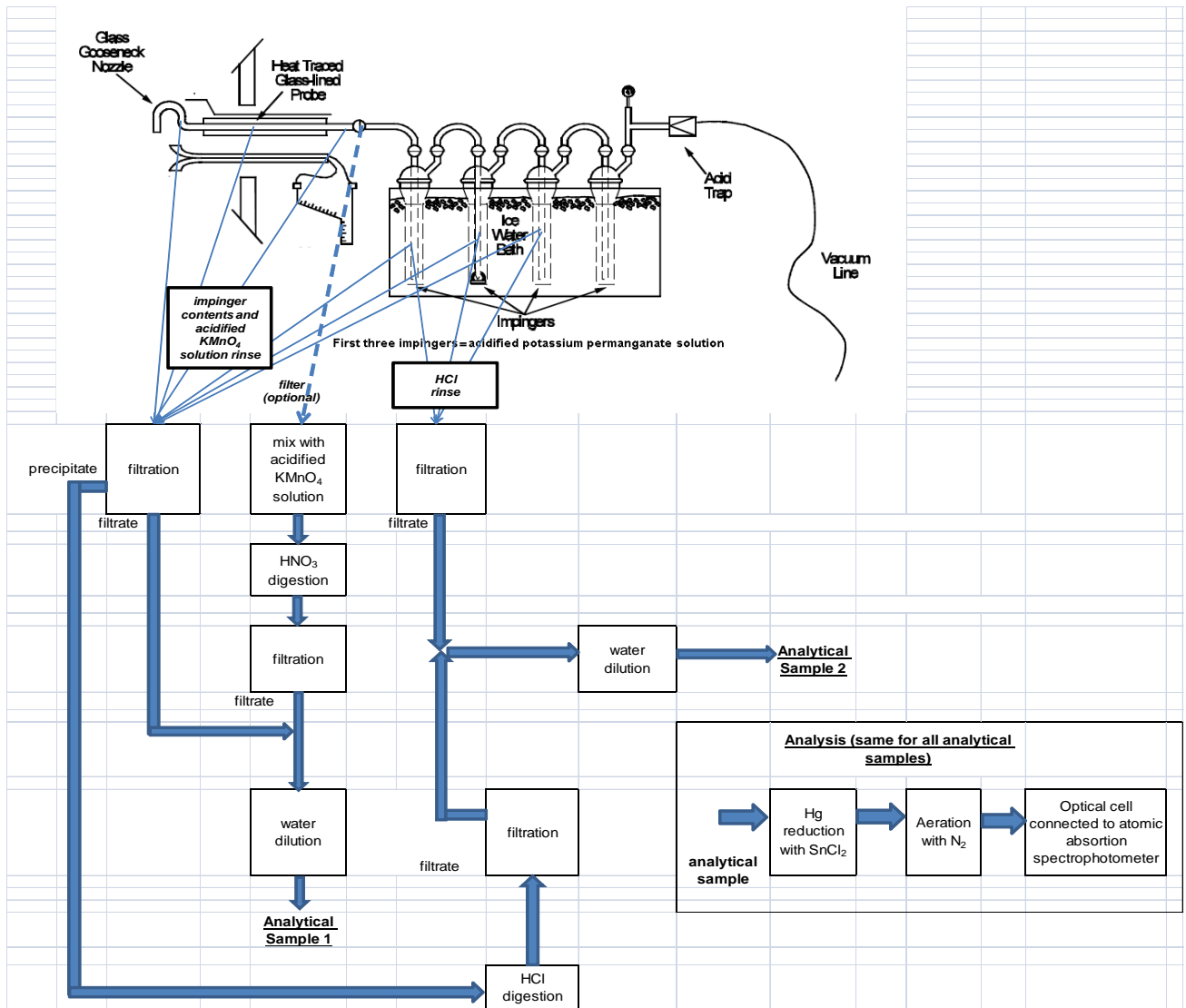


Figure 18 Analytical Summary Diagram B – EPA Method 101A

## 12.0 CARBON MONOXIDE (CO)

### 12.1 Sources of CO at Forest Products Manufacturing Facilities

Carbon monoxide is generally formed during combustion processes, specifically as a result of partial oxidation of carbon-containing compounds when there is not enough oxygen to produce carbon dioxide ( $CO_2$ ) (Pfafflin and Ziegler 2006). Hence, CO emissions can result from the burning of wood, oil, gas, and coal in pulp mill boilers. In kraft pulp mills and pulp mills that practice either oxygen delignification or pulp bleaching with chlorine dioxide ( $ClO_2$ ), CO can also be formed during these delignification processes and released to the atmosphere. Kraft pulp mills that burn concentrated non-condensable gases (NCGs) and stripper off-gases (SOGs) in thermal oxidizers may also emit some CO. For combustion sources, CO emissions are related to combustion efficiency.

In wood products mills, CO is primary emitted from wood dryers, lumber kilns, panel presses, combustion units (boilers/thermal oil heaters/conical burners), and hardboard tempering ovens. Direct fired wood products dryers generate CO both at the direct fired burners and within the dryer. Exhaust gases from sanders, chippers, saws, and other wood handling and finishing sources are expected to contain negligible amounts of CO.

## 12.2 Source Test Methods for CO Approved Across Canada

Five source test methods have been identified as having been approved by provincial authorities for measuring CO. Provinces allow the use of at least one method. Table 11 shows the list of approved source test methods for each Canadian province. This list suggests that EPA Method 10 – *Determination Of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)* is the most commonly approved method in Canada for measuring CO from stationary sources at forest products manufacturing facilities.

**Table 11** Source Test Methods Approved by Provincial Authorities to Measure Carbon Monoxide

Methods	Provinces								
	Alberta	British Columbia	Manitoba	New Brunswick	Newfoundland & Labrador	Nova Scotia	Ontario	Quebec	Saskatchewan
<b>Alberta Stack Sampling Code: Method 10</b> - Determination of carbon monoxide emissions from stationary sources	X								
<b>U.S. EPA 10:</b> Determination of carbon monoxide emissions from stationary sources (Instrumental Analyzer Procedure)		X	X	X	X		X	X	
<b>U.S. EPA 10B:</b> Determination of carbon monoxide emissions from stationary sources				X					
<b>EPS 1/RM/4:</b> Measurement of releases of carbon monoxide from stationary sources		X	X						
<b>EPS 1/RM/15:</b> Reference method for the monitoring of gaseous emissions from fossil fuel-fired boilers			X	X		X			X

## 12.3 Principal USEPA and Environment Canada Standard Methods Used at Forest Products Manufacturing Facilities

### 12.3.1 EPA Method 10: Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)

In this method, stack gases are extracted and analyzed continuously for carbon monoxide. Alternatively, the gas sample is collected in a Tedlar bag (integrated sampling) and analyzed off-line. In either case, CO is measured with an instrumental analyzer. The sampling train consists of the following primary components:

- (a) A probe.
- (b) An in-stack or heated out-of-stack particulate filter.
- (c) A heated sample line from the probe to the sample conditioning equipment (condenser or dryer) to prevent condensation. Heating is not necessary on dry gases or for systems that measure CO on a dry basis.



- (d) A condenser or dryer device to remove moisture from the gas sample.
- (e) Continuous sampling:
  - i. A calibration gas manifold to allow the introduction of a calibration gas directly to the analyzer and/or into the measurement system (at the probe)
  - ii. A gas sample manifold to divert a portion of the sample to the analyzer
- (f) Integrated sampling:
  - i. Flexible Tedlar bag
- (g) A sample pump to pull the gas through the system.

CO is measured with a Luft-type nondispersive infrared analyzer (NDIR) or equivalent. The method specifies a procedure to conduct an interference test on the gas analyzer prior to its initial use. Substances having a strong absorption of infrared energy (e.g., particulate matter, water, CO<sub>2</sub>) may interfere to some extent in some analyzers. Filters, silica gel and ascarite traps can be used to eliminate some of these interferences. Calculated concentrations must be corrected for CO<sub>2</sub> removal.

The minimum detectable concentration is 20 ppm for a 0 and 1,000 ppmv span.

#### **12.3.2 EC Method EPS 1/RM/4: Measurement of Releases of Carbon Monoxide from Stationary Sources**

This method is equivalent to the integrated sampling and analysis specified in EPA Method 10. EPS 1/RM/4 is confronted with the same interferences as EPA Method 10; however, the EC method provides more details regarding the configuration of the interference trapping system. This system consists of a pump to extract the sample from the Tedlar bag followed by two chilled impingers or tubes, one containing silica gel and the other ascarite to remove, respectively, water and CO<sub>2</sub>. The impinger set is followed by a filter to remove trapping particles larger than 3 microns in diameter.

#### **12.3.3 EC Method EPS 1/RM/15: Reference Method for the Monitoring of Gaseous Emissions from Fossil Fuel-Fired Boilers**

This method is applicable to the measurement of emissions of nitrogen oxides (NO species), sulphur dioxide (SO<sub>2</sub>), and carbon monoxide (CO) contained in the flue gases from the combustion of fossil fuels used to generate hot water or steam.

The sampling system essentially consists of a probe connected to a portable calibrated analyzer<sup>34</sup>. The gas sample is extracted from a single point in the exhaust gas from the stack under test<sup>35</sup>. The water vapour is removed from the sample, and the resulting concentrations of SO<sub>2</sub>, NO, CO and oxygen are measured using species-specific sensors. Portable packages range from single species systems designed for very short sampling to those which can operate continuously for long time periods, and measure multiple gaseous compounds. The method also has a procedure to check for interference between each of the measured compounds (SO<sub>2</sub>, NO, and CO). This method does not use a heated filter to remove particulate matter prior to the analyzer. The analytical range of the method has been determined to be 0–1,000 ppmv CO.

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<sup>34</sup> Ambient air (provided ambient CO concentration is less than 3 ppmv) and CO in nitrogen are used as the zero and span gas, respectively, to calibrate the analyzer for measuring CO.

<sup>35</sup> A check for gas stratification must be performed.

## 12.4 Alternative Source Test Methods

### 12.4.1 EPA Method 10B: Determination of Carbon Monoxide Emissions from Stationary Sources

In this method, a gas sample is extracted from the stack, passed through a conditioning system, and collected in a Tedlar bag. CO is separated from the sample by GC and determined by FID.

The sampling train consists of the following primary components:

- (a) A stainless steel, sheathed Pyrex glass, probe (or equivalent) equipped with an in-stack glass wool plug to remove particulate matter.
- (b) Three impingers connected in series containing a potassium permanganate solution to remove sulphur and nitrogen oxides.
- (c) A pump followed by a surge tank.
- (d) A Tedlar bag.

The gas sample is pulled through the sampling train and collected in the Tedlar bag until the bag is nearly full. The collected sample is measured with a GC/FID analyzer which primarily consists of a chromatographic column capable of separating CO from CO<sub>2</sub> and organic compounds that may be present, and a reduction catalyst capable of reducing CO to CH<sub>4</sub>, as quantified by FID.

Carbon dioxide and organics can potentially interfere with the analysis. CO<sub>2</sub> is primarily removed from the sample by the impingers, while any residual CO<sub>2</sub> and organics are separated from the CO by the chromatographic column.

### 12.4.2 Alberta Stack Sampling Code Method 10 - Determination of Carbon Monoxide Emissions from Stationary Sources

The sampling component of this method is equivalent to that specified in EPA Method 10. The details regarding the conditioning (trapping) system prior to CO analysis are similar to those specified in EPS 1/RM/4 except that the pump extracting the sample from the bag is located after the silica gel and ascarite impingers and prior to the filter.

## 12.5 Synthesis of Test Methods for CO

This subsection of the report provides a synthesis of the sampling train configuration as well as sample recovery and analysis principles behind the test methods used in Canada to measure CO. The intent is to help the reader pin down the most important similarities and/or differences between methods using similar principles. Method schematics are conceptual and grouped according to the principle used to collect and analyze the sample. Relevant characteristics associated with each method are noted on the conceptual diagram.

### 12.5.1 Direct Sampling Methods

These methods involve on-line chemical analysis of the gas sample, i.e., as soon as it is withdrawn from the stack. The schematic comparison between these methods is shown in Figure 19.

### 12.5.2 Indirect Sampling Methods

In these methods, the sampling and measurement of CO are not performed continuously; i.e., sample recovery and analysis are carried out off-line. These methods are illustrated in Figure 20.

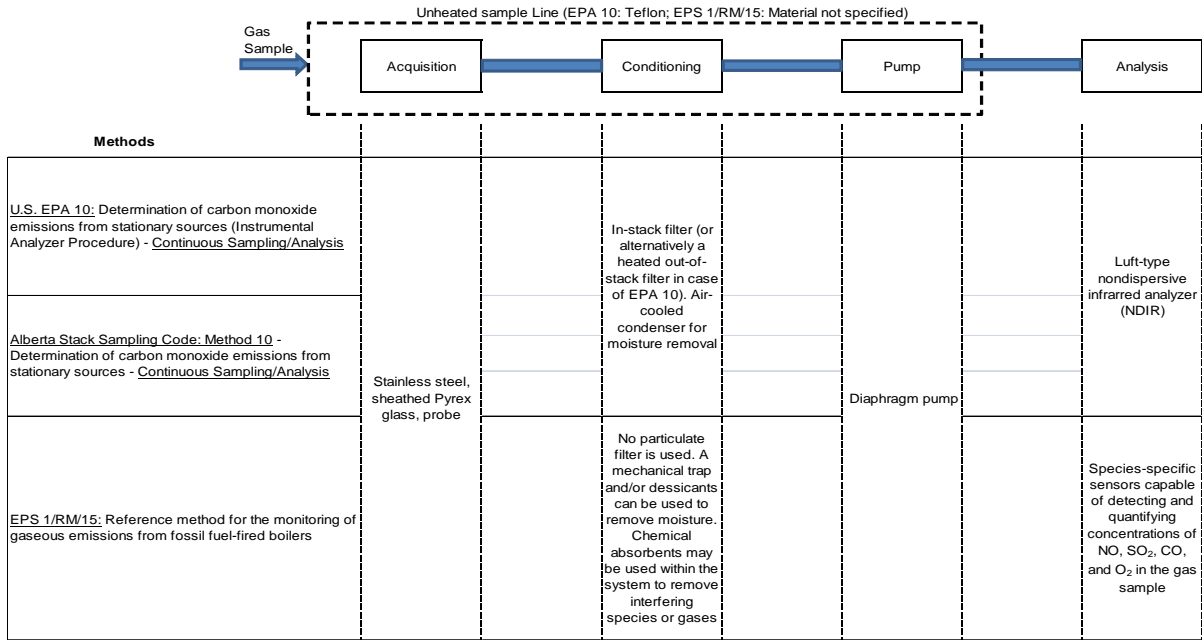


Figure 19 Direct CO Methods

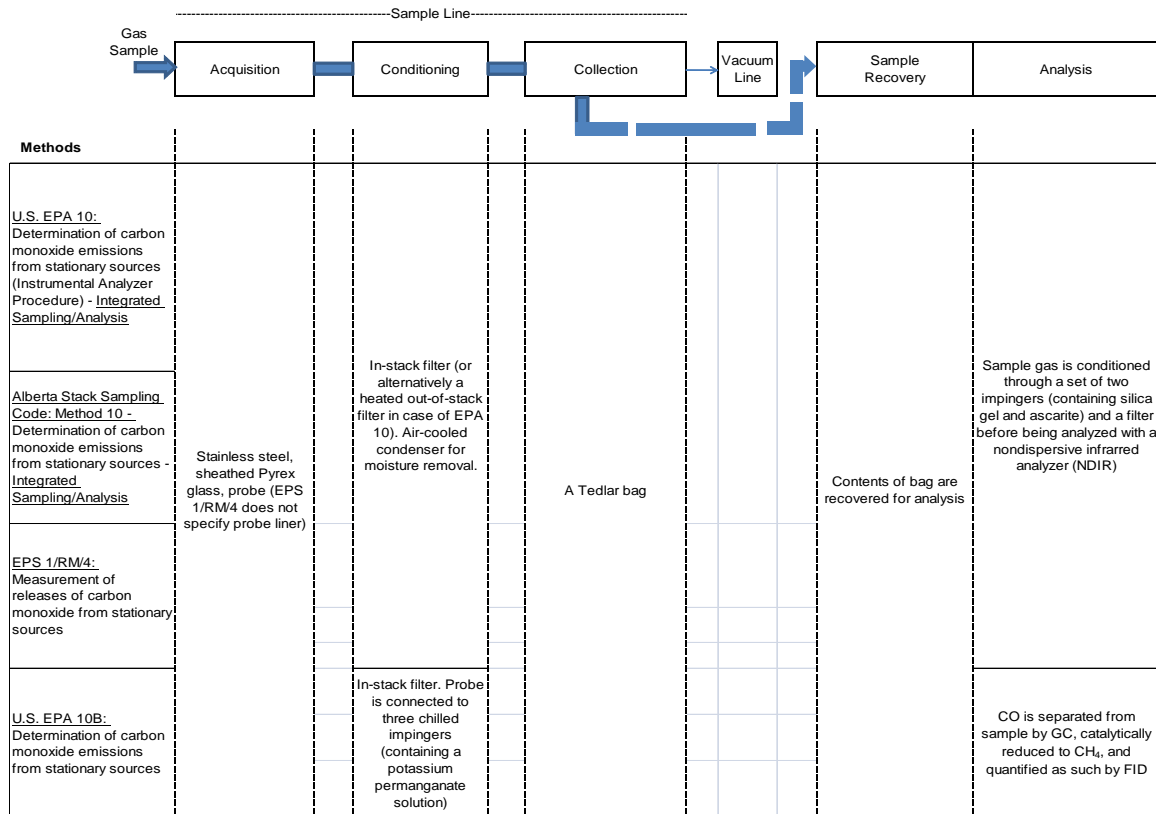


Figure 20 Indirect CO Methods

### 13.0 SULPHURIC ACID (H<sub>2</sub>SO<sub>4</sub>)

#### 13.1 Sources of H<sub>2</sub>SO<sub>4</sub> at Forest Products Manufacturing Facilities

In pulp and paper and wood products mills, sulphuric acid (H<sub>2</sub>SO<sub>4</sub>) is coincidentally manufactured in boilers that burn coal, fuel oil, or fossil fuels in combination with bark. Gaseous sulphuric acid is produced when sulphur trioxide (SO<sub>3</sub>) reacts with water vapour, and the gases are cooled, both in the atmosphere and in the flue gas. Sulphur trioxide is formed in small amounts from further oxidation of the SO<sub>2</sub> generated from the thermal oxidation of the sulphur present in the fuel. In pulp and paper mills, H<sub>2</sub>SO<sub>4</sub> can also be generated from recovery furnaces, lime kilns burning fossil fuels or non-condensable gases (NCG), and during NCG and stripper off-gas (SOG) incineration in thermal oxidizers.

#### 13.2 Source Test Methods for H<sub>2</sub>SO<sub>4</sub> Approved Across Canada

Only one method has been identified as having been approved by provincial authorities for measuring H<sub>2</sub>SO<sub>4</sub>: EPA Method 8 – *Determination of H<sub>2</sub>SO<sub>4</sub> and Sulphur Dioxide Emissions from Stationary Sources*. Table 12 shows the provinces that approve the use of this method.

**Table 12** Source Test Methods Approved by Provincial Authorities to Measure Sulphuric Acid

Methods	Provinces								
	Alberta	British Columbia	Manitoba	New Brunswick	Newfoundland & Labrador	Nova Scotia	Ontario	Quebec	Saskatchewan
<b>U.S. EPA 8:</b> Determination of H <sub>2</sub> SO <sub>4</sub> and sulfur dioxide emissions from stationary sources	X	X	X	Not specified			X	X	Not specified

#### 13.3 EPA Method 8 – Determination of H<sub>2</sub>SO<sub>4</sub> and Sulphur Dioxide Emissions from Stationary Sources

EPA Method 8 is the reference test method used for sulphuric acid mist and SO<sub>3</sub>, but can also be used to measure SO<sub>2</sub> emissions. In this method, a sample is extracted isokinetically from the source, and the H<sub>2</sub>SO<sub>4</sub> mist and the SO<sub>2</sub> present in the gas sample are both captured and recovered separately for analysis using the barium-thorin titration method. The sampling train consists of the following primary components:

- A probe, equipped with a heating system to prevent water condensation.
- One impinger containing a solution of isopropanol (80% v/v). The isopropanol solution collects the SO<sub>3</sub> and sulphuric acid mist present in the sample.
- A glass fibre filter, that need not be heated, is placed between the isopropanol impinger and the first hydrogen peroxide impinger (see below).
- A set of three impingers connected in series. The first two impingers contain a solution of hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>, 3% v/v), while the final impinger is packed with silica gel to dry the gas sample.

After the sampling run is complete, a post-test leak check must be conducted, and the contents of the isopropanol and H<sub>2</sub>O<sub>2</sub> impingers recovered for analysis. The isopropanol solution in the first impinger is combined with isopropanol rinses from the probe, the first impinger, all connecting glassware before the filter, and the front half of the filter holder. The filter is added to the combined solution, which is stored for analysis (Sample 1). The H<sub>2</sub>O<sub>2</sub> solutions in the second and third impingers<sup>36</sup> are combined with water rinses from the back half of the filter holder and all the connecting glassware between the filter and the silica gel impinger, and stored for analysis (Sample 2).

Although both samples are titrated with a solution of barium perchlorate<sup>37</sup>, Sample 1 is directly analyzed, whereas Sample 2 must be previously combined with pure isopropanol. The volume of titrant used on Sample 1 serves to calculate the concentration of sulphuric acid captured by the isopropanol impinger, while that used on Sample 2 serves to calculate the concentration of SO<sub>2</sub> captured by the H<sub>2</sub>O<sub>2</sub> impingers<sup>38</sup>.

Possible interfering agents of this method are fluorides, free ammonia, and dimethyl aniline. The minimum detectable limit of the method is 0.06 mg H<sub>2</sub>SO<sub>4</sub>/dscm.

***Note on NCASI Method 8A – Determination of Sulphuric Acid Vapour or Mist and Sulfur Dioxide Emissions from Kraft Recovery Furnaces***

This method was developed by NCASI to measure sulphuric acid mist from pulp mill sources. A description of the original method as applied to kraft recovery furnaces can be found in NCASI Atmospheric Quality Technical Bulletin No. 106 (NCASI 1980). The method is also available in the *NCASI Methods Manual*, and it received EPA approval in 1996 as a Conditional Test Method (CTM-013). NCASI has developed modified versions of this method, which can be used on recovery furnaces as well as on combination boilers with PM control devices. These versions have also been approved by EPA as Conditional Test Methods (CTM-013A and CTM-013B).

When testing recovery furnaces, EPA Method 8 is subject to significant interference from sulphates (present in the particulate matter) and SO<sub>2</sub>. Method 8A uses an out-of-stack quartz filter to remove particulate matter from the gas stream prior to capturing H<sub>2</sub>SO<sub>4</sub> with a controlled H<sub>2</sub>SO<sub>4</sub> condenser, which eliminates the potential for interference from SO<sub>2</sub>. The condenser is followed by a set of three impingers (two containing a solution of H<sub>2</sub>O<sub>2</sub> and the last one containing water) and a silica gel tube. At the conclusion of the sampling run, and following a mandatory post-test leak check, the probe, the quartz filter holder, and the H<sub>2</sub>SO<sub>4</sub> condenser are washed with deionized water and the rinse is collected for H<sub>2</sub>SO<sub>4</sub> analysis. The collected rinse is combined with an 80% (v/v) isopropanol solution and analyzed using the same barium-thorin titration method specified in EPA Method 8. If concurrent determination of SO<sub>2</sub> is desired, the contents of the two first impingers are also analyzed using the barium-thorin titration method.

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<sup>36</sup> First two impingers following the filter.

<sup>37</sup> Provided a few drops of thorin indicator are added prior to titration.

<sup>38</sup> Sulphur dioxide is trapped, in the form of sulphuric acid, by the hydrogen peroxide solution (Hocking 2005):  
 $\text{SO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_3$ ;  $\text{H}_2\text{SO}_3 + \text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{SO}_4 + \text{H}_2\text{O}$ .

### 14.0 LIST OF EXTRACTIVE SOURCE TEST METHODS APPROVED FOR USE AT CANADIAN FOREST PRODUCTS MANUFACTURING FACILITIES (SHADED SQUARES)

Substance	Methods	AB	BC	MB	NB	NFL	NS	ON	QC	SK
TPM	Alberta Stack Sampling Code: Method 5 - Determination of particulate emissions from stationary sources									
	U.S. EPA 5: Determination of particulate matter emissions from stationary sources									
	U.S. EPA 5B: Determination of nonsulfuric acid particulate matter emissions from stationary sources									
	U.S. EPA 5D: Determination of particulate matter emissions from positive pressure fabric filters									
	U.S. EPA 17: Determination of particulate matter emissions from stationary sources									
	U.S. EPA CTM 003: Determination of particulate matter (modified high volume sampling procedure)									
	British Columbia Field Sampling Manual – Appendix 12: Method for measuring particulate emissions from stationary sources with cyclonic flow pattern									
	State of Oregon Source Sampling Manual - Method 8: Sampling particulate emissions from stationary sources (high volume method)									
	Environment Canada EPS 1/RM/8 (Method E): Measurement of releases of particulate from stationary sources									
	Ontario Source Testing Code - Method 5: Determination of particulate emissions from stationary sources									
	Saskatchewan Environment Standard Reference Methods for Source Testing, APC-31: Measurement of emissions of particulates from stationary sources									
PM <sub>10</sub> /PM <sub>2.5</sub>	U.S. EPA 201: Determination of PM <sub>10</sub> emissions (exhaust gas recycle procedure)									
	U.S. EPA 201A: Determination of PM <sub>10</sub> emissions (constant sampling rate procedure)									
	Ontario Source Testing Code – (Draft) Method ON-7: Determination of size distribution of particulate matter from stationary sources									
CPM	Alberta Stack Sampling Code: Method 5A (AEP) - Determination of condensable particulate emissions from stationary sources									
	U.S. EPA 202: Determination of condensable particulate emissions from stationary sources									
	State of Oregon Source Sampling Manual - Method 7: Sampling condensable emissions from stationary sources									
NO <sub>x</sub>	Alberta Stack Sampling Code: Method 7 - Determination of NO <sub>x</sub> emissions from stationary sources									
	Alberta Stack Sampling Code: Method 7A - Determination of NO <sub>x</sub> emissions from stationary sources (ion chromatographic method)									
	Alberta Stack Sampling Code: Method 7C - Determination of NO <sub>x</sub> emissions from stationary sources (alkaline-permanganate/colorimetric method)									
	U.S. EPA 7: Determination of NO <sub>x</sub> emissions from stationary sources									
	U.S. EPA 7A: Determination of NO <sub>x</sub> emissions from stationary sources (ion chromatographic method)									
	U.S. EPA 7C: Determination of NO <sub>x</sub> emissions from stationary sources (alkaline permanganate/colorimetric method)									
	U.S. EPA 7D: Determination of NO <sub>x</sub> emissions from stationary sources (alkaline permanganate/ion chromatographic method)									
	U.S. EPA 7E: Determination of NO <sub>x</sub> emissions from stationary sources (instrumental analyzer procedure)									
	Environment Canada EPS 1/RM/15: Reference method for the monitoring of gaseous emissions from fossil fuel-fired boilers									
Environment Canada EPS 1-AP-77-3: Measurement of releases of NO <sub>x</sub> emissions from stationary sources										
SO <sub>2</sub>	Alberta Stack Sampling Code: Method 8 - Determination of sulphuric acid mist and SO <sub>2</sub> emissions from stationary sources									
	U.S. EPA 6: Determination of SO <sub>2</sub> emissions from stationary sources									
	U.S. EPA 6A: Determination of SO <sub>2</sub> , moisture, and carbon dioxide from fossil fuel combustion sources									
	U.S. EPA 6B: Determination of SO <sub>2</sub> and carbon dioxide daily average emissions from fossil fuel combustion sources									
	U.S. EPA 6C: Determination of SO <sub>2</sub> emissions from stationary sources (instrumental analyzer procedure)									
	U.S. EPA 8: Determination of sulphuric acid and SO <sub>2</sub> emissions from stationary sources									
	Environment Canada EPS 1/RM/15: Reference method for the monitoring of gaseous emissions from fossil fuel-fired boilers									
	Environment Canada EPS 1-AP-74-3: Measurement of releases of SO <sub>2</sub> from stationary sources									

(Continued on next page. See note at end of table.)

Substance	Methods	AB	BC	MB	NB	NFL	NS	ON	QC	SK
Total VOC	<b>Alberta Stack Sampling Code: Method 25</b> - Determination of total gaseous non-methane organic emissions as carbon									
	<b>U.S. EPA 25:</b> Determination of total gaseous non-methane organic emissions as carbon									
	<b>U.S. EPA 25A:</b> Determination of total gaseous organic concentration using a flame ionization analyzer									
Individual VOCs	<b>Alberta Stack Sampling Code: Method 18</b> - Measurement of gaseous organic compound emissions by gas chromatography									
	<b>U.S. EPA 18:</b> Measurement of gaseous organic compound emissions by gas chromatography									
	<b>U.S. EPA 308:</b> Procedure for determination of methanol emission from stationary sources									
	<b>U.S. EPA SW-846 - Method 0010:</b> Modified method 5 sampling train (semi-volatiles)									
	<b>U.S. EPA SW-846 - Method 0011:</b> Sampling for selected aldehyde and ketone emissions from stationary sources									
	<b>U.S. EPA SW-846 - Method 0030:</b> Volatile organic sampling train									
	<b>U.S. EPA SW-846 - Method 0207:</b> A method for measuring isocyanates in stationary source emissions									
	<b>NCASI Method CI/WP-98.01:</b> Chilled impinger method for use at wood products mills to measure formaldehyde, methanol, and phenol									
	<b>NCASI Method CI/SG/PULP-94.02:</b> Chilled impinger/silica gel test method at pulp mill sources for methanol, acetone, acetaldehyde, methyl ethyl ketone and formaldehyde									
	<b>NCASI Method IM/CAN/WP-99.02:</b> Impinger/canister source sampling method for selected HAPs at wood products facilities									
	<b>NCASI Method ISS/FP A105.01:</b> Impinger source sampling method for aldehydes, ketones, and polar compounds									
	<b>Environment Canada EPS 1/RM/2:</b> Measurement of releases of selected semi-volatile organic compounds from stationary sources									
TRS	<b>Alberta Stack Sampling Code</b> - Total reduced sulphur compounds from pulp and paper operations									
	<b>U.S. EPA 16:</b> Semicontinuous determination of sulfur emissions from stationary sources									
	<b>U.S. EPA 16A:</b> Determination of total reduced sulfur emissions from stationary sources (impinger technique)									
	<b>U.S. EPA 16B:</b> Determination of total reduced sulfur emissions from stationary sources (GC/FPD)									
	<b>Environment Canada EPS 1/RM/6:</b> Total reduced sulphur compounds from pulp and paper operations									
D/F	<b>U.S. EPA 23:</b> Determination of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans from municipal waste combustors									
	<b>U.S. EPA SW-846 - Method 0023A:</b> Sampling method for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofuran emissions from stationary sources									
ClO <sub>2</sub>	<b>Alberta Stack Sampling Code:</b> Method for measuring chlorine and chlorine dioxide gaseous emissions									
	<b>EPA 40CFR63.457 - Subpart S - National emission standards for hazardous air pollutants from the pulp and paper industry:</b> Test Methods And Procedures (paragraphs (b)(5)(ii)(A) through (b)(5)(ii)(K))									
	<b>NCASI method</b> for the determination of chlorine and chlorine dioxide in pulp mill bleach plant vents									
Hg	<b>U.S. EPA 29:</b> Determination of metals emissions from stationary sources									
	<b>U.S. EPA 101A:</b> Determination of particulate and gaseous mercury emissions from sewage sludge incinerators									
CO	<b>Alberta Stack Sampling Code: Method 10</b> - Determination of carbon monoxide emissions from stationary sources									
	<b>U.S. EPA 10:</b> Determination of carbon monoxide emissions from stationary sources (Instrumental Analyzer Procedure)									
	<b>U.S. EPA 10B:</b> Determination of carbon monoxide emissions from stationary sources									
	<b>EPS 1/RM/4:</b> Measurement of releases of carbon monoxide from stationary sources									
H <sub>2</sub> SO <sub>4</sub>	<b>EPS 1/RM/15:</b> Reference method for the monitoring of gaseous emissions from fossil fuel-fired boilers									
	<b>U.S. EPA 8:</b> Determination of H <sub>2</sub> SO <sub>4</sub> and sulfur dioxide emissions from stationary sources									

\* Black cells = "Not Specified"

## 15.0 HYPERLINKS TO FULL TEST METHOD WRITE-UPS

The hyperlinks provided below are accessible through the NCASI website. USEPA methods can be also found at <http://www.epa.gov/ttn/emc/tmethods.html>.

Source Test Method	Website
<b>Alberta Stack Sampling Code</b> - Total reduced sulphur compounds from pulp and paper operations	<a href="http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_TRS.pdf">http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_TRS.pdf</a>
<b>Alberta Stack Sampling Code: Method 10</b> - Determination of carbon monoxide emissions from stationary sources	<a href="http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_10.pdf">http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_10.pdf</a>
<b>Alberta Stack Sampling Code: Method 18</b> - Measurement of gaseous organic compound emissions by gas chromatography	<a href="http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_18.pdf">http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_18.pdf</a>
<b>Alberta Stack Sampling Code: Method 25</b> - Determination of total gaseous non-methane organic emissions as carbon	<a href="http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_25.pdf">http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_25.pdf</a>
<b>Alberta Stack Sampling Code: Method 5</b> - Determination of particulate emissions from stationary sources	<a href="http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_5.pdf">http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_5.pdf</a>
<b>Alberta Stack Sampling Code: Method 5A (AEP)</b> - Determination of condensable particulate emissions from stationary sources	<a href="http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_5A.pdf">http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_5A.pdf</a>
<b>Alberta Stack Sampling Code: Method 7</b> - Determination of NO <sub>x</sub> emissions from stationary sources	<a href="http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_7.pdf">http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_7.pdf</a>
<b>Alberta Stack Sampling Code: Method 7A</b> - Determination of NO <sub>x</sub> emissions from stationary sources (ion chromatographic method)	<a href="http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_7A.pdf">http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_7A.pdf</a>
<b>Alberta Stack Sampling Code: Method 7C</b> - Determination of NO <sub>x</sub> emissions from stationary sources (alkaline-permanganate/colorimetric method)	<a href="http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_7C.pdf">http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_7C.pdf</a>
<b>Alberta Stack Sampling Code: Method 8</b> - Determination of sulphuric acid mist and SO <sub>2</sub> emissions from stationary sources	<a href="http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_8.pdf">http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_8.pdf</a>
<b>Alberta Stack Sampling Code: Method</b> for measuring chlorine and chlorine dioxide gaseous emissions	<a href="http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_for_Chlorine_and_Chlorine_Dioxide.pdf">http://www.ncasi.org/programs/areas/air/test_methods/Alberta_Stack_Sampling_Code_Method_for_Chlorine_and_Chlorine_Dioxide.pdf</a>
<b>British Columbia Field Sampling Manual – Appendix 12:</b> Method for measuring particulate emissions from stationary sources with cyclonic flow pattern	<a href="http://www.env.gov.bc.ca/epd/wamr/labsys/field_man_pdfs/flid_man_03.pdf">http://www.env.gov.bc.ca/epd/wamr/labsys/field_man_pdfs/flid_man_03.pdf</a>
<b>Environment Canada EPS 1/RM/15:</b> Reference method for the monitoring of gaseous emissions from fossil fuel-fired boilers	<a href="http://www.ncasi.org/programs/areas/air/test_methods/EC_EPS_1RM15.pdf">http://www.ncasi.org/programs/areas/air/test_methods/EC_EPS_1RM15.pdf</a>
<b>Environment Canada EPS 1/RM/2:</b> Measurement of releases of selected semi-volatile organic compounds from stationary sources	<a href="http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&amp;n=942FC0FB-1">http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&amp;n=942FC0FB-1</a>
<b>Environment Canada EPS 1/RM/3:</b> Method for the Analysis of Polychlorinated Dibenzo-p-Dioxins (PCDD), Polychlorinated Dibenzofurans (PCDF) and Polychlorinated Biphenyls (PCB) in samples from the incineration of PCB waste	<a href="http://www.ncasi.org/programs/areas/air/test_methods/EC_EPS_1RM3_(revised).pdf">http://www.ncasi.org/programs/areas/air/test_methods/EC_EPS_1RM3_(revised).pdf</a>
<b>Environment Canada EPS 1/RM/6:</b> Total reduced sulphur compounds from pulp and paper operations	<a href="http://www.ncasi.org/programs/areas/air/test_methods/EC_EPS_1RM6.pdf">http://www.ncasi.org/programs/areas/air/test_methods/EC_EPS_1RM6.pdf</a>
<b>Environment Canada EPS 1/RM/8:</b> Measurement of releases of particulate from stationary sources	<a href="http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&amp;n=CBA5BD1D-1">http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&amp;n=CBA5BD1D-1</a>
<b>Environment Canada EPS 1-AP-74-3:</b> Measurement of releases of SO <sub>2</sub> from stationary sources	<a href="http://www.ncasi.org/programs/areas/air/test_methods/EC_EPS_1AP743.pdf">http://www.ncasi.org/programs/areas/air/test_methods/EC_EPS_1AP743.pdf</a>
<b>Environment Canada EPS 1-AP-77-3:</b> Measurement of releases of NO <sub>x</sub> emissions from stationary sources	<a href="http://www.ncasi.org/programs/areas/air/test_methods/EC_EPS_1AP773.pdf">http://www.ncasi.org/programs/areas/air/test_methods/EC_EPS_1AP773.pdf</a>
<b>Environment Canada EPS 1/RM/4:</b> Measurement of releases of carbon monoxide from stationary sources	<a href="http://www.ncasi.org/programs/areas/air/test_methods/EC_EPS_1RM4.pdf">http://www.ncasi.org/programs/areas/air/test_methods/EC_EPS_1RM4.pdf</a>
<b>EPA 40CFR63.457 – Subpart S – National emission standards for hazardous air pollutants from the pulp and paper industry:</b> Test Methods And Procedures (paragraphs (b)(5)(ii)(A) through (b)(5)(ii)(K))	<a href="http://www.ncasi.org/programs/areas/air/test_methods/EPA_40_CFR63.457_Subpart_S.pdf">http://www.ncasi.org/programs/areas/air/test_methods/EPA_40_CFR63.457_Subpart_S.pdf</a>
<b>NCASI Method CI/SG/PULP-94.02:</b> Chilled impinger/silica gel test method at pulp mill sources for methanol, acetone, acetaldehyde, methyl ethyl ketone and formaldehyde	<a href="http://www.ncasi.org/Publications/Detail.aspx?id=1709">http://www.ncasi.org/Publications/Detail.aspx?id=1709</a>
<b>NCASI Method CI/WP-98.01:</b> Chilled impinger method for use at wood products mills to measure formaldehyde, methanol, and phenol	<a href="http://www.ncasi.org/Publications/Detail.aspx?id=1710">http://www.ncasi.org/Publications/Detail.aspx?id=1710</a>
<b>NCASI method</b> for the determination of chlorine and chlorine dioxide in pulp mill bleach plant vents	<a href="http://www.ncasi.org/Publications/Detail.aspx?id=1727">http://www.ncasi.org/Publications/Detail.aspx?id=1727</a>
<b>NCASI Method IM/CAN/WP-99.02:</b> Impinger/canister source sampling method for selected HAPs at wood products facilities	<a href="http://www.ncasi.org/Publications/Detail.aspx?id=1715">http://www.ncasi.org/Publications/Detail.aspx?id=1715</a>
<b>NCASI Method ISS/FP A105.01:</b> Impinger source sampling method for aldehydes, ketones, and polar compounds	<a href="http://www.ncasi.org/Publications/Detail.aspx?id=2763">http://www.ncasi.org/Publications/Detail.aspx?id=2763</a>
<b>Ontario Source Testing Code – (Draft) Method ON-7:</b> Determination of size distribution of particulate matter from stationary sources	<a href="http://www.ncasi.org/programs/areas/air/test_methods/Ontario_Source_Testing_Code_Draft_Method_ON-7.pdf">http://www.ncasi.org/programs/areas/air/test_methods/Ontario_Source_Testing_Code_Draft_Method_ON-7.pdf</a>
<b>Ontario Source Testing Code - Method 5:</b> Determination of particulate emissions from stationary sources	<a href="http://www.downloads.ene.gov.on.ca/envision/env_reg/er/documents/2001/ra00e0016d.pdf">http://www.downloads.ene.gov.on.ca/envision/env_reg/er/documents/2001/ra00e0016d.pdf</a>
<b>Saskatchewan Environment Standard Reference Methods for Source Testing, APC-31:</b> Measurement of emissions of particulates from stationary sources	<a href="http://www.ncasi.org/programs/areas/air/test_methods/Measurement_of_Emissions_of_Participulates_from_Stationary_Sources.pdf">http://www.ncasi.org/programs/areas/air/test_methods/Measurement_of_Emissions_of_Participulates_from_Stationary_Sources.pdf</a>



<b>State of Oregon Source Sampling Manual - Method 7:</b> Sampling condensable emissions from stationary sources	<a href="http://www.deq.state.or.us/eq/forms/sourcetests/ssmVOL1.pdf">http://www.deq.state.or.us/eq/forms/sourcetests/ssmVOL1.pdf</a> (p. 17)
<b>State of Oregon Source Sampling Manual - Method 8:</b> Sampling particulate emissions from stationary sources (high volume method)	<a href="http://www.deq.state.or.us/eq/forms/sourcetests/ssmVOL1.pdf">http://www.deq.state.or.us/eq/forms/sourcetests/ssmVOL1.pdf</a> (p. 21)
<b>U.S. EPA 1:</b> Sample and Velocity Traverses for Stationary Sources	<a href="http://www.epa.gov/ttn/emc/promgate/m-01.pdf">http://www.epa.gov/ttn/emc/promgate/m-01.pdf</a>
<b>U.S. EPA 2:</b> Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot tube)	<a href="http://www.epa.gov/ttn/emc/promgate/m-02.pdf">http://www.epa.gov/ttn/emc/promgate/m-02.pdf</a>
<b>U.S. EPA 3:</b> Gas Analysis for Determining Dry Molecular Weight	<a href="http://www.epa.gov/ttn/emc/promgate/m-03.pdf">http://www.epa.gov/ttn/emc/promgate/m-03.pdf</a>
<b>U.S. EPA 4:</b> Determination of Moisture Content in Stack Gases	<a href="http://www.epa.gov/ttn/emc/promgate/m-04.pdf">http://www.epa.gov/ttn/emc/promgate/m-04.pdf</a>
<b>U.S. EPA 10:</b> Determination of carbon monoxide emissions from stationary sources (Instrumental Analyzer Procedure)	<a href="http://www.epa.gov/ttn/emc/promgate/method10r06.pdf">http://www.epa.gov/ttn/emc/promgate/method10r06.pdf</a>
<b>U.S. EPA 101A:</b> Determination of particulate and gaseous mercury emissions from sewage sludge incinerators	<a href="http://www.epa.gov/ttn/emc/promgate/m-101a.pdf">http://www.epa.gov/ttn/emc/promgate/m-101a.pdf</a>
<b>U.S. EPA 10B:</b> Determination of carbon monoxide emissions from stationary sources	<a href="http://www.epa.gov/ttn/emc/promgate/m-10b.pdf">http://www.epa.gov/ttn/emc/promgate/m-10b.pdf</a>
<b>U.S. EPA 16:</b> Semicontinuous determination of sulfur emissions from stationary sources	<a href="http://www.epa.gov/ttn/emc/promgate/m-16.pdf">http://www.epa.gov/ttn/emc/promgate/m-16.pdf</a>
<b>U.S. EPA 16A:</b> Determination of total reduced sulfur emissions from stationary sources (impinger technique)	<a href="http://www.epa.gov/ttn/emc/promgate/m-16a.pdf">http://www.epa.gov/ttn/emc/promgate/m-16a.pdf</a>
<b>U.S. EPA 16B:</b> Determination of total reduced sulfur emissions from stationary sources (GC/FPD)	<a href="http://www.epa.gov/ttn/emc/promgate/m-16b.pdf">http://www.epa.gov/ttn/emc/promgate/m-16b.pdf</a>
<b>U.S. EPA 17:</b> Determination of particulate matter emissions from stationary sources	<a href="http://www.epa.gov/ttn/emc/promgate/m-17.pdf">http://www.epa.gov/ttn/emc/promgate/m-17.pdf</a>
<b>U.S. EPA 18:</b> Measurement of gaseous organic compound emissions by gas chromatography	<a href="http://www.epa.gov/ttn/emc/promgate/m-18.pdf">http://www.epa.gov/ttn/emc/promgate/m-18.pdf</a>
<b>U.S. EPA 201:</b> Determination of PM <sub>10</sub> emissions (exhaust gas recycle procedure)	<a href="http://www.epa.gov/ttn/emc/promgate/m-201.pdf">http://www.epa.gov/ttn/emc/promgate/m-201.pdf</a>
<b>U.S. EPA 201A:</b> Determination of PM <sub>10</sub> emissions (constant sampling rate procedure)	<a href="http://www.epa.gov/ttn/emc/promgate/m-201a.pdf">http://www.epa.gov/ttn/emc/promgate/m-201a.pdf</a>
<b>U.S. EPA 202:</b> Determination of condensable particulate emissions from stationary sources	<a href="http://www.epa.gov/ttn/emc/promgate/m-202.pdf">http://www.epa.gov/ttn/emc/promgate/m-202.pdf</a>
<b>U.S. EPA 23:</b> Determination of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans from municipal waste combustors	<a href="http://www.epa.gov/ttn/emc/promgate/m-23.pdf">http://www.epa.gov/ttn/emc/promgate/m-23.pdf</a>
<b>U.S. EPA 25:</b> Determination of total gaseous non-methane organic emissions as carbon	<a href="http://www.epa.gov/ttn/emc/promgate/m-25.pdf">http://www.epa.gov/ttn/emc/promgate/m-25.pdf</a>
<b>U.S. EPA 25A:</b> Determination of total gaseous organic concentration using a flame ionization analyzer	<a href="http://www.epa.gov/ttn/emc/promgate/m-25a.pdf">http://www.epa.gov/ttn/emc/promgate/m-25a.pdf</a>
<b>U.S. EPA 29:</b> Determination of metals emissions from stationary sources	<a href="http://www.epa.gov/ttn/emc/promgate/m-29.pdf">http://www.epa.gov/ttn/emc/promgate/m-29.pdf</a>
<b>U.S. EPA 308:</b> Procedure for determination of methanol emission from stationary sources	<a href="http://www.epa.gov/ttn/emc/promgate/m-308.pdf">http://www.epa.gov/ttn/emc/promgate/m-308.pdf</a>
<b>U.S. EPA 5:</b> Determination of particulate matter emissions from stationary sources	<a href="http://www.epa.gov/ttn/emc/promgate/m-05.pdf">http://www.epa.gov/ttn/emc/promgate/m-05.pdf</a>
<b>U.S. EPA 5B:</b> Determination of nonsulfuric acid particulate matter emissions from stationary sources	<a href="http://www.epa.gov/ttn/emc/promgate/m-05b.pdf">http://www.epa.gov/ttn/emc/promgate/m-05b.pdf</a>
<b>U.S. EPA 5D:</b> Determination of particulate matter emissions from positive pressure fabric filters	<a href="http://www.epa.gov/ttn/emc/promgate/m-05d.pdf">http://www.epa.gov/ttn/emc/promgate/m-05d.pdf</a>
<b>U.S. EPA 6:</b> Determination of SO <sub>2</sub> emissions from stationary sources	<a href="http://www.epa.gov/ttn/emc/promgate/m-06.pdf">http://www.epa.gov/ttn/emc/promgate/m-06.pdf</a>
<b>U.S. EPA 6A:</b> Determination of SO <sub>2</sub> , moisture, and carbon dioxide from fossil fuel combustion sources	<a href="http://www.epa.gov/ttn/emc/promgate/m-06a.pdf">http://www.epa.gov/ttn/emc/promgate/m-06a.pdf</a>
<b>U.S. EPA 6B:</b> Determination of SO <sub>2</sub> and carbon dioxide daily average emissions from fossil fuel combustion sources	<a href="http://www.epa.gov/ttn/emc/promgate/m-06b.pdf">http://www.epa.gov/ttn/emc/promgate/m-06b.pdf</a>
<b>U.S. EPA 6C:</b> Determination of SO <sub>2</sub> emissions from stationary sources (instrumental analyzer procedure)	<a href="http://www.epa.gov/ttn/emc/promgate/method6C.pdf">http://www.epa.gov/ttn/emc/promgate/method6C.pdf</a>
<b>U.S. EPA 7:</b> Determination of NO <sub>x</sub> emissions from stationary sources	<a href="http://www.epa.gov/ttn/emc/promgate/m-07.pdf">http://www.epa.gov/ttn/emc/promgate/m-07.pdf</a>
<b>U.S. EPA 7A:</b> Determination of NO <sub>x</sub> emissions from stationary sources (ion chromatographic method)	<a href="http://www.epa.gov/ttn/emc/promgate/m-07a.pdf">http://www.epa.gov/ttn/emc/promgate/m-07a.pdf</a>
<b>U.S. EPA 7C:</b> Determination of NO <sub>x</sub> emissions from stationary sources (alkaline permanganate/colorimetric method)	<a href="http://www.epa.gov/ttn/emc/promgate/m-07c.pdf">http://www.epa.gov/ttn/emc/promgate/m-07c.pdf</a>
<b>U.S. EPA 7D:</b> Determination of NO <sub>x</sub> emissions from stationary sources (alkaline permanganate/ion chromatographic method)	<a href="http://www.epa.gov/ttn/emc/promgate/m-07d.pdf">http://www.epa.gov/ttn/emc/promgate/m-07d.pdf</a>
<b>U.S. EPA 7E:</b> Determination of NO <sub>x</sub> emissions from stationary sources (instrumental analyzer procedure)	<a href="http://www.epa.gov/ttn/emc/promgate/method7E.pdf">http://www.epa.gov/ttn/emc/promgate/method7E.pdf</a>
<b>U.S. EPA 8:</b> Determination of H <sub>2</sub> SO <sub>4</sub> and sulfur dioxide emissions from stationary sources	<a href="http://www.epa.gov/ttn/emc/promgate/m-08.pdf">http://www.epa.gov/ttn/emc/promgate/m-08.pdf</a>
<b>U.S. EPA CTM 003:</b> Determination of particulate matter (modified high volume sampling procedure)	<a href="http://www.epa.gov/ttn/emc/ctm/ctm-003.pdf">http://www.epa.gov/ttn/emc/ctm/ctm-003.pdf</a>
<b>U.S. EPA SW-846 - Method 0010:</b> Modified method 5 sampling train (semi-volatiles)	<a href="http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/0010.pdf">http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/0010.pdf</a>
<b>U.S. EPA SW-846 - Method 0011:</b> Sampling for selected aldehyde and ketone emissions from stationary sources	<a href="http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/0011.pdf">http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/0011.pdf</a>
<b>U.S. EPA SW-846 - Method 0023A:</b> Sampling method for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofuran emissions from stationary sources	<a href="http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/0023a.pdf">http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/0023a.pdf</a>
<b>U.S. EPA SW-846 - Method 0030:</b> Volatile organic sampling train	<a href="http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/0030.pdf">http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/0030.pdf</a>
<b>U.S. EPA SW-846 - Method 0207:</b> A method for measuring isocyanates in stationary source emissions	<a href="http://www.epa.gov/ttnemc01/proposed/m-207.pdf">http://www.epa.gov/ttnemc01/proposed/m-207.pdf</a>

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