

Thunder Scientific Corporation

Certificate of Calibration

Customer: FUEL CELL TECHNOLOGIES, INC.
 9018 Berryessa Road N.E., Albuquerque NM 87122
 Purchase Order: VISA3254
 Item: Humidity Bottle w/Omega CN76000 Controller
 ID Number: None
 Serial Number: None
 Calibration Date: 14 Nov 03
 Procedure: Generic dew point measurement
 Cert Number: 3536

This certifies that the above product was calibrated in compliance with the requirements of ISO/IEC 17025 using applicable Thunder Scientific procedures.

At planned intervals, Thunder Scientific measurement and generation standards are calibrated by comparison to or measurement against national standards, natural physical constants, consensus standards, or by ratio type measurements using self-calibrating techniques.

National standards are administered by the National Institute of Standards and Technology (NIST) or other recognized national standards laboratories.

The environment in which this instrument was calibrated is maintained within the operating specifications of the instrument and the standards.

At the time of shipment, it was unknown if this instrument met operating specifications at the required humidity test points. Refer to the test report.

Supporting documentation relative to traceability is on file and is available for examination upon request.


 Thunder Scientific Corporation

REPORT OF CALIBRATION

Customer: FUEL CELL TECHNOLOGIES INC.
9018 Berryessa Road NE, Albuquerque NM 87122

Item: Humidity Bottle with Omega CN76000 Controller

Test Required: Measure gas output of humidity bottle heated to 80 °C @ flow rates of 100, 250, 500, 2000, & 5000 sccm.

Test Report Number: 3536

Standards: MBW DP30 EN0041 exp 08 Aug 04

Calibration Date: 14 Nov 03

Estimated DP Uncertainty is 0.1 °C

Procedure: Generic dew point measurement

3900 EN0013 exp 29 Jan 04

Ambient Conditions: 23.5 °C, 39% RH

Estimated FP/DP Uncertainty is 0.1 °C

Test Gas: Nitrogen

Test Gas Flow Rate: Per customer requirement

The MBW DP30 Chilled Mirror Hygrometer is an instrument utilizing a thermoelectrically cooled metallic mirror that is automatically controlled via feedback from an optical system. The mirror is maintained at a constant surface reflectance so as to control the mirror surface at the temperature where the rate of evaporation or condensation of water vapor is equal. This equilibrium condition is the dew/frost point temperature of the gas.

Thunder Scientific humidity generators utilize the NIST developed and proven "two-pressure two-temperature" humidity generation principle. Generation of humidity in a system of this type does not require direct measurement of the water vapor content of the gas. Rather the generated humidity is derived from the measurements of saturation and test pressures, and saturation and test temperatures.

Standards used to establish this calibration are traceable thru Hart Scientific reports A3507023 & A3508017, Ruska report 01050916360, and NIST test 836/H-4643/TN 260311.

Thunder Scientific certifies this calibration to be in compliance with the requirements of ISO/IEC 17025.

As Rcvd / As Left Data:

	Gas Inlet	Gas Inlet	Gas Inlet	Gas Inlet	Measured
	°C	psiA	FP °C	sccm	Outlet
	-----	-----	-----	-----	-----
	24.26	12.11	-24.72	114	79.4
	24.32	12.11	-24.98	251	78.9
	24.20	12.11	-25.00	501	79.2
	23.59	12.15	-24.99	998	78.6
	23.50	12.14	-24.98	1993	77.2
	23.81	12.13	-24.99	4996	70.0

Test Conditions: The humidity bottle controller was set to 80 °C and allowed to stabilize at "Gas Inlet" conditions. After stabilization the "Outlet DP °C" of the humidity bottle was measured.

Adjustments: None

As Rcvd / As Left:

Within Tolerance: Unknown
Limited Range: Unknown

Recall Date: N/A
Calibration Seals: N/A

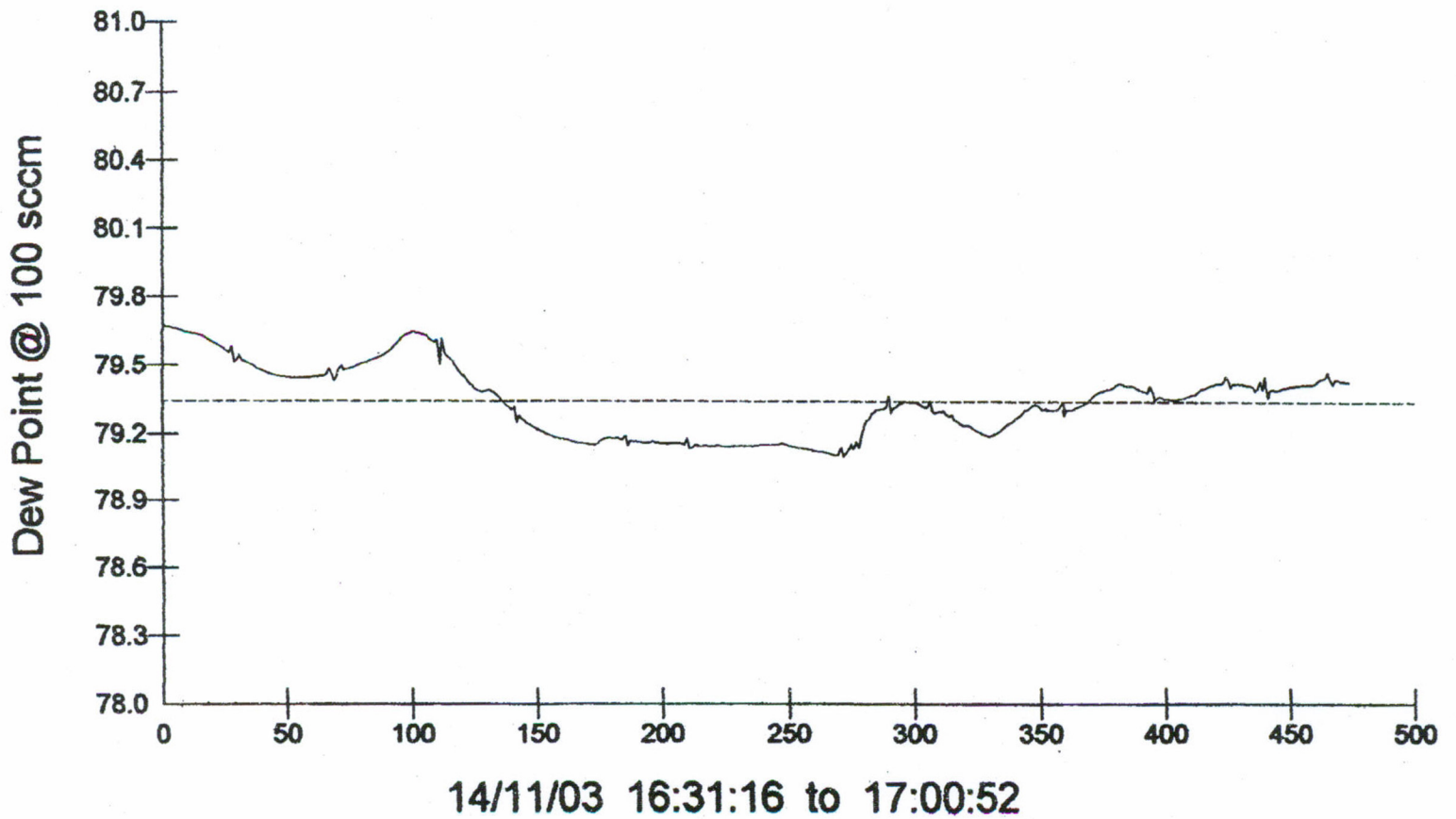

Walter Ellsbury, Cal Tech


Brad Bennewitz, Lab Manager

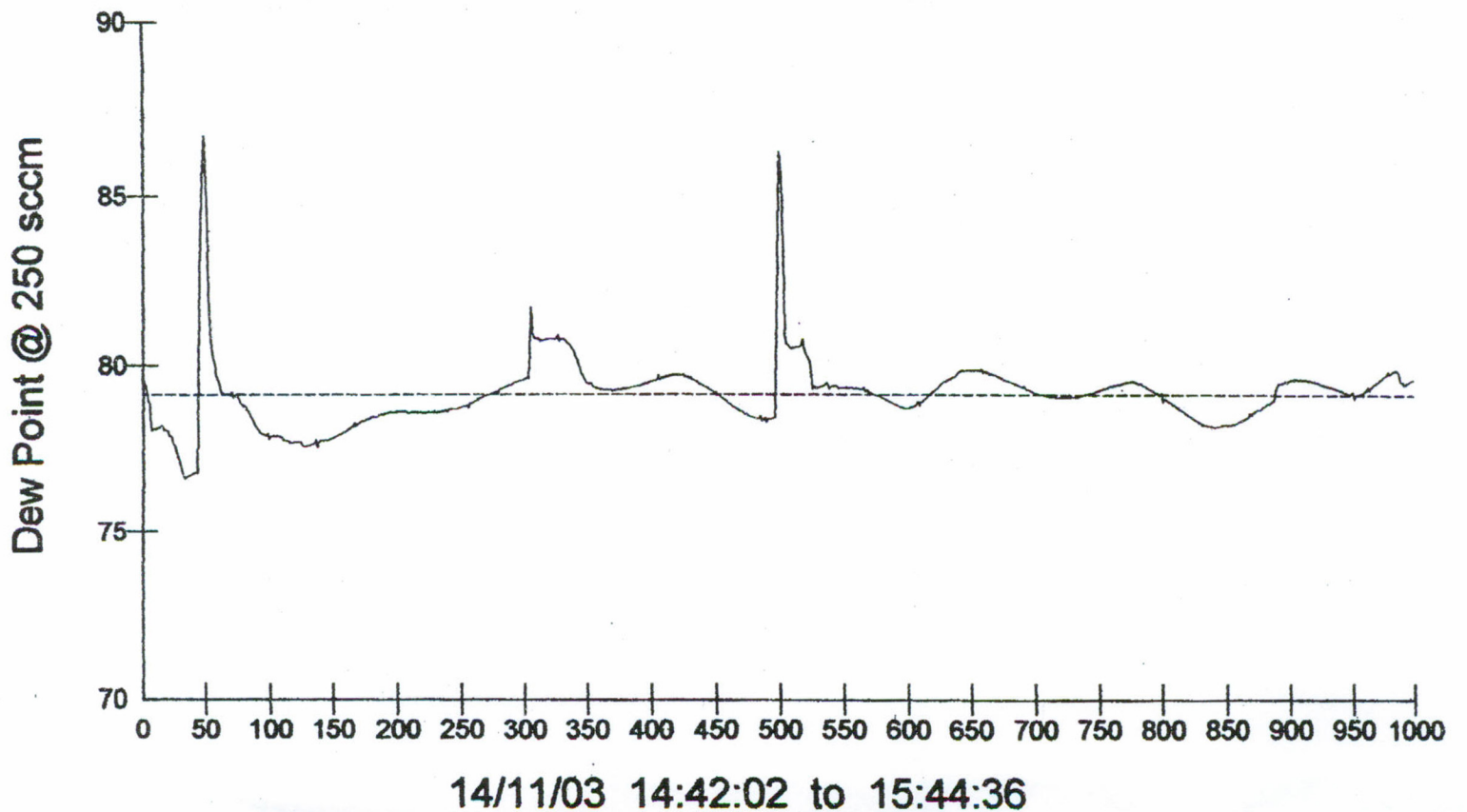
Results relate only to the items tested or calibrated.

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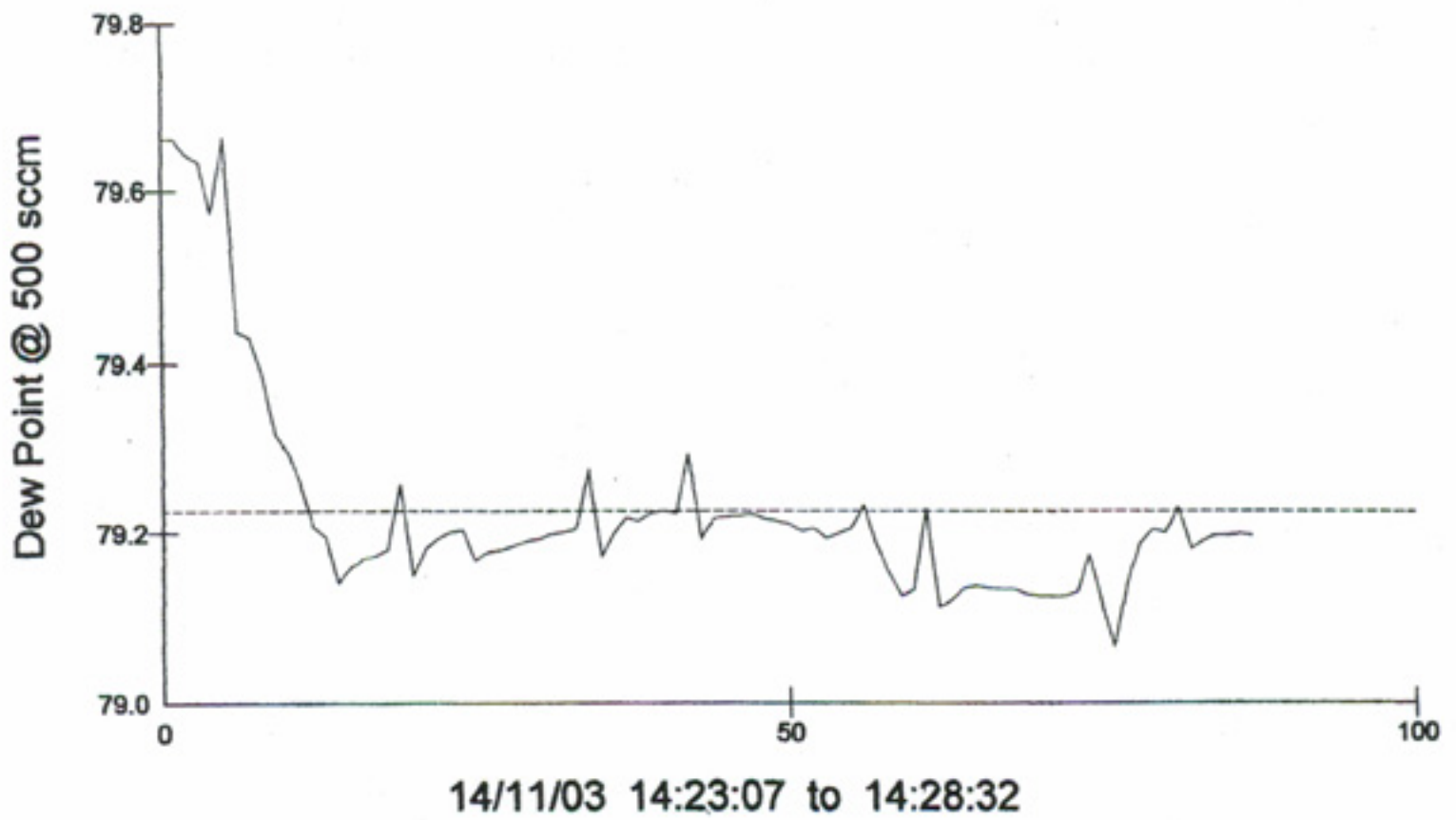
Fuel Cell Tech DP Generator & DP30 EN0041



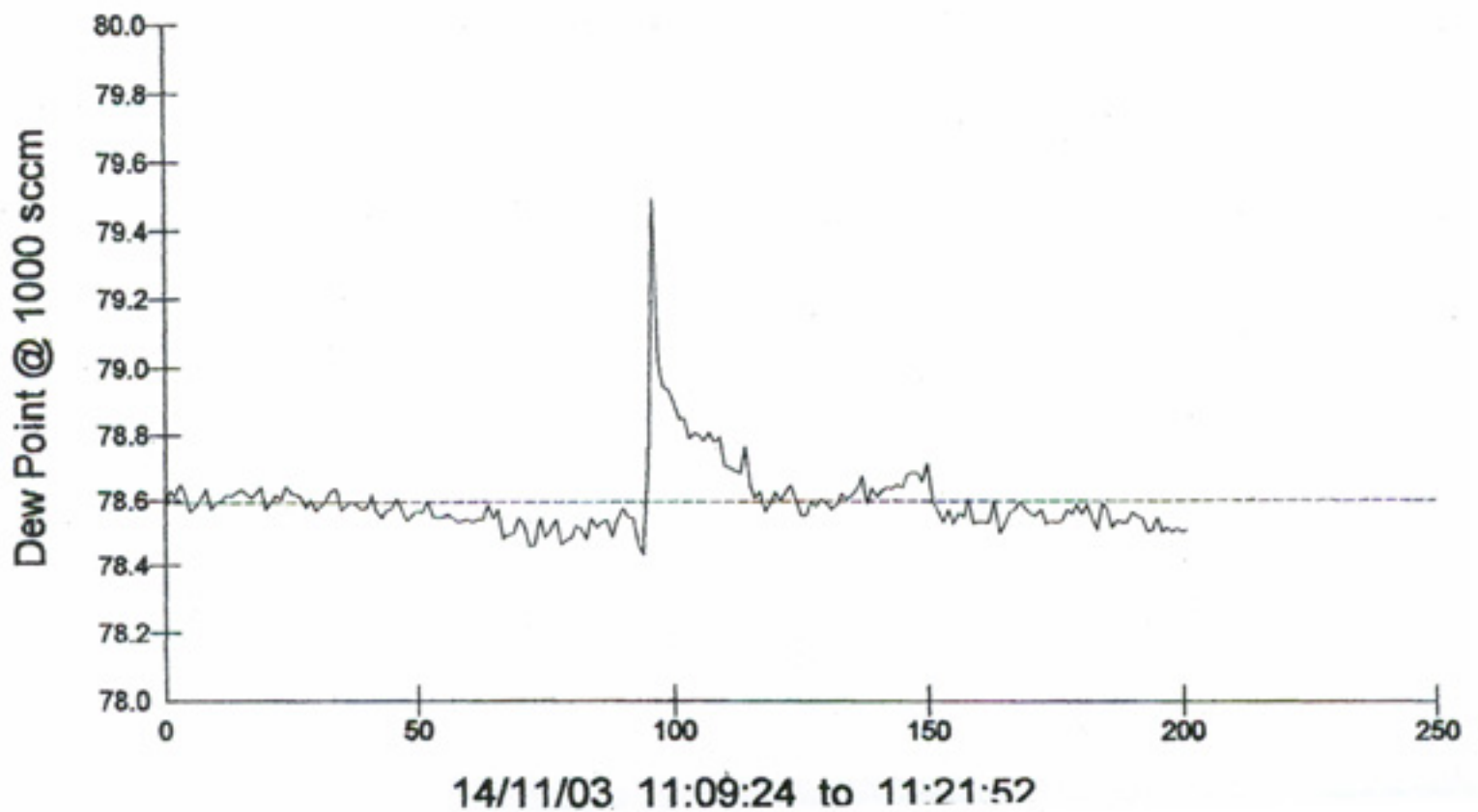
Fuel Cell Tech DP Generator & DP30 EN0041



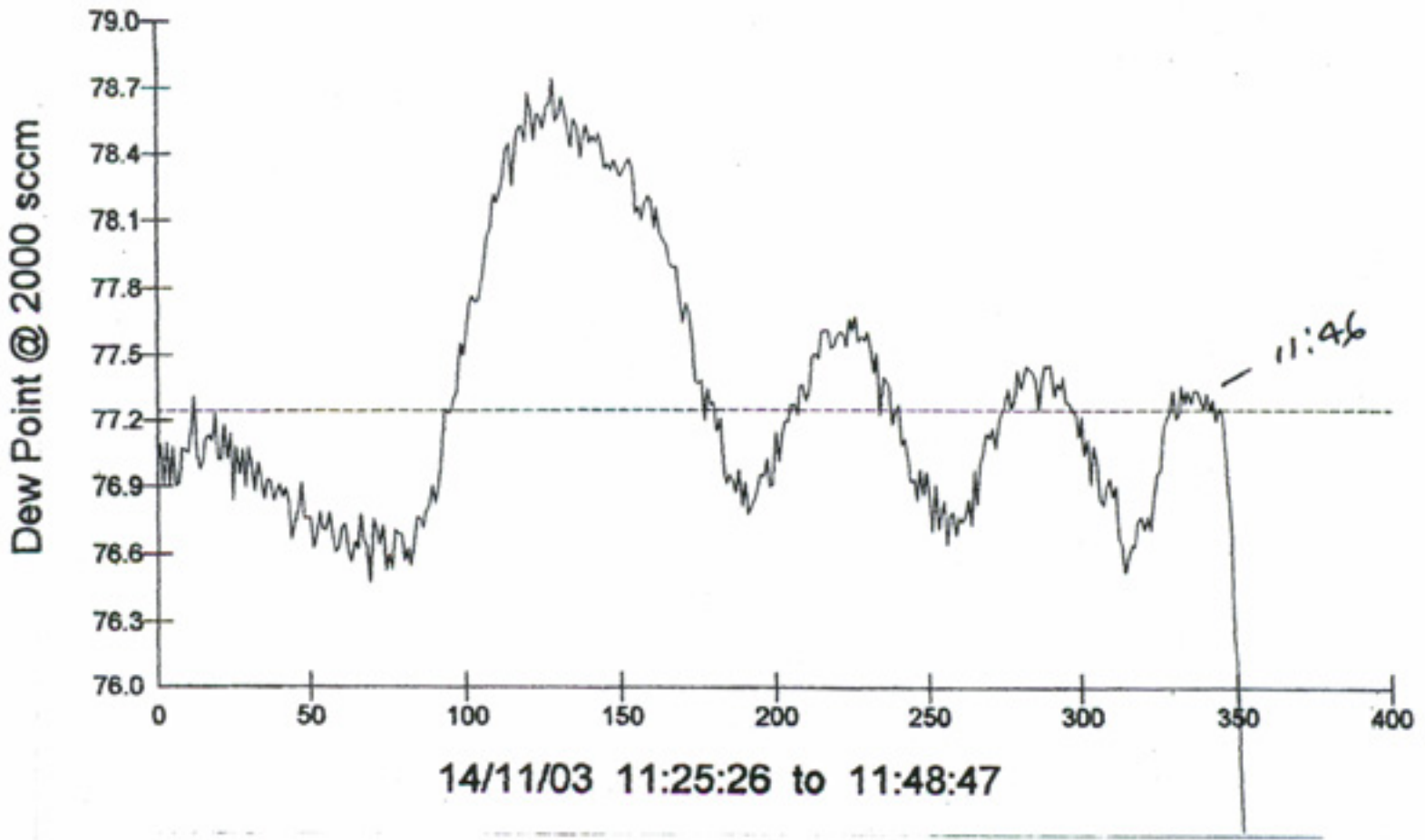
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