

Calibration Report: Spectroradiometer
s/n: 660
ECN: 1741127

18 June 2002

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

SUMMARY

Calibration date: 18 June 2002

Next Calibration due: 18 June 2004

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 18 June 2002.

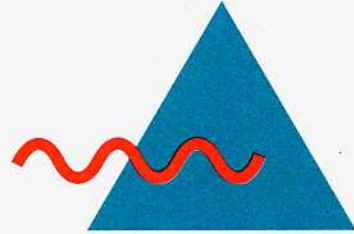
Model: FR
Serial Number: 660

The instrument response files for each foreoptic are installed on the computer operating the instrument. Instrument response files are as follows: **Ni660_8.RAW**, **1i660_8.RAW**, **5i660_8.RAW**, **8i660_8.RAW**, **18i660_8.RAW**, **COS660_8.RAW**.

Irradiance Standard Vendor, Lamp number and File Name, used for Irradiance and Radiance calculations: *Optronic Laboratories, Lamp F627*, **LMP660_8.ILL**

Reflectance Standard Vendor, Standard ID, and File Name, used for Radiance calculations: *Labsphere, Target #12137-A*, **BSE660_8.REF**

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



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Spectroradiometer Certificate of Calibration

Unit and Calibration No.: *FSFR 660/8*

Calibration Date: *06/18/02* Lamp No.: *F627* Panel No: *12137-A*

Initial all applicable entries

MC Wavelength
MC Radiometric

Foreoptics:	Bare Fiber	<u> X </u>	8 degree	<u> X </u>
	1 degree	<u> X </u>	10 degree	<u> </u>
	2 degree	<u> </u>	18 degree	<u> X </u>
	3 degree	<u> </u>	RCR	<u> X </u>
	5 degree	<u> X </u>	UW/RCR	<u> </u>

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_8.RAW*, *Ii660_8.RAW*, *5i660_8.RAW*, *8i660_8.RAW*, *18i660_8.RAW*, *COS660_8.RAW*.

Irradiance Standard Vendor, Lamp number and File Name, used for Irradiance and Radiance calculations: *Optronic Laboratories, Lamp F627, LMP660_8.ILL*

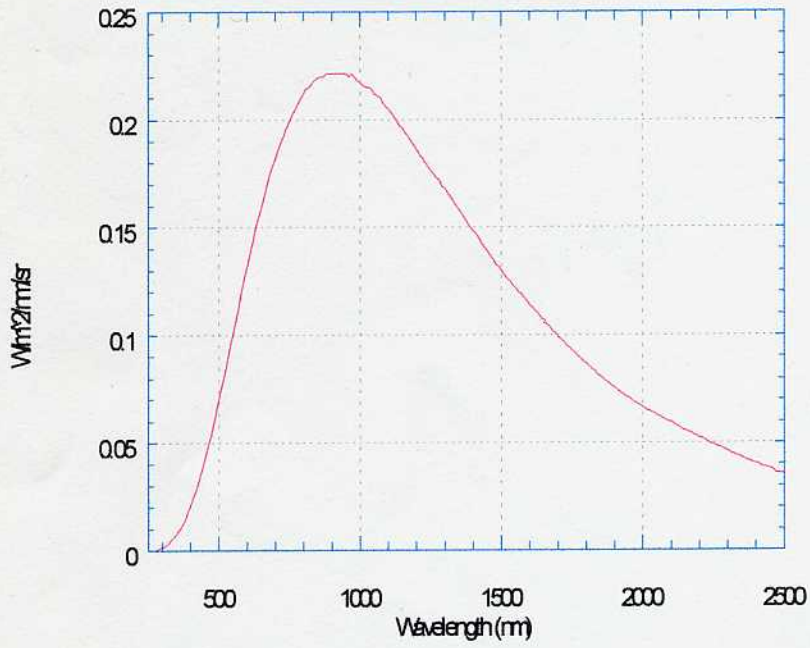
Reflectance Standard Vendor, Standard ID, and File Name, used for Radiance calculations: *Labsphere, Target #12137-A, BSE660_8.REF*

ASD Certified Calibration Engineer/Technician:

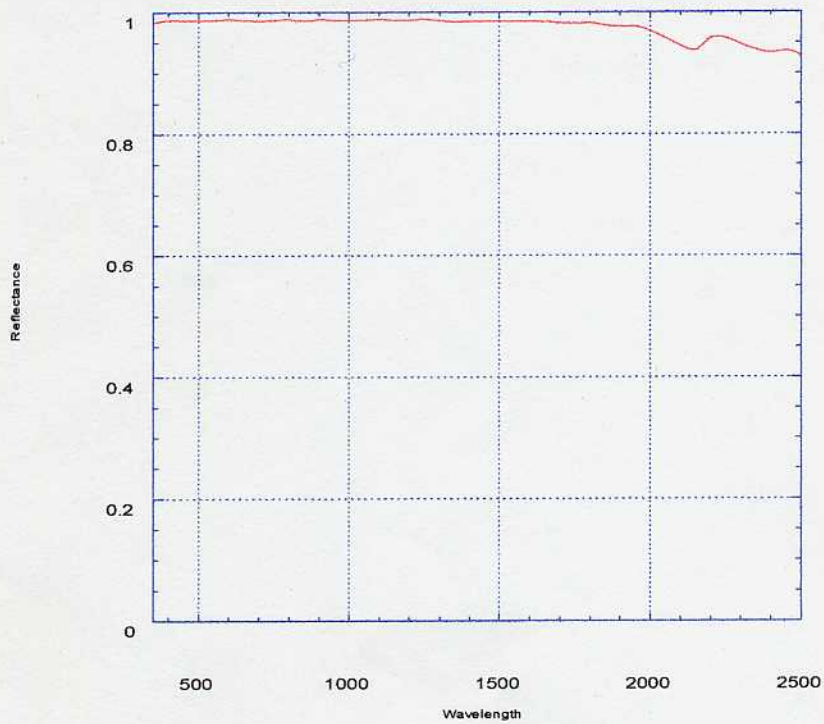
Signature *Margaret C. M...* Date *6/18/02*

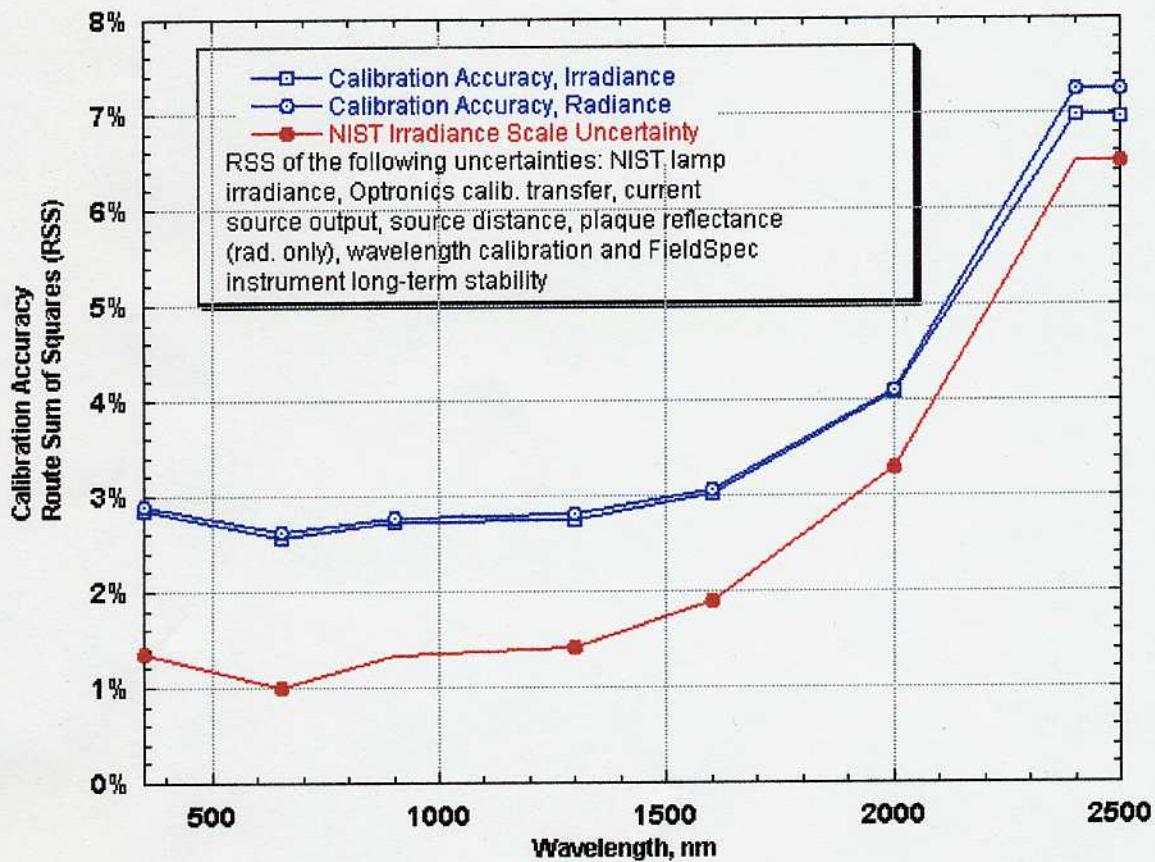
5335 Sterling Drive
Suite A
Boulder, CO 80301 U.S.A.
Phone: 303.444.6522
Fax: 303.444.6825
Web: www.asdi.com

Optronics Laboratory 1000 Watt Irradiance Standard, FEL-627
Cross Calibrated by Primary Standard, FEL-626



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

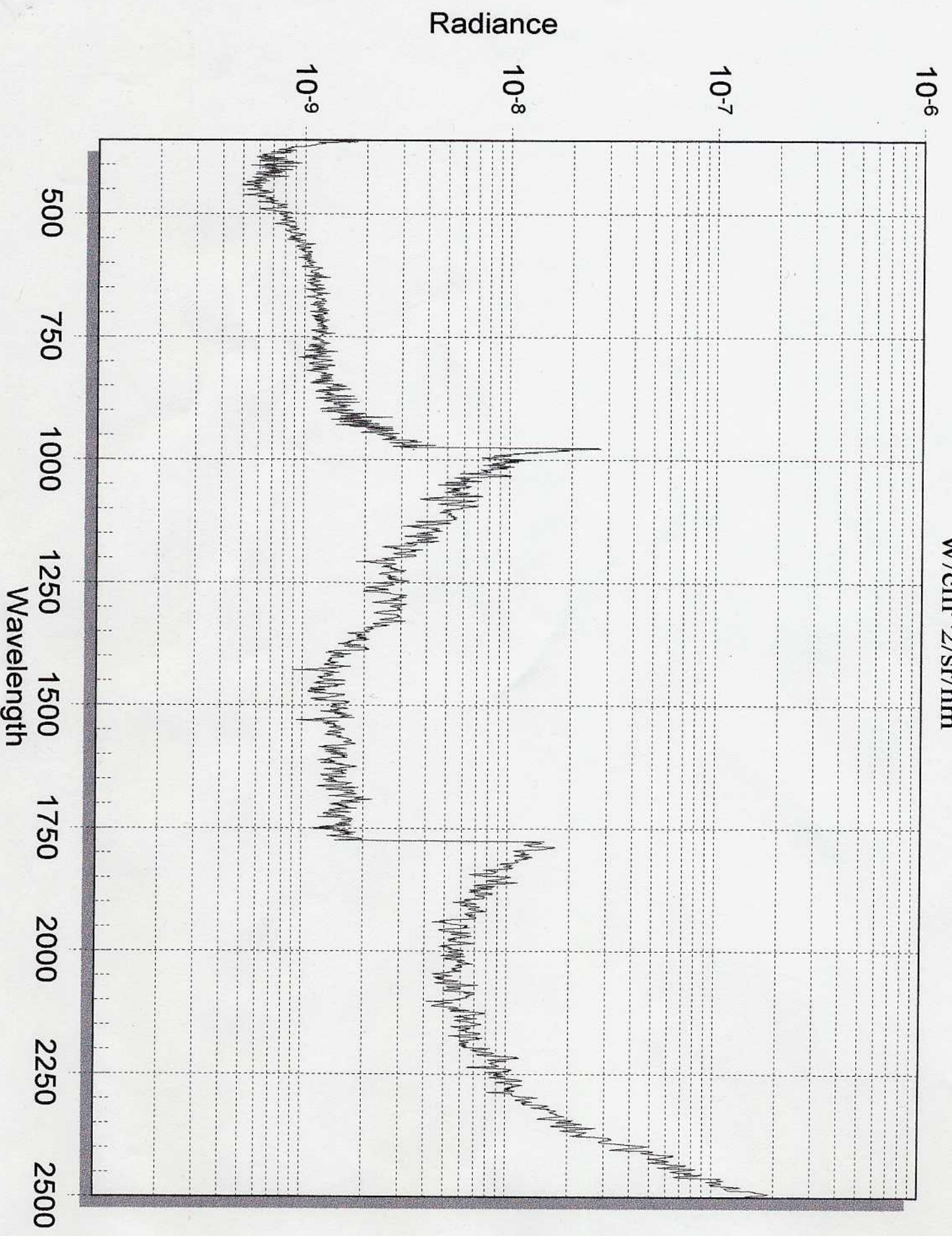




Calibration Accuracy Calculations

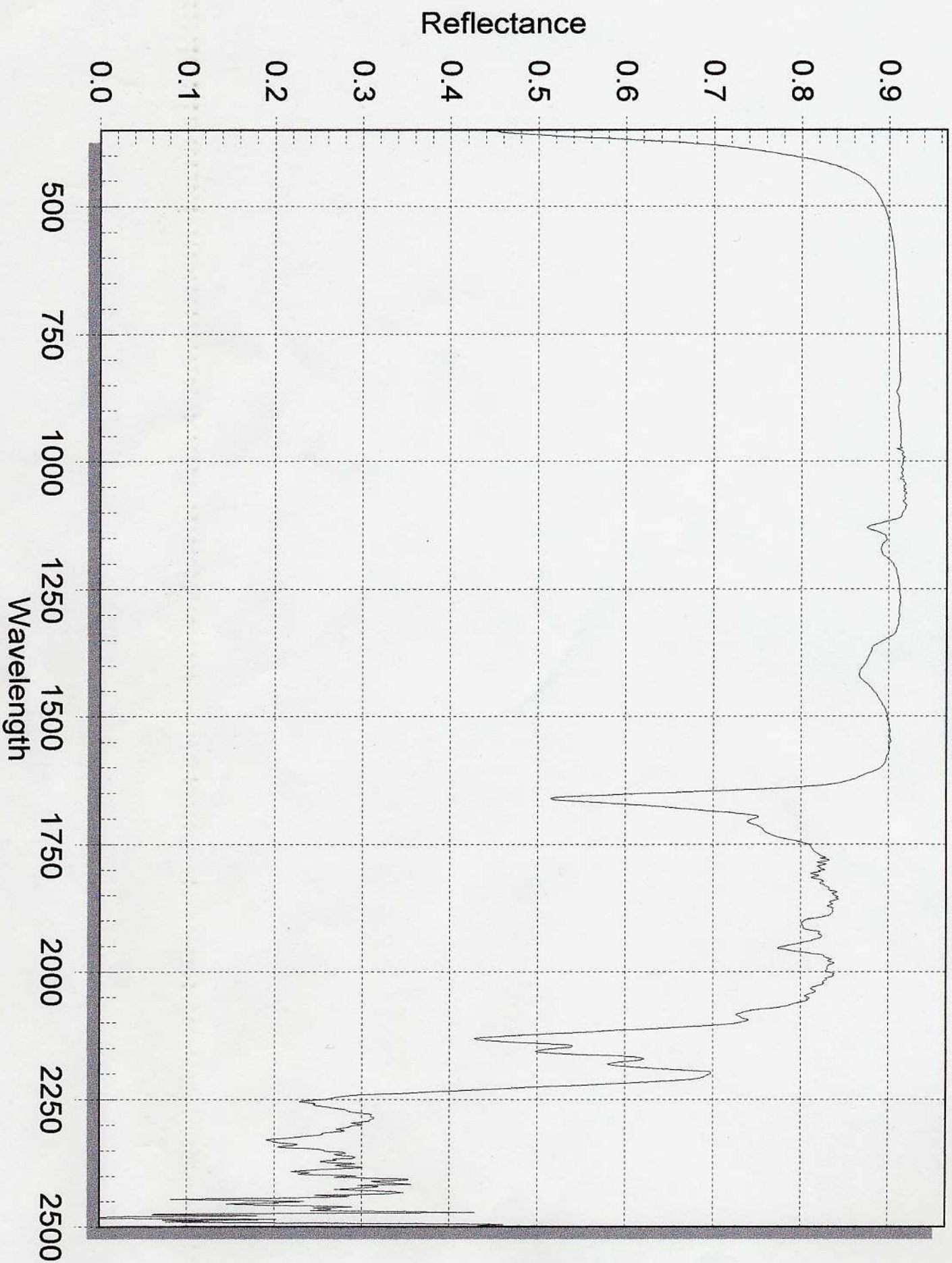
λ nm	NIST	Optronics Transfer	.1% Current Error	2mm Position Error	λ cal.	RSS Non Inst.	FR	Irr. RSS	Labsph. Refl.	Rad. RSS
350	1.35%	0.70%	0.75%	0.80%	2.50%	2.04%	2%	2.85%	0.50%	2.90%
654.6	1.01%	0.40%	0.40%	0.80%	0.88%	1.62%	2%	2.57%	0.50%	2.62%
900	1.34%	0.50%	0.35%	0.80%	0.20%	1.86%	2%	2.73%	0.50%	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 660/8; 6/17/02
W/cm²/sr/nm



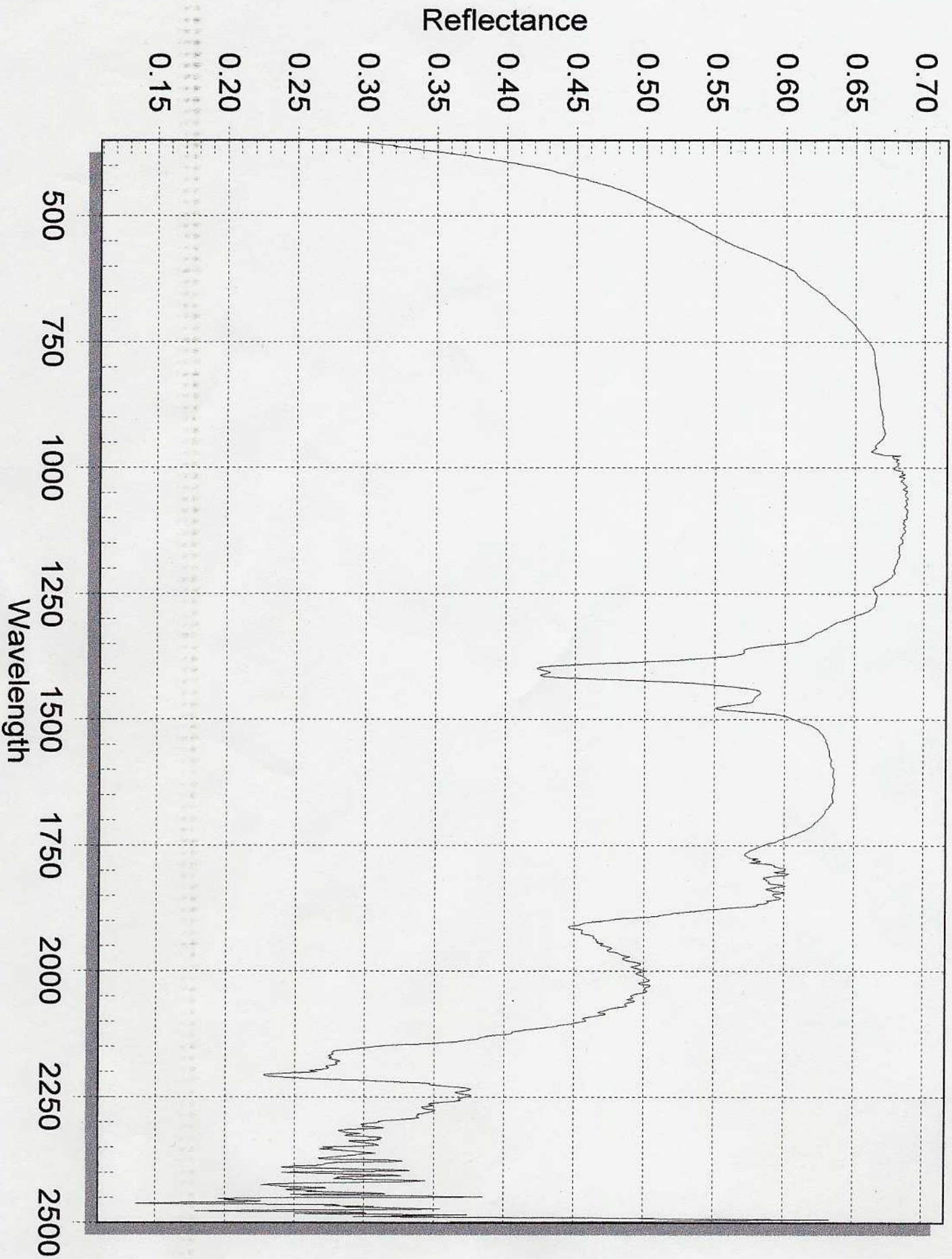
Mylar Unit 660/8; 6/17/02

Reflectance



Kaolinite Unit 660/8; 6/17/02

Reflectance



Instrument Information
 Unit #: 660 Cal #: 8
 SO#: RMA#: 1014
 PC Make & SN#: NEC 75002764

Computer Boot & Setup

X	AC Power up sequence
X	Processor speed
X	Ram
X	Hard Drive
X	Display Settings
X	Parallel Port Mode: Bi-directional
X	Turn off Power Savings
X	Configure Shortcuts
X	Black and white option
X	Install ViewSpec Pro

FieldSpec Power

X	Power on
X	Battery status light
X	Battery power
X	Modified auto adapter setup

Software and System operation

X	Optimization
X	Swir Noise level
X	white reference
X	Masked pixels
X	Vnir noise level
X	Shutter operation
X	NEdL
X	Radiometric tests - VS Pro & Realtime
X	Computer drive test
X	Spectrum save features - multiple
X	Foreoptic Check

Wavelength Checks

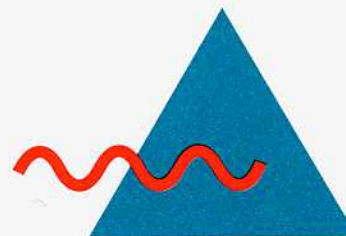
X	Mylar transmittance, 14 mil thicknes
X	Kaolinite sample reflectance
X	HgAr in DC corrected Raw Digital Numbers

Configuration File - ASD.INI

X	Foreoptics listing
X	Start/Step
X	Masked pixels listing
X	Calibration number

Shipping

X	QA plots-mylar, kaolinite, HgAr, NEdL
X	Final cal data re-installed and backed up
X	FR installation disks
N/A	Special Release Notes, if applicable
X	Radiometric Calibration Certificate
	lamp #: F627 panel #: 12137-A
X	Packing list printed
X	Packing list matches Sales Order
X	Label computer, disks, foreoptics, p-grip
X	Recorded on QA log



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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 @ 700nm 10nm @ 1400nm & 2100nm
Scanning Time	100ms
Sampling Interval	1.4nm @ 350 - 1050nm 1nm @ 1000-2500nm
Wavelength Accuracy	+/- 1nm
Noise Equivalent Radiance	1.4E-9 W/cm ² /nm/sr @ 700nm 2.4E-9 W/cm ² /nm/sr @ 1400nm 8.8E-9 W/cm ² /nm/sr @ 2100nm

Comments:

Date: 6/17/02

Quality Assurance Signature:

Margaret C. Stebbins

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 Boulder, CO 80301 U.S.A.
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