

SPARTAN Field Evaluation Protocol

12a

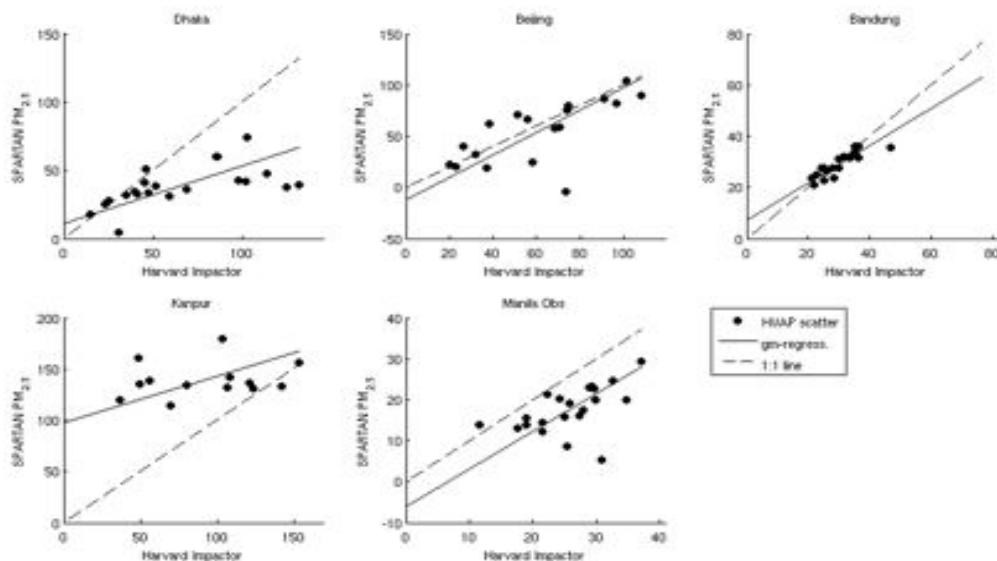
Sampling Station and Harvard Impactor Collocation

Last Updated: June 11, 2013

Version 1.0

Rationale for HI collocation:

SPARTAN collocations take place on a rotating basis. Each site samples filters for three weeks, 21 filters, and one filter per day. If consecutive days are not possible, then sample in as short a time span as possible. Shown below are the five HI evaluation tests performed as of April 1st 2015



Supplies for HI collocation:

- Three loaded AirPhoton cartridges for rapid, daily sampling
- Two PM_{2.5} Harvard Impactors
- 24 × 37 mm 2.0 µm Teflon filters (SKC part no. 225-27-07)
- 24 × 37 mm pre-fired Quartz filters (contact Igor Levin, info@concordanalytical.com)
- 48 yellow filters cassettes (Air Diagnostics & Engineering Inc. btair1@airdiagnostics.com OR 3D-print at Dal)
- 48 Pall petri dishes (one per cassette + filter assembly)
- Two pelican cases with mounting straps
- Rotameter and flow adaptor
- Two pumps (SKC Leland and Parker pump)
- Light-grade mineral (paraffin) oil (NB: Heavy-grade oil ok if light unavailable)
- Tubing, flow controller for Parker pump, Kimwipes,



Pelican cases containing Harvard Impactors HI and pumps. Centre: both cases installed on pole mount

Equipment and Materials: Calibration Kit Check List

A. *The following equipment is included in the Collocation kit:*

- ☐ Harvard Impactor (HI)
- ☐ 37mm PTFE filters loaded in clean filter holder (stored in clear, labelled petri dishes)
- ☐ Flow adapter (used to connect flow meter to Harvard Impactor)
- ☐ Rotameter
- ☐ 3 preloaded filter cartridges for AirPhoton (numbered CHTS-1, CHTS-2, CHTS-3), 29 filters for Harvard Impactor (HARVIM-001, etc). CHTS-4 and CHTS-5 are to be used for 9-day periods after HI collocation is complete
- ☐ Plastic tubing
- ☐ Leland Legacy Pump
- ☐ SKC pump programming software on a CD
- ☐ DataTrac cable for the Leland Legacy Pump
- ☐ Pump charger
- ☐ Gloves
- ☐ Tools/Supplies:
 - Spare o-rings for Harvard Impactor – ensure a few of each of the different sizes
 - Kimwipes (small)
 - Kimwipes (large)
 - Light grade mineral oil (may be referred to as Impaction plate oil)
 - Small bottle of dish detergent
 - High vacuum grease
 - Clean Ziploc bags (small, medium, large)
 - Elastic bands
 - Eye dropper
 - USB key (for data backup)
 - Binder with:
 - Binder containing Harvard Impactor Sampling Log Sheets
 - Protocol for calibration field sampling (this document)

* If any of the above supplies were not received in your package or if you have any questions or issues arise during your calibration period, please contact a site organizer at Dalhousie University at one of the following email addresses:

Crystal.Weagle@dal.ca

-OR-

Graydon.Snider@dal.ca

Shipping address

Randall Martin
6310 Coburg Rd. room 218
James Dunn bldg
Dalhousie University
Halifax, NS
B3H 4R2

B. The following equipment must be brought to the sampling site on the initial visit and left at the site throughout the 21-day sampling period:

- ☐ Harvard Impactor (HI)
- ☐ Leland Legacy pump (charged)
- ☐ Grey plastic pelican case
- ☐ Pump charger
- ☐ Outdoor extension cord(s) if needed (power cords should already exist for sampling station)

General

- It is important to thoroughly clean the Harvard Impactor as well as the impaction plates upon receiving the calibration kit at your site; see Cleaning on page 11 and 12.
- The pump should be charged prior to sampling.
- During collocation, switch the AirPhoton sampling station to a daily sampling schedule shown below:

Start Time: 09:00

Period: 01/00:00:00 (1 day)

Duration: 01/00:00:00 (1 day)

Duty Duration: 00/01:00:00 (1 hour)

Duty %: 10.00 %



- All filter changes must be made on the scheduled days (9:00 local time) and coincide with the SPARTAN sampling station sampling time (also 09:00 local time).
- Handling of filters should be minimized. Transport filters to and from the Harvard Impactor site in a small container. Although each site should sample 21 filters, spares are available if needed and blanks are included.
- Unused filters are to be kept in their respective labeled Petri dishes. Filters that have been used for sampling are to be placed back in their own original Petri dish.
- When changing filters any filter can be used. Be sure to label the log sheet (under “Filter IN – Filter ID”) with one of the two removable labels. One of the two smaller labels is to be transferred to the log sheet. More specific instructions are supplied later.
- After the 21-day sampling period is completed, ship sampled filters and log sheets to the Dalhousie University address.
- **Important:** If you tear or drop a filter on the ground (on-site or in the lab), replace that filter with another filter - **do not use the compromised filter.**
- Ensure that the proper filter ID is used in the log sheets. Return any damaged filters to Dalhousie University at the end of the collocation with an explanation of what happened in the comments section of the log sheet.

Summary of duties needed to be performed:

1. Clean equipment (to be done before the first sampling session, i.e. upon receiving the Harvard Impactor)
2. Reassemble cleaned HI
3. Load a new filter (contained in a yellow cassette)
4. Calibrate the pump flow rate
5. Record starting measurements on the log sheet (flow)
6. Program or turn on the pump for 23.5 hours
7. Place the pump and HI in the grey pelican case to begin sampling
8. Process a field blank – performed at each site after 10 days of collocation as well as at the end of the collocation (after 21 days)
9. Record the end measurements on the log sheet (flow, total sampling volume, total sampling time)
10. Remove the sampled filter
11. Download pump data
12. At the end of the 21-day collocation repackaging sampling equipment and ship out (to Dalhousie University).

ON-SITE PREPARATION

Filter Replacement and Pump Reprogramming – Follow these instructions in the order written

A. Upon delivery of instrument

1. Prepare a clean indoor work surface such as with a large Kimwipe (included).
2. Clean the Harvard Impactor and impaction plate (see Cleaning, Page 11).
3. For your first sampling session (day 1) proceed directly through Sections E (complete clean), F (flow calibration), then G (programming sampling time).
4. After completing E,F and G, proceed to Section D (installing new filter) and B (measuring end flows)
5. For all subsequent sampling sessions (days 2-21) proceed through sections B, C, and D. Simply restart pump manually for consecutive sampling days (no need to reprogram).
6. On final day, download recorded pump data

B. Record Pump Sample Volume/Time/End Flow Rate

(MEASUREMENT MUST BE COMPLETED OUTDOORS)

1. Bring the Omega rotameter to the outdoor sampling location.
2. Open the pelican case. Remove HI and Leland Legacy pump from the pelican case. Remove the HI sampling inlet and attach the flow adaptor (**Figure 1**) and tubing. Attach flow adaptor tubing to the TOP outlet of the Omega rotameter. If the weather is bad (e.g. windy, raining) protect the equipment.
3. Make sure the Omega rotameter is on a level surface (e.g. do not hold it in your hand) otherwise measurement will be affected. Be sure to turn the black valve at the base of the rotameter so that it is open all the way.
4. Turn on the Leland Legacy pump by pressing any button and then the '▲▼' buttons simultaneously to start pulling air. **Do not remove the sampled filter before measuring the end flow.**
5. Let the pump run for at least 1 minute. Record the flow reading of the Omega rotameter on the log sheet under the End Flows Section in the 'Measured Flow (lpm)' column pertaining to the filter inside the HI. Also record the flow reported by the Leland Legacy pump under the End Flows section in the 'Reported Pump Flow (lpm)' column. Instructions on how to read the flow from the Omega rotameter is included in the SPARTAN Standard Operating Procedures, page 11. Site operators should already be familiar with this protocol, but please refer back in the case of any confusion.
6. Press the '▲▼' buttons on the Leland Legacy pump simultaneously to stop the pump.
7. Record the total time elapsed and the air volume sampled for the Leland Legacy pump under **Filter Out – Total Time Elapsed** (minutes) and **Filter Out – Air Volume Sampled** (litres) respectively on the log sheet in the table starting on Page 4. To obtain this information, use the '*' key on the Leland Legacy pump to

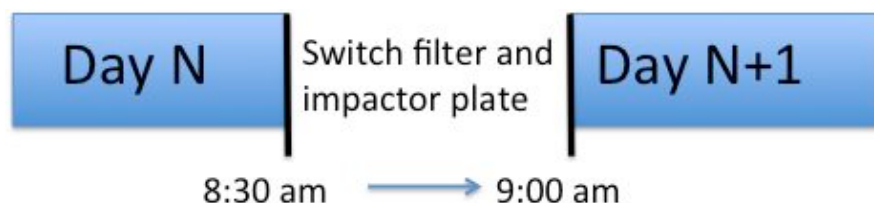


Figure 1: Photo of how to attach the flow adaptor to the HI inlet to measure the flow

advance through the information screens. It is imperative that the information be recorded to correspond to the appropriate FILTER.

8. Remove the flow adapter from the Harvard Impactor and replace the inlet cap.

C. Replacing the Impaction Plate and Removing the Loaded Filter MUST BE COMPLETED INDOORS – Wear gloves)



Put on a pair of clean gloves and open the base of the Harvard Impactor by flipping the clamps at the base open (**Figure 2**).

1. Disconnect the tubing between pump and HI, move HI indoors, and place HI on a clean surface (i.e. a large Kimwipe) and put on gloves.
2. Carefully remove the filter from the Harvard Impactor and gently place it (without removing it from its yellow cassette) into its corresponding labelled Petri dish. Be extremely careful not to touch the filter surface.
3. Remove one filter label (HARVIM-OXX) from the filter casing and place it on the sampling sheet under 'Filter OUT – Filter ID '(there should now be 1 label on the Petri dish and 2 labels for this particular filter on the field sheet).
4. Close the petri dish closed and place into a Ziploc or other bag and place into a box or bag for transport back to the lab.

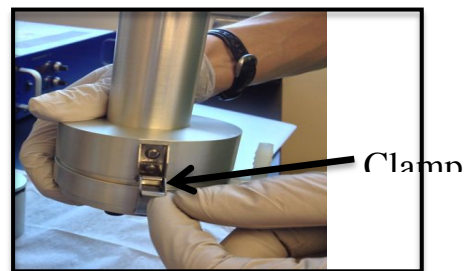
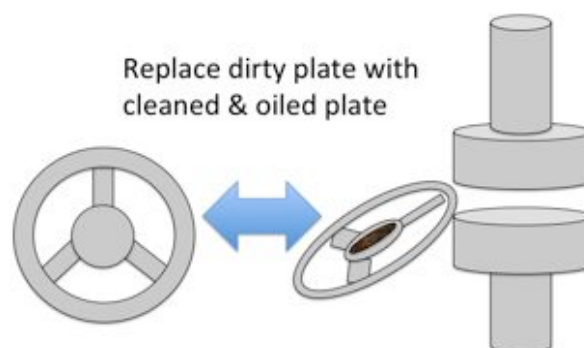


Figure 2: Open the base by flipping the clamps

***Note:** Ensure sampled filters are carefully handled and placed securely in a padded box for shipping back to Dalhousie University. Return all filters, sampled and blanks, as well as any compromised filters together but clearly labelled.

5. Remove the impaction plate by twisting the widest cross-section of the Harvard Impactor body apart from one another. Handle these plates by their edges, being careful to avoid touching the rough metal centre. See Cleaning, p. 11 for instructions on how to clean the impaction plate.
6. Wipe inside of Harvard impactor carefully with a small Kimwipe.
7. A pre-cleaned impaction plate should be ready to use for the present day's sampling session. Install the clean & oiled impaction plate (see **Figure 8**, page 11).
8. Clean the used impaction plate immediately.
9. Reassemble Harvard Impactor



D. Installing a New Filter – Field Blank or Sample Filter

Inserting a New Sample Filter into the Harvard Impactor (MUST BE COMPLETED INDOORS)

1. Remove the new sample filter (pre-loaded in yellow filter holder cassette) from its labelled Petri dish.
2. Place the filter in the recessed hole containing a rubber gasket located in the base of the Harvard Impactor (be careful not to touch the filter) (**Figure 3a**) and reassemble the body of the Impactor and its base back together (**Figure 2**).
3. Remove one of the two small Filter ID stickers from the Petri dish and stick it onto the Harvard Impactor housing.
4. Remove the second Filter ID sticker from the Petri dish and stick it onto the sampling log sheet under 'Filter IN – Filter ID'.

Filter blanks

After both 10 and 21 sampling sessions a field blank is scheduled at each site; follow these instructions.

1. Filter field blanks will be performed between the 10th and 11th sampling sessions as well as after the 21st sampling session. Any filter *can* be used as a field blank except for two “travelling blanks” Do not open travelling blanks.

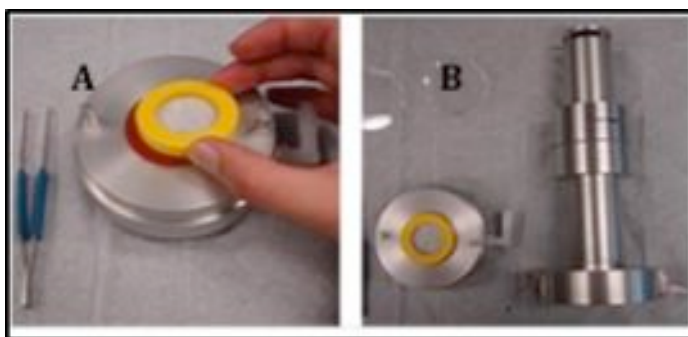


Figure 3: Proper placement of the filter cassette inside the HI

2. At the field site, process one field blank **before** the sample filter:
 - ★ Install field blank filter or sample filter (in its cassette) into the cleaned and assembled Harvard Impactor:
 - i. Remove the base of the Harvard Impactor by flipping the clamps at the base open;
 - ii. Place the loaded filter cassette into the recessed hole containing an orange rubber gasket located in the base of the Impactor (**Figure 3**). Cassette should be placed in orientation as **Figure 3b**;
 - iii. Clamp body of the Impactor and its base back together;

- iv. Remove one of the filter's 3 ID labels from the Petri dish cover and stick it onto the sampling log sheet being careful to place it in the correct spot. Be sure to transfer the filter label to the log sheet in the designated Blank ID row.

Note: Field blanks in their Petri Dishes will be returned to Dalhousie University with 2 ID labels (sampled filters will return with only 1 ID sticker on their Petri Dish).

- v. Close the Harvard Impactor and then wait about 5 minutes
 - vi. After 5 minutes, open the Harvard Impactor, and place filter back into its Petri dish. Treat as if it is a sampled filter from now on. Record the total time the filter was in the HI on the log sheet.
3. Proceed with installing the sample filter and continuing with equipment set up and sampling start.

E. Cleaning the Pump and Impactor for the next sampling session

1. Completely disassemble the Harvard Impactor, put on a pair of clean gloves, and clean (see Cleaning, Page 12) all parts of the inside and outside with Kimwipes and methanol* (**Figure 7**, page 11). Use a separate small Kimwipe for each part.
2. Ensure that all the Impactor parts are dry before reassembling.
3. Check the impaction plate - if the oil has been absorbed, add more oil in increments of one drop (using eye dropper provided) until the oil no longer absorbs. Wipe off any excess carefully with a small Kimwipe.
4. Install the clean & oiled impaction plate (see **Figure 8**, page 12).

F. Pump Calibration using the Omega rotameter (MUST BE COMPLETED OUTDOORS)

1. Bring Harvard Impactor, Leland Legacy pump and Omega rotameter back outside. Make sure the Omega rotameter is placed on a flat, level surface.
2. Turn the Leland Legacy pump on (press the '▲▼' buttons simultaneously) and let run for at least 2 minutes (to warm up for calibration procedure).
3. After the pump has warmed up for at least 2 minutes, turn it off and reconnect to the HI. Ensure that you push the tubing firmly down onto the pump and twist a few times to secure adequately.
4. Remove the sampling inlet (uppermost part; leave inlet inside the clean bag) of the Harvard Impactor, and replace with the flow adaptor (**Figure 1**). Attach flow adapter tubing to the TOP outlet of the rotameter.
5. Connect the Leland Legacy pump to the Harvard Impactor flow adaptor with tubing.
6. Ensure the Omega rotameter is placed on a level surface.
7. Turn the pump ON by pressing '*' on the keypad.

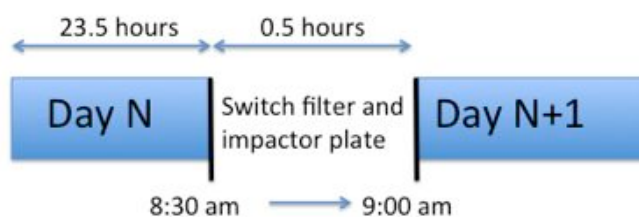


Figure 4: Arrangement of Harvard Impactor and Leland Legacy pump inside the grey pelican case

8. Begin flowing air through the pump by pressing the two '▲▼' keys simultaneously
9. To begin calibration you must be in 'SETUP'. To get into SETUP press 4 keys in the sequence of: '*▲▼*'. This will bring 'SETUP' up on the LCD screen. It may not enter SETUP immediately as the pump may not respond right away; just keep trying the 4 key sequence until you see SETUP appear on the screen.
10. Once in SETUP ensure the pump flow is set at 10.00 L/min. If necessary, adjust the pump flow rate using the ▲ or ▼ keys.
11. Once the pump is set at 10.00 L/min press the '*' key until you see 'ADJ FLOW' written diagonally across the top of the screen in small letters (the 'ADJ FLOW' will not flash, but 'SET' and the numbers will).
12. Adjust the pump flow rate using the ▲ or ▼ key until the rotameter shows a reading as close to 10.00 L/min as possible.
13. Once pump is calibrated, allow the pump to run for 2 minutes and then record the flow reported by the pump under 'Reported Pump Flow (lpm)' and the flow read from the Omega flow meter under 'Measured Flow (lpm)' under the 'Start Flows and Date' heading. If the pump has strayed from 10.00 L/min, re-calibrate (steps 4-12).
14. Once calibration is complete, press '*' until you see 'Clr' on the LCD; then press the '▲▼' keys simultaneously to clear the pump's memory.
15. Press '*' key again, until the LCD screen reads 'End' (first it will read ESC then End). When it says 'End' press the '▲▼' keys simultaneously. This will exit the Setup session and return to the LCD screen display mode where the pump should read 'HOLD' (blinking diagonally in small letters on the top centre) and 0.0 mins.
16. Remove the flow adaptor from the Harvard Impactor and reattach to pump.

Note: If the LCD screen shows an E43 error message during calibration, turn pump off and attach tubing to pump more firmly. If the LCD screen shows an F43 message do not worry, this does appear to affect the functioning of the pump.

G. Setting a sampling time



1. Press ['▲▼'], then press the security code '*▲▼*' in sequence. Setup will display briefly.
2. Repeatedly press * until ST L/min and a flashing time and Set appear on the display.
3. Set the sampling time to (24 hours = 1440 minutes) by pressing ▲ or ▼ to increase or decrease it to the desired time in minutes.
4. Press * repeatedly until End appears.
5. Press [▲▼] to save the new sampling time and exit Setup.

If starting immediately, go to step 6 below. For a delayed start, follow steps 7-14

6. Press [▲▼] to begin sampling. The time display will count down in minutes and the pump will go to Hold. The total sampling time will now be displayed.

Delayed start:

7. Press [▲▼], then press the security code *▲▼* in sequence. Setup will display briefly.
8. Press * until the display reaches the 12 Hr/24 Hr clock.
9. If delayed start is already programmed, the display will show Dela (delayed start) in place of 12 Hr. If no delay is programmed, press ▲ or ▼ until the display shows a flashing Dela (delayed start).
10. Press * until the time of day (flashing hours) displays. Select the hour (time of day) that the pump is to begin sampling (within the next 12 hours) by pressing ▲ or ▼ until the desired hour displays. Press * and the minutes will flash. Press ▲ or ▼ until the desired minutes display.

NB: The time of day entered will be the next occurrence of this time within the next 12-hour period after the delayed start is entered. There is no a.m. or p.m. designation.

11. Press * until the ST displays. Press ▲ or ▼ to set the desired run time in minutes. A delayed start cannot be run unless a sampling time (ST) is programmed.
12. Press * until End appears.
13. Press [▲▼] to save settings and exit Setup.
14. "Prog" and a flashing "Hold" will appear in the upper left corner of the display. The pump is now set for delayed start.

Place the Leland Legacy pump and Harvard Impactor (connected by tubing) into grey pelican case. Connect the pump to the AC power cord. Plug in the AC power cord (green light should be solid and red light should be flashing on AC power cord). Example of the arrangement of pump and Harvard Impactor inside the pelican is shown in **Figure 4**. Close the pelican case.

On Return to Lab

1. Check that sampled filters have only one ID label (Field Blank filters will have 2 ID labels). **Be sure not to use these for a sampling session.**
2. Store the sampled filters inside 3 clean and sealed Ziploc bags, in a protected space (with a steady temperature) until transport to DALHOUSIE UNIVERSITY.

Miscellaneous

1. **FILTER TEAR OR CONTAMINATION** (even if only suspected): If a Teflon filter is contaminated **prior to sampling** in any way or damaged, use any other filter. Be sure to write the ID for the filter used on the Log Sheet. Return the damaged, torn, contaminated filter in its Petri dish with other used filters when a shipment occurs clearly labelling why the filter was not used. **If a filter is torn or contaminated after sampling**, send the filter back to Dalhousie University with the others but be sure to indicate in the 'Notes' column of the log sheet what happened (e.g. did the filter tear during sampling? Did the tweezers tear it? Did it get dropped to the floor? Etc.)
2. **Replacing O-Ring in Harvard Impactor:** Sometimes the O-rings in the Harvard Impactor crack or dry out. If the Omega flow meter is not responding to flow rate changes (on the pump) and the filter is not damaged/faulty, one or more of the o-rings in the Harvard Impactor may need replacing. In the very unlikely event that an o-ring needs to be replaced, record the replacement in the 'Comments' section on the *Log Sheet*.

Filter Shipments

Following your collocation period of 21 days, ship the used filters to Dalhousie University for analysis.

1. Verify that each Petri dish has one Filter ID label.
2. Carefully pack the Petri dishes into a box, lined with adequate foam or other padding to prevent dishes from moving around during shipment.
3. Ship all filters to:

Randall Martin
Dalhousie University
Department of Physics and Atmospheric Science
6310 Coburg Road
Halifax NS, Canada
B3H 4R2

Telephone (office): (902) 494- 3915

Thank you for your assistance and hard work during this collocation.

APPENDIX 1 – CLEANING Equipment & Supplies

A. Cleaning Impaction Plates

- a. Two impactor plates are included in the calibration kit. Upon receiving the kit, wash both plates following the instructions listed below.
 - b. Once both plates are washed, one will be used immediately for the first sampling session, the other will be used for the second sampling session. This will reduce the time needed between filter changes such that sampling is not interrupted. After the first sampling session is complete, clean the used impaction plate so that it is ready for the third sampling session. Continue in this manner until the end of the collocated sampling period.
1. Mix a drop of Dawn dish soap into a beaker of distilled water, place impactor plates in beaker and let soak for 30 minutes.
 2. Dispose of the soapy water and rinse the impactor plates with clean distilled water and let sit for 15 minutes.
 3. Dispose of the distilled water and repeat steps 1 and 2.
 4. After the second wash and rinse, place the plates back in the beaker and begin dispensing distilled water into the beaker. Let the water continue running into the beaker such that it's overflowing for 30 minutes.
 5. Let plates air-dry overnight, on a Kimwipe-lined tray, covered with another large Kimwipe.
 6. Store dry plates in a clean Ziploc bag, be sure to label the bag with the date they were cleaned as well as 'CLEAN'.

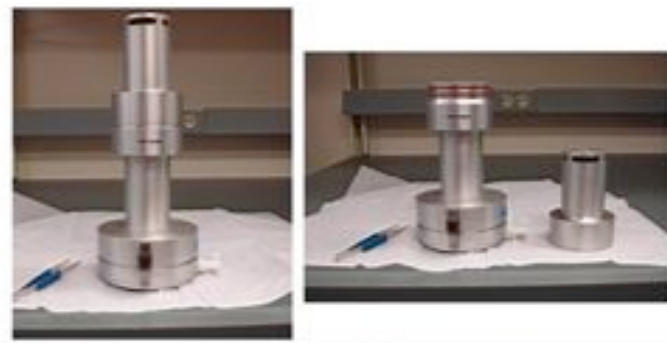


Figure 6: a) Assembled Harvard Impactor, b) Section of Harvard Impactor that must be taken apart to access impaction plate



Figure 7: A completely disassembled Harvard Impactor. All parts must be cleaned every filter change



Figure 8: Installation of a clean and oiled impaction plate

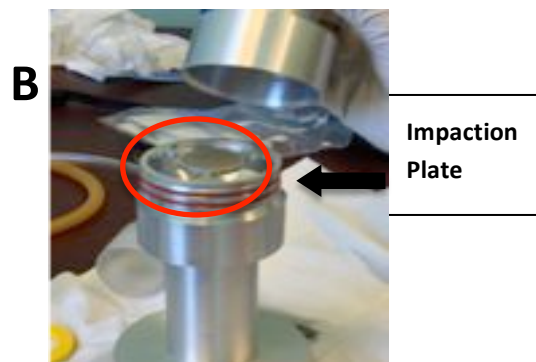


Figure 9: Example of reassembling Harvard Impactor with impaction plate installed

B. Cleaning Harvard Impactors – to be done upon receiving the HI and after the 21-day collocation period

1. Take the impactor apart by twisting it. If it does not come apart easily it may be necessary to use a bit more grease when putting it back together. Remove the impaction plate by twisting the middle section of the Harvard Impactor body apart from one another (**Figure 6a**). Handle these plates by their edges, being careful to avoid touching the rough metal centre.
2. Completely disassemble the Harvard Impactor and clean the inside and outside of all 5 parts with a Kimwipe and alcohol (**Figure 7**).
3. Ensure that all parts are completely dry before reassembling.
4. Once all parts of the Harvard Impactor are dry, take a clean impaction plate and add one drop of mineral oil, using the included eye dropper, onto the rough metal surface. If it absorbs, add more oil in increments of one drop until the oil no longer absorbs. Wipe off any excess with a Kimwipe.
5. Install the clean oiled impaction plate (**Figure 9**) and reassemble the Harvard Impactor.
6. *Make sure that the impaction plate is installed with the rough disk facing upward (**Figure 8**).*
7. Install a slotted inlet over the impactor nozzle if it is not already in place. To protect the sampler during transport from the field lab to the sampling site, cover the inlet of the impactor stage with a Ziploc bag and elastic to hold the bag in place.

APPENDIX 2: Pump Programming for complex pump schedule (COMPLETE INDOORS) - Must have a PC computer for this section

The sampling time and duration of the Leland Legacy pump may need to be reprogrammed for your sampling session.

1. In the SKC DataTrac Pump Manager window, click on View then Pump Scheduler from the drop-down menu. A dialog box with the Cycle Scheduler should also appear (if it does not, choose View from the Pump Scheduler screen, and select Cycle Scheduler). **It may be the case that the pump was pre-programmed before sent to your site – a site organizer will relay specific instructions on pump programming.**
2. The specific information to be programmed into the pump will vary from site to site. For this reason, a site organizer will provide detailed instructions on the specific programming for your site when your calibration period is approaching. If your calibration period is close but a site organizer has not contacted you, please contact one using an email addresses found on page 1.

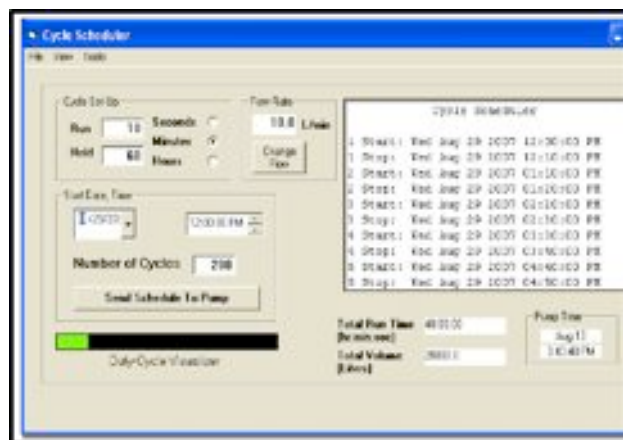


Figure A2 : Picture of the pump programming window

3. Scroll through the white window at the right-hand side of the Cycle Scheduler dialog box to confirm that the pump will begin on your specified time/date setting. Also, record the end date and time of the pump operation on the sampling log sheet.
4. Click on the 'Send Schedule to Pump' button; once the program is saved in the pump, the letters 'PROG' will appear diagonally on the top of the pump's LCD screen, and a confirmation message will appear on the software screen.

Note: If an error message appears indicating that communication between the pump & software has been lost, click on the 'RETRY' button.

Downloading Pump Data (COMPLETE INDOORS) – Must have a PC computer for this section

1. Install DataTrac software on a PC computer. **If you do not have Windows then only manual control of pump is possible. Skip this section if downloading data is not possible.** If only manual control is possible, log sheets provide space for recording start and end flows of pump flows.
2. Turn pump on by pressing any key.
3. Connect DataTrac cable to the top of the pump (next to the port for the power charger), and connect the other end (RS-232 connector) to the back of a computer.
4. Click on the 'Leland Legacy' Icon on the desktop. You will need to see the 'little handshake' symbol that confirms that the software is communicating with the pump.

5. Once in the Leland Legacy pump software, go to menu bar in the upper-left hand side corner of the screen, and click on “Pump History”. Records of stored pump history data will appear in tabular form on the screen.

Click on “**Save as Comma Delimited File**”, and then type in a destination (For example, C:\) Use the following file naming convention (red indicates where specific information needs to be inserted):

PumpData_**SiteID**_MM/DD/YYYY_TEST.txt

* Note: Site ID should already be known, however if this is not the case, please contact a site organizer at one of the email addresses on Page 1.

6. If you get an error message from the Leland Legacy pump software reporting that communication with the pump has failed, click on the “Retry” button, and communication will be re-established with the pump.
7. Turn the pump off by pressing the ‘*’ button & holding it down until you see the pump do a shut-off countdown “OFF 3, 2, 1”.
8. Verify that the data has been properly saved by opening the Comma Delimited File in Excel. Look at the dates and data values to determine if the data seems reasonable or if any errors occurred. Save a second copy of the file on a USB key.
9. Save the data on a USB key at this point.

➤ *Note: Only after the Pump’s Volume, Time and Post Flow have been recorded can you prepare the pump for the next sampling session. (You can download the pump data a little later prior to redeploying the pump if necessary.)*

Downloading the Pump Calibration - Must have a PC computer for this section
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1. Connect the Datatrac cable to the Leland Legacy pump and download the calibration data

In the Leland Legacy pump software, from the menu select ‘View’ then ‘Pump History’. Records of stored pump history data will appear in tabular form on the screen.

In the SKC Pump History window, click on ‘File’ then ‘Save as Comma Separated Text’, and then type the file name and save it to its assigned folder. Use the following file naming convention (red indicates where specific information needs to be inserted):

PumpData_**SiteID**_FilterID_MM/DD/YYYY_CAL.txt

For example if the Site ID is CHTS, filter ID is HARVIM-001 and the date is July 21/2013, the file name would be:

PumpData_CHTS_HARVIM001_07/21/2013_CAL.txt

2. Verify that the data has been saved properly by opening the Comma Delimited File in Excel. Look at the dates and data values to determine if the data seems reasonable or if any errors occurred.

We present the results of five PM_{2.5} Harvard Impactor/AirPhoton collocations thus far. Given the often-poor correlations, we have opted to consider HI reference on a site-by-site evaluation, but not as a definite reference point.

