

Calibration Report: Spectroradiometer

s/n: 648

ECN: 1429915

18 July 2002

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

SUMMARY

Calibration date: 17 June 2002

Next Calibration due: 17 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 17 June 2002.

Model: FR

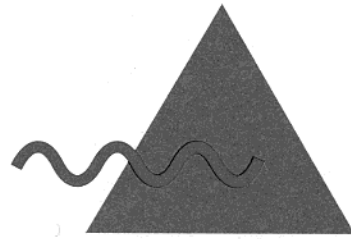
Serial Number: 648

The instrument response files for each foreoptic are installed on the computer operating the instrument. Instrument response files are as follows: **Ni648_6.RAW**, **1i648_6.RAW**, **5i648_6.RAW**, **8i648_6.RAW**, **18i648_6.RAW**, **COS648_6.RAW**.

Irradiance Standard Vendor, Lamp number and File Name, used for Irradiance and Radiance calculations: *Optronic Laboratories, Lamp F627*, **LMP648_6.ILL**

Reflectance Standard Vendor, Standard ID, and File Name, used for Radiance calculations: *Labsphere, Target #12137-A*, **BSE648_6.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 648/6*

Calibration Date: *06/17/02* Lamp No.: *F627* Panel No: *12137-A*

Initial all applicable entries

MCA Wavelength
MCA Radiometric

Foreoptics:	Bare Fiber	<u>X</u>	8 degree	<u>X</u>
	1 degree	<u>X</u>	10 degree	
	2 degree		18 degree	<u>X</u>
	3 degree		RCR	<u>X</u>
	5 degree	<u>X</u>	UW/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: *Ni648_6.RAW*, *Ii648_6.RAW*, *5i648_6.RAW*, *8i648_6.RAW*, *18i648_6.RAW*, *COS648_6.RAW*.

Irradiance Standard Vendor, Lamp number and File Name, used for Irradiance and Radiance calculations: *Optronic Laboratories, Lamp F627, LMP648_6.ILL*

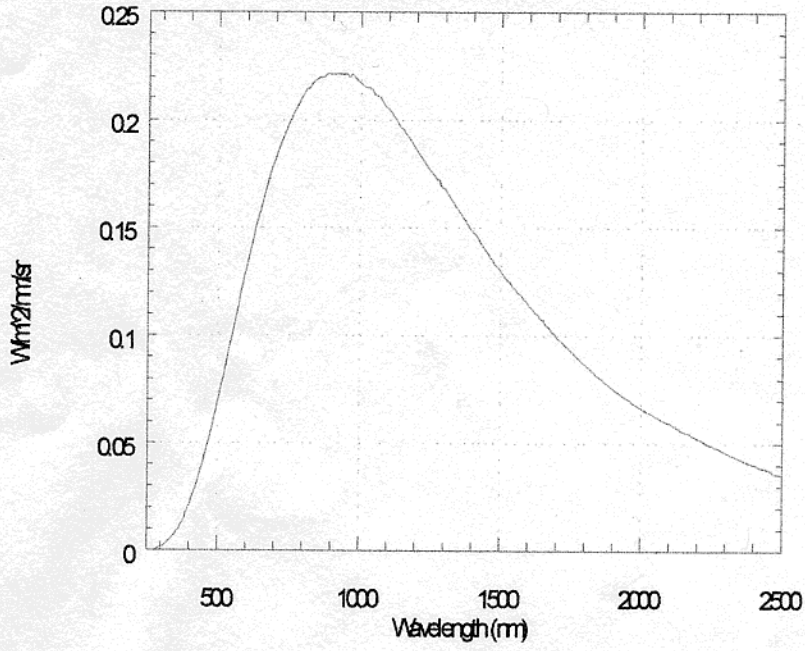
Reflectance Standard Vendor, Standard ID, and File Name, used for Radiance calculations: *Labsphere, Target #12137-A, BSE648_6.REF*

ASD Certified Calibration Engineer/Technician:

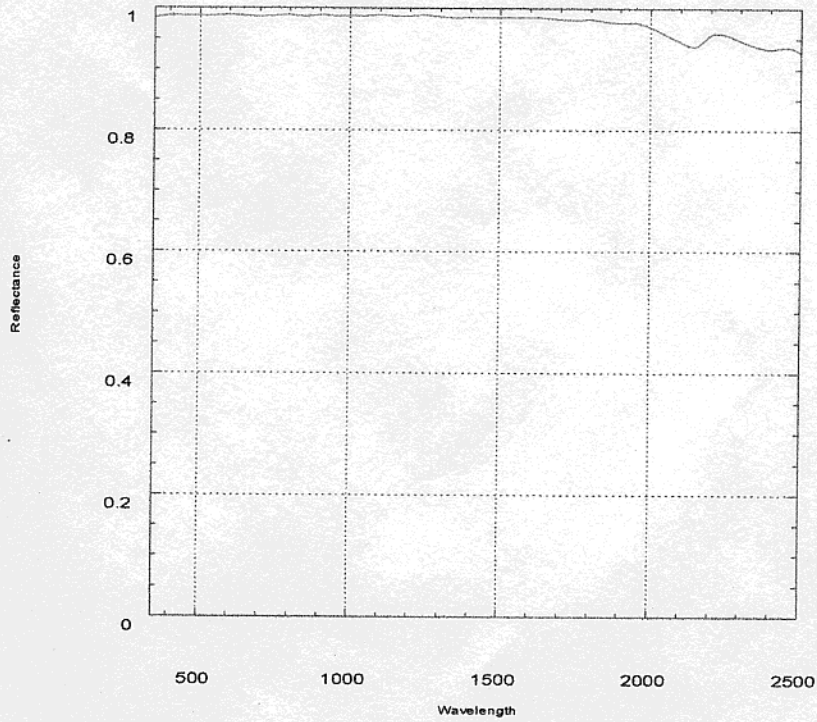
Signature *Margaret C. Miller* Date *6/17/02*

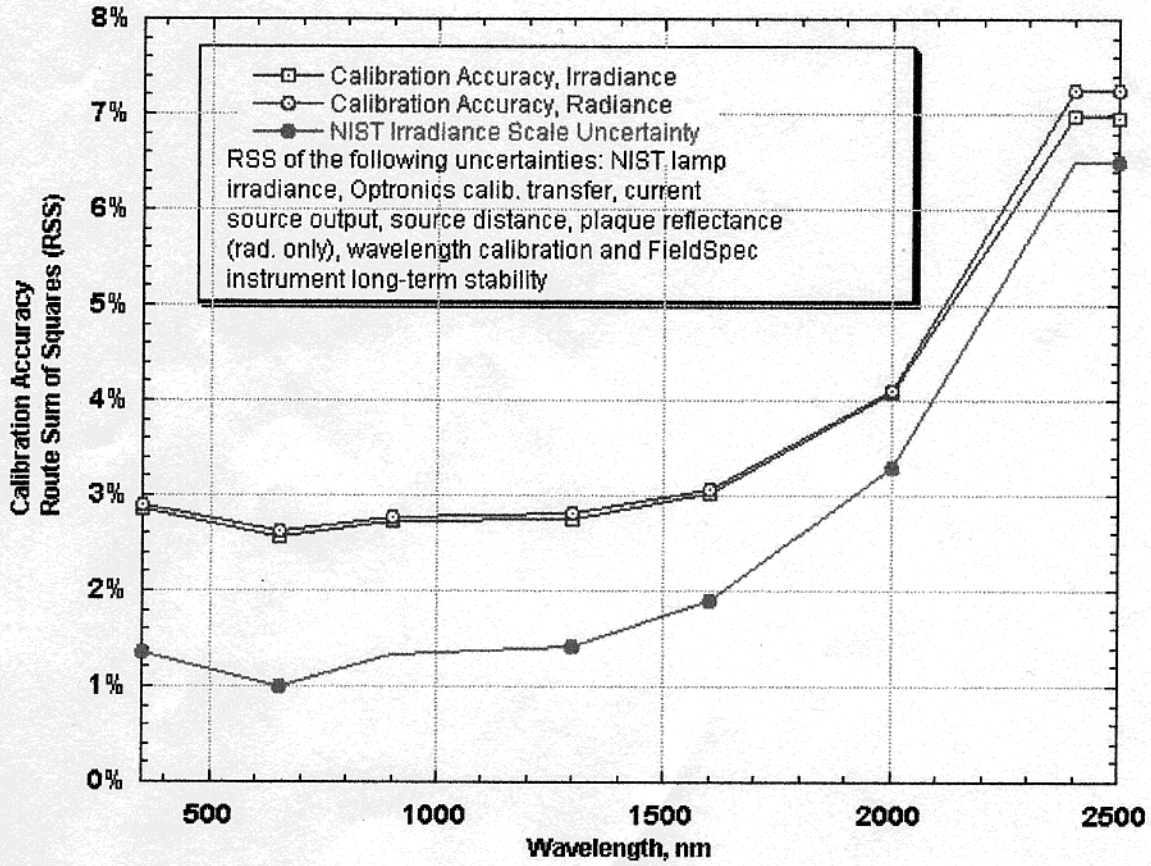
5335 Sterling Drive
Suite A
Boulder, CO 80301 U.S.A.
Phone: 303.444.6522
Fax: 303.444.6825
Web: www.asdi.com

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



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

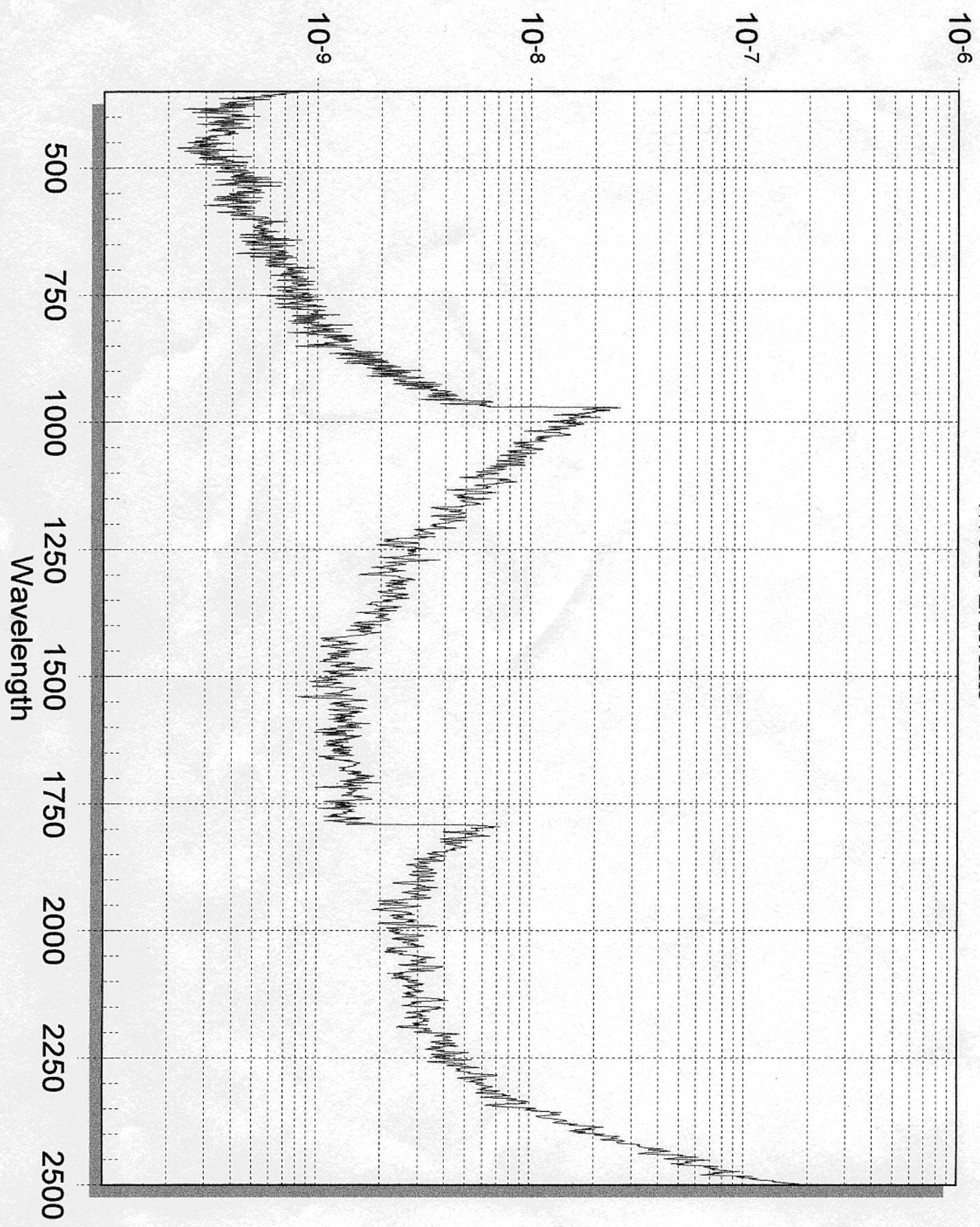




Calibration Accuracy Calculations

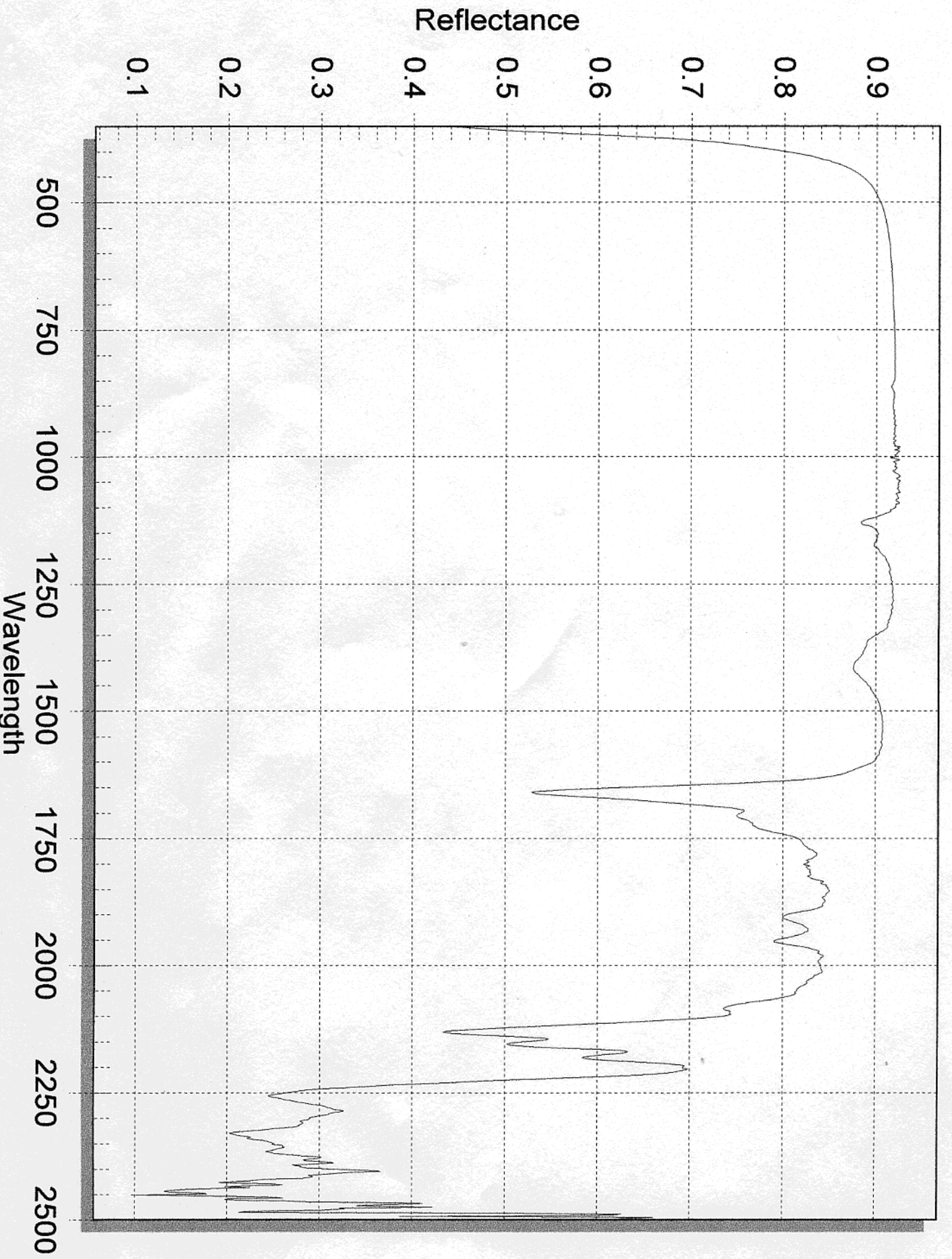
λ nm	NIST	Optronics Transfer	.1% Current Error	2mm Position Error	λ cal.	RSS Non Inst.	FR Irr. RSS	Labsph. Refl.	Rad. RSS	
350	1.35%	0.70%	0.75%	0.80%	2.50%	2.04%	2%	2.85%	0.50%	2.90%
654.6	1.01%	0.40%	0.40%	0.80%	0.88%	1.62%	2%	2.57%	0.50%	2.62%
900	1.34%	0.50%	0.35%	0.80%	0.20%	1.86%	2%	2.73%	0.50%	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 648/6; 06/17/02
W/cm²/sr/nm

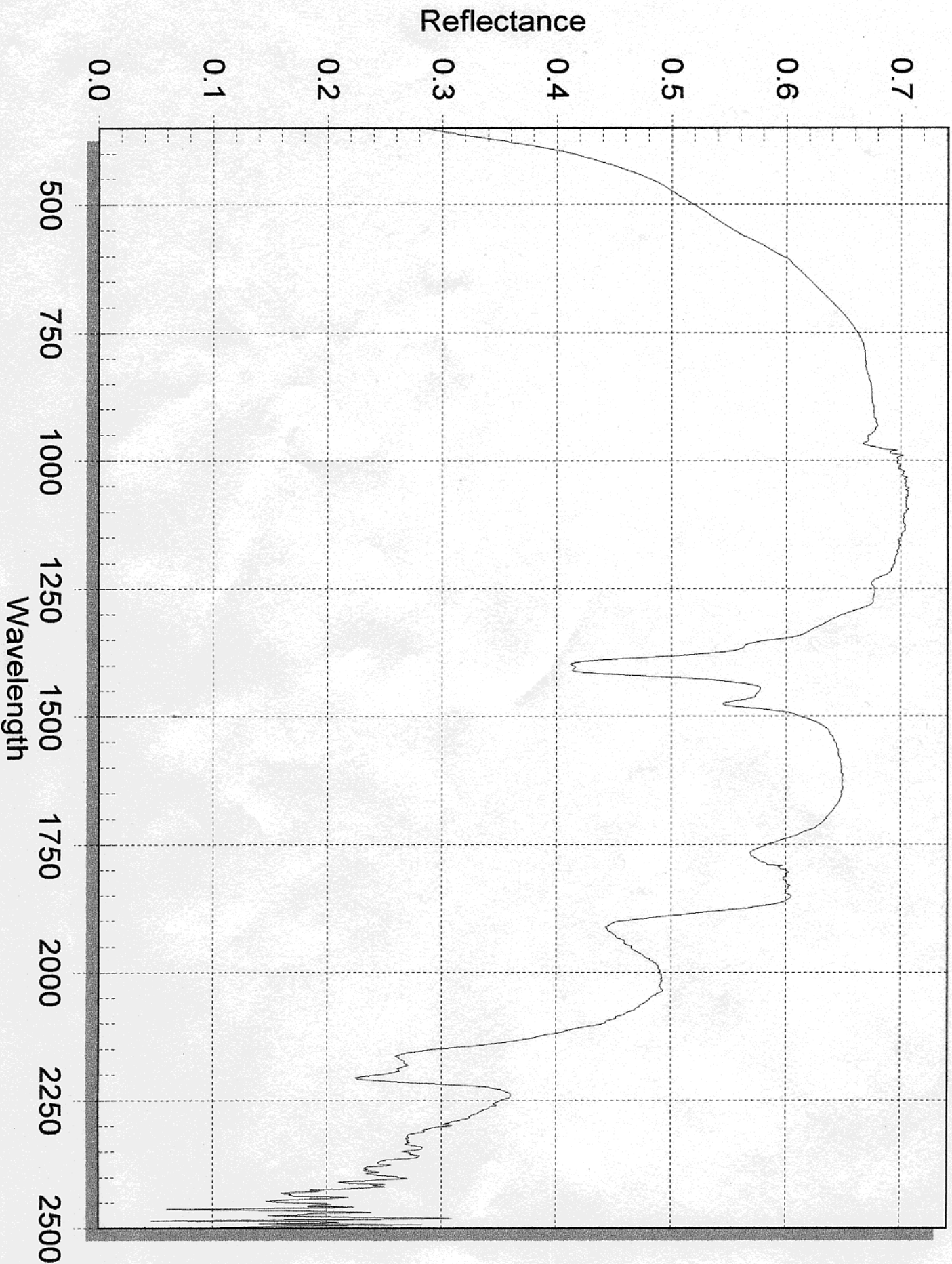


Mylar Unit 648/6; 06/17/02

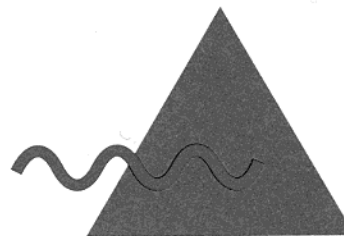
Reflectance



Kaolinite Unit 648/6; 06/17/02
Reflectance



Instrument Information
 Unit #: 648 Cal #: 6
 SO#: RMA#: 1015
 PC Make & SN#: NEC 75002740



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FieldSpec Full Range

Computer Boot & Setup

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

FieldSpec Power

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

Software and System operation

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

Wavelength Checks

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

Configuration File - ASD.INI

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

Shipping

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

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/cm²/nm/sr @ 700nm
 2.4E-9 W/cm²/nm/sr @ 1400nm
 8.8E-9 W/cm²/nm/sr @ 2100nm

Comments:

Date: 6/17/02

Quality Assurance Signature:

Margaret C. Mcken

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