LEAK CHECKING SILICA GEL CARTRIDGES

Purpose

This Meteorology and Air Quality Group (MAQ) procedure describes the process to perform leak checks of the plastic silica gel cartridges used to collect water samples in the AIRNET system.

Scope

This procedure applies to the individuals assigned to perform leak checks of the silica gel cartridges using the helium tank and leak detector at TA-54-1001 ("Cave").

In this procedure

This procedure addresses the following major topics:

Signatures

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12/23/04

General information about this procedure

Attachments

This procedure has the following attachment:

Number	Attachment Title	No. of pages
1	Hazard Control Plan	2
2	AIRNET Silica Gel Cartridge Leak Testing	1

History of revision

This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
0	9/27/99	New document.
1	8/23/01	Slightly revise wording in Hazard Control Plan and added Attachment 2.
2	1/15/04	Add step to weigh cartridges for empty weights.
3	12/22/04	Quick-change revision to replace HCP with HR.

Who requires training to this procedure?

The following personnel require training before implementing this procedure:

- Technicians assigned to perform leak checks of the cartridges.

Personnel previously trained to revision 2 of this procedure do not require re-training to this revision.

Training method

The training method for this procedure is **on-the-job** training by a previously-trained individual and is documented in accordance with the procedure for training (MAQ-024).

Prerequisites

In addition to training to this procedure, the following training is also required prior to performing this procedure:

- MAQ-011, “Logbook Use and Control”
- Cardiopulmonary Resuscitation (CPR)
- PS-13 class “Pressure Safety Orientation”
- PS-13 class “Gas Cylinder Safety”

References

The following documents are referenced in this procedure:

- MAQ-011, “Logbook Use and Control”
- MAQ-024, “Personnel Training”
- MAQ-204, “Sampling of Ambient Airborne Tritium”
- Instruction manual for Matheson “Leak Hunter Plus” Model 8066

Performing leak checks

Purpose of leak checking

The silica gel cartridges are plastic cylinders with screw-on metal ends. A plastic plug, with the quick-disconnect fitting, is screwed into the metal end. The plastic plug occasionally becomes cracked and can allow air to enter, bypassing the silica gel. The cracks are not easily noticed and can allow significant air leakage past the silica gel. Also, missing o-rings under the caps and plugs will be found by leak testing.

WARNING: breathing He gas

Helium gas is a simple asphyxiant and excessive concentrations (greater than 5%) may reduce the oxygen supply enough to cause light-headedness or unconsciousness. This gas has been inhaled for entertainment purposes. DON'T DO IT.

Frequency of leak checks

All cartridges for each bi-week period (either blue or gold) should be checked every six months.

Equipment needed

The following equipment is used to perform the leak checks:

- Tank of He gas
- Matheson "Leak Hunter Plus" Model 8066
- Pressure regulator for He tank
- Hose with pressure relief valve (22 psi) and quick-disconnect fitting
- Cartridges to be checked, empty of silica gel

Steps to check for leaks

To check for leaks in the cartridges, perform the following steps:

Step	Action
1	Check the He tank in the straps on door opening into main room of Cave and ensure it is secure. Do not move the tank – gas plant personnel **only** will move the cylinders. **CAUTION**: **Proper restraint of high pressure gas cylinders is important.**
2	If necessary, attach regulator unit to He bottle.
3	Turn black knob on pressure regulator ***counter-clockwise*** until it stops (this ensures the regulator is set to zero pressure before the main tank valve is opened).
4	Open the main tank valve.

Performing leak checks, continued

Step	Action
5	SLOWLY turn the black knob on the pressure regulator ***clockwise*** until the gauge reads **10 psi**. **NOTE**: If the pressure is set higher than about 20 psi, the pressure relief valve will start to open and release He gas.
6	Turn on the leak detector unit by pressing ON. The unit will self-test, then should read "x10^{-5}." Ensure the unit reads "ml/sec" in the lower part of the display. If necessary to change the display units, see the instruction manual.
7	Optional: Attach the lower fitting on the silica gel cartridge to a suitable stand, such as the manifold assembly on the old leak detector unit.
8	Ensure the end of the silica gel cartridge is closed off, either by a quick-disconnect fitting that is disconnected, or by closing the valves below the fittings. If using the manifold assembly, open two of the valves on the manifold.
9	Attach the quick-disconnect fitting from the tank to the top of the silica gel cartridge. This will pressurize the cartridge with He.
10	Start at the top of the cartridge and move the leak detector probe tip around the silica gel cartridge to sniff for leaks. It takes one second for the gas to travel from the tip to the internal sensor, so move slowly and allow time for the unit to clear itself if necessary.
11	After checking a cartridge, disconnect it from the hose at the top and remove it from the stand.
12	On a form (similar to Attachment 2) or in the logbook for leak checking, record the station number and color (either blue or gold) of the cartridge checked. Follow the requirements in MAQ-011 when making logbook entries.
13	To check the next cartridge, repeat steps 7 through 12.
14	When done checking the last cartridge, close the main tank valve and turn off the leak detector.

Weigh empty cartridges

At the time of leak checking or when requested by the team leader, weigh each empty fully-assembled cartridge and record the weight in the Access AIRNET database in the form for gel empty weights. Follow the steps for weighing as described in MAQ-204. (These data are used to calculate the weight of silica gel used each sampling period.)

Records resulting from this procedure

Records

The following records are generated as a result of this procedure and will be submitted according to MAQ-011:

- Entries in the leak checking logbook

HAZARD REVIEW

Work tasks/Steps	**Hazards, Concerns, and Potential accidents; Likelihood/ Severity**	**Controls, Preventive Measures** *(e.g., safety equipment, administrative controls, etc.)*	**Hazard Level** *from IMP 300-00-00 Hazard Grading Matrix*
None.	Inhaling He gas (employees may inhale gas for entertainment purposes). He gas is a simple asphyxiant. Excessive concentrations (greater than 5%) may reduce the oxygen supply enough to cause light-headedness or unconsciousness. Improbable / negligible = minimal	Don't.	Low
As part of steps to check for leakage, use high-pressure tank of He gas.	Tank contains high pressure gas and if tank fell over and regulator valve were knocked off, could become dangerous missile. Remote / critical = minimal	High pressure tank of gas will be secured and mounted in accordance with requirements for gas bottles. Only properly trained individuals will move tank. Tank of gas likely to last for years.	Low
As part of steps to check for leakage, use high-pressure tank of He gas.	Explosion of cartridge due to accidental overpressuring: Cartridge could explode if pressurized over the manufacturer's safe limit of 110 psi. improbable (because pressure regulator limits pressure in line) / critical = low.	A safety pressure relief valve (set at 15 to 25 psi) has been installed in the line used to pressurize the cartridges. This will vent any pressure over 50 psi that occurs in the line, thus limiting maximum pressure in the cartridges to a value well under the manufacturer's safe pressure limit of 110 psi.	Low

Wastes or residual materials resulting from process

None.

Emergency actions to take in event of control failure	For all injuries, provide first aid and see that injured person is taken to Occupational Medicine (only if immediate medical attention is not required) or the hospital. Follow all site-specific emergency plans for any radiation or explosives emergencies.

Air Quality Group

AIRNET Silica Gel Cartridge Leak Testing

This form is from MAQ-234

Date tested:

Cartridge color: Gold Blue

Cartridge #	Pass?	Comments

Tested by:

Signature(s) _____ Name(s) (print) _____ Date _____

Air Quality Group

AIRNET Silica Gel Cartridge Leak Testing

This form is from MAQ-234

Date tested:	**Cartridge color:** Gold Blue	
Cartridge #	**Pass?**	**Comments**

Tested by:

Signature(s) Name(s) (print) Date