STANDARDS COORDINATING COMMITTEE 28
(NONIONIZING RADIATION)

Annual Report: 1999 – 2000

Executive Summary:

The membership of SCC-28 has increased to 101. Although 6 members were dropped from the roster we gained 9 new members, mostly non-U.S. The number of non-U.S. members now stands at 18. With the leadership of Dr. Michael Murphy, Chairman of International Liaison, and Dr. Tom McManus, Membership Chairman, the SCC-28 Committee and its Subcommittees are becoming increasingly international. During the year a mailing of substantial material about SCC-28, including a complimentary copy of IEEE C95.1-1991 (1999 Edition) was made to over 200 key health or standards organizations around the world. In addition, Dr. McManus carried out extensive mailings to key non-U.S. personnel in the field of non-ionizing radiation with an invitation to attend our meetings in Munich, Germany. Between 40 and 50 non-U.S. people attended the various meetings of SCC-28 in Munich, our first meeting outside of the U.S. These events, as well as associated activities, continue to make IEEE SCC-28 more international and the broadest-consensus body in the world for standards on the safe use of electromagnetic energy. As an outgrowth of these activities, a proposal has been generated for the creation of a Council to oversee SCCs dealing with electromagnetic energy (non-ionizing radiation), which now include both SCC-28 and SCC-34. This Council would be named the International Council on Electromagnetic Safety (ICES). The Council would include representatives of the involved SCCs and key organizations that contribute financial support to ICES. We believe ICES is important to permit a more efficient operation of an international Committee entailing significant travel for key contributors (volunteers) around the world.

Besides international expansion, the highlights of the work of SCC-28 in the last year have included: (a) Publication of IEEE C95.2-1999, *IEEE Standard for Radio-Frequency Energy and Current-Flow Symbols*, the revision of IEEE C95.2-1982; (b) Balloting at the Committee level of the draft Recommended Practices on safe distances between RF sources and electro-explosive devices; (c) Balloting at the Subcommittee level of a draft Recommended Practice (a revised C95.3) on measurement techniques; (d) Intense activity within SC4 towards the revision of C95.1 including continued literature reviews and meetings of the risk assessment working group and the

editorial committee; (e) Discussion in SC3 of draft material for a standard for safe exposure below 3 kHz based on the work of J. Patrick Reilly; and the submission to an U. S. interagency committee of a consensus statement on the use of cautionary policies relative to potential hazards of exposure to low levels of electromagnetic fields.

The Executive Committee (EXCOM) of six (plus ex-officio IEEE staff liaison) continues to be very busy. Five meetings were held at various places, including one at Murray Hill and Piscataway, New Jersey. In addition one teleconference was held plus numerous E-mail correspondence, etc. During the year we revised the SCC-28 policies and procedures following the model of a Type 2 SCC and a preceding document submitted on behalf of SCC-34. In this revision we incorporated instructions on Interpretations and Appeals following drafts prepared by our Vice-Chairman (Dr. Eleanor Adair of the Air Force Research Laboratory) and recent revisions in IEEE policies. The revised P&P document for SCC-28 was submitted to the Standards Department this summer. Most recently the EXCOM has submitted comments to the IEEE Standards Board in opposition to a proposed mandatory (or-semi mandatory) fee to be imposed on participants of balloting groups and who are not members of the IEEE-SA. In the subject area that SCC-28 addresses, the participation of volunteers from all disciplines, including medicine and life sciences, is required. In addition, as SCC-28 expands internationally, the participation of people from many countries is required. It is clear to the hundreds of volunteers who contribute to the process through SCC-28, that such a fee would seriously affect the work and credibility of documents produced. Since most volunteers do not represent industrial vested interests, to which the proposed policy may reasonably apply, the existence of such a formal policy could be very discouraging and produce unintended results.

We continue to work towards the refining of the C95.1 Standard to be more purely an ***exposure*** standard. The creation of an appropriate committee for the development of environmental standards remains to be done.

As mentioned above, the key aspect of SCC-28 activity today is international expansion. Response to our international mailings from various countries, e.g. Saudi Arabia, Albania, South Africa, New Zealand as well as mainstream European countries reflects a widespread interest in participation in a process to develop world-wide consensus on matters of safety standards for the safe use of electromagnetic energy. This international activity, although greatly facilitated by modern electronic communications, still will require new financial support beginning with the need to subsidize travel, often intercontinental. The proposed Council (ICES) is the basic solution. We look forward to working with the IEEE to make the Council and its functions a reality.

Another aspect of international harmonization of standards is our liaison relationship to other standards groups and in particular, the International Commission on Non-Ionizing Radiation Protection (ICNIRP). In the spring of 2000, ICNIRP invited the leadership of SCC-28 to a closed meeting with 5-6 leaders of ICNIRP to discuss potential collaboration and cooperation towards the goal on international harmonization of standards. The first of such meetings was held in Munich, Germany on June 12. In addition to SCC-28 leadership, this meeting was also attended by IEEE staff liaison. This will be followed by other meetings beginning in November 2000 in San Antonio, Texas.

While SCC-28 is devoted to *exposure* standards, we recognize the importance of maintaining close liaison to the organizations that develop *product-performance* standards. We are fortunate that the Chairman of SCC-34 is Ron Petersen who is also our Executive Secretary. This facilitates the cooperation of SCC-28 and SCC-34 on matters such as resolving questions of SAR definitions and “extremity” definitions which have come up during the development of certification procedures for hand-held wireless phones by SCC-34. Through SCC-34 and Ron

Petersen and others, we also maintain liaison with other committees that address measurement techniques and product standards like CENELEC in Europe and the IEC (International Electrotechnical Commission). The latter organization has created a new umbrella committee, TC-106 that is chaired by Ron Petersen.

It is important to note that these diligent activities in standards setting for electromagnetic energy are taking place at the same time that other media and governmental actions threaten the primacy of science-based standards. These events include the proposed applications of the Precautionary Principle in the area of electromagnetic energy, at least in Europe, and various media events alleging hazards of exposure to wireless handsets, generally with sensationalism and great distortion. We acknowledge the fruitful efforts by many groups, including the IEEE Committee on Man and Radiation (COMAR), the U. S. Air Force and the World Health Organization (WHO) to shed light on these issues while supporting the primacy of science-based standards as the basis for regulations and policy development by governmental authorities.

Membership and Organization:

SCC-28 consists of a parent (administrative) Committee and five Subcommittees whose Chairmen are listed on the letterhead (cover page of this report). The Subcommittees are dominated by research scientists and engineers and they do most of the work in developing or revising new standards (or other documents). The one change in the leadership of SCC-28 resulted from the death of Matthew Mingoia, long-time Secretary of Subcommittee 3 and a faithful member of SCC-28 for many years beginning in the eighties when he represented the Edison Electric Institute. The new Secretary of Subcommittee 3 is James M. Daly who is well-known to the IEEE Standards Board.

As we related in last year's report, the key development in SCC-28 leadership is the expanded role of our Membership Committee Chairman, Dr. Tom McManus, of the Department of Public Enterprise in Ireland. He has taken the membership base and membership policies built up by Dr. Quirino Balzano and extended them into a global expansion mode with the important help of our International Liaison Chairman, Dr. Michael Murphy of the U. S. Air Force. During the past year he played a key role in carrying out our international mailing and inviting non-U.S. professionals to attend our meetings in Munich and to join and participate in our organization. In addition he has informed the EXCOM and the SCC-28 community of events in Europe related to our subject area. Since he is a member of key committees dealing with this area in the European Parliament, he is an authoritative source of information on European activities.

The Executive Committee is listed on the letterhead. It met five times during the year: in Atlanta in October 1999; San Antonio in January 2000; Murray Hill and Piscataway, New Jersey in March, 2000; Munich, Germany in June, 2000; and Gig Harbor, Washington in August 2000. We also met by teleconference in April 2000. In addition the EXCOM engages in extensive E-mail correspondence as necessary to address a multitude of administrative and policy questions.

During the year we gained 9 new members, 8 of whom are non-U. S. through the key efforts of Drs. McManus and Murphy. Our non-U.S. membership now stands at 18 distributed as follows: U.K. (3), Australia (3), Sweden (2) and 1 each in Ireland, Northern Ireland, Switzerland, Italy, Bulgaria, Finland, Greece, Israel, China and Canada. Our near-term goal for SCC-28 is 33% non-U. S. to match roughly the proportion of non-U.S. membership in the IEEE. We believe there are up to 10 more non U. S. people interested in SCC-28 membership based upon our interaction at the Munich meetings and correspondence with Dr. McManus. Substantial additional non U. S. participation has been infused also into the Subcommittees as a result of the Munich meetings, although we don't have an accurate accounting at this time. It is clear,

however, that we are well on our way to be a truly broad-based international organization for standards setting in the field of safe use of electromagnetic energy. We acknowledge the support and advice of the IEEE Standards Activities, led by Judy Gorman in this international expansion.

In terms of stakeholders we are well balanced except for a lack of representation among wireless industry groups. Overtures to CTIA have failed because of a reported policy against activity in “technical” activities. We are exploring other trade associations that represent this industry.

Our total mailing list is over 350, which number includes the many volunteers on the Subcommittees. As in the past we must stress to the IEEE the importance, which SCC-28 somewhat uniquely bestows, of these Subcommittees, following the traditions initiated by the key founder of the C95 standards community, Prof. Herman P. Schwan in the sixties with the support of the IEEE and the U. S. Navy. The Subcommittees are composed mainly of research scientists and engineers of all disciplines ranging from medicine and epidemiology to microbiology and physics. Included are more practical disciplines of industrial health specialists and measurement engineering specialists. They are well balanced among disciplines and their deliberations, including balloting, are given the same formal respect and due process as the deliberations of the parent administrative Committee, SCC-28. The latter is considered the official “balloting group” by the IEEE and is aimed at reflecting balance among stakeholders according to the conventional rules of the IEEE such as distribution among user, producer and general categories. We can now add the question of geographical distribution with the goal of truly international distribution—so that many countries are represented in the international consensus of future C95 standards.

So we see that besides broad distribution of participants we have a 3-tier process of approval of documents; first by the working scientists (SC level), then by the stakeholders (SCC level) and finally by the IEEE itself (Standards Board level). This process of approval by stages only enhances the credibility of the product and the role of the IEEE system in assuring due process, broad consensus and input from all stakeholders. In addition SCC-28 and its Subcommittees adhere to the principles of openness (transparency) and full documentation of all deliberations available to all.

It is clear that it is impractical that all volunteers in the SCC-28 community be IEEE or SA members. We do encourage IEEE membership and over 50 % of the SCC-28 members have been IEEE members in the past. As our international makeup grows we will continue to encourage IEEE membership and require such membership for all officers, which has been graciously agreed to by all officers heretofore. In Appendix A we list the roster of SCC-28 members, with their IEEE membership number if known at this time. We will continue to update this information as it accrues.

We are aware of the current debate about a fee for “invited” experts to participate in IEEE-SA approved or sponsored balloting. This applies only to balloting at the SCC level, as we understand it, and not the Subcommittee level, which is considered a “working group” by the IEEE. Still such a rule would severely and adversely impact SCC-28 if enacted, because many of our members are non-engineers, e.g. MDs, and/or from outside the U. S. where their primary professional affiliation may not be IEEE. In the latter cases we certainly will encourage future IEEE membership but at the same time encourage their primary organization to coordinate and work with IEEE through SCC-28. This can only lead to greater appreciation of the IEEE throughout the world and eventually increase IEEE membership on a wholesome voluntary basis. It would be unfortunate if IEEE global expansion were discouraged by any heavy-handed rules about IEEE membership for volunteers—“invited experts”.

Besides international expansion, SCC-28 has been proactive in encouraging broader participation by governmental agencies. The project, reported in last year's report, of a letter from IEEE-USA to federal agencies, encouraging such broad and uniform support, has been delayed for extraneous reasons. We hope, however, that under the leadership of Dr. John Moulder, Chairman of SC3 of the Medical Technology Policy Committee of IEEE-USA, that this task will soon be carried out.

During the year we revised the Operating Rules for SCC-28 (Policy and Procedures) to conform to the Model Type 2 P&P for SCCs, including reference to revised IEEE procedures as for Interpretations. The revised P&P were submitted during the summer of 2000 to the Standards Department for approval.

Activity:

For the past year, we compare the objectives (in italics), stated in last year's report, with actual achievements during the year.

1999 – 2000:

Continue to revise and update roster. Continue expansion of non-U. S. membership under the leadership of Drs. McManus and Murphy.

As reported earlier in this report we have expanded our non-U. S. membership to 18. The roster is continually being updated and the last update is Appendix A.

In February 2000, a membership update form was sent by U. S. mail to every SCC-28 member. The information received was used to update the rosters, especially on E-mail address. In addition a follow-up personal contact by EXCOM members of non-respondents narrowed the non-respondents down to a few who were dropped from the roster. Before being dropped from the roll, the EXCOM reviewed the history of communication, either of indications to resign or continued non-response to contacts.

Have representatives of SCC-28 attend meetings in Moscow (Sept. '99), Munich (oct.'99), Erice (Nov.'99) and elsewhere on international harmonization of standards.

Drs. Adair and Murphy attended the Moscow meeting, Dr. Osepchuk attended the Munich meeting and Ronald Petersen attended the Erice meeting. In addition many SCC-28 members participated in meetings in Munich on standards harmonization during an Air Force sponsored Forum. Finally the Chairman of SCC-28, presented an invited report on the activities of IEEE SCC-28 to a meeting of the WHO international EMF project held on June 19 – 20, 2000, in Geneva.

Review and confirm liaison arrangements between SCC-28 and IEC in view of new IEEE policy and new IEC objectives.

The Advisory Committee on Electromagnetic Compatibility within IEC to which SCC-28 maintained a liaison relationship was disbanded after they made a recommendation to form a new umbrella committee in IEC to oversee all activity on standards relating to assessment of exposure to electromagnetic energy at frequencies between 0 and 300 GHz. The Secretariat for this new Committee, TC-106, was given to Canada and they selected the new Chairman, Ronald Petersen. TC-106 is expected to hold its first meetings in October 2000 and we are assured of good communication with this new Committee and associated groups such as CENELEC committees.

Carry out various tasks to support the success of the first meeting of SCC-28 overseas, in Munich, in June 2000. Carry out a mailing through the IEEE to an extensive (>200) list of health agencies and standards organizations throughout the world. A covering letter from SCC-28

Chairman will explain the work of SCC-28 and invite participation. Enclosed materials will include the new SCC-28 brochure, material describing the IEEE, and a description of current activities within SCC-28.

This international mailing was carried out successfully in early 2000. It has triggered various communications of interest around the world in SCC-28 and, no doubt helped to stimulate attendance at the Munich meetings. The mailing, including the new brochure, was subsidized by Lucent Technologies, Raytheon, Motorola and the U. S. Air Force. It was supplemented by separate mailings to many key professionals in the field throughout the world by Dr. McManus who extended a personal invitation to attend and participate in the Munich meetings. The meetings at Munich took place on Friday and Saturday, June 9 and 10 and included meetings of SCC-34, SC4 and SC3 of SCC-28 and finally SCC-28. In attendance were about 20 U. S. SCC-28 members and other U. S. observers plus between 40 and 50 non-U. S. people. Many of these have indicated interest in a Subcommittee and/or the parent Committee. About 40 non-U.S. people are now on the SC4 roster and 10 to 20 have indicated a desire to join SCC-28. These meetings were very productive. Besides the normal discussions at these meetings we had the privilege of an address by Judy Gorman at the SCC-28 meeting to explain the global goals of the IEEE and the relation to SCC-28/34 expansion internationally. The presence of IEEE members anywhere in the world was stressed along with the desire of the IEEE to coordinate with local engineering professional societies, as well.

An unplanned productive meeting of the SCC-28 leadership and the ICNIRP leadership took place on June 12 in Munich. This transpired after an invitation from ICNIRP was extended to IEEE and accepted. The closed meeting was congenial and productive. Plans for further meetings beginning with a meeting at San Antonio in November were made. Besides maintaining closer communications we believe these meetings will be a step toward serious work on international harmonization of standards for the safe use of electromagnetic energy.

Copies of the brochure on SCC-28 are being submitted along with this report to the Standards Board for their perusal and reference.

Ballot revisions of C95.3 and C95.4

The balloting on the revision of C95.3, the measurement techniques standard, was delayed and was conducted this year at the SC1 level. This document is now being prepared for a re-circulation ballot within SC-1.

The balloting on C95.4, the Recommended Practice for safe distances for use of EEDs from RF sources was carried out at the SCC-28 level. The final draft is being modified to reflect comments from coordinating groups and some of the balloters. It is expected that it will to be re-circulated shortly and submitted to the Standards Board in 2000.

Complete revisions of the SCC-28 Operating Procedures for submission to SCC-28 and Standards Board.

The revised operating procedures for SCC-28 were drafted following the model for Type 2 SCCs and the preceding procedures for SCC-34. They incorporated procedures on interpretations and appeals, which were developed by Vice Chairman, Dr. Eleanor Adair. They were submitted to the Standards Board this summer.

Work with IEEE-USA in the letter campaign encouraging uniform support and participation of SCC-28 among Federal agencies.

This action was delayed because of a change in leadership in the MTPC Committee in the IEEE-USA, which necessitated a reindoctrination of this leadership on the rationale for the action. The mailing consists of a short letter, already drafted with an enclosure representing a

statement approved by consensus of the SC3 of the MTPC, under Dr. John Moulder, Chairman. Both general and specific mailing lists have been supplied and we hope the action will be carried out this year.

Consider newly proposed publications about SCC-28 and its standards in journals like ***Health Physics.***

This important suggestion was made by Dr. McManus. No action was taken during this year but it remains to be done.

Begin Fund-raising.

This long-delayed task has become urgently needed as our international expansion proceeds. It is being introduced as part of our proposal to create the ***International Council on Electromagnetic Safety*** by the IEEE as a governing structure above the current SCCs in this field, viz. SCC-28 and SCC-34. The need for and value of a name change was first voiced by Judy Gorman at our EXCOM meeting in March at Piscataway. She noted that the name, SCC-28, is not very informative to non-U. S. people on the scope of our work or its international nature. Following our successful meetings in Munich the impetus for this change has accelerated, both from U.S. and non-U.S. membership.

A draft proposal has been prepared by the SCC-28 Chairman and submitted to Judy Gorman and staff and the SCC-28 EXCOM. The concept is for a Council consisting of representatives of the two SCCs as well as organizations who provide financial support. This Council will oversee the raising and expenditure of funds for these SCCs. In addition the Council will distribute to members and supporters appropriate progress and other reports to permit supporters to be kept informed in a timely fashion of global developments in this field. A high-priority item in anticipated budgets will be the support of international travel of selected individuals to insure ample representation of key organizations and countries in the activities of SCC-28 and SCC-34. We look forward to working with IEEE to carry out the formation of this Council and begin fund-raising.

In the late spring of 2000, the TransAtlantic Business Dialogue (TABD) expressed interest in meeting with SCC-28 to discuss how international harmonization could be pursued. Since ICNIRP does not accept input from “industrial vested interests”, in principle TABD cannot directly influence ICNIRP. This common interest resulted in a meeting on August 16 in Washington, D. C. at the offices of NEMA. Present were officers of SCC-28, staff people from IEEE, and representatives of TABD, NEMA, EEI, AHAM and Motorola. A key attendant was Dr. McManus who was able to provide an accurate report of the status of the ICNIRP’98 Guidelines in Europe. At the meeting the plans for a new Council, ICES was aired as well as the need for fund-raising. Specific focus was drawn to the series of meetings in San Antonio in November (12 – 19) of WHO, ICNIRP and SCC-28 groups. A closed meeting of SCC-28 and ICNIRP leadership is expected. In addition the first two days of the week will be devoted by WHO to a review of international harmonization and a proposal to form a working group on this task.

Another unscheduled accomplishment of SCC-28 during the year was the submission of a consensus advice document to the Inter Agency Committee (IAC) which was charged with submitting a report to Congress following the completion of the EMF RAPID program. Two members of the IAC, who are members of SCC-28 presented a request for advice to SCC-28 at its meeting in Atlanta in October, 1999. SCC-28 was asked how the idea of cautionary policies and procedures could be introduced into occupational protection programs, given the remaining uncertainties about the possibility of a small health effect from exposure to low-level EM fields.

A consensus statement was drafted, reviewed by the Committee and modified to be a true consensus. It was sent to the IAC in late 1999. Basically, the statement advised that such

cautionary policies are suitable for discussion in documents that are at the authority level of a "Guide" in IEEE parlance—i.e. measures that may be taken at the discretion of local supervisors, authorities, etc. without the higher level of authority suggested in Recommended Practices or Standards.

In May 2000, the question of SCC-28 policy towards journalists was raised. At issue was the desire of a journalist to be informed and invited to all meetings of SCC-28. After review by staff and IEEE counsel, the SCC-28 Chairman issued a memo restating SCC-28 policy in light of the *Guide to IEEE Standards Meeting Policies* issued in September 1999. The SCC-28 policy is very hospitable towards the press for most meetings and documents. The press, however, will not be invited to meetings of the EXCOM and small working group meetings where, in the judgment of the Chairmen, the presence of the press would be detrimental to free discussion.

Also in May 2000, we were informed of an E-mail communication by a doctoral student inquiring about policies and procedures in standards setting. This questionnaire of 79 substantial questions was sent to over 300 people around the world, including many SCC-28 members. Since some of the questions seemed directed towards the IEEE, the question arose if anybody could or should respond to such questions. After consultation with the EXCOM and IEEE staff, the SCC-28 Chairman sent a letter to the doctoral student with a copy to all SCC-28 members. In that letter the Chairman made it clear that no one person could respond on behalf of the IEEE to such questions. Furthermore it was pointed out that the questionnaire was so burdensome that knowledgeable professionals could spend several weeks preparing a response. The doctoral student was invited to study the extensive documented record of SCC-28 activities and to participate personally in SCC-28 activities. He was informed of current activities and invited to respond by attendance at meetings or by some other actions.

SC1:

Help shepherd the revised C95.3 through SCC-28 and the Standards Board.

A meeting of SC1 was held in Durham, NC on March 15, 2000 to finalize a draft of a revised C95.3 Recommended Practice on measurement techniques. This was balloted by SC1 in the late spring of 2000. This is a substantial document that invites much detailed comment and review. The response, however, has been overwhelmingly positive. Editorial comments and one substantive change are now being incorporated and the document will be sent to the subcommittee in September for re-circulation ballot. Thus we expect this draft to be balloted by SCC-28 in 2000 and sent on to the IEEE Standards Board in early 2001.

Address questions on frequencies less than 3 kHz.

This has not been done yet, partly because of the absence of an IEEE exposure standard for frequencies below 3 kHz. We may note here, that the charter of SCC-34 is limited to frequencies above 3 kHz, also, in part because of the absence of a C95 standard for frequencies below 3 kHz. This points to the importance and priority of work in SC3 towards such a standard.

SC2:

Be prepared to address questions on the new C95.2.

The new C95.2, *IEEE Standard for Radio-Frequency Energy and Current-Flow Symbols,* is a greatly improved document over the last revision in 1982. It is much more detailed, informative and consistent with the ANSI Z535 series of standards on design and use of environmental warning signs and labels. It also is consistent with the latest C95.1 standard, 1999 Edition. In addition to the rf-energy advisory symbol, which is now well-known, it introduces a new RF

electric current hazard advisory symbol. Although this new standard was issued on December 30, 1999, few inquiries have been received on the use of this standard. It is an excellent piece of work and the principal authors, including Messrs. Tell, Miller, Curtis and Leonowich deserve great credit.

One of our members from the U.K. pointed out an apparent oversight that should be corrected in the future. Since OSHA, in the United States, still has on its books obsolete standards, including an obsolete C95.2 symbol from the sixties, we were urged to obtain an official statement from OSHA of exemption from the obsolete standard (which is in 29 CFR 1910.97). As Chairman of Subcommittee 2, in 1991, I received a letter from Patricia K. Clark, Director of Compliance Programs stating such exemption and recognizing the use of the accepted symbols following C95.1-1982. This letter was disseminated widely in SCC-28 publications and reports but was not referenced in the present version of C95.2. At some point it should be noted in C95.2 until such time as OSHA changes the regulations on its books or any further communication from OSHA is received.

Complete the Work Practices document and ballot at the SC level.

Considerable work on this document was accomplished during recent years with key contributions from Messrs. Tell, Hare, Curtis, Ehrgott, Sena and Varanelli. At one time there was an active E-mail reflector and much discussion. Activity dropped off for some reason but is now being revived. A PAR (P-1466) for the extension of this project was approved in 2000. Its importance has not been diminished but increased by recent events, e.g. the advice supplied to the IAC on cautionary policies by SCC-28 in December 1999 (described above).

SC3:

PAR (P-1555) for a *Standard for Maximum Levels of Human Exposure to Electromagnetic Fields, 0 to 3 kHz*

A PAR for a new standard (*Maximum Levels of Human Exposure to Electromagnetic Fields, 0 to 3 kHz*) was approved by the IEEE Standards Board on September 16, 1999. Before approval, there was some concern among utility personnel that SCC-28 did not contain adequate “medical” expertise to deal with the issue. This misconception was dispelled by extensive distribution of the facts about the very broad expertise within SCC-28, including medicine and all the pertinent life sciences. The standard is aimed at providing rules for human exposure that will prevent the occurrence of confirmed bioeffects. These are under the general classification of electrostimulation.

At various SC3 meetings, experts on various phases of the subject have made detailed presentations; e.g. Dr. Silny, of Germany, on the experimental database on magnetophosphenes, Veronica Ivans on the phenomena involved in interference effects in medical devices, Bill Bailey on survey and classification of existing standards for ELF frequencies and J. Patrick Reilly on a proposed standard (“strawman”) under this PAR.

Begin a literature review process.

This activity appears to be stalled. There has been some debate on whether to emulate the SC-4 process of reviewing a wide selection of papers with the aid of a computerized system or to focus on a review of the many extensive reviews carried out recently by many organizations including the National Academy of Science in the U. S. A. and those carried out by the NRPB in the U. K., ICNIRP and the Health Council of the Netherlands. It seems that external funding would be required to carry out a computerized process as in SC4.

Create working groups and assigned tasks toward drafting a standard.

Although here had been significant work before this year, a small working group of Reilly, Jaffa and Bailey have been able recently to focus on a draft standard—i.e. a description of the proposed rules (limits) with scientific rationale. This work has largely been done by Pat Reilly and was presented at the June meetings of SC3 and SCC-28 as well as elsewhere (e.g. meetings in Brussels, Belgium and in Gig Harbor, Washington). The strawman draft is well thought out and includes some new solutions on how to cover exposures to multiple-frequency or complex waveforms.

SC4:

Amendment to IEEE Standard C95.1-1991

On 20 January 2000, the IEEE Standards Board approved the PAR PC95,1b; *Amendment to* ***"IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields. 3 kHz to 300 GHz, IEEE C95.1-1991 (1999 Edition)."*** This is a new task aimed at clarifying the standard by specifically defining additional portions of the body (e.g. the outer ear or pinna) as extremities subject to the relaxed SAR limits that apply to the extremities already specified—i.e. wrists, hands, feet, and ankles. Of course, this task is in addition to the main task of SC4 which is the extensive revision of the existing C95.1 (1999 Edition). This new task is of importance to SCC-34 in their development of certification procedures for hand-held wireless phones.

Continue literature review and designate end of reviews.

This process of reviewing well over 1000 selected papers is well under away but behind schedule, especially in the reviews by life scientists. Leaders of the program have speculated on a finishing date in a year or so but there is a need at present to accelerate the reviews. This is requiring diligent pressure and communications by the group leaders with the reviewers.

Risk assessment working group to present their report.

This group, the RAWG, under the Chairmanship of Ric Tell has met and conducted extensive discussions centering not only on the data base but also whether data on human exposure to RF energy and other forms of heat stress can be applied to the rationale for the C95.1 standard. In addition there is a fundamental debate on whether an exposure standard should have one or two tiers of safety limits (MPEs). Although there is an extensive record of discussions and debate on these issues, the RAWG has not yet prepared a report.

Editorial committee to complete drafts of a revised C95.1 standard.

The Co-chairs of SC4, Drs. Chou and d'Andrea, formed an editorial committee to begin preparing a draft of the revised C95.1 standard in 1999. Inputs were solicited from the broad SCC-28 community on all sections of the standard. In October 1999, at the SC4 meetings in Atlanta, Georgia there was debate about the relative role of "normative" and "informative" material in a standard. In March 2000, a 2-day working meeting of the editorial committee was held in Ft. Lauderdale, Florida. About 20 people attended. Substantial sections of the revised standards exist in preliminary proposed form. These include such details as the ramps for averaging time at both the high and low frequency ends of the frequency range covered by C95.1 The committee is mindful of the need to match the limits derived by SC3 for 3 kHz and the laser community at 300 GHz. The committee is also mindful of the desire for international harmonization. There, are however, some fundamental new issues where it is believed IEEE is forward-looking. These includes the basic question of whether to include one or two tiers in safety limits, inclusion of human exposure data as a key part of the database underlying the standard, balancing practical benefits against potentially adverse effects of otherwise relatively

innocuous sensation phenomena (auditory effect, magnetophosphenes, etc.) and several other key problems. The next meeting of the editorial committee is scheduled for September 7 – 8, 2000 in Washington, D. C. (at NEMA offices). This location will permit more federal agency employees to attend. Around 40 people are expected to attend.

Begin preparations for forming a Balloting group within the Subcommittee.

This goal was premature in view of the delays and very heavy workload borne by the RAWG and editorial committees. It is hoped that in the next year that such preparations will be initiated.

Review plans for a second Short Course.

Because of the pressure of the work on the revision we have not addressed this task. It certainly is justified in terms of interest in the standard-user communities and in terms of its contribution to SCC-28 financial income. We hope to find time to address this in the next year.

Among the unanticipated tasks for the year was the receipt of a request for an Interpretation from the Space and Naval Warfare Systems Center, regarding an apparent contradiction between limits on induced and contact currents and peak current density MPEs shown ins the exclusions (Section 4.2). An Interpretations Working group chaired by Jim Hatfield submitted a response in August 2000. It acknowledged an apparent paradox between those two sets of limits with hope for resolution in the ongoing C95.1 revision. For the moment, the interpretation is that the more restrictive current limits apply below 100 kHz where electrostimulation is the dominant bioeffect and where SAR considerations become secondary or inapplicable. Participating working group members were Messrs. Cohen, Gandhi, Guy, Reilly, Tell and Ziskin.

SC5:

Aid SCC-28 in the review process after balloting the proposed C95.4 Recommended Practice.

Early in the spring of 2000, SCC-28 approved, by ballot, the draft *Recommended Practice for Determining Safe Distances from Radio-Frequency Transmitting Antennas when Using Electric Blasting Caps During Explosive Operations.* (Project 1472/D1.1) It is being revised to accommodate revisions suggested by the Institute of Makers of Explosives and the FCC. It is expected that this will be submitted to the Standards Board by the end of 2000.

Review plans for future activity.

A working group meeting was held during the summer of 2000 to resolve points of final revision of C95.4. Also at recent meetings SC5 has reviewed future tasks. One is to potentially draft a statement on the urban myth of hazards to users of cell phones at gas pumps because of the danger of igniting a fuel explosion. A small working group was set up to investigate this subject with reference to existing information and protective measures against fuel ignition.

2000 – 2001 Goals:

SCC-28:

- Continue to revise and update roster. Continue expansion of non-U.S. membership under the leadership of Drs. McManus and Murphy. Introduce new leadership within EXCOM and elsewhere with an emphasis on more participation by non-U.S. members and younger members.
- Review and confirm liaison arrangements between SCC-28 and other groups such as ICNIRP, IEC, CENELEC and national groups throughout the world. Continue closed policy meetings with ICNIRP and explore possible jointly sponsored public forums on standards.

- Work with IEEE staff on proposal to form the *International Council on Electromagnetic Safety. (ICES).* Obtain Standards Board approval and carry out organizational tasks and begin fundraising.
- Continue liaison with TABD and other industry groups, both U. S. and non U. S. Expand liaison with wireless industry groups.
- Ballot the revision of C95.3. Ballot “extremity” amendment
- to C95.1
- Prepare for balloting of the revision of C95.1 Work with the IEEE-USA in the letter campaign encouraging uniform support of and participation in SCC-28 among federal agencies.
- Consider newly proposed publications about SCC-28 and its Standards in journals like *Health Physics.* Consider the creation of an electronic newsletter for the SCC-28 (ICES) community.

SC1:

- Help shepherd the revised C95.3 through SCC-28 and the IEEE Standards Board.
- Address questions on frequencies below 3 kHz. Consider a project for a new recommended practice.

SC2:

- Complete the Work Practices document and ballot at the SC level.
- Consider how to document OSHA exemption in C95 documents.

SC3:

- Conduct SC discussion and review of strawman (Reilly) standard principles.
- Address literature review task.
- Begin editorial committee for drafting a standard and
- Begin preparations for balloting at SC level.
- Prepare budget for future activity.

SC4:

- Complete balloting on amendment to C95.1 (extremity Issue).
- Continue literature reviews and designate endpoints.
- Receive reports from the RAWG and the editorial committee.
- Begin drafting final version of revision of C95.1 and prepare for balloting.
- Review plans for second Short Course.
- Prepare budget for future activity.

SC5:

- Review plans for future activity. Statement on urban myth of fuel ignition hazard at gas pumps with wireless phones.

IEEE Staff:

We have been fortunate to have the faithful services of Ms. Denise Scozzafava (Pribula) as our staff liaison in recent years. In addition we have benefited from the personal involvement and advice of Judy Gorman, Manager of IEEE Standards Activities, Terry deCourcelle and others of the Standards department. Their advice and participation in our international expansion has been invaluable. Judy helped address the non U. S. audience in Munich and supplied key ideas for the creation of the *International Council on Electromagnetic Safety (ICES).*

Other Activity:

Members of SCC-28 are continually involved in a wide spectrum of activities that relate to standards setting from research through education. As such, we participate
In various national government activities. These include interaction with the FCC, FDA and military agencies in the U. S. and the European Community (Parliament) overseas. We also interact with various professional societies including the IEEE societies, the Health Physics Society, the Bioelectromagnetics Society and many others. Many of us are also involved in other international meetings sponsored by either WHO or ICNIRP. Thus in the next year we anticipate meeting in China, Finland, Greece as well as San Antonio, Texas.

The IEEE is in close collaboration with many groups including the NCRP in the U. S. and ICNIRP and other standards groups based outside of the U. S. Two members of ICNIRP are also now members of SCC-28 as are several members of NCRP. We offer these groups a formal opportunity to review and comment on our documents and we expect to review and comment on theirs.

Meeting Schedule:

- Meetings of SCC-28 with Subcommittees:
- October 17 – 19, 1999 in Atlanta, Georgia.
- June 9 – 10, 2000 in Munich, Germany.
- November 17 – 29, 2000 in San Antonio, Texas.
- June 8 – 10, 2001 in St. Paul, Minnesota.

This report was prepared and submitted by:

John M. Osepchuk, Ph. D.
Chairman, SCC-28
August 30, 2000

Appendix A

Membership of SCC-28; August 30, 2000

Name	Affiliation	Classification
Eleanor R. Adair, Ph. D.	Air Force Research, Texas	User (U)
Melvyn R. Altman	FDA/CDRH; Wash. D. C.	General (G)
Vitas Anderson	Telstra Research; Australia	Producer (P)
J. Robert Ashley, Ph. D.	EM Inventions; Florida	(G)
Edward Aslan	Narda Microwave; New York	(G)
Q. Balzano, Ph. D.	Motorola, Ft. Lauderdale	(P)
Howard Bassen	FDA/CDRH, Wash. D. C.	(G)
John Bavin	Consumers' Energy, Michigan	(P)
John A. Bergeron, Ph. D.	Independent Consultant; New York	(G)
Ulf Berquist, Dr. Med. Sci.	Univ. Linköping; Sweden	(G)
Aviva Brecher, Ph. D.	Dept. of Transportation; Cambridge	(G)
Charles Buffler, Ph. D.	Int. Microwave Power Institute; NH	(P)
Jerrold T. Bushberg, Ph. D.	U. California/Davis	(G)
A. Scott Chesnick	Nat Inst. Health; Bethesda, MD	(G)
Huai Chiang, M. D.	Zhejiang Medical Univ.; China	(G)
Stephen Chiusano	Lawrence Livermore Lab.; Calif.	(G)
C. K. Chou, Ph. D.	Motorola, Ft. Lauderdale	(P)
Robert F. Cleveland, Ph. D.	FCC OET; Wash. D. C.	(G)
Roger Coghill	Coghill Res.Labs; U.K.	(G)
Jules Cohen, P. E.	Consultant	(G)
Robert A. Curtis	OSHA; Salt Lake City	(G)
John A. d'Andrea, Ph. D.	Navy Health Research; Texas	(U)
James M. Daly	BICC Cables Corp; New York	(P)
John J. DeFrank	Army CHPPM; Maryland	(U)
John O. DeLorge, Ph. D.	McKesson Bioservices, Texas	(G)
David Dini	Underwriters Laboratory, New York	(G)
Louis Dornetto, Ph. D.	Navy SPAWAR; South Carolina	(U)
Linda S. Erdreich, Ph. D.	Exponent; New York	(G)

David N. Erwin, Ph. D.	USAF/Research; Texas	(U)
Stewart Fastman	Insurance consultant	(G)
William E. Feero	Elec. Res. & Mgt., Inc; Pennsylvania	(G)
Kenneth R. Foster, Ph. D.	Univ. of Pennsylvania; Philadelphia	(G)
Om P. Gandhi, Ph. D.	Univ. of Utah; Salt Lake City	(G)
Robert C. Gardner	Min. of Defense; U. K.	(U)
David L. George	Unisys Corp; Pennsylvania	(P)
Gregory M. Gorsuch	Navy Bur. Of Medicine; Wash. D. C.	(U)
Martino Grandolfo, Ph. D.	Instituto Superia di Sanita; Italy	(G)
Arthur W. Guy, Ph. D.	Bioelectromagnetics Consult., WA	(G)
Dennis E. Hadlock, Ph. D.	Geo-Centers, Inc., Maryland	(G)
Donald L. Haes, Jr., CHP	MIT; Cambridge	(G
K. N. Halkiotis, Ph. D.	Greek Atomic Energy Commission	(U)
Ed Hare	ARRL, Connecticut	(U)
James B. Hatfield	Hatfield&Dawson; Seattle, WA	(G)
Donald M. Heirman	Don HEIRMAN Consultants; NJ	(G)
Paul Heroux, Ph. D.	McGill Univ., Montreal	(G)
Louis N. Heynick	Independent Consultant, Calif.	(G)
Michel Israel, Ph. D.	Nat. Ctr. Of Hygiene; Bulgaria	(G)
Veronica Ivans, Ph. D.[a]	Medtronic, Inc., Minneapolis	(G)
Kent C. Jaffa	Pacificorp; Salt Lake City	(P)
Kenneth H. Joyner	Motorola; Australia	(P)
Ralph Justus	Elec. Indust. Assoc., Wash. D. C.	(G)
Sheila Kandel	Tel Aviv Med. School; Israel	(G)
B. Jon Klauenberg, Ph. D.	USAF/Research; Texas	(U)
G. A. Koban	Nav. Surf. Warfare Ctr; Virginia	(U)
Joseph L. Koepfinger	Duquesne Light Co; Pittsburgh	(P)
Anthony LaMastra	Amer. Iron&Steel Inst.,Pennsylvania	(U)
John A. Leonowich, Ph. D.	Pacific NW Nat. Lab., Washington	(G)
James C. Lin, Ph. D.	Univ. of Illinois; Chicago	(G)
C. J. Maletskos[b]	NCRP; Gloucester, MA	(G)
Edwin Mantiply	EPA/FCC; Wash. D. C.	(G)
Stewart Maurer, Ph. D.	RF&ELF Consultant, New York	(G)
Robert W. McCourt	PSE&G; Newark, NJ	(P)
Tom McManus, Ph. D.	Dept. Pub. Enterprise; Ireland	(G)

Martin L. Meltz, Ph. D.	Univ. Texas Hlth. Sci. Ctr.	(G)
John C. Monahan, Ph. D.	FDA/CDRH; Wash. D. C.	(G)
Noel D. Montgomery	Navy Jt. Nonlethal Weapons, Virginia	(U)
Michael R. Moore	Oak Ridge Nat. Lab., Tennessee	(G)
Amitaba Mukhopadhyay	Con Edison, New York	(P)
Michael R. Murphy, Ph. D.	USAF/Research, Texas	(U)
John L. Orr, Ph. D.	Toxicology Consultant, Texas	(G)
John M. Osepchuk, Ph. D.	Full Spectrum Consulting; Concord, MA	(G)
Russell D. Owen, Ph. D.	FDA/CDRH; Wash. D. C.	(G)
Andrei Pakhomov	McKesson Bioservices, Texas	(G)
William F. Paul	IBEW; Wash. D. C.	(U)
Bertil R. Persson, Ph. D.	Lund Univ., Sweden	(G)
Ronald C. Petersen	Lucent Technology Bell Labs, NJ	(P)
J. Patrick Reilly	Metatec Associates, Maryland	(G)
Michael H. Repacholi, Ph. D[c]	World Health Organization, Geneva	(G)
Brad J. Roberts	Army CHPPM; Maryland	(U)
Ervin D. Root	Alliant Energy; Iowa	(P)
Terence Rybak	Gen. Mtrs. Proving Ground, Michigan	(U)
Veli Santomaa	Nokia Research Center, Finland	(P)
William G. Scanlon, Ph. D.	Univ. of Ulster, Northern Ireland	(G)
Herman P. Schwan, Ph. D.	Univ. of Pennsylvania (Ret.)	(G)
Asher R. Sheppard, Ph. D.	Asher Sheppard Consulting, Calif.	(G)
Jon H. Sirugo	So. Calif. Edison	(P)
Jan A. Stolwijk, Ph. D.	Yale Sch, of Medicine	(G)
F. Kristian Storm, M. D.	Univ. of Wisc. Clin. Sci. Ctr.	(G)
Carl H. Sutton, M. D.	VA Med. Ctr., Wisconsin	(G)
Mays L. Swicord, Ph. D.	Motorola; Ft. Lauderdale	(P)
Rosa M. Tang, M. D.	Univ. of Texas	(G)
John Tattersall , Ph. D.	DERA; U. K.	(G)
Richard A. Tell	Richard Tell Assoc., Inc., Las Vegas	(G)
Thomas S. Tenforde, Ph. D.	Battelle Pacific NW Labs, Washington	(G)
Tammy Utteridge, Ph. D.	Institute of Medical&Veterinary; Australia	(G)
Arthur A. Varanelli	Raytheon Company; Massachusetts	(P)
Robert T. Watkins	Mass. Dept. of Public Health	(G)
Christian B. Wenger, Ph. D.	Army Res. Inst., Massachusetts	(U)

Louis A. Williams, Jr.	Louis A. Williams Consult., Ohio	(G)
Donald W. Zipse	Zipse Elec. Engr., Inc., Pennsylvania	(G)
Marvin C. Ziskin, M. D.	Temple Univ. Sch of Medicine; Philadelphia	(G)

(a) AAMI Liaison (b) NCRP Liaison (c) WHO Liaison