

**NADP AMNet Standard Operating Procedure
Site Report B - Field: Glassware Change-out/Monthly
Maintenance**



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Abbreviations

AIRMoN	Atmospheric Integrated Research Monitoring Network
AMNet	Atmospheric Mercury Network
AMoN	Ammonia Monitoring Network
CAMD	Clean Air Markets Division
CAMNET	Canadian Atmospheric Mercury Network
CASTNET	Clean Air Status and Trends Network
CVAFS	Cold Vapor Atomic Fluorescence Spectroscopy
DFU	Dry Filter Unit
DQO	Data Quality Objectives
GEM	Gaseous Elemental Mercury (expressed in ng/m ³)
GOM	Gaseous Oxidized Mercury (expressed in pg/m ³)
Hg	Mercury, the element (“hydrargyrum”)
LPM	Liters per Minute
LST	Local Standard Time
MDE	Mercury Deposition Event
MDN	Mercury Deposition Network
MSDS	Material Safety and Data Sheets
NADP	National Atmospheric Deposition Program
NIST	National Institute of Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
NOS	Network Operations Subcommittee
NTN	National Trends Network
OSHA	Office Safety and Health Administration
PBM _{2.5}	Particle-Bound Mercury less than 2.5 µm in diameter (expressed in pg/m ³)
PO	NADP Program Office
QA	Quality Assurance
QAAG	Quality Assurance Advisory Group
QC	Quality Control
QR	Quality Rating
RF	Response Factor
RGM	Reactive Gaseous Mercury
RPF	Regenerable Particulate Filter
SOP	Standard Operating Procedure
SQL	Structured Query Language
TGM	Total Gaseous Mercury
UHP	Ultra High Purity
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey

Introduction

Maintenance activities are required bi-weekly and monthly for each site in the NADP Atmospheric Mercury Network (AMNet). These activities are described in this Standard Operating Procedure (SOP) document, *Site Report B - Field: Glassware Change-out/Monthly Maintenance*. This SOP considers field activities only. A separate SOP, *Site Report B - Laboratory: Glassware Change-out/Monthly Maintenance*, describes activities that need to be completed before going to the field site.

Activities described in this SOP ensure that the instrument is free from typical mechanical and operational faults. The SOP and its associated report identify the components that require maintenance, the consumables required as part of the maintenance, and the tools necessary to perform the maintenance. Both laboratory and field activities are required as part of both the glassware change-out and the monthly maintenance. Table 1 lists activities associated with glassware change-out. Table 2 lists activities associated with monthly maintenance. Clean, non-talc gloves must be worn when handling the Tekran equipment.

A copy of the glassware change-out/monthly maintenance report is included in the Appendix to this document. The report requires confirmation of specific measurements. An “X” in the **Done** column indicates the task was performed. The date and time of the period impacted by each task should be indicated in the report. Users are encouraged to use the electronic version of the report.

The completed report should be named using the naming scheme *RSSSSYYYYMM.xls*, where R is the report type (e.g., A, B, C, or D – refer to title of the corresponding SOP), SSSS is the 4-character site ID, YYYY is the 4-digit year, and MM is the 2-digit designation for the month. For example, BVT99200912.xls is the glassware change-out/monthly maintenance report that was completed for activities completed in December 2009 for VT99. A copy of the report should be submitted to the NADP Program Office upon completion of the maintenance activities. The information contained in the report, and in all other reports, is used when validating the data. It is important that all reports are submitted in a timely manner.

This SOP is not intended to be a troubleshooting guide. Additional information is available in the user manuals for the instrumentation, the instrument Tech Notes, and from the AMNet Site Liaison.

Glassware Change-out, Field Activities

Table 1. Glassware Change-out, Field Activities.

Maintenance required	Install new pre-purged soda lime trap Install blanked GOM denuder Install trace-clean elutriator Install new 1130 sample filter Leak check the system by zero-air vacuum method Complete AMNet Site Report A Complete AMNet Site Report B
Consumables required	Pre-purged soda lime trap Blanked GOM denuder Trace-clean elutriator New borosilicate filter for 1130 Pre-cut cling wrap, or finger from clean, non-talc glove
Tools required	Clean, non-talc gloves Adjustable wrenches

Completing Site Report B

Site, Block 1 – Enter the site name and the site ID. Site names are chosen during the site selection and installation process. The site ID is a four-character code that is assigned by the NADP Program Office.

1. Site	
Name:	ID:

Operator, Block 2 – Enter the name and initials of the person that performed the maintenance, and to whom questions should be directed if there are questions about the report. Three initials should be used, if possible.

2. Operator	
Name:	Initials:

Date, Block 3 - Enter the date the maintenance was performed, or the date the maintenance was started if maintenance extends multiple days. Enter the date in the form YYYY/MM/DD, where YYYY is the 4-digit year, MM is the numeric designation for the month, and DD is the day of the month.

3. Date (YYYY/MM/DD)

Glassware Change-out Checklist, Block 4 - The checklist is comprised of questions to confirm completion of different tasks. Again, an “X” indicates that the task was completed and is “done.” The Period Impacted identifies the range of data that should be invalidated due to each maintenance task. Checklist items are repeated to allow two glassware change-outs each month.

4. Glassware Change-out Checklist							
	Task	Done	Period Impacted (local standard time, 24 hr)			Comments, Actions	
		X	MM/DD	13:50	MM/DD		15:15
First Change-out	B01	Soda lime changed					
	B02	Soda lime changed (second)					
	B03	Denuder changed					
	B04	Elutriator glassware changed					
	B05	1130 sample filter changed					
	B06	Leak check $\leq 0.3 \text{ ng/m}^3$					
	B07	Instrument meets specifications					
Second Change-out	B08	Soda lime changed					
	B09	Soda lime changed (second)					
	B10	Denuder changed					
	B11	Elutriator glassware changed					
	B12	1130 sample filter changed					
	B13	Leak check $\leq 0.3 \text{ ng/m}^3$					
	B14	Instrument meets specifications					

Soda lime changed - Refer to Tekran Tech Note 1130-304: *Model 2537 and 1130 Sodalime Trap* for replacement procedure. Figure 1 indicates the location of the soda lime trap within the analytical train.

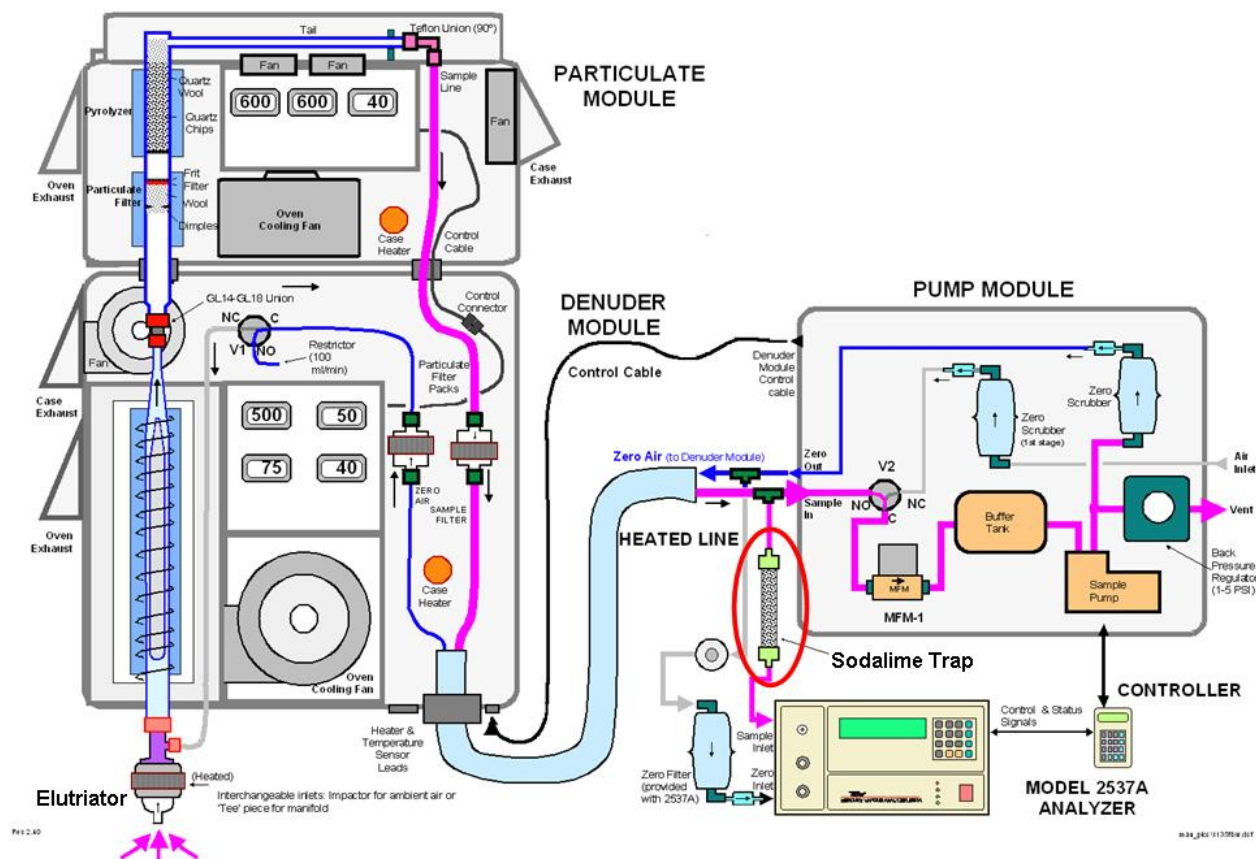


Figure 1. Location of the soda lime trap in the AMNet instrumentation. (source: Tekran Instruments, Inc.)

Soda Lime Changed (second) - If soda lime changes are required more frequently than once every two weeks, identify additional changes here.

Denuder Changed - Refer to Section 8 of the 1130 user manual for proper removal and installation of the denuder.

Elutriator Glassware Changed - Refer to Section 8 of the 1130 user manual for proper installation of trace clean elutriator glassware.

1130 Sample Filter Changed

- Step 1. Remove the sample filter by unscrewing the Teflon nuts attaching the Teflon tubing (see Figure 2). **Be careful not to twist the Teflon tubing when disconnecting the housing. This may torque the regenerable particulate filter (RPF) and break the RPF tail. Be careful not to lose the ferules.**
- Step 2. Remove the bottom tube. Hold the filter housing and pull down on the tubing,

- Step 3. Remove the top tube by holding the tubing in place and pulling down on the filter. This technique will prevent stress on the RPF tail.
- Step 4. Remove the pre-cleaned filter from the zip-type bags with gloved hands.
- Step 5. Ensure compression fitting ferrules are in place.
- Step 6. Attach and tighten top tube then place filter into bracket.
- Step 7. Check ferrules then attach and tighten lower tube.
- Step 8. Close case

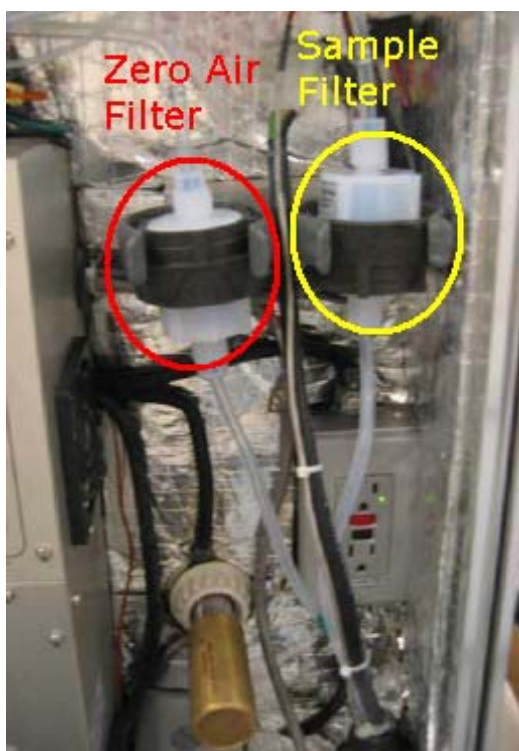


Figure 2. Tekran model 1130 zero air and sample filter

Leak Check < 0.3 ng/m³

- Step 1. Ensure the 2537 and 1130 are in sample mode (flow 10 lpm).
- Step 2. Secure a zero air canister to the 1130 elutriator T using Tekran part #30-13200-00. The zero air canister will remove all Hg from the incoming air and decrease the pressure within the entire speciation system.
- Step 3. Allow system to operate in sample mode. If the Hg₀ concentration is less than 0.3 ng/m³, then the entire speciation system passes the leak check.
- Step 4. If the concentration is greater than 0.3 ng/m³, then a significant leak is present and needs to be corrected.
- Step 5. When the criterion in Steps 3 and 4 has been met, remove the zero air canister and replace the elutriator T and heater.
- Step 6. Note the date and time of the period impacted on the report.

Instrument Meets Specifications – Complete Site Report A to verify whether the instrument meets specifications. Place an “X” in the **Done** column to indicate that this work was performed and that the instrument meets specifications..

Monthly Maintenance, Field Activities

Table 2. Monthly Maintenance, Field Activities.

Maintenance required:	Install blanked RPF Install trace-clean GL 14-18 union Install new 1130 zero air filter Complete AMNet Site Report B
Consumables required:	Baked RPF Trace-clean GL 14-18 union New Teflon zero air filter for 1130
Tools required:	Clean non-talc gloves Adjustable wrenches

End of Month Checklist, Operator, Block 6 – Enter the name and initials of the person that performed the maintenance. Questions about the report will be directed to this person. Three initials should be used, if possible.

6. Operator

Name:

Initials:

End of Month, Date, Block 7 – Enter the date the maintenance was performed, or the date the maintenance was started if maintenance extends multiple days. Enter the date in the form YYYY/MM/DD, where *YYYY* is the 4 digit year, *MM* is the numeric designation for the month, and *DD* is the day of the month.

7. Date (YYYY/MM/DD)

RPF changed - Refer to the 1135 user manual for proper RPF installation

GL 14-18 union cleaned - The GL 14-18 union needs to be removed when replacing the RPF. After installing the RPF, replace the GL 14-18 union with one cleaned in the laboratory.

1130 zero air filter changed - Refer to 1130 user manual for proper 1130 zero air filter replacement.

Remarks, Block 8 - Enter any additional comments or explanation regarding the monthly maintenance activities in this block. Please be concise and clear.

8. Remarks

Appendix

1. Site		2. Operator				3. Date (YYYY/MM/DD)	
Name: _____ ID: _____		Name: _____ Initials: _____					
4. Glassware Change-out Checklist							
	Task	Done Y	Period Impacted (local standard time, 24 hr)				Comments, Actions
			00:00-00:00	12:00-12:00	00:00-00:00	00:14	
First Change-out	001 Soda lime changed						
	002 Soda lime changed (second)						
	003 Dewoder changed						
	004 Effluator glassware changed						
	005 1130 sample filter changed						
	006 Leak check @ 0.3 ng/m ³						
	007 Instrument meets specification						
Second Change-out	008 Soda lime changed						
	009 Soda lime changed (second)						
	010 Dewoder changed						
	011 Effluator glassware changed						
	012 1130 sample filter changed						
	013 Leak check @ 0.3 ng/m ³						
	014 Instrument meets specification						
5. End-of-month Checklist		6. Operator				7. Date (YYYY/MM/DD)	
		Name: _____ Initials: _____					
	Task	Done Y	Period Impacted (local standard time, 24 hr)				Comments, Actions
			00:00-00:00	12:00-12:00	00:00-00:00	00:14	
Monthly	015 PPF changed						
	016 GL 14-18 fusion done						
	017 1130 zero air filter changed						
8. Remarks							

At the end of the month, please upload the completed form to: <http://nadp.sws.uiowa.edu/upload/amm>

Problems? Contact Mark Olson at 608-335-4232