

Calibration Report: Spectroradiometer
s/n: 648
ECN: 1429915

30 June 2003

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

SUMMARY

Calibration date: 28 May 2003

Next Calibration due: 28 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 28 May 2003.

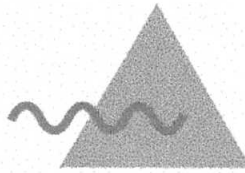
Model: FR
Serial Number: 648

The instrument response files for each foreoptic are installed on the computer operating the instrument. Instrument response files are as follows: **Ni648_7.RAW**, **1i648_7.RAW**, **5i648_7.RAW**, **8i648_7.RAW**, **18i648_7.RAW**, **COS648_7.RAW**.

Irradiance Standard Vendor, Lamp number and File Name, used for Irradiance and Radiance calculations: *Optronic Laboratories, Lamp F627*, **LMP648_7.ILL**

Reflectance Standard Vendor, Standard ID, and File Name, used for Radiance calculations: *Labsphere, Target #12137-A*, **BSE648_7.REF**

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



ANALYTICAL SPECTRAL DEVICES, INC.
Portable, Accurate Solutions From Light

5335 Sterling Dr., Suite A, Boulder, CO 80301
(303) 444-6522 Fax: (303) 444-6825
Website: www.asdi.com

SPECTRORADIOMETER CERTIFICATE OF CALIBRATION

UNIT AND CALIBRATION NO.: *FSFR 648/7*

CALIBRATION DATE: *5/28/03* 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: *Ni648_7.RAW*, *Ii648_7.RAW*, *5i648_7.RAW*, *8i648_7.RAW*, *18i648_7.RAW* and *Cos648_7.RAW*.

Irradiance Standard Vendor, Lamp number and File Name, used for Irradiance and Radiance calculations: *Optronic Laboratories, Lamp F626, LMP648_7.ILL*

Reflectance Standard Vendor, Standard ID, and File Name, used for Radiance calculations: *Labsphere, Target #12137-A, BSE648_7.REF*

ASD Certified Calibration Engineer/Technician:

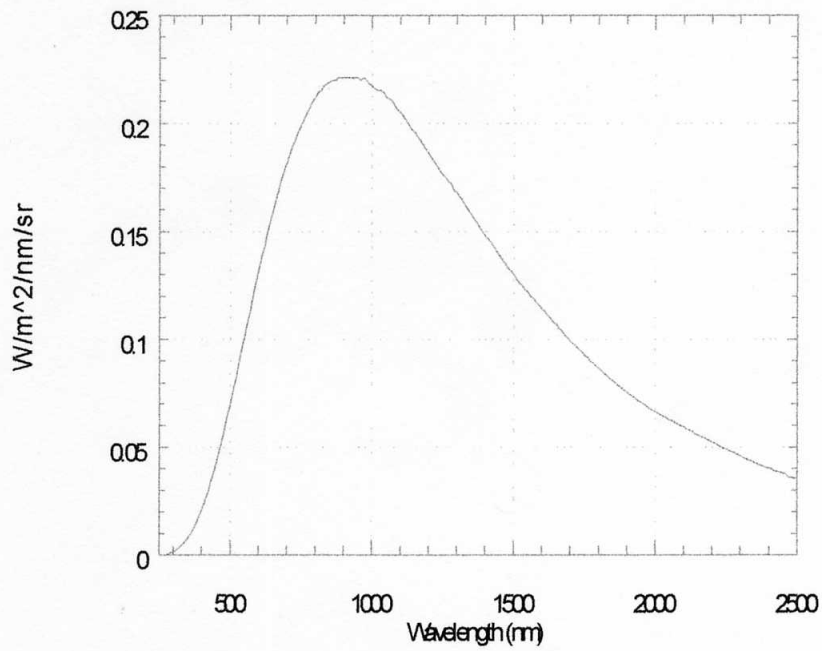
Signature

Margaret P. Steinhilber

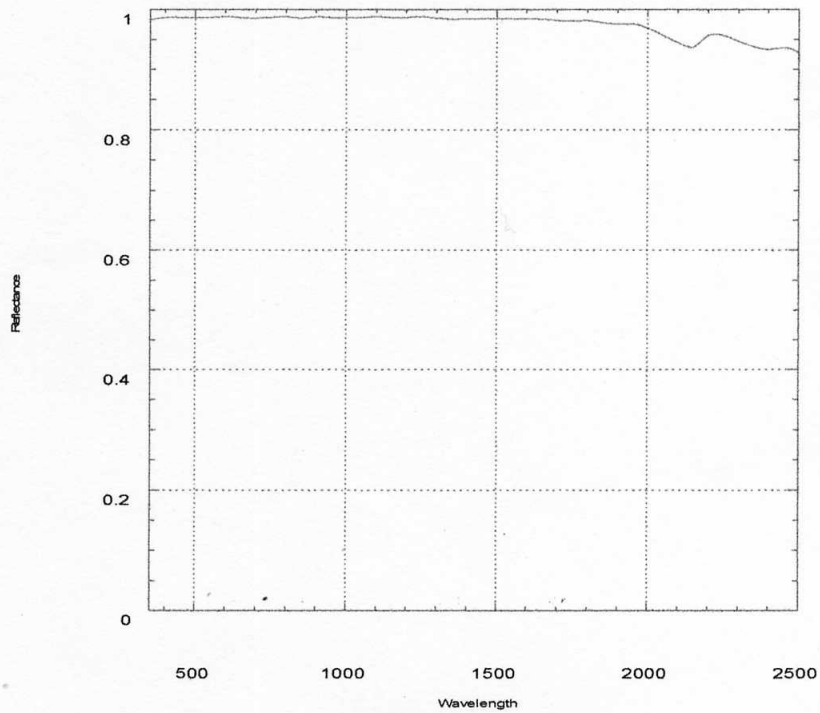
Date

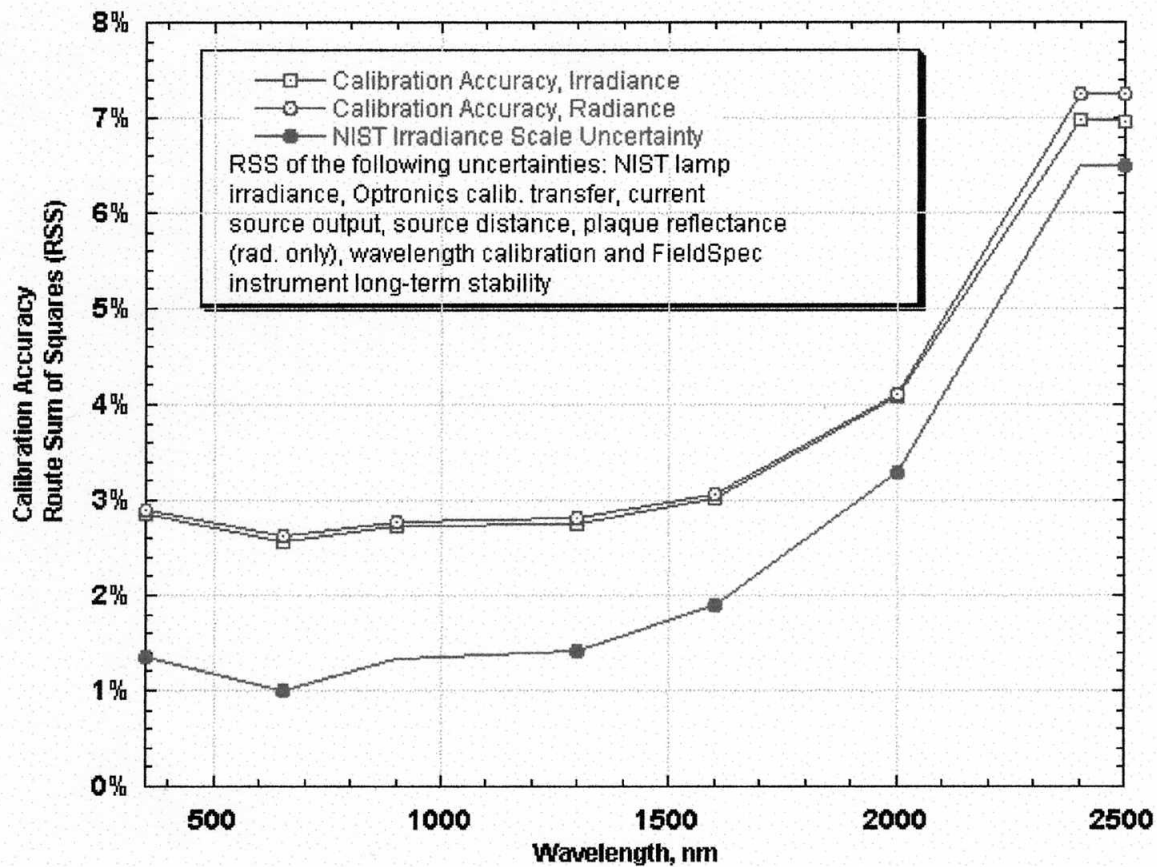
5/28/03

Optronics Laboratory 1000 Watt Irradiance Standard, FEL-626



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

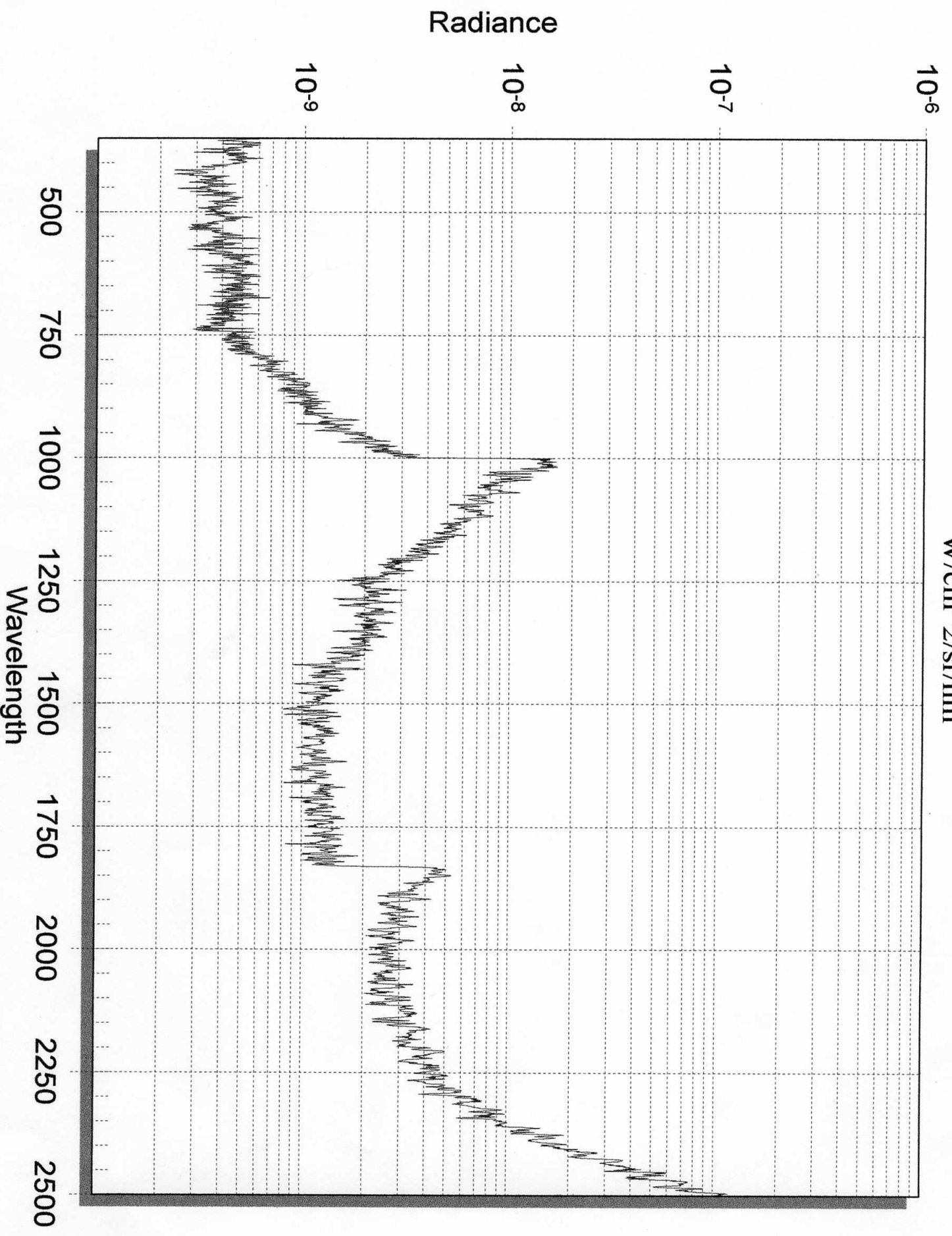




Calibration Accuracy Calculations

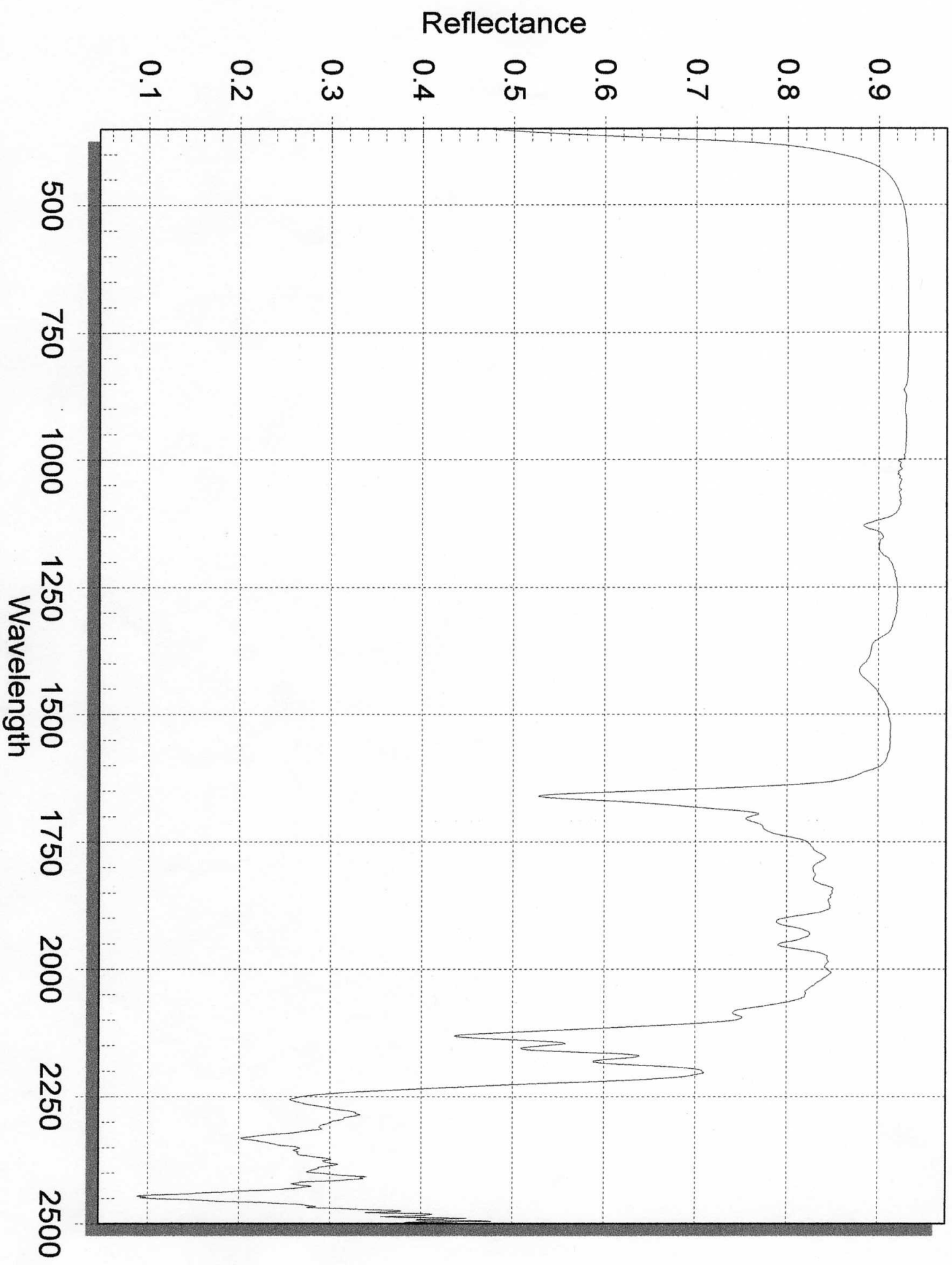
λ nm	NIST	Optronics Transfer	.1% Current Error	2mm Position Error	λ cal.	RSS Non Inst.	FR Irr. RSS	Labsph. Refl.	Rad. RSS	
350	1.35%	0.70%	0.75%	0.80%	2.50%	2.04%	2%	2.85%	0.50%	2.90%
654.6	1.01%	0.40%	0.40%	0.80%	0.88%	1.62%	2%	2.57%	0.50%	2.62%
900	1.34%	0.50%	0.35%	0.80%	0.20%	1.86%	2%	2.73%	0.50%	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 648/7; 05/27/03
W/cm²/sr/nm

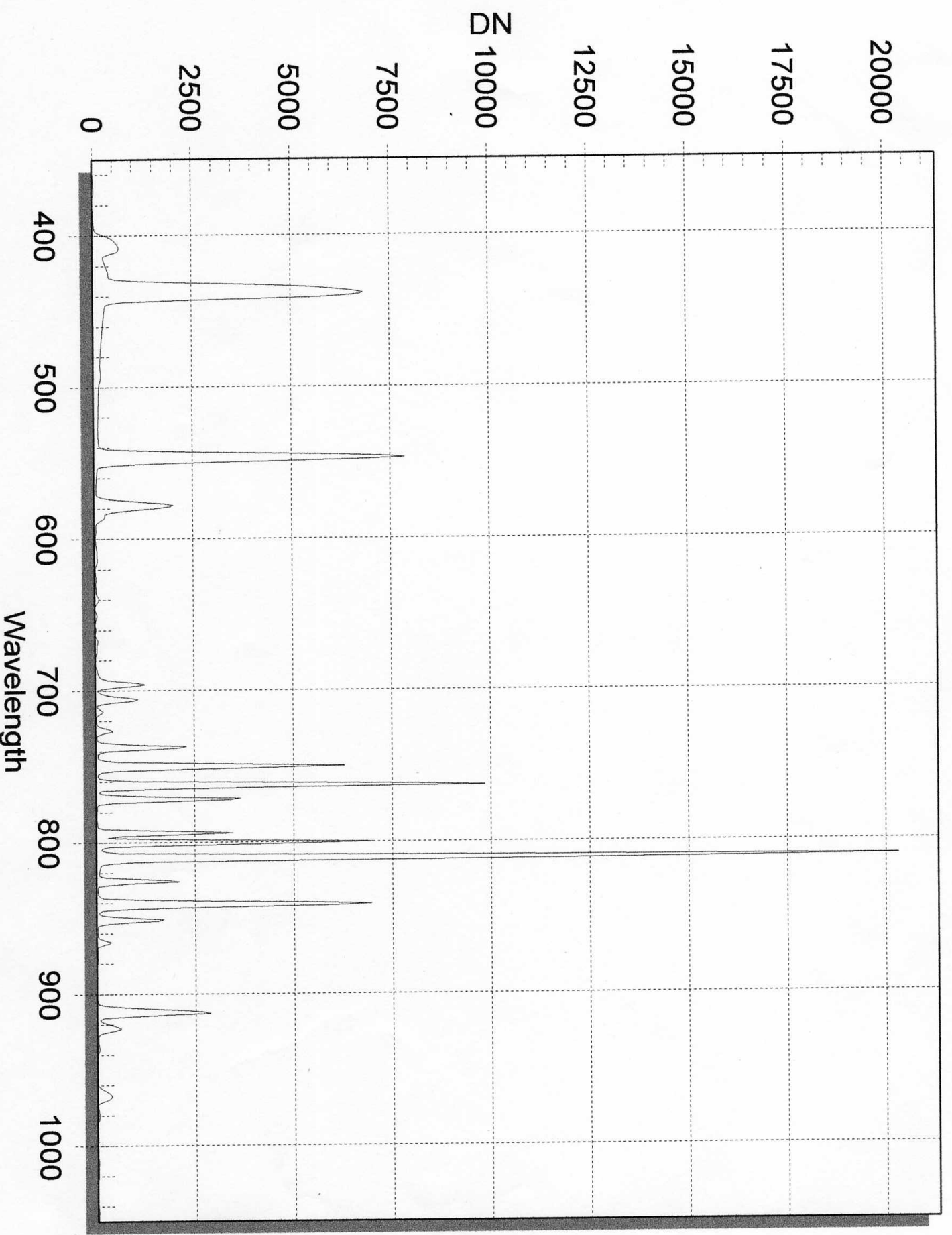


Mylar Unit 648/7; 05/27/03

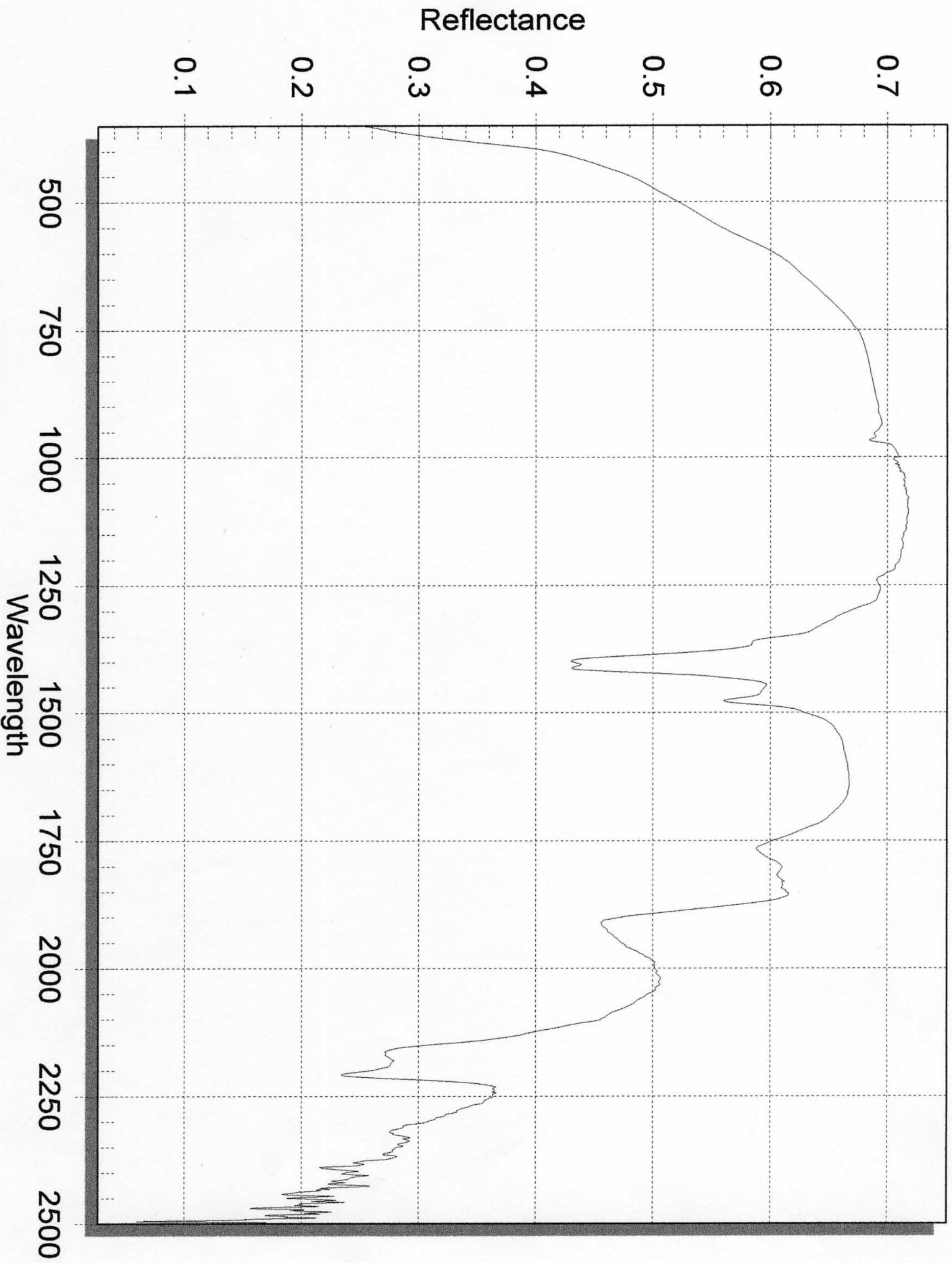
Transmittance

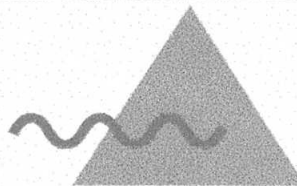


Mercury Argon Unit 648/7; 05/27/03
Raw DN



Kaolinite Unit 648/7; 05/27/03
Reflectance





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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: ± 1 nm
Noise Equivalent Radiance: $1.4E-9$ W/cm²/nm/sr at 700nm
 $2.4E-9$ W/cm²/nm/sr at 1400nm
 $8.8E-9$ W/cm²/nm/sr at 2100nm

Comments:

Date: 5/9/2003

Quality Assurance Signature:

Instrument Information

Unit #: 648 Cal #: 7
SO #: C993739A RMA #: 1126
PC Make: NEC
SN #: 75002740
Operating System: DrDOS

Computer Boot & Setup

② AC Power up sequence
② Processor speed
NA Ram
NA Hard Drive
NA Display Settings Cleared
② Parallel Port Mode: Bi-directional
② Power Savings Turned Off
NA Install ViewSpec Pro supplied diskettes
② Install RS^2
NA Black and white option
NA Install Technical Guides

FieldSpec Power

② Power on
NA Battery status light
NA Battery power

Software and System Operation

② Optimization
② Vnir Noise level
② Swir Noise level
② White reference
② Masked pixels
② Shutter operation
② NEdL
② Radiometric tests - VS Pro & Realtime
NA CD/Floppy drive test - transferring files
② Spectrum save features - multiple
② ForeOptic check

Wavelength Checks

② Mylar transmittance, 14 mil thickness
② Kaolinite sample reflectance
② HgAr in DC corrected Raw Digital Numbers

Configuration File - ASD.INI

② Calibration number
② Start/Step
② Masked pixels listing
② Foreoptics listing

Shipping

② QA plots: Mylar, Kaolinite, HgAr, NEdL
② Final cal data re-installed and backed up
② RS^2 Software Package Ver. 2.16
② ViewSpec Pro Software Package Ver. 3.09
N/A Special Release Notes, if applicable
② Radiometric Calibration Certificate
lamp #: F627 panel #: 12137-A
② Packing list printed
② Packing list matches Sales Order
② Label computer, disks, p-grip