

## CIE Div 8 TC8-10 Office Lighting Meeting Minutes

6-September-2006 TC8-10 Meeting notes

Attendees: Danny Rich, Todd Newman, János Schanda, Phil Green, Dave McDowell, Eric Zeise, Yasuki Yamauchi, Ann McCarthy

### Future meetings:

Next meeting will be a teleconference on Oct 24.

**Time 11am - 1pm Eastern for this meeting.**

Face-to-face meeting - at CIC - TBD time and date. [János will not attend. Nakaya-san will attend this meeting for Japan. Phil Green prefers the meeting near or at the beginning of the week.]

### 1. Worldwide test sites for pilot (how many, who)

Discussion:

Sites with full UV measurement capability, i.e., 300nm and above:

[Danny Rich, Yamauchi-san(TBD)] [see appendix regarding instrument usage for this]

Notes on this measurement:

- This will be an irradiance measurement. The reading is taken by putting the irradiance measuring head on the wall, or other surface on which measurement is desired.
- Al Kravetz may be able to bring a radiance measurement instrument [visible light range] to Danny's site so that the two instruments can be used together. This will give us one direct comparison case.
- Yamauchi-san will look for a site with UV measurement capability in Japan (300nm and above). He is meeting soon with others who are interested in this work and will inquire.

Sites with 380nm and up measurement capability [visible light measurement]:

[Phil Green, Ann McCarthy, János Schanda, Eric Zeise]

Notes on this measurement:

- These will be radiance measurements, e.g., use a telespectroradiometer with the white plaque to calibrate, and then take the readings off of with the designated white paper located on wall, on desk, etc.

### 2. Sharing the calibrator

A. Status of construction and ETA for availability

Discussion:

János will be able to start circulating the calibrator mid-October, i.e., 2<sup>nd</sup> half of October. The box will be 20 inches high, 8 inches square.

A Spectralon plaque is used in the calibrator with a LED light source to calibrate the radiance measurement devices. Note that Spectralon is very delicate. We cannot use this for the general measurements, e.g., cannot put on wall. Tile relative SPD is traceable to NIST. Tile characteristics are indirectly traceable.

B. Process and timetable for sharing the calibrator device (who pays for shipping, etc.)

Discussion:

It will take 12 weeks just to complete the shipping and sharing process if we each complete using the calibrator within two weeks.

**Each person should make calibration measurements within two weeks of receiving.**

Candidate shipping sequence:

János → Phil Green  
Phil → Danny  
Danny → Ann  
Ann → Eric  
Eric → Yamauchi  
Yamauchi → János

- When we start the shipping process - if it is possible to hand carry to a meeting, etc., to pass it to the next person then we will do that.
- We will also need also the special paper from Bryon with the calibrator.
- Todd will contact Bryon and ask him to send a stack to János. Then each person will keep some paper and pass on the rest to the next person when shipping the calibrator.
- Todd will see János at end of October in CIE board meeting in Vienna. This may start the shipping process - perhaps Todd can bring it to CIC?

### 3. Planning the pilot study:

Each person to make measurements in **two offices**: with window, office with no window.

*There are actually four categories of offices: cube farm, full wall office with door, office with window, office with no window. We should ensure before finalizing pilot plan that we will have at least two measurement sets from each office category.*

5 measurement locations within each office:

- Desk preferred work space [45 degrees]
- Wall not lit by window [perpendicular]
- Wall lit by window [perpendicular]
- Monitor face with paper [perpendicular - with monitor off measures stray light - use to evaluate partial adaptation]
- Monitor face with NO paper [flare - computed from measurement with paper on surface of monitor and measurement of monitor surface with paper removed]

### Action items toward the pilot study plan:

- Ann to sketch office layouts in Visio - birds eye view and elevation angles - by the Oct 24<sup>th</sup> meeting.
  - Four basic types of offices: Cube farms and single offices X window and no window.
- Phil to write up measurement geometries before next meeting. Write-up to include standard method for using the paper and attaching it to the monitor - by the Oct 24<sup>th</sup> meeting.
- János to circulate guideline for using calibrator - for review at October 24<sup>th</sup> meeting. We can ask questions at the next meeting which will give him time to finalize before sending the calibrator.

### 4. Process to finalize guidelines

- A. Who is responsible to review? Edit? Final review?
- B. What is the timetable?

Everyone agreed to have review comments send to the mail reflector within two weeks, that is, by September 20. Janos will send directions for using the calibrator in 1 month's time. These will be integrated into the guidelines. Todd will integrate the comments and send them out for a second review. We can review and ask questions at our next meeting, Oct 24.

5. Timetable for returning measurements

We agreed everyone should distribute measurements within the committee as they become available.

Agenda items NOT Discussed - move these to a later meeting:

2.B. Cost of shipping

3. Planning the pilot study: who will document the instrument spec [similar to what Danny has provided] for the visible light instruments

6. Process for analyzing and comparing measured results

Pertinent follow-on discussion:

Todd:

>On that note, I have a follow up question of my own about returning  
>measurements. Yasuki, do you think that you could both take your  
>calibration measurements and your office measurements within two weeks  
>of receiving the LED calibrator? If so, then we can set an estimate on  
>when we'll have our final measurements in place.

Yasuki:

My feeling is that two week is not long enough, as I am trying to calibrate both UV and normal instruments.

I was wondering whether we need to wait until the calibration is done.

As we have no way to change the valued provided by the instruments, we may be able to measure the room in advance, followed by some post-measure processing of the data.

And I would be glad if approximately when I will get the stuffs.

(2 weeks by the number of the preceding locations? How about holiday season? Should we take it in consideration?)

Todd:

>The last open question that we did not address in our meeting was the  
>timetable and process for analyzing the data from the pilot study. I  
>suggest that we can start the analysis as soon as we have measurements  
>from three sites. This is not enough to produce any statistically  
>meaningful result, of course. But it should be enough to start testing  
>our analytical tools and checking that the results make sense. As we  
>gather more data, we can re-run the tests. But my experience in running  
>psychophysical tests is that you don't need a lot of data to start  
>finding problems with the analytical tools.

Yasuki:

I agree with you. We may be able to start the analysis with the first results. There would be a lot of potential issues, so sooner the better, I think.

## Appendix: UV + Visible Spectroradiometer configuration and options from Danny Rich for use in this project

### Sun Chemical Color Research Laboratory

#### OL Series 756 Portable UV-VIS Spectroradiometer



The OL 756 High-accuracy UV-VIS Spectral Measurement System is our newest state-of-the-art compact, double monochromator system for spectral measurements over the 200 – 800 nm wavelength range.

**With a maximum speed of 200 nm per second (Quickscan Mode), the OL 756 is the fastest scanning portable spectroradiometer available.**

This versatile portable system combines the electronics and optics in a single package and features: a USB interface, high sensitivity, extremely low stray light levels, narrow bandwidths, large dynamic range, and high wavelength accuracy and precision. The OL 756 is ideal for performing solar spectral measurements over the full range in about 3 seconds. It also operates on 12V DC power, providing portability for remote measurements.

Fast and accurate spectroradiometric measurements can be performed in the laboratory or outside with the battery/DC power option for total portability under demanding field conditions. The detector consists of a high sensitivity, temperature-stabilized, S-20 response photomultiplier. The double monochromator utilizes concave, holographic gratings with peak efficiencies at 300 nm. The five sizes of fixed slits that are provided enable the user to vary the half-bandwidth from 0.5 to 10 nm.

**The applications software includes calibration and measurement routines for performing measurements of:**

- Source Spectral Analysis
- Radiance
- Irradiance
- Spectral Reflectance
- Spectral Transmission

Other software features include:

- Color CIE diagrams with zoom capability for precise color studies and sequential measurement result accumulation on the diagram
- An impressive suite of calculations are performed automatically, including chromaticity, CCT, CRI, photobiological parameters, etc.
- Highly flexible plot manipulation shows up to 10 scans on a single graph. Select and/or protect one or many with “hide scan” or “lock scan” features.
- Favorite calibration file list saves searching and selection time by showing recently used files.
- A supervisor password protects data and prevents measurement setups from being altered by unauthorized personnel.
- Results can be sent directly into Excel for custom analysis and into Word templates for custom report generation
- Savitzky-Golay plot smoothing reduces noise while preserving features such as peak height and width.
- Optional ActiveX controls available for custom programming.

A variety of input optics are also available, such as the OL IS-670 6" PTFE coated integrating sphere with near-ideal cosine response for spectral irradiance measurements of the most demanding light sources and matching optical fused silica dome window for use in harsh environments without affecting the cosine response.

**OL 756 Optional Accessories include:**

- Dual Calibration Check Source Module
- Cosine corrected integrating spheres (submersible sphere for underwater measurements up to 20m)
- NIST-traceable standard calibration lamp

**Specifications Table**

Wavelength Range.....	200 to 800 nm
Wavelength Accuracy.....	± 0.15 nm
Wavelength Resolution.....	0.025 nm
Wavelength Repeatability.....	± 0.05 nm
Optical Half Bandwidth (FWHM).....	0.4 – 10 nm
Stray Light Level .....	< 10 <sup>-8</sup> @ 285 nm
Spectroradiometric Accuracy (Normal mode, Uncertainty @ k=2).....	1%(UVA-Vis) 3% (UVB-UVC)
Measurement Modes .....	Manual, Normal, Quickscan
Maximum Scan Speed (200 – 800 nm) .....	200 nm/sec (Quickscan Mode)
Noise Equivalent Irradiance(W/cm <sup>2</sup> nm).....	1.7 E-7 @ 300nm 1 E-7 @ 500 nm 5.6 E-7 @ 700 nm
Detector.....	TE-cooled S-20 Response Photomultiplier
PMT High Voltage Range.....	0 – 1100V
Communication Interface.....	USB / RS-232
Operating Temperature.....	10 – 40°C
Power Consumption .....	12VDC / 3A max or 115VAC / 1.2A or 230VAC / 0.6A
Dimensions.....	12.75" x 11" x 8.75"
Weight .....	25 lbs