COMMISSION INTERNATIONALE DE L'ÉCLAIRAGE
INTERNATIONAL COMMISSION ON ILLUMINATION
INTERNATIONALE BELEUCHTUNGSKOMMISSION

DIVISION 2 : PHYSICAL MEASUREMENT OF LIGHT AND RADIATION

Home Page: http://cie2.nist.gov

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DIVISION 2
ACTIVITY REPORT
May 2004

May 26, 2004

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Division Officers

Director:	Miss Teresa Goodman
Associate directors:	Dr. Georg Sauter
	Mr. Nobert Johnson
	Mr. Guy Vandermeersch
Editor*	Dr. Jim Gardner
Secretary	Dr. Yoshi Ohno

* Editor changed from John Moore to Jim Gardner since June 2003.

Country Members (37 countries: +1 from 2003)

ARGENTINA	Lic. Adrian J. Cogno
AUSTRALIA	Jim Gardner
AUSTRIA	Michael Matus
BELGIUM	Etienne Pierson*
BRAZIL	Ana V. de Freitas Silva*
BULGARIA	Bojana Florian
CANADA	Joanne C. Zwinkels
CHINA	Pan Jiangen*
CROATIA	Mrzljak Zeljko
CZECH REPUBLIC*	Smid Marek*
DENMARK	Poul Erik Pedersen
FINLAND	Erkki Ikonen
FRANCE	Jean Bastie
GERMANY	Georg Sauter
GREAT BRITAIN	Teresa M. Goodman
HONG KONG	T. M. Chung
HUNGARY	Gyula Dézsi
INDIA	V.D.P. Sastri*
ISRAEL	Dan Scheffer
ITALY	Maria Luisa Rastello
JAPAN	Ichiro Saito
KOREA	Jin Sang Kwon
NETHERLANDS	Paul Nederpel
NEW ZEALAND	John F.Clare
NORWAY	Tore Kolas*
POLAND	Jerzy Pietrzykowski
ROMANIA	Mihai Simionescu
RUSSIA	Raissa Stolyarevskaya
SLOVENIA	Stanko Erste
SOUTH AFRICA	Franz Hengstberger
SPAIN	Antonio Corrons
SWEDEN	Allan Ottosson
SWITZERLAND	Peter Blattner
THAILAND	Surapol Vatanawong
TURKEY	Leyla D. Öztürk
USA	Norbert Johnson
YUGOSLAVIA	Predrag Vukadin

Changes since May 2003:

China, Feb. 2004 (from Guan-Rong Ye)
Belgium, Sep. 2003 (from Vandermeersch)
Czech Republic, July 2003 (new D2 member)
Norway, June 2003 (from Bjorn Brekke)
India, June 2003 (from Anool Mahidharia)
Brazil, May 2003 (from Giorgio Moscati)

Current Technical Committees

May 2004

	Technical Committee	AD	Chair
	TC2-16 Characterization of the performance of tristimulus colorimeters	S	M. Luisa Rastello
	TC2-17 Recommendation for integrated irradiance and spectral distribution of simulated solar radiation	J	Gene Zerlaut
	TC2-19 Measurement of the Spectral Coefficient of Retroreflection	J	Norbert Johnson
	TC2-23 Photometry of Street-Lighting Luminaires	V	Guy Vandermeersch
	TC2-25 Calibration Methods and Photoluminescent Standard for Total Radiance Factor Measurement	J	Joanne Zwinkels
	TC2-28 Methods of characterizing spectrophotometers	J	Peter Clarke
	TC2-29 Measurement of detector linearity	S	Tom Larason
	TC2-32 Measuring Retroreflectance of Wet Horizontal Road Markings	J	Neil Hodson
*	TC2-35 (S) CIE Standard for V(□) and V'(□)	J	Klaus Mielenz
	TC2-37 Photometry Using Detectors as Transfer Standards	S	Yoshi Ohno
	TC2-39 Geometric Tolerances for Colorimetry	J	Danny Rich
*	TC2-40 (S) Characterizing the Performance of Illuminance and Luminance Meters	S	Reiner Rattunde
	TC2-42 The Colorimetry of Visual Displays	J	Christine Wall
	TC2-43 Determination of measurement uncertainties in photometry	S	Georg Sauter
	TC2-44 Vocabulary Matters	J	Jim Gardner*
	TC2-45 Measurement of LEDs - Revision of CIE 127	S	Kathleen Muray
*	TC2-46 (S) CIE/ISO standards on LED intensity measurements	S	John Scarangello
	TC2-47 Characterization and Calibration Methods of UV Radiometers	S	
	TC2-48 Spectral responsivity measurement of detectors, radiometers, and photometers	S	George Eppeldauer
	TC2-49 Photometry of Flashing Light	V	Yoshi Ohno
	TC2-50 Measurement of the optical properties of LED clusters and arrays	V	Georg Sauter
	TC2-51 Calibration of multi-channel spectrometers	J	Richard Austin
	TC2-52 Photometry of Emergency Lighting Luminaires	V	Guy Vandermeersch
	TC2-53 Multi-Geometry Color Measurements of Effect Materials	J	Gerhard Rösler
NEW *	TC2-56 (S) CIE/ISO standard on retroreflection measurements	J	Cameron Miller
NEW *	TC2-57 (S) Revision of CIE S014-2	J	Alan Robertson
NEW	TC2-58 Measurement of LED radiance and luminance	S	Kohtaro Kohmoto

* TCs producing ISO/CIE standards AD: J- Johnson, S- Sauter, V- Vandermeersch

Chairperson changes: TC2-44 (from J Moore), TC2-47 (G Xu resigned)

Reporterships

	Reporter Title	AD	Reporter	
	R2-21 Use of Detectors as Absolute Transfer Standards for Spectroradiometry	S	Nigel	Fox
	R2-23 ISO/CIE Standards for the measurement of reflectance and transmittance	J	Danny	Rich
	R2-27 Field Measurement for Traffic Signals	V	Carl	Andersen
	R2-28 Evaluation of Colorimeter Spectral Responsivity	S	Balazs	Kránicz
	R2-29 Characterization of imaging luminance measurement devices	S	Peter	Blattner
	R2-30 Problem linked to correct measurement of TL5 fluorescent lamps with existing electronic ballast	V	Guy	Vandermeersch
	R2-31 Problems with spectroradiometric measurement of light sources associated with bandpass and sampling intervals.	J	David	Gibbs
NEW	R2-32 Visual appearance measurement	J	Mike	Pointer
NEW	R2-33 Measurement of laser-based projection displays	S	Keith	Niall
NEW	R2-34 Methods for characterising and calibrating detectors in photon counting regime	S	M Luisa	Rastello

Liaisons

Organization	Liaison Officer
CCPR - Consultative Committee of Photometry and Radiometry	Yoshi Ohno
Division 8	Alan Kravetz
ISO TC6 Paper, board & pulps	Joanne Zwinkels
IEC TC 34: Lamps and related equipment	G. Vandermeersch
ISO on reflectance and transmittance issues	Danny Rich
IDA (International Dark Sky Association)	Justin Rennison
OIML (Organization of International Legal Metrology)	Georg Sauter
IALA (International Association of Lighthouse Authorities)	Carl Andersen
IEC TC100/TA2 (Color Management and Measurement/Audio, Video and Multimedia Systems and Equipment)	Danny Rich*

* Changed from J. Schanda.

Closed functions

TC2-04 Secondary standard sources (J. Moore)
TC2-24 Users guide for the selection of illuminance and luminance meters (Ganesha)
TC2-55 Round Robin Investigation of Implementation of CIE Photobiological Safety Standard (K. Kohmoto)
R2-05 Visual Gloss (M. Pointer)

New functions established

TC 2-56(S) CIE/ISO standard on retroreflection measurements (Cameron Miller)
TC2-57(S) Revision of CIE S014-2 (Alan Robertson)
TC2-58 Measurement of LED radiance and luminance (Kohtaro Kohmoto)
R2-32 Visual appearance measurement (Mike Pointer)
R2-33 Measurement of laser-based projection displays (Keith Niall)
R2-34 Methods for characterising and calibrating detectors in photon counting regime (M Luisa Rastello)

Changes of functions

TC2-44: The chairperson has been changed from John Moore to Jim Gardner.
TC2-47: The chairperson (Gan Xu) has resigned.
The TR of TC2-51 has been revised.
The liaison person for IEC TC100/TA2 has changed to D. Rich.

Progress on TC document publication

TC2-22 document "Report on an intercomparison of measurements of the luminous flux of high-pressure sodium lamps" has been published as CIE 153:2003.

Meetings

1. CIE 25th Session, San Diego, CA, USA (26 - 28 June 2003)
12 presented papers and 29 presented posters were presented in Division 2. The papers were published in Proceedings of the 25th Session of the CIE (Volume 1).

2. 2003 Division 2 Meeting (2 July 2003)

The 2003 Division 2 Meeting was held on 2 July, 2003 in San Diego, with 70 attendees from 22 countries, including 15 country members. The minutes of the meeting were compiled by the Secretary and distributed in September 2003, and are attached to this Activity Report.

3. 2003 Technical Committee Meetings (30 June - 1 July, 2003)

The following meetings were held in conjunction with the 2003 Division 2 Meeting. Brief

reports on these TC meetings are included in the 2003 Division 2 Meeting minutes.

TC2-23 Photometry of Street-Lighting Luminaires (Guy Vandermeersch)

TC2-25 Calibration Methods and Photoluminescent Standard for Total Radiance Factor Measurement (Joanne Zwinkels)

TC2-29 Measurement of detector linearity (Tom Larason)

TC2-32 Measuring Retroreflectance of Wet Horizontal Road Markings

TC2-39 Geometric Tolerances for Colorimetry (Neil Hodson)

TC2-43 Determination of measurement uncertainties in photometry (Georg Sauter)

TC2-45 Measurement of LEDs - Revision of CIE 127 (Kathleen Muray)

TC2-46 CIE/ISO standards on LED intensity measurements

TC2-48 Spectral responsivity measurement of detectors, radiometers, and photometers (George Eppeldauer)

TC2-50 Measurement of the optical properties of LED clusters and arrays (Georg Sauter)

TC2-51 Calibration of multi-channel spectrometers (Richard Austin)

TC2-52 Addendum to CIE 121-1996 for the Photometry of Emergency Lighting Luminaires (Guy Vandermeersch)

TC2-53 Multi-Geometry Color Measurements of Effect Materials (Gerhard Roesler)

Other TC meetings

TC2-56 (S) (Cameron Miller) had its first TC meeting on May 17, 2004 at NIST, Gaithersburg, USA.

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September 5, 2003

Minutes of 2003 CIE Division 2 Meeting

9:00 – 18:00, 2 July 2003
San Diego

Abbreviations:

AD:	Associate Director	NC:	National Committee
CIECB:	CIE Central Bureau	TC:	Technical Committee
CIEBA:	CIE Board of Administration	TCC:	Technical Committee Chair
CM:	Country Member	TR:	Terms of Reference
D2:	Division 2 (D1, D4, D8, likewise)	ST:	Status
DD:	Division Director	WG:	Working Group
ILV:	International Lighting Vocabulary		
ML:	Member List		

Attendees:

Steve Jenkins	Australia
Janos Makai	CIECB, Austria
Aplette Blochouse	R-TECH, Belgium
J-F Laporte	R-TECH, Belgium
Etienne Pierson	Laborelec, Belgium
Guy Vandermeersch	Laborelec, Belgium (D2 AD)
Robert Hirschler	SENAI/CETIQT, Brazil
Byron Jordan	PAPRICAN, Canada
Keith Niall	DRDC, Canada
Alan Robertson	NRC, Canada
Roy Williams	Duha Color, Canada

Joanne Zwinkels	NRC, Canada
Jean Bastie	BNM-INM/CNAM, France (CIE Vice President)
Jeanne-Marie Coutin	BNM-INM/CNAM, France
Wolf Czepluch	BAM, Germany
Richard Distl	Instrument Systems, Germany
Werner Horak	Siemens, Germany
Reiner Rattunde	LMT, Germany
Klaus Richter	BAM, Germany
Georg Sauter	PTB, Germany (D2 AD)
Hans Schmidt-Clausen	Tech. Univ. Darmstadt, Germany
Walter Steudtner	OSRAM, Germany
Janos Schanda*	Univ. Veszprém, Hungary (CIE Secretary)
Claudio Oleari	Parma University, Italy
Gorow Baba	Murakami Color Res. Lab, Japan
Kohtaro Kohmoto	Chiyoda Kohan, Japan
Satoko Kohmoto	Japan
Kosei Oshima	Otsuka Electronics, Japan
Ken Sagawa	AIST, Japan (CIE Vice President)
Ichiro Saito	NMIJ, Japan
Changsoon Kim	KRISS, Korea
Wout van Bommel	Philips, Netherlands (CIE President)
John Clare	MSL, IRL, New Zealand
Tore Kolas	SINTEF, Norway
Irena Fryc	Bialystok Univ. Tech, Poland
Raisa Stolyarevskaya	Light and Engineering, Russia
Pierre Botha	CSIR-NML, South Africa
Franz Hengstberger	CSIR-NML, South Africa (CIE Vice President)
Natasha van Tonder	CSIR-NML, South Africa
Hans Allan Löfberg	Univ. Gävle, Sweden (CIE Past President)
Allan Ottosson	Univ. Gävle, Sweden
Peter Blattner	METAS, Switzerland
Fei-Chang Hwang	ITRI, Taiwan
David Gibbs	NPL, UK
Teresa Goodman	NPL, UK (D2 DD)
James Nobbs	Leeds University, UK
Mike Pointer	NPL, UK (D1 AD, D8 Editor)
Carl Andersen	FHWA, USA
Richard Austin	Gamma Scientific, USA
Rolf Bergman	Consultant, USA
David Burns	3M, USA
Ellen Carter	Color Res & Appl. USA
Dennis Couzin	Avery Dennison, USA
Edward Early	NIST, USA
George Eppeldauer	NIST, USA
Richard Harold	BYK-Gardner, USA
Jack Hsia	NIST, USA
Norbert Johnson	3M, USA (D2 AD)
Thomas Larason	NIST, USA
Larry Leetzow	USA
Jim Leland	Labsphere, USA

Cameron Miller	NIST, USA
Kathleen Muray	INPHORA, USA
Yoshi Ohno	NIST, USA (D2 Secretary)
Jim Palmer	Univ. Arizona, USA
Danny Rich	Sun Chemical, USA
John Scarangello	Lumileds Lighting, USA
Pierce Webb	Eastman Kodak (retired), USA
Gene Zerlaut	SC-International, USA
Yuqin Zong	NIST, USA

Total **70** persons from **22** countries, including **15** country members. Underlines indicate country members. * proxy for country member.

Handouts

Agenda of 2003 Division 2 meeting (**Attachment 1**)
List of the country members, TCs, Reporterships, and Liaisons.

Opening

Division Director, Teresa Goodman, opened the meeting at 9:00 a.m. and welcomed everyone present.

1. Attendance list, apologies

Secretary received regrets from the following persons:

John Moore (UK, D2 Editor)
Erkki Ikonen (Finland C/M)
Anton Bouman (Netherlands)
Jerzy Pietrzykowski (Poland C/M)
Hideki Kondo (Japan)
Gan Xu (Singapore)
Pieter Walraven (Netherlands)
Arnold Gaertner (Canada)
Jim Gardner (Australia C/M, New D2 Editor)
Karl Schulmeister (Austria)
Gerhard Roesler (Germany)*
Alan Kravetz (USA)*
Ron Daubach (USA)*
Gyula Dezsi (Hungary)

* those who left San Diego before the D2 meeting.

2. Introductions

All the participants introduced themselves.

3. Approval of Agenda

The agenda of 2003 Division 2 meeting (**Attachment 1**), which was distributed to the attendees and also via e-mail circular prior to the meeting, was approved. One item has been added: Report from CIE President, Wout van Bommel.

3a. Report from CIE President, W. van Bommel

CIE President,Wout van Bommel gave a report on the vision of CIE and the Board plans. CIE has 90 years of history. CIE today has about 40 NCs, seven Divisions, and about 120 publications, and has about 135 TCs, which means close to 1000 technical experts are working. The environment surrounding CIE is growing and changing. The internal parts of CIE (NCs, Division/TC members, Board, staff in Vienna) are surrounded by the outside stakeholders – industry, academia, government labs, international organizations, professional technical societies, consultants, and media. The interactions with these outside parts are increasingly important. Several years ago, CIE made an agreement with ISO and IEC so that CIE is *the* world standardizing body in the field of light and lighting. Associate Member category was introduced to help bring in more new NCs. Budget and financial issues are very important. Four years ago CIE introduced Supportive Membership categories (Gold, Silver, etc.), which have been revised to give more benefits for members. We need everybody's support in finding candidates for more new members. One of the difficulties seen recently in the internal part of CIE is that we have fewer active volunteers and that they have less time and travel budget. We also need more young people. To overcome such difficulties, we need a stimulating and effective work environment, making best use of modern tools. Div.2 is doing this in a fantastic way. The CIE Board is planning to create workspace (on the web) to be used by TCs. CIE Publications should spread more widely. CIE CB has recently reduced the prices of publications to half to help achieve this aim. The Board is planning to start publication sales on the Internet, having all documents available in PDF format. Looking ahead, CIE should be a lean, compact, and focused organization. The Board needs everyone's ideas and support. (A PowerPoint presentation[1] is available on the website.)

4. Approval of the 2002 Div.2 meeting minutes

The minutes of the 2002 D2 meeting in Veszprém, Hungary, which were distributed via e-mail circular and on the website in May 2003, were approved with no change.

5. Director's Report (T. Goodman)

Quadrennial report: DD produced the quadrennial report 1999 – 2003 and distributed it via email and on the website in the middle of June. In the last quadrennium, D2 organized four symposia; 1) Color 2000 Conference with D1and D8, 2) symposium on Uncertainty Evaluation in January 2001, 3) 2nd symposium on LED measurement in May 2001, and 4)

[1] Hyperlink is provided on the words underlined. Double-click to open the webpage. If the link does not work, visit D2 website <http://cie2.nist.gov> and find the item under Activity Reports.

D1/D2 joint symposium on temporal and spatial aspects of light and color perception and measurement in 2002. These symposia were all well attended, and showed the high level of interest from industry and elsewhere in these subject areas. Three technical reports were published, as well as three proceedings of the symposia. Two draft CIE standards have also been prepared and should be published shortly. (For further details, see the quadrennial report on the D2 website.).

CIE Publications: After CIE CB reduced the price of CIE publications, different NCs chose to implement these savings in different ways, leading to significantly different prices for publications from different NCs. This has led to some confusion and has also meant that many members of CIE have not seen the benefits of the substantial discount in the price charged by CIE CB. A new policy on sale of publications is therefore being developed, under which all NCs will charge the same prices; this will pave the way for future sales via the Internet. NCs will be contacted individually with details of the new proposals. Review of sales figures shows that marketing of publications by NCs has a major effect on the numbers sold and is therefore extremely important. DD asked everybody to put forward any ideas for better marketing of CIE and to inform CIE CB of individual names and companies who might be interested in supportive membership of CIE.

Copyright: When a CIE publication is published, the copyright of the contents belongs to CIE. However the formal transfer of copyright has not been rigorously coordinated in the past. There is a copyright form on the website (it is included at the end of CIE Code of Procedure for Divisions and TCs - go to http://www.cie.co.at then About CIE – Procedures.). In future, when a TC is set up, the form will be sent to the chairperson, who should then forward the form to all members, together with a request for full contact details etc. Thus this will also provide a mechanism for officially recording details of TC members. For existing TCs, the chairperson needs to download the form and send to TC members. The form can be sent back electronically.

Handbooks: The idea of the CIE handbooks was discussed last year. The suggestion was to gather together publications on related topics in a single volume, with some text to provide linkage between the documents. However, this involves a lot of work, and it has therefore been decided to have a trial for a new approach, which is to simply bind related documents together, with no linking text. It is planned to try this in the colorimetry area first, then extend it to other areas. DD asked everyone to think about what areas might be suitable in D2. There are a number of benefits for such handbooks, e.g., it is much easier to handle and keep track of one thick volume rather than many thin publications.

6. Secretary's Report (Y. Ohno)

CIE 25th Session TC meetings: 12 TC meetings were held in San Diego, which is the largest number in the last several years. Each TC meeting was also well attended. Some of the TCs had 40 to 50 participants.

Country Members: Div. 2 now has 36 country members, with a new country (Israel) added. The country representatives of Brazil, India, Netherlands, and Norway, have changed.

Vandermeersch reported that the country member of Belgium would change to Etienne Pierson.

Reports Issued: The summary of the 2002 D2 meeting (Veszprem, Hungary) was distributed in Oct. 2002. The Activity Report – May 2003, which included the minutes of the 2002 D2 meeting (Veszprem, Hungary), was produced and distributed in May 2003. From next time, the secretary will try to distribute the summary and the minutes of the meeting much faster.

Div.2 Mailing List: The D2 mailing list now has 161 persons (last year – 152). Almost all communications in Division 2 are done by email and through the website.

Email reflectors: CIE-D2@nist.gov is the email reflector used for D2 circulars and for discussions on D2-wide issues (e.g., the discussion on radiance definition in December 2002). Non subscriber block is set to block junk mails and spams. Messages only from the registered subscribers are distributed. Any changes of subscribers' email address must be notified to the Secretary, otherwise they will not be able to send messages. All messages posted are archived and viewed from the link in D2 website. We also have email reflectors for TCs, currently for TC2-45, 2-46, and 2-48. More will be added on request basis.

D2 Website: The website (http://cie2.nist.gov/) is constantly updated, and the latest information on D2 is made available. Recent focus was to complete the list of TC drafts. 13 draft documents are now posted at password-protected webpage, and also links have been made in each TC page. The global password (to access all TC documents) is distributed to all country members, D2 officers, and TC chairs. Individual passwords are also available for each TC for its members. There still are a few TC drafts missing, and also some new drafts were distributed at TC meetings this time. Secretary requested TC chairpersons to send to him revised drafts to keep the list updated.

DD Goodman expressed her thanks for the excellent work and dedication of the Secretary, especially in relation to the D2 website and facilitating communication within D2. This was enthusiastically endosed by everyone present.

7. Editor's report

DD Goodman received a written report from the Editor, J. Moore, who was not present. Moore asked to step down as the D2 Editor at the end of this term (July 2003). DD expressed her formal thanks to J. Moore for his dedicated work and extremely thorough job as D2 Editor for many years. Our new Division Editor is Jim Gardner, who is retired from CSIRO-NML, Australia, has agreed to serve as the Editor for the new term.

The TC2-04 report has been published in November 2002 as CIE Publication 149:2002 "The use of Tungsten Filament Lamps as Secondary Standard Sources".

The TC2-22 report (Intercomparison of Measurements on HPS lamps) went through final editing to resolve the negative vote at Divisional ballot, and is now being prepared at CIE CB for publication in CIE Collection.

7.1 DS010.2e and radiance/luminance definition

CIE DS 010.3/E:2002 The CIE System of Physical Photometry, the report from TC2-35, went through the NC ballot in Dec. 2001, and had a negative vote proposing that the current form (dF on the numerator of the equation) was in error and should be corrected to d2F. The same form of equation is in the ILV, so changing the formula would be to change the definition in ILV. It was discussed at the last D2 meeting in Veszprém, but was not resolved. DD Goodman asked for comments on the e-mail reflector in December 2002, which triggered tremendous responses and debates. Strong opinions were expressed, but these were evenly divided between keeping the definition unchanged and the various proposed options for change. It was also later confirmed that, the current form of equation was deliberately chosen when the ILV was last revised, and was changed from the double to single derivative form. Based on the general policy for the ILV, that existing definitions should stand unless there is a strong consensus for change, D2 voted that the definition of radiance (and related quantities) in the ILV and DS010.2e should be left unchanged. A suggestion was made by J. Schanda to add a note on the other form of equation (using d2F), which will be considered.

7.2 DS014-2 and Illuminant A wavelength definition

This document (originally from TC2-33) is a revision of ISO 10526/CIE S005 Joint ISO/CIE standard: CIE standard illuminants for colorimetry (1999). The revision was supposed to correct the wavelength definitions to standard air for all the standard illuminants, based on the decision in 2001 D2 meeting. The version distributed for Divisional ballot in March 2003 stated that the wavelengths given in the tables for Illuminant A apply in vacuum, due to an interpretation that the original equation in 1931 was for vacuum wavelengths. (D65 was corrected to standard air). There was one negative vote (USA) and one vote with comment (Canada), both requesting an explicit change to standard air, to ensure consistency with other CIE colorimetric tables. A concern was also raised in TC1-48 (Ohno and others) as its latest draft for CIE 13.3 adopted vacuum wavelength for Illuminant A to bring it in line with DS014-2. Robertson commented that the original equation was not necessarily intended for vacuum wavelength, but rather, that the distinction between vacuum and air wavelengths was not considered important at that time. Editor J. Moore had sent a proposal that "the values for the relative spectral power distribution of CIE Standard Illuminant A adopted in 1931 shall be taken to relate to wavelengths measured in standard air." After some discussion, D2 voted, with no objection, to adopt this resolution (this resolution was also subsequently passed by the Board). It was also agreed that DS014-2 would be amended as necessary, to make clear that the wavelengths are for standard air and to update the notes explaining the history. There was also a suggestion to use nm rather than μm in the equation, which was also agreed.

8. Progress reports from Technical Committees, Reporters, and Liaison persons

8.1. Associate Director Johnson and TC chairpersons

Reports on TCs 2- 17, 19, 25, 28, 32, 35, 39, 42, 44, 51, 53 were given.

8.2. Associate Director Sauter and TC chairpersons

Reports on TCs 2-04, 16, 29, 37, 40, 43, 45, 46, 47, 48, 55 were given.

8.3. Associate Director Vandermeersch and TC chairpersons

Reports on TCs 2-23, 24, 49, 50, 52 were given.

The reports given for 8.1, 8.2 and 8.3 are summarized below in the numerical order of all the TCs.

TC2-04 Secondary standard sources

Chair: J. Moore (UK) **AD:** Sauter

ML: Bandyopadhyay (India), Corrons (Spain), Gaertner (Canada), Jiang (China), Low (USA), Metzdorf (Germany), Nishi (Japan), Schanda (Hungary)

TR: Produce a technical report on the selection and operation of stable secondary standard sources.

ST: The document has been published as CIE Publication 149:2002 "The use of Tungsten Filament Lamps as Secondary Standard Sources". The TC is closed. AD Sauter thanked J. Moore for his hard work to complete this publication.

TC2-16 Characterization of the performance of tristimulus colorimeters

Chair: M. L. Rastello (Italy) **AD:** Sauter

ML: Denner (South Africa), Goodman (Great Britain), Hengstberger (South Africa), Moore (Great Britain), Muray (USA), Ohno (USA), Rattunde (Germany), Robertson (Canada), Sauter (Germany), Schanda (Hungary), Steindl (Austria), Terstiege (Germany)

TR: To produce a report recommending methods for assessing the performance of tristimulus colorimeter heads for measuring chromaticity coordinates.

ST: AD Sauter reported. A revised draft (7th draft) was sent to the editorial group (Goodman, Sauter, Schanda) within the TC in May 2001 and editing is in progress. After it is finalized by the editorial group, the draft will be distributed for TC ballot.

TC2-17 Recommendation for integrated irradiance and spectral distribution of simulated solar radiation

Chair: Gene Zerlaut (USA) **AD:** Johnson

ML: Aydinli (Germany), Goodman (Great Britain), Ignatiev (Russia), Justus (USA), Kaase (Germany), Kasten (Germany), Kok (South Africa), Wilkenson (Australia), Zerlaut (USA)

TR: Revise and update CIE Publication No.20 (1972)

ST: AD Johnson introduced the new TCC, Gene Zerlaut (USA), who were present. Zerlaut has taken over the chairmanship after the former TCC retired. Zerlaut made a short presentation on the status and plans for the TC. His plans are as follows:

Proposed Approach - Task I

Re-compute Publication No. 85 on the basis of the SMARTS2 solar radiation code developed by Dr. Christian Gueymard. Re-compute using the atmospheric, geographical and geometric input parameters used to compute Publication No. 85. Re-issue Publication No. 85 under the rules established by CIE for such revisions

Proposed Approach - Task II

Using the SMARTS2 radiation code, compute application-based reference spectra that the community of solar radiation and related technologies deem to be needed, or useful - e.g., building energy technologies for different climates (e.g., solar loading), daylighting technologies, fenestration energy considerations, UV radiometer calibrations using reference spectra.

Proposed Approach - Task III

Continue the task begun in Part II of Publication No. 85 to construct tables to guide efforts to simulate solar radiation for various applications: Completing Part II based on the SMARTS2 version of Publication No. 85, Initiate activities to construct tables as guides for simulation of solar radiation applications identified in Task II (For further details, PowerPoint presentation is available on the website.)

Some discussion followed. TCC is requested to update the TC membership list. It was reported that Kok (South Africa) passed away.

TC2-19 Measurement of the Spectral Coefficient of Retroreflection

Chair: N. Johnson (USA) **AD:** Johnson

ML: Arens (USA), Brekke (Norway), Fisher (USA), Hsia (USA), Hubert (France), Kurioka (Japan), Price (Great Britain), Rendu (France), Rennilson (USA), Richey (Germany), Schreiber (Germany), Sugiyama (Japan), Terstiege (Germany), Vandermeersch (Belgium)

TR: Identify the critical measurement parameters, tolerances, and requirements for, and conduct an international intercomparison of, the spectral coefficient of retroreflection.

ST: Report given by the TCC, Johnson. The final preparation of the document has been delayed due to questions regarding how to present the final data regarding anonymous contributors. He discussed with J. Moore in April and now agreed on the final document, which should be distributed for TC ballot shortly.

TC2-23 Photometry of Street-Lighting Luminaires.

Chair: G. Vandermeersch (Belgium) **AD:** Vandermeersch

ML: Lou Bedocs (UK), Ian Lewin (USA), Reiner Rattunde (Germany), Agnes Por (France), Giuseppe Rossi (Italy), David Gibbs (UK), Etienne Pierson (Belgium), Arlette Blochouse (Belgium), Antonio Corrons (Spain), Carl Andersen (USA), Paul Nederpel (Netherlands), Allan Ottosson (Sweden), Christine Stratford (UK), Koichi Ikeda (Japan) – updated July 2003.

TR: Prepare a technical report on the photometry of street lighting luminaries.

ST: Report given by the TCC. The intention is to prepare a Complementary Part to CIE publication 121-1996 "Photometry and goniophotometry of luminaires" which will be numbered CIE 121-Part 2. It will cover photometric data to be measured (as provided by CIE 140), photometric methods, and uncertainties and tolerances. It will definitively replace the old publication CIE 27. This addendum will fix the specific problems for the photometry of this kind of luminaire, so as to give greater confidence in measurement results and ensure correct application in lighting calculations.

The TC met on 30 June in San Diego, with majority of the members being present. The following items were identified to progress the work:

- transformation of photometric intensity tables measured according old CIE 30-2
- minimum measurement steps to guarantee accuracy

- clear conventions to fix the mechanical axes of the luminaire against the coordinate system
- to solve contradictions between CIE 140 and CIE 121 regarding the first axis of a luminaire (linked to the luminaire in CIE121 while vertical in CIE140 - even if CIE 140 mention the definition is taken over from CIE 121)
- measurement of critical intensities for TI calculations (angles above 70°)
- measurements of critical intensities and uwpward flux for glare classification.
- specific problems linked to the technology of new lamps (correct positioning, warm-up time, stabilisation, etc).

Ian Lewin provided information on the existing IESNA code on this matter. The TCC and secretary will prepare a first tentative draft for the end of the year.

<Note>

During the discussion in R2-30 report, D2 decided that TC2-23 will prepare an update of chapter 5 (Preparation lamps, ballasts and luminaires for tests) of CIE 121, dealing with measurement of TL5 lamps - the last item identified in TC2-23 meeting. TC2-52 is also working on addendum to CIE 121. The final form of publication of these addenda and numbering of the documents will be coordinated.

TC2-24 Users guide for the selection of illuminance and luminance meters

Chair: K. Ganesha (India) **AD:** Vandermeersch

ML: Andor (Hungary), Arens (USA), Austin (USA), Bastie (France), Chang (Taiwan), Dibbern (Germany), Eppeldauer (USA), Gardner (Australia), Goodman (UK), Hengstberger (S. Africa), Moore (UK), Muray (USA), Ohno (USA), Rennilson (USA), Ritzol (USA), Sauter (Germany)

TR: Prepare a user's guide for the selection and use of illuminance and luminance meters.

ST: AD Vandermeersch reported. He had received no report from the TCC. No new draft was distributed since 2000. Secretary reported that the contact with K. Ganesha has been lost for more than a year (his e-mail address no longer working). DD is to try to establish communication with K Ganesha through Hari Mamak. It was agreed that the TC will be closed if the contact with the TCC cannot be re-established and if no volunteer to take over the chairmanship.

<Note>

Discussion with Hari Mamak confirmed that the TCC is no longer active in this field and has no interest in continuing the work. It was therefore agreed at the Board meeting that the TC should be closed, unless a volunteer is found quickly – anyone with an interest in chairing this TC should contact DD urgently.

TC2-25 Calibration Methods and Photoluminescent Standard for Total Radiance Factor Measurement

Chair: J. Zwinkels (Canada) **AD:** Johnson

ML: Bristow (Sweden), Erb (Germany), Leland (USA), McCamy (USA), Nayatani (Japan), Puebla (Germany), Racz (Hungary), Simon (USA), Witt (Germany), Peter Clarke (NPL)- revised Aug. 2002

TR: Prepare a CIE report on methods for measurement of total radiance factors of photoluminescent materials. Recommendations for realizing and calibrating photoluminescent standards by the one and two-monochromator methods will be

included.

ST: Report given by the TCC, J. Zwinkels. The TC met on the previous day, attended by 3 members and 5 advisors, and 14 observers. The 11th draft was distributed on May 16 for TC vote for deadline 23rd of June. TCC received 5 ballots from members and two from advisors. There were four approvals, one approval with editorial change, and two abstained. TCC also distributed the 11th draft to chairs of TC1-48 (revision of CIE 15.2) and TC1-44 (practical daylight sources) for which these TCs have liaisons. The TC meeting discussed the comments received in the ballot and managed to get through substantial comments. TCC started to revise the TC report based on these inputs. TCC will send the 12th report to Div. Editor, then to Div. Ballot for target date, October this year. There are many new terms in the document, which will be sent also to Div. Editor so they can be included in the revised ILV. AD Johnson clarified that the new Division Director (J. Gardner) is to be collecting the new terms for the revised ILV.

TC2-28 Methods of characterizing spectrophotometers

Chair: Peter Clarke (UK) **AD:** Johnson

ML: Andor (Hungary), Bastie (France), Berns (USA), Distl (Germany), Eckerle (USA), Konstantinova (Bulgaria), McCamy (USA), Robertson (Canada), Sugiyama (Japan), Ulyanov (Russia), Zwinkels (Canada)

TR: Write a CIE report on the characterization of spectrophotometers by means of reference materials and other methods, with particular reference to linearity, wavelength error, stray light, and integrating sphere errors.

ST: DD Goodman reported. P. Clarke was in San Diego but was unable to stay till D2 meeting. The TCC hopes to have next version of the report ready very shortly. He has put in all the extra pieces needed to complete the document prepared by John Verrill. The final version will be ready by the end of this month and will be send for TC ballot and hopefully to Division ballot by the end of the year.

TC2-29 Measurement of Detector Linearity

Chair: Thomas Larason (USA) **AD:** Sauter

ML: J. Bastie (France), J. Clare (New Zealand), R. Distl (Germany), G. Eppeldauer (USA), T. Goodman (UK), P. Webb (USA), J. Palmer (US), G. Sauter (Germany), G. Andor (Hungary), A. Bittar (NewZealand), W. Budde (Canada), G. Dezsi (Hungary), Mihailov (Russia), K. Moestl (Germany) - July 2003 (being updated)

TR: Prepare a CIE guide on methods for the characterization of the linearity of detectors of optical radiation, including different principles by which the linearity of detectors can be determined and causes of non-linear behavior, to aid users of optical radiation detectors in the selection and use suitable devices for specific applications.

ST: Report given by the new TCC, Larason. The TC had a meeting in San Diego on June 30 with 23 people attending (10 members, 13 guests). This was the first meeting of reactivated committee after a few years of inactivity. The TC membership is to be re-established starting with the members present. The 3rd draft, which was handed over from the previous chair, was distributed and discussed. There was a great deal of positive discussion of the draft and a keen interest was expressed in continuing the committee. Several definitions need to be reworded, and other measurement methods to be added, such as DSR and beam conjoiner. The current draft will be totally

rewritten in a new structure and format, with more parts to be added. Email reflector will be set up for further discussion and draft 3 will be posted on the website in the next several weeks. The TCC plans to have 4th draft in Jan. 2004.

TC2-32 Measuring Retroreflectance of Wet Horizontal Road Markings
Chair: N. Hodson (USA) **AD:** Johnson
ML: Austin (USA), Davies (USA), Dibbern (Germany), Hubert (France), Johnson (USA), Lundkvistl (Sweden), Meydan (Australia), Meseberg (Germany), Rennilson (USA), Schmidt-Clausen (Germany), Schnell (USA), Schreuder (Netherlands), Soardo (Italy), Sorenson (Denmark) - revised August, 1999
TR: To prepare a guide for the methods of measuring coefficient of retroreflected luminance (specific luminance) of horizontal road markings under wet weather conditions.
ST: AD Johnson reported. The TCC, Hodson, could not stay for the D2 meeting. The TC had a meeting on June 30 in San Diego with 5 members and 7 guests present. There is one section remaining to be further reviewed before they can proceed. The TC will continue to discuss the draft changes by email. Next meeting will be planned for either next D2 or D4 meeting, depending on availability of the TC members.

TC2-35 CIE Standard for V(λ) and V'(λ)
Chair: K. Mielenz (USA) **AD:** Johnson
ML: Bastie (France), Gardner (Australia), Hengstberger (South Africa), Moore (UK), Ohno (USA), Parr (USA), Robertson (Canada), Sauter (Germany), Schanda (Hungary)
TR: To prepare a new CIE Standard on the present V(λ) and V'(λ) functions.
ST: The TC report, now as CIE DS 010.3/E:2002–The CIE System of Physical Photometry, went through the NC ballot in Dec. 2001, with a negative vote requesting that the current form of the equation (dλ on the numerator of the equation) be corrected to $d^2\lambda$. This was discussed during Editor's report earlier in this meeting, and D2 decided that the current definition will stay unchanged. The document will be edited for other editorial comments received in the ballot for final publication. (See section 7.1 for the details.)

TC2-37 Photometry Using Detectors as Transfer Standards
Chair: Y. Ohno (USA) **AD:** Sauter
ML: Andor (Hungary), Austin (USA), Bastie (France), Bittar (New Zealand), Czibula (Germany), Corrons (Spain), Dézsi (Hungary), Eppeldauer(USA), Gardner (Australia), Goodman (U.K.), Kohler (BIPM), Moore (UK), Muray(USA), Pietrzykowski (Poland), Rattunde (Germany), Rastello(Italy), Sauter (Germany), Schanda (Hungary), Wychorski (USA)
TR: To prepare a report on the properties of $V(\lambda)$-corrected detectors that are suitable for disseminating and maintaining photometric units. This report will include methods for the use of these detectors.
ST: Report given by the TCC, Y. Ohno. The work is close to completion. Last draft version had only a few minor comments. The TCC prepared the 7th draft for TC ballot and tried to send it to Editor before sending out. The Editor, however, suggested that this should be done by the new Editor, since the work may continue after San Diego

meeting. The TCC will send the 7th draft to the new Editor after this meeting and then for TC ballot, hopefully before the end of 2003.

TC2-39 Geometric Tolerances for Colorimetry
Chair: D. Rich (USA) **AD:** Johnson
ML: Baba (Japan), Bittar (New Zealand), Decarreau (France), Fisch (USA), Hanssen (USA), Jordan (Canada), Johnson (USA), Kravetz (USA), Ladson (USA), Terstiege (Germany), Pietrzykowski (Poland), Verrill (UK), Zwinkels (Canada). Consulting member: Erb (Germany). - revised June 1999.
TR: Compile a technical report and recommendations specifying the geometric tolerances for the various geometries in colorimetry, including 0/45, 0/d and others. Parts of this technical report may be suitable for inclusion in a CIE standard specifying several geometric tolerance levels.
ST: The Committee met in San Diego on 1 July of 2003. Six members and ten guests were present. Two new drafts of the committee report (Drafts 5 and 6) have been circulated since the last meeting in May 2001. Draft 5 received many useful comments from the committee, and all were implemented in Draft 6. The revised report was distributed again, and comments received from G. Baba (member) and K. Imura (guest). These and several other issues were discussed at San Diego meeting. Based on the comments at this meeting, a 7th draft will be prepared. The chairman will solicit the information volunteered by the attendees and will issue a new draft by the fall. It is hoped that the final report can be distributed for Divisional ballot by the end of 2003. (Further details are available in the Activity Report of TC2-39, July 1, 2003, in **Attachment 3**.)

TC2-40 Characterizing the Performance of Illuminance and Luminance Meters
Chair: R. Rattunde (Germany) **AD:** Sauter
ML: Austin (USA), Bastie (France), Czibula (Germany), Dezsi (Hungary), Goodman (UK), Khandelwal (India), Khanh (Germany), Mahidharia (India), Moore (UK), Ohno (USA), Pietrzykowski (Poland), Saito (Japan), Sauter (Germany), Stolyarevskaya (Russia), Xu (Singapore), Ye (China) – revised July 1999
TR: Convert the present CIE Technical Report No. 69 into an ISO/IEC standard. Prepare a combined CIE/ISO standard describing the definitions of quantities influencing the performance of illuminance and luminance meters, as well as defining measurement procedures for the individual error quantities.
ST: Report given by the TCC, Rattunde. TCC regrets the slow progress of this TC recently, as he had very little time to work on this. TCC is working on the next draft version, but not completed by this meeting. The TCC plans to finish it and distribute the new draft in two weeks after this meeting and to have discussion via e-mail correspondence.

TC2-42 Colorimetric Measurements for Visual Displays
Chair: C. Wall (UK) **AD:** Johnson
ML: G Andor (Hungary), S Ansell (USA), R Baribeau (Canada), R Berns (USA), P Boyton (USA), CDalton (UK), A Hanson (UK), J Hardis (USA), H Ikeda (Japan), H Lara (USA), J Laur (Germany), C Leone (USA), M Lindfors (Finland), R Luo (UK), L

MacDonald (UK), J Maelfeyt (Belgium), S McFadden (Canada), Y Ohno (USA), ML Rastello (Italy), M Reid (UK), T Sakai (Japan), J Schanda (Hungary), A Stienstra (Netherlands), M Stokes (USA), F Vienot (France) – revised June 2001

TR: To produce a Technical Report summarizing recommended practice for the measurement of the colorimetric and spectroradiometric properties of visual displays.

ST: No report received this time.

TC2-43 Determination of measurement uncertainties in photometry.

Chair: G. Sauter (Germany) **AD:** Sauter

ML: Bastie (France), Corrons (Spain), Daubach (USA), Ellis (USA), A.Gaertner (Canada), Goodman (Great Britain), Moore (Great Britain), Ohno (USA). Aug. 2002

TR: To prepare a CIE recommendation as the basis for the determination of measurement uncertainties valid for selected quantities used in photometry.

ST: Report given by the TCC, G. Sauter. The TC had a meeting in San Diego on 1 July with many participants. The main part of the document was reviewed and was accepted in the current form. The second part of the document has several examples of uncertainty budget in practical measurements. The TC discussed a possibility of adding more examples, including those for color quantities, to be published in two or thee parts, in the form of CD ROM, including EXCEL sheets. The main part is basically ready for publication. The TCC will have the document checked by Maurice Cox (UK) and a PTB statistician for all the equations and consistency with GUM. The TCC plans to have the final version ready for TC ballot by the end of the year.

<Discussion>

J. Schanda suggested that uncertainty is an area of great interest, and can be another subject for the CIE book. Vandermeersch commented that examples for industry are missing, e.g., uncertainty related to goniophotometry.

TC2-44 Vocabulary Matters

Chair: J. Moore (UK) **AD:** N. Johnson

ML: Billmeyer (USA), Burghout (Netherlands), Ionescu (Romania), Johnson (USA), Kohler (BIPM), Morren (Bergium), Nishi (Japan), Ohno (USA), Poppe (Hungary), Sauter (Germany), Schanda (Hungary), Woo (Canada)

TR: To provide liaison between Div.2 and TC 7-06 "Lighting Terminology" and support the preparation of the new edition of the Lighting Vocabulary in the field of light and colour measurements.

ST: This TC will be transferred to the new Editor. DD Goodman reported that there was an issue of the radiance definition, which was already discussed. Also, as general information, the ILV committee decided that 1st of July next year will be the deadline for all the Divisions. We already had Division ballot for D2, and Editor is incorporating some comments received. There is an opportunity by that deadline to add new terms. M. Pointer reported that D1 did not have TC for ILV (they only had a WG) before, but at the D1 meeting this time, they established a new TC. This TC, chaired by the new D1 Director, Sharon Mcfadden, should work very closely with D2. There is a TC in D8 on terminology, chaired by J. Schanda. All these TCs should coordinate.

TC2-45 Measurement of LEDs - Revision of CIE 127

Chair: Kathleen Muray (USA) **AD:** Sauter

ML: Austin (USA), Bando (Japan), Balta (USA), Berkhout (USA), Bouman (Netherlands), Budzinski (South Africa), Bym (USA), Carr (USA), Distl (Germany), Ellis (USA), Fleischer (USA), Gan (Singapore), Halkin (Belgium), Heidel (Germany), Jones (USA), Kohmoto (Japan), Larsen (Denmark), Marchl (Germany), Moore (UK), Myers (USA), Ohno (USA), Rastello (Italy), Sauter (Germany), Scarangello (USA), Schanda (Hungary), Solomon (Taiwan), Stolyarevskaya (Russia), Webb (USA), Young (USA) – Jul. 2000.

TR: Revise CIE Pub. 127 to include improved definitions of quantities and methods of measurement for total flux and partial flux of LEDs and to re-evaluate other parts including spectral and color measurements of LEDs.

ST: Report given by TCC, K. Muray. The TC met on July 1, 2003 in San Diego. The TC is working on three issues; 1) total/partial luminous flux measurement, 2) evaluation of photometer V(λ) match, 3) conditions for spectral radiometric measurement. The TC came to a consensus on the first two issues. The TC agreed to define CIE LED partial flux that is measured with an integrating sphere with an entrance aperture of a defined diameter, where the solid angle is calculated from the tip of the LED lamp. For evaluation of the V(λ) match of photometers, f_{LED} proposed by R. Young was discussed, but it was not adopted. The TC agreed to keep f_1' as general method, and add another index for LED measurements, which is an average of spectral mismatch errors for several LEDs of different colors (similar to traditional f_1). The details on the partial flux geometry and the formula for the V(λ) match evaluation will be worked out and put into the next draft. The spectral measurement issue will be discussed by e-mail. There was another issue - measurement of radiance of LEDs for photobiological safety, which was requested from D6. There was a presentation by W. Horak at the meeting. After some discussion, the TC agreed that it is a difficult issue crossing D2 and D6, and that it should be handled in a separate TC.

TC2-46 CIE/ISO standards on LED intensity measurements

Chair: John Scarangello (USA) **AD:** Sauter

ML: Angerstein (Germany), Bando (Japan), Bouman (Netherlands), Bym (USA), Carr (USA), Distl (Germany), Ellis (USA), Goodman (UK), Heidel (Germany), Hwang (Taiwan), Jones (USA), Lester (USA), Moore (UK), Ohno (USA), Rastello (Italy), Sauter (Germany), Scarangello (USA), Schanda (Hungary), Schumacher (Germany)

TR: To prepare a CIE/ISO standard on the measurement of LED intensity measurements based on the CIE Pub. 127.

ST: Report given by TCC, J. Scarangello. The TC had a meeting in San Diego on July 1, 2003 with 32 participants. Draft 5 was presented and discussed. The TC discussed several major issues, such as dealing with tolerances, uncertainty calculation, test geometry variations, LED test conditions, and detector calibration. The TC agreed to have tolerances in the appendix. Test geometry with mechanical axis only was agreed. Uncertainty section is still to be written with input from members. Discussed LED test conditions, current drive, and temperature setting. How to specify temperature for high power LEDs (with heat sink) was discussed but will need further work. The TC also discussed generalizing the description of the detectors which can be used,

including spectroradiometers. Terminologies and calibration issues are still to be resolved. Draft 6 will be prepared after more inputs from members are received, hopefully in the next few months. (The materials presented at July 1 meeting are available on the website. Draft 5 is posted on the website for TC members.)

TC2-47 Characterization and Calibration Methods of UV Radiometers
Chair: Gan Xu (Singapore) **AD:** Sauter
ML: L.P.Boivin (Canada), Hengstberger (South Africa), Wilkinson (Australia), Lambe (UK), Rattunde (Germany), Saunders (USA), Pietrzykowski (Poland), Corrons (Spain), Larason (USA), Thompson (USA), Kohmoto (Japan), McArthur (Canada), Kravetz (USA)- Aug. 2002
TR: Prepare a CIE recommendation on methods of characterization and calibration of broad-band UV radiometers in the spectral ranges of UVA and UVB for industrial applications.
ST: No report was received from the TCC. Secretary received a written report from the TCC after the meeting as below:
The TC had an informal meeting during NewRad2002 at Gaithersburg attended by about 19 people. The chair informed the meeting that as he had been assigned a new post by his organisation to work in dimensional & mechanical metrology areas and would be no longer directly involved in P&R work, he had difficulty to continue the work for TC2-47 and was considering resigning as the TC chair. As no one volunteered to replace him, he decided to continue as the TC chair for at least another year and try to finish the revised (2nd version) document. Now, the revision of the document is still on-going and is expected to be finished and circulated to members for comment by September. The chair regrets that he could not hold the TC meeting in 2003 due to budgetary reasons and he also wishes to get more support from members of the TC.

TC2-48 Spectral responsivity measurement of detectors, radiometers, and photometers
Chair: G. Eppeldauer (USA) **AD:** Sauter
ML: Austin (USA), Boivin (Canada), Bouman (USA), Corrons (Spain), Coutin (France), Dezsi (Hungary), Gardner (Australia), Goodman (UK), Köhler (BIPM), Larason (USA), Larsen (Denmark), McArthur (Canada), Ohkubo (Japan), Palmer (USA), Pietrzykowski (Poland), Rattunde (Germany), Sauter (Germany), Webb (USA), Xu (Singapore), Schanda (Hungary) – June 2001.
TR: To rewrite the technical report CIE 64 (1984) "Determination of the spectral responsivity of optical radiation detectors" to update device and measurement technology, and include the spectral irradiance and radiance responsivity measurement for radiometers and photometers from UV to near IR.
ST: Report given by the TCC, G. Eppeldauer. The TC met on June 30, 2003 in San Diego, with 20 participants including 10 members. The newly written 5th draft was presented and discussed. The new draft added Chapter 5 (spectral radiance responsivity) and a part of Chapter 6. Basic chapters of the report – spectral radiant power responsivity, spectral irradiance responsivity, and spectral radiance responsivity - are now done. The TC agreed on some changes to remove sections on responsivity for spectrally integrated quantities. Chapter 6 (spectral considerations in responsivity measurements)

is to be completed for two more sections. Chapter 7 (preamplifires for spectral responsivity measurements) is to be written. Overall, 75 % of the report has been written. Next draft will be prepared to incorporate comments received this time. (Draft 5 is posted on the website for TC members).

TC2-49 Photometry of Flashing Light
Chair: Y. Ohno (USA) **AD:** Vandermeersch
ML: Carl Andersen (USA), John Arens (USA), Richard Austin (USA), Jan Berkhout (USA), Dennis Couzin (USA), Dave Ellis (USA), George Eppeldauer (USA), Ahmad Fedai (USA), Irena Fryc (Hungary), David Gibbs (UK), Teresa Goodman (UK), Franz Hengstberger (South Africa), David King (USA), Rainer Kohler (BIPM), Hideki Kondo (Japan), Reiner Rattunde (Germany), Justin Rennilson (USA), Ken Sagawa (Japan), H. -J. Schmidt-Clausen (Germany), Georg Sauter (Germany), Ian Tutt (UK), Francoise Vienot (France), Pierce Webb (USA). – April 2003.
TR: Produce a technical report for photometric measurements of flashing light, including derivation of the photometric quantities applied to flashing light, measurement of light sources, and calibration of photometers for flashing light.
ST: The report was given by the TCC, Y. Ohno. The TC last met in Veszprem in 2002. The TC has not come to a consensus on the definition of effective intensity. TC formed a Working Group to formulate the experimental conditions of the required visual experiments and publicize a call for research. The TCC is having communication by e-mail among WG members to start this process.
<Discussion>
DD Goodman suggests a request for research should be placed in one of the scientific journals, such as CR&A. K. Sagawa mentioned that there is a written report from the D1 reportership (D. Couzin) on this subject, which is included in the last D1 activity report.

TC2-50 Measurement of the optical properties of LED clusters and arrays
Chair: G. Sauter (Germany) **AD:** Vandermeersch
ML: C. Jones (USA), J. Scarangello (USA), Xu Gan (Singapore), J. Arens (USA), T. Goodman (UK), D. Halkin (Belgium)
TR: To produce a technical report for the measurement of optical properties of visible LED arrays and clusters, to derive optical quantities for large LED arrays and recommendations for measurement methods and conditions.
ST: Report given by the TCC, G. Sauter. The TC met in San Diego on July 1, 2003 with many attendees. Draft 1 (proposed contents and scope of the technical report) was presented and discussed. The TC agreed to cover combinations of structures of LEDs used for general illumination purposes as well as for signaling applications. But the scope will be limited not to include displays in the general meaning. Some terms to be defined were also discussed. The TC will collect more inputs from the manufacturers and users of LED clusters and arrays to start drafting the report. (Draft 1 – June 2003 is available on the website for TC members).

TC2-51 Calibration of multi-channel spectrometers
Chair: Richard Austin (USA) **AD:** Johnson

ML: T. Goodman (UK), G. Hopkinson (UK), S. Prince (UK), Pietrzykowski (Poland), R. Smith (USA), R. Bergman (USA)

TR: To produce a technical report which sets out guidelines for the recommended procedures, methods and transfer standards for the calibration of multi-channel spectrometers.

ST: Report given by the TCC, Austin. The TC had a meeting in San Diego on June 30. The title of the document has changed to "Calibration, Characterization, and Use of Array Spectroradiometers." to reflect the contents of the document that have been agreed by the TC. The document will cover all array type instruments. The TR were also revised, and agreed by D2. The new TR are:

> Produce a technical report for the calibration of array spectroradiometers primarily for the determination of colorimetric and photometric quantities, including sources of error in array spectral measurements systems, evaluation of these errors, calibration methods and methods for the determination of uncertainty.

J. Palmer will edit and update the bibliography collected in TC2-30. TCC requested that, if any one has bibliographic information, they should be sent to Palmer. Member list and current draft (0.2a) will be submitted for posting on the website. Next meeting will be scheduled before the end of this year, possibly in Germany. (PowerPoint file available on the website.)

<Discussion>

There was some discussion on bibliography. F. Hengstberger suggested that the bibliography, a 100 page document, should probably be published as CD ROM. Others also preferred electronic version as it will be searchable. AD Johnson commented that the idea was to have the original bibliography in a more updated and condensed form, also resolving some issues of copyright, and not necessarily to make it a searchable document.

TC2-52 Addendum to CIE 121 for the Photometry of Emergency Lighting Luminaires

Chair: G. Vandermeersch (Belgium) **AD:** Vandermeersch

ML: Antonio Corrons (Spain), Allan Ottosson (Sweden), Reiner Rattunde (Germany), Christine Stratford (UK), Bruno Weiss (Germany), Lou Bedocs (UK), Giuseppe Rossi (Italy), - updated July 2003.
David Price (UK, until 1/3/2003), John Arens (USA, until 1/1/2002).

TR: To produce an addendum to CIE publication 121 containing specific requirements for the photometry of emergency lighting luminaires, in particular to provide additional correction factors on the relative output of the luminaires at specified times of operation.

ST: Report given by the TCC. The TC met in Veszprem on 26 August 2002, in Berlin on 18 November 2002, and in San Diego on 30 June 2003. The TC work relates to work in D5, IEC and CEN. There has been good progress in IEC for the evaluation of lighting performance of emergency electronic ballasts by introducing the concept of emergency mode ballast lumen factor. This has been approved by IEC, but the document is still before voting stage. CIE TC 5-19 has also arrived to a final draft on emergency lighting. So no further delay is necessary for achieving TC2-52 work. Within TC 2-52 the draft 2b - June 2003 was examined and approved in San Diego. After consideration of all comments, it was agreed that a final draft 3 – September

2003 would be issued for TC ballot. In parallel the draft will be submitted to D2 Editor. It is hoped that this technical report numbered CIE 121 Part 2-1 will be submitted for D2 ballot before next D2 meeting.

<Discussion>

F. Hengstber suggested that, since this will be the first case of multiple-parts CIE document, the numbering and the title of the document should be carefully chosen. He suggests numbering 121-1, 121-2, and so on. The TCC agreed.

J. Schanda asked if any parallel work on this subject is going on in CEN. The problem can be that CEN normally refers only to CIE standards and not technical report. The headquarters should make clear with each other what work is in progress. Vandermeersch answered that CEN will probably need to refer to this document. DD Goodman will raise the issue at the Board.

TC2-53 Multi-Geometry Color Measurements of Effect Materials

Chair: Roesler (Germany) **AD:** Johnson

ML: Mike Pointer (UK), Maria Naddal (USA), Jerzy Pietrzykowski (Poland), George Andor (HU), Luise Rastello (Italy), Marta Klanjsek Gunde (SI), Irena Fryc (Poland), Allan Rodrigues (USA), Mike Nofi (USA), Danny Rich (SUSA), Thomas Dauser (Germany), Peter Gabel (Germany), Werner Cramer (Germany), Gorow Baba (Japan), Ellen Carter (USA), Harold VanAken (USA) - April 2003

TR: Write recommendations for the color measurement of effect materials.
Workplan:
Comparison of the DIN and ASTM standards on Multigeometry color measurement.
Preparation of an educational section to combine most interests.
Recommendations from the educational section for the next meeting.

ST: Report given by M. Pointer. G. Roesler had a TC meeting during ASTM meetings in San Diego on June 24, 2003. He has started to put together a draft report on multi-geometry color measurements of effect materials, associated with color torelances. It will be a framework of the TC work and is a dynamic report until we have the first draft. It is a very active committee with 17 members.

TC2-55 Round Robin Investigation of Implementation of CIE Photobiological Safety Standard

Chair: Kohtaro Kohmoto

ML: (not established yet)

ST: Report given by the TCC, K. Kohmoto. The TC was approved in Veszprem. After that in Nov. 2002, IEC TC34 had a meeting in Beijing, where they rejected publication of CIE S009 as joint IEC/CIE standard. The TCC was affiliated with JELMA (Japan Electric Lamp Manufacturer's Association), which stopped support of this TC work (including financial support and round robin test) since it is no longer linked to IEC standards. For this reason, with his great regret, the TCC has to resign from the chairmanship. The TCC hoped the TC could continue with a new chairperson.

<Discussion>

AD Vandermeersch, who attended the IEC meetings in Beijing, clarified that IEC did not reject the document, but decided not to publish it as an IEC standard. J. Schanda

added that IEC decided this way because they were not competent in this subject. R. Bergman commented that D6 decided to reopen a task force in TC6-47 (which created the standard) to find out from TC34 about rejection, and also to reconcile the elements (with respect to LEDs) of the IEC TC76 (laser standard). He suggested not to go back to IEC till D6 does some work. DD proposed two options, to close this TC and wait till TC6-47 come up with some actions, or continue this TC with a new chairman. D2 agreed to close this TC and wait for any outcome from TC6-47.

8.4 Reporters

R2-05 Visual Gloss
Reporter: Mike Pointer (UK) **AD:** Johnson
ST: Report given by M. Pointer. There is a lot of work in progress relating to the subject of gloss. ISO TC 130/WG4 is leading a series of experiments to produce a new measure of visual luster. INCITS W1.1 (the U.S. committee for ISC/IEC JTC1/SC28) is developing test targets and procedures for evaluating the uniformity of gloss on the printed page. A student at the University of Derby, has conducted a number of studies in the area of visual gloss and then gone on to develop a method of measuring gloss based on digital imaging. At the meeting in San Diego, CIE D1 established a technical committee, TC1-65 *Visual Appearance Measurement*, with Mike Pointer as the chairman. The TR:

> To study, develop and recommend a soft-metrology framework for measuring visual appearance. This should include potential measurement areas, psychophysical procedures and real applications.

There is also a sub-committee within ASTM E12 *Color and Appearance* that deals with *Visual Methods* – Pointer is chair of this sub-committee and is also responsible for a number of ASTM Methods involving gloss.
Further details are available in the written report prepared by the reporter – **Attachment 4**.
<Discussion>
D2 agreed to close this reportership R2-05, since a new TC has been established in D1 on this subject and the detailed written report was produced, and the initial purpose of R-05 fulfilled. D2 also agreed that a close liaison should be maintained with the new TC1-65, and agreed to create a new reportership, with M. Pointer as the reporter.

R2-21 Use of detectors as absolute transfer standards for spectroradiometry
Reporter: N. Fox (UK) **AD:** Sauter
TR: To review the potential use of absolutely calibrated spectroradiometers as transfer standards
ST: DD reported for N.Fox. There are a lot of developments going on in this area including use of acousto-optic filters. But it is still premature to set up a TC, as measurement problems are not clear yet. The DD suggested that the reportership be kept open so as to keep the Division aware of new developments in this area. D2 agreed to keep this open.

R2-23 ISO/CIE Standards for the measurement of reflectance and Transmittance
Reporter: D. Rich (USA) **AD:** Johnson
TR: To investigate the need for converting the CIE technical report on reflectance and

transmittance measurement (CIE 130) to a joint ISO/CIE standard

ST: Report given by D. Rich. There have been no new standards on the measurement of reflectance and transmittance. Nor have there been significant advances in any D2 TC that may require the promotion of a Technical Report to the development of a standard. ISO 13655 on the measurement of the reflectance and color of printing is under revision. One problem is in the measurement of the reflectance of non-optically thick materials, and is addressed by specifying a highly absorbing, matte backing. But this backing will distort the reflectance curves of certain commercial materials. This is a very difficult measurement problem, not clearly addressed in CIE 130. ISO 5 is being revised with new, clearer specifications of the requirements for density using spectral reflectance or transmittance measurements and then numerical conversion to ISO Status Density (transmission density or reflection density). There is a need to continue to monitor the advances of the ISO and CIE looking for the opportunity to set up a TC to develop a standard on the measurement of spectral reflectance (either regular or diffuse) and transmittance (either regular or diffuse). (Further details are available in the report submitted by the reporter - **Attachment 2**.). This reportership will continue.

R2-27 Field Measurement for Traffic Signals

Reporter: Carl Andersen

AD: Vandermeersch

TR: To assess the need for a TC to produce recommendations on field measurements for traffic signals, in particular those using LED arrays.

ST: AD Vandermeersch reported for C. Andersen (attending D4). The reporter started investigation with existing equipment at FHWA. There are two new types equipment for traffic signals on field, but he has not been able to procure the equipment for testing. The reportership will be kept open.

R2-28 Evaluation of Colorimeter Spectral Responsivity

Reporter: Balazs Kranicz (Hungary) **AD**: Sauter

TR: To review new methods for assessing the 'quality-of-fit' of the spectral responsivity of colorimeters, particularly for use with new sources such as LEDs.

ST: J. Schanda reported for Kranicz. TC2-16 is fininishing its report. The reporter's work will start after TC2-16 report has been finalized.

R2-29 Characterization of imaging luminance measurement devices (Peter Blattner) / AD: Sauter

TR: To prepare a proposal for a new TC to prepare recommendations on the characterization and calibration of CCD-based imaging photometers, having input from D4 and D8 on the needs from the application side.

ST: Report given by P. Blattner. There are six or seven manufacturers for this type of instrument. There are several applications such as for displays, indoor measurements, lamps and luminaires, near-field goniophotometry of luminaries, and testing of road and tunnel lighting. There are many properties of imaging photometers that are not covered in CIE 69, e.g., number of pixels, cell size, frame rate, shutter speed, noise, dynamic range, non-uniformity, etc. Some of the parameters in CIE 69 do not apply, e.g., method to evaluate out-of-field response. Many of manufacturers' catalogs do not

use parameters defined in CIE 69 and proper terms for uncertainty. In conclusion, imaging luminance measurement devices are complex systems, and CIE 69 is not sufficient to characterize them. There is some interest from industry to have some guidelines on how to characterize such devices. (PowerPoint presentation file available on the website.)

<Discussion>

M. Pointer mentioned that some RGB cameras are also used for such measurements, to measure luminance. R. Distl, one of the manufacturers of such devices, supported the view that image photometers are very complex devices and a separate new recommendation is needed. R. Rattunde commented that the recommendations of CIE 69 apply for each single pixel, but supported a new TC. There was also a comment that many such imaging photometers are also equipped with tristimulus filters for color measurement, so the problems are not only for luminance. After some discussion, D2 agreed on the need for a new TC. In the discussion later (see 10.1), a new TC was not formed at this time, and this reportership will continue.

R2-30 Problems linked to correct measurement of TL5 fluorescent lamps with existing electronic ballasts (Guy Vandermeersch) / AD: Vandermeersch

TR: To review the specific problems associated with the correct measurement of TL5 fluorescent lamps with existing electronic ballasts

ST : Report given by G. Vandermeersch. TL5 Lamps (T12, T8, and T5) are very temperature dependent. The luminous flux depends on the coldest spot of the lamp, which is situated, by construction of TL5 lamps, behind the electrode at the stamp side, the so-called cold chamber. For the optimum performance, it is important that excess mercury is concentrated at the cold chamber. Lamp flux is also dependent on prior history if cold spot was not at the cold chamber and liquid mercury was not at this location. For these reasons, it is necessary to use specific measurement procedures for this type of lamp, such as handling the lamp in vertical position with the stamp side down when lamps are seasoned, stored, or transported. IEC standards have not yet implemented such procedures, but the proposal is under consideration within IEC 34. The reporter will prepare an update for the chapter "Handling and measuring lamps" in CIE 121-1996 Photometry and Goniophotometry of Luminaires. (PowerPoint presentation file available on the website.) The reportership will close once this has been done; subsequent work will be done in TC2-23.

R2-31 Problems with the spectroradiometric measurement of light sources (David Gibbs) /AD: Johnson

TR: To consider the need for a revision of CIE 63 (1984) and make a recommendation regarding whether a separate document is necessary to deal specifically with issues relating to band pass and sampling intervals, including the effects on color calculations.

ST: Report given by D. Gibbs. He reviewed CIE 63. Although the document is old (1984), the concepts and general principles described are still valid. There are descriptions on matching bandwidth and scanning interval and some guidance on measurement of incandescent and fluorescent lamps. TC2-51 plans to include issues on bandpass and

resolution but only for array instruments. The reporter suggests that there is a need for a new work on the subject, specifically in relation to the effect of bandpass and scanning interval on measurement results and the influence on derived quantities such as chromaticity, but indicated further discussions with other researchers in this field should take place before suitable TR could be defined.

<Discussion>

Ohno supported the need for a new document that addresses issues on bandpass and scanning interval in general for spectroradiometers and spectrophotometers for colorimetry, including methods for correction of bandpass errors (referring to his paper presented at CIE 25th Session). N. Johnson commented that the issues on spectrophotometers should be addressed in TC2-28 report. Robertson commented that TC2-28 deals with characterization of instruments, and their report being nearly completed, it should not be further delayed. Robertson, Rich, and Hirshler supported the need for a general guide on such issues in spectroradiometry and spectrophotometry. D2 agreed on the need for a new TC, but there was no volunteer for chairperson. Gibbs and Ohno are asked to work together to prepare a TR of a new TC and propose a chairperson. (Ohno's paper presentation mentioned above is available on the website.)

8.5. Liaisons with other Divisions

Division 1

K. Sagawa reported. The D1 Director has changed to Sharon Mcfadden (Canada) for the new term. D1 met on July 1 in San Diego, and the following new TCs and reporterships have been established.

TC1-63 Validity of the range of CIEDE2000, Chairman: Klaus Richiter
TC1-64 Terminology for vision, colour and appearance, Chairman: Sharon McFadden
TC1-65 Visual appearance measurement, Chairman: Mike Pointer
R1-32 Emotional aspects of colour and light, Reporter: Gunilla Defefeldt
R1-33 Colour-difference evaluation, Reporter: Ronnier Luo
R1-34 Indoor daylight, Reporter: Janos Schanda

TC1-65 has some measurement aspects related to D2. Its TR is to study, develop and recommend a soft-metrology framework for measuring visual appearance. This should include potential measurement areas, psychophysical procedures and real applications.

The next D1 meeting is to be held in Japan in June 2004, in conjunction with CIE Symposium on LED to be organized with D2.

Division 4

AD Johnson reported that there are no imminent issues that D2 needs action to. D4 meeting is concurrent, and brief summary of the meeting will be provided afterwards.

Division 6

DD Goodman reported that the main issue of interest to D2 is the photobiological safety of LEDs (CIE S009), which was covered in the report of TC2-55.

Division 8 (Alan Kravetz)
Kravetz attended D8 meeting but left San Diego early. He gave his report in PowerPoint file to Secretary, which was presented by M. Pointer (D8 Editor). D8 had one new TC and two new reporterships. New TC: TC 8-08 Testing Spatial Colour Appearance Models (Chairman: Garrett Johnson?). TR: To design, implement and report the results of a psychophysical test comparing the output of spatial appearance models (including Retinex, MOM, iCAM) for high dynamic range still colour images. Two new reporterships: R8-05 Image Appearance (Mark Fairchild), and R8-06 Image appearance (Nathan Moroney). Further details are available in the written report submitted later by M. Pointer (**Attachment 5**).

8.6 Liaisons with other organizations

CCPR - Comité Consultatif de Photométrie et Radiométrie (Yoshi Ohno)
Report given by Y. Ohno. The previous liaison person, R. Kohler of BIPM, took a new position and can no longer serve for this function. The new secretary of CCPR, Michael Stock, cannot accept this either, since the Photometry and Radiometry program at BIPM will be closed and his activity on P&R will be very limited. The secretarial work for CCPR stays in BIPM. CCPR meets every two years. Last meeting was held at BIPM, Paris, just a few weeks ago. The president of CCPR has changed to F. Hengstberger of CSIR. The main issues now are the Key Comparisons, which are the international intercomaprions for fundamental quantities, started to support CMCs (Calibration and Measurement Capabilities), essential parts of MRA (Mutual Recognition Arrangement) signed in 1999. Seven Key Comparisons and 2 Supplimentary Comparisons are now in progress (see the list in **Attachment 6**). The CMCs and other details are available on the BIPM website <www.bipm.fr>.

ISO TC6/WG3 Paper, board & pulps – optical properties (J. Zwinkels)
Report given by J. Zwinkels. Several standards are being developed in this WG that require a normative reference to CIE illuminant C and measurement geometry of d/0° which are not recommended in the latest draft of CIE 15.3. The Chair and Secretary of ISO TC6 visited Robertson and Zwinkels at NRC to discuss this. The TC 1-48 and TC 2-39 meetings in San Diego agreed on alternate wordings that maintained the status of Illuminant C for continuing applications and kept specific reference to d/0°. Also, the WG is addressing a need for indoor daylight illuminant (with less UV contents), as CIE does not recommend Illuminant C for new applications. The WG also requested for Illuminant D50 to be considered as a CIE Standard Illuminant with a status similar to that of CIE Standard Illuminants A and D65. This would help to contribute to uniformity of practice for colorimetry, where Illuminants A or D65 are inappropriate, such as colorimetry for paper and printing applications. (Further details are available in the written report - **Attachment 7**)
<Discussion>
D. Rich, who is liaison to ISO/TC 130, strongly supported this proposal for a CIE Standard on Illuminant D50 (the values are already defined in CIE 15.2). A suggestion was made to add Illuminant D50 in DS014-2 (or S014-2). D2 agreed to establish a new TC to work on this. (See section 10.1).

IEC TC34 Lamps and related equipment (Vandermeersch)
The issues already covered in the report of R2-30.

ISO on reflectance and transmittance issues (D. Rich)
Report given by D. Rich. ISO 5 series is under revision by ISO TC 42. Part 1 on Terminology and Symbols has been completed, Part 2 on Transmission Density is being revised by E. Early, Part 3 on Spectral Status has been revised by D. Rich and T. Johnson and Part 4 on Reflection Density is being revised by R. Whittall and T. Johnson.

IDA (J. Rennilson)
No report made this time. Secretary to contact the reporter to obtain updates.

OIML (G. Sauter)
Sauter reported. There is no issues to be reported this time. Keep this function open.

IALA (International Association of Lighthouse Authorities) (Carl Andersen)
The reporter was not present at the meeting. Secretary to contact the reporter to obtain updates.

IEC TC100 (Color measurement and management in multimedia systems) (J. Schanda)
The reporter has been changed to D. Rich. The only thing to report is that the committee has distributed a revised draft CDV for the document of digital cameras, which includes a method of spectral responsivity measurement using monochromatic radiation.

9. Proposals for dissolution of TCs and reporterships

Closure of the following TCs was approved by the Division:

TC2-04 Secondary standard sources: TC report has been published as CIE 149:2002.

TC2-24 Users guide for the selection of illuminance and luminance meters: To be closed if contact with the chairman cannot be re-established (note that following discussion with colleagues of the chairman, it is apparent that he is no longer involved in this work and the Board therefore agreed that the TC should be dissolved).

TC2-55 Round Robin Investigation of Implementation of CIE Photobiological Safety Standard: Chairman resigned and no new volunteer. Also, S009 is being reconsidered in Division 6 and an intercomparison is therefore premature.

R2-05 Visual Gloss: A report has been produced. Further work on this topic will be pursued in D1 via a new TC on Visual appearance measurement.

10. Proposals for new TCs and reporterships

10.1 New Technical Committees

D2 decided to establish the following three TCs, which have subsequently been agreed by the Board.

1) TC 2-56 (S) CIE/ISO standard on retroreflection measurements

Chair: Cameron Miller (USA) - AD Norb Johnson

TR: To prepare a CIE/ISO standard on the measurement of retroreflective materials based on CIE Publication 54.2

ML: Norbert Johnson (USA), Christine Stratford (UK), Steve Jenkins (AU), Kai Sorenson (Denmark), Maria-Luisa Rastello (Italy), Vincent Ledoux (FR), Helmut Frank (DE)

It was already agreed in 2002 to establish this new TC, but the chairperson was not determined. A new candidate, C. Miller, was recommended and accepted. D2 voted with no objection to establish this TC. The initial members were selected after the meeting.

2) TC2-57 (S) Revision of CIE S014-2

Chair: Alan Robertson (Canada) - AD Norb Johnson

TR: To revise CIE Standard S014-2 (Colorimetry Part 2: CIE Standard Illuminants) to include Illuminant D50

ML: Joanne Zwinkels (Canada), Danny Rich (USA), Janos Schanda (Hungary), Mike Pointer (UK), John Bristow (SE), Robert Hirschler (BR)

Proposed in the liaison report of ISO TC6/WG3 by J. Zwinkels. The paper and graphics arts industries (ISO TC130) have requested that Illuminant D50 should be included in this CIE standard. D2 voted with no objection to establish this TC. The initial members were selected after the meeting.

<Note>

The change of DS014-2 for the wavelength definition of Illuminant A (see Editor's report) will not be worked on in this new TC but by a small editorial group in D2 and CIE CB.

3) TC2-58 Measurement of LED radiance and luminance

Chair: Kohtaro Kohmoto (Japan) - AD Georg Sauter

TR: To prepare a CIE Technical Report setting out recommended measurement methods for the luminance and radiance of LEDs, taking particular account of the specific requirements of relevant photobiological safety standards

ML: Werner Horak (Germany), David Sliney (USA), Kathleen Muray (USA), Teresa Goodman (UK), Yoshi Ohno (US) + others to be agreed

The issue was raised by D6 and brought to TC2-45. A recommendation is needed for measurement of radiance of LEDs that is required by the newly published photobiological safety standard (CIE S009). The TC2-45 meeting on Jul. 1, 2003 agreed that this is a substantial issue crossing D2 and D6 and should be handled in a separate TC. D2 voted with no objection to establish this TC.

D2 also discussed the establishment of a new TC for image luminance measurement devices as proposed in the R2-30 report. D2 agreed on the need for a TC, but P. Blattner could not accept chairmanship due to his current workload. There were no other volunteers. D2 decided to wait till Blattner or some other volunteer becomes available to start the TC. The reportership R2-29 will be kept till a new TC is established.

10.2 New Reporterships

1) R2-32 Visual appearance measurement
Reporter: Mike Pointer (UK) - AD Norb Johnson
TR: To monitor the work of Divison 1 on visual appearance measurement, which will include potential new measurement areas
It was proposed in R2-05 report (see section 8.4). D2 voted with no objection to establish this reportership.

2) R2-33 Measurement of laser-based projection displays
Reporter: Keith Niall (Canada) - AD Georg Sauter
TR: To describe concepts and methods of photometry for the comparison of laser-based projection displays.
Proposed by J. Zwinkels. The reportership addresses issues of the luminance and contrast of an emerging class of displays: laser-based projection displays. D2 voted with no objection to establish this reportership. (A summary of proposal available on the website.)

3) R2-34 Methods for characterising and calibrating detectors in photon counting regime
Reporter: M. L. Rastello (Italy) - AD Georg Sauter
TR: To consider the emerging requirements for characterisation and calibration of detectors in the photon counting regime.
DD received a written proposal from Rastello, originally for a new TC. It was agreed that more information should be collected to determine the need for establishing a TC. D2 voted to establish this function as a new reportership. (A summary of proposal available on the website.)

10.3 New Liaisons

No new liaison functions have been established.

10.4 Changes in TCs and reporterships

- The chair of TC2-17 has changed to Gene Zerlaut (before San Diego meeting)
- The chair of TC2-44 has changed to the new Editor, Jim Gardner.
- The TR of TC2-51 has been revised (See TC2-51 report in section 8.)
- The liaison person for IEC TC100 has changed to D. Rich (USA).
- The liaison person for CCPR has changed to Y. Ohno (before San Diego meeting)

11. General issues (DD Goodman)

11.1. Future D2 Symposia

D2 already agreed last year to have the third CIE Symposium on LED measurement in 2004, in conjunction with the 2004 D2 meeting. DD suggested that there is also a great interest in another symposium on uncertainty evaluation for 2004 or 2005. Voting by the attendees indicated a preference for having it in 2005.

11.2. Future directions for measurement R&D

DD introduced the topic that, when looking at TCs and reporterships, we have responded to the problems when they were raised, but we were not good at looking ahead and anticipating where there might be problems that would need D2 to take some action. DD would like to give more opportunity for people to think ahead, to consider where new technologies are emerging and be prepared for possible new work for D2. This would allow us to take actions earlier (to establish new TCs and reporters) to address problems and needs in industry. As DD requested for input from the attendees, the following topics were mentioned:

- xenon light sources that have basic emissions lower than 180 nm, where measurement cannot be done in atmospheric environment. (R. Bergman)
- standards derived from synchrotron radiation (related to topic above) (F. Hengstberger)
- measurement for laser projection display (J. Zwinkels) … possibly a reportership.
- measurement for optical radiation safety (W. Horak). 2.5-3.0 μm range where there are no standards available (Goodman). Even longer than 3.0 μm may be necessary (Kohmoto).

DD asked everyone to provide such information to her any time, and particularly requested those who are involved in other Divisions to feed the information to her if there are areas in emerging applications that might need help from D2.

11.3. Training and education

DD Goodman reported that CIE Board is planning to provide training courses on selected subjects in the area of light and lighting, aiming at basic level participants for education purposes. Such courses can be organized by Divisions and held, e.g., at CIECB in Vienna. There were comments from participants that there are already many basic-level courses provided by companies, national labs and universities in various countries intended for local participants. It was questioned how such CIE courses can be successful competing with these existing courses held locally, and how it can attract basic-level participants all the way internationally.

11.4. Database of optical radiation properties of sources, detectors and materials

A project is underway at NPL (UK) to establish a database of the key optical radiation properties of commonly used sources, detectors and materials. It is hoped that this will become a widely used resource, available to anyone with an interest in the topic. Anyone who wishes to provide information for the database, or to learn more about its aims, objectives and how to use it, should contact DD Goodman.

12. Future D2 meetings:

12.1. 2004

There were two options:

1) D1 has decided to have its next meeting in Tokyo, Japan, in early June 2004, and proposed to have joint D1/D2 meetings and a D1/D2 joint symposium on LEDs
2) IEN, Italy extended an invitation to hold the next D2 meeting and LED symposium in Turin, Italy.

D2 voted unanimously to meet in Tokyo, Japan and also to hold a D1/D2 joint symposium on measurement and visual aspects of LEDs. The dates are TBD soon.

12.2. 2005

There are two options:
1) Leon, Spain, in conjunction with CIE Midterm meeting and AIC meeting (May 2005)
2) Davos, Switzerland, in conjunction with NEWRAD, Sep. 19-23, 2005.
The preliminary choice of D2 was Leon, Spain, by dominant vote. A formal decision will be made next year. It was also decided that D2 will organize another symposium on uncertainty evaluation in 2005.

12.3. 2006

We have an invitation from G. Sauter for a D2 meeting at PTB, Braunschweig, Germany. Still open to other invitations. Formal decision will be made in 2005.

13. Any other business

No new issues were raised.

14. Adjournment

The Division 2 meeting adjourned at 5:55 PM, July 2.

Note:
The materials presented at the meeting and some reports received after the meeting are available at: http://cie2.nist.gov/documents/2003-D2.htm

Attachment 1 Agenda of 2003 Div.2 Meeting
Attachment 2 TC2-39 Committee Activity Report July 2003 (D. Rich)
Attachment 3 R2-23 Report (D. Rich)
Attachment 4 Report of R2-05 Visual Gloss (M. Pointer)
Attachment 5 Liaison Report – CIE Division 8 *Image Technology* – June 2003 (M. Pointer)
Attachment 6 List of CCPR Key Comparisons (Y. Ohno)
Attachment 7 Liaison Report – ISO TC6/WG3 (J. Zwinkels)

Attachment 1

2003 Division 2 Meeting

San Diego, CA, USA

09:00 – 17:00, 2 July 2003

Agenda

1. Attendance list, apologies
2. Introductions
3. Approval of agenda
4. Approval of the minutes of 2002 Division meeting
5. Director's report
6. Secretary's report
7. Editor's report
   - 7.1 DS010.2e and radiance/luminance definition
   - 7.2 DS014-2 and Illuminant A wavelength definition
8. Progress reports from Technical Committees, reporters and liaison persons
   - 8.1. Associate Director Johnson and TC chairpersons
   - 8.2. Associate Director Sauter and TC chairpersons
   - 8.3. Associate Director Vandermeersch and TC chairpersons
   - 8.4. Reporters
   - 8.5. Liaisons with other Divisions
   - 8.6. Liaisons with other organisations
9. Proposals for dissolution of TCs and reporterships
10. Proposals for new TCs and reporterships
11. General issues
    - 11.1. Future D2 Symposia
    - 11.2. Future directions for measurement R&D
    - 11.3. Training and education
    - 11.4. Database of optical radiation properties of sources, detectors and materials
12. Future meetings
    - 12.1. 2004
    - 12.2. 2005
    - 12.3. 2006
13. Any other business
14. Adjournment

Attachment 2

Committee Activity Report
CIE TC 2-39
Geometric Tolerances for Color Measurement

Terms of Reference

Compile a technical report and recommendations specifying the geometric tolerances for the various geometries in colorimetry, including 0/45, 0/d and others. Parts of this technical report may be suitable for inclusion in a CIE standard specifying several geometric tolerance levels.

Working Program

Utilize ISO 5/1 and ASTM E 1767 to develop a system of specifications for the geometry of color measurements. Define the specifications in the following order: Reflectance factor (t/8, d/8, d/0), radiance factor (45/0) and transmittance geometries (0/0, d/0). Specifications will be developed via computer simulation & verified experimentally.

Current Committee Membership:
A Bittar (New Zealand), J. Taylor (United Kingdom), E. Early (USA), L. Hanssen (USA), G. Baba (Japan), B. Jordon (Canada), J. Zwinkels (Canada), W. Czepluch (Germany), N. Johnson (USA), D. Rich (USA), Chairman, R. Fisch (USA), J. Pietrzykowski (Poland), A. Kravetz (USA), J. Ladson (USA), J. Decarreau (France)
Consulting Member: W. Erb (Germany)

Status

The Committee met at the Town & Country Hotel in San Diego, USA on 1 July of 2003 and reviewed its progress. Six members and ten guests were present. Two new drafts of the committee report have been circulated since the last meeting in May, 2001. At a CORM meeting and the CORM / NPL Oxford Conference in the USA member E. Early made a proposal to utilize a new method of specifying the geometry of an instrument based on the formalism of geometric lens design programs. While the proposal appears to have merit, it is too recent for optical engineers and metrologists to have tested and compared it to existing instrument performance so that tolerances on an instrument design may be defined in the prescriptive notation. Draft 6 included the main parts of the Early proposal in an Annex so that readers of the report might have the opportunity to develop the required comparisons.

Draft 5 of the committee report received many useful comments from the committee and all were implemented. The revised report was distributed again, as Draft 6 and received a comment from member G. Baba and several comments from a guest, K. Imura of Minolta, Japan. In the Baba comment, it was suggested that the term, “level” used to describe the degree of conformance of an instrument to the specifications be changed to the term, “category”. This is a good suggestion and will be implemented in the final report. He also supplied an additional reference to some of the data which he had supplied to the committee.

The following issues were raised during the meeting in San Diego:

1. J. Zwinkels commented that she is still uncomfortable with the specification and tolerances on integrating spheres. She volunteered to supply an alternative specification and some editorial comments. Several other attendees agreed with her on the issue of sphere efficiency.
2. B. Jordan suggested that the reference to Helmholz reciprocity be changed to reflect that its validity has been challenged in the literature and may not hold if certain, non-geometric attributes of the measurements are not taken into account.
3. There was a suggestion to include a description of the various approaches that might be used to test or verify the level of uniformity across the sampling aperture. Several attendees volunteered to send suggestions for inclusion.
4. J. Zwinkels suggested consulting a publication by Clarke and Compton. She will supply a reference to the Chairman.
5. E. Early suggested that the functional notation be re-ordered so that the centroid angle occurs first in the series of Influx or Efflux.
6. It was suggested that the title of section 2.2 be changed from specifying "colorimeters" to specifying "color measurements".
7. N. Johnson suggested than an informative Annex be included which contains example specifications for each geometry.

Based on the comments of the committee members at this meeting and comments from guests, a 7th draft will be required. The chairman will solicit the information volunteered by the attendees and issue a new draft by the fall. If the volunteered information is not received by September, the draft will revised as best as possible and distributed along with a ballot, assuming that the issue was not as important or tractable as stated at the meeting. It is hoped that the final report can be distributed to the Division members for approval by the end of 2003.

(Submitted by D. Rich, July 3, 2003)

Attachment 3

Status to CIE Division 2

Reporter R2-23 ISO/CIE Standards for the measurement of reflectance and transmittance

There have been no new standards on the measurement of reflectance and transmittance. Nor has there been significant advances in any Division 2 Technical Committees that may require the promotion of a Technical Report to the development of a standard.

ISO 13655 on the measurement of the reflectance and color of printing is under revision. One problem with which they are struggling involves the measurement of the reflectance of non-optically thick materials, where the measurement radiance may propagate horizontally away from the measurement aperture or through the specimen and be reflected from the backing into the measurement aperture. Currently, ISO 13655 addresses this by specifying a highly absorbing, matte backing. But this backing will distort the reflectance curves of certain commercial materials, such as translucent or transparent ink on clear or translucent plastic substrates. These materials are used in flexible packaging where the colors convey commercial or contractual information and must meet tight specifications in contracts that cross inter-national boundaries. This is a very difficult measurement problem, not clearly addressed in Publication CIE 130.

ISO 5 is being revised with new, clearer specifications of the requirements for density using spectral reflectance or transmittance measurements and then numerical conversion to ISO Status Density (transmission density or reflection density). The standard on transmission density has is being revised by E. Early of NIST who has recently completed a revised calibration service and artifacts for the measurement of this property.

There is a need to continue to monitor the advances of the ISO and CIE looking for the opportunity to set up a TC to develop a standard on the measurement of spectral reflectance (either regular or diffuse) and transmittance (either regular or diffuse).

Respectfully submitted,

Dr. Danny C. Rich

Attachment 4

Report to Meeting of CIE Division 2 – 2-Jul-2003 – San Diego, USA

R2-05 Visual Gloss

There is an amount of anecdotal evidence that the methods of measuring visual gloss described in BS EN ISO 2813 *Paints and varnishes – Determination of specular gloss of non-metallic paint film at 20°, 60° and 85°* and ASTM D523 – *Standard Test Method for Specular Gloss* (intended for the measurement of non-metallic specimens) do not give numbers that correlate with visual impression. That this is true is probably compounded by the fact that users are applying the methods to materials for which they were not originally intended. I would appreciate input from any D2 members to try to substantiate this claim.

ISO TC 130/WG4 *Graphic technology/Media and materials* is leading a series of experiment with the aim of producing a new measure of visual lustre. This measure is based on the ratio of the diffuse reflectance to the specular reflectance with the illumination is set at 45° and visual data for a number samples have been obtained from groups in Germany, Japan, Switzerland and the UK. The samples include a number of different paper types unprinted and printed with cyan, magenta, yellow and black ink. There are potential problems in that the measurements obtained by the different countries, using different instruments, are not all correlated, and the visual experiments differ in detail in the different countries. Further analysis of the data is awaited. A committee draft standard is available *Graphic technology – testing of prints – Visual lustre* although this is proving contentious.

INCITS W1.1 *Standardisation for Evaluation of Perceptual Macro-Uniformity for Printing Systems* is developing test targets and procedures for evaluating the uniformity of gloss on the printed page. This committee is the US representative of ISC/IEC JTC1/SC28 *Office Equipment*. The committee is concerned with the overall appearance of the uniformity of the printed page and, while colour is obviously an issue, gloss is known to be an important contributor to the appearance. The committee aims to:

- define the relevant varying attribute (measure) based on appearance,
- design a series of digital test targets,
- create a collection of hard copy test samples spanning a diverse range of marking technologies, image quality levels and defect types,
- digitise these hard copy sample images,
- perform surveys to obtain subjective ratings of the hardcopy samples,
- develop objective metrics for quantification of the attribute – these metrics to be appearance based, in the sense that they scale with the human visual perception of the attribute.

These steps will be followed by a further series to test and establish correlations between the objective and subjective measures of the attribute.

A student at the University of Derby, has conducted a number of studies in the area of visual gloss and then gone on to develop a method of measuring gloss based on digital imaging.
A number of samples were prepared with different colours and gloss levels and a pilot study carried out using two different Macbeth® viewing devices: the SpectraLight® and the SkyLight®. This pilot investigation showed that both viewing conditions gave very similar

visual results in terms of gloss. The main experiment was carried out using only the SpectraLight® viewing condition. All samples were assessed 20 times by 14 observers.

An instrumental method was developed based on the measurements of two reflectance functions using a spectrophotometer (each sample was measured using specular component included and specular component excluded conditions). These data are then converted to two sets of CIE tristimulus values (*XYZ*). The difference in Y tristimulus value ($\Delta Y_{SCI-SCE}$) gives an accurate prediction of the perceived gloss results.

An imaging system was configured including a digital camera and a fixed illumination and viewing (10°/0°) geometry. Two digital imaging system methods based on the concept of a distance profile were developed for measuring gloss and both gave satisfactory performance compared with the visual data.

At the Quadrennial meeting in San Diego, CIE D1 established a technical committee, TC1-65 *Visual Appearance Measurement*, and I was appointed chairman. The Terms of Reference of the TC are:

> To study, develop and recommend a soft-metrology framework for measuring visual appearance. This should include potential measurement areas, psychophysical procedures and real applications.

The work of this Technical Committee will include the visual assessment and the instrumental measurement of gloss in all its definitions. The following have asked to join the TC: Jim Nobbs (UK), Ronnie Luo (UK), John Hutchings (UK), Claudio Oleari (IT), Osvaldo da Pos (IT), Françoise Viénot (FR), Gunilla Derefeldt (SE), Jim Leland (US), Richard Harold (US).

There is also a sub-committee within ASTM E12 *Color and Appearance* that deals with *Visual Methods* – I am chair of this sub-committee and am now responsible for a number of ASTM Methods involving gloss.

I recommend that, with the establishment of TC1-65 in Division 1, this D2 reportership be disbanded and a new reportership established with the title *Visual Appearance Measurement*; I am happy to be this reporter.

Mike Pointer
02-Jul-2003

Dr Michael R Pointer
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Attachment 5

Liaison Report – CIE Division 8 *Image Technology* – June 2003

Division Officers:

Director: Todd Newman US
Secretary: Dave McDowell US
Editor: Mike Pointer UK

The officers can be contacted via the Division 8 web site: www.colour.org

Division Terms of Reference:

To study procedures and prepare guides and standards for optical, visual and metrological aspects of the communication, processing, and reproduction of images, using all types of analogue and digital imaging devices, storage media and imaging media.

TC 8-01 Colour Appearance Models for Colour Management Applications

Year established: 1998
Terms of Reference:
To study, develop, and recommend a colour appearance model based on CIECAM97s for use in digital colour management and to develop clear usage guidelines for common applications. Consideration is to be given to colour and engineering requirements for open colour management systems.
Chairman: Nathan Moroney (nathan_moroney@hp.com)
Report:
A technical report entitled *A Colour Appearance Model for Colour Management: CIECAM02* has completed the Technical Committee ballot and has been sent to the Central Bureau for balloting and distribution.

TC 8-02 Colour Difference Evaluation in Images

Year Established: 1998
Terms of Reference:
To study and recommend methods to derive colour differences for images.
Chairman: M Ronnie Luo (m.r.luo@derby.ac.uk)
Report:
An interim report entitled *Methods for Deriving Colour Differences in Images* is being prepared by the Chairman.

TC 8-03 Gamut Mapping

Established: 1998
Terms of Reference:
To study, develop and recommend an optimal solution for cross–device and cross–media image reproduction. This solution will provide a standard procedure to calculate the colour gamut of an image, an imaging system, or its components, and either one algorithm, or a set of algorithms and rules for use in specific applications.

Chairman: Jan Morovic (j.morovic@derby.ac.uk)
Report:
A technical report entitled *Guidelines for the Evaluation of Gamut Mapping Algorithms* has completed the Technical Committee ballot and has been sent to the Central Bureau for balloting and distribution.

TC 8-04 Adaptation under Mixed Illumination Conditions

Established: 1998
Terms of Reference:
To investigate the state of adaptation of the visual system when comparing soft-copy images on self-luminous displays and hard copy images viewed under various ambient lighting conditions.
Chairman: Naoya Katoh (naoya@color.sony.co.jp)
Report:
A draft technical report entitled *Adaptation when Comparing Softcopy and Hardcopy Images under Mixed Illumination* is being considered by the members of this committee.

TC 8-05 Communication of Colour Information

Established: 1999
Terms of Reference: (from http://www.colour.org/tc8-05/)
To standardise a minimal set of techniques that enable unambiguous and efficient communication of the colour information in images. Two fundamental approaches will be addressed:

1. The association with the image data of additional data that describes the colour space of the image data.
2. The representation of the image data in a standard colour space.

The standard will also define a minimal set of standard colour spaces that addresses a wide range of imaging applications. Whenever possible, existing standard colour spaces will be used in preference to creating new ones.
Chairman: Robert Buckley (rbuckley@crt.xerox.com)
Report:
A first draft of a Technical Report is being considered by the members of the Committee.

TC 8-06 Image Technology Vocabulary

Established: 2000
Terms of Reference:
To liaise with other Division 8 Technical Committees and collate definitions of terms associated with image technology.
Chairman: Janos Schanda (schanda@ella.hu)
Report:
The Chairman has been collecting terminology for the report.

TC 8-07 Multispectral Imaging

Established: 2002

Terms of Reference:
Chairman: Patrick Herzog (p.herzog@color-experts.de)
Report:
The TC was formed in 2002 and held its first meeting in November of that year. The TC is still formulating a plan of work.

R8-04: Effect of fluorescence on colour characterization of image reproduction media
Reporter: Danny Rich
A report is nearing completion.

New Work Proposed in San Diego

TC 8-08 Testing Spatial Colour Appearance Models
Terms of Reference:
To design, implement and report the results of a psychophysical test comparing the output of spatial appearance models (including Retinex, MOM, iCAM) for high dynamic range still colour images.
Chairman: Garrett Johnson?

R8-05 Mark Fairchild *Image appearance*
Terms of Reference:
To investigate and report on research extending colour appearance models to include properties of spatial vision for static images and scenes with particular focus on:

- Spatial filtering for image difference metrics
- Spatial adaptation for image rendering
- Potential interactions between the above

R8-06 Nathan Moroney *Image appearance*
Terms of Reference:
To monitor the response to CIECAM02. This includes answering questions, reviewing the literature and recommending future activities.

Next Meeting

The next formal meeting of the Division will be in Scottsdale, Arizona in November 2004.

Attachment 6

Comité Consultatif de Photométrie et Radiométrie (CCPR)

MRA (Mutual Recognition Arrangement) 1999

CMC (Calibration and Measurement Capability)

Key Comparisons in progress

- Spectral irradiance K1.a 250 - 2500 nm – NPL
- Spectral irradiance K1.b 200 – 400 nm – PTB
- Spectral responsivity K2.a 900 – 1600 nm – NIST …. preparing report.
- Spectral responsivity K2.b 300 – 1000 nm – BIPM …. preparing report.
- Spectral responsivity K2.c 200 – 400 nm – PTB
- Spectral diffuse reflectance K5 – PTB
- Regular Spectral Transmittance K6 – BNM …. preparing report.

Supplementary comparisons in progress

- CCPR-S1 spectral radiance - VNIIOFI
- CCPR-S2 aperture area - NIST

For further details, visit BIPM werbsite: www.bipm.fr

(Report by Y. Ohno)

Attachment 7

Liaison Report, July 2003

ISO TC6/WG3

The next meeting of TC6/WG3 (paper, pulp and boards – optical properties) will be held on 3 or 4 November, 2003, in conjunction with the ISO TC6 meeting in Tokyo, Japan.

The following ISO TC6/WG3 activities are relevant to the work of CIE D1 and D2.

Several ISO standards developed by this working group (WG) require a normative reference to the characteristics of the CIE illuminant C and to a CIE recommended measurement geometry of d/0°. Thus, when the WG Chair (A. Bristow) became aware that Publication 15.3 Colorimetry, being prepared by CIE/TC 1-48, had declared illuminant C to be obsolete and that d/0° was not included as a recommended measurement geometry, there was considerable concern. This prompted the Chair and Secretary of ISO TC6, Mr. George Weiss and O. Tardiff, respectively, to visit Drs Robertson and Zwinkels at NRC to discuss how this issue might be resolved. Based on these discussions, a proposal was put forward by A. Robertson for changes to the latest draft of CIE Publication 15.3. Mr. Weiss also contacted the CIE CB and set up a meeting in Vienna for May 2003 to highlight the importance of this ISO issue with J. Makai and Christine Hermann. At the CIE meetings of TC 1-48 and TC 2-39 in San Diego, alternate wording was agreed to by TC members that maintained the status of Illuminant C for continuing applications, and kept specific reference to d/0° in the list of recommended measurement geometries.

ISO TC 6/WG3 has developed several recent standards that distinguish between optical properties determined for indoor (CIE Illuminant C) and outdoor (CIE Illuminant D65) illumination conditions (e.g. ISO 11476:2000 Paper and board – Determination of CIE whiteness, C/2° (indoor illumination conditions; ISO 11475:1999 Paper and board – Determination of CIE whiteness, D65/10° (outdoor daylight)). The CIE Illuminant C has has been used by the paper industry to represent indoor illumination because it has a proportion of UV radiation more typical of indoor daylight conditions (where lower UV content is available due to filtering of daylight through window glass) and produces the same visual effect with the fluorescent whitening agents found in papers and boards. Since the CIE recommends that Illuminant C not be used for new applications, there is a need for CIE to recommend a daylight illuminant for indoor applications.

Respectfully submitted,

Joanne Zwinkels
ISO/TC6 WG3 Liaison
National Research Council of Canada
Ottawa, Ontario Canada

<Another report in next page>

Liaison Report, January 2003

ISO TC6/WG3

The next meeting of TC6/WG3 (paper, pulp and boards – optical properties) is scheduled in conjunction with the ISO TC6 meeting in Tokyo in November 2003.

The following ISO draft standard has been posted for ballot:

ISO/DIS 8254-3.2: Paper and board – Measurement of specular gloss – Part 3: 20 degree gloss with a converging beam, TAPPI method. The previous draft standard, ISO/DIS 8254-3, was balloted with 28 members voting in favour out of 31. The CIE comments on the previous draft (ISO DIS 8254-3) indicated an error with equation 2 in Section 5.2.2; this has been corrected in this version (i.e. K=1 for n=1.54).

The following new work item has been posted for vote:
N1165: Paper and board – Measurement of D65 brightness – diffuse reflectance factor under UV(D65) conditions..

Respectfully submitted,

Joanne Zwinkels
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