

# Calibration Report: Spectroradiometer

s/n: 660

ECN: 1741127

30 June 2003

Bryan Fabbri  
Analytical Services & Materials, Inc.  
Hampton, Virginia

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## SUMMARY

Calibration date: 9 May 2003

Next Calibration due: 9 May 2005

A collection, analysis and calibration of data from Analytical Spectral Devices, Inc. (ASDI), Full Range Fieldspec Radiometer, has been completed. The calibration was performed by the manufacturer, ASDI. These data were collected by ASDI, on 9 May 2003.

Model: FR  
Serial Number: 660

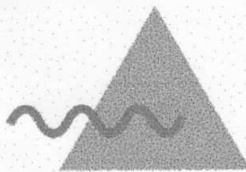
The instrument response files for each foreoptic are installed on the computer operating the instrument. Instrument response files are as follows: **Ni660\_9.RAW**, **1i660\_9.RAW**, **5i660\_9.RAW**, **8i660\_9.RAW**, **18i660\_9.RAW**, **COS660\_9.RAW**.

Irradiance Standard Vendor, Lamp number and File Name, used for Irradiance and Radiance calculations: *Optronic Laboratories, Lamp F627, LMP660\_9.ILL*

Reflectance Standard Vendor, Standard ID, and File Name, used for Radiance calculations: *Labsphere, Target #12137-A, BSE660\_9.REF*

Application: The instrument response files are utilized by the computer operating the instrument at the time of data collection.

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**ANALYTICAL SPECTRAL DEVICES, INC.**

*Portable, Accurate Solutions From Light*

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(303) 444-6822 Fax: (303) 444-6825

Website: [www.asdi.com](http://www.asdi.com)

## SPECTRORADIOMETER CERTIFICATE OF CALIBRATION

UNIT AND CALIBRATION NO.: *FSFR 660/9*

CALIBRATION DATE: *5/9/03* LAMP NO.: *F626* PANEL NO.: *12137-A*

Applicable entries:

Wavelength

Radiometric

Foreoptics:

Bare Fiber

3 Degree

10 Degree

Jumper

1 Degree

5 Degree

18 Degree

Jumper with RCR

2 Degree

8 Degree

RCR

All calibrations have been performed according to Analytical Spectral Devices' accepted procedures, using verifiable NIST-traceable irradiance, reflectance and wavelength standards.

Calibration data resides on the ASD instrument's controlling computer's hard drive and/or the controlling software system disk. Instrument response files: *Ni660\_9.RAW*, *Ii660\_9.RAW*, *5i660\_9.RAW*, *8i660\_9.RAW*, *18i660\_9.RAW* and *Cos660\_9.RAW*.

Irradiance Standard Vendor, Lamp number and File Name, used for Irradiance and Radiance calculations: *Optronic Laboratories, Lamp F626, LMP660\_9.ILL*

Reflectance Standard Vendor, Standard ID, and File Name, used for Radiance calculations: *Labsphere, Target #12137-A, BSE660\_9.REF*

ASD Certified Calibration Engineer/Technician:

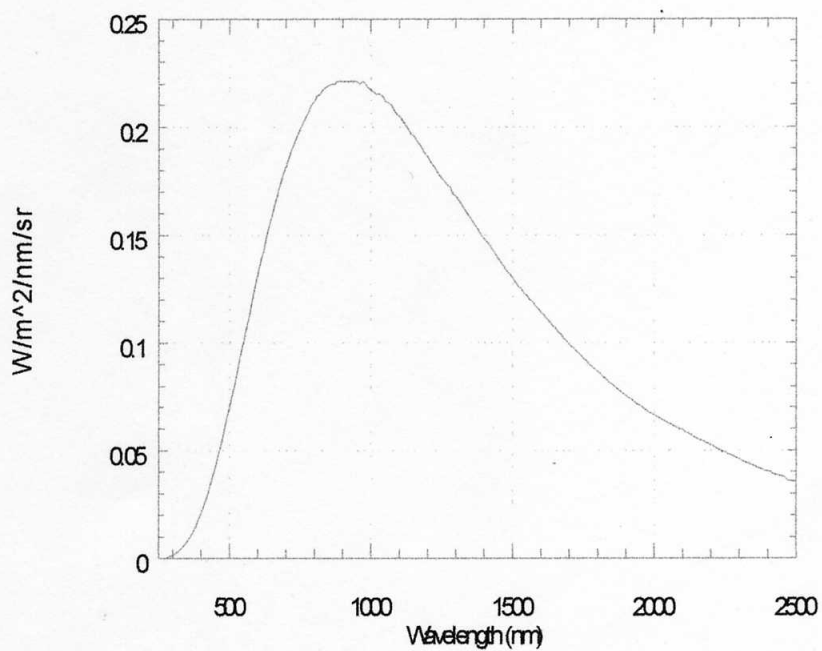
Signature

*Margaret C. Meahm*

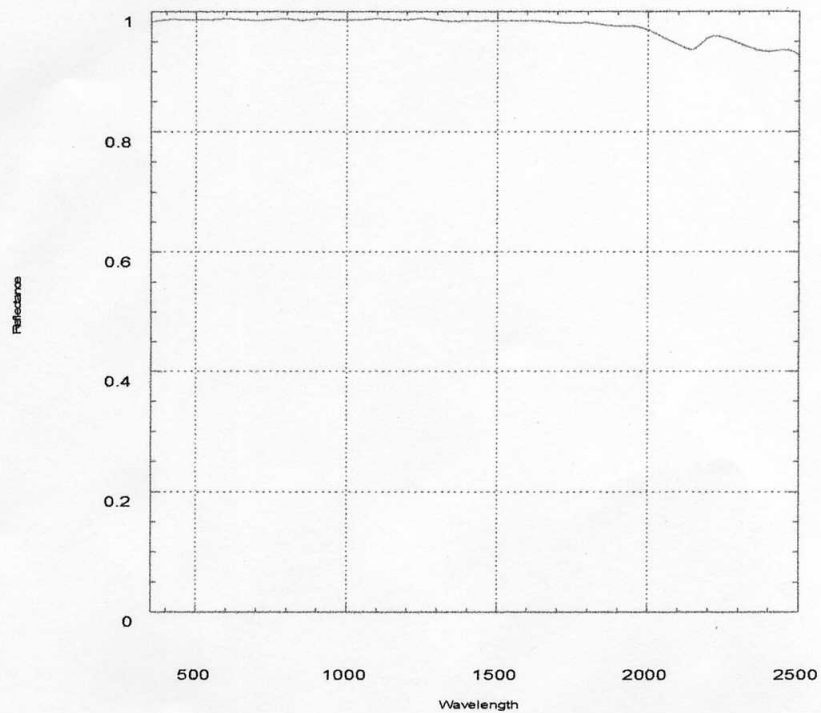
Date

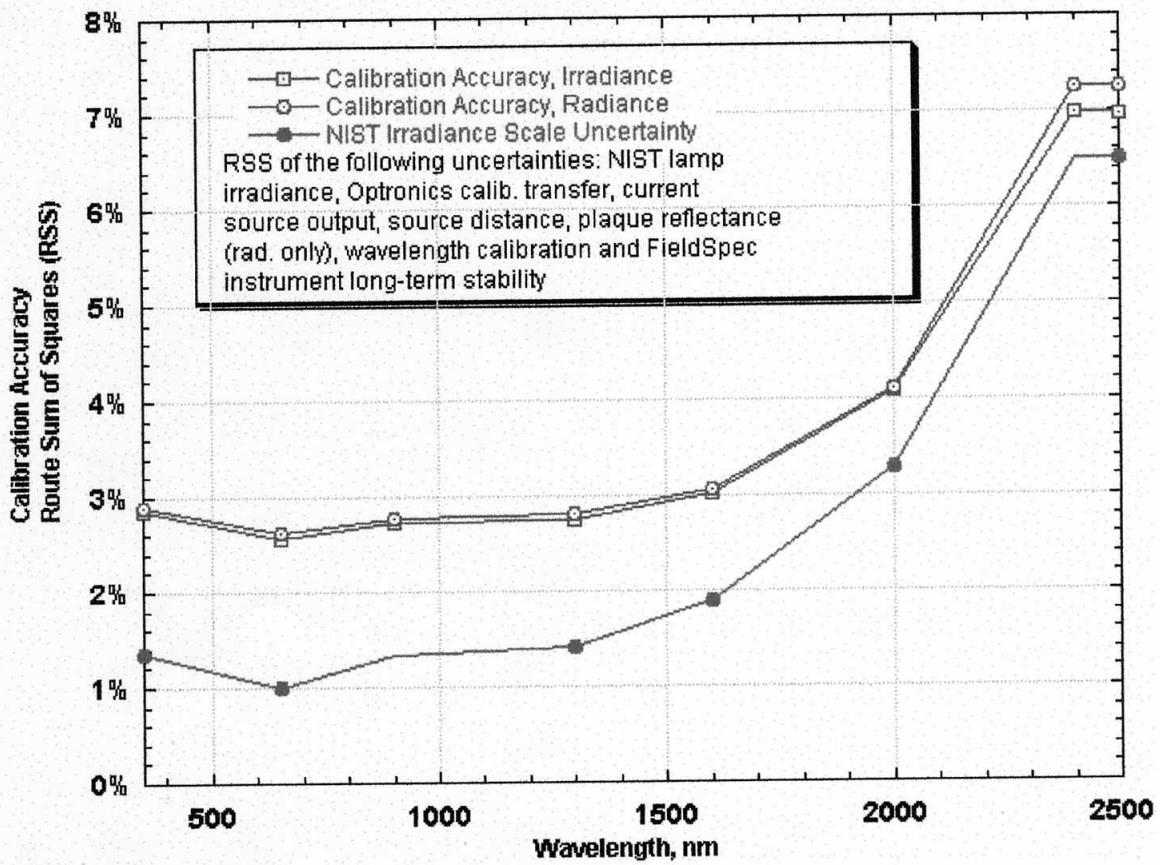
*5/9/03*

Optronics Laboratory 1000 Watt Irradiance Standard, FEL-626



Spectralon(tm) Reflectance Standard, Target #12137-A



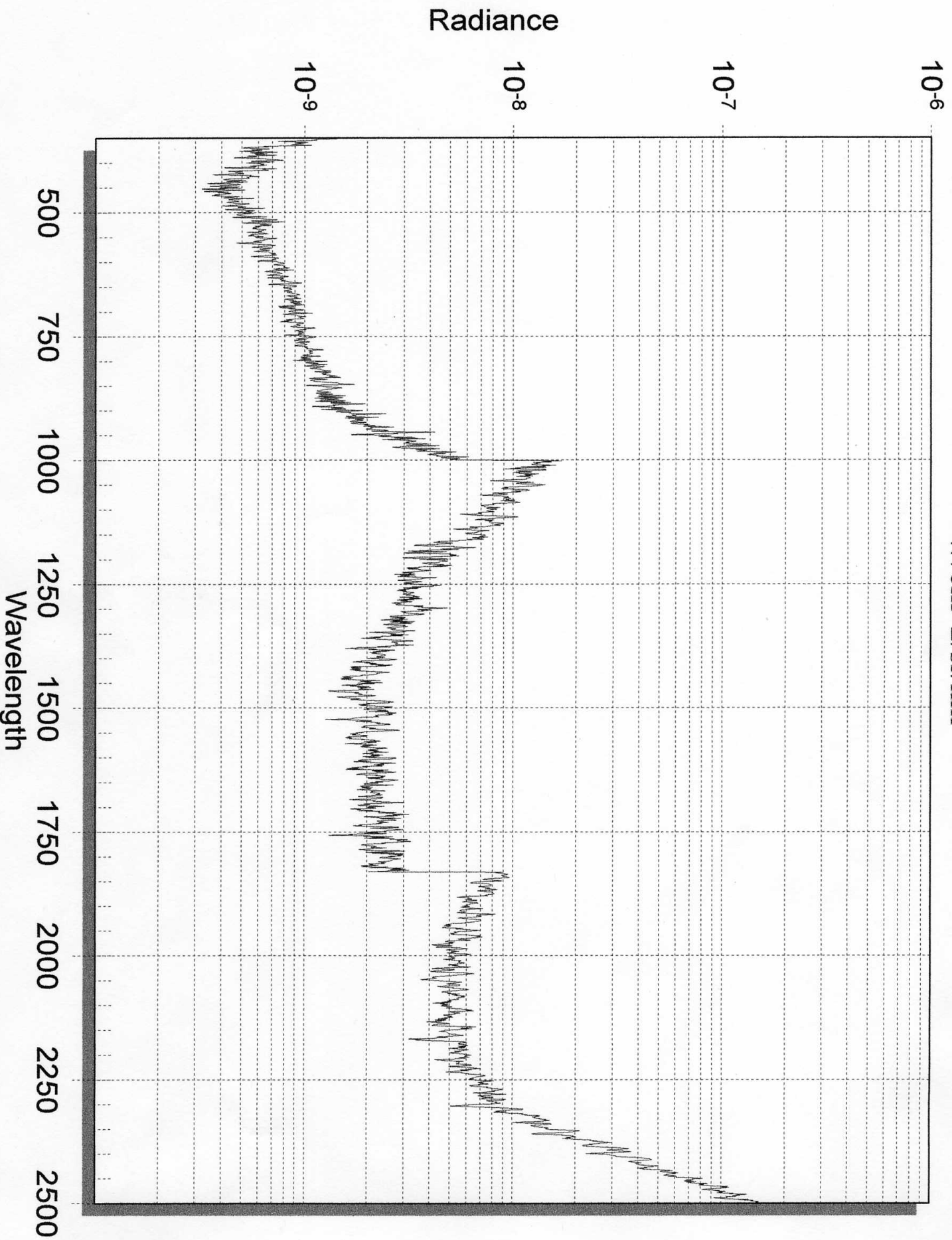


#### Calibration Accuracy Calculations

$\lambda$ nm	NIST	Optronics Transfer	.1% Current Error	2mm Position Error	$\lambda$ cal.	RSS Non Inst.	FR Irr. RSS	Labsph. Refl.	Rad. RSS	
350	1.35%	0.70%	0.75%	0.80%	2.50%	2.04%	2%	2.85%	0.50%	2.90%
654.6	1.01%	0.40%	0.40%	0.80%	0.88%	1.62%	2%	2.57%	0.50%	2.62%
900	1.34%	0.50%	0.35%	0.80%	0.20%	1.86%	2%	2.73%	0.50%	2.77%
1300	1.42%	0.50%	0.30%	0.80%	0.04%	1.91%	2%	2.76%	0.50%	2.81%
1600	1.89%	0.50%	0.20%	0.80%	0.04%	2.27%	2%	3.02%	0.50%	3.06%
2000	3.29%	0.75%	0.14%	0.80%	0.04%	3.56%	2%	4.08%	0.50%	4.11%
2400	6.51%	1.00%	0.14%	0.80%	0.04%	6.68%	2%	6.98%	2.00%	7.26%
2500	6.50%	1.00%	0.14%	0.80%	0.04%	6.67%	2%	6.97%	2.00%	7.25%

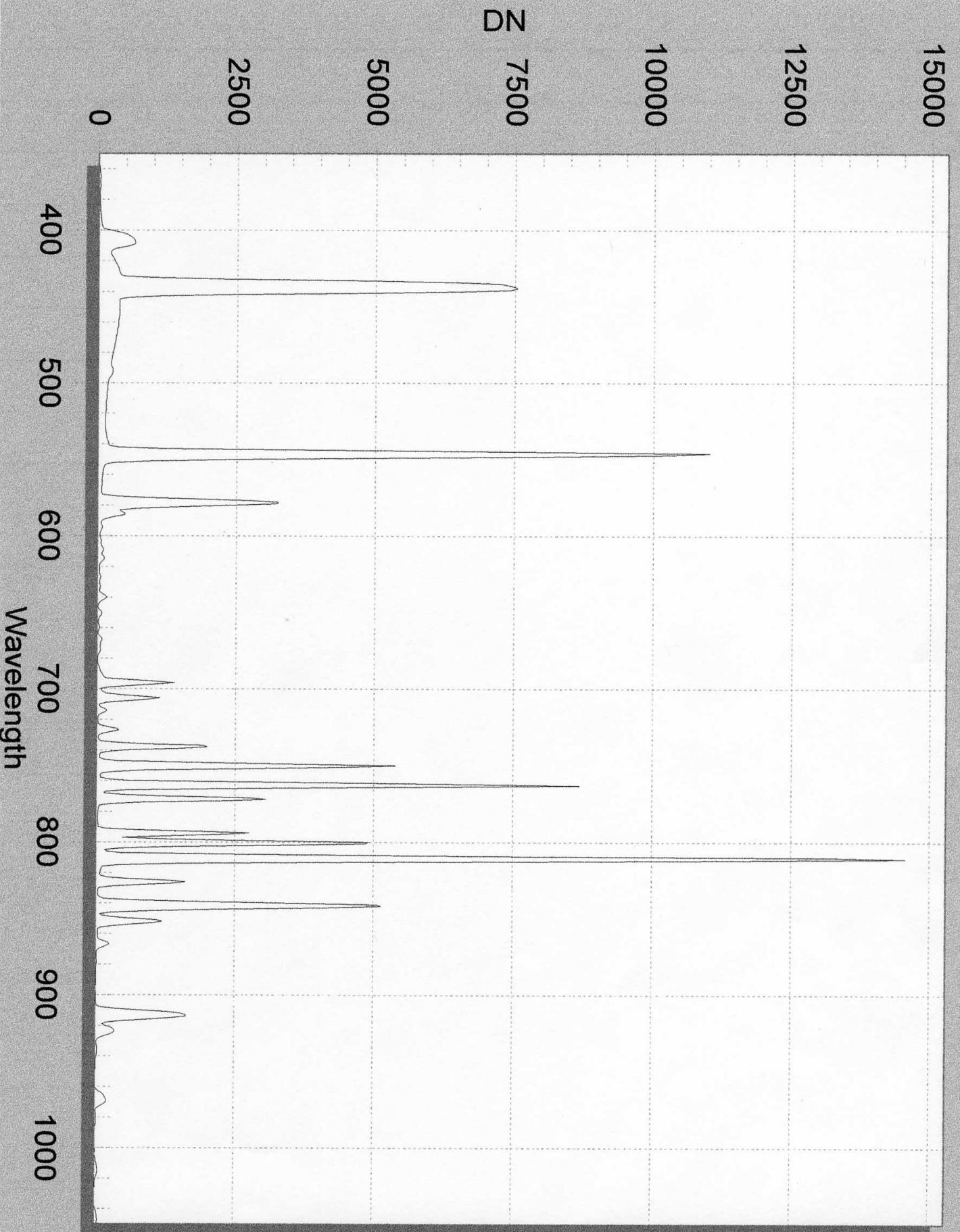
# NEdL Unit 660/9; 5/30/03

W/cm<sup>2</sup>/sr/nm

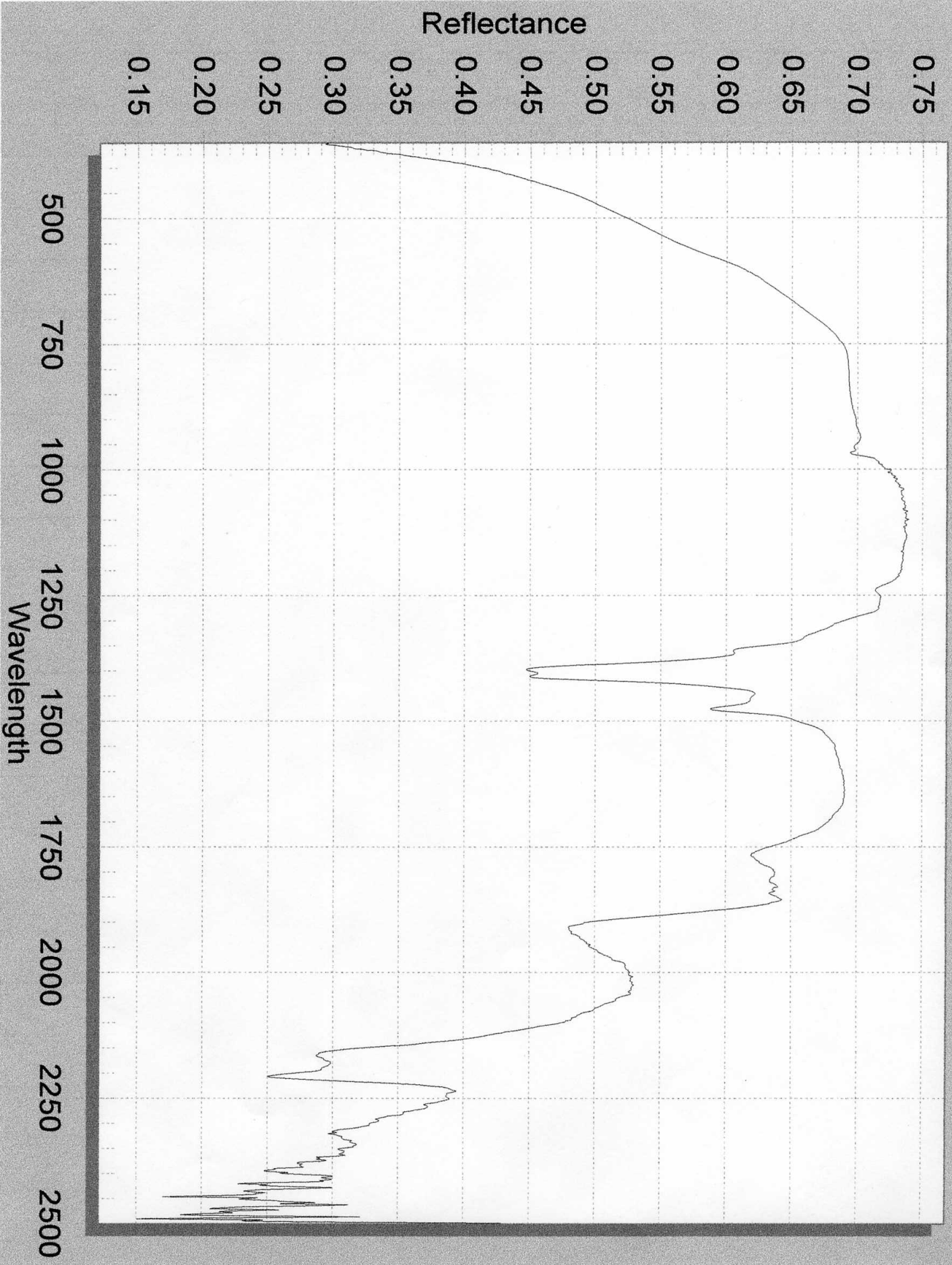


# Mercury Argon Unit 660/9; 05/09/03

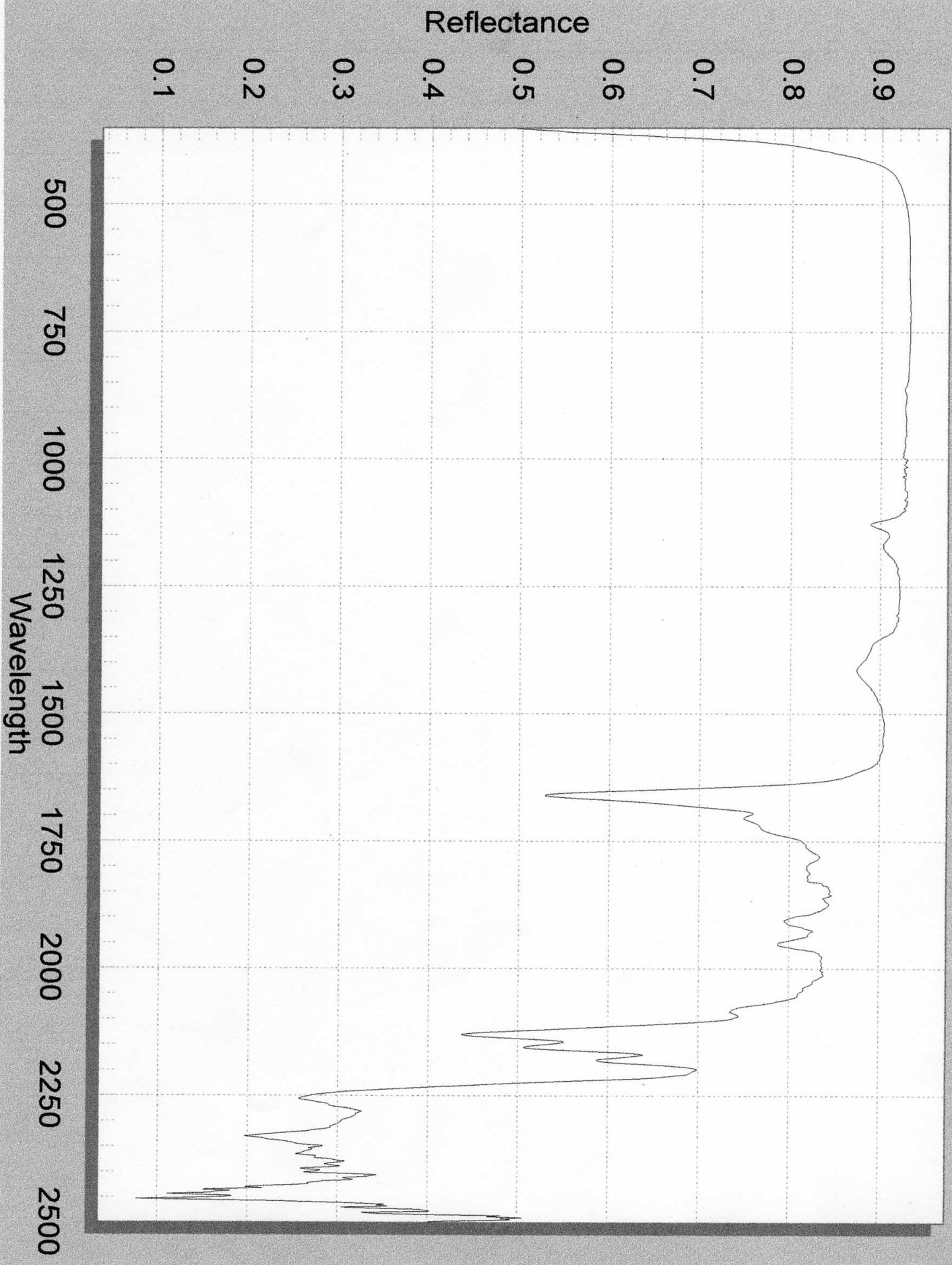
Raw DN



Kaolinite Unit 660/9; 05/09/03  
Reflectance

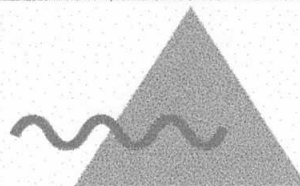


Mylar Unit 660/9; 05/09/03  
Transmittance





Instrument Information	
Unit # : 660	Cal # : 9
SO # : C993739A	RMA # : 1127
PC Make: NEC	
SN # : 75002764	
Operating System: DrDOS	
Computer Boot & Setup	
<input checked="" type="checkbox"/>	AC Power up sequence
<input checked="" type="checkbox"/>	Processor speed
NA	Ram
NA	Hard Drive
NA	Display Settings Cleared
<input checked="" type="checkbox"/>	Parallel Port Mode: Bi-directional
<input checked="" type="checkbox"/>	Power Savings Turned Off
NA	Install ViewSpec Pro supplied diskettes
<input checked="" type="checkbox"/>	Install RS^2
NA	Black and white option
NA	Install Technical Guides
FieldSpec Power	
<input checked="" type="checkbox"/>	Power on
NA	Battery status light
NA	Battery power
Software and System Operation	
<input checked="" type="checkbox"/>	Optimization
<input checked="" type="checkbox"/>	Vnir Noise level
<input checked="" type="checkbox"/>	Swir Noise level
<input checked="" type="checkbox"/>	White reference
<input checked="" type="checkbox"/>	Masked pixels
<input checked="" type="checkbox"/>	Shutter operation
<input checked="" type="checkbox"/>	NEdL
<input checked="" type="checkbox"/>	Radiometric tests - VS Pro & Realtime
NA	CD/Floppy drive test - transferring files
<input checked="" type="checkbox"/>	Spectrum save features - multiple
<input checked="" type="checkbox"/>	ForeOptic check
Wavelength Checks	
<input checked="" type="checkbox"/>	Mylar transmittance, 14 mil thicknes
<input checked="" type="checkbox"/>	Kaolinite sample reflectance
<input checked="" type="checkbox"/>	HgAr in DC corrected Raw Digital Numbers
Configuration File - ASD.INI	
<input checked="" type="checkbox"/>	Calibration number
<input checked="" type="checkbox"/>	Start/Step
<input checked="" type="checkbox"/>	Masked pixels listing
<input checked="" type="checkbox"/>	Foreoptics listing
Shipping	
<input checked="" type="checkbox"/>	QA plots: Mylar, Kaolinite, HgAr, NEdL
<input checked="" type="checkbox"/>	Final cal data re-installed and backed up
<input checked="" type="checkbox"/>	RS^2 Software Package Ver. 2.16
<input checked="" type="checkbox"/>	ViewSpec Pro Software Package Ver. 3.09
N/A	Special Release Notes, if applicable
<input checked="" type="checkbox"/>	Radiometric Calibration Certificate
	lamp #: F627 panel #: 12137-A
<input checked="" type="checkbox"/>	Packing list printed
<input checked="" type="checkbox"/>	Packing list matches Sales Order
<input checked="" type="checkbox"/>	Label computer, disks, p-grip



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### FieldSpec Full Range

### Quality Assurance Certificate

This document certifies that the instrument listed meets Analytical Spectral Devices, Inc. standard of quality. The instrument has passed and completed all tests and procedures listed and has been found to meet or exceed the following specifications.

Spectral Range:	350-2500nm
Spectral Resolution:	3nm at 700nm 10nm at 1400nm and 2100nm
Scanning Time:	100ms
Sampling Interval:	1.4nm at 350-1050nm 1nm at 1000-2500nm
Wavelength Accuracy:	± 1nm
Noise Equivalent Radiance:	1.4E-9 W/cm <sup>2</sup> /nm/sr at 700nm 2.4E-9 W/cm <sup>2</sup> /nm/sr at 1400nm 8.8E-9 W/cm <sup>2</sup> /nm/sr at 2100nm

Comments:

Date: 5/9/2003

Quality Assurance Signature:

*Margaret Clarke*