

Standard Operation Procedures for Air Toxics

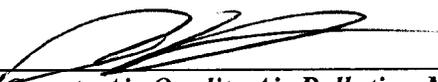
In Use By

**Polk County Air Quality
Ambient Air Monitoring Personnel
For Calendar Year 2014**

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**POLK COUNTY AIR QUALITY DIVISION
 STANDARD OPERATING PROCEDURE MANUAL FOR ATEC MODEL 2200 AIR TOXICS MONITORING**

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8.0 STANDARD OPERATING PROCEDURES FOR AIR TOXICS

8.1 Purpose

To establish a standard operating procedure (SOP) manual for the Polk County Ambient Air Quality personnel concerning the setup, operation, audits and maintenance of the air toxic monitor maintained and operated by Polk County staff. This SOP is intended for individuals responsible for collecting ambient air monitoring data supported by the Polk County Air Quality Division.

8.2 Scope

These procedures are to be used by Polk County Air Quality Division personnel. The objective of this SOP is to familiarize the station operator with procedures used in the collection of air monitoring data. The accuracy of the data obtained from any instrument depends upon the instrument's performance and the operator's skill. It is important that the station operator become familiar with both this SOP as well as the manufacturer's instruction manual in order to achieve a high level of data quality. This SOP is to be used as an outline and is not intended to replace the equipment manufacturer's manual or procedures. This SOP describes the proper procedures for the setup, operation, calibrations, audits and maintenance of Air Toxics equipment operated by Polk County Air Quality personnel.

8.3 References

- 8.3.1 ATEC Model No.2200 Operations and Maintenance Manual, ATEC Atmospheric Technology, Version 1.22, May 15, 2005.**
- 8.3.2 EPA Toxics Pilot Monitoring Study Measurement Guidelines.**

8.4 Quality Control

- Sample duplicates as scheduled by State Hygienic Laboratory (SHL). (Minimum 10%)
- Sample field blanks as scheduled by SHL. (Minimum 10%)
- Carbonyl cartridge breakthrough samples as scheduled by SHL (Minimum 10%)
- Sampling flow for carbonyl cartridge adsorbent cartridges ~1 liter/min (Accuracy +/- 1% Full Scale – "FS").
- Sampling rate for canister will be ~3.5 cc/min (Accuracy +/- 1% FS) with a canister starting vacuum of approximately 0.1-0.3 psia (Accuracy +/- 0.25% FS) and an ending pressure of ~12.7 psia.
- 24 hour ending sample pressure of approximately 12.7 in psia or 2 psia < than ambient pressure.
- Annual audits or calibrations shall be run on the following portions of the sampling system:
 - Timer
 - Mass Flow controllers (4) using Appendix A in the ATEC Model No.2200 Operations and Maintenance Manual

- Pressure Transducers (2) using Appendix A in the ATEC Model No.2200 Operations and Maintenance Manual
- Canister Flow using evacuated canister

8.4.1 Flow Checks

Flow checks shall be made before and after each sampling event using the BIOS Defender for the carbonyl cartridge channels. Record values on the Field Sheet for both the ATEC sampler and external device.

8.4.2 Pressure Checks

Pressure checks shall be made before and after each sampling event using an external NIST traceable pressure gauge for the canister channels. Record values on the Field Sheet/COC for both the ATEC sampler and external device.

8.5 Summary of Method

Using the ATEC Model 2200 Toxic Air Sampler, a 24-hour ambient air sample will be taken. Air will be drawn into cartridges and canisters for later analysis of Volatile Organic Compounds (VOC's) and Carbonyl compounds. The monitor has been pre-programmed to comply with EPA Methods TO-11A and TO-15.

The sampler consists of a single pump that pulls ambient air into the sampler. In order to control and monitor the canister and cartridge flow rates, there is an independent mass flow controller for each channel.

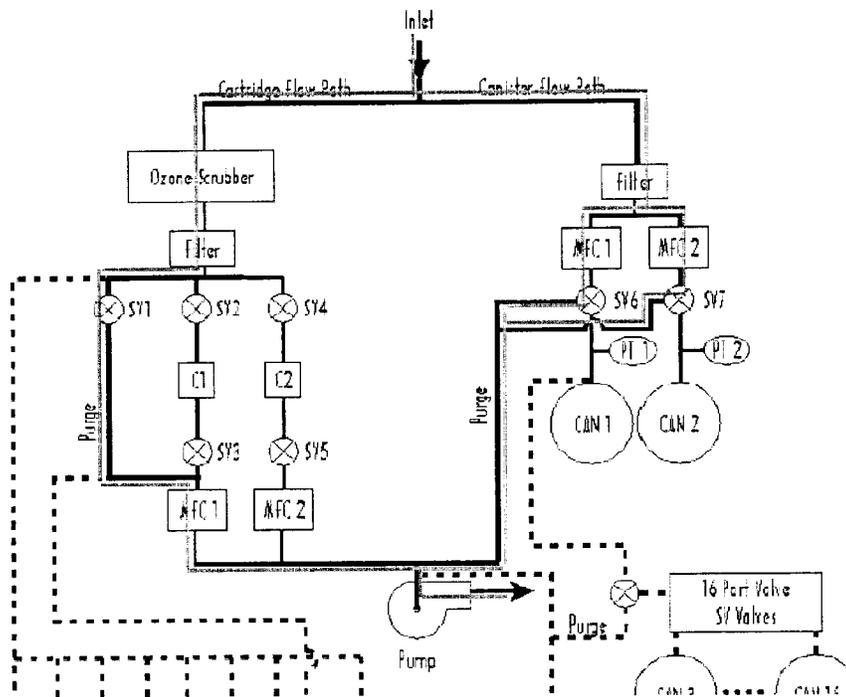
Polk County Air Quality operators will go into the field with an evacuated canister and a carbonyl adsorbent cartridge (cartridges to be kept cool to < 4°C), supplied by SHL's lab. **(Note: Lab will supply materials to field operators at least two days in advance of sampling).** The operator will install the collection media, program sampler, retrieve collection media, fill out appropriate paperwork, and return samples to SHL's lab for analysis. See Appendix A, Forms 1 and 2 for examples of Chain of Custody Sheets. Prior to sampling the Model 2200 will purge the sample line, See Figure 8-1. The default purge time is one hour. After analysis, SHL will submit results to appropriate personnel for review before uploading to AIRS. Sampled carbonyl cartridges should be placed in cooler with ice packs after sampling for transport to maintain a temperature of <4°C.

The following materials are required:

- ATEC Model 2200 Toxic Air Sampler
- 1/8" and 1/4" Stainless Steel Sampling Tubing
- 6L Evacuated Summa Canister
- 1 - 7/16 wrench
- 1 - 9/16 wrench
- 1 pair - Polyethylene gloves
- NIST Traceable Pressure Gauge
- NIST Traceable BIOS Defender (100ml/min – 7 L/min)
- Carbonyl adsorbent cartridge(s) **(Note-DNPH cartridges should not be exposed to sunlight.)**

- Field data sheets
- Sampler Maintenance/Log book
- Computer with 2200 Data Retrieval Software or USB
- NIST Traceable Barometer
- NIST Traceable Thermometer
- Cooler and Ice Packs for Transport of DNPH Cartridges
- Site AIRS codes
- Calculator

Figure 8-1: Purge Flow Diagram



Purge Flow Diagram: Purge flow paths are shown in green. Sampler is purged for 60 minutes prior to the start of each sampling event.

8.6 Equipment Installation

The ATEC Model 2200 Toxic Air Sampler (See Figure 8-2) should be set up in a weather protected area with 115 VAC current. Although not necessary, a controlled environment of 20-30°C is suggested for operation of the sampler.

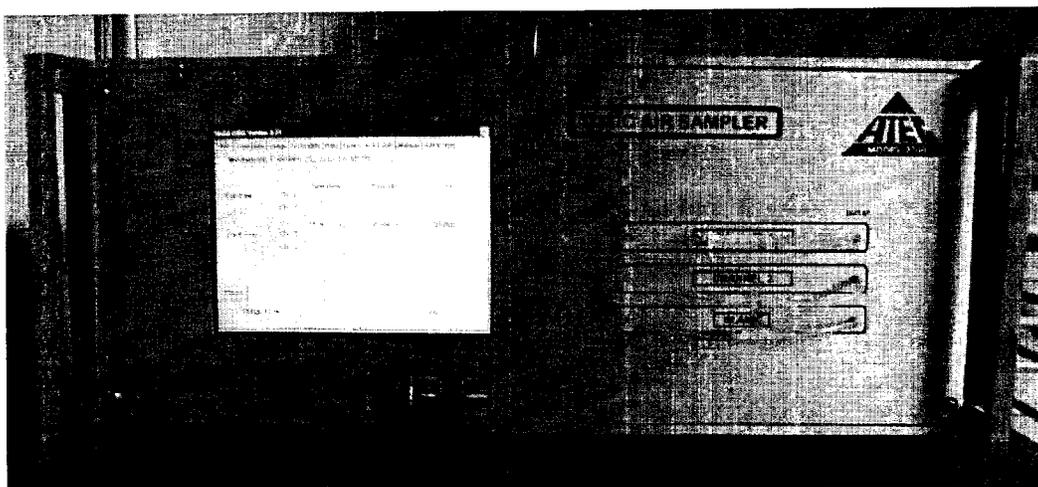
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Mobilize the unit to the field-sampling site and plug into a 115 VAC outlet. Move power switch to "On". The system will "boot up" in ~ 30 seconds. The system is operated using the ¼ VGA LCD color touch screen display, which shows current status, and allows entry of information into the system's computer. A pen may be used as a "stylus" to operate the touch screen's buttons.

Run a ¼" diameter SS tube to the exterior of the sampling enclosure as a sample line. Using a ¼" Swagelok connector and ferrule, connect the sample line to the back of the sampler labeled "Input".

Cut two pieces of 1/8" SS tube to a length of ~ 2ft. (or other length as needed to reach the sampling storage area for the Summa Canisters). Place 1/8" Swagelok connectors and ferrules on both ends of this canister line. Hook one end of each line to the positions labeled "Channel 1" and "Channel 2" on the back of the sample unit. The other end of these lines have quick connectors to attach to the Summa canisters for sampling.

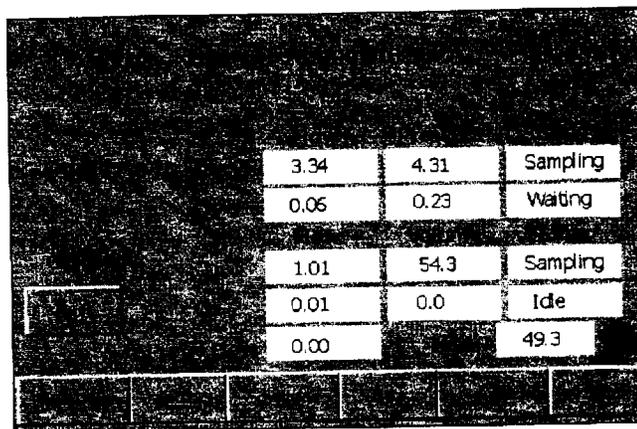
Figure 8-2: Model 2200 Front Panel View



8.7 Sample Set-up Operation

The following steps are necessary for the daily sample set-up. Values are entered or are pre-set and may be viewed on the Model 2200's touch screen, see Figure 8-3.

Figure 8-3: Model 2200 Touch Screen



8.7.1 Sampler Program Setup

Press the **Setup** button on the touch screen. This will show a green screen with “Canister and Carbonyl Parameters”. Set “Canister Parameters” to the following numbers:

Pressure Tolerance: **2.00** psia
End Pressure: **(ATEC Amb -2)** in psia
Leak Rate Limit: **0.10** psia/sec
Canister Volume: **6** liters
Used Can Limit: **0.5** psia
Purge Time: **60** min

Set “Cartridge Parameters” to the following numbers:

Ch. 1 MFC Set Point: **.800** lpm
Ch. 2 MFC Set Point: **.800** lpm
Flow Leak Limit: **0.03** lpm
Flow Tolerance: **0.05** lpm
Data Write Interval: **5** min
Site Label: **(Insert site name)**

Press **Set**.

NOTE: Model 2200 Mass flow controllers measure flow in Standard cc/min and L/min at 0°C and 1 atmosphere.

8.7.2 Installation of Evacuated Canister and Carbonyl Cartridge

8.7.2.1 Canister Setup

With no canister attached, record the value of the canister(s) pressure displayed on the main screen of the Model 2200 on the canister field sheet under “initial ambient pressure: psia from (ATEC)” (Appendix A, Form 3). Since no canister is attached to the sampler at this point, the value that appears on the “canister pressure” screen will be the ambient pressure as measured by the sampler.

Verify the canister(s) pressure using the NIST traceable pressure gauge by connecting the gauge directly to the canister via of the quick connect. The pressure reading should be approximately 27-30 inHg. Record pressure on the canister field sheet under “Pre-Sampling Can Pressure”. Use the following equation to convert the pre-sampling can pressure to psia:

inHg to psia: $P_{amb} (\text{in Hg}) - (\text{Vac Gauge Reading, in Hg}) = Y$

$$Y \times 0.4912 = P_{psia}$$

Where $Y = \text{inHg (absolute)}$

Record the converted reading on field sheet under “Hg Converted to psia”. Remove the NIST traceable pressure gauge.

Following the completion of all pre-sampling checks, attach canister(s) to sampler position 1 (and 2 if a duplicate). With the canister attached to the sampler, read the canister pressure from the main screen Model 2200 sampler and record the reading on the canister field sheet under “Pre-Sampling Can Pressure”. The absolute difference between the canister pressure as measured by the NIST gauge versus the ATEC sampler should be within ± 0.6 psia.

8.7.2.2 Carbonyl Cartridge Setup

NOTE: Polyethylene Gloves should be worn whenever the DNPH-Carbonyl cartridges are being handled.

On the display screen select **Schedules** button. Change the date to the current date on the carbonyl cartridge Channel 1, change the start time to 5-minutes ahead of the current time, and change the duration to 1-hour. Press **Exit**. The ATEC 2200 machine will begin to purge itself and then perform a leak check. Once this is complete the machine goes into sampling mode, disconnect the sample line and connect the BIOS Defender to the Channel 1 cartridge position on the exit side of the DNPH cartridge in the Carbonyl cartridge sample line. Initiate the flow using the manual control and measure local flow rate. Record the ATEC current flow in L/min.Std 0°C on the Carbonyl cartridge Field Sheet (Appendix A, Form 4). Recording the average BIOS Defender flow rate in L/min local. Stop the BIOS Defender from taking reading and abort sampling on ATEC. NOTE: The

ATEC is reading in Standard Conditions while the BIOS Defender is reading in Local. Therefore, it is necessary to take the barometric pressure and temperature readings to convert the local flow reading to Standard Condition Flow (0°C, 760 mmHg) using the following equation:

$$\text{Flow Rate Std (0°C)} = \text{Flow Rate}_{\text{Local}} \times \frac{P_{\text{site}} \text{ mmHg}}{760 \text{ mmHg}} \times \frac{273 \text{°K}}{(\text{Temp}_{\text{site}} \text{°C} + 273)}$$

This will give a comparison to the flow reading on the Model 2200. Record Standard BIOS Defender flow in L/min Std 0°C. If the percent difference is no greater than ± 2% between the ATEC and converted BIOS Defender reading then, with Polyethylene gloves on, attach the carbonyl cartridge to the appropriate Teflon sample line (Position 1 Sample/Position 2 Duplicate). Repeat this process for channel 2 if it is a duplicate sampling day. NOTE: If the percent difference is greater than ± 2%, a calibration will need to be performed. Instructions are in the ATEC Model No.2200 Operations and Maintenance Manual, pg. 40, Appendix A.

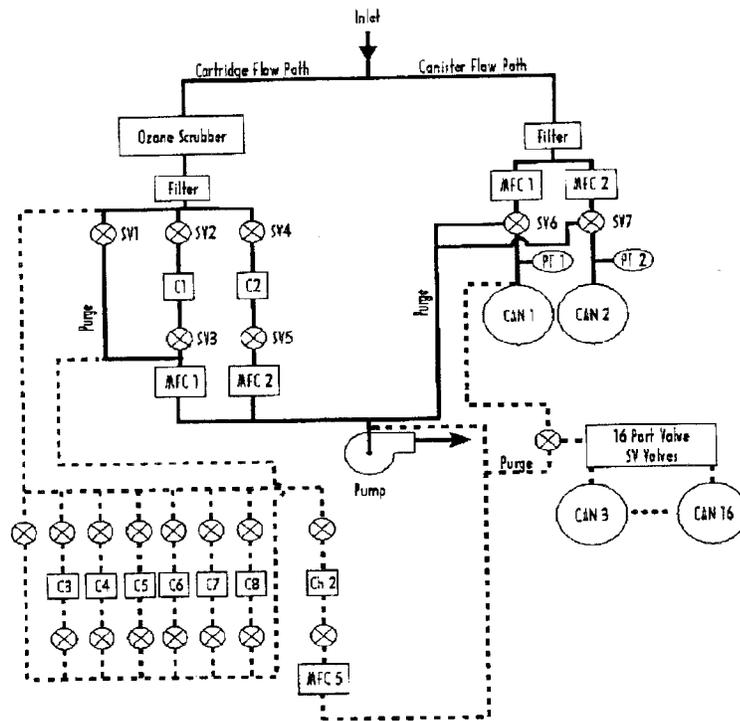
8.7.3 Perform Leak Checks/Setup.

Press **SOP**. A screen will appear. Select canister(s) and/or carbonyl(s) to run, and press **Next** to get to the Leak Screen. The instrument will run leak checks on any canisters and/or carbonyls that were selected in the first screen. Press **Next** to run the leak check. The canister leak check will run for 60-seconds. Acceptance rate is set in Section 8.7.1. If leak rate is not met, canister connections should be tightened and leak check repeated. The carbonyl leak check will run for 20-seconds. Acceptance limit is set in Section 8.7.1. If leak rate is not met, connections on lock fittings should be checked and leak check re-run. If this does not solve the problem, ATEC should be contacted. Record all leak rates on the field sheets. Canister leak check will test the portion of the sample train from canister connection to the canister solenoid valve (SV6 and SV7). Cartridge leak check will test the portion of the sample train from the closed upstream solenoid valves (SV1, SV2 & SV4) through the cartridge (C1 & C2), downstream solenoid valves (SV3 & SV5) and Mass Flow controllers (MFC1 & 2) on to the pump. See Figures 8-4 and 8-5 for details.

When the leak checks are complete, continue navigating through the SOP screens to schedule the next sample run. Enter start dates, start times, and durations of the canisters/carbonyls scheduled to run. Enter canister labels. Press **Next** after each canister/carbonyl is scheduled to continue on to the next one. Upon completion, the SOP Summary Page will appear with a summary of everything scheduled to run. Confirm that the schedule is correct, and press **Next**. The instrument will return to the Main Screen. The status box for the canisters/carbonyls scheduled to run should say “waiting”.

NOTE: If a problem is recognized while performing any maintenance, diagnostic, or flow checks which has or could affect data, a corrective action form is to be filled out describing the problem identified and the action taken to correct the problem. See Appendix A, Form 5.

Figure 8-4: Model 2200 Flow Diagram

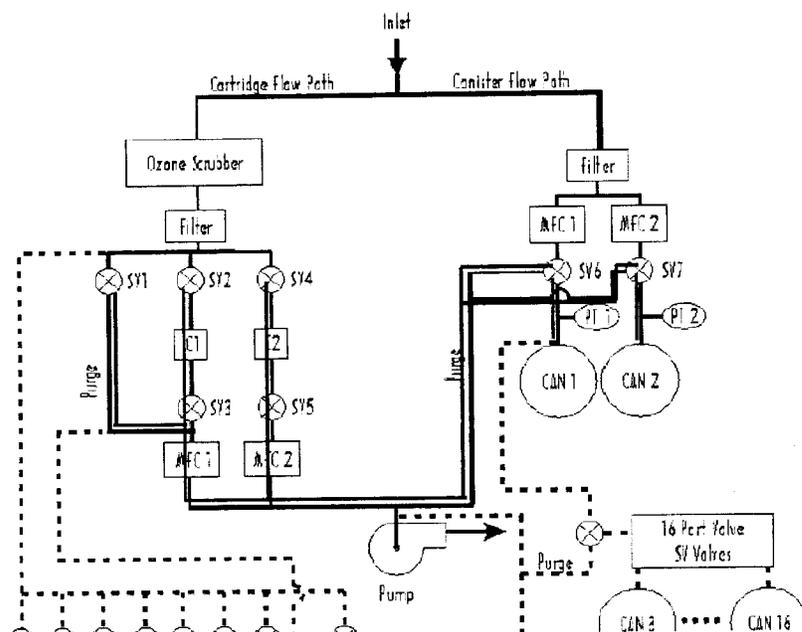


Model 2200 Flow Schematic with Canister and Cartridge Expansions



Figure 8-5: Leak Check Vacuum Train

Automated and Operator Initiated Leak Checks



Blue lines show sampling train under vacuum during cartridge leak check.
Red lines show sampling train under vacuum during canister leak check.

8.7.4 Sample Pickup Procedure

8.7.4.1 Downloading Data

Note: Data must be downloaded prior to proceeding with post-sampling checks. Otherwise, five minute data could will be lost in the process.

Connect the USB Drive to the sampler's "Data" port on the front of the sampler. Press the **Data** button on the sampler. A screen will appear with the start date, stop date, flow, and time on it. Press the **Store** button on the sampler. When data transmission is complete, a screen will appear stating data was downloaded. Press **OK**. If during sampling a power failure occurs, the sampler will remain sampling according to schedule after power is resumed. No data should be lost, however on the downloaded data, a "power loss" error will show and there will be no data given for the powerless interval. For a 24-hour run, there will be approximately 300 lines of data. Figures 8-6 and 8-7 give examples of the five minute data files.

8.7.4.2 Canister Pickup

After the data has been downloaded, continue in the Data Screens to read the Post-Sampling Canister Pressure. Record the “Elapsed Time” on the field sheet from Canister Channel 1, and remove the canister from sample line. Attach NIST traceable pressure gauge to the canister, and read final pressure from the NIST gauge. Record all readings on field sheet. Repeat for Canister 2 if it is a duplicate sampling day.

8.7.4.3 Carbonyl Cartridge Pickup

After the canister data has been recorded, continue in the Data Screens to read the Post-Sampling Carbonyl data. Record the final total flow and time passed readings on the field sheet from Carbonyl 1.

Put on polyethylene gloves. Remove carbonyl cartridge from sampler and replace caps on the ends. Place into foil pouch labeled with sampler location, sampler system number and run date, and zip-lock the pouch shut. Place cartridge in cooler with ice packs for transport to lab at <4°C. Re-connect the carbonyl cartridge inlet tubes together, unless setting up another sample to run. Perform post sampling flow checks. Repeat procedures from Section 8.7.2.2 to determine final flow readings. Volume sampled will be in Standard Conditions of 0°C and 1 atmosphere-conversion will be made using the following equation:

$$\text{Total volume (from 2200) } 0^{\circ}\text{C, 1 atm} \times 1.0916$$

Record all readings on field sheet. Repeat for Carbonyl 2 if it is a duplicate sampling day. The canister (uncooled) and carbonyl cartridge samples (in cooler <4°C) are then brought back to Polk County’s lab and stored until they can be transferred to SHL for analysis.

8.7.4.4 Data Validation Checks

8.7.4.4.1 Canister Validation

Review the five minute data from Section 8.7.4.1 of this SOP. Verify that the flow rates (Max-Min/Average) * 100 < 30%. The maximum, minimum, and average flow rates are given at the top of the run files, above the five minute data.

In the event that the 30% criteria is not met, a graph will be generated from a download of the analyzer “run files”. The Y axis of the plot will indicate the psia of the canister. The X axis will indicate time. If a visual inspection of the plot indicates that the pressure increase during the course of the run was not linear, the canister will be invalidated. Form 6 in Appendix A shows 2 sample runs, one with and one without a linear pressure increase.

Mark the field sheet appropriately. If the canister is determined to be invalid, the “Field Sample Validity” line on the “Canister Chain of Custody Sheet” will be marked invalid, and SHL should be notified by phone.

8.7.4.4.2 Carbonyl Validation

Review the five minute data from Section 8.7.4.1 of this SOP. Verify that the minimum and maximum flow rates, located at the top of the cartridge run files, differ by no more than 0.020 LPM.

In the event that the minimum and maximum flow rates differ by more than 0.020 LPM, a graph will be generated from a download of the analyzer “run files”. The Y axis of the plot will indicate the flow through the cartridge in LPM at 1 atm and 0°C. The X axis will indicate time. If a visual inspection of this plot indicates that the flow through the cartridge was not uniform during the course of the sample run, the cartridge will be invalidated. (Note: Since the flow during the first 5 minute average is typically erratic, that value will not be used to invalidate a cartridge). Form 7 in Appendix A shows a sample run that demonstrates constant flow, with the exception of the first five minutes.

Mark the field sheet appropriately. If the carbonyl is determined to be invalid, the “Field Sample Validity” line on the “Carbonyl Chain of Custody Sheet” will be marked invalid, and SHL should be notified by phone.

Prior to sending canisters and cartridges to SHL for analysis, Polk County personnel will verify that each of the validation criteria in Table 1 has been met. After AIRS strings have been generated by SHL, Polk County personnel will verify that the appropriate flags or void codes (as specified below) have been entered for questionable or voided samples.

Table 8-1: Field Validation Criteria

Void/Flag Criteria Table for Polk County Toxics Monitoring		
Criteria	Acceptable Range	Polk County Void/Flag
Scheduled but not collected		AF
Field Pick-Up	< 72 hrs from completion	3
Maintenance		BA
Canister		
Leak Rate Limit	0.1 psi/sec	AN
Sampling Period	1380-1500 minutes	AN
Flow rate validation	(max-min)/average*100 <30%	AN
Cartridge		
Leak Rate Limit	0.03 lpm	AN
Sampling Period	1380-1500 minutes	AN
Flow rate validation	Max-min < 0.020 LPM	AN
Flow Rate Check	Difference between actual and indicated \pm 2%	AN

Figure 8-6: Sample Canister Download

SAMPLE 2

Ch. 1 Canister Started at 3/26/02 1:00:03 PM

Starting Pressure -0.40 psia

Flow Rate Set Point 0.00 cc/min

Stopped at 3/27/02 1:00:10 PM

End Pressure 3.65 psia

Average Flow Rate 1.20 cc/min
 Minimum Flow Rate -0.52 cc/min
 Maximum Flow Rate 3.74 cc/min
 Error Status Pressure Tolerance Exceeded

Time	Can Pressure
3/26/02 1:00:24 PM	-0.31
3/26/02 1:05:33 PM	-0.26
3/26/02 1:10:43 PM	-0.22
3/26/02 1:15:43 PM	-0.16
3/26/02 1:20:53 PM	-0.13
3/26/02 1:25:53 PM	-0.09
3/26/02 1:31:03 PM	-0.07

Figure 8-7: Sample Carbonyl Cartridge Download

Ch. 1 Cartridge Started at 4/30/02 2:19:06 PM
 Flow Rate Set Point 1.000 lpm
 Stopped at 4/30/02 2:34:27 PM
 Total Volume 14.86 liters
 Average Flow Rate 0.992 lpm
 Minimum Flow Rate 0.989 lpm
 Maximum Flow Rate 0.994 lpm
 Error Status OK No Errors

Time	Flow Rate	Volume
4/30/02 2:19:28 PM	1.896	0.35
4/30/02 2:24:36 PM	0.993	5.44
4/30/02 2:29:46 PM	0.994	10.57

8.8 Maintenance and Troubleshooting

The ozone scrubber on the carbonyl cartridge sampling system should be replaced annually or after 83 days of sampler operation, whichever comes first. See page 32 of ATEC Model No.2200 Operations and Maintenance Manual for instructions.

The Teflon and sintered stainless steel filters in the cartridge and canister flow paths should be replaced annually or when the flow rate through the canisters or carbonyls cannot be maintained. See page 31-32 of ATEC Model No.2200 Operations and Maintenance Manual for instructions.

Mass Flow controllers and pressure transducers should be calibrated annually. See Appendix A of ATEC Model No.2200 Operations and Maintenance Manual for instructions. When calibrating the mass flow controllers, the flow measured by the transfer standard will need to be corrected to standard temperature and pressure (1atm and 0°C).

8.8.1 Calibration of the Mass Flow Controller

Calibration of the mass flow controller should be done annually, or any time major repairs are done to the instrument. Remove the connections (7/16 fitting) to the Mass Flow Controllers

(MFCs). The lines to the MFCs are connected by a t-fitting. Connect the low-end Bios (or a control device that reads 10-20 cc/min) to Channel 1 or Channel 2's mass MFC. In Manual Mode, read the flow for the channel you are calibrating. If the flow is not ± 0.02 , adjust the zero pot-knob on the MFC. In the Advanced Menu, verify the Intercept is reading 0.000. If not, type in 0.000. Attach an evacuated can to the channel that is being calibrated. In Manual Mode, make sure flow is set to where the instrument is normally operated. For Polk County Air Quality uses a flow of 10 cc/min. Open the solenoid by selecting the channel that is being calibrated. The flow should start. Do not turn on the pump. A flow reading should appear. Record the flow from the channel reading in the Manual Screen. Take the reading from the Bios in local condition and convert it to standard conditions. Calculate the slope of the actual flow/sampler flow. Enter the newly calculated slope into the Advance Screen for Flow Controller. Go to the Schedule Screen and program the sampler to start in a few minutes. After the sampler has started, verify that the flow rate displayed on the main screen is the same as the calibrated flow device. If the flow rates agree within $\pm 2\%$, then the channel has been calibrated correctly.

8.8.2 Calibration of the Pressure Transducer

Calibration of the pressure transducer should be done annually, or any time major repairs are done to the instrument. Connect an evacuated canister to the sample line. In the Manual Screen, take the reading from **PRESS 1** for Channel 1, or **PRESS 2** for Channel 2. In the Advanced Screen, enter the opposite sign of what was read for **PRESS 1** under **PRESS INTERCEPT** (i.e. if the reading was positive, make it negative). Disconnect the canister. Unhook the sample line from the instrument to bring the machine back to ambient pressure. Connect the sample line back up. Determine the slope:

In **Manual** Menu, take the reading from **PRESS 1** (i.e. 14.00)

From a transfer standard (hand-held barometer), get the reading and convert to psi (ie. $28.85 \times .4912 = 14.17$). Calculate the slope.

$$\text{Barometer Reading/Press 1 Reading from Manual Mode} = \text{slope} \\ (\text{i.e. } 14.17/14.00 = 1.012)$$

Take the newly calculated slope and enter it into the **Advance** Screen for **PRESS SLOPE**. Connect the evacuated canister back up and read the pressure for Ch1 in the Main Screen. The value for pressure should read close to zero.

APPENDIX A- Critical Forms and Field Sheets

Form 1.....	Canister Chain of Custody Sheet
Form 2.....	Carbonyl Chain of Custody Sheet
Form 3.....	Canister Field Sheet
Form 4.....	Carbonyl Field Sheet
Form 5.....	Corrective Action Form
Form 6	Plot of Canister Showing Constant Pressure Increase
Form 7.....	Plot of Cartridge Showing Constant Flow

Form 1 - Canister Chain of Custody Sheet



UATMP/SNMOC Summa Canister

Chain of Custody

Collection Site (Check One):

- 50223 10th & Vine Davenport
- 50224 Carpenter Des Moines
- 50225 Public Health Cedar Rapids
- 50229 HACAP Cedar Rapids

Other: _____

Collection Date: _____

Cartridge Lot #: _____

Duplicate Event: Y N

Date Can Cleaned: _____

Cleaning Batch #: _____

Type of Sample (Circle One): Sample Duplicate Break-Through Field Blank Trip Blank

Field Sample Validity (Circle One): Valid Review QA/QC Invalid

Post Sampling Can Pressure: _____ psia

Lab Can PS Pressure: _____ psia

Post Sampling Can Pressure: _____ in. Hg gauge

Lab Press. - Field Press.= _____

Can Valve Closed: Y N

Lab to Field Press Diff < 1 psia: Y N

Elapsed Time: _____ min

Field Comments: _____

CHAIN OF CUSTODY

Relinquished By: _____
Date/Time: _____

Received By: _____
Date/Time: _____

Relinquished By: _____
Date/Time: _____

Received By: _____
Date/Time: _____

Relinquished By: _____
Date/Time: _____

Received By: _____
Date/Time: _____

Lab No.: _____ Lab Status: Valid Void Lab Can Press.: _____ "Hg

If Void/Why: _____

Form 3 - Canister Field Sheet



UATMP/SNMOC Summary Canister
 Field Sampling Sheet

Collection Site: 50224 Carpenter Des Moines
 Sample Duration: 24 hr
 Channel (Circle): Can 1 Can 2
 Duplicate Can (Circle): Y N
 Date Can Cleaned: _____

Collection Date: _____
 Canister #: _____
 Duplicate Event: Y N
 Cleaning Batch#: _____

ATEC Serial #: 21134
 Calibration Date: 8/19/10
 NIST Pressure Gauge Traceable Model: Cole Parmer 30" Hg Vac
 NIST Pressure Gauge Traceable Serial Number: 40731
 NIST Pressure Gauge Traceable Calibration Date: 05/30/10

Temperature Ref Model: Oakton
 Temperature S/N: 451025
 Temperature Calibration Date: 2/17/10
 Amb Press Ref Model: Cole Parmer Hand Held Baro
 Amb. Pressure S/N: 212

Pre-Sampling

Set Up Date: _____

Set Up By: _____

Site Amb. Pressure: _____ in Hg
 Pressure Calibration Date: _____

Site Amb. Temp.: _____ °C

Initial ambient Pressure: _____ psia (from ATEC)

Target End Press = _____ psia
 (Initial ambient pressure - 2)

Pre-Sampling Can Pressure: _____ in Hg (NIST) Pre-Sampling Can Pressure: _____ psia (from ATEC)
 Pre-Sampling Can Pressure converted to psia: _____ psia
 (Site ambient pressure - Pre-Sampling NIST traceable Can Pressure) X .4912
 Pressure comparison = ATEC - NIST = _____ psia (Readings should be ± 0.6 psia)
 (ATEC Pre Sampling Can Pressure - NIST Pre-Sampling Can Pressure converted to psia)
 Pre-Sampling Leak Check Passed: Yes No Leak Rate: _____ psia/min (≤0.10)

Post-Sampling

Recovery Date: _____ Pick-up <72 Hr.: Y N Recovered By: _____

Site Amb. Pressure: _____ in Hg
 Pressure Calibration Date: _____

Site Amb. Temp.: _____ °C

Post Sampling Can Pressure: _____ psia (ATEC)
 Post Sampling Can Press: _____ inHg (NIST traceable)
 Post Sampling Can Pressure converted to psia: _____ psia
 (Site ambient pressure - Post Sampling NIST traceable Can Pressure) X .4912
 Pressure comparison = ATEC - NIST = _____ psia (Readings should be ± 0.6 psia)
 (Post Sampling ATEC Can Pressure - NIST Post Sampling Can Pressure converted to psia)
 Elapsed Time: _____ min. (from ATEC) Total Time between 1380-1500: Y N
 Data Validation Check: Flow Rate: (Max - Min/Average)*100 < 30% Y N
 Max: _____ Min: _____ Avg: _____ Percentage: _____

Field Comments:

Form 4 – Carbonyl Field Sheet



Carbonyl Field Sampling Sheet

Collection Site: 50224 Carpenter Des Moines
 Sample Duration: 24 hr
 Duplicate Event: Y N

Collection Date: _____
 Cartridge Lot #: _____

ATEC Serial #: 21134
 Calibration Date: 8/19/10
 Transfer Flow Standard Model: Bios DC Lite M
 Transfer Flow Standard S/N: 6350
 Transfer Flow Std Calibration Date: 5/10/10

Temperature Ref Model: Oakton
 Temperature S/N: 451025
 Temperature Calibration Date: 2/17/10
 Amb Press Ref Model: Cole Parmer Hand Held Baro
 Amb. Pressure S/N: 212

Pre-Sampling

Type of Sample (Circle One): Sample Duplicate Break-through
 Set Up Date: _____

Field Blank Trip Blank
 Set Up By: _____

Site Amb. Pressure: _____ in Hg
 Site Amb. Pressure: _____ mmHg (site press in Hg x 25.4)
 Amb. Pressure Calibration Date: _____

Site Amb. Temp.: _____ °C
 Site Amb. Temp.: _____ °K (site temp °C + 273)

Pre-Sampling Bios Flow Rate: _____ L/min Local
 Pre-Sampling Bios Flow Rate Converted to Standard: _____ L/min Std 0°

$$\left\{ \text{Bios FR L/min} \times \left(\frac{\text{Site Pressure mm/Hg}}{760 \text{ mm/Hg}} \right) \times \left(\frac{273}{\text{Site Temp K}} \right) \right\}$$

Pre-Sampling ATEC Flow Rate: _____ L/min Std 0° Flow Rate Setting: .800 L/min
 Flow Rate Difference: _____% (Difference should be within +/- 2%. If not within calibrate flow)
 ((ATEC L/min Std 0° - Bios L/min Std 0°)/Bios L/min Std 0°) X 100
 Pre-Sampling Leak Check Passed: Y N Leak Rate: _____ L/min

Recovery Date/Time: _____ Pick-up < 72 hours: Y N Recovered By: _____
 Cartridges Capped: Y N Total Volume (from 2200): _____ L (0°C, 1 atm)
 Total Time: _____ min Total Time between 1380-1500 (circle): Y N

Site Amb. Pressure: _____ in Hg Site Amb. Temp.: _____ °C
 Site Amb. Pressure: _____ mmHg (site press in Hg x 25.4) Site Amb. Temp.: _____ °K (site temp °C + 273)
 Amb. Pressure Calibration Date: _____

Post-Sampling

Post Sampling Bios Flow Rate: _____ L/min Local
 Post Sampling Bios Flow Rate Converted to Standard: _____ L/min Std 0°

$$\left\{ \text{Bios FR L/min} \times \left(\frac{\text{Site Pressure mm/Hg}}{760 \text{ mm/Hg}} \right) \times \left(\frac{273}{\text{Site Temp K}} \right) \right\}$$

Post Sampling ATEC Flow Rate: _____ L/min Std 0°
 Flow Rate Difference: _____% (Difference should be within +/- 2%. If not within calibrate flow)
 ((ATEC L/min Std 0° - Bios L/min Std 0°)/Bios L/min Std 0°) X 100
 Total Volume Std. Condition (25°C, 1 atm): _____ L (Total volume (from 2200) 0°C, 1 atm, X 1.0916)
 Data Validation Check: Flow Rate (Max - Min < 0.020 LPM): Y N

Max: _____ Min: _____ Ave: _____ LPM: _____

Field Comments: _____

Form 5 – Corrective Action Form

Polk County Air Quality - Corrective Action Form

To: _____ Polk County Air Quality _____
(position)

From: _____

Copies of completed form to: AQ Supervisor, File

Urgency: Emergency (immediate action needed) Urgent (24 Hr.)
 Routine (7 days) Next scheduled visit Information only

Problem Identification:

Site: _____
System: _____
Date: _____

Description of Problem: _____

Recommended Action: _____

Signature of Initiator: _____ Date: _____

Problem Resolution:

Date of Corrective Action: _____

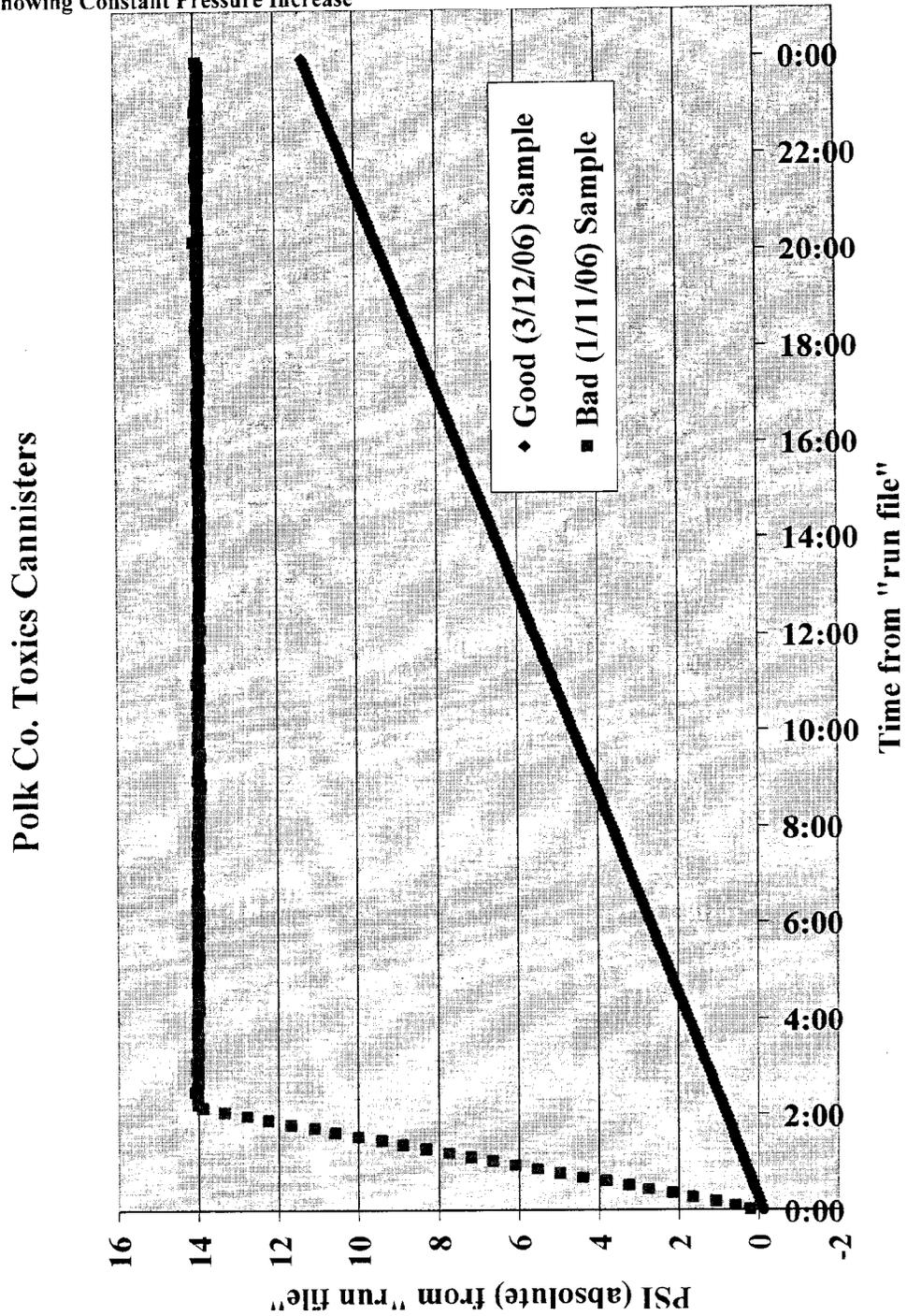
Summary of Corrective Action: _____

Result of Corrective Action: _____

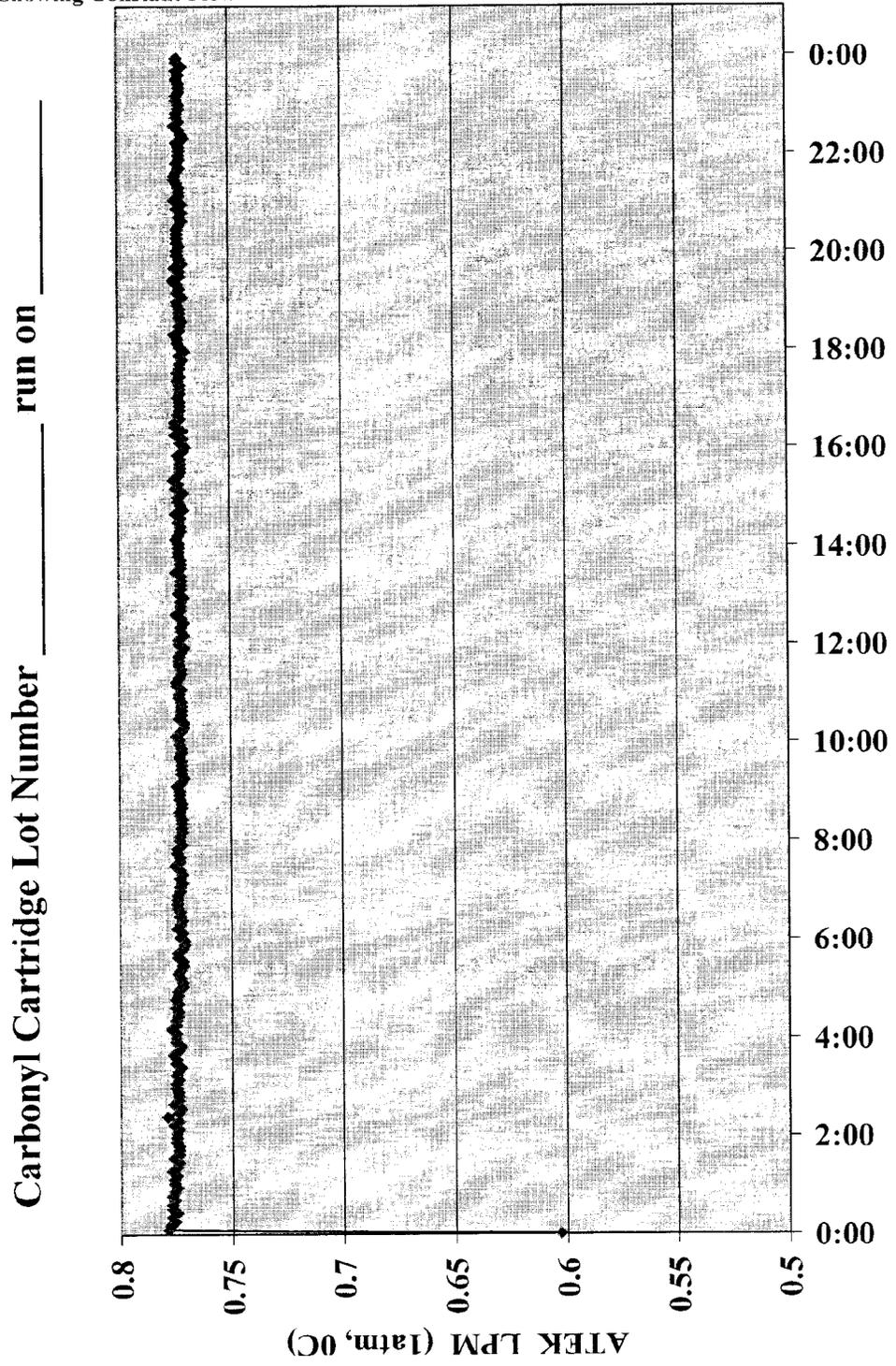
Signature of resolver: _____ Date: _____

Signature of QA Officer: _____ Date: _____

Form 6- Plot of Canister Showing Constant Pressure Increase



Form 7 – Plot of Cartridge Showing Constant Flow



Carbonyl Cartridge Lot Number _____ run on _____