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<b>WBEA – Standard Operating Procedure</b>			
<b>SOP Title</b>		Procedures for Sampling Poly Aromatic Hydrocarbons using Poly Urethane Foam	
<b>SOP Number</b>		WBEA SOP-INT-008	
<b>Author</b>		Gary Cross	
<b>Implementation date</b>		February 8, 2013	
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1.01	04/07/2013	Addition of EC provided procedures	EC / Gary Cross

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## Introduction and Background

This procedure is a description of the specific steps that WBEA follow to collect PAH samples in the WBEA ambient air monitoring network. This method follows the EPA Toxic Organic (TO) method 13A.

For the purpose of collection of ambient air samples for determination of poly aromatic hydrocarbons (PAH), a high volume sampler is used for this method with a poly urethane foam (PUF) cartridge. Samples are collected on the National Air Pollution Surveillance (NAPS) schedule, every six days. PUF samplers are named as such because they use a plug of polyurethane foam to trap the target compounds that exist in the vapor phase. A particulate filter is also used to trap dust and prevent deterioration of the foam.

This SOP adheres to the requirements of the current Air Monitoring Directive (AMD) finalized by Alberta Environment in 1989. In some cases the limits and specifications exceed the requirements of the current AMD. It should be considered that the current and any future amendments or drafts of the AMD will be used as the benchmark for requirements and criteria for ambient air monitoring practices conducted in the WBEA network. Information used to write this procedure was also taken from sources identified in the reference section.

WBEA operates two PUF sampling programs in the current network. WBEA operates its own PUF sampling program using commercially available PUF High Volume (Hivol) samplers and utilizes a commercial laboratory for analysis. WBEA also facilitates an Environment Canada PUF sampling program where custom made Hivol samplers are used (supplied by Environment Canada) and samplers are sent the Environment Canada laboratory for analysis. The major difference between the two programs is that the Environment Canada sampler draws sample air at a much higher volume than the commercially available ones.

## Principle of the Method

For the WBEA sampling program, ambient air samples are collected using a high volume sampler through the following steps:

- The sample air first passes through a particulate filter to remove any particulate matter prior to entering the PUF cartridge. This filter is also included in the PAH extraction and analysis.
- The sample air then passes through a poly urethane foam cartridge to trap the compounds of interest.
- Sample air is drawn through the sampling system using a high volume blower motor.

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- The collected sample is then sent to the laboratory for analysis

The Environment Canada PUF sampler is a modification of a conventional hi-volume sampler. It is used in the sampling of PAH (Polycyclic Aromatic Hydrocarbons), PCB (PolyChlorinated Biphenyls) and other semi-volatile organic compounds in ambient air. A Teflon coated borosilicate glass filter is used to capture the solid phase of these compounds in combination with PolyUrethane Foam (PUF) for the trapping of the vapour phase of these compounds. The PUF is located inside a stainless steel or glass liner which is in turn placed inside a PVC or aluminum cartridge with Teflon end caps. The foam plugs and liner are chemically cleaned and free of residual contamination. This cartridge is connected to the lower end of the particulate filter holder, (see figure 1). A stainless steel reducer is connected to the other end of the cartridge by a plug ring (see figure 2).

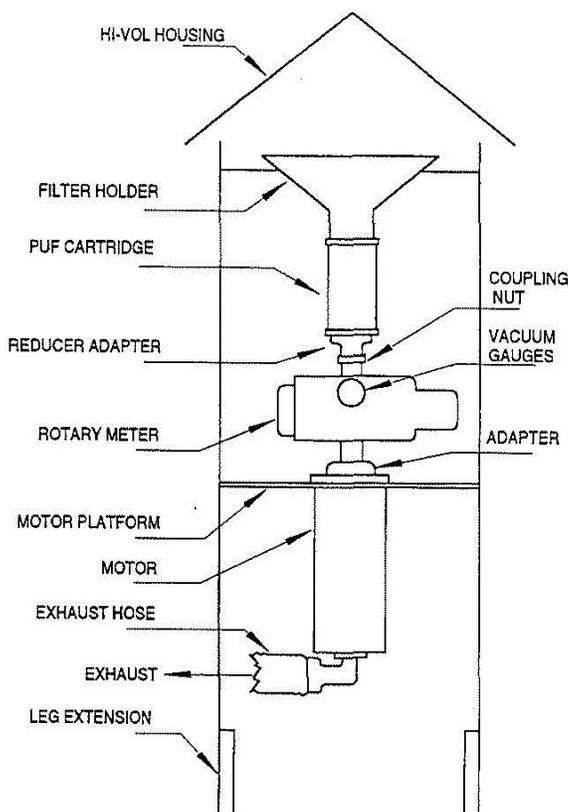


FIGURE 1 ENVIRONMENT CANADA SAMPLER ASSEMBLY



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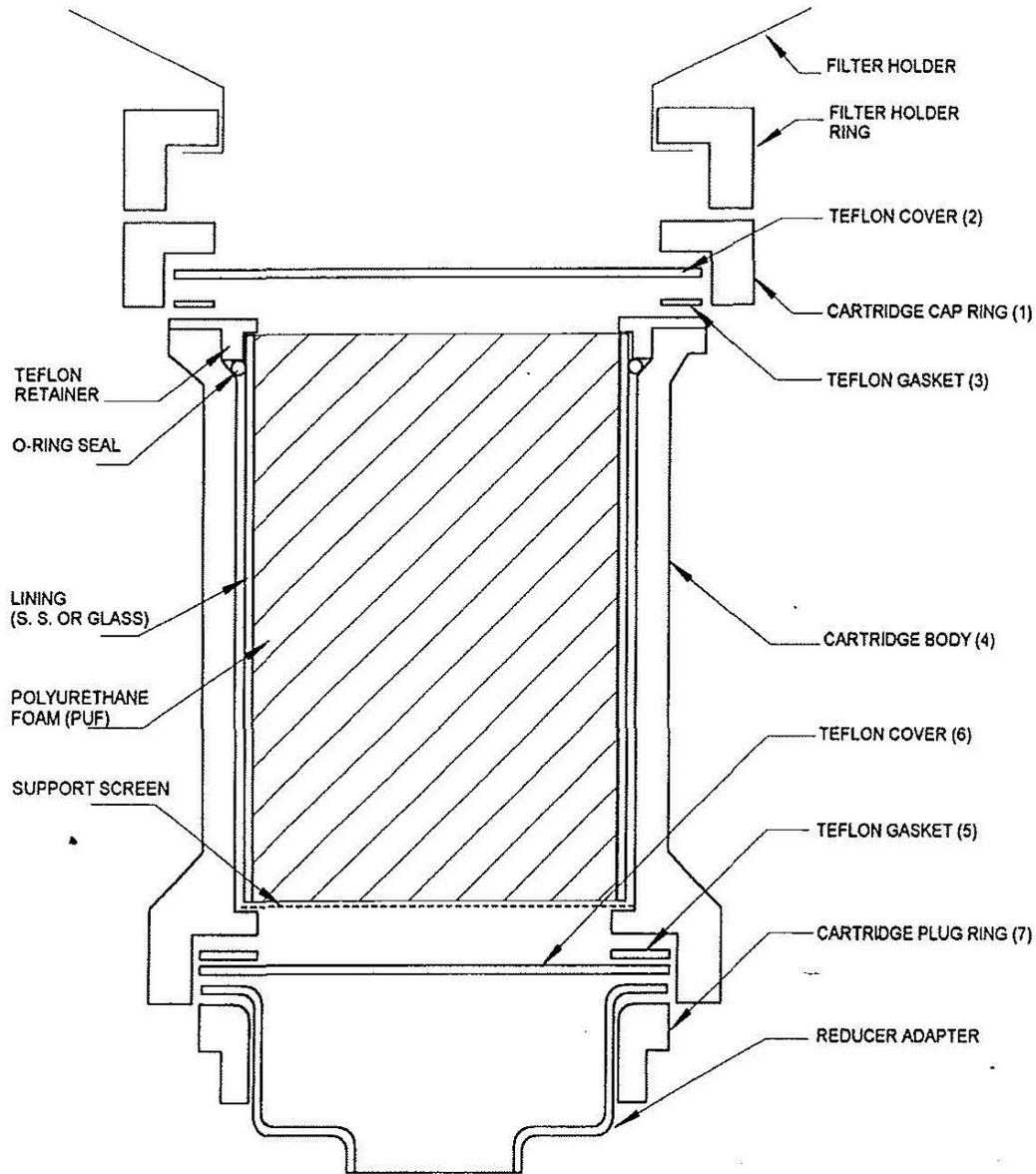


FIGURE 2 POLYURETHANE FOAM ( PUF ) CARTRIDGE ASSEMBLY

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## Measurement Range and Sensitivity

Range and sensitivity are governed by the method procedures and analytical detection limits. The EPA method followed for this sampling is EPA TO-13A.

The list of compounds that each sample is analyzed for was decided by WBEA for the WBEA sampling program. The list can be found below in Table 1.0

Naphthalene	7,12-Dimethylbenz(a)anthracene
Acenaphthylene	Benzo(b)fluoranthene
Acenaphthene	Benzo(k)fluoranthene
Fluorene	Benzo(a)pyrene
Phenanthrene	3-Methylcholanthrene
Anthracene	Indeno(123-cd)pyrene
Acridine	Dibenz(a,h)anthracene
Fluoranthene	Benzo(ghi)perylene
Pyrene	Dibenzo(a,l)pyrene
Benzo(c)phenanthrene	Dibenzo(a,i)pyrene
Benz(a)anthracene	Dibenzo(a,h)pyrene
Chrysene	

**Table 1. Target PAH compounds and common abbreviations**

## Equipment and Apparatus

The following samplers are used in the WBEA network for PAH sampling. The Tisch unit is commercially available, and the Environment Canada system is a modified version of the Tisch sampler to achieve a higher flow rate.

- Tish Environmental Model TE-1000 PUF Sampler
- Environment Canada custom design built by Environment Canada

## Interferences

Interferences in this method typically occur at the laboratory where sample media are prepped and then samples subsequently analyzed. These interferences can include contaminated solvents used in extractions, glassware that was not properly cleaned, etc.

UV light can interfere with the stability of the sample during transport to and from the laboratory. For both sampling programs, the PUF cartridges are loaded in the laboratory into a light proof canister for field deployment. This eliminates the potential for this interferent.

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## Precision and Accuracy

The measurement precision is generally considered to be the “repeatability of the measurement”. For this method, field blanks are regularly sent to the laboratory as a QA check, but can also be used to estimate precision. Precision in the maintenance of the instruments is also important. See the calibration and routine maintenance section later in this document.

The accuracy of the sensor is generally considered the “deviation from true”. This means how close it is to what it should be. This is considered in the laboratory procedure. See APE method TO-13A for more details.

## Site Requirements

These samplers require 120VAC at up to 10 amps on startup. A standard 110V 15A household type receptacle is required. There should be very little other equipment using the same power circuit to avoid circuit overloads.

Choose an unobstructed site with:

- No trees within 10 meters of sampler
- Sampler intake height 2 to 4 meters above the ground
- Distance from sampler to any obstacle at least twice the height of the obstacle
- 270 degree arc of unrestricted air flow around the sampler, 360 degree is desirable
- If placed on a roof, at least 2 meters from any wall, parapet, penthouse etc and no nearby flues that may significantly impact sampling
- Do not site the sampler on a treated wood platform interesting, wonder where he got this from?
- Depending on expected concentration build-up, at least 15 meters from traffic for moderate pollutant concentration and 60 meters from traffic for low pollutant concentration. Choose a site as far as possible away from dusty roads.

## Installation Requirements

For the WBEA sampling program, follow the installation procedures detailed in the Operations Manual for the Tisch TE-1000 sampler as well as the conditions outlined below.

The samplers are approximately 16 inches square by 48 inches tall.

In the WBEA network, siting of the sampler on an elevated deck is preferred.

Always anchor the sampler with screws or heavy items like sand bags to prevent blow over.

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Route the motor exhaust away from the sampler, preferably downwind, with a large diameter hose at least 2 metres in length.

The location of the sampler will need to be added to the existing site documentation if it is located at an existing site. If this is a new site, a new site document will need to be created following the criteria found in the AMD.

## EC Site and Installation Requirements

### Assembling the Unit

1. Install the extension brackets to each leg of the sampler. Then install the sampler on a level surface. Verify that the sampler is levelled by using a bubble level.
2. Fill the rotary meter (Roots) with supplied lubricant and install it in the sampler by following the instruction below "Installation & removing of the rotary meter in the PUF sampler". Connect the meter to the motor using a strap wrench.
3. To prevent recirculation of filtered air, a 3" diameter flexible exhaust hose must be connected to the exit of the motor housing. This hose should be extended and anchored at least ten (10) feet downwind from the sampler.
4. The sampler should be anchored to the ground or floor in the usual manner to prevent it from falling over in high winds.

### Installation & removing of the rotary meter in the PUF sampler

1. For transportation purposes, the meter is drained of lubricant from both the front and rear bearing chambers. Before installing the meter in the sampler, fill both the front and rear chambers with lubricant by following the steps below.
  - a. Place the meter on a level surface in the upright position. Remove a screw plug from the side or top of each oil chamber (a Philips screw driver is required). Fill the chambers with the recommended lubricant up to the center of the view glass using a syringe or similar device. Approximately 16cc is required for the rear chamber and 12cc for the front counter chamber. The lubricant level must be maintained within the central hole of the star shaped metal indicator inside the view port when the meter is in operation. Replace the screw plugs.
  - b. Place the motor on the bottom support platform of the sampler.
  - c. Install the meter in the sampler by connecting it to the motor with a neoprene gasket in between and the counter facing front. Maintain the meter in the upright position during this procedure. Otherwise the lubricant will leak into the measurement chamber and alter its operation.

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- d. After the meter is connected to the motor, visually check that the lubricant levels in both chambers are within the central hole of the indicator. Make adjustments if necessary.
2. To transport the PUF sampler, it's necessary to remove the rotary meter from the sampler and drain the lubricant from both oil chambers before transport. This will prevent seepage and loss of lubricant into the measurement chamber. Follow the procedure below.
  - a. Remove the meter from the sampler by disconnecting it from the motor. Take care to keep the meter in the upright position while this is done.
  - b. Place the meter on a level surface and a container ready to catch the lubricant drained from the oil chamber.
  - c. Remove the screw plugs from the side of the oil chamber and let the lubricant drain out by tipping the meter to its side. Vent the chamber by loosening the other side screw. Do this for both the front and rear chambers. Replace the screw plugs. It's recommended that the lubricant be discarded and new lubricant be used when the meter is reinstalled. This would ensure that any filings and grits will not be reintroduced into the meter.

## Sampling Procedures

Following are the steps required to collect, install, and ship a sample collected from both sampling programs. Documentation of the observations from the steps below are captured in different locations due to deficiencies in the current Doc-It chain of custody (COC) forms and specific Environment Canada requirements. Procedures are separated below for each sampling program; WBEA and Environment Canada (EC). These steps begin with the collection of an already deployed sample as these are the usual routine steps.

### WBEA Sample Collection:

Record the observations from the sampler in the PUF calibration/data spreadsheet located on the site PC. This spreadsheet should be found on the PC desktop. Observations entered into the spreadsheet will calculate the required values to be entered into the DOC-It COC. The Doc-It system will prompt you to enter the appropriate values for the PUF sample COC.

***Always use nitrile gloves when handling any sample media.***

- i. Retrieval
  - Prior to removing old media, turn on sampler and record the magnahelic reading.
  - Record the reading on elapsed timer. Use this as final time.
  - Remove the sample cartridge from the sampler. Cover the end that inserts into the sampler with the plastic/tissue that should be left from deployment.
  - Cover the top of the filter with the cover left from deployment.

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ii. Deployment

- Take media out of plastic bag, remove plastic bag/tissue from one end. Place that end in the sampler, WITHOUT removing the cover on the filter.
- Turn on the sampler and perform leak check. Magnahelic reading should stay at zero. Record the value observed on the magnahelic on the spreadsheet. If the value is more than 1, see maintenance procedures further in this document.
- Now remove cover from media. Cover may be either a stainless steel cover, or white Teflon.
- Turn sampler on again, watch magnahelic reading. It should be at 50”H2O. If it isn’t take a screw driver and turn the screw above “motor speed” to increase/decrease the speed of the motor until it reads 50”H2O. Record initial magnahelic reading.
- Turn motor off. Move on/off pins to appropriate place on timer wheel. Record reading on timer. Use this as initial time.

iii. Blanks

- A travel blank is shipped to the lab with each set of four samples every NAPS date. The blank is just an unsampled cartridge that was on the shelf in the FOC.
- A COC needs to be prepared for this blank

iv. Shipping – Samples that have been collected and retrieved from the field should be placed on the shelf labelled “Sampled PUF Cartridges”. Once all four collected samples from one NAPS sample day have been returned to this shelf, they need to be shipped back to the lab as quickly as possible. A travel blank should also be included in the shipment--take one of the unsampled cartridges and label it the “travel blank” and add to the shipping container with the other four samples. The travel blank must be entered into the Doc-It system before it is shipped. These samples are shipped to:

**Airzone One Ltd**

222 Matheson Blvd E.

Mississauga, ON L4Z 1X1

Phone (905) 890-6957 ext. 106

Attn: Natalie DeSousa

\*Ship via Purolator express air service

**EC Sample Collection:**

Record the observations from the sampler on the EC PUF sample sheet as well as the Doc-It system. The Doc-It system will prompt you to enter the appropriate values for the PUF sample COC. We maintain the

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Doc-It information for our own tracking purposes. Field sample sheets must be copied and filed in the FOC and the original sample sheet returned to EC with the sample media.

***Always use nitrile gloves when handling any sample media.***

The polyurethane foam (PUF) for trapping the vapour phase of P AH and PCB is installed inside a stainless steel or glass and Teflon lined cartridge. The cartridge assemblies are shipped separately from the sampler. Follow the procedures below for installing and removing the cartridge from the sampler, (see figure 2).

Required at each site:

1. 2 strap wrenches,
2. Plastic gloves without white powder,
3. Tedlar sheet,
4. Polypropylene bags, and
5. Sample filters.

NOTES:

1. The strap wrenches should only be applied on the ends of the cartridge, never on the body which has a much thinner wall
2. Do not attempt to disassemble this cartridge or remove the foam in the field. It's impossible to reassemble it without contamination to the foam once the assembly is taken apart
3. The unit reading (each line) on the roots meter is  $0.02 \text{ m}^3/\text{min}$  with a precision of  $0.01 \text{ m}^3/\text{min}$ .
4. After each sample (24 hours), the total sampled volume should be  $720 \text{ m}^3 \pm 10\%$  ( $(0.5 \text{ m}^3/\text{min} * 60) * 24$ ). If not, a flow adjustment should be performed. See the section below in the "Routine Maintenance" section titled "*Flow adjustment*".

**Installing the sample**

1. Remove the cap ring (1) from the cartridge assembly while leaving the plug (7) ring in place. Wearing clean plastic gloves remove the Teflon cover (2) and place it and the cap ring (1) in a polypropylene envelope to prevent contamination.
2. Connect the PUF sampler filter holder onto the cartridge with the Teflon gasket (3) in place.
3. Place a pre-weighed Pallflex filter (shiny side down) on the filter holder. Then place a Tedlar sheet on top of the Pallflex filter and tighten the filter holder nuts by hands.
4. Remove the plug ring (7) from the cartridge assembly and place the Teflon cover (6) into the same envelope (clean side with clean side). The outside of the covers are marked to prevent contamination when resealing the cartridge after sampling.

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5. With the Teflon gasket (5) in place, connect the reducing adapter to the cartridge using the plug ring (7) of the cartridge.
6. Remove the gloves & tighten the filter holder and the reducing adaptor to the cartridge assembly using the strap wrenches.
7. Fill required information on the filter envelope.
8. Connect the unit to the electrical outlet and remove the stainless steel cap from the inlet of the roots meter.
9. Install the entire assembly (sampling cartridge and filter holder) into the PUF sampler housing and make the final connection between the reducer and the roots meter.
10. To test for leakage in the system, with the Tedlar sheet already in place, turn on the motor. The air leakage rate can be measured with the dial of the gas roots meter. It should not exceed 0.01 m<sup>3</sup>/minute.
11. Remove the Tedlar sheet and store it in a clean envelope for reuse. (\*\* A flow check can be performed at this time \*\*)
12. Turn the system on for 2 minutes for the flow to stabilize (maybe longer in cold conditions). Measure and record the initial inlet vacuum of the roots meter. Shut the motor off, record the initial reading of the gas meter & the initial time.
13. Visually check that the lubricant levels in both the front and rear chambers are at the centre level.
14. Set the clock to the actual standard time and day by turning the clock face clockwise only. Set the pins (silver for ON and black for OFF), to the sampling day and time.
15. Fill in columns 1 to 7 of the data sheet.

### Removing the sample

1. After sampling, before removal of the cartridge assembly, turn the system ON for 2 minutes for the flow to stabilize (maybe longer in cold conditions) and record the final inlet vacuum of the roots meter. Turn the system OFF. Record the final meter reading and final elapsed time reading on the data sheet (columns 8 to 11) and the other information.
2. Remove the entire cartridge assembly (sampling cartridge and filter holder) from the PUF sampler housing by disconnecting the reducer from the roots meter.
3. Install the stainless steel cap at the inlet of the roots meter and disconnect the unit from the electrical outlet until the next sample installation.
4. Un-tighten the filter holder and reducing adaptor from the cartridge assembly.
5. Wearing clean plastic gloves, remove the reducing adaptor from the cartridge assembly and reinstall the Teflon cover (6) and the plug (7) ring on the cartridge assembly.
6. Remove the filter from the holder, fold it in four, and place it in the aluminum foil which in turn is placed inside the polypropylene envelope and finally store it in the brown envelope.

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7. Remove the filter holder from the cartridge assembly and reinstall the Teflon cover (2) and the cap ring (1) on the cartridge assembly.
8. The bottom of the filter holder and the reducing adaptor should be covered with a clean polypropylene bag until a new sample is prepared.

### Blanks

- This program requires field blanks only.
- On specific dates, given to us by our contact at Environment Canada, a PUF and filter are deployed and left outside in the sampler on the sample day.
- The sampler should never be turned on while the field blank is deployed, so doing a leak check and vacuum check is not necessary.

### Shipping

Samples that have been collected and retrieved from the field should be placed on the shelf labelled "EC Sampled PUF Cartridges". These samples are shipped in full sets of two, meaning six samples, three from each NAPS cycle, should be in each shipment. So six sampled cartridges, six particulate filters and three field sample sheets (there are two samples from consecutive NAPS days on each sheet) are to all be shipped in the same cooler. Also ensure that a copy of the field sample sheet is filed in the FOC for future reference. It is not necessary to include a printed COC, just the field sheet is needed for shipping. These samples are shipped to:

**Environment Canada**

335 River Road

Ottawa, ON K1V 1C7

Attn: Allison Walkey

Phone - (613) 991-4428

\*Ship via Purolator express air service

\*Use EC Purolator account number 8322405

### Operational and Maintenance Requirements

Perform the following service checks according to the schedule and procedures documented in this section. Checks may be performed more frequently, but should be performed at least at the prescribed intervals. The following section has been divided into the two sampling programs in the WBEA network for specific operational checks.

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## WBEA PUF Samplers

### Every Sample Change

During every sample change visually and physically check all components of the sampler to ensure they are firmly secured to the sampler housing. This includes the:

- Motor assembly
- Timer assembly
- Counter assembly

Check the time on the timer dial to ensure the clock is running accurately.

Flow Meter Tubing - On all samplers, inspect the tubing for deterioration or cracks. Replace, if necessary.

### Every Six Months

The motor brushes should be changed every six months or approximately every 720 hours. This represents 30 – 24 hour samples on the NAPS schedule. The procedure is as follows:

- Unplug the motor housing from the timer assembly
- Remove the large retaining ring from the top of the motor housing
- Loosen the steel strap securing the motor housing in place
- Remove the motor housing from the sampler
- Install the rebuilt motor housing in reverse of the previous steps.

To change the motor brushes in the shop follow the steps below

- Remove the four screws holding the motor housing top on
- Loosen the cords on the opposite side of the housing to allow the motor to come out of the housing
- Pull the aluminum and foam support rings off the motor and slide them down the cord
- Remove the plastic motor cap by loosening the retaining clips
- Unscrew the clip holding the brush assembly
- Using a Dremel cutting wheel, cut the plastic top of the brush housing to remove the motor connecting clip
- Push a new brush on the connector clip
- Repeat for the other side
- Replace the motor to the motor housing by repeating the above steps in reverse

To burn in the new motor brushes follow the steps below

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- Situate the motor housing in the jig on the bench in the shop designed for this purpose. This jig is to allow airflow while the burn in takes place and prevents the motor housing from moving due to vibration.
- Plug the motor into the motor control unit for this purpose
- Set the motor control to “low” and allow the unit to run for at least four hours.
- At the end of the burn in period, tag the motor with date, status and the name of the tech who completed the work.
- Return the burned in motor to the parts shelf

Complete the following checks while performing tasks above on the motor health.

Armature - Once the armature becomes worn, the brush life drops considerably, to 300 hours or less. When opening the motor housing to change the brushes, inspect the armature. Replace the motor if the armature has excessive wear, such as deep grooving on the commutator or lack of segmentation.

Motor - When replacing brushes, pull at the center motor shaft to check for excessive play. If shaft play exceeds 1/8" in any one direction, replace the motor.

Motor Wiring - Inspect motor windings for any abnormalities such as burnt wires. Clean dust from motor.

Motor Gaskets - Inspect top and bottom gaskets for wear and deterioration and replace if necessary. Twisted power leads indicate that motor gaskets are not holding motor firmly and gaskets need to be replaced.

## Calibration

The TE-PUF Sampler should be calibrated:

- Upon installation
- At least once every three months
- After motor maintenance

### CALIBRATION PROCEDURE

Calibration of the PUF Sampler is performed without a foam plug (TE-1010) or filter paper in the sampling module. A sample cartridge is kept in the calibration kit for this purpose. When completing the calibration, use the calibration spreadsheet that is found on the station PC desktop, which also serves as the sample information sheet.

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1. Install the TE-5040A Calibrator (orifice) on top of the 4" Filter Holder
2. Open both ports on top of manometer and connect tubing from manometer port to the pressure tap on the TE-5040A Calibrator. Leave the opposite side of manometer port open to the atmosphere.
3. Open ball valve fully (handle should be straight up), this is located inside of shelter directly above the blower motor.
4. Turn the system on by tripping the manual switch on the timer. Allow a few minutes for motor to warm-up.
5. Adjust and tighten the voltage control screw (variac) on the time counter to obtain a reading of 70 inches on the Magnehelic Gage (or 80 whatever is desired). Do not change until completion of calibration.
6. With 70 inches on the gage as your first calibration point, record this figure and the orifice manometer reading on the calibration spreadsheet. The digital display on the manometer is in inches of water.
7. Close the ball valve slightly to readjust the dial gage down to 60 inches. Record this figure and the orifice manometer reading on the calibration spreadsheet.
8. Using the above procedure, adjust the ball valve for readings at 50, 40, and 30 inches and record the values on the calibration spreadsheet.
9. Manually turn the sampler off
10. Return the ball valve to the fully opened position
11. Install a new sample cartridge loaded with PUF and filter
12. Turn on the motor and adjust the motor voltage to give a reading of 50 on the magnahelic.
13. Turn off the motor and set the timer lugs for the next sample day.
14. Save the new calibration sheet on the station PC on the desktop with the new calibration date.

## EC PUF Samplers

### Every Sample Change

During every sample change visually and physically check all components of the sampler to ensure they are firmly secured to the sampler housing. This includes the:

- Motor assembly
- Timer assembly
- Counter assembly

Check the time on the timer dial to ensure the clock is running accurately.

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Flow Meter Tubing - On all samplers, inspect the tubing for deterioration or cracks. Replace, if necessary.

### Flow Adjustment

With a sample media (filter, filter holder, and cartridge assembly) installed in the unit, Turn the unit ON and check the reading on the roots meter. The meter should count  $0.5\text{m}^3$  in a minute. If the reading is lower or higher than  $0.5\text{m}^3$ , adjust the motor speed accordingly using the voltage variator located on the elapsed timer assembly and wait for one minute. Repeat this step until the reading on the roots meter counts  $0.5\text{m}^3$  for one minute.

### Every Six Months

The motor brushes should be changed every six months or approximately every 720 hours. This represents 30 – 24 hour samples on the NAPS schedule. The procedure is as follows:

- Unplug the motor housing from the timer assembly
- Remove the large retaining ring from the top of the motor housing
- Loosen the steel strap securing the motor housing in place
- Remove the motor housing from the sampler
- Install the rebuilt motor housing in reverse of the previous steps.

To change the motor brushes in the shop follow the steps below

- Remove the four screws holding the motor housing top on
- Loosen the cords on the opposite side of the housing to allow the motor to come out of the housing
- Pull the aluminum and foam support rings off the motor and slide them down the cord
- Remove the plastic motor cap by loosening the retaining clips
- Unscrew the clip holding the brush assembly
- Using a Dremel cutting wheel, cut the plastic top of the brush housing to remove the motor connecting clip
- Push a new brush on the connector clip
- Repeat for the other side
- Replace the motor to the motor housing by repeating the above steps in reverse

To burn in the new motor brushes follow the steps below

- Situate the motor housing in the jig on the bench in the shop designed for this purpose. This jig is to allow airflow while the burn in takes place and prevents the motor housing from moving due to vibration.

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- Plug the motor into the motor control unit for this purpose
- Set the motor control to “low” and allow the unit to run for at least four hours.
- At the end of the burn in period, tag the motor with date, status and the name of the tech who completed the work.
- Return the burned in motor to the parts shelf

Complete the following checks while performing tasks above on the motor health.

Armature - Once the armature becomes worn, the brush life drops considerably, to 300 hours or less. When opening the motor housing to change the brushes, inspect the armature. Replace the motor if the armature has excessive wear, such as deep grooving on the commutator or lack of segmentation.

Motor - When replacing brushes, pull at the center motor shaft to check for excessive play. If shaft play exceeds 1/8" in any one direction, replace the motor.

Motor Wiring - Inspect motor windings for any abnormalities such as burnt wires. Clean dust from motor.

Motor Gaskets - Inspect top and bottom gaskets for wear and deterioration and replace if necessary. Twisted power leads indicate that motor gaskets are not holding motor firmly and gaskets need to be replaced.

## Data Collection and Management

The sampling methodology described in WBEA SOP-INT-001 general sampling instructions describes the Chain of Custody (COC) system of which could comprises the field data collection. Sample results are provided by the laboratory that completes the analysis of the sample media. This data, for the WBEA sampling program is now being entered into the integrated sampling database on the WBEA server.

## Reference Documents

- Tisch Environmental Inc. – TE-1000 Operations Manual
- High Volume Sampler, Environment Canada custom design – Operations Manual
- State of California Air Resources Board (CARB) Method Volume II Standard Operating Procedures for Air Quality Monitoring Appendix E.1 dated January 1989.
- U.S. Environmental Protection Agency’s “Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air” Method TO-13A.
- Environment Canada PUF sampler instructions