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

Canadian National Committee Comité National Canadien

CNC/CIE

45th Annual Meeting

2000-October-13

- Minutes
- Division Members' Reports

NRC·CNRC
Institute for National Measurement Standards • Institut des étalons nationaux de mesure • Ottawa, Canada, K1A 0R6, Fax (613) 952-1394

COMMISSION INTERNATIONALE DE L'ÉCLAIRAGE
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MINUTES OF THE 45TH ANNUAL CNC/CIE MEETING

2000-October-13

The 45th annual meeting of the Canadian National Committee of the Commission Internationale de l'Éclairage (CNC/CIE) was held on Friday, October 13, 2000 at the Defence and Civil Institute of Environmental Medicine (DCIEM), 1133 Sheppard Avenue West, Toronto, Ontario M3M 3B9.

Note: the following acronyms are used in this report:

CIE	Commission Internationale de l'Éclairage
CNC/CIE	Canadian National Committee of the CIE
USNC	US National Committee of the CIE
BA	CIE Board of Administration
CB	CIE Central Bureau
NC	CIE National Committee
TC	CIE Technical Committee
NRC-INMS	Institute for National Measurement Standards at the National Research Council of Canada
NRC-IRO	International Relations Office at the National Research Council of Canada

1. Call-to-order:

The 45th annual meeting of the Canadian National Committee of the Commission Internationale de l'Éclairage (CNC/CIE) was called to order at 9:38 on Friday, October 13, 2000 by S.M. McFadden, President.

Twenty-one Members and Advisory Members, and one guest were in attendance at various times. The list of all attendees is given in Appendix A.

The agenda, as circulated by mail (Appendix B), was modified with the addition of one item between items 7 and 8:

7A. Report on CIE Divisions 4 and 5 meeting in Toronto, 2000 September 1–6.

Moved by R.A. Smith, seconded by K.F. Lin that this modified agenda be accepted. Passed.

At the President's request, each attendee introduced themselves.

2. Minutes of the 44th Annual CNC/CIE Meeting:

The following items arising from the Minutes of the 44th annual meeting were considered:

1. Item 2.1 Concerning the CNC/CIE award for H.W. Budde, A.A. Gaertner indicated that the certificate had been prepared and was available for viewing at this meeting.
2. Item 4 J. Roberge reiterated his comments concerning the importance of the President attending the CIE-BA meetings as an observer.
3. Item 6 The President indicated that the letter to CISTI had been sent, but that there had not yet been enough time elapsed to expect a reply.
4. Item 7 J. Roberge noted that André Laperrière of Hydro Québec was not present and asked whether he had been sent CNC/CIE information. The Secretary replied that Mr. Laperrière had been added to the Advisory Member list and had received all information concerning this meeting. The Secretary noted that he had not yet sent Dr. Guy Newsham the invitation to CNC/CIE Advisory Membership.
5. Item 8 The President asked R. Topalova whether she had received any information concerning her Division 3 reportership *R3-06 Accidents and Lighting*. R. Topalova gave a short review of the request, which had been sent to the CIE world-wide, and indicated that she had not received any replies. She asked whether there was any way that it could be required that lighting data be collected at accident sites. I.C. Pasini indicated that he had checked some accident reports and that none of them included lighting information. J. Roberge noted that CSST in Québec would have some data and suggested that insurance companies might have data. He volunteered to check with one company which he knows. K.F. Lin suggested that in Canada, Marion Bassett may have information, and that in the USA, Ian Lewin might be asked.
6. Item 9.5 The Secretary inquired whether G. Dugan of *Lighting Magazine* had attended last year's meeting. It was indicated that he had attended and that a picture and a summary of the meeting were in the magazine (December 1999 issue).

Moved by J. Roberge, seconded by J. Bastianpillai, that the Minutes be accepted as circulated. Passed.

3. Election of Reporter for the Lighting Press:

This item was postponed until later in the meeting since J.A. Love had not yet joined the meeting.

4. President's Report:

S.M. McFadden presented her report, which is attached as Appendix C.

5. Secretary's Report:

A.A. Gaertner presented his report, which is attached as Appendix D. He also noted that:

1. He had recently received CIE Draft Standard *DS009.1/E Photobiological Safety of Lamps and Lamp Systems* for comment and requested that anyone interested in reviewing the document contact him for a copy.

2. The CIE had just published an 'Image Brochure' which included information concerning the new types of CIE memberships. It was recommended that he send a copy to each person on the CNC/CIE mailing lists and keep some on hand for use at small meetings. He indicated that large quantities could probably be ordered for special meetings, such as the IESNA meetings.

3. He had recently received an email notice from J-O. Laval in France concerning an international seminar *Urban Public Lighting in Europe*. He distributed copies of the announcement to those who were interested and asked whether this type of announcement could be sent to all on the CNC/CIE mailing lists by email rather than sending paper copies by regular mail. Consensus

was that more information could be sent by email rather than by regular mail.

It was questioned why IESNA information was not included in the *CIE News*. M.K. Timmings, who is presently President of IESNA, volunteered to check with the CIE-CB whether this information could be included.

J.C. Zwinkels suggested that the Minutes of the CNC/CIE meetings include a summary sheet highlighting the items which required action and the person responsible for the item. (See the table at the end of these Minutes.)

6. Financial Report:

A.R. Robertson presented his report, attached as Appendix E. He indicated that Annex 1 contains the transactions since his last report, leading up to the transfer of the account to K. Frank Lin. There are some additional bank charges which are not included in this list. He noted that the transactions related to the 1999 joint CNC/USNC/CIE meeting are presented in Annex 2. R.A. Smith added that in addition to these transactions, it should be noted that Osram-Sylvania donated the supper on 1999 October 15 as part of the tour of their facilities.

7. Publications Report

K.F. Lin presented his Publication/Financial Report, attached as Appendix F. He noted that the third page of his report is composed of the tables given by A.R. Robertson for the 1999 and 2000 annual meetings, respectively.

R. Topalova indicated that she had attended the CIE Warsaw meeting, but had not yet received the CIE Publication CIE x017-2000: Special Volume, *24th Session of the CIE, Warsaw, 24–30 June, 1999, Late Papers*. The Secretary is to check with the CIE-CB whether attendees to the Warsaw conference are to receive this document as part of their attendance fees.

J. Roberge asked whether we should have a more involved financial account system which would include the value of the CIE publications which we have in stock. He also asked whether our account is only a CIE Publications account, as appears to be indicated in the titles on page 3 of K.F. Lin's report. A.R. Robertson indicated that the account was registered as a CNC/CIE account and therefore could include other finances besides the accounting for sales of CIE publications.

J. Roberge reminded the attendees of the option of obtaining a Master Copy of CIE publications, from which copies could be made and sold, with a royalty for each copy to be paid to the CIE-CB. This could reduce some costs and he suggested that K.F. Lin consider that possibility.

M.K. Timmings moved, seconded by V. Cimino, that the Financial and Publications reports be approved. Passed.

7A. CIE Divisions 4 and 5 meeting:

W.K. Adrian presented a verbal report on the CIE Divisions 4 and 5 meetings in Toronto 2000 September 1–6. He indicated that he would send the Secretary a written report to be included with the Minutes (Appendix G). He thanked J. Bastianpillai and A. Silbiger for their extensive help in the preparation and execution of the meeting. He thanked M. K. Timmings for hosting the reception at the hotel 'at the last minute' when previous arrangements failed. He indicated that the financial report for the meeting is not yet available since the finances are not yet complete. He expects a small surplus, due to the gracious support of several sponsors. J. Bastianpillai thanked these sponsors, who donated a total of approximately $5000.00 towards the expenses of the meeting: Canlyte, Hubbell Canada, Lithonia, Lumec-Schreder, Ministry of Transportation (Ontario), Omnilumen, Osram-Sylvania, and Thomas & Betts.

3. Election of Reporter for the Lighting Press:

J.A. Love indicated that he had been unable to carry out this task after the last meeting.

S.M. McFadden indicated that she had sent some information to a USA contact, and that she would follow-up on how this was used. E. Wotton asked what was meant by 'the lighting press' in

Canada—do we want CNC/CIE affairs published in *Lighting Magazine*? M.K. Timmings noted that we need to obtain the magazine deadlines from G. Dugan. It was pointed out that we would need to edit information for the magazines such that it was in a form they could use.
J. Bastianpillai suggested that we might get information into the IESNA journal *Lighting Design and Application.*

J.A. Love stated that he would try again this year, and J. Bastianpillai volunteered to help him.

8. Reports from the Division Members:

(Note: The CNC/CIE Division Member's Reports are attached as a separate document, i.e. they are not labeled with an Appendix number. This has been done to enable these reports to be made available to various individuals, independently of the Minutes of this Annual Meeting.)

DIVISION 1 Vision and Colour — S.M. McFadden

S.M. McFadden presented her report. She highlighted some of the TCs, indicating that she has more information available for anyone who is interested. W.K. Adrian added that TC 1-19 was in the final ballot stage and summary responses were being done. One negative vote had been received, from the USA. He also noted that Division 4 already had TCs working on the same items as TCs 1-50 and 1-51. S.M. McFadden indicated that the Division 1 TCs were not attempting to do the same research, but to take the research which was already done and write it into standards. Discussion followed concerning calculations of discomfort and disability glare, and on problems of 'equivalent luminance'.

* The meeting broke for lunch at this point. S.M. McFadden had arranged for a lunch to be served in the meeting room. During the meeting she expressed thanks on behalf of the attendees to Sue Viel and the kitchen staff for arranging the food and drinks for the morning and afternoon coffee breaks, and the excellent lunch.*

DIVISION 2 Physical Measurement of Light and Radiation — J.C. Zwinkels

J.C. Zwinkels presented her report, pointing out that the Minutes of the CIE Division 2 meeting are only in draft form. She highlighted the work of the committees which had Canadian members. W.K. Adrian and J. Roberge indicated that Division 5 was also working on aspects of Emergency Lighting.

DIVISION 3 Interior Environment and Lighting Design — I.C. Pasini

I.C. Pasini presented his report, noting the additional (email) page from J.A. Veitch with a short report on the activities of TC 3-34 *Protocols for Describing Lighting*. He pointed out the inclusion of the report from R 3-18 *Thermal Environment, Outdoor Climate, and Visual Preferences*, and the comments received from J.A. Veitch. R. Topalova indicated that although she was presently living in the USA, she would like to remain as a CNC/CIE Advisory Member, as her presence at this meeting indicated. Discussion of her reportership had occurred in Item 2.5 above.

DIVISION 6 Photobiology and Photochemistry — J.D.Y. Deslauriers

Yvon Deslauriers presented his report at this time since he had to leave the meeting early. He noted that Pascale Reinhardt, a radio biologist with his group in Health Canada had attended the last Division 6 meeting with him. He recommended that the CNC consider her for CNC/CIE Advisory Membership.

DIVISION 4 Lighting and Signalling for Transport — W.K. Adrian

W.K. Adrian presented a verbal report, indicating that he would prepare a written report for the Minutes of this meeting.

DIVISION 5 Exterior and Other Lighting Applications J. Roberge

J. Roberge presented his report. He thanked Werner Adrian for his excellent organisation of the Division 4 and 5 meetings in Toronto (see item 7A above). J. Bastianpillai inquired whether there was any information concerning lighting of pedestrian walkways. Both J. Roberge and W.K. Adrian indicated that there was very little.

DIVISION 8 Image technology R. Baribeau

Réjean Baribeau presented his report, highlighting the work of the TCs in this relatively new division.

9. Nominations and Appointments:

A list of the CNC/CIE Members and Advisory Members (Appendix H) was circulated by the Secretary.

Members:

The Secretary noted that the three Member appointments recommended by the CNC/CIE at its 44th annual meeting were endorsed by Dr. Janusz Lusztyk, Director-General of NRC-INMS, and all three had accepted this appointment: Sharon M. McFadden, Jacques Roberge and Dr. J.D. Yvon Deslauriers.

The Secretary indicated that the terms of two of the present Members expire this year: K. Frank Lin and R.W. White. A discussion followed concerning the guidelines of the NRC International Relations Office (NRC-IRO) that the CNC/CIE should attempt to select its Members for geographical, gender, and linguistic diversity. It was noted that we had several active Advisory Members from Ontario who could be nominated as Members, but that Ontario was already well represented. J.A. Love moved, S.M. McFadden seconded, that K. Frank Lin, the CNC/CIE Publications Officer be renominated as a CNC/CIE Member. This was passed. J.C. Zwinkels moved, I.C. Pasini seconded, that L.A. Whitehead of UBC be nominated as CNC/CIE Member. This was passed.

Advisory Members:

The Secretary indicated that he had reviewed the c.v. of Mankajee Shrestha as requested at the 44th annual meeting and had added him to the CNC/CIE Advisory Members list, noting that Mr. Shrestha was present at this meeting. He noted that R.B. Gibbons had contacted him with regrets for this meeting, which would indicate his interest in remaining a CNC/CIE Advisory Member.

E. Wotton questioned what we expected of Advisory Members. A.R. Robertson pointed out that although the Code of Procedure for the CNC/CIE demands a small (maximum of 12) Membership appointed by the NRC, the CNC/CIE itself may appoint an unlimited number of Advisory Members. In practise, the CNC/CIE makes very little distinction between the two forms of membership in most of its activities.

E. Wotton suggested we contact Ken Loach of H.H. Angus as a possible Advisory Member. He indicated that he would give Mr. Loach's address to S.M. McFadden who would follow-up on this suggestion.

The Secretary noted that Mario Bucci had requested Advisory Membership after the last annual meeting. Moved by A.A. Gaertner, seconded by J. Bastianpillai, that Mario Bucci of SNC•LAVALIN be invited to Advisory Membership. Passed.

S.M. McFadden introduced Dr. Keith Niall, who has been working with DCIEM since the late 1980s. He is interested in all aspects of visual perception, although his primary research interest has been on shape constancy under changing viewpoints. More recently he has been involved in the development of a large screen display technology for simulators. As part of that work, he has

become interested in the area of colour vision, and in particular colour appearance. It was moved by S.M. McFadden, seconded by J. Roberge, that Dr. Niall be invited to Advisory Membership. Passed.

Following the recommendation of J.D.Y. Deslauriers (Division 6 report above), it was moved by J. Roberge, seconded by J.C. Zwinkels, that Pascale Reinhardt be invited to Advisory Membership. Passed.

It was noted that E. Szamosi had moved from direct activity in lighting issues at CSA. It was recommended we contact him to determine whether there was someone at CSA who was involved in lighting issues who would be interested in Advisory Membership. The Secretary pointed out that C.M. Henville had probably retired from Ontario Hydro since his mail was now being returned and he was not able to contact him by telephone. J.A. Love volunteered to determine whether someone he knows at Ontario Hydro would be interested. J.C. Zwinkels noted that J. Diwan was no longer at Consultex Inc., and that he should be removed from Advisory Membership since we do not know his new address.

10. Nomination of CIE officers for 2003–2007 quadrennium:

The CIE-BA nominations (Appendix I) for Officers for the 2003–2007 quadrennium was considered. A.R. Robertson pointed out that these were all excellent people, but expressed concern that these people had all been involved with the CIE for some time now and the CIE should be encouraging younger people to be involved in the CIE activities. No further nominations were considered.

11. CIE Midterm Session, Istanbul 2001 September 6–12:

The following individuals are considering attending: W.K. Adrian, S.M. McFadden, I.C. Pasini, J. Roberge and R. Topalova. Discussion followed concerning funding to enable attendance at the Session. It was moved by V. Cimino, seconded by J. Roberge, that the CNC/CIE strongly recommends to NRC-IRO that they support the CNC/CIE Vice President, W.K. Adrian, in his attendance at this Session by paying some of his expenses.

12. CIE 25th Session, San Diego 2003

The President indicated that she had reported on her interaction with the USNC in her report (item 4 above), and that she intended to continue the dialogue with them.

13. Other Business:

13.3 Date and Place for Next Year's Meeting:

The President stated that she had been in correspondence with the USNC, who were intending to invite the CNC/CIE to a joint meeting next year. A possible meeting location of Niagara Falls, New York had been suggested. It was felt that this location was favourable for the CNC/CIE. A November date, which was thought to be usual for the USNC, was also considered suitable. It was recommended that the date be chosen: i) to have it late enough after the CIE Istanbul meeting to allow reports from the CIE meeting to be received in time for the joint CNC/USNC/CIE meeting, and ii) to avoid conflict with the Colour Imaging Conference held in Scottsdale each November (November 5–9, 2001). The President agreed to continue the dialogue with the USNC.

13.2 Correspondence:

The President brought forward a letter (Appendix J) from ICAO (International Civil Aviation Organization) concerning an invitation to conduct a scientific study on vision and colour perception requirements for air crew and air traffic controllers. She had received the letter from Dr. Hugh O'Neill, Director of Civil Aviation and Marine Medicine in Transport Canada. ICAO has sent this letter to five countries, one of which is Canada, requesting that these countries set up a research program to study the problems indicated in the letter. Dr. O'Neill is looking for researchers within Canada who might be interested in undertaking aspects of this research. He can be contacted at (613) 990-2048. W.K. Adrian suggested that this information be forwarded to Jeff

Hovis in the School of Optometry at the University of Waterloo.

13.1 Lighting Education.

Following the request at last year's annual meeting to continue this discussion, the President opened the floor for discussion concerning lighting education in Canada. R. Topalova began the discussion by presenting her experiences in developing a course of study for Ryerson for the evening Continuing Education program. It was found that Ryerson was unable to obtain qualified people to teach these courses. It also appeared that there were no programs for lighting education in any Canadian universities. J. Bastianpillai pointed out that the IES does put on lighting courses. E. Wotton noted that we need to have lighting as a required course, not an elective, to obtain certain undergraduate degrees. "It must be realised that lighting is a subject worth an investment." S.M. McFadden noted that at present many Canadian students go to the USA or the UK for an education in lighting. She suggested that this may be a necessary first step to obtaining people adequately trained to carry out research and to teach lighting in our Canadian universities. It was realised that the real demand for lighting education will need to come from users demanding that these services be incorporated in any contracts which involve lighting.

It was decided to set up a working group to study these issues, prepare a report, and determine the most appropriate recipients of the report. It was requested that an interim report be made available to the CNC/CIE in six months. The following people volunteered to serve on the working group: Joe Bastianpillai (convener), Vince Cimino, Andrew Silbiger, Ernest Wotton, Mankajee Shrestha and Rados Topalova.

13.4 Other Business:

E. Wotton initiated a discussion concerning the best means of presenting the Division Members' reports to allow for adequate discussion at the annual meetings. It should not be necessary to read reports which were already in written form. If the reports could be distributed far enough in advance of the annual meeting, the attendees could review them and come to the meeting better prepared to discuss items of interest. It was considered that distribution of the reports before the meeting, together with a limited presentation at the annual meeting, should be tried. Moved by E. Wotton, seconded by S.M. McFadden that the Division Members' presentation of their reports at the annual meetings be limited to 15 minutes each. Passed. It was recommended that the reports be distributed by electronic means in advance of the annual meeting to all CNC/CIE Members and Advisory Members.

14. Adjournment:

The meeting was adjourned at 18:40.

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2000-December-08

CNC/CIE 45th Annual Meeting

Action Items

MINUTES ITEM NUMBER	RESPONSIBLE	ACTION
2.1	S.M. McFadden, A.A. Gaertner	presentation of certificate to H.W. Budde
2.4	A.A. Gaertner	Advisory Membership invitation to Dr. Guy Newsham
2.5	J. Roberge	Insurance company information for R. Topalova
3	S.M. McFadden	follow-up on CNC/CIE information sent to USA contact
3	J.A. Love, J. Bastianpillai	CNC/CIE information to the lighting press
5	A.A. Gaertner	copy of CIE "Image Brochure' to CNC/CIE mailing lists
5	M.K. Timmings	IESNA information to CIE News.
5	A.A. Gaertner	summary action sheet from Minutes
7	A.A. Gaertner	CIE x017 to Warsaw attendees?
7A	W.K. Adrian	Written report of CIE Division 4 and 5 meetings in Toronto
7A	J. Bastianpillai	List of Sponsors of CIE Division 4 and 5 meetings in Toronto.
8.4	W.K. Adrian	written Division 4 report
9	A.A. Gaertner	Membership appointments for K.F. Lin and L.A. Whitehead
9	S.M. McFadden	check interest of Ken Loach for Advisory Membership
9	A.A. Gaertner	Advisory Membership invitations to Mario Bucci, Keith Niall, and Pascale Reinhardt.
9	A.A. Gaertner	contact E. Szamosi at CSA re possible Advisory Members
9	J.A. Love	Check Ontario Hydro contacts re Advisory Membership
13.1	Lighting Education working group	interim report on lighting education by April 15, 2001
13.4	Division Members, Secretary	distribute reports before annual meeting

LIST OF APPENDIXES

APPENDIX A

Attendees to the 45th Annual Meeting of the CNC/CIE

2000-October-13

Werner Adrian	Professor Emeritus, University of Waterloo
Réjean Baribeau	National Research Council (INMS)
Joe Bastianpillai	Lumentech Engineers Inc.
Vince Cimino	Ontario Ministry of Transportation
William Cowan†	University of Waterloo
Yvon Deslauriers	Health Canada (RPB)
Arnold Gaertner	National Research Council (INMS)
Barbara Kolesnik	UMA Engineering Ltd.
Frank Lin	Lighting Sciences Canada Ltd.
James Love	University of Calgary
Sharon McFadden	DCIEM
Keith Niall‡	guest, DCIEM
Ivan Pasini	Public Works and Government Services Canada (A&ES)
Jacques Roberge	Infranor Canada Inc.
Alan Robertson	National Research Council (INMS)
Mankajee Shrestha	self
Andrew Silbiger	Andrew Silbiger Management Inc.
Ralph Smith	Ralph Smith Engineering Inc.
Martyn Timmings	Canlyte Inc.
Rados Topalova	Irvine Engineering
Ernest Wotton	Consultant - Toronto
Joanne Zwinkels	National Research Council (INMS)

† attended morning session only
‡ attended afternoon session only

Regrets

R.B. Gibbons	Philips Lighting Company
Thomy Nilsson	University of Prince Edward Island
Nikolay Stoev	Photonics Research Ontario
Jennifer Veitch	National Research Council (IRC)

APPENDIX B

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

Canadian National Committee Comité National Canadien

CNC/CIE 45th Annual Meeting

Proposed Agenda

DATE: 2000-October-13 - Friday

TIME: 09:30 to 17:00

LOCATION: DCIEM (Defence and Civil Institute of Environmental Medicine)
1133 Sheppard Ave. West, Toronto, Ontario M3M 3B9

PROPOSED AGENDA:

1. Call to Order and Approval of Agenda — S.M. McFadden
2. Minutes of the 44th Annual CNC/CIE Meeting (Matters arising?)
3. Election of reporter for lighting press
4. President's Report — S.M. McFadden
5. Secretary's Report — A.A. Gaertner
6. Financial Report — A.R. Robertson, K.F. Lin
7. Publications Report — K.F. Lin
8. Reports from Division Members
   - Division 1: Vision and Colour — S.M. McFadden
   - Division 2: Physical Measurement of Light and Radiation — J.C. Zwinkels
   - Division 3: Interior Environment and Lighting Design — I.C. Pasini
   - Division 4: Lighting and Signalling for Transport — W. K. Adrian
   - Division 5: Exterior and Other Lighting Applications — J. Roberge
   - Division 6: Photobiology and Photochemistry — J.D. Yvon Deslauriers
   - Division 8: Image Technology — R. Baribeau
9. Nominations and Appointments (CNC/CIE)
10. Nomination of CIE officers for 2003-2007 quadrennium
11. CIE midterm session, Istanbul 2001, 6–12 September
12. CIE 25th Session, San Diego 2003
13. Other Business
    - 13.1 Lighting Education
    - 13.2 Correspondence — S.M. McFadden
    - 13.3 Date and Place for next year's meeting
    - 13.4 Other business
14. Adjournment

CNC/CIE 45th Proposed Agenda

October 3, 2000

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PRESIDENT'S REPORT TO THE CNC/CIE 45TH ANNUAL MEETING

2000–October–13

The past year has been a relatively quiet one for the CNC/CIE. This was fortunate as it has allowed me time to learn about my new role. I have been supported in that effort by the Past President, Jacques Roberge, with his considerable experience in the workings of the CIE and the Secretary/Treasurer, Arnold Gaertner, who keeps the CNC/CIE on track and functioning. I would like to thank them both for their help and guidance and their continuing support of the CIE, especially the CNC/CIE.

The main event of note this past year was the joint meeting of Division 4 and 5 that was held in Toronto at the beginning of September. Unfortunately, I was unable to attend, but the programme looked very interesting. I would like to thank Dr. Adrian and his colleagues for all the hard work they put into organizing the meeting.

In compliance with the motion at last year's meeting, I wrote to the Director General of CISTI to recommend that it acquire copies of major CIE publications. Unfortunately, the letter was sent out only recently and it is too soon to expect a reply.

On behalf of the CNC/CIE, I also sent a letter to SANCI expressing our condolences on the death of their esteemed colleague, Dr. Einhorn. I know that he will be missed by the many members of the CIE that had the privilege of working with him.

As many of you recall, last year's joint meeting with the USNC was a great success. The presentations were excellent and I think all those that attended took away some useful information. Moreover, I noticed an increased level of informal interaction with our American colleagues compared to the initial joint meeting. This interaction is of benefit both to the CNC and the individual members. Thus I would once again like to thank all those who worked so hard to make the meeting a success. I have already been in contact with the USNC about next year's meeting. They would like to continue the tradition and asked for our input on a suitable location in the US.

The President of the USNC also reiterated his interest in having our active participation in the work of putting on the Quadrennial Meeting of the CIE in 2003. Information on the meeting is available at the USNC web site www.cie-usnc.org.

I am looking forward to the rest of my term as President of the CNC/CIE. Together we can continue its proud tradition. In support of that goal, I encourage you to send me your suggestions and ideas for increasing Canadian participation in the CIE and in lighting research in general.

Respectfully submitted

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

Canadian National Committee Comité National Canadien

2 October, 2000

Bernard Dumouchel
Director-General
CISTI
Building M-55
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Ottawa, Ontario K1A 0S2

Dear Mr. Dumouchel,

I am writing to you in my position as President of the Canadian National Committee of the Commission Internationale de l'Eclairage (CNC/CIE) to suggest that it would be beneficial if CISTI held copies of the major Technical Reports and Standards of the CIE. The CIE is a technical, scientific, and cultural non profit organization that develops standards and guidelines related to the science, technology, and art of light and lighting. Their publications contain a wealth of information on the specification and measurement of lighting over a wide range of applications from electronic displays to residential streets. Their work has been instrumental in ensuring the development of useful standards based on sound scientific research on the perception and measurement of light.

The work of the CIE is supported through dues from each member nation and the sale of CIE publications. In order to maintain the work of the CIE, the cost of these publications is often relatively expensive making them beyond the reach of students and small consulting companies. Moreover, no library in Canada, public or private, contains an extensive collection of CIE publications. This further limits access to these publications resulting in duplication of effort, poor measurement practice, and inadequate lighting.

As the primary source of scientific and technical literature in Canada, it would seem most appropriate for CISTI to hold copies of the major CIE publications to ensure their availability to all Canadian researchers, technologists and manufacturers working in the field of light and lighting. The CNC/CIE does not have the resources to donate these documents to CISTI, but we are willing to supply them at our cost.

I hope you will consider this request. I would be pleased to discuss it further and provide you with a list of the publications that we believe should be included in a Canadian collection of CIE

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documents. Further information on the work of the CIE can be found at their web site < www.cie.co.at/cie/home.html>.

I look forward to discussing this proposal with you.

Sincerely

Sharon McFadden

Sharon McFadden
President, CNC/CIE
Human Engineering and Command Systems Section
Defence and Civil Institute of Environmental Medicine
1133 Sheppard Avenue West
Toronto, Ontario, M3M 3B9

Tel: (416) 635-2189
Fax: (416) 635-2013
Email: sharon.mcfadden@dciem.dnd.ca

Cc: Dr. Arthur J. Carty
President
NRC
Building M-58
Ottawa,Ontario K1A 0R6

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

Canadian National Committee Comité National Canadien

CNC/CIE SECRETARY'S REPORT TO THE 45th ANNUAL MEETING

2000-OCTOBER-13

The following acronyms are used in this report:

CIE-CB:	CIE Central Bureau in Vienna, Austria
CIE-BA:	CIE Board of Administration
CNC/CIE:	Canadian National Committee of CIE
NC:	National Committee

This report covers the period from 1999-October-15 to 2000-October-12.

CIE MATTERS:

1. Annual Membership Fee:

   The annual membership fee of the CNC/CIE as a member of the CIE for 2000 is 6,885 EUROs. This was $9684.00 Cdn. The NRC Public and International Relations branch is responsible for making this payment, and has continued to do so.

2. CIE Membership of Yugoslavia:

   The results of the CNC/CIE letter ballot was to approve CIE membership of the CIE National Committee of Yugoslavia. Fifty-one ballots were mailed to Members and Advisory Members, 24 were returned, of which 21 were in favour and 3 were opposed. The final approval, together with the concern voiced due to the political situation in Yugoslavia, was conveyed to the CIE-CB. The results for the international CIE vote were 18 NC ballots returned, all in favour.

3. New CIE Website:

   The main CIE website has been completely restructured. Please visit it at http://www.cie.co.at/cie/

4. CIE Draft Standards:

   CIE DS 008.2/E-2000 *Lighting of Indoor Work Places*. This CIE Draft Standard has passed the CIE-BA and Divisional ballots. It was sent to the NCs for comments. Nineteen copies were mailed to CNC/CIE Members and potentially interested parties. Two were returned with comments. These comments were forwarded to the CIE-CB.

5. Mailings:

   Amongst others, the following CIE materials have been received and mailed to the membership as appropriate:

   CIE NEWS #52, December 1999
   CIE NEWS #53, March 2000
   CIE NEWS #54, June 2000
   CIE NEWS #55, September 2000

   CIE Press Releases:

   Publication CIE 133-1999: *Proceedings of the 24th Session of the CIE*, Warsaw, Poland, 24-30 June 1999.
   Publication CIE 135-1999: *CIE Collection in Vision and Colour and in Physical Measurement of Light and Radiation, 1999.*
   Publication CIE 136-2000: *Guide to the Lighting of Urban Areas.*
   Publication CIE 137-2000: *The Conspicuity of Traffic Signs in Complex Backgrounds.*

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Publication CIE x016-1998: *Measurements of Optical Radiation Hazards*, Gaithersburg, Maryland, USA, September 1-3, 1998.

Publication CIE x017-2000: Special Volume, *24th Session of the CIE, Warsaw, 24-30 June, 1999, Late Papers.*

Publication CIE x018-1999: *Proceedings of the CIE Symposium '99 "75 Years of CIE Photometry".*

CIE Draft Standard DS 008.2/E-2000: *Lighting of Indoor Work Places.*

ISO 10526:1999/CIE S005/E-1998 *CIE Standard Illuminants for Colorimetry.*

ISO 16508:1999/CIE S006.1/E-1998 *Road Traffic Lights - Photometric Properties of 200 mm Roundel Signals.*

ISO 17166:1999/CIE S007/E-1998 *Erythema Reference Action Spectrum and Standard Erythema Dose.*

CNC/CIE MATTERS:

1. 1999 Joint CNC/USNC meeting:

   Last year's annual meeting was a joint meeting with the USNC. There were approximately 62 attendees (38 from Canada, 23 from the USA, 1 from the Netherlands). A list of (almost) all attendees was mailed out to the attendees. We are grateful to Ralph A. Smith and his committee (Werner K. Adrian, James A. Love, and Martyn K. Timmings) for the many skilful hours they gave to ensure that the meeting was a success.

2. Mailing Lists:

   At present I maintain 3 mailing lists: Members(13), Advisory Members(41), General Interest(27). In general, the difference between the first two and the third is that the third list tends to receive only CIE material (press releases of CIE publications, CIE NEWS) and notices of international conferences. Members and Advisory Members receive more CNC information such as various ballots, and the Minutes of the annual meeting and related information.

3. Membership:

   A list of our Members and Advisory Members is available and will be discussed during the annual meeting for the purposes of making any changes.

   3.1. Members:

   At last year's annual meeting three Member appointments were recommended by the CNC/CIE. Letters of appointment were sent to these people by Dr. Janusz Lusztyk, Director-General of INMS. All have accepted. They are:

   Sharon M. McFadden as President of the CNC/CIE
   Jacques Roberge
   Dr. J.D. Yvon Deslauriers

   3.2. Advisory Members:

   I have reviewed the c.v. of Mankajee K. Shrestha as requested at the last CNC/CIE annual meeting and have added him to our Advisory Membership.

   Mario Bucci of SNC•LAVALIN has requested to become an Advisory Member.

Respectfully submitted,

A.A. Gaertner
Secretary, CNC/CIE
Institute for National Measurement Standards
Building M-36
National Research Council of Canada
Ottawa, Ontario K1A 0R6

Tel: (613) 993-9344 Fax: (613) 952-1394 Email: arnold.gaertner@nrc.ca

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

Canadian National Committee Comité National Canadien

Financial Report to CNC/CIE, 13 October 2000

A.R. Robertson

My final report on the purchase and sale of CIE publications (dated October 1999) showed a bank balance of $6078.08, cheques worth $978.00 in hand but not deposited, and an outstanding debt to the CIE Central Bureau of Euro 649.30.

Since then, there have been various transactions as listed in annex 1 leading to a balance of $7530.75. There will be some additional bank charges (probably less than $20) for which I do not yet have a statement from the bank. I have now arranged for the account to be transferred to a bank in Waterloo so that Frank Lin can have easy access for publications transactions.

For the information of the Committee, I have extracted the transactions related to the 1999 joint meeting of the CNC and USNC (annex 2). This shows that the meeting made a small profit of $437.41.

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CIE Publications Bank Account, 1999/2000						
Date		Sales	Other income	Payments to CB	Other expenses	Balance
99-10-06	Forward					$6,078.08
99-09-30	Bank charges (May 31 to Sep 30)				$10.00	$6,068.08
99-10-21	Publication sales	$978.00				$7,046.08
99-10-21	1999 meeting income		$4,430.00			$11,476.08
99-10-21	1999 meeting income (US$1735)		$2,542.24			$14,018.32
99-10-21	Publications payment (Euro 649.30)			$1,062.97		$12,955.35
99-11-17	R. Smith, audio-visual equipment				$287.50	$12,667.85
99-11-17	R. Smith Eng, distribution of materials				$30.07	$12,637.78
99-12-15	J. Love, gifts re 1999 meeting				$211.50	$12,426.28
00-01-31	Bank charges (Oct 31 to Jan 31)				$8.80	$12,417.48
00-02-22	Philips, advertising re 1999 meeting		$600.00			$13,017.48
00-02-22	Regal Constellation Hotel re 1999 meeting				$5,486.73	$7,530.75
	Total	$978.00	$7,572.24	$1,062.97	$6,034.60	$7,530.75

Financial Report for Joint CNC/USNC/CIE Meeting, Toronto, 1999-10-14/17

Date	Item	Income	Expense	Balance
99-04-07	Regal Constellation Hotel, deposit		$1 000.00	($1 000.00)
99-07-28	R. Smith, distribution of brochures		$ 119.03	($1 119.03)
99-10-21	Registrations (CDN$)	$3,230.00		$2 110.97
	Cooper Lighting	$600.00		$2 710.97
	Metalumen	$600.00		$3 310.97
99-10-21	Registrations (US$1735)	$2,542.24		$5 853.21
99-11-17	R. Smith, audio-visual equipment		$287.50	$5 565.71
99-11-17	R. Smith, distribution of materials		$30.07	$5 535.64
99-12-15	J. Love, gifts		$211.50	$5 324.14
00-02-22	Philips, advertising	$600.00		$5 924.14
00-02-22	Regal Constellation Hotel		$5,486.73	$ 437.41

A.R.Robertson
2000-08-03

CNC/CIE PUBLICATION REPORT
October 2000

K. Frank Lin

As this is the first year I am on the position as the publication officer, I cannot give out detailed spreadsheet as Dr. Alan Robertson normally did. I have requested data files from Dr. Robertson. Hopefully, I can continue to provide spreadsheet printouts in the future.

The CIE publication purchases from CB, 1999-2000 are listed as below.

CIE Publication Purchases from CB, 1999-2000

Date	Invoice No.	Publication No.	Title	Quantity	Unit Cost (EURO)	Cost (EURO)	Discount (EURO)	Payments (EURO)	Running Total
12/20/99	328/NC	135-1999	CIE Collection 1999 Vision and Colour	2	$ 63.00	$ 126.00	($44.10)	$ -	$ 81.90
02/11/00	031/NC	136-2000	Guide to the Lighting of Urban Areas	2	$ 48.00	$ 96.00	($33.60)	$ -	$ 62.40
03/03/00	073/NC	137-2000	Conspicuity of Traffic Signs in Complex Background	2	$ 48.00	$ 96.00	($33.60)	$ -	$ 62.40
05/03/00	145/NC	084-1989	Measurement of Luminous Flux	1	$ 56.00	$ 56.00	($19.60)	$ -	$ 36.40
09/30/00	253/NC	138-2000	Collection in Photobiology and Photochemistry 2000	2	$ 56.00	$ 112.00	($39.20)	$ -	$ 72.80
			Total			**$ 486.00**	**($170.10)**	**$ -**	**$ 315.90**

The CIE publication sales 1999-2000 are listed as below.

CIE Publication Sales 1999-2000					
Date	**Description/Title of Publication**	**Qty**	**Sale**	**Expense**	**Balance**
12/10/99	Sherritt International Corporation CIE Publication no.116-1995, ISBN 3-900-73460-7 Re:Technical Report: Industrial Colour-Difference Evaluation. Shipping Cost - FedEx	1	$ 92.52	$ 13.25	$ 79.27
03/14/00	Elcan Optical Technologies CIE Publications nos. 69,53,63,84. No. 69: Illuminance Meters No. 53: Radiometers and Photometers No. 63: Spectroradiometry No. 84: Luminous Flux Shipping Cost - FedEx	 1 1 1 1	$ 496.00	$ 18.80	$ 556.47
05/25/00	The Optikon Corporation Ltd. CIE Publication no. 61(1984) Re:Tunnel Entrance Lighting - A survey of fundamentals for determining the luminance in the threshold zone.	1	$ 210.00	$ -	$ 766.47
	Total		**$ 798.52**	**$ 32.05**	**$ 766.47**

No payment or deposit has been done as the bank account transfer is still in progress.

CIE Publications Bank Account , 1998/1999						
Date		Sales	Other income	Payments to CB	Other expenses	Balance
98-11-04	Forward					$5,347.91
99-04-07	1999 Meeting - hotel deposit				$1,000.00	$4,347.91
99-04-30	Bank charges				$12.80	$4,335.11
99-05-19	Deposit	$1,862.00				$6,197.11
99-07-28	1999 Meeting - R. Smith				$119.03	$6,078.08
Total	Total	$1,862.00	$0.00	$0.00	$1,131.83	$6,078.08

CIE Publications Bank Account, 1999/2000						
Date		Sales	Other income	Payments to CB	Other expenses	Balance
99-10-06	Forward					$6,078.08
99-09-30	Bank charges (May 31 to Sep 30)				$10.00	$6,068.08
99-10-21	Publication sales	$978.00				$7,046.08
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00-02-22	Philips, advertising re 1999 meeting		$600.00			$13,017.48
00-02-22	Regal Constellation Hotel re 1999 meeting				$5,486.73	$7,530.75
	Total	$978.00	$7,572.24	$1,062.97	$6,034.60	$7,530.75

Dr. Werner Adrian
48-1 Allen St. West
Waterloo ON N2L 6H2
Canada Ph: 519 579 7575 Fax: 519 579 6292

Report on the CIE – Divisional Meeting Division 4 and 5, Toronto, Sept.3 – 8, 2000

In the early 1990ties an invitation was extended to host an annual meeting of the CIE Division 4 in Waterloo, Ontario. This Invitation was elicited by the past director of Div.4 , P. Walraven, many times postponed and finally set for the Fall 2000 at the CIE Meeting in Warsaw.
In the interim the author of this report officially retired from the University of Waterloo so that no longer meeting rooms and facilities of the University were available, and further to that, Division 5 has decided to hold their meeting jointly with Division 4. These reasons made it necessary to locate the meeting at Toronto that was easier accessible and provided the decorum to accommodate such a large group. Out of convenience for the accompanying ladies a down-town location of the hotel was requested.

After an extensive search,the Courtyard by Marriott Hotel on Yonge street had been chosen because of the excellent meeting facilities (at the time the contract was signed still under construction), the newness of the Hotel and the lowest room rate to be found based on 250 assumed room-nights, As the staff of the hotel was also new and inexperienced, some difficulties arose that could ultimately be overcome.

As the CNC of the CIE was not prepared to extend at least one Dinner-Invitation to the delegates, as is customary in civilized countries, a Registration Fee had to be charged to cover the incurring expenses for the meeting. As a Principle the fee was kept as low as possible in order not to repel participants but still allowing for adequate facilities. The most difficult and risky task was keeping the balance between so many imponderables as are occurring in such an undertaking. The financial needs could be reasonably met, and the higher than expected number of participants made it even possible to achieve a small surplus. The set-up of a VISA–account facilitated the registration procedure greatly, and the financial support by the Lighting industry, successfully raised by Joe Bastianpillai and Andrew Silbiger , eased the operation.

Aside from the traditional TC 4-11 event (used to disguise social activities normally on weekends), a modest Ladies program has been organized by Hildegard Neumann who had been also instrumental and indispensable in the whole organization of the meeting.

Enclosed are the handouts to the delegates such as the total program, Symposium papers, meeting room schedule, recommendations for nearby Restaurants and shopping places and the list of the Participants.

As social events a cruise with the schooner " Kajama " on Lake Ontario and a dinner at the "Pier 4 " restaurant had been organized. The very efficient former Division 4 secretary, Elisabeth de Vries de Mol attended these events and took the opportunity at the dinner to bid farewell to the Division. She is followed by Tampani Nurmi of Finland. The Ontario Ministry of Transportation,

after much ado, provided Bus transportation to and from the harbour. To those interested in Street-Lighting,a special tour was offered after return to the hotel.

On the evening of the 5th of September a Reception was arranged for the delegates and their company at which the Major of Toronto was supposed to address the almost 100 people from 20 countries (Quebec was counted as a province of Canada and not as a separate country). Mr Lastman did neither respond to nor follow the invitation and even failed to send a representative of the town of Toronto. So Mr. Martyn Timmings, President of the IESNA, had been kind enough to fill in on very short notice.

The papers presented at the Symposium on the 4th of September had been well received. The focus of the presentations was placed on Luminance and Visibility in Roadway-Lighting, which was in line with the initiation of the past Director of Div.4. The speakers were awarded for their efforts with a bottle of drinkable Canadian champagne that was even accepted by our French speakers.

The Ladies grouped for shopping, enjoying the low Canadian Dollar. On Sept.4th a Trolley Car Tour through Toronto was arranged in perfect weather (for which the author does not claim credit). Unfortunately Mrs. Neumann slipped on leaving the Car and broke her ankle. However no further Ladies activities were planned that could have been affected by the deplorable mishap.

In all modesty,the meeting and its organization can be called a success which is also reflected by the enclosed official letter of Division 5 and kind words of recognition by the Director of Division 4 , Pentti Hautala during the plenary session and many personal congratulations on a remarkably well organized meeting.

October 31st ,2000

Enclosures.

CIE Divisional Meeting Div.4 and Div.5

Sept. 3 to 8, 2000 Toronto
Conference Hotel : Courtyard by Marriott
475 Yonge St. (at Carlton St.)

Sunday 3. September

14.00 (2:00 p)	Gathering in the Foyer of the Hotel
15.00 (3:00 p)	Departure by Bus to Queens Quay to board the 3 mast schooner " Kajama " sailing on Lake Ontario.
17.30 (5:30 p)	Return
18.00 (6:00 p)	Dinner at " Pier 4 " Restaurant
~20.30 (8:30)	Return by Bus to the hotel. Those interested can have a Lighting Tour through some streets of Toronto.

Monday 4. September

9.00 (9:00 a)	Symposium " University Room "
15.00 (3:00 p)	Division 4&5 opening session

Tuesday 5. September

9.00 (9:00 a)	TC Meetings all day
18.00 (6:00 p)	Reception in the hotel

Wednesday 6. September

9.00 (9:00 a)	TC Meetings all day
~ 9.30 (9:30 a)	Ladies and accompanying persons meet in the Foyer of the hotel to depart for the " Old Town Trolley Tour (included in the Registration Fee)

Thursday 7. September

9.00 (9.00 a)	TC Meetings

Afternoon,Div 4 Plenary session

Friday 8. September

Morning, Plenary session of Div.5

CIE Meetings of Division 4 and 5, Sept. 3 – 8, 2000
Toronto Canada

Registration Form

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Country: _____ E-mail: _____

Phone: _____ Fax: _____

Meeting Registration : $ 170.- (US$ 120.-)

Ladies and accompaning Persons $ 60.- (US$ 41.-)
This includes all Social Events,such as
Lake Cruise,Banquet (3.Sept.) and
Reception (5.Sept.)

Hotel

Deadline for Hotel Reservation August 1.2000. After that date the Hotel does not guarantee accommodation. The special Room-rate is: $137.- (US$ 94.-) that cannot be met by other Hotels nearby. Please register with

" Courtyard by Marriott "
CIE –Divisional Meetings
475 Yonge Street, Toronto M4Y 1X7
Ph: +416 924 0611 Fax: +416 924 8692

Room Reservations are to be made individually.

Mode of Payment

Visa, Cheque or Bankdraft in CD $ or Cash at arrival.

_____ _____
Card Number Expiration Date

_____ _____
Name on the Credit Card Signature

Registration in advance would be appreciated to accelerate formalities.

Please direct your Registration to: Dr.W.Adrian CIE ,
48-1 Allen Street West , Waterloo Ontario, Canada, N2L 6H2

Ph: + 519 579 7575 Fax: + 519 579 6292

Symposium

Roman Stemprok **Bobby Green** **Zhen Tang**	Measurement of Visibility with CCD-Devices
Jacques Lecocq	Small Target Visibility as a Quality Criterium In Roadway Lighting
James Havard	Visibility and Lighting Parameters in Roadway Lighting
Werner Adrian	The Spectral Reflectance of Road Surfaces and Resulting Luminance in MH and HPS Light
H.J. Schmidt Clausen	Visibility under Headlamp Lighting

Preliminary Schedule of Room-use at the DIV 4&5 meeting in Toronto 3. - 8. Sept 2000

60-80 p.		10-15 persons p. room							Capacity
University		Leaside		Rosedale		Yonge		College	Rooms
am	pm	am	pm	am	pm	am	pm	am	Time
SYMPOSIUM	DIV 4 Opening Session								Monday 4.9.
		TC 5-12	TC 2-32			TC 4-35	TC 4-35		Tuesday 5.9.
		TC 5-14	TC 4-36	TC 5-16	TC 4-38	TC 4-37	TC 4-37 + TC 4-41	TC 4-40	Wednesday 6.9.
	DIV 4 Plenary Session	TC 4-21		TC 4-26	TC 5-19		TC 5-18	TC 4-33	Thursday 7.9.
DIV 5 Plenary Session									Friday 8.9.

Tips for Shopping

Eaton Center	Corner of Yonge & Dundas Streets Largest Downtown Shopping Mall with appr. 150 stores 3 short Blocks South of Hotel.
Bloor Street	between Yonge Street and Avenue Road. Many exclusive international Boutiques 5 Blocks North of Hotel
Bloor – Yorkville	trendy, expensive shops and Restaurants
Hazelton Lanes Shopping Centre	between Avenue Rd. and Yorkville, Plush Fashion Centre
Harbour Front	on Lakeshore Boulevard , with Queens Quay Shopping Mall And Patio Restaurants. Antique Market with about 50 shops under one roof.

and many more to spend a whole fortune!

MENU at Pier 4 Restaurant

Clam Chowder or Caesar Salad

Fillet of Salmon
or
Chicken Penne
or
Prime Rib

Cheesecake or V. Ice Cream
Coffee / Tea

Wine: Bel Arbors Vintage , red / white

Restaurants in walking distance to the Courtyard by Marriott Hotel

Golden Griddle (Breakfast and Dinner) Family Restaurant
45 Carlton Ph: 977 5044

Frans Restaurant (Dinner) Family Restaurant
20 College Ph: 923 9867

Bistro 990 Exclusive French Restaurant (Reservations needed)
990 Bay Street Ph: 921 9990

Carman's Club Steak and Seafood Price Range $ 15 to 20
26 Alexander Ph: 924 8697

Sassafraz Price Range $ 15 to 20
100 Cumberland Ph: 964 2222

Green Mango – Thai Food (Reasonably priced good food)
707 Yonge Street Ph: 928 0021

Movenpick Marche BCE Place Price Range $ 25 to 30 15 Minutes
42 Yonge Street Ph: 366 8986 South of Hotel

Movenpick Marche Yorkville Price Range from $ 18 North of the Hotel
133 Yorkville Ph: 926 9545

Swiss Chalet Low priced Chicken ,Ribs and Salads
1415 Yonge Street Ph: 944 8716
and 362 Yonge Street Ph: 597 0101

CIE Division 4+5 Meeting, Toronto, September 3 to 8, 2000

List of Participants

W. Adrian	Waterloo, Ont.	Canada
S. Almasi and Mrs.	Budapest	Hungary
E. Alvarez	Tucson, AZ	USA
B. Ananthanarayanan	Madison, Wis.	USA
P. Arumugasaamy	Newark. OH	USA
A. Bacelar	Le Grand - Guevilly	France
P. Bandyopadhyay	Junnarkar	India
J. Bastianpillai	Markham	Canada
R.Bendal	Toronto	Canada
M. Bizjak	Ljubljana	Slovenia
E Bjelland and Mrs.	Oslo	Norway
B. Brekke	Trondheim	Norway
E. Burini	Sao Paulo	Brazil
V. Cimino	St.Catharines	Canada
J. Coatham and Mrs.	Uttoxeter	UK
D. Culley	Durban	South-Africa
J. Ewald	Heerlen	NL
H. Frank	Darmstadt	Germany
A. Floris	Paris	France
M. Furusho	Kobe	Japan
M. Gillet	Liege	Belgium
B. Green	Lubbock, TX	USA
T.Hagiwara	Sapporo	Japan
J. Hart	Reedsburg.WI	USA
P. Hautala	Espoo	Finland
J. Havard and Mrs.	Hendersonville, NC	USA
J. Horvath and Mrs.	Budapest	Hungary
G. Irvine	New York	USA
N. Johnson	St.Paul, MN	USA
H. Juslen	Idman, OY	Finland
K.S.Kang	Markham	Canada
K. Kawakami	Tokio	Japan
A. Korobko	Moscow	Russia
I. Kiss and Mrs.	Budapest	Hungary
S. Lain and Mrs.		UK
M. Lasinski and Mrs.	Pila	Poland
J. Lecocq	Les Andelys	France
V. Ledoux	Paris	France
T. Lemons	Mass.	USA
G. Low	Toronto	Canada
P. Lutkevitch	Boston ,Mass.	USA
D. Mace	Penn.	USA
D. Marr	Toronto	Canada
G. Major	Budapest	Hungary

E. Morel	Schaumburg, ILL.	USA
A. Mori	Tokio	Japan
K. Narisada and Mrs.	Hirakata	Japan
H. Neumann	Waterloo	Canada
T. Nurmi	Tampere	Finland
S. Onaygil	Istanbul	Turkey
N. Pollard and Mrs.	Bath	UK
J. Rands and Mrs.	Southport	UK
V. Rattigan	Toronto	Canada
J, Rennilson	La Mesa, CA	USA
W. Riemenschneider	Zurich	Switzerland
J. Roberge and Mrs.	St.Hyacinthe, Que.	Canada
P. Rombauts	Brussels	Belgium
G. Rossi and Mrs.+ 2 Daughters	Turino	Italy
H. Sahsuvar	Toronto	Canada
P. Soardo and Mrs.	Turino	Italy
H. J. Schmidt-Clausen and Mrs.	Darmstadt	Germany
D. Schreuder	Leidschendam	NL
P. Schwarcz	Budapest	Hungary
M. Serefhanoglu Sozen and Mrs.	Istanbul	Turkey
A. Silbiger	Toronto	Canada
R. Stark and Mrs.	Chicago, ILL.	USA
R. Stemprok	Denton, TX	USA
A, Stockmar	Celle	Germany
T. Takeuchi	Osaka	Japan
A. Tanaka-Numao	Tsukuba	Japan
A. Valero-Seros	Madrid	Spain
T. van den Brink	Rotterdam	NL
A. de Visser	Eindhoven	NL
J. Wild	Warsaw	Poland
B. Weiss	Cologne	Germany
R. Yates and Mrs.	Randburg	South – Africa
J. Yerrell	Budleigh – Salterton	UK

INTERNATIONAL COMMISSION ON ILLUMINATION
INTERNATIONALE BELEUCHTUNGSKOMMISSION
Central Bureau: Kegelgasse 27 · A-1030 Wien · Austria

Division 5, Secretary and UK Member: N.E.Pollard, I.Eng. FILE, MSLL
NEP Lighting Consultancy, 6 Leopold Buildings, BATH, England,BA1 5NY.
Tel/Fax: + 44 (0)1225 338 937. E-Mail : NEP_Lighting @ compuserve.com

Dr. Werner Adrian
48-1 Allen St. West
Waterloo
Ontaria N2L 6H2
CANADA

24th September 2000

Dear Werner,

As Secretary to Division 5, may I formally thank you for arranging and hosting our most successful meeting in Toronto.

During the week we had over thirty members in attendance that was more than we had at the Quadrennial meeting in Warsaw, that shows the popularity of the destination and its first class organization. The Hotel and meeting rooms were first class, together with the coffee and tea facilities, for which you most thoughtfully got sponsorship.

May I thank you also, on behalf of the Division 5 members not joint members of Division 4, for their invitation to the TC 4.11 meeting on the Sunday. It was a most memorable occasion and one which, as I know from the Bath meeting, went well because of all your organization before, during, and I expect even after, the actual event !

Thank you again for all your hard work, much appreciated, and please also pass on our thanks to both the National Committee and all the various sponsors, for a most successful and memorable CIE meeting in Toronto 2000.

Yours Sincerely,

Nigel Pollard

Secretary to CIE Division 5.

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

Canadian National Committee Comité National Canadien

CNC/CIE MEMBERS

CNC/CIE			TERM (expiry)	CIE
President	S.M. McFadden	Ontario	2003-12-31	Division 1
Vice President	W.K. Adrian	Ontario	2002-12-31	Division 4
Secretary/Treasurer	A.A. Gaertner	Ontario	2001-12-31	
Publications	K.F. Lin	Ontario	2000-12-31	
	R. Baribeau	Ontario	2002-12-31	Division 8
	J.A. Love	Alberta	2002-12-31	
	I.C. Pasini	Ontario	2002-12-31	Division 3
	J.D. Yvon Deslauriers	Ontario	2003-12-31	Division 6
	R.W. White	Québec	2000-12-31	
	J.B. Roberge	Québec	2003-12-31	Division 5, Finance Com.
	Ralph A. Smith	New Brunswick	2001-12-31	
	J.C. Zwinkels	Ontario	2002-12-31	Division 2
ex officio	A.R. Robertson	Ontario		NRC/INMS Member

CNC/CIE ADVISORY MEMBERS

Eduard Alf	Ontario	Brian Liddy	Ontario
Ian Ashdown	British Columbia	P. Manning	Nova Scotia
M.G. Bassett	Ontario	J. Bruce McArthur	Ontario
J.(Joe) Bastianpillai	Ontario	Donald B. McIntyre	Ontario
(Mario Bucci)	Ontario	S.W. McKnight	Ontario
J. Allyson Chrysler	Ontario	Arthur H. Mendel	Québec
Vince Cimino	Ontario	H. H. Mikaelian	New Brunswick
W.B. Cowan	Ontario	T. Nilsson	P.E.I.
Biman Das	Nova Scotia	Tim M. Richardson	Ontario
R.V. Day	Ontario	Mankajee K. Shrestha	Ontario
Joseph Diwan†	Ontario	Andrew D. Silbiger	Ontario
R.B. Gibbons	Ontario	Nikolay Stoev	Ontario
~~C.M. Henville~~	~~Ontario~~	Eli Szamosi	Ontario
Byron Jordan	Québec	B.W. Tansley	Ontario
Roy Kaufmann	British Columbia	D.K. Tiller	Ontario
S.M. Kaye	Manitoba	M.K. Timmings	Ontario
A. Ketvirtis	Ontario	R. Topalova	Ontario
Barbara Kolesnik	Ontario	J.A. Veitch	Ontario
Jacques Lacasse	Québec	James G. White	Ontario
R. Lakowski	British Columbia	Lorne A. Whitehead	British Columbia
André Laperrière	Québec	Ernest Wotton	Ontario

( ) = requires CNC/CIE appointment at annual meeting of 2000-October-13.
† = has not replied to invitation

October 10, 2000

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Institute for National Measurement Standards • Institut des étalons nationaux de mesure • Ottawa, Canada, K1A 0R6, Fax (613) 952-1394

APPENDIX I

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

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Circular Letter
to
National Committees
NCCL0010

2000-08-18

Dear Colleagues,

According to the By-Laws 1.2.2, nominations for Officers for the 2003 - 2007 quadrennium may be made by the Board of Administration or by National Committees. Nominations of the Board are to be sent to National Committees at least 10 months before the Midterm Meeting of the General Assembly.

The Board of Administration, at its meeting on 16 June 2000, recommended the following slate of officers:

President-Elect 2001-2003 and President 2003-2007	W. van Bommel	NL
Past-President	H. A. Löfberg	SE
Vice-President Publications	F. Hengstberger	ZA
Vice-President Technical	W. Julian	AU
Vice-President	J. Bastie	FR
Vice-President	H. S. Mamak	IN
Vice-President	K. Sagawa	JP
Secretary	J. Schanda	HU
Treasurer	M. Seidl	DE

National Committees are entitled to make further nominations for Officers.

Nominations by a National Committee, endorsed by at least two other National Committees, must reach the General Secretary **by 2001-04-01 latest**.

Yours sincerely,

Christine Hermann
General Secretary

AAJ-5004-10-2

A

INTERNATIONAL CIVIL AVIATION ORGANIZATION
ORGANISATION DE L'AVIATION CIVILE INTERNATIONALE
ORGANIZACIÓN DE AVIACIÓN CIVIL INTERNACIONAL
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ГРАЖДАНСКОЙ АВИАЦИИ
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国际民用航空组织

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In. 82

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Ref.: AN 5/9.2

9 April 1999

Sir/Madam,

Invitation to Conduct Scientific Study on Colour Perception

1. I have the honour to inform you that the Air Navigation Commission, at the second meeting of its 150th Session held on 21 January 1999, carried out a preliminary review of a proposal for the amendment to Annex 1 — *Personnel Licensing* regarding vision and colour perception requirements for air crew and air traffic controllers.

2. The proposed amendment, which is now being circulated to Contracting States and interested international organizations for comments to reach Montreal by 23 July 1999, was developed by the Secretariat with the assistance of an air navigation study group in order to bring the vision and colour perception requirements in Annex 1, Chapter 6 up to date.

3. Attachment A to this letter contains the background information for the proposed amendment as regards colour perception, including a discussion of the difference between the current provisions in Chapter 6 of Annex 1 and the proposed new requirements as spelled out in Attachment B.

4. The Commission agreed that further scientific research into certain aspects of colour perception as it relates to modern aviation is needed. The research work to be undertaken by a fully developed aviation medicine research institution should concern the following areas:

a) determination of colour-critical tasks in aviation;

b) the relevance of differentiation between air traffic control duties and flying tasks (to include a study of colour-coded information inside and outside the cockpit);

c) the relevance of colour vision testing by means of a signal light gun (a method still in use in at least one Contracting State);

d) the relevance of using simulators for assessing colour perception; and

e) validation of one or more colour perception testing methods for pilots and air traffic controllers.

5. The highly developed state of aviation medicine research in your country is widely recognized. With this in mind, I invite your Government to initiate a scientific study as outlined above at an aviation medicine research institution in your country, with the findings to be submitted to ICAO where they will be consolidated and used to support a further revision of the relevant Standards and Recommended Practices and corresponding guidance material.

6. For your information, this invitation is being extended to Canada, Germany, the Netherlands, the United Kingdom, and the United States. In case your research institute should wish to coordinate its efforts with those of the other institutes in the States mentioned, I would appreciate being kept informed.

7. I should be grateful to have an indication of your position on this matter by 9 July 1999.

Accept, Sir/Madam, the assurances of my highest consideration.

for R.C. Costa Pereira
Secretary General

Enclosures:
Attachment A — Background Information
Attachment B — Proposed amendment to Annex 1

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

Canadian National Committee Comité National Canadien

CNC/CIE DIVISION MEMBERS' REPORTS for the 45th annual CNC/CIE Meeting 2000-October-13

NRC·CNRC
Institute for National Measurement Standards • Institut des étalons nationaux de mesure • Ottawa, Canada, K1A 0R6, Fax (613) 952-1394

Further information concerning the work of the CIE Divisions may be obtained from the CNC/CIE Division Members:

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Division 7 General Aspects of Lighting

This Division has been dissolved.

Division 8 Image Technology

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Division 1: Vision and Colour
Report to CNC/CIE 45th Annual Meeting

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The annual meeting of Division 1 was held 6-7 April at NPL in Teddington, U.K. in conjunction with the Colour 2000 meeting. Eleven nations were represented. Dr. Joanne Zwinkel represented Canada on my behalf. The following six Technical Committees (TC) met in conjunction with the Division 1 meeting: TC1-27 Specification of Colour Appearance for Reflective Media and Self-Luminous Display Comparison (P Alessi), TC1-37 Supplementary Systems of Photometry (K Sagawa), TC1-42 Colour Appearance in Peripheral Vision (M Ayama), TC1-47 Hue and Lightness Correction to Industrial Colour Difference Evaluation (M R Luo acting for D Alman), TC1-48 Revision of CIE Document 15.2 Colorimetry (J Schanda), and TC1-52 Chromatic Adaptation Transform (M R Luo).

The following summaries of activities in the various Technical Committees of Division 1 are based on the Activity Report for 2000 and material supplied by J. Zwinkel. The complete Activity Report and last year's minutes are both available in PDF format on request.

Progress in Vision Section

TC1-19 Specification of visibility for real tasks: The final report was submitted for divisional ballot in March 2000.

TC1-21 Testing of supplementary systems of photometry: The report of this TC was sent out in April. Voting was to be completed by July. The conclusion of the TC was that as far as numerical testing is concerned, all the proposed systems are better than the CIE photopic and scotopic photometric systems in describing heterochromatic brightness. However, they found no one system that was better than the rest and could be recommended as a CIE supplementary system of photometry. The Chair is currently incorporating the comments arising from the ballot.

TC1-26 Individual variation in heterochromatic brightness matching: The chairman was collecting data on the spectral luminous efficiency functions of older people.

TC1-30 Luminous efficiency functions: Draft 3 has been revised according to comments from TC members. The description of equivalent luminance was simplified. A revised draft report will be distributed shortly. It is expected to be the last draft before a final report is distributed for Division ballot.

TC1-36 Fundamental chromaticity diagram with physiologically significant axes: To the best of my knowledge the TC is still waiting for the publication of some additional data on fundamentals. The secretary gave a progress report at the CIE 99 symposium in Budapest which was published in the Proceedings.

TC1-37 Supplementary system of photometry: The TC has discussed the photometric conditions for a supplementary system of photometry and agreed on some of them: use of a 10° field for a photometric field and the 540 THz monochromatic light as a reference light. Two major problems have been addressed in constructing the supplementary system; one is the description of the chromatic contribution (Helmholtz-Kohlraush effect) in the photopic range and the other is the introduction of the rod contribution (Purkinje effect) in the mesopic range. The chairman will propose a photometric model comprised of the concepts adopted in the already proposed models tested in TC1-21. This model will serve as the basis for further discussion.

TC1-41 Extension of $V_m(\lambda)$ beyond 830 nm: In principle the report of this TC is ready for publication. However, they are waiting for the outcome of the activities of TC1-36 which is also dealing with the slope of the eye's sensitivity curve at the red side of the spectrum. The report of this TC also contains critical comments on the CIE 1924 $V(\lambda)$ regarding the values of the red side of the spectrum. A proposal will be made by TC1-41 to amend $V_M(\lambda)$ for the long wavelength side according to the present insights regarding the absorption characteristics of visual pigments. A more detailed report on the work of this TC can be found in the Proceedings of the CIE symposium for the celebration of the 75th anniversary of the CIE 1924 $V(\lambda)$.

TC1-42 Colour appearance in peripheral vision: The TC met in GB. The data collection continues. The latest experiments investigated the most suitable stimuli for measuring the colour zone map. It was recommended that those stimuli that produced results similar to the earlier studies on colour perception in peripheral vision should be used in further studies.

TC1-46 Concept and application of equivalent luminance: No further progress has been reported on the work of this TC.

TC1-50 Disability glare formula: The Chair was drafting a formal report proposing a CIE Standard Disability Glare Observer. He had hoped to have it distributed by early 2000 and to complete the work of this TC by summer 2000.

TC1-51 Visual acuity: The purpose of this TC is to write a technical report to provide, on the basis of data collected from the literature, standard functions on visual acuity, defined by the Landolt-ring, as a function of luminance, contrast, presentation time, age, and colour. No report was received.

TC1-54 Age-related changes of visual responses: This TC was established in 1999. The working programme has been established by the chairman and the TC is now in the process of acquiring members. Its purpose is to establish luminous efficiency, visual acuity, and contrast sensitivity as a function of age. Further members are being sought.

R1-03 Engineering applications of brightness scales: No report.

R1-06 Transient adaptation: No report.

R1-16 Visual adaptation to complex luminance distribution: The report was published in the CIE Collection 1999 (CIE Publ. 135).

R1-19 Specification on individual variation in heterochromatic matching: The reporter examined the possibility of developing a simple test of the individual characteristics for heterochromatic brightness matching. The reporter planned to present a report at the most recent Division 1 meeting.

R1-20 Visual performance in the mesopic range: Activity and interest in developing a standard for visual performance, particularly in the mesopic range, is growing. It is recognized that a spectral luminous function for the mesopic range would be complex and also inadequate for predicting task performance. The Colour 2000 conference held at NPL in April included a discussion on aspects of mesopic scales and performance. Information from this conference will be fed into the reportership and will aid in formulating appropriate recommendations.

R1-22 Contrast sensitivity function for detection and discrimination: A survey of the literature is in progress. It is looking at a wide range of issues including the representation of spatial visual stimuli by their sinusoidal components, the use of Fourier analysis to predict visual response, distinction between chromatic and achromatic CSF, distinction between CSF for detection and discrimination, effect of methodology, and applications of CSF.

R1-23 Guidelines for planning a mesopic photometry investigation: The reporter was aiming to have a draft report prepared for the most recent Division 1 meeting.

Progress in Colour Section

TC1-27 Specification of colour appearance for reflective media and self luminous display comparison: A hardcopy/softcopy image comparison experiment featuring as much built in consistency as possible to evaluate color appearance models was conducted at Derby University in the UK and at Kodak in the US. It featured a softcopy white point of 9300K and the hardcopy print illuminated with CIE 5000K simulators both at an equal luminance level of approximately 80cd/m^2. Results should be available soon. A second experiment will be conducted featuring different chromaticities and different luminance levels across media.

TC1-38 Compatibility of tabular data for computational purposes: A third draft has been distributed and comments received. Further comments on interpolation are being considered before distributing a fourth draft for ballot.

TC1-43 Rod intrusion in metameric colour matches: This TC was disbanded at this year's Division 1 meeting because no report was received from the Chair.

TC1-44 Practical daylight sources for colorimetry: No report.

TC1-47 Hue and lightness correction to industrial colour difference evaluation: A partial draft of a technical report was prepared and distributed to the TC for comment. The report included a hue-dependent correction and a blue-region hue-chroma interaction correction to industrial color-difference evaluation. Subcommittees are contributing investigations of lightness-dependent correction and improved blue-region correction. A full draft report was expected by the Spring of 2000.

TC1-48 Revision of CIE document 15.2 Colorimetry: The work of this TC is nearing completion. The following decisions were made during the meeting:

1. Colorimetric calculations will recommend the use of 1-nm data (referee method).

2. The tables for Illuminants A and D65 and the Colorimetric Observers will not be included in this document since they are available in other CIE standards.

3. The tables for other CIE Illuminants in the Appendix of 15.3 will be at 5 nm intervals. The recommendations for an interpolation method to obtain 1-nm data will have to be coordinated with the work of TC 1-38. For the F illuminants, it is recommended to include only F2, F4, F7 and F11.

4. Calculation of correlated colour temperature will continue to be based on the u,v diagram (i.e. will not change to u',v' diagram).

5. The colour matching functions will have different notation: the xbar, ybar, zbar notation will be replaced by $X(\lambda)$, $Y(\lambda)$, $Z(\lambda)$.

6. The 1964 10° Observer will no longer be referred to as Supplementary.

7. The D Illuminants will be written as D65, D50, etc. (no subscripts for the correlated color temperature notation).

8. The instrument geometries have changed to those recommended by TC2-39 (there will be a reference to this TC report rather than reporting the complex recommendations put forward in the draft 15.3 report).

TC1-52 Chromatic adaptation transform: A draft technical report reviewing a number of studies on chromatic adaptation is in preparation. The topics of the report include experimental techniques, important experimental data sets, chromatic adaptation transforms, testing performance of transforms, and recommending a chromatic adaptation transform as the new CIE standard.

TC1-53 A standard method for assessing the quality of daylight simulators: A final draft with a letter ballot was distributed to TC members at the end of 1999.

TC1-55 Uniform color space for industrial colour difference evaluation: The purpose of this TC is to develop a new uniform colour space for industrial colour-difference evaluation using existing experimental data. Members are currently being sought.

TC1-56 Improved colour matching functions: This TC was proposed at the Division 1 meeting in Warsaw, but was not approved at that time because no Chair was chosen. Subsequent to that meeting, M. Brill (US) agreed to serve as Chair. The purpose of the TC is to:

1. compare results based on current CIE colour matching functions, colour matching functions proposed by Dr. W. Thornton's laboratory, and those of CIE TC1-36;

2. initiate experiments in different laboratories to obtain data for the comparisons;

3. report the results and make recommendations for future CIE colour matching functions; and

4. report the use of those functions in specifying colour spaces and colour-difference formulae.

R1-04 Colour difference evaluation: An updated report is available in the Activity Report.

R1-11 Cognitive aspects of colour: Some experiments on memory aspects of colour are being set up.

R1-15 Lighting terminology: The final versions of Section 2 and 3 were submitted to Division 1 members for ballot.

R1-18 The use of colour identification under various illuminance levels: A survey of related studies was presented in Warsaw. A more extensive report should have been presented at the most recent Division 1 meeting.

R1-24 Colour appearance models: The purpose is to monitor the progress and development of colour appearance models.

R1-25 Liaison with ICO/TC35: Paint and Varnishes Colorimetry: The reporter has established contact with the individual responsible for ISO TC35.who promised to keep Division 1 informed of the activities of that committee.

R1-26 CIE Encyclopedia of Colour: Negotiations with Wiley to produce such a volume are continuing. The aim is to have a publication that is within the publication strategy of the CIE.

Proposals for New Reporterships and Technical Committees

Three new TCs and one reportership were proposed:

TC1-57 Standards in colorimetry: It will prepare a series of CIE/ISO/IEC standards that describe:

1. a method for calculating CIE XYZ and x,y;
2. a uniform colour space and its associated metric;
3. a formula for industrial colour difference evaluation.

These standards are based on relevant passages in CIE Publication 15.3. J. Zwinkel will represent Canada on that TC.

TC1-58 Visual performance in the mesopic range: It will:

1. define visual performance and related terms;
2. investigate performance based photometry and colorimetry in the low photopic to scotopic region; and
3. investigate and establish a relationship between performance and equivalent luminance.

TC1-59 Standard photometric 10 degree observer: It will give guidelines on how and when to use the CIE $V_{10}(\lambda)$ as the spectral luminous efficiency function for the 10° observer.

R1-27 Measurement of pupil diamter: This reportership replaces TC1-43. It will examine the variation in pupil diameter at both scotopic and photopic luminance levels.

Liaisons

Division 1 maintains liaisons with:

- the Association International de la Couleur,
- ISO/TC35 – Determination of Colour Bias of Achromatic Near White Paint Films,
- ISO/TC38/SC1 _ Textiles: Colour Fastness and Measurement, ISO/TC42 – Photography,
- ISO/TC187 – Colour Notations, ISO/TC6/3 – Paper, Board, and Pulp – Optical Properties,
- Comite Consultatif de Photometrie et Radiometrie, BIPM.

Next Meeting

The 2001 meeting will be held in June in Rochester, New York in conjunction with the AIC meeting.

New Officers for Division 1

The officers of Division 1 are unchanged. New representatives have been appointed for Japan – Y. Nakano, India – A. K. Datta, Romania – C. Parlog, and Great Britain – M. Pointer.

Canadian Participation in Division 1

Based on the latest information available to me, Canada has representatives on 14 Technical Committees in Division 1. The Canadian representatives are W. Adrian on TC1-51, A. Robertson on TC1-27, TC1-38, TC1-47, TC1-48, TC1-56, and TC1-59, W. Cowan on TC1-21 and TC1-37, J. Zwinkels on TC1-38, TC1-44, TC1-53, and TC1-57, R. Topalova on TC1-46 and TC1-54, and S. McFadden on TC1-42.

CIE DIVISION 2:

PHYSICAL MEASUREMENT OF LIGHT AND RADIATION

Report to CNC/CIE Annual Meeting

October 13, 2000

J.C. Zwinkels
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The most recent CIE Division 2 meetings were held April 6-8, 2000 at NPL, Teddington, UK The meeting on April 6, 2000 was joint with Division 1. I attended both these meetings and the following report is a summary of the meeting highlights. The DRAFT (unconfirmed) minutesof this meeting, prepared by the D2 Secretary, are also attached.

Administrative Matters

The Division 2 officers for the 1999-2003 term are:
Division Director – T. Goodman (UK) ; Associate Directors: N. Johnson (USA), T. G. Sauter (Germany); G. Vandermeersch (Belgium); Division Editor - J. Moore.
Secretary: Y.Ohno (USA).

The Division has a website at: http://nml.csir.co.za/~cie2/, which was most recently updated August 10, 2000.

Secretary's Report

D2 agreed to establish email reflectors for each TC to facilitate virtual TC meetings. Secretary has undertaken to set up these reflectors at NIST.

Editor's Report

No reports submitted to D2 Editor.

Circulated for Division Ballot:

TC 2-35	Standard CIE System of Photometry
TC 2-36	Technical report – Publication CIE 54.2 Retroreflection: Definition and Measurement (to replace CIE Pub. 54-1982).

The Editor noted that there have been some problems with electronic balloting; some members not receiving this info. The following was recommended:
(1) notify NC members as well as Country members re ballots
(2) send out reminders – 30, 60 days after ballot and status report.
(3) send out immediate acknowledgement.,
(4) send a copy of final ballot document to TC Chairman..

Technical Committee Work in Progress

TC 2-04	Secondary light sources (Moore, UK)	Report has been balloted by TC members. Comments received; will now be sent out for Division ballot. CM would like to include photos in TC report.
TC 2-16	Characterization of the Performance of tristimulus colorimeters (Rastello, Italy)	The TC met in Teddington and discussed the 5th draft of report and Y.Ohno's proposal to evaluate colorimeters using CRI.
TC 2-17	Simulated solar radiation (D. Kockot, Germany)	No report received.
TC 2-19	Measurement of spectral coefficient of retroreflection (N. Johnson, USA)	Document has been delayed due to strong request to include more data.
TC 2-23	Photometry of street-lighting luminaires (G. Vandermeersch, Belg.)	No progress. This TC is awaiting results of D4 on street lighting and EEC comparison (1996-99) to be completed to give important info re uncertainties
TC 2-24	Users guide for the selection illuminance and - luminance meters (K. Ganesha, India)	TC has completed draft of 1st 2 chapters. (out of 8). Members to send comments by May 15, 2000.

TC 2-25	Calibration methods and photoluminescent standards for total radiance factor measurements (J. Zwinkels, Canada)	TC last met in May 1999 in Vancouver and discussed 8th draft of the report. Revisions were received to two sections. These are being implemented by CM and final draft (9th) will be circulated for TC ballot in Fall of 2000.
TC 2-28	Methods of characterizing spectrophotometers (P. Clarke, UK)	The CM has changed. The 4th draft of report will be circulated later this year.
TC 2-29	Measurement of detector linearity (T. Goodman, UK)	No progress has been made this year. CM proposes to step down and ask Jean Bastie (France) to assume Chairmanship.
TC 2-30	Diode array radiometry (J. Palmer, USA)	No report received.
TC 2-32	Measuring retroreflectance wet horizontal road markings (Hodson, USA)	The TC last met in Warsaw. The subject of was divided into (1) retroreflection due to rainfall or condensation and (2) retroreflection during a rainfall. The CM plans to meet with D4 in Toronto this year.
TC 2-35	CIE Standard for $V(\lambda)$ and $V'(\lambda)$ (Mielenz, USA)	The document has been re-worked. It is in the ballot process. Replies were due May 31.
TC 2-36	Revision of CIE Publ. 54: Retroreflection (J.Rennilson, USA)	Results of division ballot were discussed at Teddington. No negative votes received. Several comments are being included in final (15th) draft.
TC 2-37	Photometry using $V(\lambda)$-corrected detectors as transfer standards (Ohno, USA)	The 6th draft of report is almost complete. Both relative and absolute methods are described. Recommended use of sphere source instead of bare lamp.
TC 2-39	Geometric tolerances for colorimetry (D. Rich, USA)	TC met in Teddington and discussed progress since 2nd draft. Baba and Hanson have provided expt'l data to support. next recommendations for tolerances.

TC 2-40	CIE standard: Characterizing the performance of luminance illuminance meters (Rattunde, Germany)	No report received.
TC 2-42	Colorimetry of visual displays (A. Hanson, U.K.)	TC met in Teddington and discussed 1st draft of report. The report will concentrate on problems in measuring colour and luminance and provide a roadmap to user.
TC 2-43	Determination of measurement uncertainties in photometry (Sauter, Germany)	TC met in Teddington and discussed the 3rd draft of report. There will be 3 main parts: (1) summary from international documents; (2) selection of examples; and (3) worked examples. CM has asked members for examples of practical interest to be submitted for consideration.
TC 2-44	Vocabulary Matters (Moore, UK)	This TC is responsible for D2 terms in the revision of the ILV. Chairman has circulated about 300 new terms to members. Comments have been collected/ compiled for revision; a second mailing is being prepared.
TC 2-45	Measurement of LEDs-Revision of CIE 127 (Muray, USA)	TC met in Teddington and discussed 2nd partial draft.
TC 2-46	CIE/ISO standards on LED intensity measurements (Scarangello, USA)	TC met in Teddinton, chaired by K Jones, and discussed 3rd draft of report. The report will include white LEDs (3-4 elements). More complicated structures will be dealt with in TC 2-50.
TC 2-47	Characterization and Calibration Methods of UV Radiometers (G. Xu, Singapore)	CM has contacted several members. Work is on-going and 1st draft will be ready later this year.
TC 2-48	Spectral responsivity measurement of	TC met for in Teddington and discussed 2nd draft of report. This includes

	detectors, radiometers, and photometers (Eppeldauer, USA)	measurement set-up, geometry and standards. Some changes to structure. were proposed; about 40% of draft has been prepared.
TC 2-49	Photometry of Flashing Lights (Y. Ohno, USA)	TC met in Teddington. Partial draft has been completed. Some problems were identified with definition of effective intensity in terms of Form Factor method, e.g. in the case of a narrow sharp pulse superimposed on low broad pulse.
TC 2-50	Measurement of the optical properties of LED clusters and arrays (G.Sauter, Germany)	TC had an ad-hoc meeting in Teddington with Japanese colleagues. The CIE task will focus on photometric and colorimetric properties.
TC 2-51	Calibration of diode-array spectrometers (R.Austin, USA)	TC held its 1st meeting May 8th in conjunction with CORM2000 and CR-6 WG (Radiometry) Committee.

Reporterships in Progress:

R 2-05	Visual gloss (J. Taylor, UK)	No need for a TC at this time; continue to monitor situation.
R 2-06	Standardization of measuring ASTM geometry standard is geometry for the colorimetry of metallic paints (C. McCamy, USA)	Both ASTM and DIN have established standards. Reporter recommends the formation of a TC with A.Rodrigues (USA) as possible Chair.
R 2-09	Absolute cryogenic radiometers (Parr, USA)	Reporter stated that applications of cryogenic radiometers at the industry level are not imminent and proposed closing this reportership. D2 agreed.
R 2-17	Aviation photometry (Ohno, USA)	Efforts to contact ICAO regarding the need for CIE collaboration have been unsuccessful. It was proposed to close this reportership. D2 agreed.

R 2-18	OIML Matters (Sauter, Germany)	No new issues at this time. It was recommended to hold this reportership open.
R 2-19	Emergency lighting Luminaires (L. Bedoc)	Workshop was held at Teddington. It was recommended to close this reportership and form a new TC.
R 2-21	Use of detectors as absolute transfer standards for spectroradiometry (N. Fox, UK)	No need for a TC at this time; situation will continue to be monitored.
R 2-22	Implementation of Photometric Units (Kohler, BIPM)	No new inputs received since last year. Recommended closing this reportership.
R 2-23	ISO/CIE standards for the measurement of reflectance and transmittance (D. Rich, USA)	Reporter reviewed CIE Publication 130 and reported to CIE CB.
R 2-24	Classification of colour-measuring instruments (Y. Ohno, USA)	This reportership was a request from D8 to have a standardized method for classifying instruments – similar to TC 2-40. It is proposed to develop an index similar to F_1'
R 2-25	Liaison with IALA (I. Tutt)	Draft standard for marine lighting has been prepared by Int. Assoc'n of Lighthouse Authorities – look to CIE for approval. The Document uses a term "zero-length photometry" – not recognized by CIE.

*** Reports of Liaisons:**

CCPR (Kohler) No report received

ISO/ TC6 (J.Zwinkels, Canada) The most recent meeting of the working group (WG3) was held on September 25, 2000 at Whistler, B.C in conjunction with the main ISO TC6 meeting. I participated in this meeting where the major issues discussed were: revision of ISO 2469, ISO draft standard for gloss at 20°, report of the activities of the ISO/TC6 standardizing and authorized laboratories, and proposals for new work items on: D65-brightness, colour (D65/10) and transparency; the proposal on transparency was accepted; Germany and Sweden supported the other two proposals but they were opposed by Canada and the US; technical concerns in realizing D65 were discussed.

The following ISO draft standards were reviewed and comments given to CIE CB:

(1) ISO/FDIS 5631 "Paper, board and pulps – Determination of colour – (C/2°) Diffuse Reflectance Method"
(2) ISO/FDIS 8254-1 "Paper and board: Measurement of specular gloss Part 1: 75 degree gloss with a converging beam, TAPPI method".

*** Proposals for 3 New Technical Committees:**

(1) Photometry of Emergency Lighting Luminaires
Vandermeersch (Belgium) as the Chairman.
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.

(2) CIE/ISO Standards on Retroreflectance Measurements
J. Rennilson (USA) as the Chairman.
TR: To be prepared by Rennilson for circulation to TC 2-35 and then for division ballot by e-mail.

(3) Measurement of Metallic Coatings
C. McCamy (USA) as the Chairman
TR to be prepared by Johnson with McCamy and to be circulated for division ballot.

*** Proposal for 1 New Reportership:**

Definition of Star Magnitude – Reporter: Rastello (Italy)

General CIE Issues:

There was considerable discussion of handling TC draft documents on the web-site. The following points were considered: (1) CIE drafts should not be available to non-CIE experts; (2) wide input is required; (3) drafts may contain errors; (4) source of income for CIE.

Upcoming Meetings in 2001:

AIC (International Color Association) Conference, Rochester, USA, June.

NEWRAD 2001, NIST, Gaithersburg, Oct 26.

CIE Midterm Session, Turkey, Sept.

Future CIE Division 2 Meetings:

2001: 17-19 May at NIST, Gaithersburg in conjunction with 2nd CIE Expert Symposium on LED measurement (May 10-12) and CORM'2001 (May 13-16) and NIST Centennial Celebrations. D2 main meeting will be on May 19.

2002: Open

2003: June-July at San Diego, California in conjunction with CIE 25th Session.

Other CIE Division 2 Notes:

Canadian participation in the work of the Division continues at a high level with the following members of Technical Committees or Liaisons:

TC 2-16	A.R. Robertson (NRC)
TC 2-25, Chairman	J.C. Zwinkels (NRC)
TC 2-28	A.R. Robertson, J.C. Zwinkels
TC 2-35	A.R. Robertson
TC 2-39	J.C. Zwinkels, B. Jordan (PAPRICAN)
TC 2-42	S. McFadden (DCIEM), R. Baribeau (NRC)
TC 2-43	A. Gaertner (NRC)
TC 2-47	L.P. Boivin (NRC), B. McArthur (AES)
TC 2-48	B. McArthur (AES)
ISO/TC6, Liaison	J.C. Zwinkels (NRC)

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

DIVISION 2 : PHYSICAL MEASUREMENT OF LIGHT AND RADIATION

Home Page: http://nml.csir.co.za/~cie2

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October 9, 2000

Minutes of CIE Division 2 Meeting
Saturday, April 8, 2000
Teddington, UK
(DRAFT - Unconfirmed)

Abbreviations:

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

Attendees:

Richard Austin	Gamma Scientific, USA (TC2-51)
Jean Bastie	BNM-INM/CNM, France (CIE Vice President)
Anton Bouman	Philips, Netherlands
Joaquin Campos	CSIC, Spain
Peter Clarke	NPL, UK (TC2-28)
Dennis Couzin	Avery Dennison, USA
George Eppeldauer	NIST, USA (TC2-48)
Teresa Goodman	NPL, UK (D2 Director)
Didier Halkin	Laborelec, Belgium
Günther Heidel	Osram Optosemiconductors, Germany
Andrew Hanson	NPL, UK (TC2-42)
Paola Iacomussi	IEN, Italy
Norbert Johnson	3M, USA (D2 AD)

Carolyn Jones	LumiLeds, USA
David King	PK Scientific, USA
Kohtaro Kohmoto	JELMA, Japan
Hans Allan Löfberg	Unig. Gävle, Sweden (CIE President)
Dave McDowell	Kodak, USA (D8 AD)
John Moore	UK (D2 Editor)
Kathleen Muray	INPHORA, USA (TC2-45)
Yoshi Ohno	NIST, USA (D2 Secretary)
Allan Ottosson	Univ. Gävle, Sweden
Jerzy Pietrzykowski	GUM, Poland
Maria Luisa Rastello	IEN, Italy (TC2-16)
J. Rennilson	RCS, USA (TC2-36)
Danny Rich	Sun Chemical, USA (TC2-39)
Terubumi Saito	ETL, Japan (representing H. Onuki)
Victor Sapritsky	VNIIOFI, Russia
Georg Sauter	PTB, Germany (D2 AD)
Paolo Soardo	IEN, Italy
Raissa Stolyarevskaya	VNIIOFI, Russia
Natasha van Tonder	CSIR-NML, South Africa (representing F. Hengstberger)
Heinz Terstiege	Germany
Ian Tutt	Trinity House, UK
Guy Vandermeersch	Laborelec, Belgium (D2 AD)
Pierce Webb	Eastman Kodak-retired, USA
Joanne Zwinkels	NRC, Canada (TC2-25)

Total 37 persons from 14 countries, including 14 country members (representatives) attended. Underlines indicate country members.

Regrets received by Secretary

Carl Andersen (USA, IALA)
John Arens (USA)
Peter Blattner (Switzerland)
John Clare (New Zealand)
Antonio Corrons (Spain)*
Stanko Erste (Slovenia)
Arnold Gaertner (Canada)
Jim Gardner (Australia)
K. Ganesha (India, TC2-24)
Franz Hengstberger (South Africa)*
Neil Hodson (USA, TC2-32)
Hiroaki Ikeda (Japan, IEC TC100/TA2)
Rainer Kohler (BIPM)
Ian Lewin (USA)
Daniel Lozano (Argentina)
Michael Matus (Austria)
Calvin McCamy (USA)
Klaus Mielenz (USA, TC2-35)
Hideo Onuki (Japan)*
Leyla Özturk (Turkey)
Alan Robertson (Canada)
John Scarangello (USA, TC2-46)
Gan Xu (Singapore, TC2-47)
Jeanne Marie Coutin (France)
Reiner Rattunde (Germany, TC2-40)

* Represented by other participant.

Underlines: country members.

Handouts

1) Agenda of the 2000 Division Meeting
2) List of Division 2 TCs, Reporterships, and Liaisons

1. Call to order

The Division Director, Teresa Goodman, opened the meeting at 10:45 am, and welcomed all present. The Director expressed her thanks to Secretary Y. Ohno for his hard work to prepare for this meeting and to keep Division 2 running actively throughout the year. The Director introduced Jay Rennilson who is the president of CIE-USA and the host of the CIE 25th Session in 2003 in San Diego. Rennilson thanked Goodman and National committee of UK for the hospitality for this meeting in Teddington, and expressed his wish to welcome many people to the 2003 Session in San Diego.

2. Approval of agenda

Agenda of this 2000 Division 2 meeting (Attachment 1) was approved with no changes.

3. Approval of the minutes of the 1999 Division meeting

The minutes of the last Division meeting in Warsaw (distributed by e-mail and mail in September 1999) was approved with no corrections. The attendees were in favor of the detailed version of the last meeting minutes.

4. Director's report (T. Goodman)

Director reported one of the important issues that came up at the Board meeting in Warsaw – a proposal for new membership categories. These do not replace existing membership but are additional ways that particular companies or new countries can become involved in CIE. The new categories are: 1) Associate national committee member – for new countries or geographic areas that have established a new national committee, no voting rights, 2) Associate members – for organizations or individuals in countries where there is no national committees or associate NCs, and 3) Supportive members – for international or regional organizations and companies. Supportive members must be already a supporter of the NC and their support in those countries must not be reduced. Supportive members split into 4 different levels: Basic, Silver, Gold, and Diamond. Different levels have extra bonuses, for example, Gold members have a right to have 3 pages space in CIE news, copies of CIE publications within the company, etc. The levels depend on the fees.

5. Secretary's report (Y. Ohno)

(1) Arrangement for London meeting

Secretary first thanked Goodman and other members of NPL for various arrangements for this meeting. It was a bit pity that we had a conflict with Euromet meeting in Turkey, due to which several people could not come. Their schedule came out later without our knowledge.

(2) Country members

Div.2 currently has 34 country members, the same as last year. Since last D2 meeting, we have some changes of the country representatives; Japan (Nishi to Onuki), Romania (Ionescu to Simionescu), Russia (Ignatyev to Stolyarevskaya), and Switzerland (Blaser to Blattner).

(3) Activity Reports

The minutes of the Warsaw meeting were issued and distributed in Sep. 1999. The draft minutes were first circulated by email in August. The 1999 Activity Report was also issued and distributed in Feb. 2000. Most of D2 circulars are now distributed via email only, with documents posted on the website. Any problems with electronic circulation of documents are to be reported to Secretary. Physical mails are used only for those who have no access to email and are limited to important circulars only. Fax modem is also used for fax recipients to send email circulars (text only).

(4) Division 2 Mailing List

The D2 mailing list now contains 138 persons (last year – 129). Among them, 128 have e-mail addresses (93 % of all), 4 have access to fax and 6 rely on mail. The List includes 34 country members, 20 officers of CIE and Div.2, 29 TC chairs and reporters, 8 former TC chairs, 5 liaison persons from outside organizations, and 56 associates.

(5) Email reflector & virtual TC meeting

An email reflector for Div. 2 (cie-d2@nist.gov) was established in March and is already being used actively. The subscribers are all the persons on the D2 Mailing List and not open to others. This reflector is intended for use for free discussions the people on the D2 Mailing List as well as by Secretary (and other D2 Officers) for distributing circulars. Moderated discussion is also possible to reach decisions on urgent matters. The Secretary also plans to create email reflectors for all the D2 TCs to facilitate TC work. TC chairs are encouraged to use email reflectors to hold virtual TC meetings in between physical meetings or to follow up on the physical meetings that tend to be very short.

Vandermeersch suggested to make a procedure for holding a virtual TC meeting (agenda, start date, duration, advance announcement, etc.). Hanson stressed that it is very important to set (early) deadlines for responses in such virtual meetings. Answering questions, Secretary added that attachments can be used in these email reflectors (but long ones should be posted on the website to avoid long receiving time for modem users), and these reflectors can be set up at NIST shortly. Vandermeersch suggested to have minimum rules (email titles, format, etc.) for the email list (IEC, e.g., every comment is numbered and initials of the sender, and refer to the number for response to this.) Director commented that it is an excellent idea and encourage TC chairs to use this to get TC work going as quickly as possible.

(6) D2 Website

The D2 website has been maintained to keep information up-to-date. Some changes were made: 1) new background (also used for CIE main page that is being renovated by CIE BA). On the TC page, the status records for only past two years is posted to reduce the file size. Documents submitted from TC chairs (not TC draft) are posted on these TC pages (with no passwords).

Kohmoto commented that the managing system of D2 is working very well compared with D6; all CIE divisions should apply the same system. Ohno mentioned that it is already agreed

among other Division Secretaries to use the D2 website as a model for Division website (Secretary meeting in Warsaw, 1999).

6. Editor's report

(1) Editing documents

Since Warsaw, no TC reports have been submitted to Editor.

(2) Status of publications

The document from TC2-33, CIE Standard Illuminants for Colorimetry has been published as ISO10526-1999/CIE005-1998, which replaces previous ISO/CIE 10526. The other document, a CIE Standard - CIE System of Photometry from TC2-35 is under Division ballot, due by the end of May. The Technical Report – Pub. 54.2 Retroreflection: Definition and Measurement, from TC2-36 has finished Division ballot and is to be published. This document will replace Pub. 54-1982. (See TC2-36 report in later section) The Editor also put together a report to publish the data from now-closed TC2-22 (Luminous Flux of High-Pressure Sodium Lamps) in CIE Collection. The report includes data of partially completed intercomparison.

(3) Electronic ballot issue

The Editor has a concern on electronic balloting, which has been employed since the ballot for TC2-14 document (on measurement of reflectance and transmittance). At this ballot, we got 6 comments, and none of these were from countries that were active in the TC. The same thing has happened to the ballot for TC2-36 document. Some Division members say they never received notification in these two past votes. The Editor is not against electronic balloting but brings up a caution that system is not working and suggests that some measures be taken.

<Discussion>

Sauter commented that there should be a confirmation that the notification and document have been received so that any communication problems may be found. Goodman pointed out that these people are not sending ballot back partly because they were active in the TC and already happy with the document; another problem may be that the voting has a very long dead line, and people wait till the end and forget it. She suggested that a reminder be sent two weeks before closing. Löfberg noted that long reply time (90 days) is necessary for national committees to collect comments, and agreed to have reminders for such a long deadline. Vandermeersch mentioned that voting should reflect the position of industry and government authority of that country, and national committee should also be alert. He suggests all the NCs also receive the voting information as well as Division members. Johnson suggested that reminders be sent 30 days and 60 days rather than two weeks. Ohno suggested that it might help if Division Secretary also receives the notification and circulate the information to Division Mailing List. Sauter suggested to post the information at CIE website. Moore suggested that TC chairperson should also receive a courtesy copy of the voting document since the page layout of the voted version often changes, which causes confusion at later editing process; TC chairs should be kept informed at all stages until the document has been published.

<Consensus>

Goodman summarized and the attendees agreed that

- we request CB that, when the voting notification is sent to CMs, CB also notify to the NC Secretaries that vote is underway,
- ask CB to issue reminders at 30 and 60 days to those countries who have not responded,
- ask CB to send a request to CMs for immediate response for confirmation of receiving the notification and document.
- A courtesy copy of the voting document (and notification) should also be sent to the TC chairperson and Division Secretary and the news also be posted on the CIE website.

7. Progress report of Technical Committees

7.1 Technical Committees

Progress reports on the technical committees were given by Associate Directors. Vandermeersch reported TCs 2-23, 24, 49, 50, and reportership R2-19, 25. Johnson reported TCs 17,19, 25, 28, 30 32, 35, 36, 39, 42, 44, 51, and reporterships R2-5, 6, 23, 24, 25. Sauter reported TC2-04, 16, 29, 37, 40, 43, 45, 46, 47, 48, and reporterships R2-18, 21, 22. The reports of all the TCs are shown below in the numerical order of 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: A draft Technical Report has been circulated to the members of the TC for ballot. Provided that no serious objections are received, it is intended that the Division and Board ballot should take place later this year and it should then be possible to publish a CIE Technical Report on the selection and operation of stable secondary standard sources next year. It has already been decided to limit the coverage of the report to tungsten filament lamps. Because of the special nature of the hand-made lamps recommended for use as stable secondary standards, the report will contain a complete list of all the known manufacturers of such lamps. With recent rapid developments in digital scanning procedures, it has been possible to include a number of photographic illustrations in the report. These are not in colour, but as far as the TCC is aware, it will be the first time that photographs have been published in a CIE Technical Report.

TC2-16 Characterization of the performance of tristimulus colorimeters
Chair: M. L. Rastello (Italy) **AD:** Sauter
ML: Denner (South Africa), Goodman (UK), Hengstberger (South Africa), Moore (UK), 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: Report given by TCC. The TC had a meeting on April 7th. The 5th draft was discussed.

There was not enough time to go through the document. We discussed a proposal by Ohno to evaluate spectral response properties by using CRI. Some in favor, some against. There was an alternative suggestion by Schanda to use metamerism index, which is to be investigated. Schanda will discuss this with the Chair on this by email. The Chair expects commetns on the draft and the proposals from the TC members to be reflected into the next draft.

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

Chair: D. Kockott (Germany) **AD:** Johnson

ML: Aydinli (Germany), Goodman (UK), 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 has not received report from the chairman. He will re-establish contact with the chairman.

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 (UK), 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 AD Johnson. The intercomparison work has all been complete. The data are separated into two documents, one contains data, and another is intended to be a report of the intercomparison results for a CIE collection. We held on to this because of one final laboratory that were still to submit data. The Chair hopes to finish it toward the end of the year.

TC2-23 Photometry of Street-Lighting Luminaires.

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

ML: Arens (US), Blaser (Switzerland), Blochouse (Belgium), Claassens (NL), Corrons (Spain), Price (UK), Rattunde (Germany), Rossi (Italy), Simons (UK), Sorensen (Denmark)

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

ST: Report given by the TCC. The report will be an addendum to CIE 121. Three aspects will be addressed in the addendum 1) photometric data, 2) photometric methods, and 3) uncertainties. The work has not started yet because the work relies on the D4 document on photometric calculation method in public lighting, now at the final vote. The work should also have a close link to work by CEN, chaired by the same person. For uncertainty, we should consider the results of intercomparison of luminaires by European Commission, which we are still waiting for. (Iacomussi reported that it might be available this fall.) The member roster will also be revised to include Netherlands and representatives from D4.

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), Sojourner (USA)

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

ST: The written report from the TCC was read by the AD Vandermeersch. It summarizes as follows. The TC has been active and has completed the draft of the first two chapters out of eight. The responses for the circulated drafts of these are just being received. Very good constructive comments have been received from some of the members and more are expected soon after the members find themselves free from the heavy work of the D2 meeting. The TCC proposes to hold virtual meetings on Internet and complete the work within a year at best and submit the final draft to the Division. The TCC has observed that some international brands of cheap lux meters of very poor qualities are mass-produced and sold with low prices with attractive presentations. As such, there is a great and urgent necessity to complete this users guide at the earliest. The TCC requests all the D2 members even those who are not presently the members of the TC to participate actively in the TC work. The drafts circulated already are on the web and the members can send their comments.

Moore commented that he had heard nothing from the chairman though he is a member and the former TCC, but he agrees that what is proposed sounds sensible. (The Secretary will contact the chairman to make sure that his circulars be sent to all the TC members.)

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), Verrill (UK)

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 method swill be included.

ST: Report given by the TCC. The TC last met in May 1999 in Vancouver, B.C. in conjunction with the Inter-Society Color Council meeting. The eighth draft of the TC report was discussed. Revisions were received to Section 2.1 on FWAs in Textiles and Paper and it was recommended to condense the information in Section 4.3 on the Effect of Instrument Polarization and to remove the description of the fluorescence-weakening method in Section 3.1 of the One Monochromator Methods. The other suggested changes were largely editorial in nature and include grouping the References together at the end of the document. These revisions are currently being implemented by the Chairman and the revised document (ninth draft) will be circulated for TC ballot by the Fall of 2000.

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: Report given by the TCC. The third draft was recently distributed, and comments received from the members. The TCC is working on the fourth draft and hopes to circulate it later this year for TC vote and to finish the document by next D2 meeting. The contents of the report was presented at the D1/D2 Joint meeting.

TC2-29 Measurement of Detector Linearity
Chair: T. Goodman (UK) **AD:** Sauter
ML: Andor (Hungary), Bastie (France), Bittar (New Zealand), Budde (Canada), Distl (Germany), Dezsi (Hungary), Mihailov (Russia), Mostl (Germany), Ohno, Parr (USA)
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 TCC. This TC has not progressed much in the past year to her regret. The TCC finds it exceedingly difficult to finish this work, and suggests to find another chairperson. Jean Bastie will consider taking the chair. The TCC will wait for his decision.

TC2-30 Array Radiometry
Chair: Jim Palmer (USA) **AD:** Johnson
ML: Abasari (Hungary), Andoh (Japan), Goodman (UK), Jones (USA), Mihailov (Russia), Pfleger (Austria), Sauter (Germany)
TR: Prepare an annotated bibliography for the CIE journal on diode array radiometry. Make appropriate recommendations for future work in diode array radiometry.
ST: Report given by the AD Johnson. This TC was reassigned to Jim Palmer recently. No information has been received from him this time.

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 TC had a meeting in Warsaw. They plan a meeting and outdoor testing at the end of May in Denmark to look at wet reflectivity of pavement markings. The subject was divided into measurement of retroreflection of pave markings after rain fall and, the other is during rain fall. Testing procedures proposed are addressing questions on those two aspects. These are highly related to work of Division 4 as well. The TC will probably have a TC meeting in conjunction with Div.4 in Sep. in Toronto. They have a draft document and expect revisions after the May experiments and the Toronto meeting.

TC2-35 CIE Standard for $V(\lambda)$ and $V'(\lambda)$
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: AD Johnson reported. The status was already reported in Editror's report. The document went out for Division ballot for the deadline of 31 of May. If no problem, it will then be sent for NC ballot.

<Discussion>

Ohno asked about German translation that was done before Division ballot. Sauter commented that some of the country members did not receive the document and he was one of them, but received a request from CIE CB for translation and got the document. He made the translation as requested. Together with translation, Sauter sent some comments on Annex in different format of terminology from ILV and suggested to keep the same format.

Johnson suggested that we need an immediate follow-up on the ballot. Director agreed to contact CB after the meeting. Schanda noted that the CIE procedure is to conduct Board and Division ballot in parallel. Schanda, as well as the Hungarian country member, received the ballot sheet. The document hardcopy will not be sent unless requested. All Division members should be asked to respond for confirmation. The Board should address this issue.

About translation issue, Johnson mentioned that ballots are always sent out in English. Moore suggested that we do not translate the document until we have final agreement on the English version; this is a standard and there will be another ballot by NCs, where more comments are expected, and this document has not come to the final point yet.

Schanda gave information that, at the D1 meeting on 7 April, D1 agreed to establish a new TC to define $\bar{y}_{10}(\lambda)$ to be $V_{10}(\lambda)$ in a technical report. The TC to be chaired by Schanda.

TC2-36 Retroreflection: Definition and Measurement (Revision of CIE Publication 54, Liaison with CEN/226) **AD:** Johnson

Chair: J. Rennilson (USA)

ML: Arens (USA), Couzin (USA), Dibbern (Germany), Heenan (USA), Hubert (France), Johnson (USA), Kramp (Germany), Nanjo (Japan), Price (UK), Schmidt-Clausen (Germany), Sorensen (Denmark), Terstiege (Germany), Werner (Sweden) – revised, August 1999.

TR: To revise and update publication 54. To standardize test methods and measurement geometry for measuring the photometric and colorimetric properties of all types of retroreflectors under both day and nighttime conditions. To prepare this CIE document in ISO format to be issued as a joint CIE/ISO standard.

ST: Report given by TCC. The TC has 15th draft after 8 years. The TC finished last work in Warsaw and went out for Division ballot in last September. Some members did not receive the copy. There was no negative votes but were several comments. The TC met on April 7, and spent 3 and half hours to make relatively minor changes. The 15th draft to be finished and to be sent to editor and then to CB for publication. This concludes the TC work and there will be probably no more meetings. However, important aspect is to prepare a standard from this TC It should be the responsibility of a new committee with a new chairperson to publish a CIE/ISO standard.

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), Dezsi (Hungary), Eppeldauer (USA), Gardner (Australia), Goodman (U.K.), Köhler (BIPM), Muray (USA), Pietrzykowski (Poland), Rattunde (Germany), Rastello (Italy), Sauter (Germany), Schanda (Hungary), Sojourner (USA), 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 TCC. Apology was given for little progress made for the past year. The 6th draft is almost finished. Some terminology issues were resolved. The section for method for measuring reference plane has been rewritten to include an absolute method and some precautions in practical measurements, e.g., to use a sphere source. Next draft, hopefully a final version before TC ballot, to be circulated shortly.

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.

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.

ST: The TC met for the sixth time on 7 April in Teddington. Three committee members and twelve guests were present. Discussed the requirements to continue revisions of the first draft report. Discussed in Warsaw that we need some experimental verifications of some of the tolerances and definitions that the TC is making. One of the member sent 8MB data and begun to analyze it. Hanson also sent some data. Unfortunately other things that we agreed to add have not been submitted and we are 18 months behind. The TCC hopes to have another draft in fall, and next year to have document close to finish. See Attachment 4 for the TC Activity Report and Minutes of the Meeting, 7 April, 2000 submitted by the chairman.

<Discussion>

Moore commented that this is one of the most important documents and it is essential that these improved geometries and tolerances be made into a standard. Rich mentioned that the original TR was to produce a standard but TC decided that it was premature. Our goal is produce a technical report with all background information, and then we should be able to draft a standard version from that under a standard committee.

Related to this TC, Schanda and Sagawa added that D1 decided to establish a new committee to write a standard for colorimetry based on 15.3, with Mike Pointer as the chair. Some of the parts of 15.3 should be standardized. 15.2 is now widely used and some other documents refer to this as a standard. Participation from D2 to this committee is welcome.

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: The chairman was here in London, but had to leave early, and no report made this time. The draft document is on the website.

TC2-42 Colorimetry of Visual Displays
Chair: A. Hanson (UK) **AD:** Johnson
ML: Andor (Hungary), Berns (USA), Dalton (UK), Fairchild (USA), Ikeda (Japan), Hardis (USA), Leone (USA), Luo (UK), Maelfeyt (Belgium), MacDonald (UK), McFadden (Canada), Munger (Canada), Reid (UK), Schanda (Austria), Stokes (USA), Sakata (Japan), Stienstra (Netherlands), Ohno (USA), Vienot (France)
TR: To produce a Technical Report summarizing recommended practice for the measurement of the colorimetric and spectroradiometric properties of visual displays.
ST: Report given by the TCC. First draft distributed in January 2000, and the TC met on 7 April in Teddington with nearly 30 participants. The TC deals with emissive displays though it is not indicated in the title. The TC addresses issues in the measurement of x, y, Y - color and luminance of displays and does not deal with electronic side, characterization of displays other than color and luminance, nor appearance. Some more sections to be added for 2nd draft, which is to be circulated next spring. Then 3rd draft is planned for fall 2001 and the final document for spring 2002. A little restructuring of the document after the first outline was circulated and comments received. The current draft includes sections for display technologies, measurement technologies, measurement methods, and recommended practice. Emphasis will be made on measurement instrumentation and how to deal with errors and uncertainties. Membership list will change to include some D8 members.

<Discussion>

Rennilson asked about plasma displays. Hanson answered that if there are specific problems with any other type of displays, we can address the issues and any input is welcome. Rich commented that IEC TC100/TA2, which he serves, is drafting standards for CRT and flat panel, ahead of us. Hanson answered that we keep good liaison with them by himself as well as Ohno and others; the IEC document, as well as another one from VESA, are specifying how to characterize displays, e.g. uniformity and viewing angle, which we do not deal with in TC2-42 document. Johnson asked about liaison to D8 in this activity. Hanson answered that he keeps good contact with them. Ohno also serves as a liaison person to D8

from D2.

TC2-43 Determination of measurement uncertainties in photometry.

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

ML: Bastie (France), Corrons (Spain), Goodman (UK), Köhler (BIPM), Moore (UK), Ohno (USA)

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

ST: Report given by the TCC. The TC met in Teddington and discussed the third draft. The format and style of the document have been agreed. The document is divided into 3 parts: the first part is a summary of information from ISO Guide to the Expression of Uncertainty (GUM), the second part is a selection of examples, and the last part deals with uncertainty of quantities correlated. Part dealing with summary of background is accepted. Examples start with very simple questions, eg. the resolution of meter indicators, operation of incandescent standard lamps at nominal current, and how to handle correlated measurements. Still looking for examples of more practical use. More ideas of good examples are welcome.

TC2-44 Vocabulary Matters

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

ML: Billmeyer (USA), Burghout (Netherlands), Ionescu (Romania), Johnson (USA), Köhler (BIPM), Morren (Belgium), 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: Report given by the TCC. The work is being finished. CB is to publish new ILV (International Lighting Vocabulary) soon. The new ILV will be published in electronic form, and it is proposed that this ILV be updated continuously. The Chair circulated 200 definitions and got agreement on only 20 that will be added to D2 terminology. Many terms are still in debate and could not be included in the next version: e.g., spectral mismatch correction factor, and distinction of "luminous" and "radiant" from "photometric" and "radiometric". The new ILV is planned to be published this year.

<Discussion>

Hanson asked how the ILV could be updated continuously. Moore answered that update will made more often on the disk form, and also, there is a suggestion that the vocabulary be made available on the web in the future (though there are a lot of difficulties). Johnson asked if any date associated with individual definitions available; when ILV has additions and changes, it would be useful to have information on each term when it is added or definition changed. Moore answered that the committee has no plan to do so but he agrees that it will be useful.

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) – revised Jul.00.

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 reevaluate other parts including spectral and color measurements of LEDs.

ST: Report given by the TCC. The TC had the third meeting yesterday. The second draft was presented. Major problems are still to be resolved: 1) decision on how an alternate method to replace f_1' for LEDs. The same problem addressed by TC2-46. 2) How to measure luminous flux. First question is what quantities are needed. The TC is discussing the total flux (4π) and partial LED flux (2π, etc., with defined reference point). This question is highly dependent on users and applications. More discussions are planned via email. See Attachment 5 for the Summary of the Teddington TC meeting, submitted by the TCC.

<Discussion>

Heidel pointed out an error in membership list. Kohmoto mentioned that f_1' is good for white LEDs which will be more practical in the future. Muray agreed to address it. Moore mentioned that the situation of flux seems similar to the case for luminous intensity. If industry use something other than the basic photometric quantities, we should define some arbitrary geometries that can be accepted by industry, just as done for intensity. Muray answered that this was exactly what we are trying to do. Sauter mentioned that total flux is not relevant to alignment and no problem, but when we measure partial flux (hemispherical) we need a reference position of LEDs to define the hemisphere. The current decision is to use the bottom of LEDs located at the plane. In case of intensity, use the tip of LEDs. Conical partial flux may also be interested, then we need definitions for such partial flux. The TC is open to more other geometries if necessary.

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 (Austria), Schumacher (Germany), Sojourner (USA).

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

ST: C. Jones reported representing Scarangello, sending his regret. The TC had its third meeting on April 7 in Teddington (chaired by Jones). The third draft was discussed. Some serious issues have been resolved related to calibration of photometers and radiometers for LED intensity measurements. The TC plans virtual meetings to handle some of the remaining issues.

<Discussion>

Kohmoto mentioned that the recommended LED intensity measurement is no problem for single-chip LEDs, but is a problem for three-chip type white LEDs whose optical axis and spatial distributions are different for each color. The same problem exists for white LEDs with blue chip and phosphor. He suggested a need for a new work in future for intensity

measurements for white LEDs. Jones answered that such subject should be discussed with TC2-45 and 46 together.

Schanda mentioned that the recommended method (by CIE127) is to use mechanical axis, not optical axis, so white LEDs should not be a problem. Sauter mentioned that more complicated problems of three chip type LEDs should be dealt with as a cluster of LEDs (in TC2-50). Muray added that special problems of white LEDs will be treaated in 2-45 in the last section of the document.

TC2-47 Characterization and Calibration Methods of UV Radiometers

Chair: Gan Xu (Singapore) **AD:** Sauter

ML: 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)

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: Report given by AD Sauter. Gan Xu regrets for not being able to be present. Not much progress has been made since Warsaw meeting. The TCC has been in contact with some members of the committee and UVnet WG1 leader to exchange opinions on the content of the new document, and have started to write the introduction and calibration parts. However, opinions are still divided and decisions remain to be made on the following points; whether CIE should adopt the major part of the UVNet WG1 document on UV measurements; whether or not it is meaningful to follow the same approach as in photometry for the characterization of UV meters, taking into consideration that the spectral mismatch in UV measurement is much worse and more complicated than the photometric measurement. The TCC will summarize the situation shortly and write to the members for consensus. The TCC also hopes that the TC has chances to meet either later this year or the first half of next year and have planned to get the first draft ready for discussion by then.

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),– revised Aug. 99.

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 responsivity measurement for radiometers and photometers from UV to near IR.

ST: Report given by the TCC. The TC met on April 8 in Teddington. In the new report, we are including modern detectors and also discusses not only spectral power response (beam geometry) but also spectral irradiance response (overfilled geometry) and radiance response measurements. New report describes measurement geometries, methods, setups, and uncertainties. The outline of the first draft was discussed in Warsaw and the scope and table of contents agreed. Since then the second draft (40 % done) was produced and discussed this time. Many suggestions have been made, and the TCC will work on the slight change of the structure and write the rest of the document. The TCC plans to finish the work in three years.

TC2-49 Photometry of Flashing Light

Chair: Y. Ohno (USA) **AD:** Vandermeersch

ML: Arens (USA), Austin (USA), Berkhout (USA), Couzin (USA), Ellis (USA), Eppeldauer (USA), Goodman (UK), Hengstberger (South Africa), Köhler (BIPM), Kondo (Japan), Rattunde (Germany), Sagawa (Japan), Schmidt-Clausen (Germany), Sauter (Germany), Webb (USA) –revised June 2000.

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: Report given by the TCC. The TC had its second meeting in London, April 7, 2000 and discussed the new draft (partial draft 0.2). The definition of effective intensity was mainly discussed. The current draft employs the definition of Schmidt-Clausen's Form- Factor method. A problem on the Form-factor method was raised and a proposal (to use convolution) was made by D. Couzin et al, claiming that the Form-factor method would give erroneous values when a narrow pulse is superimposed on a slow pulse. The TC did not agree to adopt the proposed method that has no publication and not enough supporting data. Such investigations would belong to D1. To address such a problem, the TCC suggested to incorporate low-pass filtering (with a time constant short enough not to alter the slow pulse). As there was no time to discuss other parts of the document, the TCC plans to hold a virtual meeting to follow up the discussion.

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: The report given by the TCC. This TC was established in Warsaw last year. The start of the work delayed due to major changes of the companies of the initial TC members who proposed the TC. However, at the last ad-hoc meeting on LEDs on April 6th, we are given clear directions of what to do. The proposals in IEC (TC34-A) on photometry of white LEDs include measurement of clusters and arrays, and the photometry part should be handled by CIE – this TC. There is standardization work in progress in Japan, and this TC will be in close contact with the Japanese group. The work is urgent and the TCC expects active participation and contributions by many members.

Vandermeersch commented that the specifications of LED lamp sources will be covered by IEC34-A (lamps) but the aspect of photometry will be transferred to CIE, which was agreed at the last October meeting in Kyoto. They will meet next week in Helsinki.

TC2-51 Calibration of diode-array 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 diode array spectrometers.

ST: This committee was formed in Warsaw. Technical report that sets up guidlelines and recommended procedures to calibrate such devices. There are in much more use in the past and parallel in performance to scanning instruments. Provide a guideline, maybe in appendix, for people to allow to make decisions on what sort of measurements or results they can expect. The initial meeting will be held in Rochester in May 8-10 in conjunction with CORM2000. CORM has a new committee CR6 on this subject which Austin is assisting. Hope to have a first draft before the Rochester meeting.

<Discussions>

Clarke asked about dealing with spectrophotometers. Austin answered that this TC will deal with spectral radiance and irradiance measurements for sources. There are many similar parameters as spectrophotometers but they apply slightly different in terms of input geometry and calibration methods. Goodman hopes that the document also includes spectrophotometers. Goodman has some document that may be useful for the document and will send it to Austin. Moore commented that he sees the two, spectrophotometry and spectroradiometry, have important differences and are not closely related.

7.2. Reporterships

R2-05 Visual Gloss (J. Taylor, UK) **AD:** Johnson

ST: No report from Taylor this time.

Rich mentioned that, last week at TC130 meeting, WG4 has been working on a draft of standards for measurement of visual gloss - a form of gloss to be used in graphic arts industry, in which they measure gloss and at the same time a component related to diffuse reflectance in order to correct the gloss scale for changes of average diffuse reflectance. The standard is about to come out as draft standard.

R2-06 Standardization of Measuring Geometry for the Colorimetry of Metallic Coatings (C. McCamy, USA) **AD:** Johnson

ST: A written report submitted from McCamy (See Attachment 2). It summarizes as follows. Both ASTM and DIN have continued to pursue standardization of a method of measuring the colors of metallic materials. The German work is nearing completion and the standard will probably be issued at about the time of the CIE meetings in UK this April. The American standard is near completion and the committee responsible for it is turning to the somewhat more complex task of standardizing measurement of the colors of materials containing interference pigments. There has been divergence of opinion on the choice of angles for measuring metallic materials. The largest aspecular angle in the proposed German standard is 75°, while that in the American proposal is 110°. The German proposal includes some mandatory tolerances. American standards do not usually contain tolerances except where matters of safety are involved. These differences in standards will present a substantial problem to the paint and plastic industries. No effort yet to standardize the measurement of materials containing interference pigments. McCamy recommends considering formation of a technical committee and suggests asking Dr. Allan B.J. Rodrigues of DuPont in the United States to chair the committee, who is a leader in the

metallic paint industry and is the chairman of the ASTM committee on this subject. (to be discussed in section of new TC)

Terstiege added that German standards committee recently met and finished the German standards as DIN standard, to be published in August-September this year.

R2-18 OIML Matters (G. Sauter, Germany) **AD:** Sauter

ST: Sauter reported. There are currently no activities that need actions by CIE but some issues may come up in illuminance measurement. The reporter suggests to keep this reportership open.

R2-19 Emergency Lighting Luminaires (Lou Bedocs, UK) **AD:** Vandermeersch

ST: The details on this issue was discussed at the ad-hoc meeting on April 7. The written report from Bedocs was read by Vandermeersch. An assessment of the photometry of emergency lighting luminaires was made. The findings indicate that the emergency lighting luminaires have to provide lighting conditions similar to normal luminaires but at much lower levels, and at a specified time after turning on for a set period. Therefore, emergency lighting luminaires can be treated as a special variant of standard luminaires. There are two types of luminaires, self-contained with power source built in, and those with remote power sources. The photometry of these two types of luminaires can be made by the testing procedures given in CIE 121 (Photometry and Goniophotometry of Luminaires). There is a need to provide additional correction factors on the relative output of the luminaires and circuit as specified times of operation. Also it is necessary to provide ballast lumen factor for the luminaire circuit. Recommendations: D2 should agree that no new separate publication be produced for photometry of emergency luminaires. D2 should publish an addendum to CIE 121 which should contain the definitions and meanings of the photometric factors together with examples how to apply them. D2 to terminate this reportership. (See later section for New Reporterships.)

R2-21 Use of detectors as absolute transfer standards for spectroradiometry (N. Fox, UK)
AD: Sauter

ST: Goodman reported. Much work is going on in the use of absolute transfer standard detectors for spectroradiometry, but is not yet at a stage to establish a TC. Fox suggests to keep the reportership open.

R2-22 Implementation of SI Photometric Units (R. Köhler, BIPM) **AD:** Sauter

ST: Sauter reported. Köhler sent a message stating that, due to the fact that there are no real activities to create new $V(\lambda)$ function in near future, he recommends to close down this reportership.

<Discussion>

Sauter mentioned that we just learned from D1 that $V_{10}(\lambda)$ will be defined. Schanda mentioned that this could be a liaison issue. Separate from this, he made a comment that, every year Division gets report of a few lines from many of the reporterships and no proposals. If a lot of things are happening, we should have more detailed reports. Moore mentioned that the principle function of the reporter is to make a recommendation whether or not we should have a new TC or not. Sagawa mentioned that Kohler is the official liaison person in D1 for D2. Goodman proposed to close this reportership because we have liaison

to CCPR through Kohler and this will do the job when the issue has come up. The Division agreed to close the reportership with no objection.

R2-23 ISO/CIE Standards for the measurement of reflectance and Transmittance (Danny Rich) **AD:** Johnson

ST: Rich reported. As this is the first report from this reportership since its inception at the Division 2 meeting in Warsaw last summer, the reporter do not have a great deal of new information to report. The reporter has found some technical errors in Publication CIE 130 that he has reported to the Division Secretary and requested independent verification. There is a round-robin being conducted in a CORM technical subcommittee on Optical Properties of Materials on diffuse reflectance using research grade instrumentation over the range 360 nm to 780 nm at 5nm intervals. The current plans are to have four industrial research labs participate and the results will be presented at the 2001 CORM meeting in Gaithersburg, MD just prior to the next Division 2 meeting.

R2-24 Classification of Color Measurement instrument (Ohno) **AD:** Johnson

ST: Ohno reported. This reportership was established in Warsaw by request from D8. There is the same reportership in D8 with Ohno as the reporter. D8 likes to have guidelines as to how accurate various color measuring instruments are, and in what cases what kind of instruments should be used. Problem is that the performance (the uncertainty) of the instruments is not clear from manufacturer's catalogs. E.g., in case of display measurements, they show uncertainty for only CIE illuminant A (which is similar to repeatability of the instrument) and users tend to believe this is the uncertainty for measurement of all colors of display. The errors can be one order of magnitude higher for display colors. They like to have a standardized way to characterize or evaluate the uncertainties of these instruments and thereby to grade the performance, as being done for illuminance meters in TC2-40 (class A, B, C, etc.). Ohno has an idea of using color rendering index (CIE 13.3) as presented at TC2-16 meeting on 7 April, and will investigate this further. Ohno suggests to keep this reportership open for another year.

<Discussion>

Answering question from Dave McDowell, Ohno mentioned that this would include spectrophotometers as well as spectroradiometers for displays. Rich asked 1) how one can separate the instrument performance for displays from the performance to reproduce surface colors (CIE13.3), 2) those sampling of Munsell space (CIE13.3) is designed for spectral distribution of lamps with low chroma. An instrument that can measure these 13.3 samples may fail to measure other high-chroma samples accurately. Ohno commented that these details should be studied but he hopes that the differences of measurement targets (between lamps and samples) may correlate well and hopes to come up with an index like f_l'. McDowell suggested to investigate different metamors, e.g., spectral reflectance curves with more abrupt changes. Ohno said that the reference samples can be replaced by other colors and these problems need to be investigated and asked for help.

R2-25 Liaison with IALA (Ian Tutt) **AD:** Vandermeersch

Report given by Tutt, who is a member of IALA (International Association of Lighthouse Authorities). IALA is revising "Standard for Photometry of Marine Aids-To-Navigation

Signal Lights (1977)" under a working group established last June. This is designed to complement 1977 document and to be seen as a standard. The draft will go to IALA Engineering Committee after Easter when they next meet. If they accept it, they look towards approval of this document by CIE as a CIE standard. The IALA committee will welcome any comments on the comments. Any one need to see copies, contact Secretary. The document recommends the use of Schimidt-Clausen's method to calculate effective intensity for flashing light. During this process, we compared various LED beacons using existing methods. There are several methods included in the document including "zero-length photometry" – a specific technique for measuring search lights.

There was a question about the term zero-length photometry. Moore suggested that terminology in this area be carefully determined and possibly to be included in the ILV.

Tutt added that there is a proposed study in Europe on visual perception and measurement of flashing lights. Trinity House is a partner of the study. The proposal is at European Commission for their approval.

7.3. Liaison report

CCPR (Köhler)

No report received this time. Sauter, as a CCPR working group member, gave the following information. The MRA (mutual recognition agreement) for equivalence of the units among national laboratories was signed in October 1999. To achieve the equivalence, so-called Key Comparisons are carried out, first at the CCPR level, then at RMO (Regional Metrology Organization) level. The Key Comparison for luminous intensity and luminous flux using transfer standard lamps have just been finished with the final draft approved. 16 countries participated at the CCPR level and 10 participated in the European RMO intercomparison for the luminous intensity and luminous flux units.

IEC TC34A on Lamps, TC34D on Luminaires (Vandermeersch)

Vandermeersch reported. As discussed at the ad-hoc meeting on white LEDs the day before, the proposals on white LEDs were made last year in TC34A. The work has not started at IEC. The decision will be taken next week in Helsinki, regarding the part to be submitted to CIE Div. 2. This question was also discussed in TC34D (luminaires). This new type of LED lamps are already used for signaling of emergency luminaires. Arrays of white LEDs, where we have a problem that we have no requirements for uniformity of luminances of this type of signs. Vandermeersch is a liaison in this committee for CIE, and liaison is working well.

IEC TC100/PT61966 -Colour Measurement and Management in Multimedia System (Y. Ohno)

Ohno reported. Written report received from H. Ikeda, reporting that the former PT61966 has been restructured as TA2 (Technical Area 2) and that they had the first TA2 meeting in Tokyo a few weeks ago. The meeting minutes are on the D2 website. Liaison is maintained at D2 level (Ohno) and also by TC2-42. TA2 appreciates first draft of TC2-42. Many documents are being developed in TA2 and some D2 members (Ohno, Schanda, Hanson, and Rich) reviewed these documents (not all and not completely) and sent comments. The sRGB standard (Part 2) has been published last October. Part 3 (CRT) and 4(LCD) both have just been published. Part 5 (Plasma display) and Part 6 (Image projection) are being developed.

Part 9 (Digital camera), which Ohno made some contribution last year, is in its final stage. They plan to develop some more documents.

<Discussion>

Schanda mentioned that this group is working extremely hard and very fast. Part 1 is the area CIE should be responsible. CIE should start working on it as soon as possible. Ohno will look into this for necessary action by D2.

JTAG2 – ISO/IEC Joint Technical Advisory Group 2 (Y. Ohno)

McDowell, the chair of JTAG2 was present to give a report. This is a joint ISO IEC committee to coordinate among all ISO, IEC, and CIE committees involved in imagery. Measurement is a big part of the coordinating activity. JTAG2 meets every 9 months. Currently CIE representative to that is Tim Kohler from CIE D8 (Alan Robertson formerly represented CIE). He will send reports to D2 Secretary. Now there are not much issues that directly affect D2. Mainly it is a forum for exchange of concerns and recommendations to CIE and IEC committee for action and ISO technical management board. One important thing that occurred recently is that JTAG2 made a recommendation that procedures be modified to enable true joint activities between CIE, IEC and ISO. Today if we want to have a joint standard with CIE/IEC/ISO logo, the only process is to develop a document in one organization and sent to others for yes/no vote. There is no mechanism in place for truly joint development. We welcome any concerns you have, sent to Tim Kohler or McDowell. If D2 or D1 sees enough concerns on imagery issues and they wish to have representative, it would be possible, too.

There are a number of related activities. ISO TC42 photographpy and ISO TC130 graphics arts are two image committees that interact most with CIE. IEC/TC100 multimedia, an IEC committteee that deals with characterization of display devices, as well as printers, cameras and detectors. TC42 photography is also looking at characterization of electronic capture devices. TC130 as well as industry consortium, ICC, who are developing color management techniques and characterization of output devices. McDowell is AD of D8 for liaison. True joint activity is important and we make sure that imaging community keep CIE informed.

ISO TC6/WG3 Paper, board & pulps (J. Zwinkels)

Zwinkels reported. Written report already submitted to Secretary (see Attachment 3). This committee will meet in Vancouver in September. Number of issues that is interest within this WG. One of these is the standard for measurement of gloss at 20°. Question is which refractive index, wavelength, and standard illuminant should be used in the definition, and the calibration of reference instruments – specialized spectrophotometers at d/0 geometry defined by ISO2469. Past year Zwinkels reviewed two ISO draft standards and sent to CIECB, One was determination of color in C/2 geometry. Another ISO draft standards called "Paper and board: Measurement of specular gloss - 75° gloss with a converging beam, TAPPI method". Gave extensive comments and raised concerns over their relaxation of the geometric tolerances. Pointed out that these tolerances were unacceptably large and contrary to the findings in published studies on the instrument variables. Another ISO 2469 Measurment of Diffuse Reflectance Factor is now under revision. ISO 2470 Measurement of diffuse blue reflectance factor (ISO brightness) is also under active revision. Received correspondence from Secretary about a concern raised by Ellen Carter that the ISO subcommittee was defining the UV content of Illuminant C for measurement of fluorescent

materials. A reply was sent to her to clarify that the committee is proposing to redefine ISO brightness and not to redefine Illuminant C. Zwinkels will follow up on this committee to make sure they will not violate the CIE's territory.

ISO TC 180/SC 1: Solar energy/Climate - Measurement and data (Dieter Kockott)

No report has been received this time.

Division 8 (Ohno)

D8 added a new TC8-06 (Image Technology Vocabulary) chaired by Schanda. TC8-02 has a very comprehensive draft and some interest by D2. D8 has a reportership (Grading of instruments) – the same one as R2-24 as reported above. D8 will meet in Derby after this D2 meeting. See Attachment 7 for the summary of the status of D8.

Moore commented that grading of instruments is very important and is something that D2 has been concerned for a long time.

8. Dissolution of TCs and other functions

Division 2 agreed as follows.

(1) R2-22 Implementation of SI Photometric Units, is to be closed as proposed by the reporter.

(2) R2-19 Emergency Lighting Luminaires, is to be closed since a new TC is to be established from the reportership (See next section).

9. Proposal for NEW TCs and Reporterships

New TCs

(1) Photometry of Emergency Lighting Luminaires (Vandermeersch)

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.

Vandermeersch proposed to establish this new TC, as proposed from R2-19 by Bedocs. Keep the same document number since this document (CIE121) is already referred in other European and international documents. The addendum will define proper correction factors for use in emergency luminaires, and also provide practical methods to measure such type of luminares because the total luminous flux of luminare is to be measured as a function of time, and an integrating sphere must be used rather than a goniophotometer.

<Discussion>

Answering a question by Moore, Vandermeersch added that the correction factor is due to the fact that normally all meausrements for luminaires are expressed in cd/1000 lumens using catalog lumen values of bare lamps, but in emergency luminaires, the flux of bare lamps are quite different because of built-in power supplies and operation time. Moore also asked if any correction is needed for mesopic region. Vandermeersch answered that photopic value is used over 30 years and this cannot be changed. Sauter suggested to give a better terminology for this correction factor. Vandermeersch volunteers to chair this TC with help of Bedocs

and other members. Schanda commented that we need to be very careful with CIE-IEC-CEN coorperation as he remembers that final votes for documents often came out with one or two negative votes from European countries because the document is not identical with the CEN draft; it is critical to work with CEN committee at early stage.

<Decision>

D2 agreed unanimously to establish this new TC.

(2) CIE/ISO standards on retroreflectance measurements (Rennilson)

A proposal made from Rennilson to publish a CIE standard on retroreflectance, by taking the important contents from the TC2-36 report (Revision of Pub. 54 to be published).

<Decision> Since the TR and chairperson have not been proposed, Division agreed to defer the decision. Rennilson will prepare proposed TR and chairperson and circulate first to TC2-36 members. The Division will then vote by email.

(3) Measurement of metallic coatings (McCamy)

A new TC was proposed in the McCamy's report for R2-06. Johnson explained that the proposal is to take the work by ASTM and DIN committee to issue a standard and turn this into an international document that would recommend the measurement angles, calibrations, and other aspects of measurement for metallic materials.

<Decision> Since a TR was not prepared, Division agreed to wait to see it before voting. Johnson will work with McCamy to prepare TR and to circulate it for division voting.

(4) Definition of star magnitude (Rastello)

Rastello relayed the proposal from Paolo Soardo. The tentative TR is to establish the relationship between astronomical magnitude and the SI unit, lux. The reason for this proposal is present tension on lighiting polution problem. Some documents have already been issued by Div.4. Liaison to be made with D4 and IAU (Internationa Astronomers Union). The objective is to write a technical report then later to publish a CIE standard.

<Discussion>

The proposal was not clearly understood (Moore et al). Schanda mentioned that other Divisions (4 and 5) deal with astronomical communities (stray light, dark sky, etc), and suggested to bring it up at next board meeting to ask their opinion, then if necessary, to establish a reportership to collect information to made judgement. Rennilson mentioned that we should get input from IDA(International Darksky Association), and try to get information.

<Decision> Director will bring up this issue at next Board meeting to get inputs from other Division directors and, if it is found necessary, will establish a reportership.

10. General Issues

(1) Handling of TC documents on the website

We had some discussions by email before this meeting. To summarize it, we have three possible options – 1) have the draft totally open, 2) restrict to people on the D2 mailing list with a global password, 3) restrict each document for TC members only with each password for each TC. We need to bear in mind that CIE drafts should not be available for CIE non-experts. Code of practice says the draft documents are only available for TC members. If we did other than option 3), we would be against the code of practice. Reason is that there are

often errors in early drafts, and wide dissemination of such could be a lot of confusion and damage the reputation of CIE. Also, publication is a valuable source of income of CIE. Draft toward at their final stages is quite temptation for some people to use it rather than buying the documents.

Ohno suggested another option to combine option 2 or 3 above, choose the ways depending on the TCs and the stage of the draft. The decision may be left to TC chairs. Ohno mentioned that he could set up the D2 website for any of these options. Sauter mentioned that, if we choose option 3, there is a possibility that some people become a member of TCs only to get draft documents. Goodman answered that it is left to discretion of TC chairperson to accept only those members who are contributing to the TC. Terstiege agreed to Sauter's comment. Schanda pointed out that the code of practice says it is a task of TC chairperson to drop inactive members. Moore suggested that TC chairs should be warned for this practice. Moore commented that he prefers option 3 and is against option 1. N. Johnson suggests to differentiate between the draft and the approved document by clear background on the document saying "DRAFT", then it would be no problem to have it open. Rennilson mentioned that National Comiittees can request anyone from the country to be on the committee whether or not he or she contribute to TC or not. Schanda answered that such person can be accepted first, but later should be dropped. Austin commented that, option 3 can still work for Johnson's concern because if some non-members ask for a draft copy, the TC chair can send it electronically to such persons under his discretion. Löfberg is hesitant to have drafts open to everyone. People still have access to the list of TC, TR, and other information on TCs, so if people are really interested in some draft document, they can contact TC chairs or someone and they can get the document. He suggests to use option 3 or combination of option 2 or 3. Goodman asked, if we have individual password for each TC, could it be possible to update the password to exclude inactive members? Ohno answered it is technically possible. Kathleen thinks option 3 is the best option, but regarding to excluding inactive members, she wonders what is the definition or the rules to decide who is actively participating TCs. Goodman answered that it is up to the TC chair. Schanda suggests to visit CIE website to see the Code of Procedures. Sauter suggested to charge a very small amount of price to visit the draft page on the website, then the problem of the income may be solved. Goodman answered that it is beyond what we can decide here.

Director Goodman took vote on the options from all the participants. The result was 7 for option 1, 10 for option 2, and 10 for option 3. Goodman suggests that we choose option 3 for the moment because of the Code of Practice, but will present this at the board for discussion and their advice on this issue.

11. Future meetings

2001

May 16-19 at NIST, Gaithersburg, Maryland, USA, in conjunction with CORM2001 (Council for Optical Radiation Measurements) on May 14-16 and with the NIST Centennial Celebration. D2 main meeting will be Saturday, May 19.

2002

As there have been no proposals from any countries, Director suggested to have another joint meeting with Division 1. Schanda suggested Slovenia, probably in Maribu (in conjunction with

...) or at Univ. of Veszprem in Hungary. Sagawa suggested another possibility to have it in conjunction with AIC Session in Slovenia. Any other proposals can still be considered.

2003

San Diego, California, USA, around last week of June to first week of July, as a part of CIE 25th Quadrennial Session.

12. Adjournment

The Division 2 meeting was adjourned at 5:30 pm.

Attachments

(1) Agenda of the 2000 Division 2 Meeting
(2) R2-06 report, March 17, 2000 (C. McCamy)
(3) ISO TC6 WG3 report (J. Zwinkels)
(4) TC2-39 Committee Activity Report and Minutes of the Meeting, April 7, 2000 (D. Rich)
(5) TC2-45 APRIL 6, 2000 Teddington Meeting; Summary of Results (K. Muray)
(6) TC2-49 Committee Activity Report, April 2, 2000 (Ohno)
(7) Summary of CIE Division 8 (Ohno)

Attachment 1

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

Division 2: Physical Measurement of Light and Radiation

2000 Division 2 Meeting
NPL, Teddington, UK
April 8, 2000
10:45 - 17:30

Agenda

1. Attendance list, apologies
2. Approval of agenda
3. Approval of the minutes of 1999 Division meeting
4. Director's report
5. Secretary's report
6. Editor's report
7. Progress reports from Technical Committees, reporters and liaison persons
   - 7.1. Associate Director Vandermeersch and TC chairpersons
   - 7.2. Associate Director Johnson and TC chairpersons
   - 7.3. Associate Director Sauter and TC chairpersons
   - 7.4. Reporters
   - 7.5. Liaisons with other organisations
8. Proposals for dissolution of TCs and reporterships
9. Proposals for new TCs and reporterships
10. General issues
    - 10.1. How future Division 2 meetings should be structured
    - 10.2. New form of CIE publications ('handbooks')
    - 10.3. Handling of TC draft documents on the website
    - 10.4. Symposium
    - 10.5. How to take CIE into the 21st Century
11. Future meetings
    - 11.1. 2001
    - 11.2. 2002
12. Adjournment

Attachment 2

C. S. McCamy
Consultant in Color Science

44 All Angels Hill Road
Wappingers Falls NY 12590
Phone and Fax 914 297-7986
c.mccamy@worldnet.att.net

March 17, 2000

Yoshi Ohno
National Institute of Standards & Technology
100 Bureau Drive, Mailstop 8442
Gaithersburg MD 20899-8442

Dear Yoshi:

Accompanying this letter is the report to CIE Division 2 from the Reporter R2-06 on Standardization of Measuring Geometry for the Colorimetry of Metallic Coatings. I regret that I will not be at the meeting in the United Kingdom to present it. I find that however fast I run or fly, I can be in, at most, two places at once.

At the end of the report, I recommended considering formation of a technical committee. If I may, I suggest that the Division consider asking Dr. Allan B.J. Rodrigues of DuPont in the United States to chair the committee. He is a leader in the metallic paint industry, he is the chairman of the ASTM committee on this subject, he has years of experience in standardization, he is a good organizer and leader, he gets things done, and his company has a substantial interest in this activity and is capable of supporting it.

In any case, I need to divest myself of some administrative and reportorial responsibilities so I can devote more time to pressing theoretical work, which is where I think I can make the most useful contributions. If the division decides not to form a technical committee, I suggest considering Dr. Rodrigues to become the reporter on this subject. If there is a need, I might be able to suggest some other possibilities.

Very best regards.

Very truly yours,

C. S. McCamy

Report to CIE Division 2
from
Reporter R2-06 on Standardization of Measuring Geometry for the Colorimetry of Metallic Coatings

C. S. McCamy
March 17, 2000

As reported on June 10, 1999, both the American Society for Testing and Materials (ASTM) and the German standards organization (DIN) have continued to pursue standardization of a method of measuring the colors of metallic materials. The German work is nearing completion and the standard will probably be issued at about the time of the CIE meetings in the United Kingdom this April. The American standard is near completion and the committee responsible for it is turning to the somewhat more complex task of standardizing measurement of the colors of materials containing interference pigments. There has been divergence of opinion on the choice of angles for measuring metallic materials. A clearly cooperative attitude abounds, but there are honest differences of opinion. The largest aspecular angle in the proposed German standard is 75°, while that in the American proposal is 110°. The German proposal includes some mandatory tolerances. American standards do not usually contain tolerances except where matters of safety are involved. Whether or not these international differences in standards will present a substantial problem to the paint and plastic industries is not known at this time. The international character of the automotive industry, where metallic finishes are very prevalent, suggests that possibility. No such technical polarization has developed as yet in the initial stages of the effort to standardize the measurement of materials containing interference pigments.

Some consideration should be given to the formation of a CIE technical committee on the measurement of metallic and interference colors. An international effort could foster uniformity of practice in this field. The chairmen of the corresponding standards committees in America and Germany could offer valuable guidance in deciding whether or not formation of a committee would be desirable.

(The letter and this report were posted at D2 website since March 20, 2000)

Attachment 3

ISO TC6/WG3 Report for CIE Division 2 Meeting in Teddington, UK, April 2000

Joanne Zwinkels

The most recent meeting of TC6/WG3 was in May 1999 in Helsinki, Finland. The next meeting will be in conjunction with the ISO/TC6 meeting in Whistler, B.C., Canada, September 25-30, 2000. The main issues that will be discussed are: (1) the calibration of reference instruments by authorized laboratories; and (2) the question of which refractive index, wavelength, and reference illuminant should be used in the definition of the gloss scale in ISO 8254-3 "Gloss at 20°".

The following ISO draft standards were reviewed and comments sent to CIE CB: ISO/FDIS 5631 "Paper, board and pulps – Determination of colour – (C/2°) Diffuse Reflectance Method" and ISO/FDIS 8254-1 "Paper and board: Measurement of specular gloss Part 1: 75 degree gloss with a converging beam, TAPPI method". In the former case, the comments were generally editorial and included changing an equation to be consistent with CIE Publication 15.2:1986 and adding ISO/CIE standard 10256 to the Bibliography. In the latter case, the comments were extensive and raised concerns over the general relaxation of the geometric tolerances. It was considered that these tolerances were unacceptably large and contrary to the findings in published studies on the instrument variables in measuring 75° specular gloss. This standard is now in final version and is to be submitted for parallel CEN and ISO balloting.

ISO Standard 2469 "Paper, board and pulp: Measurement of Diffuse Reflectance Factor" was last approved in 1994 and this standard is under active revision. ISO Standard 2470 "Paper, board and pulp: Measurement of diffuse blue reflectance factor (ISO brightness)" is also under active revision. There was some concern from a CIE member (Dr. Ellen Carter) that the ISO subcommittee was defining the UV content of Illuminant C for these ISO brightness measurements. A reply was sent to clarify that the committee is proposing to redefine ISO brightness and not to redefine Illuminant C.

Attachment 4

Committee Activity Report and Minutes of the Meeting

7 April, 2000
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), K. Witt (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 for the sixth time just prior to the CIE Division 2 meeting in Teddington, England at the National Physical Laboratory. Three committee members and twelve guests were present. An agenda was handed out and an additional item added concerning the work of ISO TC 42 / ISO TC 130 joint working group 21 who are revising the standards ISO 5 parts 1 to 4. The revised agenda was approved. The minutes and activity report from 1999 were reviewed and approved.

The Technical Committee Chair (TCC) reviewed the action items from the last meeting (see document 2-39/15). Many of the action items were not completed and so a second draft of the committee report has not yet been prepared. Measurement data was received from committee member G. Baba. The data have been put up on the Division 2 web site for access by CIE Division 2 and TC 2-39 members. The data show clear confirmation of the geometric definitions and tolerances recommended by the committee. As a result of the lack of activity from the committee members, the program of work is now 18 months behind schedule.

Mr D. McDowell, Chairman of ISO TC 130 reported on the work of Joint Working Group 21 formed between ISO TC 42 and ISO TC 130 to revise ISO 5, parts 1-4. Explained the philosophy of the JWG and the progress to date. D. Couzin asked about whether ISO 5 set

specifications on the azimuthal angles. D. Rich commented that it does indeed specify annular illumination but does allow discrete circumferential approximation to the full annular geometry. Mr. McDowell also raised the issue that ISO 5/4 defines a diffuse transmittance geometry that uses an opal glass diffuser instead of an integrating sphere and wondered if this geometry could be added to the TC 2-39 report. N. Johnson commented that we could try to add a definition of opal glass diffuse transmittance to the section of the report that covers diffuse transmittance. Committee members thought that it would be a good idea if we could get a good definition of the geometry. D. Couzin thought that it might be possible to treat the system as opal glass + specimen rather than making the opal glass part of the instrument. D. Rich commented that committee E. Early has recently published work done at NIST on this type of measurement – indicating that NIST had established and was providing realizations of a scale of opal glass diffuse transmittance. The TCC will follow up with Mr. Early about this measurement geometry. Mr. McDowell volunteered to send the committee copies of a paper that he wrote that describes the correspondence between opal glass transmission density and integrating sphere transmission density on two color film bases.

Incorporating the opal glass diffuse transmittance specifications will bring together the work of CIE Division 2 and ISO TC 42 and TC 130. J. Taylor of NPL commented that the committee should make every effort to bring these three groups together and harmonize the two geometric specifications even further that we have to date. Mr. McDowell indicated that current reports, drafts on working documents from the ISO JWG can be found on the web page at (ww.pima.org/tc42/programofwork/JWG21/). The TCC will submit documents to ISO JWG21 through Mr. McDowell in order to form a closer liaison with them on drafting standards on the geometry for color measurements.

Mr. Andrew Hanson of NPL commented, indicating that he has been testing integrating sphere uniformity and geometric tolerances as well. He supplied some print-outs of goniophotometric characterizations of several different materials standards. His results show very similar behavior to that of Mr. Baba and is in qualitative agreement with the experiences of committee member, N. Johnson. Mr. Hanson also commented that some instruments exhibits spatial displacements of the influx or efflux images in the specimen plane.

Committee member, J. Zwinkels reported on some additional changes that need to be made to the draft document. Some of these changes had already been suggested and noted at the Warsaw meeting last year. Others were truly new changes and were noted in Draft 1 and will be incorporated in the next draft. She also requested that the next draft put the definitions and specifications back into tabular form rather than in textural form.

The committee desires to hold the next meeting in conjunction with the Council on Optical Radiation Measurements meeting, to be held in Gaithersburg, Maryland in May of 2001. Mr. McDowell invited the TC members to attend the next meeting of JWG 21 which will be held in the fall of 2000 in Tokyo, Japan.

Attachment 5

APRIL 6, 2000 TEDDINGTON CIE-TC2-45 MEETING; SUMMARY OF RESULTS.

The rather short meeting centered around the two major problems: 1.) defining the new quantities for LED luminous/radiant flux evaluation in an integrating sphere and 2) finding a formula to estimate the detector-filter combination suitability for photometric measurements.

1.) Definition for LEDs partial flux: 4p/x: x could be any number >2; if the solid angle is too small, this definition would merge with the "averaged LED intensity" definition. To hold these definitions simple, it was proposed that the solid angle for any partial flux measurement should start from the tip of the lens, along the geometrical axis of the LED. When partial flux is measured in the integrating sphere the LED should be inserted at the side-window such, that the radiation entering the sphere within the solid angle starting from the tip of the lens along the geometrical axis of the LED should correspond to the 4p/x value.

   For total flux measurement, the LED can be totally inserted inside the sphere, or from a side-window, if the backside radiation is not considered.

   In the case when x=2, the hemispherical radiation measurement might be unanswered with the new definition; if it is important that none of the radiation coming from the backside of the chip should be included, but every part of the radiation going into the forward direction should be counted, the positioning of the LED cannot be defined easily for the many different types.

   A) The main question here is: how important is the small error caused by insertion to the tip of the LED instead of to the position of the chip for certain applications or can this be neglected.

2.) Solution to this problem has to include the white LEDs, where similar function as f_1' might be suitable; or using an other weighting function instead of CIE "A" source, or not use any, just express the integrated errors for different wavelength regions.

   These problems will have to be decided together with the members of TC2-46, since they have to introduce the same solution into their final report.

No new meeting has been scheduled . Please respond to let me know your opinion on these questions, so I could finalize our recommendations. (Third and hopefully last draft) If we need one more meeting, we can schedule one either late Fall this year or early next year. Please let me hear your opinion on this matter as well.

Final remark: Next mailings will be sent only to those members who indicate their interest and active participation in TC2-45, by responding promptly. Please Try!

Wishing you all a pleasant spring and summer (I hope we have more correspondence before Fall, so I have time to wish you a pleasant winter later)

Kathleen Muray

Attachment 6

TC2-49 Committee Activity Report

April 2, 2000 (Before London meeting)

Y. Ohno

1. Workshop on Photometry of Flashing Lights, Warsaw, June 25, 1999
   - Report published in CIE Pub. 133, Proc., 24th Session of CIE, Vol.2, 64-67 (1999)
   - http://nml.csir.co.za/~cie2/meetings/1999_Warsaw/Workshop_Proceeding4.htm

2. TC2-49 Meeting, June 29, 1999, Warsaw

   Attendees:
   Y.Ohno R. Distl, P. Kohn, J. Berkhout, M. L. Rastello, T. Larason, G. Sauter, P. Webb, G. Eppeldauer, A. Bouman, L. L. Larsen, P. Kärhä, T. Goodman, M. Budzinski, K. Muray, C. Jones, H. Kondo, F. Hengstberger, R. Stolyarevskaya, G. Xu, J. Scarangello, R. Kohler, U. Kucuk, R. Austin, (underline: then member)

   New members after the meeting:
   David King, R. Kohler, Jan Berkhout, H. J. Schidt-Clausen, J. Rennilson

   Distribution: CIE TC2-49 Report (Draft 0.1) – June 18, 1999
   Discussion:
   (1) Form Factor method should be included → TC agreed.
   (2) Multiple flash should be defined in this document → to be discussed further.
   (3) Background (DC component) over a flash should be addressed → not agreed.
   (4) Detector linearity issues to be covered in detail → agreed.
   (5) Spectroradiometric methods (for photometric purpose) to be included → agreed. (for diode-array/CCD spectroradiometers only).
   (6) Details of the requirements of photometer head should not be included → agreed. (refer to Pub. 69 and TC2-37 document)
   (7) Section of "derivation of quantities" be changed to "calibration of photometers" → agreed.
   (8) Timeframe of completing the document → 3 years
   (9) Scope is accepted with no changes.
   The chairman requested further comments by email.

3. Papers received from Schimidt-Clausen
   (10)"A Comparison of different methods for the determination of the effective luminous intensity of singal lights in the form of Multiple pulses," CIE-Journal, 1-1 (1982)
   (11)"Investigation of the spectral luminous efficiency and the signal process in the human eye," Proc., EPRI/LRO Fourth Symposium – Vision at Low Light Levels, Orlando Florida (1998)
   (12)"The influence of the angular size, adaptation luminance, pulse shape, and light colour on the Blondel-Rey constant a", *The Perception and Application of Flashing Lights*, Adam Hilger London, 95-110 (1971)
   (13)ECE Regulation No. 65 Uniform Provisions Concerning the Approval of Special Worning Lights for Motor Vehicles

4. Other documents received

(14)Japanese Committee Report: "Methods for Photometry of Flashing Light" (1988) – in Japanese. (from H. Kondo)

(15)IALA standard: "Recommendations on the determination of the luminous intensity of a marine aid-to-navigation light" (December 1977) (from Carl Andersen)

5. ASTM Standard Test Method for Measuring the Photometric Performance of Flashing Lights

The document is now being developed by ASTM committee D04.38.04 chaired by J. Rennilson, with several members from TC2-49. Close contact is kept to avoid inconsistency. There was a D04.38 meeting at NIST, Jan. 10, 2000. Fourth draft is now distributed.

6. TC2-49 Partial Draft 0.2 produced to be discussed in London

Attachment 7

Summary of
CIE Division 8 Image Technology
April 2, 2000

Established in October 1998.

Officers

Director of Division	Todd Newman (USA)
Associate Directors	Mike Pointer (UK)
	David McDowell(USA)
Secretary of Division	Michael Stokes (USA)
Editor of Division	Mike Pointer (UK)

Terms of Reference

To study procedures and prepare guides and standards for the 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.

Div. 8 Technical Committees

TC8-01: Colour Apearance Modeling for Colour Management Applications (G. Dispoto, USA)
Fall 1998 Report, Gary Dispoto - TC Chair

TC8-02: Colour Difference Evaluation in Images (M. Stokes, USA)
DRAFT Version 0.3 June, 1999 METHODS TO DERIVE COLOUR DIFFERENCES FOR IMAGES

TC8-03: Gamut Mapping(J. Morovic, UK)
Progress Report No. 2 1st Half 1999

TC8-04: Adaptation Under Mixed Illumination Conditions (N. Katoh, Japan)
TC8-04 Meeting (November 16 1999) Minute

TC8-05: Communication of Colour Information (L. MacDonald, UK)
Will meet in Derby and Scottsdale

TC8-06: Image Technology Vocabulary (J Schanda) - June 99
TR: To liaise with TC7-06 (International Lighting Vocabulary) and collate definitions of terms associated with image technology.

Div.8 Reporterships

Grading of instruments
will be pursued for establishment by director Newman and Y Ohno on the grading of instruments for imaging technology as requested in the D8 meeting in Baltimore.

R8-02 Reportership on Fluorescence
C McCamy (USA)
TR: To report annually on problems involving fluorescence in image technology, activities in the standards bodies and publications that bear on fluorescence problems, and to recommend the formation of a technical committee if such activity appears desirable.

R8-03 Reportership on potential CIE and IEC/TC100/PT61966 interactions
H Ikeda (Japan)

TR: To produce a report on how CIE Division 8 should interact with IEC TC100 PT61966.

CIE DIVISION 3 ACTIVITY REPORT

Submitted by I. Pasini, Canadian Delegate to Division 3
for the CNC/CIE Annual Meeting, DCIEM, Toronto, October 13, 2000

Division 3 met last in York, UK on the 8th of July 2000. I. Pasini could not attend and Dr. Jennifer Veitch attended on his behalf. The minutes of the meeting are attached.

The highlights of Division 3 meeting were:

1. The Director, Marc Fontoynont, reported on the loss of Professor H. Einhorn and the Division members recognized the innumerable and important contribution this exemplary member made to the CIE through a life-long and productive career.

2. New *Lighting Study Group* internet-based, run by Yanos Schanda, is operational since last spring.

3. Liaison with other Divisions requires appropriate coordination among them; Dr. J. Veitch was selected as the most appropriate person to liaise Division 3 with Division 6; Lou Bedoc is doing the same but with Division 5.

4. The VP (Technical) has agreed to investigate the relationship of Division 3 activities with energy issues in order to establish the most appropriate policy.

5. Several TC's are scheduled to be closed due to inactivities. Most appear to be headed by the same Chair, however only one is Canadian.

6. No reports had been submitted by most Reporters and with Dr. R. Topalova apparently having moved to New York, it leaves the only Canadian Reportership vacant.

7. One TC, headed by Dr. J. Veitch of NRC/IRC had submitted the Terms of Reference of TC-34 : Protocol for Describing Lighting. Two new TC's were proposed (see attachments)

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

Central Bureau: Kegelgasse 27 - A-1030 Wien - Austria

Division 3: Interior Environment and Lighting Design

Minutes of Meeting CIE Division 3
York, 8th & 9th July 2000
Secretary: Geoffrey Cook

Attendees

Odd Arnesen	ICG/NTNU, Norway	Norway Rep
Lou Bedocs	Thornlighting, UK	TC3-21 Chair, R3-10 Report.
David Carter	University of Liverpool, UK	TC3-31 Chair
Geoffrey Cook	University of Reading, UK	UK Rep, Div. 3 Sec.
Jan Ejhed	Konstfack. Sweden	Sweden Rep
Dilek Enarun	Elektrik-Elecktronik	Turkey Rep.
Marc Fontoynont	ENTPE, Lyon, France	Div.3 Director
Simon Hayman	CIE	Australia Rep
Warren Julian	University of Sydney	.CIE – VP(Technical)
Sueko Kanaya	Kanazawa Inst. of Tech	Ass. Dir. (Elec. Light)
Yasuko Koga	Kyushu Univ	TC 3-25 Sec.
Heinrich Kramer	Lichtdesign GmbH	TC3-20 Chair
Peter N Haug	Lyskultur	Observer
Terry McGowan	EPRI, USA	TC 3-34 Member
Naomi Miller		TC3-34 Member
Anna Perigrino	Torino University	Observer
Anthony Slater	BRE, UK	CEN Liaison
Axel Stockmar	LCI, Germany	Pres. German Nat. Comm
Peter Tregenza	University of Sheffield	Observer
Johan Van Kemende	Philips, Netherlands	TC 3-34 Member
Jennifer Veitch	NRC, Canada	TC3-34 Chair

1 Opening of Meeting
The Director of the division opened the meeting. This being the first meeting after the recent loss of Prof. H. Einhorn the Director led a series of tributes by members of the Division to his life and work. The Division then observed a minute of silence in remembrance of the loss of this highly respected member.

2 Approval of Agenda
The Agenda was approved.

3 Apologies for Absence
The Secretary tabled the list of apologies for absence:

Mr K. R. Ackerman
Craig A Bernecker
Dorin Beu
Christopher Cuttle
Jonathan David
Dominique Dumortier
Derrick Kendrick
Leif Liedquist
Eliyahu Ne'eman
Peter Ngai
Martin van Ooyen
Ivan Pasini
Yoshiaki Uetani

4 Approval of Warsaw Meeting Minutes
The minutes of the last meeting of the Division in Warsaw on 28th and 29th June 1999 were approved.

5 Division Membership changes
The Secretary informed the Division of the following changes to membership.

Belgium National Committee for Illumination is now:
Mrs Benedicte Collard
Product Line "Light and Customer Safety"
LABORELEC
Rue de Rhodes, 125
B-1630 Linkebeek.
BELGIUM
Tel: +32 02 3820367
Fax: +32 02 3820649
Email: benedicte.collard@laborelec.be

Prof. Craig A Bernecker
Executive Director
Albright-Penn State Partnership
c/o Albright College
13th & Bern Streets
PO Box 15234, Reading, PA 19612
USA
is now the US Member.

Gonzalo Esquerro
ODEL LUX, SA
C/ Cid Campeador s/n
28935 Mostoles (Madrid)
SPAIN
is the new Spanish member.

It was noted that the Director had been approached by representatives from the lighting community from Greece, who would like to take an active role in the CIE. It was noted that Greece cannot be Division 3 members since they are not members of CIE, but they may attend the meetings as observers. They could also take Part in the activities of TCs.

6 The Divisional Director & Associate Director's Report

6.1 Divisional Director.

The division director gave a report, which was mainly drawn from a recent meeting of Division Directors at CIE HQ in Vienna.

CIE Web Sites: the CIE has recently revamped its main web site. It is keen to have a web site for all divisions and it has expressed the wish that all division sites follow the same design. Since the Division 3 web site was created at a time (1997) when CIE had no guidelines, it does not have the same interface as the other division sites. However, in many ways, the division 3 web site is more advanced than any other division site. Therefore the site will stay as it is unless the CIE HQ take the initiative of changing it. (There was a proposal of Vice President Wout Van Bommel to take care of these changes). It was brought to the notice of the committee that the Division 3 web site has moved to a faster Internet access in June. Users will certainly notice the change.

The need for a common database of member information was also identified as essential for the future. A CIE group was set up in Vienna in June. It is working on this database. It was noted that many members do not have access to electronic information. There was a call for further information from CIE-HQ to be supplied to members on how to access all of the CIE web sites. This is particularly important where members were involved in cross division activities. It was suggested that the password system currently operated by CIE does not facilitate good communication.

Publications: Some discussion concerning allowing industry to pay for the production and distribution of publications, although with no overt recognition, took place. This would allow publications to be issued free. The idea of an industry body, e.g., The European Union, The International Energy Agency (IEA) or other industry representative body, rather than individual companies, was favoured. The involvement of these industry agencies may also enhance a case for research funding from Government. It was noted that selling publications is a major source of income for some countries. There is also a problem of copyright making some publications cheaper in different countries.

The need to preserve academic independence in CIE activities is essential. The effective control of TC performance, e.g., meeting output objectives, would improve the publication output of the division and enhance the image of the division with industry. A Division 3 fund for research and TC activity would be advantageous.

Liaisons with other Divisions: Is complicated by the different objectives of different Divisions, e.g., work in Division 3 and Division 6. But Division 3 is certainly willing to benefit from the objectives defined in Division 6. J. Veitch (NRCC, Canada) is the most appropriate person to conduct such liaison. This can be effective with good feedback through division members. It was noted that Division 5 requires a liaison member for TC5-19 Emergency Lighting, Lou Bedocs accepted this role.

An Energy Policy: Although energy issues are not a focus of Division 3 activity there is a need to identify a specific topic within this area and carry it forward. The impact of lighting provision, including daylight integration and power demand was discussed. The Division wished the CIE to have a voice in

the energy debate, but at the CIE Board level. Division 3 does not have the expertise on energy issues, although the results of Division 3 activity can be used to allow CIE to have a view on energy. Since different countries have their own energy needs the CIE view may not be relevant everywhere. The CIE requires a series of statements on strategic policy, of which Energy is an important topic. The VP (Technical) agreed to investigate this issue.

6.2 Associate Director (Electric Lighting)
Work was progressing as described by these minutes.

Associate Director (Daylighting)
Work was progressing as described by these minutes.

7 TC Chairman reports

TC3-01 Glare from small and large sources - Chairman H Einhorn
Due to the death of the TC Chairman, the work on glare from large sources has not been completed. The Associate Director (Electric Lighting) was to check that the TC had voted last autumn on an interim report intended to go into the collection. It was agreed that this report should be published in the CIE collection and then the TC would close.

TC3-11 Daylight calculation methods - Chairman M Navvab
No report was tabled. The Division agreed that the Secretary would write to the TC Chairman and that if no report was available by the 30th September the TC would close and all archive material be sent to CIE HQ. [The secretary sent out the letter on 25th July 2000]

TC3-15 Sky Luminance models - Chairman Y Uetani
A report was tabled. The Secretary to contact the Chairman for this to be issued to all TC members. [The secretary contacted the chairman on 25th July 2000]

TC3-19 Scale Model Photometry for Interior Lighting - Chairman M Navvab
No report was tabled. The Division agreed that the Secretary would write to the TC Chairman and that if no report was available by the 30th September the TC would close and all archive material be sent to CIE HQ. [The secretary sent out the letter on 25th July 2000]

TC3-20 Lighting and Architecture - Chairman H Kramer
A verbal report was given. The final version of the report of this TC is due to be produced next year. The scanning of over 200 colour slides for inclusion in this over 100-page report, is an expensive problem. However, production is proceeding and a review committee is to be appointed. It will be used as a teaching tool in architecture and lighting. The size and the colour aspect of the report mean that it would be difficult to publish by CIE. A half-day presentation is to be arranged for the next meeting of the Division with the text to be issued a month before the presentation. The President of the Hungarian CIE requests that Dr. Andras Majoros, BME H-1022 Budapest Muegyetem rkp.3 e-mail: majoros@egt.bme.hu) join the committee.

TC3-21 CIE/ISO Interior Lighting Standards - Chairman L Bedocs
The Chairman submitted a report. Comments on the draft standard document are required by CIE HQ by the end of July 2000.

TC3-22 Museum Lighting and Protection against Radiation Damage Chairman E Ne'eman

A report had been received by the Secretary and this was summarised. TC members present at the meeting added specific details. The TC has approved the contents of the final report. This should now proceed to the Division 3 and Board ballot. It was noted that there was considerable potential for the sales of this report.

TC3-25 Co-ordination Development of the IDMP and its data Chairman D Dumortier

A verbal report was given. The web server was now operating and the TC will be closing in the near future and the team will become a Study Group. The deliverable is the IDMP Web server, which is in full operation.

CLOSED TC3-26 Development of a Protocol for Post Occupancy Evaluation of Lighting - Chairman D Tiller

The TC was **closed** at the Warsaw meeting of the Division and the output of TC is to be archived at CIE HQ. The Canadian member to investigate what had been produced and report to the Division Director.

TC3-30 Hollow Light Guides - Chairmen L Whitehead

A report has been received. There was an extensive discussion concerning the content of the report and the critical views on the content of the report by one member of the TC. The Division Director has been involved in discussions with the members who have different views on the report content. There is a need to describe both hollow light guide systems in the report objectively: guides using highly reflective mirrors or total internal reflections. The Division Director to contact TC members to ensure that the report fairly reflects the state of development of the subject and that no minority report will be allowed by the division. The division director will contact the TC Chairman and Prof Julian Aizenberg to arrange a fair and professional conclusion to the work of this TC.

TC3-31 Lighting for Real Spaces - Chairman D Carter

Final report under detailed review. Final document to be TC balloted and go to Division by end of 2000.

TC3-32 Validation of Algorithms for Daylight Outdoors Chairman N Navvab

No report was tabled. The Division agreed that the Secretary would write to the TC Chairman and that if no report was available by the 30th September the TC would close and all archive material be sent to CIE HQ. [The secretary sent out the letter on 25th July 2000].

TC3-33 Test Cases for the Assessment of Accuracy of Lighting Computer Programmes - Chairman R Mitanchey

The Division director gave a verbal report of the TC activity. A review of BRE work on artificial lighting software validation was given and a paper is being presented at the Lighting 2000 Conference following this meeting. The BRE output will be a CIBSE technical memorandum. A validation report on daylighting software has been produced by IEA (using results from BRE-UK and ENTPE-France and members of the TC) and this could be published by CIE. Prior to this the TC should be balloted on the contents. Sample reports of IEA will be circulated.. The Divisional and Board balloting would then follow.

TC3-34 Protocols for describing lighting – Chairman Jennifer Veitch
A report was received. The work is proceeding, a TC meeting took place prior to the Division 3 meeting. A draft report is to be produced during 2001.

TC3-35 General evaluation of discomfort glare Chairman - Kai Sorensen
The TC chairman has resigned which has raised issues concerning the work of the TC. It was agreed that the large sources aspect of the work of TC 3-01, and the work of R3-19 should be included in this TC. In addition there was also a need to include overhead glare and the determination of UGR at a point. The Deputy Director (Artificial Lighting) to contact a prospective TC chairman.

8 Division Reporters' Reports

R3-02 Stage and studio lighting - K R Ackerman
A report was received reporting the continuing activity of this reportership. Details of Showlight 2001 were issued to the Division.

R3-06 Accidents and lighting - R Topalova
No report

R3-10 Maintenance of indoor lighting - L Bedocs
Verbal report was given that the work of the reportership continues.

R3-13 Lighting vocabulary - C Belcher
No report

R3-15 Lighting standards - S Simos
No report

R3-16 Lighting in developing countries - R Henderson
No report

R3-17 Calculation of utilisation factors - R Topalova
No report

R3-18 Thermal Environment, outdoor climate and visual preferences – C Laurentin
The Division Director gave a brief presentation of the work of this reportership. The influence of temperature on light perception and the link between colour temperature outside and turning on lights was identified. Some discussion then occurred. The Division will be asked to comment on a PDF version of the final report by the end of October. The reporter was thanked for her work.

R3-19 Glare from windows - M. Velds
The Division Director gave a brief presentation of the work of this reportership. Literature review and a review of other methods of assessing glare were progressing. The Division will be asked to comment on a PDF version of the final report by the end of October. The reporter was thanked for her work.

R3 20 The use of satellite images – Y. Koga
Yasuko Koga gave a brief presentation of the work of the reportership. The report is to be completed by August 2000. This will then proceed through Division balloting. The reporter was thanked for her work.

9 Liaison Officers Reports

The Division Director has recently been appointed to an EU Commission concerned with research in lighting.

9.1 CEC JOULE Projects: Daylight Europe and Satellite Data
Liaison Officer - Mark Fontoynont

Nothing to report

9.2 CEN/TC169 Lighting Applications
Liaison Officer - Anthony Slater

The work into the lighting of indoor workplaces is progressing. This is due to be voted on by CEN later this year. Further work on the data for luminaires is also progressing. Work is also progressing in CEN 1838 Emergency lighting and CEN 12-193 Sports lighting. This is the subject of a paper at the Lighting 2000 Conference following the Division meeting.

9.3 International Association of Lighting Designers
Liaison Officer - Jules G Horton

No report.

9.4 International Energy Agency
Liaison Officer - Nancy Ruck

No report.

9.5 ISO/159/SC4/WG3:Ergonomics/Signs and Contr./Workpl. and Environ.
Liaison Officer - Lou Bedoc.

Discussions concerning symbols and shapes are progressing.

ISO/TC159/SC5/WG2 Ergonomics Physics Environment Lighting
Liaison Officer - Lou Bedocs

Work is progressing.

9.6 ISO/TC160/SC2/WG2 Glass in Buildings - Light and Energy Transmission - Hans Allan Löfberg

No report.

9.7 ISO/TC59/SC159/SC3: Building Construction User Requirements
Liaison Officer - Peter Tregenza

No report.

9.8 WMO - Liaison Officer Peter Valko

No report.

10 Review of Division 3 Publications.

The Division Editor was asked to consider the need to withdraw or revise existing publications from the Division. CIE 29-2 was of particular concern.

11 Future work

11.1 New Technical Committees.

The following new TCs were proposed:

TC 3-36 The use of satellite images to derive daylight data.

Duration: 4 years (2000-2004)
Chairman: D. Dumortier

Members: R. Perez (USA),
P. Ineichen (Switzerland),
Y. Uetani (Japan),
Y. Koga (Japan),
To be completed.

Terms of Reference:
Assessment of the techniques used to derive the global, the direct and the diffuse horizontal illuminances from the images provided by the current generation of satellites. Work towards defining a standard procedure, which could be used to provide these quantities for any part of the world.

The first output will be a review of the different techniques to derive the components of daylight used around the world. The amount of extra information (i.e. not part of the satellite image) needed by each of this techniques will be highlighted and the accuracy claimed by each technique will be weighted against the results expected by final users (i.e. accuracy of daily means vs accuracy of monthly means).

The second output will be the definition of a CIE standard procedure to derive daylight data from satellite images.

The third output will consist in CIE recommendations to space agencies on the satellite ideally suited for the production of daylight data.

The TC will liaise with the CIE Division 3 Study Group on daylight measurements (past TC 3.25), the CIE division 2 on the physical measurement of light and radiation, the European projects working with satellite images (i.e. SODA-Solar Radiation Database), other projects in the world currently involved in the use of satellite images.

The TC proposal was voted and agreed by the Division.

TC 3-37 Guide for the application of the CIE General sky.

Duration: 4 years (2000-2004)
Chairman: Y.Uetani (Japan)

Members: S. Darula (Slovakia),
D. Dumortier (France),
M. Fontoynont (France),
R. Kittler (Slovakia),
K. Matsuura (Japan),
Y. Miki (Japan),
R. Mitanchey (France),
M. Navvab (USA),
R. Perez (USA),
P. Tregenza (UK).

Terms of reference:
The objective of the TC is to prepare a guide for users who apply the CIE General Sky to the practical daylighting calculation.

The CIE General Sky is the draft standard being prepared by the TC 3-15. The relative luminance distribution of the whole sky is defined by a series of equations. The wide range of sky conditions from the CIE overcast sky to the CIE clear sky are classified in fifteen categories by the sets of standard parameters.
The guide will provide the following:

(1) Recommended procedure to derive absolute values: The CIE General Sky is intended to be linked with the absolute values of zenith luminance and horizontal illuminance. The raw data measured in different climates should be processed following to a unique procedure.

(2) Recommended procedure for the classification and frequency analysis: Some researchers reported that frequency occurrence of standard sky categories varies in different climates. The guide will provide recommended procedure to determine categories from measured data in different locations. The statistical procedure and condition are also recommended.

(3) Recommended interface for applications of daylighting calculation: For the easy use of end users, recommended interface are recommended to the application developers. It may include example of sky images of fifteen categories, sample source code to generate absolute values of sky luminance distribution as a function of categories, solar altitude, etc.

The item (1) and (2) depend on IDMP data in the world by the CIE Division 3 Study Group on daylight measurements (past TC 3.25). TC 3.36 is also expected to provide information on horizontal illuminance and zenith luminance formulae. The item (3) will be studied in closer connections with TC3-11, TC3-19, TC3-32, and TC3-33.

The TC proposal was voted and agreed by the Division

11.2 Proposals for new reporterships
There were no new proposals

12 Next meeting.

The next meeting will be Saturday 16th June and Sunday 17th June prior to the Lux Europa Conference in Iceland.

Technical Committees

TC 3-34: Protocols for Describing Lighting

Chairman	Secretary	Start	End?	Product
J. Veitch (Canada)		1999	2001	Guide

Members

P. Boyce (United States)	K. Cuttle (New Zealand)	J. Ejhed (Sweden)
J. Kemenade (Netherlands)	H. Kramer (Germany)	A. Liljefors (Sweden)
T. McGowan (United States)	N. Miller (United States)	Y. Nakamura (Japan)
N. Oi (Japan)	A. Pellegrino (Italy)	R. Topalova (Canada)

Terms of reference

To develop a set of photometric descriptors of lit scenes for use by researchers and designers, and prepare action plans for promulgation.

Progress

Last update August 17, 2000. This TC was created at the Warsaw meeting. It will meet for the first time in York, probably on Saturday morning.

Several CIE events have established a framework for lighting quality and a list of important characteristics of lit scenes. These include workshops at the 23rd and 24th CIE sessions (New Delhi, India, 1995; Warsaw, Poland, 1999), the First CIE Symposium on Lighting Quality (Ottawa, Canada, 1998), and the invited address by N. Miller and T. McGowan at the 24th Session. This TC will build on this foundation to achieve the following goals:

1. To establish a catalogue of application-independent descriptors of lighting.
2. To provide relevant, specific, objective definitions of supporting concepts (e.g., 'field of view').
3. To develop a measurement protocol for each of the descriptors, with the goal of achieving protocols for use equally bu researchers, in recommendations, and in design.
4. To prepare a strategy and action plan for widespread promulgation and application of these protocols and definitions by researchers, journal editorial boards, lighting educators, CIE technical committees and standards, and in other lighting organisations.

The purpose of this endeavour is to establish a common ground for describing lighting so that further discussions of lighting quality issues are based on the same vocabulary and measurement system, rather than upon arbitrarily-chosen, idiosyncratic values that are unrepeatable. The protocols will not preclude the development of new, additional descriptors of

lighting, but will establish a minimum requirement for specifying and describing lit scenes.

A TC meeting took place prior to the Division 3 meeting in York. Work is progressing and a draft report will be produced in 2001.

(Back to Activity Summary)

TC 3-35: General Evaluation of Discomfort Glare

Chairman	Secretary	Start	End?	Product
Wanted !		1999	2003	Guide

Members		
L. Halonen (Finland)	S. Kanaya (Japan)	R. Topalova (Canada)

Terms of reference

To study existing methods of evaluating discomfort glare and recent research in order to establish a method of general applicability, from small to large light sources, with recommandations for applications.

Progress

Last update August 17, 2000. This TC was created at the Warsaw meeting. It should develop and extend the work of earlier TCs involved in the UGR method. Unfortunately, its first chairman: K. Sorensen had to resign because of a lack of manpower. **Anyone interested contact S.Kanaya.**

In York, it was agreed that the large sources aspect of the work of TC 3-01, and the work of R3-19 should be included in this TC. There have been several features not covered by the existing UGR approach, e.g. road lighting, which is being examined by Division 4. However, the particular interest of Division 3 in this TC, is to examine daylighting and artificial lighting glare evaluation in a combined and unified way. It was further identified that there should be a need to include overhead glare in any UGR revision. There was also a need for assessing user tolerance and a system of validating any design criteria so that it would be possible to assess and measure effects rather than rely on mathematical descriptions. In particular there was a need for the UGR to be modified so that it could determine glare at a particular point.

(Back to Activity Summary)

TC 3-36: Use of Satellite Images to Derive Daylight Data

Chairman	Secretary	Start	End?	Product
D. Dumortier (France)		2000	2004	Standard

Members

P. Ineichen (Switzerland)	Y. Koga (Japan)	Y. Uetani (Japan)
R. Perez (USA)	others welcome !	

Terms of reference

To assess the techniques used to derive the global, the direct and the diffuse horizontal illuminances from the images provided by the current generation of satellites, to work towards defining a standard procedure, which could be used to provide these quantities for any part of the world.

Progress

Last update August 17, 2000. This TC was created at the York meeting.

Its first output will be a review of the different techniques to derive the components of daylight used around the world. The amount of extra information (i.e. not part of the satellite image) needed by each of this techniques will be highlighted and the accuracy claimed by each technique will be weighted against the results expected by final users (i.e. accuracy of daily means vs accuracy of monthly means).

Its second output will be the definition of a CIE standard procedure to derive daylight data from satellite images.

Its third output will consist in CIE recommendations to space agencies on the satellite ideally suited for the production of daylight data.

The TC will liaise with the CIE Division 3 Study Group on daylight measurements (past TC 3.25), the CIE division 2 on the physical measurement of light and radiation, the European projects working with satellite images (i.e. SODA-Solar Radiation Database), other projects in the world currently involved in the use of satellite images.

(Back to Activity Summary)

TC 3-37: Guide for the application of the CIE General sky

Chairman	Secretary	Start	End?	Product
Y. Uetani (Japan)		2000	2004	Guide

Members

S. Darula (Slovakia)	D. Dumortier (France)	M. Fontoynont (France)
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R. Mitanchey (France)	M. Navvab (USA)	R. Perez (USA)
P. Tregenza (UK)		

Terms of reference

To prepare a guide for users who apply the CIE General Sky to the practical daylighting calculation.

Progress

Last update August 17, 2000. This TC was created at the York meeting.

The CIE General Sky is the draft standard being prepared by the TC 3-15. The relative luminance distribution of the whole sky is defined by a series of equations. The wide range of sky conditions from the CIE overcast sky to the CIE clear sky are classified in fifteen categories by the sets of standard parameters.

The guide will provide the following:

(1) Recommended procedure to derive absolute values: the CIE General Sky is intended to be linked with the absolute values of zenith luminance and horizontal illuminance. The raw data measured in different climates should be processed following a unique procedure.

(2) Recommended procedure for the classification and frequency analysis: some researchers reported that the frequency of occurrence of standard sky categories varies in different climates. The guide will provide recommended procedure to determine categories from measured data in different locations. The statistical procedure and conditions will also be recommended.

(3) Recommended interface for applications of daylighting calculation: for the easy use by end users, recommended interface are recommended to the application developers. It may include example of sky images of fifteen categories, sample source code to generate absolute values of sky luminance distribution as a function of categories, solar altitude, etc.

The item (1) and (2) depend on IDMP data in the world by the CIE Division 3 Study Group on daylight measurements (past TC 3.25). TC 3.36 is also expected to provide information on horizontal illuminance and zenith luminance formulae. The item (3) will be studied in closer connections with TC3-11, TC3-19, TC3-32, and TC3-33.

(Back to Activity Summary)

Ivan Pasini

From: Veitch, Jennifer [Jennifer.Veitch@nrc.ca]
Sent: Tuesday, October 10, 2000 11:14 AM
To: 'Pasini, Ivan'
Subject: TC3-34 report for CNC meeting

Hi Ivan,
Here is a short report on the activities of TC 3-34, Protocols for Describing Lighting, which I chair.

The committee was created at the Warsaw session in 1999, and has held two meetings since then, as well as extensive electronic mail dissussions. The most recent meeting was at the CIBSE/ILE Lighting 2000 conference in York in July, 2000. Progress is being made on a catalogue of descriptors of lighting, and detailed protocols for measuring each descriptor will be the task of the winter months. It will be a challenge to have a complete report ready in time for the Division 3 meetings in Reykjavik (at Lux Europa in June 2001), but we are working to that deadline. If any CNC members want more details about this TC, they should feel free to ask.

Jennifer Veitch

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Ivan Pasini

From: Val Keane [v.a.keane@reading.ac.uk]
Sent: Tuesday, September 19, 2000 5:48 AM
To: CIE Headquarters Vienna Christine Herman; dominique.dumortier; eb09; ejhed.arch; p.tregenza@sheffield.ac.uk; richard.mitanchey; slaterai@bre.co.uk; dkendric; Geoff; nanr; gertec; dikanar; love; bruce.mcarthur; pasinii; dale.tiller; rados; jennifer.veitch; whitehead; pse; ks; liisa.halonen; ilkka.pekanheim; marc.fontoynont; dietrich.gall; lichtdesgn; prc; reise; mike; general; parenta; arren01; ifraia; igawa.norio; suekok; yskktar; nakamura; oki; taka28; uetani; jadi; toru; l.zonneveldt; t.bittar; k.cuttle; h.willey; asantos; ooo_vnisi; farom; usarsdar; usarkit; boris.sovic; robert.henderson; weine.joseffson; leif.liedquist; hansallan.lofberg; tpersson; pierre.ineichen; simos; fengjnh; alpin; jdavid; littlefairp; T.Muneer; cbelcher; irvine; TKMcGowan; hting; moji; perez; dale; simon; zgx-sa@mail.tsinghua.edu.cn
Subject: Report CIE Div 3


Review-laurentin.doc

Dear CIE Division 3 members,

Catherine Laurentin, Reporter of R3-18, has asked me to circulate the attached report to you so that you may comment on the contents. Please communicate these comments directly back to Catherine. The address is shown below and the e-mail address is:

catherine.laurentin@entpe.fr

Your contribution to content this report is greatly appreciated.

Regards,
Geoff Cook

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Influence of thermal and/or light conditions on visual expectations: A review of previous experiments

R 3-18

Catherine Laurentin, Marc Fontoynont

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Influence of thermal and/or light conditions on visual expectations: A review of previous experiments

R 3-18

Catherine Laurentin, Marc Fontoynont
Lyon, July 2000

Abstract

This paper proposes a literature review of experiments, investigating the effects of air temperature on visual perception or preferences and conversely, the effects of light caracteristics on thermal perception. A distinction has been made between two effects: the thermal conditions on color perception (and conversely, the effects of color on thermal perception) and the thermal conditions on illuminance level preferences (and conversely). From this review, we can first conclude that, although many studies have been conducted on the effects of color on perceived air temperature, less studies examined the effects of air temperature on visual comfort or visual preferences. It seems also that it was a preoccupation during the past 15 years, then disappeared to appear again the 2 years ago. From these experiments, the interactions are not conclusive and the authors did not agree, but in general we can say that no interaction between visual and thermal conditions on perceptions has been detected, and the parameter the most important in global comfort seems to be the thermal conditions, just followed by the lighting. Concerning the color, it seems that temperature could influence color preferences, but this phenomena could not be "turned around": color (of walls or of electric light) have no effect on perceived thermal comfort. Anyway, the results from all these experiments could suggest to review the actual recommendations, according to the location in Europe or to the season.

Introduction

More than generate several sensations, vision is the sense that contributes the most to information taking. Therefore, it seems necessary to satisfy the vision needs by a luminous environment which follows performance criterion, comfort and visual pleasantness.
Nowadays, visual comfort is defined by some criterions (illuminance levels recommended, glare indices, ratios of luminances,...), but these criterions come from empirical studies where ambiance parameters from other types of comfort (thermal, acoustic or olfactory) were not kept constant or not controlled. We can suppose that the effect of odour on visual perception is non-existent (according to our knowledge, no study treating on this effect has occured). Nevertheless, an effect of noise on visual fatigue has already been demonstrated[1] and an influence of visual informations on auditive impressions has been found recently[2]. Besides, according to informations from lighting practionners, users expectations in terms of illuminance might depend on temperature conditions or on season. In summer for example, lighting professionals have observed that office occupants who endured high temperatures could deliberately work at daylight levels inferior to recommendations (i.e. blinds closed) without turning on electric lights (contrarily to what most control systems would automatically do), as if dimness was symbolically associated with coolness[3]. Furthermore, Arvev[1] has demonstrated that, in South of France, office ocupants preferred colored windows than "clear" windows and that, in less sunny climates, ocupants rejected colored windows. These different reactions bring up (or raise) some questions: are the visual preferences or expectations for office occupants depend on thermal conditions, on daylight caracteristics (color, quantity, luminances, ...) or on season ? If these effects exist, if color influences thermal perception, this could improve energy savings, by for example illuminating a room with blue light in summer that allows to decrease the amount of refrigeration, or illuminating a room with red light (or wall colors) in summer that allows to decrease heating requirements. These results could also have an impact on the design of lighting control systems and on lighting recommendations, with for example, illuminance levels recommended different from North and South of Europe or from winter and summer.

1. Effect of colors on thermal perception

Such interaction between thermal and visual expectations is plausible. It occurs for example in the case of color perception. Many studies have shown that colors have no effect on persons' thermal sensation. One of the first experiment with bearing on this question was conducted by Houghten *et al.*[4] (1940). They studied the effects of wall colors on thermal sensation votes, in an environmental chamber where subjects were successively exposed to red, white and blue environment. They found no influence of color, either on physiological measurements or on thermal sensation votes. Berry[5] (1961) conducted an experiment on 25 subjects, exposed to 5 different colors of illumination: blue, green, white and amber and with an ambient temperature slowly increasing. The subject was told to indicate by a switch when he was beginning to feel uncomfortably warm. The results showed no change in the upper limit of comfort as a function of the color. Bennet and Rey[6] (1972) manipulated wall temperatures in an experimental chamber while subjects wore red, blue, or clear goggles, and found no differences in thermal comfort associated with color. Fanger *et al.*[7] (1977), using similar techniques as Berry, found such small differences in thermal tolerance that they concluded the results were of little practical significance. Greene and Bell[8] (1980) conducted

an experiment on 72 men and 72 women, exposed to one of the possible combinations of 3 wall colors: red, blue, or white, and 4 room temperatures: 18, 22, 29, and 35°C. They concluded that color influenced personal comfort and perceived environmental quality but did not influence perceived temperature. Finaly, only 2 studies have been found, one by Rohles *et al.*[9] (1981), which concluded on an effect of color on thermal preferences. When the environment was illuminated with cool-white or daylight fluorescent lamps, more of the subjects stated they preferred a warmer temperature than when it was illuminated with warm-white lamps. Conversely, when the space was illuminated with warm-white lamps, there was a tendency to prefer a cooler temperature. And the second one, by Candas and Pellegrin[10] (2000), who experimented the interaction between air temperature (21 and 27°C) and correlated color temperature of artificial light (2700 and 5000K). They found a significant effect of correlated color temperature on thermal comfort: the thermal pleasantness was greater with fluorescent lamps at 5000 K than at 2700 K.

2. Effect of thermal conditions on color perception

Although it has been shown in a majority of the studies that colors have no effect on thermal sensation, the colors have been perceived differently depending on air temperature. Generally speaking, higher (respectively lower) wavelengths tend to be preferred at lower (respectively higher) temperatures, due to the substantiated hue-heat mental associations between red-orange-yellow and warm, and blue-green and cool[11]. Kearney[12] (1966) conducted an experimental study on subjects exposed to 3 temperature levels and 3 color levels. He found that subjects' color preferences were positively correlated with wavelength under cool temperatures and negatively correlated under warm temperatures. In other words, when subjects are cool, they prefer warm correlated color temperature and when they are warm, they prefer cool correlated color temperature. Nakamura[13] (1999) conducted an experiment on 8 subjects in two rooms: A and B. the air temperatures of which were different from each other, to evaluate the variation of color temperature preference in A (23°C) immediately after entering A from B (10°C or 35°C). He found that immediately after moving from B (low air temperature: 10°C) to A (medium air temperature: 23°C), the subject preferred a low color temperature in room A to a high color temperature. And immediately after moving from B (high air temperature: 35°C) to A (23°C), the subjects preferred a high color temperature to a low color temperature. These results are in contradiction with the supposed association between yellow and warm and blue and cool. And finally, we are conducting an experiment to evaluate the effects of daylight color and air temperature on visual comfort appraisal. Thirty subjects are exposed to a fixed illuminance level of 250 lux, 2 temperatures (22 and 26°C) and 2 colored filters (blue and yellow), fixed on a real window. This study is not finished yet but we expect to bring new insight on the relationship between air temperature and the color temperature of daylight.

3. Effects of thermal and/or lighting conditions on visual preferences

In the case of light level perception, the effect of thermal conditions is less known and available data are not conclusive. Nelson[14] (1984) measured the mood of 144 subjects who wrote stories in ambient temperatures of 13, 23 or 30°C under illuminations of 100 or 300 lux (with 6500 K fluorescent tubes). He found that mood was significantly poorer in the cool-

bright (13°C x 300 lux) and warm-dim (30°C x 100 lux) environments, which is contradictory with the above-mentioned practitioners' observations, and somewhat unexpected since in some conditions a very low illuminance like 100 lux was perceived more positively than 300 lux. On the other hand, Rohles[15] (1983) examined the effects of lighting on thermal comfort. He measured thermal subjective responses of 144 subjects, exposed to 20°C, 25.6°C and 31.7°C, in an environment lighted with high-pressure sodium lamps, daylight fluorescent, soft white fluorescent and "ambient" fluorescent lighting (lamps that are mounted behind a valence). He did not detect effects of lighting on thermal comfort responses. More recently, Yamazaki[16] (1998) examined the effects of air temperature, light and sound on perceived work environment. He recorded the sensation of 16 subjects working in ambient temperatures of 19°C to 29°C, desktop illuminance of 75 lux to 1500 lux (and equivalent sound pressure levels of 40 dBA to 60 dBA). One of the main results he obtained is that, when the illuminance is low, the sensitivity of reaction to temperature is low, and when increasing illuminance, the sensitivity to the temperature increases. Finaly, he concluded that it exists optimal environmental conditions (24°C and 1100 lux, 45 dB and 400 lux).
Candas and Pellegrin[10] conducted also an experiment in 4 experimental rooms, on 48 subjects, exposed to 2 air temperatures (21 and 27°C) and 2 types of lighting: direct lighting (ceiling-mounted) and indirect lighting (wall-washers), maintaining a constant illuminance level on the workplane (500 lux). They found an effect of air temperature on visual perception but only for men. For men, visual pleasantness was greater in cool condition, that was not the case for women. In warm condition, this effect disappeared.

The effect of temperature on the visual perception seems to depend on light source type. This effect is probably non-existant on visual performance, i.e. on the rapidity and accuracy of how a visual task is achieved[17]: a direct effect of temperature on this aspect of visual perception has never been suggested; as for light source type, it has been proved that its spectral quality has no influence on visual performance[18]. This is the reason why such an effect (if any) acts upon visual preferences. The effect of temperature on visual perception could not be the same depending the source of light: daylight, electric light or combined. That is why we have looked to the combined effect of temperature and light source type on visual preferences and pleasantness. So, in our study[19], the hypothesis we wanted to test was: "the thermal conditions and the type of light source have an effect on visual comfort appraisal". We have tested 21 subjects, in an experimental room equiped with windows, at a temperature of 20.5°C and one week after at 27°C. For each temperature, the subjects had to read a text on a paper while their desk was illuminated by successively daylight only, artificial light only and mixed light (50% daylight, 50% artificial light). During all the test the illuminance level on the workstation was maintained at 300 lux whatever the light source type.

First, we found a tendancy of the effect of temperature on lighting environment sensation: under electric light only (300 lux maintained on the workstation), the environment was considered darker at 27°C than at 20.5°C. But this only result is not enough significant to conclude on a real effect of thermal conditions. We had expected a significant effect of temperature on visual preferences and pleasantness but these results did not appear. So, the results do not support the hypothesis that air temperature influences visual comfort. This suggests that the visual use differences observed between the north and south of Europe or between winter and summer are probably due to another parameter (e.g., culture or season).

Our results support the hypothesis that light source types have an effect on visual comfort appraisal, not only for the perception or preferences of visual environment but also for the perception and preferences of illuminance level on the desk. Based on our results, individuals

may prefer an illuminance level higher under daylight or mixed light than under electric light. These results can have an important impact on lighting control design. For example, in offices with little amounts of daylight (e.g., in the back of the room), the illuminance level maintained at the workstation can be lower than the levels normally recommended. From these results, we can also suppose that the subjects would prefer an illuminance level higher under daylight or mixed light than electric light because of the equilibrium of luminance or because of the directionality of light (very horizontal daylight that creates shadows). A large amount of daylight came from the left of the subject, whereas the back of the office (on the right) was dark (because of the configuration of the room). Through the answers of the questionnaire, the subjects would probably be disturbed by this contrast.

During our study, daylight correlated color temperature couldn't be controlled and was only measured. Thus, we are not able to definitively conclude that there is an effect of color temperature on visual and thermal comfort. However, the correlation between correlated color temperature and illuminance preference we found is in agreement with that observed by Kruithof[20]. This suggests that for a high color temperature, the ambience is satisfactory at a high illuminance level. The correlations found between lighting environment perception and correlated color temperature are conflicting with the results of Kruithof. Anyway the chart of Kruithof was established for color temperature of fluorescent lamps and for an illuminance level on the workstation, not for the color temperature of daylight and the lighting environment as the present study. We can suppose that to have more significant correlations, it would be probably necessary to have more wide range values of correlated color temperature. This question will be addressed in future work.

We observed differences between men and women regarding the thermal and more often the visual comfort appraisal. This difference facing the air temperature perception has not been demonstrated by thermal specialists. Generally speaking, the thermal comfort is exactly the same for men and women. The explanation of our results can be the clothing value differences between each test (not totaly controlled). Nevertheless, according to visual studies, interactions have been found between gender, visual and/or thermal comfort[13-14-21-22]. Nelson determined that women responded more favourably to bright illumination and their judgements suggested greater field dependence, and determined also that there was a significant effect of gender on thermal perception: men rated both cool and warm temperatures as being less extreme than women. Rohles found results showing that thermal comfort was greater among the women than among the men for a temperature of 25.6°C. Russel *et al.* examined the response variability of a group of 31 subjects and they found that men prefer higher light levels than women. The evidence of a sex difference with regard to illumination has not occured in other studies[23].
From our results, we can say that, in general, women responses were more exaggerated (illuminance too low, temperature too cool,...).

4. Discussion

In conclusion, we can say that many studies (the first one was conducted by Morgensen and English[24] in 1926) have been conducted to determine an interaction between color and thermal comfort. From this review of experiments, it seems that temperature could influence color preferences, but this phenomena could not be "turned around": color (of walls or of electric ligth) have no effect on perceived thermal comfort. The interest on an influence of

color on thermal comfort was to improve energy savings, Unfortunately, heating energy savings could probably not been made by treating wall colors or changing correlated color temperature of lamps. However, if temperature has an effect on color perception, we can suppose that temperature could have an impact on the perceived visual environment, because according to Kruithof, perception of colors are directly related to illuminance level preferences.

Concerning the effects of thermal conditions on visual comfort, the experiments are not conclusive and are fewer than studies on interaction between color and air temperature. We can nevertheless conclude that in almost all experiments, the environment parameter the most important to provide global comfort is the temperature, followed by the light and the sound. This indicates that when a subject is thermally uncomfortable, the lighting will not be judged positevely, but the opposite is not necessarily true.

A resume of the results obtained in the different experiments is presented in the following tables:

A. Effect of air temperature and/or color on visual or thermal preferences

References	Temperature influences color perception ?	Color influences thermal perception ?	Results
(4)	—	No	
(5)	—	No	
(6)	—	No	
(7)	—	No	
(8)	—	No	
(9)	—	Yes	Subjects preferred a warmer temperature with cool-white fluorescent lamps than with warm-white
(10)	No	Yes	Thermal pleasantness was greater with fluorescent lamps at 5000K than 2700K
(11)	Yes	Yes	Hue-heat mental association between yellow and warm and blue and cool
(12)	Yes	—	When subjects are cool, they prefer warm color temperature and conversely
(13)	Yes	—	Immediately after moving from 10°C to 23°C, the subjects preferred a low color temperature, and conversely after moving from 35°C to 23°C

B. Effect of air temperature and/or light levels on visual or thermal preferences

References	Temperature influences light perception ?	Light levels influences thermal perception ?	Results
(14)	Yes	Yes	Mood was poorer in the cool-bright (13°C x 300 lux) and warm-dim (30°C x 100 lux) environments
(15)	—	No	
(16)	—	Yes	When illuminance is low, the sensitivity of reaction to temperature is low and 24°C and 1100 lux is an optimal environmental conditions
(10)	Yes	No	For men, visual comfort was greater in cool condition
(19)	No	—	

We can observe that the majority of studies have been made in experimental chambers, in condition of artificial light only. Even if daylight is difficult to control in experiments, we consider that if an effect of air temperature, of color or of season on visual comfort exists, the results would be more significants if the subjects are in direct relation with the outside view. That is why we are trying to conduct experiments in test cells with real windows, to be closer to reality.

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Ivan Pasini

From: Veitch, Jennifer [Jennifer.Veitch@nrc.ca]
Sent: Tuesday, October 03, 2000 3:22 PM
To: 'Ivan Pasini'
Subject: RE: Report CIE Div 3 (thermal comfort and colour)

Review-laurentin jav comments....

Hi Ivan,
I have read the Laurentin report and have inserted comments in Word (in the attachment). Just in case you can't read them in Wordperfect, here they are in flat text:

At section 1: The question here is, 'Does colour influence thermal sensation?' Seems to me that there is an important distinction to be drawn between coloured walls reflecting a single light source (one wants to know what that source is) and experiments using various light sources (in which case you want to know the characteristics of the sources and of the surfaces from which they reflect). In short, unless you can characterise the actual light stimulus to which people were responding then no clear conclusions are possible. The review in this section should say more than it does about thermal sensation and models to predict it; also there should be some discussion of the literature on colour effects on other perceptual and behavioural outcomes, particularly with respect to the theories that have been suggested for such effects (although they have not been supported).

At Section 2: Here, the question is 'Do thermal conditions change colour perception?' yet the authors talk mostly about preferences - not the same thing. Also, the inclusion of material from their uncompleted, unpublished experiment is inappropriate as it cannot support or refute the hypothesis at this stage.

At Section 3: This section is also confusing. Visual preference is an undefined concept that the authors seem to define in many ways even within a single paragraph. Mood as an outcome is not a matter of visual perference per se, so it's not clear that the Nelson et al study relates to the topic of this section (unless its purpose is re-stated in some other way). The Rohles and Yamakazi studies seem more appropriately discussed in the first section, concerning lighting effects on thermal comfort. The discussion of visual performance in relation to spectral power distribution is irrelevant to the issue at hand (and the study cited is not a good proof of the question, either), and once again the discussion of the incomplete, unpublished results is inappropriate for a CIE document. (They should go through the usual peer review process first before being cited in this type of review.)

At Discussion: In sum, this review is poorly organised, and does not clearly address the questions originally set out. The reference list is suspciously short, and the use of weak articles to support certain points throws into doubt the overall quality of the scholarship (I suspect there is more literature available than cited here). The authors should clearly define, in operational terms, the sensory, perceptual, and behavioural outcomes that they want to examine in this review, and should reorganise the report accordingly. They should review the literature in a more critical manner, examining the quality of the cited work rather than accepting all results as given. They should also refrain from citing any unpublished work, as not yet being strong enough to support an official CIE publication.

I also agree with you that there are language issues that would need to be

addressed also, but these are in my opinion secondary to the more fundamental problems.

Please pass these comments along with yours when you reply to the DD on this.
Best regards,
Jennifer

-----Original Message-----
From: Ivan Pasini [mailto:Ivan.Pasini@PWGSC.GC.CA]
Sent: Wednesday, September 20, 2000 1:53 PM
To: 'guy.newsham@nrc.ca'; 'jennifer.veitch@nrc.ca'
Subject: FW: Report CIE Div 3

Hi,
I read the attached report and, aside from the many obvious grammatical/spelling and form improvements, I think this work will require some verification from other parties whoa are working & grappling with some of these issues before we can accept the material as 'the best CIE has to offer at this time'. Please provide your comments to me before the next CNC/CIE meeting in Toronto (October 12/2000). Thanks.
Jennifer, no answers yet from our field on the Spectrum filter; I am looking at Place du Portage as an alternate site as well...

Ivan

> -----Original Message-----
> From: Val Keane [SMTP:v.a.keane@reading.ac.uk]
> Sent: Tuesday, September 19, 2000 5:48 AM
> To: CIE Headquarters Vienna Christine Herman; dominique.dumortier; eb09;
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> pse; ks; liisa.halonen; ilkka.pekanheim; marc.fontoynont; dietrich.gall;
> lichtdesgn; prc; reise; mike; general; parenta; arren01; ifraia;
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Glare from windows

complete draft

R 3 –19 Glare from windows

Dr. Martine Velds
Berlin, May 2000

This literature review is primarily based on a review carried out at Delft University of Technology, documented in the thesis 'Assessment of lighting quality in office rooms with daylighting systems' (Velds 2000).

Contents

1. Introduction

Discomfort glare is a sensation of annoyance or pain caused by high or non-uniform brightnesses within the field of view (IESNA 1993). Discomfort glare does not necessarily interfere with the visual performance or visibility. This in contrast to disability glare, where a reduction of contrast of an image is a result of scattered light in the eye, which will lead to a decrease of visual performance (IESNA 1984, CIE 1987).

Research with discomfort glare has resulted in several discomfort glare formulae, through which the degree of perceived discomfort glare is expressed in a glare index. Nonetheless, the majority of existing glare formulae are developed for the evaluation of discomfort glare from small artificial light sources, such as the Visual Comfort Probability system (VCP) (Guth 1963, IES 1966, Fry 1976, IESNA 1993), the Building Research Station Glare Index (BGI) (Hopkinson 1957, IES 1962) and the Unified Glare Rating (UGR) (CIE 1995).

Previous research has shown that these glare formulae cannot be used for the assessment of discomfort glare from windows, for two reasons:

Firstly, the source size mostly subtends a solid angle on the eye that exceeds 0.01 steradian in daylit situations. In that case it is to be expected that the glare source occupies a large part of the visual field raising the adaptation level of the eye, and with that reducing the glare sensation and contrast effect (Hopkinson and Bradley 1960). Discomfort glare from a window is even said to be practically independent of size and distance from the observer, but critically dependent on the sky luminance. The adaptation level of the observer is in this case dependent on the source luminance (Chauvel et al. 1982, Velds 2000). On the other hand, when perceiving discomfort glare from small artificial light sources, the observer's adaptation level is virtually independent of the source luminance and the glare formulae for these sources are only valid over that range of conditions where the adaptation level is governed primarily by the surrounding luminances (Hopkinson and Bradley 1960).

Secondly, research has shown that, for mild degrees of discomfort glare, the luminance of the sky seen through a window can be greater than the luminance of a, in size comparable, artificial light source, to perceive the same degree of discomfort glare. In other words, there seems to be a greater tolerance for mild degrees of discomfort glare from windows (Hopkinson 1970, Chauvel et al. 1982).

The existing evaluations methods for discomfort glare from windows are described in this report and divided into two categories. One category includes formulae, discussed in paragraph 2. The other category contains the methods that employ subjects to evaluate lighting conditions, discussed in paragraph 3. Additional research that might support future research is described in paragraph 4.

2. Formulae to determine discomfort glare from windows

Three formulae are reviewed in this paragraph. The perceived discomfort glare from windows is reflected in the Daylight Glare Index, the Predicted Glare Sensation Vote and the J Index respectively.

2.1. Daylight Glare Index

One glare formula, the Cornell formula, has been developed to determine discomfort glare from large artificial light sources (Hopkinson and Bradley 1960, IES 1965). It is a modified version of the Building Research Station Glare Index, where the modification has been based on results of experiments with large artificial light sources. A bank of closely packed fluorescent lamps, whose light was diffused by an opal plastic screen, was used in the laboratory set-up. Trained subjects were asked to adjust the luminance of the large source until a certain degree of discomfort glare was reached:

- just perceptible glare,
- just acceptable glare,
- just uncomfortable glare, and
- just intolerable glare (Hopkinson 1958).

The degree of perceived discomfort glare is reflected in a glare index (GI):

$$\text{Glare Index} = 10 \cdot \log_{10} 0{,}478 \cdot \left(\frac{L_s^{1,6} \cdot \Omega^{0,8}}{L_b + \left(0{,}07\omega^{0,5} \cdot L_s\right)} \right) \qquad \text{Eq. 1}$$

where:

L_s luminance of the glare source [cd/m²]

L_b average luminance of the background without the luminance of the glare source [cd/m²]

ω solid angular subtense of the source [sr]

Ω solid angular subtense of the source, modified for its position in the field of view by means of position index P [sr] (Guth 1963):

$$\Omega = \int_{\omega_s} \frac{d\omega_s}{P^2} \qquad \text{Eq. 2}$$

A Glare Index represents a degree of discomfort glare, as shown in table 2.1.

Table 2.1 Comparison of different glare indices for the evaluation of glare

Degree of perceived glare	GI
just (im)perceptible[1]	10
just acceptable	16
Borderline between Comfort and Discomfort	18.5
just uncomfortable	22
just intolerable	28

The applicability of the Cornell formula (equation 1) for windows has been tested in field studies (Hopkinson 1970, Hopkinson 1971, Hopkinson 1972). These validation studies were conducted in classrooms and hospital wards, in two stages.

Firstly, groups of observers studied a wide range of daylit situations and made judgements of the discomfort glare both in terms of the degree of discomfort glare and the acceptability of this degree of discomfort glare for the specific purpose of the room. The observations were made with the sky luminance prevailing at the time and under conditions in which the visible sky luminance did not vary over the window area, that means uniform sky conditions. Testing the validity in field studies has led to gaps in the data, since some values of the Glare Index were never experienced or were only experienced on rare occasions. Subjective assessments were compared with calculated degrees of discomfort glare, according to the Daylight Glare Index, a slightly modified version of the Cornell formula equation 1:

$$\text{Daylight Glare Index} = 10 \cdot \log_{10} 0{,}478 \cdot \left(\frac{L_{sky}^{1,6} \cdot \Omega^{0,8}}{L_b + \left(0{,}07\omega^{0,5} \cdot L_{wp}\right)} \right) \qquad \text{Eq. 3}$$

where:

Lsky luminance of sky as seen through the window [cd/m²]

Lb background luminance, the average luminance of interior surfaces [cd/m²]

Lwp luminances visible within the window plane [cd/m²]

ω solid angular subtense of the source [sr]

Ω solid angular subtense of the source, modified for its position in the field of view by means of position index P [sr]

The second stage of the experiment was to validate proposed limiting Glare Index values. With the Cornell formula situation specific glare indices were determined, corresponding with a degree of discomfort glare. A Glare Index of 22, for example, corresponds with just

[1] Within the Daylight Glare Index the criterion 'just imperceptible' (Hopkinson 1957, Hopkinson 1970) is being used, as well as 'just perceptable' (Hopkinson 1972); the Predicted Glare Sensation Vote, as described in paragraph 2.2, uses 'just perceptible', based on a study of Matsuda et al. (cited in Iwata et al. 1992a)

uncomfortable discomfort glare (see table 2.1). Observers had to judge whether they agreed or not with the recommended glare indices for a certain purpose, e.g. hospital and school. This means, that they had to evaluate whether a situation was just uncomfortable, when it represented a calculated glare index of 22. The results of this study showed a greater tolerance for glare from daylight in comparison with artificial light, for mild degrees of discomfort glare. Therefore, the scale of Glare Indices was adjusted. A numerical relationship was drawn up between glare indices for corresponding degrees of discomfort glare from daylight and artificial lighting (see also table 2.2).

$$DGI = \frac{2}{3} \cdot (GI + 14) \qquad \text{Eq. 4}$$

Table 2.2 Comparison of glare indices for the evaluation of glare

Degree of perceived glare	GI	DGI
just (im)perceptible	10	16
	13	18
just acceptable	16	20
Borderline between Comfort and Discomfort	18.5	22
just uncomfortable	22	24
	25	26
just intolerable	28	28

Reliability method

A number of studies conducted by other researchers showed that the use of the DGI could lead to unreliable results:

- Experiments conducted by Iwata and her colleagues (Iwata et al. 1991) showed that the perceived glare under real sky conditions was smaller than predicted by the DGI. Two aspects could have influenced these differences:
  1. a difference in experimental procedure. The DGI was obtained from results of experiments where subjects had longer adaptation time, which could lead to ***lower*** calculated degrees of discomfort glare by corresponding sky luminances
  2. cultural differences. The evaluations under real sky conditions were obtained in experiments with Japanese subjects. The DGI experiments were conducted with European and American subjects. Research has shown that Japanese subjects are more tolerable to glare than American and European subjects (Ichikawa and Chonan 1964 and Manabe 1975, cited in Iwata et al. 1992a, Pulpitlova and Detkova 1993).
- Boubekri and Boyer (Boubekri and Boyer 1992) found similar differences in subjective assessments under real sky conditions and those predicted by the DGI. Nonetheless, most of

the subjects in this experiment did not have a window in their own workplace and the view of the tested situation was appealing and pleasant. Both aspects could have influenced the glare assessments significantly.

- Inoue and Itoh (Inoue and Itoh 1989, cited in Iwata and Tokura 1998) showed that the DGI is not reliable in the following cases:

  1. the DGI is not independent of the background luminance, when the solid angle of the source increases up till 2π sr, and the source fills approximately the whole field of view of the observer, although it should be independent,
  2. the DGI is not independent of source size, when the background luminance equals the source luminance. It should be independent, since no distinction can be made between the glare source and the background luminance.

- Waters and his colleagues (Waters et al. 1995) showed that non-uniform surfaces can cause more glare than uniform light sources when positioned perpendicular to the line of sight and less glare when located 10 to 20° from the line of sight. The Daylight Glare Index is based on experiments with uniform light sources (Hopkinson 1970) and should therefore not be applied when discomfort glare is caused by non-uniform light sources.

Acquirement of input parameters

The input parameters for the DGI can be obtained through simulations or measurements. Aizlewood (Aizlewood 1998) proposes a set-up with two vertical mounted illuminance sensors to obtain these parameters. A pyramid of black card shields one of these sensors in such a way that is sees the window only (see figure 1). A comparable measuring method is proposed by Nazzal, using three sensors, to measure all relevant luminance values required to calculate the DGI as given in equation 3 (Nazzal 1998).

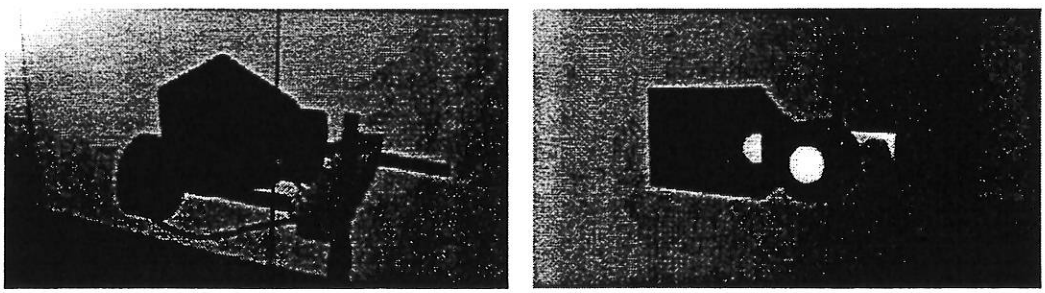

Figure 1 Set-up to be used to calculate the DGI (by courtesy of M. Aizlewood)

The 'Leuchtdichte-Analysator', a calibrated CCD camera (Wolf and Gall 1998), has been used to measure luminance values and calculate the Daylight Glare Index directly. The software used with the Leuchtdichte-Analysator includes the calculation of the modified solid angle Ω. Glare sources of at least 0.01 sr are identified through analysis of the luminance histograms obtained with the software. Therefore, the Leuchtdichte-Analysator is a useful tool to study glare from windows. It cannot be used in situations with some daylighting systems, where a number of

small areas can cause discomfort glare and the glare source is a non-uniform light source, the software is not able to detect these glare sources separately (Nevoigt 1998). The Daylight Glare Index is not valid in these situations as well.

2.2. Predicted Glare Sensation Vote

The Predicted Glare Sensation Vote (PGSV) is a formula based on experiments with simulated windows (Iwata et al. 1992a, Tokura et al 1993, Tokura et al 1996). Over 200 subjects participated in these experiments under 120 different test conditions. The perceived degree of discomfort glare was reflected in the Glare Sensation Vote (GSV), marked by subjects on a multiple criterion scale:

0 = just perceptible, 2 = just uncomfortable,
1 = just acceptable, 3 = just intolerable.

The corresponding DGI values are given in table 2.3.

Table 2.3 Comparison of different glare indices for the evaluation of glare

Degree of perceived glare	GSV	DGI
just (im)perceptible	0	16
		18
just acceptable	1	20
Borderline between Comfort and Discomfort	1.5	22
just uncomfortable	2	24
		26
just intolerable	3	28

The indices can be converted into the other using the following equation:
GSV = (DGI – 16) / 4 (Tokura et al. 1996)

Glare Sensation Votes obtained in the experiments with the simulated windows and calculated Daylight Glare Indices showed good correlation in the central vision. Iwata and her colleagues assumed that the DGI predicts the subjective evaluations under real sky conditions well. This means that the GSV's acquired in the experiments with the simulated window also reflect the subjective evaluations under real sky conditions. Therefore, they were used to draw up a new prediction method, the Predicted Glare Sensation Vote:

$$PGSV = 3{,}2 \cdot \log_{10} L_{wp} - 0{,}64 \cdot \log_{10} \omega + (0{,}79 \cdot \log_{10} \omega - 0{,}61) \cdot \log_{10} L_b - 8{,}2 \qquad \text{Eq. 5}$$

where:

$$L_b = \left(\frac{E_v / \pi - L_{wp} \cdot \Phi_w}{1 - \Phi_w} \right) \qquad \text{Eq. 6}$$

where:

Ev	vertical illuminance at the eye [lux]
Lwp	luminances visible within the window plane [cd/m²]
ω	solid angular subtense of the source [sr]
Φw	a configuration factor of the window

Reliability method

Whereas the PGSV was based on glare assessments under artificial lighting conditions, it needed to be validated in respect to its applicability under real sky conditions. For this purpose, a comparison was made between GSV's obtained in an experiment under real sky conditions and the PGSV's — the calculated degrees of discomfort glare (Iwata et al. 1992b). 46 subjects participated in this experiment. The study showed that the PGSV gives more plausible degrees of glare than the DGI does, but generally these values are still too high.

To use the PGSV the following needs to be taken into consideration:

- The PGSV does not include a position index and therefore only aims at the evaluation of glare from windows located in the line of vision. In contrast with the Daylight Glare Index, this formula takes into consideration the transition of the adaptation luminance level of the eyes and the total amount of light coming into the eyes.
- The Predicted Glare Sensation Vote is also based on experiments with uniform light sources (Tokura 1996) and might therefore not be applicable in situations with daylighting systems that realise a non-uniform luminance distribution within the window plane.
- The PGSV has a comparable application problem as the DGI. The PGSV is not independent of source size, when the background luminance equals the source luminance although it should be independent. In contradiction to the DGI, Iwata and Tokura expect that it can be applied to sources larger than 1 sr (Iwata and Tokura 1998).

Acquirement of input parameters

The input parameters for the PGSV can be obtained through simulations or measurements, comparable to those for the DGI.

2.3. J index

The discomfort J index (Meyer et al. 1993a, Meyer et al. 1993b, Meyer et al. 1996) is a tool for establishing optimal visual comfort conditions at VDT work stations. The authors state that 'visual strain, most likely to be associated with subjective signs of visual discomfort, is linked with a loss of performance due to non-optimal lighting conditions'. These non-optimal lighting conditions are a result of insufficient or too much light and / or possibly non-adapted contrasts. The J index predicts the effect of these three aspects with regard to comfort as well as performance.

The J index expresses the difference between the maximal possible visual acuity, Amax, (physiological capacity of one particular individual, taking into account their dioptric deficiencies and their sensitivity towards glare) and the visual acuity which this person can reach, A, in a given illumination condition.

$$J = \frac{(A_{max} - A)}{A_{max}} \qquad \text{Eq. 7}$$

where:

Amax maximal possible visual acuity for an individual

A computed individual visual acuity in a given situation

Acuity A is determined by the three main physical parameters characterising the visual field: the contrast between the target (e.g. text) and background (paper or screen), C_1, the contrast between this background and its surroundings, C_2, and the pupilar illuminance, Ep:

$$A = A_{max} \cdot r_1(C_1) \cdot r_2(C_2) \cdot r_3(E_p) \qquad \text{Eq. 8}$$

r_1, r_2 and r_3 represent the relative influence on the acuity of C_1, C_2 and Ep.

The J index also reflects the percentage of disturbed persons for a standard population of office employees. The J index combines the effect of three aspects with regard to comfort and performance: insufficient light, too much light and non-adapted contrasts. Therefore, the cause of problems — low J indices — will be difficult to detect. The development of the J index is still ongoing.

Acquirement of input parameters

The input parameters are obtained from:

- photometric measurements, where fully automated scans can be used to determine the J indices for every view direction in the room and pictures of a CCD camera with a fish eye lens present the necessary information for one view direction;
- computer simulations. The software Radiance (Ward 1994) includes a method to calculate J indices directly from a simulated scene.

3. Evaluation methods for discomfort glare based on subjective assessments

Three methods based on the use of subjective assessments to determine discomfort glare from windows, are reviewed in this paragraph: the Stationary Virtual Reality, the Visual Comfort Evaluation Method and the User Acceptance Studies.

3.1. Stationary Virtual Reality

The Stationary Virtual Reality (SVR) (Sick 1994, Sick 1995, Wienold et al. 1998) is based on the use of computer simulations, in order to offer equivalent test conditions to a number of subjects. The experimental set-up of the SVR consists of slide projectors and stereo images on slides of a, with Radiance simulated, situation. The stereo projection offers the opportunity to create realistic impressions, observed by the subject through magnifying glasses (see figure 2).

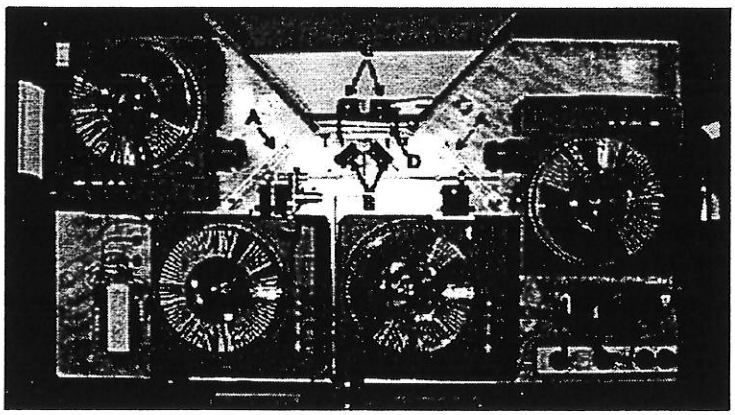

Figure 2 *Set-up of the Stationary Virtual Reality, including moveable (A) and fixed (B) mirrors, oculars (C) and a projection plane (D), picture by courtesy of J. Wienold*

This experimental set-up is chosen, while slides offer the highest possible dynamic range of all image mediums known, a maximum reachable contrast of 1:1000 and a luminance range of 10 – 9000 cd/m² can be reached. This high contrast is needed to study glaring situations, whereas the human eye can distinguish a maximum luminous intensity ratio of 10000. Comparison of assessments made in the virtual reality (SVR) and those made in identical real offices showed that there is a good correspondence with respect to perceived glare and brightness (Wienold and Schossig 1999). Full validation of the method is not yet complete.

3.2. Visual Comfort Evaluation Method

Cowdroy studied the scale effect in the use of models for discomfort glare assessment. Subjective assessments made in 1 : 4 to 1 : 6 scale models were compared with assessments obtained in a full-scale room. Both types of assessments were made under daylighting conditions. The experiments showed that there is no significant scalar effect in the use of large scale models for glare assessments (Cowdroy 1972). Hopkinson and Collins used similar experimental set-ups in the studies of glare from luminous ceilings (Hopkinson and Collins 1963).

The Visual Comfort Evaluation Method is a validated method to appoint the degree of discomfort glare in a daylit situation under reproducible conditions (Velds 2000). Glare assessments are made by subjects in a scale model placed in front of an artificial sky (see figure 3). The artificial sky used in this experimental set-up is a quarter of a cylinder. Dimmable

daylight fluorescent lamps are placed in the inner circle of the cylinder and covered with diffusing opal cloth. In order to obtain an infinite light source, mirrors are placed perpendicularly to both ends of the axis of the cylinder. In this experimental set-up an artificial skyline has been created at eye-level of a seated observer. This artificial skyline is the border between artificial sky and artificial surrounding buildings. The artificial sky is covered, around the facade of the scale model, with a black non transparent cloth, in order to exclude light from outside the experimental set-up. The maximum luminance value of the artificial sky is approximately 7000 cd/m^2.

A 1 : 5 scale model of the situation to be studied is used in the experimental set-up. Apertures in the base of the scale model allow the observer to put his head in the model to assess the degree of discomfort glare.

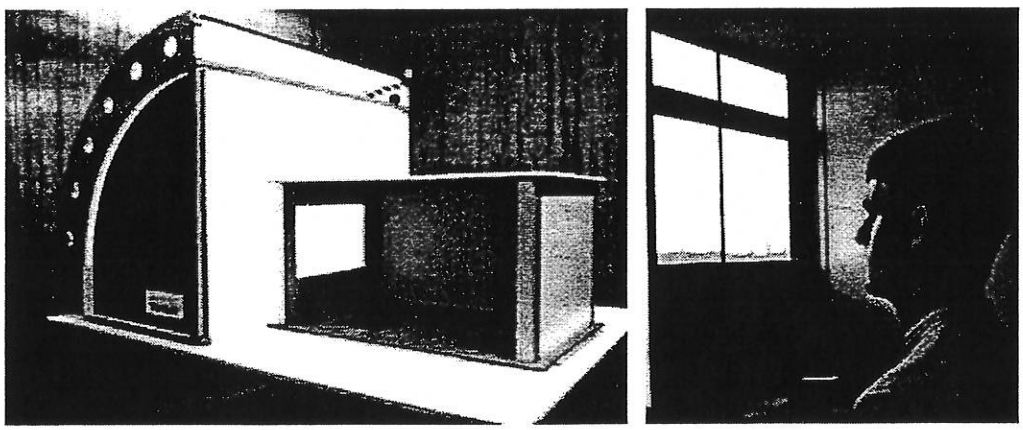

Figure 3 Experimental set-up of the Visual Comfort Evaluation Method

The method results in a maximum acceptable luminance value of the artificial sky for a certain degree of discomfort glare. Besides this, the percentage of subjects that do not accept the perceived discomfort glare for daily work purposes can be obtained. The lower the percentage of subjects under a certain lighting condition, the better the solution from a visual comfort point of view.

Nonetheless, a validation study showed that, so far, no relation between real sky luminances and the perceived degree of discomfort glare from windows can be found with this method. The use of an artificial sky, which does not contain the information of daylight (weather conditions or time of day) and does not provide a realistic view, might be the primary cause for this. Summarising, the method cannot be used for an absolute assessment of visual comfort, but the conclusions drawn by means of the VCE Method — which daylight design is better in terms of visual comfort — are also reliable under daylit conditions.

3.3. User Acceptance Studies

A new method to study discomfort glare in full-scale rooms under daylighting conditions has been proposed: User Acceptance Studies (Velds 2000). These studies are based on the use of two test rooms, an electronic questionnaire and continuous measurements, in order to obtain a relation between subjective assessments and measured quantities.

Two test rooms are used in the User Acceptance Studies, since the subject is preferably not disturbed by any measuring equipment. One room is occupied by the test person. The quantities in regard to the illumination are mainly obtained from a room identical to the room occupied by the subject. This room only contains measuring equipment (see, for example, figure 4).

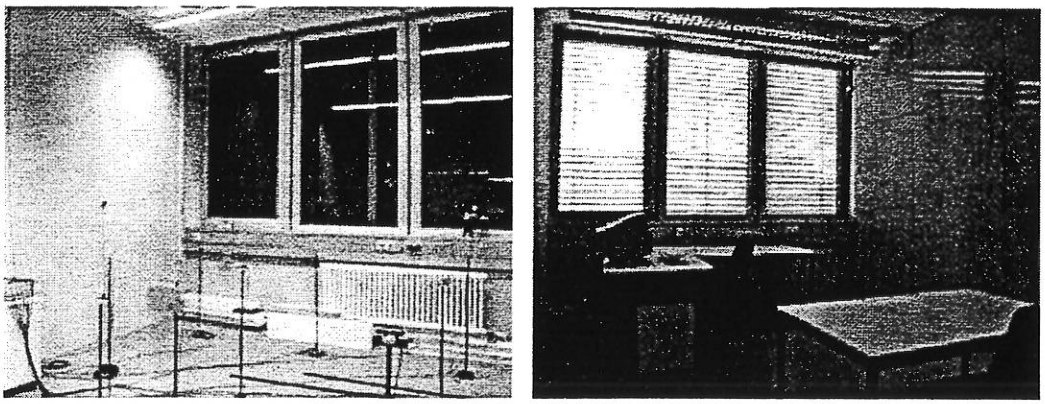

Figure 4 Two test rooms: one with measuring equipment, the other with the subject

In the User Acceptance Studies, an electronic questionnaire is used in order to link user assessments on visual comfort to prevailing lighting conditions at the moment of assessment. This questionnaire is installed on the computer available in the Subject Room. The questionnaire used in a pilot study (Velds 2000) generated questions that appeared at the computer screen regularly. It registered the time of evaluation and was able to anticipate on the subject's input or measured quantities. This quality aspect of the questionnaire prevented the user from being bothered with questions that are not essential at a specific moment.

These studies result in an absolute visual comfort assessment, for example, in maximum luminance or illuminance values for a particular percentage of subjects that do not accept the perceived discomfort glare for daily work purposes. Since comparison of a number of different situations is time consuming and costly, this method is especially used to evaluate the visual comfort in a specific situation.

4. Additional research

This paragraph includes additional research on discomfort glare, since this research could support approaches in future research on discomfort glare from windows. This research is

subdivided in two parts in this literature review. One part of the research deals with objective measures of discomfort glare. The other part on discomfort glare on discomfort glare from large artificial light sources.

4.1. Objective measure of discomfort glare

Research carried out by Fry and his associates showed a possible relation between pupil size and perceived discomfort glare (e.g. Fugate and Fry 1956, Fry and King 1975). Hopkinson and Collins (Hopkinson and Collins 1970) did not find such a relation, but showed unstability of the pupil in glaring situations, with an increasing unstability as glare increased. On the other hand, Howarth and his colleagues (Howarth et al. 1993) showed that the pupillary unrest (hippus) is unlikely to be a factor in the origin of perceived discomfort glare. Additionally, the experiment could not confirm the findings of Hopkinson and Collins. The pupil size as a discomfort glare measure is, therefore, not apparent yet.

A second objective measurement of discomfort glare is proposed by Berman and his colleagues (Berman et al. 1994), using electromyographic techniques (EMG). EMG activity of facial muscles in the neighbourhood of the eye was measured, while the subject assessed the perceived degree of discomfort glare. Generally a good qualitative agreement between the measurements and the glare assessments has been found.

4.2. Discomfort glare from large artificial light sources

Osterhaus carried out experiments to investigate the effects of large area glare sources at a VDT on the perceived glare discomfort of office workers performing a demanding screen-based letter-counting task (Osterhaus 1996, Osterhaus 1998). In the experimental set-up the subjects sat in front of a VDT. A large artificial light source was placed behind the VDT.

In one of the experiments carried out by Osterhaus, a large uniform artificial light source was positioned at 0.61 m distance of the subjects and offered 39 pre-selected lighting conditions to the subjects. 13 different configuration options of the glare source, realised by covering part of the light source and three different luminance levels for each lighting configuration. Subjective assessments (SGR = subjective glare ratings) were compared with the discomfort glare indices of the British Glare Index (BGI), Daylight Glare Index (DGI), CIE Glare Index (CGI) and Unified Glare Rating (UGR). The experiments showed that the best correlation with perceived degree of discomfort glare was found for the direct vertical illuminance at the eye or the overall brightness in the visual field, instead of existing glare formulae.

Velds conducted experiments in test rooms under real sky conditions, where subjects assessed the discomfort glare from windows facing the side wall of the room, or facing the window directly. High correlations with subjective glare ratings were found for the direct vertical illuminance at the eye as well but it is not the solely parameter in the glare assessment (Velds 2000). The results of these experiments even suggest that the perceived discomfort glare near the facade is critically dependent on the sky luminance when large glare sources lie within the field of view, independent of the view direction (up to parallel to the facade). In general the

visible sky mainly contributes to vertical illuminance in areas near the facade, therefore this illuminance value is a representative measure for the average sky luminance.

Sørensen and his colleagues investigate whether the Unified Glare Rating (CIE 1995) can be applied in situations with large glare sources (Sendrup and Sørensen 2000). Experiments are conducted with a large artificial glare source (117 x 194 cm^2) . The luminance of the glare source laid within the range of 400 to 20 000 cd/m^2. 8 Different patterns were offered to the 30 subjects that participated in the experiment. The subjects were asked to set the luminance of the glare source to three glare criteria. The 8 patterns were offered two times, which resulted in 48 settings made by the subjects. The experiment showed that the UGR as well as the illuminance on a vertical plane at the observers' eyes failed to explain the experimental data.

As mentioned in paragraph 1, the Glare Indices or maximum source luminances found in this research are not directly applicable in situations with daylight. Whereas artificial light sources can realise reproducible lighting conditions, this might be the only way to get an understanding of the impact of several parameters on the perception of discomfort glare. Therefore, this research will be described briefly in this paragraph, although the findings are not to be used in situations with daylight without (an unknown) conversion.

5. Concluding remarks and outlook

The Daylight Glare Index and the Predicted Glare Sensation Vote give higher calculated degrees of discomfort glare than those perceived under real sky conditions. Besides this, they are based on experiments with uniform light sources and it is not yet clear whether these indices can be used to represent the degree of discomfort glare in situations with a non-uniform luminance distribution within the window plane. Daylighting systems such as blinds and laser cut panels might realise such a luminance distribution. The applicability of the J index in these situations is not tested yet.

Information on perceived discomfort glare from windows is preferably acquired through subjective evaluations. These can be obtained by using the Stationary Virtual Reality or the Visual Comfort Evaluation Method. Using artificial light sources means that different situations can be compared only, until a relation between glare from artificial and daylight sources has been found. The subjective evaluations can be obtained by means of conducting studies in test rooms as well, for example according to the procedure as described in paragraph 3.3 'User Acceptance Studies'.

In order to develop a reliable formulae that can be used to predict the perceived discomfort glare from windows, a large number of aspects that influence the perception should be taken into consideration (e.g. Hopkinson 1970, Chauvel et al. 1982, Boyce and Beckstead 1991), such as:

- Lighting quantities.

  Besides illuminance and luminance values, the colour temperature might be an important aspect. Research by Yano, Kanaya and Ichikawa showed that subjects are more sensitive to discomfort glare for light sources with a high colour temperature than

for those with a low colour temperature (Yano et al. 1993). Research by Chain and his colleagues (Chain et al. 1999) showed that under uniform sky conditions the Correlated Colour Temperature (CCT) is constant, which means that the colour temperature is not a variable in the glare assessments under overcast sky conditions. For clear sky conditions it counts that the higher the luminance, the lower the Correlated Colour Temperature. This means that, with comparable high average sky luminances, the perceived degree of discomfort glare will be lower than under overcast sky conditions.

- The information given by the daylight (about weather conditions and time of day).
- The view through the window.
- Installed daylighting systems.

  The Daylight Glare Index and the Predicted Glare Sensation Vote should not be applied when discomfort glare is caused by non-uniform light sources. The vertical illuminance as a discomfort glare measure, as mentioned in paragraph 4.2, does not reflect the luminance distribution within the window plane and is not a suitable discomfort glare measure in situations with daylighting systems that realise non-uniform luminance distributions within the window plane.

- The surrounding.
- The performed task.

  The task is an important aspects, shown in experiments conducted by Osterhaus and Bailey (Osterhaus and Bailey 1992) where the glare source was a large artificial light source, situated behind the computer screen on which the letter-counting task was performed. The performance speed at a difficult letter-counting task and more frequent counting errors suggest that visual performance was slightly impaired by the presence of glare discomfort.
  Research conducted by Velds (Velds 2000) showed that VDU tasks are critical in the evaluation of discomfort glare. With comparable degrees of discomfort glare, a higher percentage of subjects that did not accept this degree of discomfort glare was found for the VDU task in comparison with writing and reading tasks.

- Prior experience of subjects.
- The subjects' state of mind.

In a formula or a measure, that represents the perceived discomfort glare from windows, all aspects that influence the perception of discomfort glare from windows have to be included. Most of these aspects can be studied under reproducible conditions, in the Visual Comfort Evaluation Method, Stationary Virtual Reality or in test rooms with simulated sky conditions. Research conducted by Enrech-Xena and her colleagues (Enrech-Xena et al. 1997) indicates how realistic sky conditions can be realised. The impact of the information given by the daylight and the view through the window should be studied in (test) rooms with real window openings and actual daylighting conditions. It should be kept in mind that a single aspect can

influence the perception alone, but also in combination with more aspects. This interaction should be studied as well.

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Report on the Activities of Division 4 " Lighting and Signalling in Transport " in the Years 1999 and 2000.

Presented at the CIE/CNC meeting on October 13, 2000 in Toronto.

Dr. W. Adrian
Div.4 Representative

The Division comprises 20 active committees. Seven of these have finished their report that are either in the voting process or await final comments or are almost ready for printing. One of these reports, that on " Lighting of Roads for Motor and Pedestrians" will be combined with the document on calculation (TC 4-24). However the proposed incorporation of " Tunnel Lighting " to form a comprehensive handbook appears too time consuming, and it would delay the publication of the whole Road lighting document. Fortunately a big step towards completion of the 6th Tunnel draft report has been achieved at the Toronto meeting. With 12 to 2 votes the members agreed to adopt the Lseq – method to determine the necessary luminance in the entrance zone which has been prevented before by more or less disguised commercial interests. However prior experience showed that decisions have often been overturned, and I am reluctant to make any predictions regarding a soon completion of the report. It seems that we are underway to agree to a draft that contains in principle the French suggestions and also those of the never fully disclosed Dutch method. An agreement on the influence of the windscreen on the driver adaptation seems to imminent. The windscreen luminance was found to be between 10 and 20 cd/m2 which is not as high as predicted by Padmos. At last ,the Tunnel lighting document has no scientific hurdles to overcome any more, and the acceptance is just a matter of politics and personal interests.

TC 4-26 " Systems for measurement of photometric quantities of Road Lighting Installations ". The chairman G. Rossi, Italy, held a meeting in Toronto. Due to his own developments of a mobile photometer for dynamic data Collection, a report on such systems is well underway.

TC 4-27 " In-service visibility requirements for road markings"
P.Walraven and K.Soerensen feel that there is a need for a CIE-publication.
No meeting took place in Toronto.

TC 4-29 This committee remainms inactive as ISO-Standards on road traffic lights have been published.

TC 4-31 and 4-32 "Colour Vision Standards for Transport" and "Surface Colours for Traffic Signs" are interrelated and have to be discussed together. The main experts, B.Cole ,Australia, and P.Walraven, NL, were not present at the Toronto meeting. The 3rd draft of a common document has been circulated to members and international authorities in this field for comment.

TC 4-33 "Discomfort Glare in Road Lighting" The new chairman H.-J.Schmidt-Clausen, Germany, called a meeting at which the presently available descriptions of discomfort glare have been elaborately presented. Formulae exist for road lighting installations and for discomfort glare by automotive head-lighting, which have very different forms. It will be attempted to find a common basis for both descriptive terms that could serve for recommendations for discomfort glare evaluation.

TC 4-36 "Visibility Design for Roadway Lighting" This relatively new committee , chaired by R.Stark, USA, is still in the introductory phase, and a list of topics the report should cover has been distributed for comment. It is expected that the committee follows the suggestions contained in the American Standard RP 8, which was recently released.

TC 4-37 "Roadway Lighting in Developing Countries" This committee met at the Toronto divisional meeting with H.Yerell in the chair. In principle there is no difference in the fundamentals to whatever country it applies. However it has been argued that many cases are so typical for developing countries That a separate study is recommendable. No material of substance is available yet.

TC 4-38 "Daytime requirements for roadway signs" At the Toronto meeting the chairman ,T.Schnell ,aggressively addressed the matter, which will be reflected in the 1st draft of a report that should be ready for the divisional meeting in 2001

TC 4-40 "Requirements for retro-reflective traffic signs". The chairman, J.Rennilson, has structured the committee into four working groups to study specific issues which will form the basis of an overall report. .Considerable progress has been made .

TC 4-41 "Crime and lighting" K.Painter called a meeting in Toronto. A remarkable amount of data have been collected that are presently condensed into a report that is awaited with great interest by the members of the division.

R 4-14 "Road lighting and accidents". B.Bijelland of Norway has compiled a great many data which are contained in a Norwegian report. The contend was presented at the meeting. It will be translated into English and made available to Div.4.

R 4-21 "300 mm roundel traffic lights". No committee was established yet. So far there was no necessity for such, as recommendations regarding intensities for 300 mm signals are contained in a DIN standard. However in this standard no LED light sources are foreseen. Because of their strongly directional light emission LED's show greater efficiency than Tungsten filament lamps and feature substantially longer life-times at lower maintenance requirements. The reporter was asked to continue his work and to address the application of LED's for signal lights.

Questions had been put forward to the CIE that suggested to appoint a reporter to look into the feasibility of defining a set of eye sensitivity functions in the mesopic range to allow for calculations for road lighting levels. No one seems to know that the CIE has already recommended in 1967 a set of functions for *preliminary use.* ,They were based partly on measurements of Smith-Kinney and interpolated curves. They proved to be not too bad as Kokoschka showed, who reinvestigated in 1970 to 74 systematically the eye sensitivity including also the influence of field size. The results suggest to adopt the $V(\lambda)$ 10° curve as initial photopic function. The mesopic sensitivity functions form the basis for the mesopic photometry system that is described in DIN 5031 Part 1 and 2 and used for 17 years. It is time that we learn it and not try to reinvent the wheel.

CIE DIVISION 5 :

EXTERIOR AND OTHER LIGHTING APPLICATIONS

REPORT toCNC/CIE, 45th ANNUAL MEETING
October 13, 2000

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The 2000 annual meeting of Division 5 took place on September 8, 2000, at the Courtyard Marriott in Toronto, as part of a joint session with Division 4, held from September 3 to 8 , including separate Division 4 and 5 meetings opened to to all, a lighting symposium, and about 17 TC meetings, 5 of which were Div.5 (-12, -14, -16, -18 & -19).

The session was skillfully organized by Dr. Adrian, attracted about 80 participants and 18 accompanying persons from 20 countries, included bells and whistles like boat tour, banquet, and reception, and according to all was a resounding success. Thank you Werner!

Two recent documents, the Division Director's Report, dated July 24 2000, and a draft of the minutes of the Division 5 meeting, dated October 10 2000, are attached and represent the most complete and up-to-date information available,

I attended all Division 5 activities, and will be pleased, if requested, to provide any further information that may be at my disposal.

There is room on many committees, for Canadians who may wish to participate : please let me know of your interest on particular subjects.

CIE DIVISION 5

DRAFT: OCT 10, 2000

Minutes of the Division Meeting
Held on Friday 8th September 2000
at the
"Courtyard Marriott"
Toronto, Canada.

Present:			VOTES	
	Alvarez del Castillo, Elizabeth	USA		
	Arumugasaamy, Panchy	USA		
	Bandypoadhyay, Pranah	India	(m)	Editor + TC 5-18
	Baldrey, Patrick	UK		Editor - Div. 4
	Bjelland, Erik	Norway		
	Calixto Burini, Elvo	Brazil		
	Candura, Paulo	Brazil		
	Culley, Dennis	South Africa	(m)	
	Hautala, Pentti	Finland		Director – Div.4
	Johnson, Norbert	USA		
	Justen, Henri	Finland	(m)	
	Horvath, Jozsef	Hungary	(m)	Division Director
	Korobko, Alexei	Russia		
	Kawakami, Kahji	Japan	(m)	Reporter, R 5-10
	Lasinski, Marek	Poland		
	Lemons, Tom	USA	(m)	Chair, TC 5-09, 5-17
	Major, Gyula	Hungary		
	Mori, Akina	Japan		
	Pimenta, Jose	Brazil		
	Pollard, Nigel	UK	(m)	Secretary + TC 5.14
	Roberge, Jacques	Canada	(m)	
	Rombauts, Patrick	Belgium	(m)	Reporter, R 5-05
	Rossi, Giuseppe	Italy		
	Schwarcz, Peter	Hungary		Chair, TC 5-16
	Serefhanoglu-Sozen, Mujgan	Turkey	(m)	
	Soardo, Palo	Italy		
	Tanaka, Atsuko	Japan		
	Weis, Bruno	Germany	(m)	
	Wild, Jacek	Poland	(m)	
	29	16	CONT.	

Note: (m) = Divisional voting member

1. OPENING OF THE MEETING

The Division Director welcomed all delegates to the meeting and especially Pentti Hautala, Director of Division 4.

Apologies were received from:

		VOTES	
Audestad, Jan (my)	Norway		
Austin, Kelvin	UK		
Di Fraia, Luciano (my)	Italy		
Haicong, Zhang (my)	China		
Lecocq, Jacques (my)	France	(AM)	vote to Dr Horvath
Lofberg, Hans Allan	Sweden		
Schreuder, Duco	Netherlands		
Stockmar, Axel	Germany		
van Bommel, Wout	Netherlands		
van den Beld, Gerrit	Netherlands		
Vassilev, Christo (my)	Bulgaria		
11	5	13	

Changes in Membership

Xiqo Hui JIQN (China)	- from Mr Haicong
Jacek WILD (Poland)	- from Mr Lasinski.
La-ovcliai LALITBULANAUT (Thailand)	- from Mr Chamchoi

Delegates introduced themselves to the meeting.

2. MINUTES OF LAST MEETING : WARSAW, 28 JUNE 1999.

Minutes accepted with minor spelling corrections.

3. DIRECTORS REPORT

This had been circulated before the meeting and was detailed by the Director, and formally accepted. (ATTACHED)

4. SECRETARY'S REPORT

There has been little Divisional activity since the last meeting in Warsaw in June 1999

One "Activity Report" has been produced together with the minutes of the aforesaid meeting. A draft Roster has been sent out and updated in line with that from the Central Bureau.

Divisional Web Sites have been set up from the CB which it is planned will be maintained by the Division Secretaries in due course.

The Division had, with the co-operation of the CB, helped with speakers for a UN/IAU meeting in Vienna in August 1999 with a follow up to the IAU meeting in Manchester UK in August 2000. Both meetings were concerned with the use of energy and the environment in relation to limiting obtrusive light and energy waste. A further link with the UN on energy use and climate control is currently being discussed.

There has been a call for papers for the next meeting in Istanbul in September 2000

5. EDITOR'S REPORT

The Editor's verbal report is summarised below:

Unfortunately, the Editor had been unable to attend the CIE Vice President's Publications Committee in Vienna in June 2000 but was asked in future, to inform the Director or Secretary to stand in for him, as it was important the Division be kept informed of developments. It was also requested that minutes of these meetings be sent to all Divisional Editors, and not just those in attendance, as happened on this occasion.

6. TECHNICAL COMMITTEE REPORTS

TC 5-08 "Lighting of Off-shore Gas and Oil Structures" (H-H Bjorset)

No Report from the Chairman had been received, although it was believed that a Technical Paper to form the basis of the TC Report was to be presented at a Nordic Lighting Conference within the next few months. The Divisional Member for Norway was to confirm this, and inform the TC Chairman that if no working draft was produced before the next Divisional Meeting in September 2000, the TC would be wound up at that Meeting.

ACTION: HH Bjorset

TC 5-09 "Illuminance Levels for Sports Events" (T M Lemons)

The Chairman produced a comparison table showing the variation in illuminance values for sports lighting on the Draft TC (CIE) values, the new CEN EN 12193 values and the proposed, revision of IESNA RP-6 values. However, as there appeared to be little if any interest by member countries to continuing this approach, following some discussion, it was proposed to close this committee. (DISSOLVED – SEE ITEM 9-i))

TC 5-11 "Practical Design Guidelines for Sports Lighting Installations for Television and Filming" (G van Den Beld)

≃ 133 PAGES
≃ 51 SPORTS COVERED
FAST TRACK TO ADOPTION

Apologies had been received from the new Chairman who reported that the text was now completed and would hopefully be ready for voting before the end of 2000.

ACTION: G Den Beld

TC 5-12 "Obtrusive Light" (N E Pollard)

TOR.

22 persons had attended the meeting on the 5th September of which 4 were TC members.

The meeting started with a presentation from Mr Yayoshi from Japan on "Measures by the Environmental Agency of Japan to prevent Light pollution" which was received with great interest.

Following the Warsaw meeting, a 5th draft had been sent our to members in March 2000 on which detailed comments had been received from Van Bommel and Bedoc/Lecocq. A draft 5a had since been produced and this document was discussed in further detail at this meeting. The following, controversial points were agreed:

i) That the document should relate to ALL lighting, including both road and sports lighting installations.

ii) That the technical parameter for sky glow should be the "Upward Light Ratio" (ULR) , previously the UWLR, and that these levels should be lowered from those given in CIE Pub. 129, which should be amended accordingly.

With these amendments, it was agreed that following late comments to be received by the 1st November 2000, the document should be sent around for TC voting before the year end and then sent for formal voting and publication, hopefully before a major IDA/IESNA gathering in March 2000.

ACTION: NE Pollard/TC

TC 5-13 "CIE / ISO Standard for the Lighting of Exterior Working Areas" (J Horvath)

The Chairman had not yet progressed the document towards an ISO standard but would purse this with the CB in Vienna.

ACTION: J Horvath/CB

TC 5-14 "Maintenance of Outdoor Lighting Systems" (N E Pollard) TOR.

Unfortunately not much progress had been made on this document. However, 15 people attended the meeting including 3 TC members. However, with the offer from a new member, Eirirt Bjelland to write a section on road lighting monitoring methods, the Chairman promised to chase up the other section writers and finalise the document as soon as possible.

ACTION: NE Pollard/TC

TC 5-15 "Tolerances in Lighting Design" (Vacant)

A draft from the new chairman, Dr Warren Julian was awaited, and this would be chased up.

ACTION: Dr Julian/Sec/DD

TC 5-16 "Exterior Security Lighting of Private Properties" (P Schwarcz) TOR.

The TC held its first meeting in Toronto, in the presence of 5 members and 9 guests at which the 1st Draft, dated July 2000 was discussed.

TC discussed the following main questions:
1. The term of Private Properties needs definition.
2. Risk classification
3. Type of security areas needs complete revision.
4. Recommended Lighting Design Values.
5. Lighting for CCTV Cameras.
6. Maintenance.
7. Correlation of security and other functions of lighting.
8. Impact on environment.
9. Appendix A: Lighting features of wired fences.
10 Appendix B: Recommendations for lamps, luminaires, cabling, and control

Inputs are expected within 2 months (till 15-11-2000), even if the answers are negative. The relative short deadline lets TCC know about progress. Draft2 is expected within 6 months and will be distributed primly by e-mail, and by fax for those, who do not have e-mail facility. It will leave time for consideration of the draft well before next meeting scheduled at Istanbul in September, 2001.

ACTION: P. Schwarcz/TC

TC 5-17 "Standardisation Format for Sports Guide" (TM Lemons) TOR.

At the 1999 Warsaw meeting a First Draft outline of a Standardization Format for Sports Guide was distributed with a request for comments. Comments have been received and work has begun on detailing the material that would be included in each section. This work should be completed by the spring of 2001 for use in the revision of the other sports lighting Reports. The suggested outline is as follows:

1 Introduction
2 Scope
3 Definitions
4 Lighting requirements/principles
5 Lighting techniques
6 Lamps and luminaires
7 Installation and operation
8 Energy
9 Obtrusive light
10 Maintenance
11 Bibliography
12 Annex.

ACTION: T. Lemons/TC

TC 5-18 "Practical Design Guidelines for the Lighting of Exterior Work Areas" (P K Bandyopadhyay) TOR.

9 members attended the meeting held in Toronto at which the contents requirements of the new Guide were finalised. Chapters of CIE Pub. 68 will be broadly followed and the following members agreed to help update the following:

a) Industrial, Storage and Parking Area lighting – Mr Lasinski
b) Petrochemical Industry and other Hazardous Areas – Mr Coatham / Dr Weis
c) Harbour, dock and Lock lighting – Mr Coatham
d) Airport Apron Lighting – Mr Schwarz.

The 1st Draft will be ready and circulated by March 2001, so that the same could be finalised within the TC during the CIE mid-term meeting in Istanbul.

ACTION: P. Bandyopadhyay/TC

TC5-19 "EMERGENCY LIGHTING" (BRUNO WEISS) TOR.

7. **REPORTERS' REPORTS** MEETING SEPT. 7, ATTENDED BY 7 MEMBERS

R 5-05 "Semi-cylindrical Illuminance" (P Rombauts)

A Report of around 30 pages would be ready by December 2000

ACTION: P. Rombauts

R 5-08 "City Beautification" (M. Serefhanoglu-Sozen)

Ms Serefhanoglu-Sozen as a follow up to her comprehensive Report produced in Warsaw, submitted an outline format* for the next step towards the formation of a TC.

It was agreed that a TC should be set up under the later agenda item.

ACTION: M. S-Sozen/Secretary/DD

* COPY AVAILABLE ON REQUEST - FROM J.R. - 4 PAGES

R 5-11 "Modelling in Sports Lighting" (T. Lemons)

At the 1999 Warsaw meeting the subject of Modelling in Sports lighting was established as a Reporter activity for one year with the request that all Division 5 members should provide information from their country on this subject. One report was received from K. Kawakami titled " A study of the influence of the shadow for watching a sports game on television". Though this provides interesting information it does not address the issue of "modelling in sports lighting".

Based upon the lack of other information and the material that was prepared and presented on this subject in Warsaw, the Reporter proposes that a committee should be established to address this issue. The Reporter, Tom Lemons, is willing to be chairman of this committee and proposed the following Terms of Reference:

To prepare a Guide to be used to specify modelling for sports lighting and give recommendations for its application for various sports.

8. LIAISON OFFICERS' REPORTS

A Stockmar reported, via the Director, that following the publication of the CEN TC 169, WG4: Lighting Application - Sports Lighting, the Committee had been suspended.

However, WG3: Emergency Lighting was still working for which Dr Seidl would be the best contact.

9. WORK PROGRAMME

i) TC's dissolved - 5.09 (ILLUMINANCE LEVELS FOR SPORTS LIGHTING)

ii) New TC's:

TC 5-xx Guide for Sports Lighting (T. Lemons, USA)

Suggested terms of reference

To prepare a Guide for Sports Lighting that excludes lighting for TV and film. This guide will replace the present publications: CIE 42,45,57,58 and 62.

A number of members showed interest in working on this TC and the chairman collected a list of names that he would notify of the next step.

There was accordingly a large vote in favour of setting up the Committee.

5-xx City Beautification (Chair: Ms Serefhanoglu-Sozen)

Suggested Terms of reference:

To prepare a Guide for "City Beautification". The Guide shall be used whenever designing new or renewed creative lighting for city beautifcation. The Guide includes an integrated approach which takes into consideration functional lighting, floodlighting, decorative lighting and considers functional, aesthetic and emotional aspects of lighting design.

A large number of members showed interest in working on this TC and the chairwoman collected a long list of names that she would notify of the next step.

There was accordingly a large vote in favour of setting up the Committee.

TC 5-xx Modelling for Sports Lighting (T. Lemons, USA)

Suggested terms of reference

To prepare a Guide to be used to specify modelling for sports lighting and give recommendations for its application for various sports.

Unfortunately, their were no interested parties to join this TC and on a Divisional vote it was decided not to proceed with this Committee.

11. DATE AND VENUE OF NEXT MEETING

The next Division 5 meeting would be held in **Istanbul, Turkey** on Monday **10th September 2001** during the "International Lighting Congress" and preceding the symposium on City Lighting and Beautification.

JULY 24, 2000

1999/2000 ANNUAL REPORT CIE DIVISION 5
June 1999-July 2000
Director: Dr. József Horváth

1. GENERAL

The terms of reference of Division 5 are: "To study procedures and prepare guides for the lighting for exterior working areas, security lighting, floodlighting, pedestrian and other urban areas without motorised traffic, areas for sports (indoor and outdoor facilities) and recreation and for mine lighting".

On the basis of that Division 5 deals with:

Exterior security lighting;
Sports lighting;
Lighting for Off-Shore structures;
Restriction of obtrusive light;
Tolerances in lighting;
Maintenance of outdoor lighting systems;
Emergency Lighting in exterior
Glare in indoor sports
City beautification

The officers of Division 5 are:

Division Director:	Dr. J. Horváth (H)
Division Secretary:	N. Pollard (GB)
Division Editor:	P.K. Bandyopadhyay (India)
Liaison officer:	A. Stockmar (D)

The present Technical Committee structure is:

TC 5-08	Lighting for Off-Shore gas and oil structures Chairman: H.H. Björset (Norway)
TC 5-09	Illuminance levels for Sports Events Chairman: T.M. Lemons (USA)
TC 5-11	Practical design guidelines for Sports Lighting installations for CTV Chairman: G. van den Beld (Netherlands)
TC 5-12	Obtrusive light Chairman: N. Pollard (Great Britain)
TC 5-13	CIE/ISO Standard for the Lighting of Exterior Working areas Chairman: J. Horváth (Hungary)

TC 5-14 Maintenance of Outdoor Lighting systems
Chairman: N. Pollard (Great Britain)
TC 5-15 Tolerances in Lighting Design
Chairman: W. Julian (Australia)
TC 5-16 Exterior Security Lighting of Private Properties
Chairman: P. Schwarcz (Hungary)
TC 5-17 Standardisation Format for Sports Guide
Chairman: T. Lemons (U.S.A.)
TC 5-18 Practical Design Guidelines for the Lighting of Exterior Work Areas
Chairman: P.K. Bandyopadhyay (India)
TC 5-19 Emergency Lighting
Chairman: B. Weis (Germany)

Reporting topics are:

R 5-05 Semicylindrical Illuminance (P. Rombauts)
R 5-07 Review of C.I.E. 83 (G. van den Beld)
R 5-08 City Beautification (M. Serefhanoglu Sözen)
R 5-10 Glare in Indoor Sports (K. Kawakami)
R 5-11 Modelling for Sports Lighting (T. Lemons)

2. MEETINGS

In 1999, Division 5 had a Meeting in Warsaw (Poland) on 28th June 1999. We had also T.C. meetings the days before this Division Meeting in the same venue. (Technical University of Warsaw)

3. PROGRESS OF TECHNICAL WORK

TC'S ACTIVITIES

TC 5-08 LIGHTING FOR OFF-SHORE GAS AND OIL STRUCTURES (H.H. Björset)

The work is continuing trying to achieve detailed draft of report. ICAO (International Civil Aviation Organisation) is touched also of this subject. A possibility of co-operation between Division 5 and Division 4 about helideck floodlighting is under investigation.
A draft Report is still awaited.

TC 5-09 ILLUMINANCE LEVELS FOR SPORT EVENTS
(T.M. Lemons)

The work was stopped in 1994 because of waiting the CEN Standard. The last Meeting in Warsaw the Chairman suggested to change the Terms of Reference of the Committee.
It was decided to postpone this idea to the next Meeting in Toronto.
The CEN document is available now and the matter will be discussed at next Meeting.

TC 5-11 PRACTICAL DESIGN GUIDELINES FOR SPORTS LIGHTING INSTALLATIONS FOR COLOUR TELEVISION
(G. van den Beld)

The guide being prepared by this TC will give practical advise on the realisation of the recommendations for sports lighting for colour television and filming,laid down in CIE Publication No 83. The practical guidance here will reflect the best of modern lighting design world-wide. The main body of the guide will be devoted to sections covering many individual sports where there may be colour television or film coverage under artificial lighting. The final draft was circulated to the Committee.
The final version of the text is awaited for voting.

TC 5-12 OBTRUSIVE LIGHT
(N. Pollard)

The terms of reference of this committee are: " To study the effects of obtrusive light from exterior lighting to residents and traffic; and to prepare a Technical Report that gives measure(s) to describe the effect(s), restricting values for these measures, and measuring methods; excluding the problem for astronomers." The new chairman of the Committee has produced 4th Draft and distributed to TC members. The discussion is continuing and the TC will have a Meeting in Toronto in September 2000.

TC 5-13 CIE/ISO STANDARD FOR THE LIGHTING OF EXTERIOR WORKING AREAS
(J. Horváth)

Originally this Committee was formed to prepare a CIE/ISO Standard.
The work is finished and the document was edited like a Technical Report C.I.E. Publication No. 129-1998 under title:
"Guide for Lighting Exterior Work Areas".
Some remarks were arrised by the Division members, why it was not a "Standard".

The Chairman has asked the help of Board of Directors and Secretariat to transform the Guide to a Standard. During July, 2000 the Chairman has received a proposal with orientations and directions how to modify text. The work is going on we have to achieve a shortening of text and to distribute to members of TC for voting.

TC 5-14 MAINTENANCE OF OUTDOOR LIGHTING SYSTEMS
(N. Pollard)

This committee is producing a Technical Report describing the parameters influencing the depreciation process and the procedure for estimating the maintenance factor for outdoor lighting systems. The 5th draft report is available and includes maintenance of columns, luminaries maintenance factors and definitions of pollution categories.
The publication is in advanced stage, but more discussion is needed.

TC 5-15 TOLERANCES IN LIGHTING DESIGN AND MEASUREMENT
(W. Julian)

This committee was established in 1994. The past Chairman Mr. Fisher has retired and happily we found a new Chairman Mr. W. Julian.
There has been little input from committee members so far, so that a 1st Draft could no be prepared. An Australian standard is available yet. The T.C. was completed with new members during Division 5 Meeting, Warsaw. Hopefully the new chairman will be capable to create the 1st Draft for discussion with help of TC members.

TC 5-16 EXTERIOR SECURITY LIGHTING OF PRIVATE PROPERTIES
(P. Schwarcz)

The term of reference of this TC is: "Guide gives recommendations of lighting designed primarily to improve security of homes, industrial, commercial properties and working area. It can serve as an additional guide to existing ones of exterior lighting. It excludes security aspects of public lighting and lighting of high security areas (military, nuclear areas, prisons) which topic is complex enough to have its own guide".
The 1st Draft is ready and was distributed to TC members just before the Division Meeting.

TC 5-17 STANDARDISATION FORMAT FOR SPORTS GUIDE
(T. Lemons)

The 1st draft was distributed in Warsaw, 1999. The Chairman has received only one reply. It is needed more discussion.

TC 5-18 PRACTICAL DESIGN GUIDELINES FOR THE LIGHTING OF EXTERIOR WORK AREAS
(P.K. Bandyopadhyay)

The terms of Reference of TC is: "To produce an "applications" guide for exterior work areas that compliments Pub. 129-1998, by updating where necessary the relevant portions of the withdrawn C.I.E. Publication 68."
The table of Contents is ready and the work has began The 1st Draft is awaiting.

TC 5-19 EMERGENCY LIGHTING
(B. Weis)

The terms of Reference of this new TC is: "The Standard to specify the luminous requirements for emergency lighting systems installed in premises or locations where such systems are required. It is principally applicable to locations where the public or workers have access."
Collecting membership and technical information is close to be completed. The work has just began.
The Chairman has had contact with LUMEX-IEC.
The Division Director has asked a delegate from Division 3 at the occasion of C.I.E. Board Meeting in Vienna in June 2000.

REPORTER'S ACITIVIES:

R 5-05 SEMICYLINDRICAL ILLUMINANCE
(P. Rombauts)

The Reporter presented his approach of this topic giving an outlook of use of semi-cylindrical illuminance concept at the occasion of last Division Meeting. The Division asked the Reporter to continue this work and a final Report should be useful to be published in C.I.E. collection.
The Report of around 50 pages would be ready by the time of next Meeting.

R 5-07 REVIEW OF C.I.E. 83
(G. van den Beld)

This reporting topic was established to ascertain world-wide opinion on the need to update C.I.E. 83 (Guide for the lighting of sports events for colour television and film systems. 1989). The work just began now.

R 5-08 CITY BEAUTIFICATION
(M. Serefhanoglu Sözen)

The Reporter has produced a comprehensive Report which was discussed in Division Meeting in Warsaw. It was decided to develop this document as preparation of a new TC work.

R 5-10 GLARE IN INDOOR SPORTS
(K. Kawakami)

The Reporter presented a paper in Warsaw.
The further version of this subject entitled "Applicability of C.I.E's Glare (GR) Evaluation System for Outdoor Facilities to Indoor Sports Facilities" has been received by the Division. The text is available via Internet from the Division's Secretary.
Comments are highly appreciated.

R 5-11 MODELLING FOR SPORTS LIGHTING
(T. Lemons)

The work began, and all division Members are asked to research any material about this topic and send it directly to the Reporter.

4. LIAISON MATTERS

The Liaison Officer Mr. A. Stockmar informed the Division during the last Meeting about the work of different CEN Committees, namely WG2: Lighting of Work places, WG4: Lighting Application-Sports Lighting.
During the last Division Meeting the Division 5 has decided to try to organize a Meeting once a year and suggested to hold this Meeting in conjunction with Division 4 which already held annual meetings.

5. ACKNOWLEDGEMENT

The Division Director expresses his thanks for the help, spending time, energy and enthusiastic volunteer works to every members of Division and TC-s.

Budapest, July 24, 2000.

Dr. József Horváth
Division Director

CIE DIVISION 6, Photobiology and Photochemistry
Report to the Canadian National Committee
October, 2000

Delegate: Yvon Deslauriers, Ph.D.
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Radiation Protection Bureau
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Ottawa, ON K1A 1C1
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The report is extensively drawn from the Division Director's notes, Dr. David H. Sliney and the meeting's minutes.

1. Meeting Venue

The division meeting took place as planned in conjunction with the 13th International Congress on Photobiology, on Sunday, 02 July 2000, at the Hyatt Regency Hotel, Embarcadero, San Francisco, USA. Approximately 30 participants were present (See attached list). No formal scientific presentations had been scheduled, since nearly 750 scientific papers were presented at the ICP. The ICP is held every four years, and Division 6 met in conjunction with the last ICP in Vienna, Austria in 1996.

2. Progress Report by the Division Director

Dr. Sliney reported on progress in the Division. Since there were a number of new participants, he briefly reviewed the role of the CIE and its structure and modes of operation.

The Measurements of Optical Radiation Hazards Book from CIE/ICNIRP

This 750 page book was held up as an example of the hard work in Division 6. Dr. Sliney noted that much of it would be the basis for the Division 6 volume of the CIE Handbook. The blue book had been published as an outcome of the CIE/ICNIRP/NIST/CHPPM International Symposium on the Measurement of Optical Radiation Hazards held in September 1998 at NIST, Gaithersburg, MD. He explained that the text had been crafted to be a handbook, which made use of the material presented at the MORH Symposium, but went much further into detail and was not a proceedings document. About 1,000 copies had been printed by ICNIRP and the book was a joint ICNIRP/CIE publication and each member of Division 6 should have received their copy during the past year. ICNIRP was publishing the book as a joint CIE/ICNIRP publication. Further copies were available for sale from the CIE CB, from any CIE national committee and from ICNIRP. Information to purchase any CIE publication was available from the web pages.

Need to Recruit Younger Participants, Statement on Need for a New Associate Division Director

Dr. Sliney also noted the importance of recruiting more energetic and younger participants in CIE Division 6 activities and the remaining vacancy in the position of the Associate Division Director (ADD) which has been vacant for several years since the tragic loss of Prof. Mutzhas (D). This ADD related to the subjects which did not require a background in the life sciences, and concentrated on areas of interest such as photochemistry, photobiological measurement, testing of fabrics and shading structures, etc. He asked for those in the audience to consider serving as an ADD. He pointed out that both he and Dr. Cesarini were to finish their final terms of office in three years.

Discussion on Process of Turning a Technical Committee Report into a CIE Standard

Dr. Forbes (US) asked about the process of turning a TC report into a CIE standard. Dr. Sliney explained the process and gave as an example the CIE standard erythemal action spectrum and the Standard Erythemal Dose (SED) Unit which first became a CIE standard and then one year later, a joint ISO/CIE standard as well. Dr. Forbes agreed to check with Janos Makai at the CB to determine the best way to proceed for the CIE Standard for the UV Photocarcinogenesis Action Spectrum (now drafted) and the photocarcinogenesis testing protocol. Dr. Sliney indicated that if a TC were aiming toward a CIE standard, it was essential that the at least five nations were represented on the TC.

The discussion about CIE standards led to a lengthy discussion relating to the dividing lines of UVA and UVB (See CIE Publication 134-1999 from TC 6-26). Dr. Urbach (US) noted the historical reasons for the 315-nm dividing line and Dr. Sliney pointed out that the terms UVA and UVB were merely shorthand notations and in the photobiological literature, the source spectrum and actual action spectrum really needed to be reported.

3. Technical Committee News

The status reports of the technical committees were then discussed. Dr. Sliney handed out a list of the Division 6 Technical Committees and noted that most would not be discussed as the status statement in the listing was self-evident. The progress of a few TCs were discussed in detail and is reported here.

6-08 Guidelines for Obtaining Action Spectra. Dr. Sliney noted his disappointment that Dr. Dieter Kockott (D) was unable to come to San Francisco to report on the progress made last year in TC 6-08 on Guidelines for Obtaining Action Spectra. This was the oldest standing TC and the report would be quite valuable once published. Dr. Kockott had informed him that the report was nearly finished more than a year earlier.

6-11 Systemic Neuroendocrine Effects of Optical Radiation on the Human. The report on the Systemic Neuroendocrine Effects of Optical Radiation on Humans was progressing, although Dr. Veitch was unable to present; Dr. Brainard (US) stated that progress had been made in determining the human action spectrum. Dr. Sliney noted that the related report from **TC 6-16 Psychobiological Effects of Lighting** (Dr. Rikard Kuller, chair) had been circulated in Division 6 for comment and that the comments from Dr. Vietch and Dr. Brainard would be incorporated after all comments had been received.
(Reporter's note: Since the Division Meeting, Dr. Veitch has indicated that the completed draft should go to the committee for review by mid-December and, following revisions, to the Division in early 2001. If any CNC members would like more information, they should feel free to contact her.)

6-23 Generalized Action Spectra for Plant Responses. Dr. Don Krizek (US) reported on the status of CIE TC 6-23 on generalized action spectra for plant responses. He explained that it had turned out to be a massive undertaking because there were so many factors to take into account. He had been interested in holding a TC meeting at San Francisco, but this had not been formalized; he asked for anyone interested in participating to see him after the meeting. Dr. Sliney suggested that Dr. Krizek attempt to bring the project to closure by reporting on the few action spectra that had been well characterized and to summarize the special problems in arriving at the action spectra, since Dr. Krizek had just done a nice job of summarizing the area in his presentation on the report status.

6-24 Sunscreen and UVA
6-28 Standardization of Sunscreen Testing - Method of UVA Sunscreen Testing
6-31 Immediate Pigment Darkening Dr. Cesarini (F) explained that he would try to bring the reports of TCs 6-24, 6-28 and 6-31 to closure. There had been a lack of consensus on the best test methods for broad-spectrum sunscreens, with strong, but differing opinions on this. Dr. Mascotto noted that it would be nice to have the CIE reports and indicated that it could be useful to have a meeting to resolve issues on the two broadly different approaches now in use.

6-35 Present State of UV Disinfection
6-43 UV Water Disinfection
6-46 Proper Measurement of Passive UV Air Disinfection Sources. The status of several TCs relating to ultraviolet disinfection and the germicidal action spectrum (TCs 6-35; 6-43 and 6-46) were noted and Dr. Sliney explained that these groups had been active only by correspondence since their joint meeting in Warsaw. Mr. Richard Vincent (US) and Dr. Bob Levin (US) had both promised completion within the next few months.

6-29 UV Protective Index for Clothing. This committee has just completed a circulation and received important comments. Dr. Sliney stated that although the TC Chair, Peter Gies (Australia), was unable to come to San Francisco, he would discuss the last remaining issues with Robert Sayre later during the meeting, and if others were interested, to see him at the close of the meeting.

6-33 Photoimmunological Effects Mediated Through the Skin. Dr. Ed de Fabo (US), chair of TC 6-33, noted recent progress in the report on photoimmunological effects and indicated that he would soon meet with Dr. Sliney to resolve any final editorial questions.

6-48 Typical Minimal Erythemal Doses. Dr. Janusz Beer, the Chair of TC 6-48 on typical minimal erythemal doses (MED), indicated that the work had turned out to be somewhat more challenging than expected. They were collecting data for use in sunbed standards and related standards.

6-51 Standardized Solar Simulator Spectral Irradiance Distribution for Sunscreen Testing. Robert Sayre (US), the Chair of the newly created TC 6-51, reported that he was drafting an initial proposal for a standardized solar simulator spectral distribution for sunscreen testing. He explained that this was definitely needed and that the current guidelines allowed too much variation. The spectrum could be weighted to favour certain products, etc.

4. Proposals for New TC's and Reporterships.

Action Spectra

In the discussion on possible new work, the subject of reviewing old action spectra came up. Dr. David Sliney asked Dr. Anne Webb, University of Manchester, about how best to go about setting up a TC to draft a report on the "action spectrum and dose requirements for vitamin D synthesis in humans," since this was said to be well known, but the action spectrum published in most text books dated from many decades earlier. Was there new data and was there a dose threshold? Anne Webb, who as a graduate student had worked with Dr. Michael Holick in Boston, explained that as vitamin D synthesis was self regulated and also depended upon the presence of precursors, the latter was somewhat difficult to handle. Dr. Sliney agreed to telephone Dr. Holick to see if he would agree to chair such a TC or to obtain a recommendation as to the best candidate.

Dosimetry of Light Therapy

Dr. Sliney also noted that several people had approached him about setting up a Division 6 TC on the dosimetry of light therapy. He noted a number of papers at the ICP on this subject. He was looking for a potential chair for such a TC.

Photobiological Requirements for Broad-Band Solar UV Radiometers

Dr. Sliney also asked Dr. Michael Blumthaler, Innsbruck (A) about the need to have a TC evaluate the photobiological requirements for broad-band solar UV radiometers. He noted that a related TC was working in Division 2 and that Dr. Teresa Goodman, was the Division 6 liaison. Dr. Blumthaler agreed to consider this.

Biologically Relevant Source Terms for Outdoor Sunlight Exposure

Dr. Anne Webb (GB) also noted the recent work on biological dosimetric concepts for skin exposure and after some discussion it was agreed to examine the need for a TC to consider biologically relevant source terms for outdoor sunlight exposure which would be superior to the use of horizontal global UV irradiance. Dr. Sliney noted that TC 6-53 on personal dosimetry might either consider this concept or recommend a new TC.

Potential Health Effects Related to Indoor Illumination

Dr. Sliney noted that Dr. Marc Fontoynont (F), the Director of Division 3, on interior lighting had written to him about establishing a link with Division 3 relative to the non-visual effects and potential health effects related to indoor illumination. As Division 3 was responsible for interior lighting design, the relevance of health effects was quite important. Dr. Sliney asked for a volunteer to serve as a liaison, and it was suggested to seek out expertise from Division 6 members who were not present.

5. Meeting Adjournment.

The meeting adjourned with a comment from Dr. Brainard that the work of the CIE Division 6 leadership was greatly appreciated by those in attendance.

6. List of Attendees

Janusz Beer, FDA, Rockville, MD (USA)
George (Bud) Brainard, Jefferson University, Philadelphia, PA (USA)
Lynn Brainard, Jefferson University, Philadelphia, PA (USA)
Jean-Pierre Cesarini (ADD6), INSERM, Paris (F)
Howard Cyr, FDA, Rockville, MD (USA)
Edward de Fabo, George Washington University (USA)
Frank deGruijl, Utrecht (NL)
Yvon Deslauriers, Health Canada, Ottawa (CDA)
P. Donald Forbes, Argus Laboratories (USA)
Jan Grzonkowski, (Poland)
Andrew Kornhauser, FDA (USA)
Donald Krizek, Agriculture Research Centre, Beltsville, MD (USA)
Sharon Miller, FDA/CDRH, Rockville, MD (USA)
Frances Noonan, George Washington University (USA)
Pascale Reinhardt, Health Canada, Ottawa (CDA)
Petra Rettberg, DLR, Cologne (D)
Joan Roberts, Fordham University, New York, NY (USA)
Robert Sayre, Rapid Precision Testing Laboratories, Cordova, TN (USA)
David H. Sliney, DD6 (USA)
Per Soderberg, St Erik's Eye Hospital, Stockholm (S)
Irina Terenskaya, (Ukraine)
Frederick Urbach, Temple University Medical Centre, FT Washington, PA (USA)
Jan van der Leun, Utrecht (N-L)
Teresa West, Welch-Allyn, Skaneateles, NY (USA)

Note: Unfortunately, some attendees were not recorded on this list.

7. Post Meeting Information

Completed Technical Committees and New Publications

A new issue of the *CIE Collection in Photobiology and photochemistry* (CIE Publication 138-2000) is now being published and this includes the four technical committee reports from:

- TC 6-14 on the Blue Light Hazard
- TC 6-32 on the Action Spectrum for Photocarcinogenesis
- TC 6-34 on the Testing Protocols for Photocarcinogenesis Safety
- TC 6-41 on A Proposed Global UV Index (UVI)
- A report from a Division 6 Reporter, Angelika Anders, on the high-resolution UV erythema action spectrum obtained by a laser.

The report on the Global UV Index is now being prepared as a CIE international standard and the report on the blue-light hazard will be also the basis for a CIE standard action spectrum. The draft CEE Standard on the Photobiological Safety of Lamps has been approved and is now being sent out to National Committees for voting.

Reportership News

According to Division 6 records, the currently active reporterships include:

- Actinic aspects of daylight utilization indoor
- Actinic properties of sunlamps
- Lighting in fish farming
- Reflectance of natural materials
- EGG and vigilant reactivity
- Health-related institutions or buildings and radiant exposure
- Measurement of skin colour for clinically normal and certain pathological conditions
- UVR emitting car headlamps

SUMMARY TABLE OF DIVISION 6 TECHNICAL COMMITTEES, as of August 2000

No.	Chair	Title	Status
6-01	Sandor Ferenczi	Actinic Effects on Man	Completed, published as MFKI report.
6-02	Alistair McKinlay	Reference UV-Erythema Action Spectrum	Completed, published in CIE Journal 6/1, 1987. Re-published in CIE 106-1993.
6-03	Bernhard Steck	Photo-kerato-conjunctivitis	Completed, published in CIE Journal 5/1, 1986.
6-04	Charles C.E. Meulemans	Selected Photobiological Information	Closed at Durban 1997 meeting; data available.
6-05	G.S. Sarytchev	Actinic Effects on Plants	Completed, published in CIE Journal 6/2, 1987.
6-06	Kohtaro Kohmoto	UV Actinic Sources of Relevance To Illuminating Engineering	Closed in 1991, no publication.
6-07	G.S. Sarytchev	Recommendation of the Methods of Measurement of Optical Radiation In Terms of " Effects on the Corresponding Receivers	Transferred to Division 2, TC 2-31. No publication.
6-08	Dieter Kockott	Guidelines for Obtaining Action Spectra	Reported at Gaithersburg 1998 and faxes to D6 chair that draft has been sent out and will be edited based on editorial comments received.
6-09	Bernard Muel	Malignant Melanoma and Fluorescent Lighting	Completed, published in CIE Journal 7/1, 1988.
6-10	Maxim Mutzhas	Photobiological Effects on Human Skin	Completed, published as Annex 2 to Board Report 0302 and CIE 103-1993.
6-11	Jennifer Veitch	Systemic Neuroendocrine Effects of Optical Radiation on the Human	Update was presented to CNC-USNC Conference in Toronto, Ontario (1999). The completed draft should go to the committee for review by mid-December and, following revisions, to the Division in early 2001.
6-12	Jean-Pierre Cesarini	Phototesting of Skin Application for Sun Protection (UV-B)	Completed, published in CIE 90-1991.
6-13	G.S. Sarytchev	Lighting Aspects of Large-Scale Plant Growing in Completely Protected Environments ("Dark Rooms")	Closed for inactivity; work assumed by TC 6-42.
6-14	Kohtaro Kohmoto	Blue Light Photochemical Retinal Hazard	Completed, published in CIE 138-2000.
6-15	Nils Svendenius	A Computerized Approach to Reflection, Transmission, and Absorption Characteristics of the Human Eye	Recommended change of chair
6-16	Rikard Küller	Psychobiological Effects of Lighting	Completed, circulated in D6 for comment.
6-17	Lucia R. Ronchi	Spatial and Temporal Variability of Radiation Exposure and Human Behaviour	Closed at Durban, 1997. Other publication by Ronchi.

6-18	Alistair F. McKinlay	Evaluation of Potential Optical Hazards Associated with "Desk Top" Quartz Halogen Lamps	Completed, published in CIE 103-1993.
6-19	Joachim Barth	Personal Dosimetry of UV Radiation	Completed, published in CIE 98-1992.
6-20	Jean-Pierre Cesarini	Phototoxicity in Domestic and Industrial Environments	A complete file of phototoxic and photoallergic compounds has been completed. They have been classified in 3 categories corresponding to high frequency, and low frequency. Meeting is scheduled during 1994, after publication of the results of the European Community Commission.
6-21	David H. Sliney	Cataractogenesis by Low-Level Exposure to Ambient Ultraviolet Radiation	Chair working on final draft.
6-22	Ted W. Tibbitts	Terminology and Units for Characterizing Photosynthetically Active Radiation for Plants	Completed, published in CIE Technical Collection 106 as 106/18.
6-23	Donald T. Krizek	Develop Generalized Action Spectra for Plant Responses to Wavebands from 280 to 1100 nm	Chair reported on progress at 2000 meeting. DD6 recommended bringing report to closure by discussing the well-characterized action spectra, and summarize the special problems in determining these action spectra.
6-24	Jean-Pierre Cesarini	Sunscreen and UVA	Report will discuss relative merits of test methods and discuss state of knowledge.
6-25	Stephen Wengraitis	Spectral Weighting of Sunlight	Draft expected within couple of months after August 2000.
6-26	Jean-Pierre Cesarini	Standardization of the Terms UVA-1 and UVA-2	Completed, published in CIE 134-1999.
6-27	Alistair F. McKinlay	Standardization of the Erythema Action Spectrum	Completed, combined with 6-40 and published as CIE Std S007/E1998.
6-28	Jean-Pierre Cesarini	Standardization of Sunscreen Testing: Method of UV-A Sunscreen Testing	Group may correspond with similar TC 2-17. Much controversy exists over whether solar simulators are a good representation of real sunlight. Awaiting TC 6-24 report. Expect that report will discuss relative merits of test methods and discuss state of knowledge.
6-29	Peter Gies	UV Protective Index for Clothing	Expects to circulate revised draft by March 2000.
6-30	C. F. Wong	Dosimetry of UVR Exposure - UV Protection of the Eye	Completed, published in CIE 134-1999.
6-31	Jean-Pierre Cesarini	Immediate Pigment Darkening	Report will discuss state of knowledge
6-32	P. Donald Forbes	Action Spectrum for Photocarcinogenesis	Completed, published in CIE 138-2000.
6-33	Edward C. de Fabo	Photoimmunological Effects Mediated Through the Skin	Chair plans to meet with DD6 and finish document before end of year.
6-34	P. Donald Forbes	Testing Protocols for Photocarcinogenesis Safety Testing	Completed, published in CIE 138-2000.
6-35	Richard L. Vincent	Present State of UV Disinfection	Completion expected within next couple of months.

6-36	Natasha van Tonder	UV Protective Materials Used in Shading	TC joined by Prof. Kawanisi from Nihon University (Jpn). DiDomenico (US) resigned as TC member. A TC meeting is being organized in conjunction with the D6 annual meeting in 2001. The focus will be to review all publications on the subject and identify possible additional research topics.
6-37	David H. Sliney	Light and Retinal Disease	More needed animal data was recently provided. Group met at Gaithersburg 1998 meeting.
6-38	David H. Sliney	Photobiological Safety Standards for Lamps	Completed, published in CIE 134-1999.
6-39	Kohtaro Kohmoto	UV Radiation in Lighted Environments	Investigations have been completed and include more than 50 lamps. Need to establish guidelines for lamps. 1st draft sent to DD6 in June 2000.
6-40	Brian Diffey	Erythema Reference Action Spectrum and Standard	Completed. Published as CIE Std S007/E1998. Also published as ISO Erythema Dose 17166:1999/CIE S 007/E-1998.
6-41	Elizabeth C. Weatherhead	A Proposed Global UV Index	Completed, published in CIE 138-2000.
6-42	Herald Seidlitz	Plant Growth Chambers	New chair was appointed in Jan.1999.
6-43	Viney Jain	UV Water Disinfection	Met with 6-35, 6-46 members in Warsaw 1999.
6-44	Myron L. Wolbarsht	Illuminators for Treatment of Infant Hyperbilirubinemia	Chair reported at Gaithersburg 1998 the need for manufacturers to make illuminators with constant output during useful life. Also has developed a meter to measure amount of bilirubin in the patient.
6-45	Alex Ryer	Optical Radiation Hazard Measurements in the Work Space	Chair and new recruits met a Gaithersburg 1998 and composed a first draft for the document.
6-46	Ed Nardell	Standard Action Spectrum for UV Disinfection	Met with 6-35, 6-43 members in Warsaw 1 999. Rettberg asked by chair to assume leadership of TC.
6-47	Rolf Bergman	Photobiological Safety of Lamps and Lamp Systems	Completed, draft standard published as DS009. 1/E-2000.
6-48	Janusz Beer	Typical Minimal Erythema Doses	Collecting data for use in sunbed standards and related standards.
6-49	Myron Wolbarsht	Infrared Cataract	New TC.
6-50	Joseph Piechocki	Photodegradation of Pharmaceuticals	Researching manufacturers of lamps used in this field; currently negotiating to host a meeting of experts to develop specs for environmental chambers used in this field.
6-51	Robert Sayre	Standardized Solar Simulator Spectral Irradiance Distribution for Sunscreen Testing	Chair reported drafting an initial proposal for a spectral distribution at Year 2000 meeting.
6-52	Richard Vincent	Proper Measurement of Passive UV Air Disinfection Sources	New TC.
6-53	Gerda Horneck	Personal Dosimetry for UV Radiation	New TC.

The CIE Division 8 "Image Technology" and its Activities in 1999/2000

Report to the CNC-CIE, October 13, 2000

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1- Introduction

The CIE Division 8 "Image Technology" held its second meeting on 10 April 2000 in Derby, England. The following organization changes were announced and accepted by the voting members present:

- Mr. Michael Stokes has ceased to act as secretary and Division 8 is currently seeking a new secretary.
- Dr. Nathan Moroney was appointed new chair of TC8-01 following the resignation of Mr. G. Dispoto.
- Prof. R. Luo was appointed new chair of TC8-02 following the resignation of Michael Stokes.
- Mr. R Buckley was appointed new chair of TC8-05 following the resignation of Prof. L. MacDonald.
- Reportership R8-02 on fluorescence was closed after C. McCamy presented his report and recommended that a new TC be established to investigate fluorescence effects in imaging.
- A new reportship designated R8-04 was established to report on the effects of fluorescence in the characterization of imaging media. D. Rich will be acting on this.

Section 2 is the current organization of Division 8 following these changes.

The meeting was the occasion for most of the chairs, reporters and liaisons to present their report and more detail about this is presented in Sections 3-5.

Near the end of the meeting, Professor Christine Fernandez-Maloigne, of the French Color Group, made a presentation on the need the need to develop a database and procedures for end-use driven decision determination about methods to use in processing a color image. The database would contain colour information, psychophysical information and image quality and robustness. It was proposed that this might form the basis for a new TC. It was decided that this was to extensive to evaluate in the available meeting time and it was agreed that an English version of the proposal would be prepared and distributed to the division for review and consideration. Such document was indeed prepared and distributed in electronic format to division members on June 30 2000. It proposes a new TC as well as a partnership with the French Color Group. Todd Newman formally has asked for volunteers to liaise with the French group. He also has suggested that interested people meet with Ms. Fernandez and draft a proposal of terms of reference and work programme.

A new moderated Divisional email list has been established. It is intended to reach all those who actively participate in Division 8 of the CIE: Division officers, Division members, and TC members. It can be reached by mailing to ciedivision8-L@vivid.colour.org .

Next Division 8 meeting will be held in Scottsdale in Fall 2001.

2- Organization

Terms of Reference:

To study procedures and prepare guides and standards for the 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.

Domain d'activité:

Etudier les méthodes et préparer des recommendations et des normes, relative aux aspects optiques, visuels et métrologiques de la communication, du traitement et de la reproduction des images, applicables à tous les types de dispositifs d'acquisition, de conservation et de restitution, aussi bien analogiques que numériques.

Web site: http://www.colour.org/

2.1 Division Officers

Director of Division	Todd Newman
Associate Directors	Dr. Mike Pointer (CIE liaison)
	David McDowell (external liaison)
	Dr. Noboru Ohta (reporters)
Secretary of Division	
Editor of Division	Dr. Mike Pointer

2.2 Official Division Members

CIE Division 8 has 34 member countries. Canadian Member: Réjean Baribeau

2.3 Liaisons

CIE Division 8 has liaisons with the following organizations and liaison officers:

CIE Division 1 (Michael Pointer)
CIE Division 2 (Y. Ohno)
AIC - Association Internationale de la Couleur
ISO/TC36: Cinematography
ISO/TC38/SC1: Textiles: Colour Fastness & Measurement
ISC/TC42: Photography (Mike Pointer)
ISO/TC61/SC5/WG1:
ISO/TC159/SC4/WG2: Ergonomics/Sign & Contr/VDU Requirements
ISO/TC187: Colour Notations
ISO/TC6/WG3: Paper Board and Pulp - Optical Properties
ISO/TC130: Graphic Technology(Danny Rich)
ISO/IEC/JTAG2:Joint Technical Advisory Group (JTAG) 2 for Imagery(Tim Kohler)
ICC -- International Colour Consortium (Tim Kohler)
CCPR - Comité Consultatif de Photométrie et Radiométrie,
BIPM
IEC/TC100 Multimedia Equipment and (Danny Rich)
ASTM/E12 Color and Appearance (Mike Pointer)

2.4 Publications from Division 8

None.

2.5 Technical Reports

None.

2.6 Technical Committees

TC8-01: Colour Appearance Modeling for Colour Management Applications
TC8-02: Colour Difference Evaluation in Images
TC8-03: Gamut Mapping
TC8-04: Adaptation under Mixed Illumination Conditions
TC8-05: Communication of Colour Information
TC8-06: Image Technology Vocabulary

2.7 Reporterships

R8-01 Reportership on Grading of Color Measurement Equipment (Y. Ohno)
R8-02 Reportership of Fluorescence (C. McCamy) –closed.
R8-03 Reportership on Potential CIE and IEC/TC100/PT61966 Interactions (H. Ikeda)
R9-04 Reportership on the Effects of Fluorescence in the Characterization of Imaging Media. (D. Rich)

2.8 Activity Reports

The following activity reports are available in electronic format at the CIE Division 8 Web site:

Report from 29 September 1998 Division meeting
Divisional Status report prepared for 24th Session of the CIE
Report from 28 June 1999 Division meeting
Attendees at the 28 June 1999 Division meeting
Minutes of 10 April 2000 Division meeting

3- Technical Committees work in progress

TC8-01: Colour Appearance Modeling for Colour Management Applications

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.

Chair: Nathan Moroney
Web site: http://www.colour.org/tc8-01/

The activities of this TC are difficult to follow from outside because only one face to face meeting took place so far and minutes from that meeting seem unavailable. Resigning chair G. Dispoto reported during Division 8 meeting that a recent paper by Nathan Moroney reports better hue constancy using CIECAM97s instead of CIELAB. He indicated that a more formal set of goals and procedures will be prepared and that more active participation from the industry will be sought.

Issues that had been identified as of Fall 1998 were: Floating J_{min} , Categorical Surround, Gamut Size Issues, Invertability, Cartesian Representation, Complexity, Chroma Expansion, and Viewing Condition Parameter Guidelines (see http://www.colour.org/tc8-01/QR_Fall98.pdf for more details). Regarding the first of those issues, Luo and Hunt had developed a modification that made J=0 when L*=0.

TC8-02: Colour Difference Evaluation in Images

Terms of Reference:
To study, develop and standardize methods to derive colour differences for images.

Chair: Ronnier Luo
Web site: http://www.colour.org/tc8-02/

Chair M. Stokes has resigned from this TC and there had been no activity since the Warsaw meeting before the committee met in Derby under the auspice of the new chair Prof. R. Luo. The working interim report "Methods to Derive Colour Differences for Images" was commented by Prof. Luo. He suggested to add a section on spatial-based models. There were three presentations during this meeting:

1. Prof. Luo reported on the new CIE2000 colour-difference formula that had just been adopted by the CIE TC1-47 and suggested its use as part of the calculation for deriving colour differences of images. The issue of perceptibility vs. acceptability was raised and it was argued that more was needed than merely averaging errors in order to evaluate how good a print is.
2. A second presentation was on tolerances derived from comparison of pairs of images on a CRT. Perceptibility thresholds were found to be in the range $\Delta E^* \cong 2$ and acceptability thresholds in the range $\Delta E^* \cong 5$, with a fixed ratio between these two (no dependence with L* for example).
3. Prof. M. Fairchild presented results of colorimetric tolerance tests of various digital imaging displays, including the IBM Roentgen prototype (200 dpi, 150 cd/m2). The emphasis was on the interdependence between sharpness and colourfullness. This work has been submitted to the 2000 IS&T/SID Color Imaging Conference.

Members are to put together the material that already exist including some small to medium difference data sets and some test images.

TC8-03: Gamut Mapping

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.

Chair: Jan Morovic
Web site: http://www.colour.org/tc8-03/

In short, the work program of this TC is:

- To review current Gamut Mapping Algorithms (GMAs).
- To provide guidelines for the evaluation of GMAs.
- To review results of GMA evaluation.
- To recommend a standard GMA, or a small number of GMAs with rules for deciding which one to use.

The survey of GMAs has been completed and a document *Survey of Gamut Mapping Algorithms* has been submitted to Color Research and Application for publication. To everywone's surprise, it was rejected and will be submitted to the Journal of IS&T. A draft of it can be downlaoded as a PDF file, and extracts in HTML format are available as well.

A fifth draft of the guidelines for the evaluation of GMAs was reviewed during the 14 April 2000 TC meeting; the following sections, with related issues, were discussed:

- Media and Test Images.
  Six work-flows will be considered: e-camera to print, CRT to print, e-camera to print, transparency to print, reflection print to print, virtual scene to print. There will be one mandatory image and three or four recommended images which would be available in wide gamut, sRGB and transparency
- Viewing Conditions and measurements.
  Experimenters are only required to report the manufacturer and model of the light source and luminaire. The group thinks that fluorescence affects on metamerism and that fluorescent lamps should be avoided, with everyone using some daylight simulator.
- Gamut Boundary.
  People are left to choose any representation they like, and are free to use either the gamut of the medium or that of a specific image.
- GMAs.
  Dr. Morovic is to provide reference implementations of two algorithms: one of the clipping type and one of the compression type. These GMAs will be mandatory for all experiments.
- Colour Space.
  The group is liberal about colour space to use for the experiments, but gamut boundaries should be reported in CIELAB. Nathan's Moroney's paper will be referenced as the guideline on how to use CIECAM97s.
- Experimental Method.
  Experiments with at least 15 observers are recommended. The Ishihara test is recommended as a minimum when selecting the observers.

This TC is to meet on Nov. 6 in Scottsdale.

TC8-04: Adaptation under Mixed Illumination Conditions

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.

Chair: Naoya Katoh
Web site: http://www.colour.org/tc8-04/

The work program of this TC is:

- Survey past relevant works
- Share a standard method and guideline for cross-examination
- Perform cross-examinations at different laboratories
- Publish a Report

A survey of relevant work (authors, titles, and, for some, abstracts) has been made available on the Web site.

The basic idea for the cross-examination is to show to test observers some soft copies and hard copies side by side and to find the percentage of adaptation between the two underlying illuminants for the best match. A related issue is the determination of the adapted white point (AWP) for a single media and Ms. Oskoui and Pirotta have proposed their own model and will be try to improve it and extend it to the softcopy/hardcopy cases. This is complicate because issues such as the size of white borders used as proximal field and the time of fixation of the soft copies and hard copies play a role. It is agreed that CIECAM97s2 model is to be used by the members in future experiments on AWP determination. An Excel implementation of CIECAM97s2 is available on the Web site. Images are being proposed for the testing and are available in sRGB format from the Web site. The committee wants to use the F11 as standard

fluorescent and is to check if Phillips' TLD840 is a good enough approximation to it. In any case, the spectral values from the actual lamps used during the experiments should be measured and reported.

Research needs to be done in accessing the differences in results of memory matching versus simultaneous binocular matching and to eventually incorporate a new parameter for this into CIECAM2s.

It is acknowledge by the members that CIECAM as it is today does not address mixed mode situations adequately and that extra parameters may have to be introduced in order to achieve the desired adaptation.

TC8-05: Communication of Colour Information

Terms of Reference:
To standardize a minimal set of techniques that enable unambiguous and efficient communication of the colour information in images. Two fundamental approaches will be addressed:

- The association with the image data of additional data that describes the colour space of the image data.
- 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.

Chair: Rob Buckley
Web site: http://www.colour.org/tc8-05/

The desire of this TC is to prepare a technical report to be drafted into a joint standard with ISO/IEC. A new program of work has been prepared and covers three areas: Terminology, Procedures for evaluation of colour spaces, and Methods of analysis of evaluation data. Task groups are associated with each of those and are led by M. Pointer, K. Spaulding and R. Buckley respectively. A draft report on terminology has been drafted and will be passed to TC8-06; further interaction with that group is anticipated regarding terminology. A preliminary list of evaluation criteria has been drafted and is being revised.

The TC will be playing a major role in the preparation and support of the Color Experts conference (Scottsdale, November 2000) to discuss the issues involved in Communication of Colour.

TC8-06: Image Technology Vocabulary

Terms of Reference:
To liaise with TC7-06 (International Lighting Vocabulary) and collate definitions of terms associated with image technology.

Chair: Janos D. Schanda
Web site: http://www.colour.org/tc8-06/

This committed has been approved by the Board of Directors. There was no report from this TC during the Division 8 meeting.

4- Reporterships

R8-01 Reportership on Grading of Color Measurement Equipment
(Y. Ohno)

Y. Ohno suggests that a method for colorimeter and digital camera evaluation be developed using a form of the CIE Publ. 13.3 Color Rendering Index as a test metric. He wants to continue this reportership as he follows the use of this index for instrument evaluation in a closely related CIE Division 2 reportership.

R8-02 Reportership on Fluorescence
C McCamy (USA)

Terms of Reference
To report annually on problems involving fluorescence in image technology, activities in the standards bodies and publications that bear on fluorescence problems, and to recommend the formation of a technical committee if such activity appears desirable.

A written report was received from C. McCamy recommending that a new TC be established to investigate fluorescence effects in imaging. This reportership is now closed. Reportership R8-04 was created following this.

R8-03 Reportership on potential CIE and IEC/TC100/PT61966 interactions
H Ikeda (Japan)

Terms of Reference
To produce a report on how CIE Division 8 should interact with IEC TC100 PT61966. End Date: March 2000.

A report on this activity has been produced by Dr. Ikeda.

R8-04 Reportership on the Effects of Fluorescence in the Characterization of Imaging Media.
D. Rich (USA)

The reporter is to define the issues and report on what the terms of reference and working program should be for possibly a Division 2 TC.

5- Outside Liaison Reports

Reports, most of which were in electronic format, have been presented during the Division 8 meeting by the following liaison:
CIE Division 1 (Michael Pointer)
CIE Division 2 (Y. Ohno)
ISO/IEC/JTAG2:Joint Technical Advisory Group (JTAG) 2 for Imagery(Tim Kohler)
ICC -- International Colour Consortium (Tim Kohler)
ISO/TC130: Graphic Technology(Danny Rich)
ISC/TC42: Photography (Mike Pointer)
ASTM/E12 Color and Appearance (Mike Pointer)
IEC/TC100 Multimedia Equipment and (Danny Rich)