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**Guideline for Stack Sampling Facilities\***

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\*Note: This document is an electronic (scanned) version of the original paper report and formatting may vary somewhat from the original.

## **Preamble**

This guideline is intended to provide general guidance only for the drafting of specifications for stack sampling facilities. As the basic configuration of both stack and method requirements vary considerably, proponents are encouraged to consult with professional stack sampling consultants before any installation occurs. Readers should also note that internal and external specifications of stack sampling equipment varies between manufacturers. Manitoba Environment staff may also be contacted by telephone at (204) 945-7100 or by facsimile at (204) 948-2420.

For specific direction in the application of a stack sampling program, a document titled "Stack Sampling Performance Protocol" is available upon request from Manitoba Environment at the above phone/facsimile numbers.

## **1. Definitions:**

"**CEM**" means continuous emission monitor;

"**monorail**" means a supporting device for the probe and sample box;

"**particulate**" means any finely divided liquid or solid matter other than water droplets;

"**sample port**" means a small opening perpendicular to the stack to provide access to the gas stream to be sampled;

"**snatch block**" means a pulley set located in a frame to simplify the lifting of equipment to the working platform;

"**stack**" means a duct, flue, pipe, chimney, vent, opening or other structure through which contaminants are emitted to the atmosphere;

"**stack sampling survey**" means a series of stack sampling tests;

"**standard conditions**" means a temperature of 25 degrees Celsius and a pressure of 760 millimetres of mercury, unless otherwise specified in an Environment Act Licence or Regulation; and

"**working platform**" means scaffolding or permanent walkway required to support personal and equipment at sample location.

## **2. Sampling ports:**

- a) Ports should normally be made from standard industrial pipe but stainless steel or other non corroding material should be used where corrosion problems might exist;
- b) The inside diameter of all ports should be at least 3 1/2 inches and should extend outwards from the exterior stack wall a distance of 3 inches. Ports should be flush with the interior stack wall. Note that some methods, such as EPA Method 201 or 201A, require a 6 inch diameter port. The proponent should verify the port diameter requirements pursuant to the applicable method before installing ports;
- c) Ports should be threaded to accommodate screw on caps which should be installed at the time of port installation. The port caps should be installed whenever the ports are not in use.

## **3. Sample port location:**

- a) Where possible, sample ports should be located at any section of the stack which is eight or more stack diameters (distance) downstream and two or more stack diameters (distance) upstream from any flow disturbance such as a bend, constriction, expansion or stack exit;

Under some circumstances, ports may be located at distances less than the 8 and 2 stack diameters mentioned above, but not less than 4 and 1 stack diameters respectively. The proponent should note that all stack sampling methods require laminar flow, i.e., no cyclonic or reverse flow or stratification pattern. Although locating ports at 8 and 2 stack diameters respectively from a flow disturbance does not guarantee laminar flow, decreasing the number of stack diameters increases the chance of flow disturbances that will negatively impact the sampling location, requiring remedial action to either correct the flow pattern or relocate the sampling ports, etc.

- c) For circular stacks with outside diameters less than 3 metres (10 feet) two ports are normally installed. Ports are installed at identical elevations and 90 degrees or right angles to each other;
- d) For circular stacks with outside diameters greater than 3 metres (10 feet) four ports are normally required. Ports are installed at identical elevations and 90 degrees or right angles to each other;

- e) For rectangular stacks all ports should be placed on one side of the stack at identical elevations.
- f) Ports should be installed at a height which provides clearance for the sample box without interference from the guard rails.

#### **4. Power supply:**

- a) One, 115 volt, 15 amp. circuit with a grounded two duplex receptacle outlet should be provided within 7.5 metres (25 feet) of each working platform;
- b) No other equipment should be connected to these circuits;
- c) The proponent should contact their stack sampling consultant to ascertain special electrical requirement for CEMs or other analyzers.

#### **5. Monorail Attachment Requirements:**

The proponent should contact their stack sampling consultant to ascertain special sampling equipment attachment requirements. Monorail attachments are necessary for each sampling port of a multi-port configuration. Note that standardization of sampling equipment attachment does not exist.

#### **6. Work platform standards:**

##### **6.1 Workplace Safety Requirements:**

- a) The working platform and access must conform to applicable Workplace Safety and Health Division Regulations, Building, Electrical and Fire Codes, and all other applicable laws. If a conflict exists between any Regulations or Codes and the general guidance of this guideline, the Regulations, Codes and other applicable laws will take precedence.

##### **6.2 Free standing stacks:**

- a) The work platform should be constructed of angle iron with an iron grate type working surface. This platform should be able to support at least three sampling personnel and 200 pounds of test equipment. A simplified diagram of a typical installation is attached to this document as Figure 1.

- b) Where a platform does not encircle the stack, the platform should extend 1 metre beyond each sampling port.
- c) The work platform should serve the entire circumference of a circular stack if sampling requires four ports.
- d) The work platform for rectangular stacks should be placed on the side of the stack where ports are located.
- e) The floor of the platform should be approximately 1.2 metres (4 feet) below the ports with a minimum width of 1 metre (3 feet) between stack wall and railing.
- f) A guard rail, meeting workplace standards, should be secured to the work platform. The guard rail should be designed so that it does not interfere with the sampling train.
- g) Safe and easy access to the work platform should be provided via a permanent ladder enclosed in a safety cage. No ladder well or other such opening should be located within 1 metre (3 feet) of any port and any opening to the platform should have a hinged cover at the platform.

### **6.3 Roof top access to stack ports:**

- a) Approved scaffolding can be used for ports located not more than 4.5 metres (15 feet) above roof level.
- b) If a stack is located near the edge of a building roof a guard rail should be provided on the building roof.
- c) If ports are located higher than 4.5 metres (15 feet) above roof level, work platform standards for free standing stacks apply.

### **7. Equipment lifting for free standing stacks:**

- a) An extended overhead beam with a winch or provision for attaching a snatch block and rope should be provided at some point beyond the edge of the platform (above the walkway). Higher sampling platforms are usually equipped with a power winch rather than a manually operated snatch block.

**Figure 1 - Typical Stack Sampling Facility**

