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Environmental Programs Directorate

Waste & Environmental Services

Standard Operating Procedure

for **AIRNET—LEAK CHECKING SILICA GEL CARTRIDGES**

Reviewer:

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1.0 PURPOSE AND SCOPE

This standard operating procedure (SOP) states the responsibilities and describes leak checking of silica gel cartridges used to collect water vapor samples in the AIRNET system for the Los Alamos National Laboratory (LANL) Waste and Environmental Services Division (WES).

All **WES** participants shall implement this procedure when leak checking silica gel cartridges for AIRNET.

2.0 BACKGROUND AND PRECAUTIONS

2.1 Background

The silica gel cartridges are plastic cylinders with screw-on metal ends. A plastic plug, with a quick-connect fitting, is screwed into the metal end. The plastic plug can crack and can allow air to be pulled through the top of the cartridge, bypassing the silica gel. The cracks are not easily noticed and can allow significant air leakage past the silica gel. Missing or decayed o-rings under caps and plugs can be identified and replaced during the leak check process.

Frits in the silica gel end caps can get clogged over time with dust and debris, reducing flow through the canister. Frits must be changed every six months during the leak checking process to avoid low water content tritium rejections.

2.2 Precautions

Helium gas is a simple asphyxiant and excessive concentrations (greater than 5%) may reduce the oxygen supply enough to cause light-headedness or unconsciousness. Inhaling gas for entertainment purposes is not safe and is prohibited during this process.

3.0 EQUIPMENT AND TOOLS

- Tank of helium gas
- Matheson “Leak Hunter Plus” Model 8066
- Pressure regulator for helium tank
- Hose with pressure relief valve (22 psi) and quick-disconnect fitting
- Empty silica gel cartridges

4.0 STEP-BY-STEP PROCESS DESCRIPTION

4.1 Frit Replacement

Frits in the silica gel canister quick connect assembly (top) and bottom end caps need to be replaced every six months. This is typically done prior to the semi-annual leak check that is described in section 4.2 so that any caps that are not securely fastened after frit replacement will be discovered. Always perform a leak check after a frit replacement to ensure there are no leaks in the canister.

Worker	1.	Remove the bottom end cap and the top quick connect assembly from the silica gel canister.
	2.	Remove the old frits and replace with new frits. Ensure the new frits are tightly installed by tapping them in with a hammer, screwdriver, or other appropriate tool.

	3.	Replace the bottom end cap and the top quick connect assembly and perform a leak check as described in section 4.2.

4.2 Performing Leak Checks

All cartridges should be leak checked every six months, whenever a cartridge is repaired, or whenever a new cartridge is assembled.

Worker	1.	Ensure helium tank is secure. Tank may be rolled up to 10 feet, moving a tank further than 10 feet will require the use of a cylinder cart. Cylinder cap must be secured prior to moving. **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.
	5.	SLOWLY turn the black knob on the pressure regulator ***clockwise*** until the gauge reads **15 psi**. NOTE: If the pressure is set higher than about 20 psi, the pressure relief valve will start to open and release helium gas.
	6.	Press "ON" to turn on the leak detector unit. After a self-test the unit should read "x10^{-5}" Ensure the unit reads "ml/sec" in the lower part of the display. If necessary, change the display units. See the instruction manual for guidance.
	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 valve below the fitting on the stand.
	9.	Attach the quick-disconnect fitting from the helium tank to the top of the silica gel cartridge. This will pressurize the cartridge with helium.
	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, if the stand is being used.
	12.	In the logbook for leak checking, record the station number and color (either blue or gold) of the cartridge checked. Indicate if no leaks were found. If a leak is found, repair the cartridge, then retest repaired cartridge.

	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.

4.3 Records Management

Worker	1.	Maintain and submit records and/or documents generated to the Records Processing Facility according to EP-DIR-SOP-4004, Records Transmittal and Retrieval Process.

5.0 DEFINITIONS

N/A

6.0 PROCESS FLOW CHART

N/A

7.0 ATTACHMENTS

Attachment 1 AIRNET Silica Gel Cartridge Leak Testing Sheet (1 page)

8.0 REVISION HISTORY

Revision No. *[Enter current revision number, beginning with Rev.0]*	Effective Date *[DCC inserts effective date for revision]*	Description of Changes *[List specific changes made since the previous revision]*
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 Hazard Control Plan with Hazard Review.
0	4/2/2009	New document number and reformatted for WES division. Formerly ENV-MAQ-234.
1	6/2/2011	Added section 4.1 to describe frit replacement.

If you have read and understand the preceding document, click here to receive EDS credit.

ATTACHMENT 1: SILICA GEL LEAK TESTING FORM

SOP-5153-1 Silica Gel Cartridge Leak Testing Sheet	Records Use only

AIRNET Silica Gel Cartridge Leak Testing

This form is from SOP-5153

Date tested: **Cartridge color:** Gold Blue

Cartridge #	Pass?	Comments

Tested by:

_____ _____ _____ _____

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