APPENDIX B

SOURCE TEST METHODS

This appendix provides information on source test methods for the Canada, the United States, and Mexico. Source test methods used nationally by Canada are presented in Table B.1, and methods used by Canadian provinces are presented in Tables B.2 and B.3. Source test methods used in the United States are presented in Table B.4. Source test methods used by Mexico are presented in Table B.5.

Source test procedures have been developed to quantify emissions from point and nonpoint sources. In addition to producing emission data for individual sources to determine compliance with emission regulations, source test data are used to develop emission factors which in turn, as described in Chapter 2, are used to prepare emission inventories.

In the United States, source test methods are available nationally through the U.S. EPA. In addition, various states (e.g., California and Pennsylvania) have developed their own source test methods, some of which are more stringent than the EPA test methods. Source test method numbers or Performance Specifications between 1 and 100 are for New Source Performance Standards (NSPS). These methods, which apply to criteria pollutants, are found in 40 CFR Part 60, Appendix A. Similarly, method numbers in the 100 series are for National Emission Standards for Hazardous Air Pollutants (NESHAPs). These methods are found in 40 CFR Part 61, Appendix B. Method numbers in the 200 series are used to develop data for SIPs. These methods are found in 40 CFR Part 51, Appendix M. Method numbers in the 300 series are for the Maximum Achievable Control Technology (MACT) based NESHAPs. These methods are found in 40 CFR Part 63, Appendix A.

Both Canada and Mexico have developed their own source test methodologies. In both Canada and Mexico, source test methods developed by the U.S. EPA were used as building blocks for the country-specific methods. Consequently, some methods used by Canada and Mexico are identical to those employed by the United States. As in the United States, source tests are used by both Canada and Mexico to quantify emissions from sources for determining compliance with applicable rules and regulations. Canada has national source test methods and two provinces have also developed their own source test methods.

Table B.1. Environment Canada Reference Methods for Stationary Sources.	
Method	**Parameter**
EPS 1-AP-74-3	Sulfur Dioxide from Stationary Sources (absorption in H_2O_2 followed by Ba thorin titration)
EPS 1-AP-75-1 EPS 1-AP-75-1A	Asbestos from Asbestos Mining and Milling Operations S-3, Sampling of Drill Baghouse Exhaust Emissions (Isokinetic sampling followed by optical phase-contrast microscopy)
EPS 1-AP-75-2	Opacity of Emissions from Stationary Sources (Trained observer and transmissometer versions)
EPS 1-AP-77-1	Vinyl Chloride from Vinyl Chloride and Polyvinyl Chloride Manufacturing (Tedlar bag sampling followed by GC/FID analysis)
EPS 1-AP-77-3	Nitrogen Oxides from Stationary Sources (grab sample followed by colorimetric wet chemical analysis)
EPS 1-AP-79-1	Arsenic from Gold Roasting Operations
EPS 1/RM/1	Gaseous Hydrogen Chloride from Stationary Sources (impinger absorption followed by IC analysis)
EPS 1/RM/2	Selected Semi-volatile Organic Compounds from Stationary Sources (isokinetic sampling with XAD /Ethylene Glycol Impingers)
EPS 1/RM3	Analysis of PCDDs, PCDFs and PCBs (high resolution GC/MS analysis)
EPS 1/RM/4	Carbon monoxide Emission from Stationary Sources (Tedlar bag sampling follow by NDIR determination)
EPS 1/RM/5	Mercury Emissions from Mercury Cell Chlor-Alkali Plants (permanganate impinger sampling followed by analysis by CVAA)
EPS 1/RM/6	Total Reduced Sulfur Compounds from Pulp and Paper Operations (dried Tedlar bag sample followed by GC/FPD analysis)
EPS 1/RM/7	Lead in Particulate from Stationary Sources (isokinetic sampling followed by aqua regia digestion and AA analysis)
EPS 1/RM/8	Particulate matter from Stationary sources, Traverse Points, Molecular Weight, Moisture (isokinetic sampling followed by gravimetric determination)
EPS 1/RM/15	Gaseous Emissions from Fossil Fuel-fired Boilers (electrochemical analyzer method for NO_x, SO_2, CO and O_2)
EPS 1/RM/23	Internal Quality Assurance Requirements for the Analysis of Dioxins in Environmental Samples
EPS 1/PG/7	Protocols and Performance Specifications for Continuous Emission Monitoring of Gaseous Emissions from Thermal Power Generation
	(CEMS summary equivalent to CFR part 60 and CFR part 75)

Table B.2. Alberta's Emission Test Methods for Stationary Sources.	
Method	Parameter
1	Traverse Points
1a	Traverse Points, Small Ducts
2	Stack Gas Velocity & Flow Rate
2c	Flow, Small Duct, Standard Pitot
3	Stack Gas Molecular Weight
4	Moisture Content
5	Particulate Emissions
5a	Condensible Particulate Emissions
7	NO_x Emissions
7a	NO_x Emissions: Ion Chromatography
7c	NO_x Emissions: Colorimetric
8	Sulfuric Acid Mist &/or SO_2 Emissions
10	CO Emissions
18	Gaseous Organic Emissions
25	Nonmethane Organic Emissions
26	Hydrogen Halide & Halogen Emissions
26a	Isokinetic Hydrogen Halide & Halogen Emissions
	Total Reduced Sulfur, Pulp & Paper
	Total Reduced Sulfur, Sour Gas Plants
	Chlorine & Chlorine Dioxide Emissions
	Vinyl Chloride Monomer Emissions
	Lead Emissions
	Volatile Organic Compound Emissions
	Semi-volatile Organic Compound Emissions
CEMS Code	Continuous Emission Monitoring System Code

Table B.3. Ontario's Emission Test Methods for Stationary Sources.	
Method	**Parameter**
1	Traverse Points
2	Stack Gas Velocity and Flow Rate
3	Stack Gas Molecular Weight
4	Moisture Content
5	Particulate Emissions
	Odour Emissions (dynamic dilution sampling on Tedlar bags followed by forced choice sensory panel)
	Total Hydrocarbon Emissions (heated continuous FID)

Table B.4. U.S. EPA Test Methods.			
Pollutant	**EPA Promulgated Test Methods**	**EPA Proposed Test Methods**	**EPA Conditional Test Methods (numbers not assigned)**
Carbon Dioxide and Oxygen	3, 3A, 3B, 3C		CTM-034
Methane	3C		
Particulate Matter	5, 5A, B, D, E, F, G, H, 5I, 17, 201, 201A, 202, 315		CTM-002
$PM_{2.5}$, PM_{10}	201, 201A, 202		CTM-039
Sulfur Dioxide	6, 6A-6C, 8		
Nitrogen Oxides	7, 7A-7E, 20		CTM-022
Sulfuric Acid Mist	8		
Opacity	9, 22	203, 203A-C	CPS-001
Carbon Monoxide	10, 10A, 10B		
Hydrogen Sulfide	11, 15		
Lead	12, 29		
Fluoride	13A, 13B. 14, 14A		
Carbonyl Sulfide, Carbon Disulfide	15		
Total Reduced Sulfur	15A, 16A, 16B		
Sulfur	16		
Volatile Organic Compounds	18, 21, 25D, 204A-F, 305, 307		CTM-028
CTM 042			
Dioxin and Furan	23		
Nonmethane Organic Compound	25, 25C		CTM-035
Gaseous Organics	25A		
Metals (Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Mn, Hg, Ni, P, Se, Ag)	29		
Hydrogen Chloride, Halides, Halogens	26, 26A, 321	322	
Mercury	29, 101, 101A, 102, 105	324	
Beryllium	29, 103, 104,		
Vinyl Chloride	106, 107, 107A		

Table B.4. U.S. EPA Test Methods (Concluded).			
Pollutant	**EPA Promulgated Test Methods**	**EPA Proposed Test Methods**	**EPA Conditional Test Methods (numbers not assigned)**
Arsenic	29, 108, 108A, 108B, 108C		
Polonium-210	111		
Radionuclides	114		
Radon-222	115		
Chromium	29, 306, 306A		
Methanol	308		
Hexane	310A, 310C		
HAPS	311		not assigned
Styrene	312A-C		
Formaldehyde	316	323	CTM-027
Isocynates		207	
Butadiene			CTM-001
Acrylonitrile			CTM-008
Halogenated Organics			CTM-011
Benzene			CTM-014
Ammonia			CTM-027
Methylene Diphenyl Isocyanate (MDI)			CTM-031
Phenol and Cresol			CTM-032
Hydrogen Cyanide			CTM-033
Toluene Diisocynate			CTM-036

Table B.5. Mexico's Reference Test Methods for Stationary Sources.		
Method No.	**Parameter**	**U.S. EPA Equivalent**
NMX-AA-009-1993-SCFI	Stack gas flow (pitot tube method)	Method 2
NMX-AA-010-SCFI-2001	Particulate Matter (Isokinetic sampling with in-stack filter)	Method 5
NMX-AA-035-1976	CO_2, CO and O_2 (Orsat analysis of combustion gases)	Method 3
NMX-AA-054-1978	Stack gas Moisture (Gravimetric impinger method)	Method 4
NMX-AA-055-1979	SO_2 (midget impinger absortion in H_2O_2 solution, followed by Ba-thorin titration)	Method 6
NMX-AA-056-1980	SO_2, SO_3 and H_2SO_4 mist (isokinetic sampling, hot filtering, isopropanol absorption of SO_3 and H_2SO_4 , thorin titration)	Method 8
NMX-AA-069-1980	H_2S (absorption in $CdSO_4$ solution, followed by iodometric titration)	Method 11
NMX-AA-070-1980	Chlorides and Cl_2 (chlorides absorbed in water impinger. Chlorine absorbed in arsenite solution. Followed by photocolorimetric determination of chlorides)	-
NMX-AA-085-1986	Calibration of dry gas meter with wet gas meters or spirometer	Method 5 QA/QC
NMX-AA-086-1986	Rotometer calibration	-
NMX-AA-090-1986	Phosphoric acid mist (Isokinetic sampling without filter, color development with Mo-Va reagent, followed by spectrophotometric determination)	-
NMX-AA-095-1986	Cyanides (Isokinetic sampling in dilute Zn acetate solution, followed by buffering and by pyridine-pyrazolone addition. Spectrophotometric determination)	-
NMX-AA-096-1986	Benzene, Toluene, Xylene and Styrene (Colorimetric determination of benzene absorbed in a concentrated formaldehyde/H_2SO_4 solution. Colorimetric determination of toluene+xylene in a concentrated KIO_4/ H_2SO_4 solution. Colorimetric determination of styrene in a concentrated H_2SO_4 solution)	-
NMX-AA-097-1986	NH_3 (Absorption in dilute H_2SO_4 solution followed by phenol-nitroferrocyanide addition and colorimetric determination)	-
NMX-AA-098-1996	Trichloroethylene (Absortion in pyridine impingers. Colour development by hot-mixing with sodium hydroxide/ethanol solution. Colorimetric determination)	-
NMX–AA-114-1991	Opacity by smoke stain in a filter	-