



ICES

International Committee on Electromagnetic Safety

ICES (SCC-39) Annual Report: 2004 – 2005

1. Reorganization

The reorganization of the International Committee on Electromagnetic Safety (ICES) was approved at the March 2005 SASB Meeting in Atlanta, GA. Specifically, IEEE SCC-28 (International Committee on Electromagnetic Safety - ICES) and SCC-34 (Product Performance Relative to the Safe Use of Electromagnetic Energy) were combined into a single Type 2 Standards Coordinating Committee (SCC-39), called ICES. SCC-28 is now Technical Committee 95 (TC-95 – in line with the C95 standards it develops); SCC-34 is now TC-34. Each TC functions as it did in the past, retaining the same structure, subcommittees and policies and procedures. An Administrative Committee (AdCom) is being established to oversee the operation of ICES, develop a fundraising program, provide liaison with IEEE and non-IEEE national and international organizations of similar scope, and submit to the SASB standards developed and approved by the TCs. Currently the AdCom is comprised of the leadership of TC-34 and TC-95 (see Table). Additional “at large” members are being sought to help oversee the operations of ICES, including fundraising, and to provide liaison with international groups, such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), WHO, IEC, NATO, national groups, such as the National Council on Radiation Protection and Measurements (NCRP), the American Conference of Government Industrial Hygienists (ACGIH), and the relevant federal agencies of the US, e.g., FDA, FCC, OSHA, as well as those of other countries.

1.1. Scope (New)

“Development of standards for the safe use of electromagnetic energy in the range of 0 Hz to 300 GHz relative to the potential hazards of exposure of humans, volatile materials, and explosive devices to such energy. Such standards will be based on established effects and will include safety levels for human exposure to electric, magnetic and electromagnetic fields, including induced currents from such fields, methods for the assessment of human exposure to such fields, standards for products that emit electromagnetic energy by design or as a by-product of their operation, and environmental limits.”

1.2. Membership

With the leadership of Dr. Tom McManus, Membership Chairman, and Dr. Michael Murphy, Chairman of International Liaison Committee, the non-US membership of ICES continues to grow. During the period covered by this report, nine new members were added to TC-95—seven from outside the US.

2. Highlights (2004-2005)

The authorization in 2000 by the IEEE Standards Board that SCC-28 be renamed the International Committee on Electromagnetic Safety (ICES) has proved to be a giant forward step toward an international forum for broad consensus in the setting of safety standards across the frequencies 0 to 300 GHz. During the past few years, ICES, its committees and products have become far better known around the world and we expect this trend to continue.

ICES held its first meeting (as SCC-39) in Dublin Castle, Dublin, Ireland, in June 2005. The five days of meetings of TC-34, TC-95 and their subcommittees were graciously hosted by the Irish Government (Department of Communications, Marine and Natural Resources). The meetings were held in conjunction with the annual meeting of the Bioelectromagnetics Society (BEMS – which were held nearby at Trinity University). This brought a number of non-US attendees from the BEMS meetings to the ICES meetings, thereby strengthening our potential for international growth.

An International Workshop on Thermal Physiology with Applications to Standards for Electromagnetic Safety (originally proposed in November 2000 by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) as a joint ICNIRP/ICES workshop), was held as a joint ICES/COST 281 (European Cooperation in the Field of Scientific and Technological Research: Action 281) workshop in September 2004 at INERIS (Institut National de l'Environnement Industriel et des Risques), outside of Paris. A two-day COST 281 Dosimetry Workshop, which was well-attended by members of ICES, preceded the Thermal Physiology Workshop.

Continuing activities with the World Health Organization EMF Project are aimed at exploring paths toward the international harmonization of standards for the safe use of electromagnetic energy. The increased international membership in ICES provides greater influence within the international community. ICES has been represented at all of the WHO EMF Project meetings world-wide.

Other highlights during the year include:

- a) Amendment 1 of IEEE C95.1-1991 (1999 edition) entitled “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz – Amendment 1: Specific Absorption Rate (SAR) Limits for the Pinna,” was approved at the June 2004 SASB meeting. (Approval of the amendment was appealed – the hearing was held during the December 2004 SASB meetings and the appeal was denied.)
- b) A new standard, C95.7-2005, “IEEE Recommended Practice for Radio Frequency Safety Programs” was approved at the September 2005 SASB meeting. This document provides the elements of an RF safety program that will be useful to those implementing IEEE C95.1-2005.
- c) The revision of IEEE Std C95.1-1991 (1999 edition), “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,” was approved at the September 2005 SASB meeting.
- d) IEEE Std 1528a, “Amendment 1: Include CAD File for Human Head Model (SAM Phantom),” to IEEE Std 1528-2003, “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques,” was approved at the September 2005 SASB meeting.

- e) Four well-received short-courses were held to introduce the new IEEE Std C95.6-2002 (IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0 to 3 kHz). The first was held in conjunction with the Canadian Electrical Association (CEA) Subcommittee on EMF Workshop in Ottawa, Canada in March 2003; the second was held in Washington DC in June 2004, the third in San Antonio, TX in December 2004 and the fourth in Dublin Ireland in June 2005. All were well-attended and the feedback was very positive.
- f) The Executive Committee (ExCom – now the AdCom) met in San Antonio and Dublin and four times by teleconference during the past 12 months. In addition, informal meetings of ExCom members are held frequently as appropriate. The ICES AdCom plans and arranges the two main meetings per year of the parent committee, and TC 34 and 95. It approves (or rejects) applications for membership in ICES technical committees. Dr. Ralf Bodemann, of Siemens AG in Germany, who serves as ICES Vice Chairman, and Dr. Tom McManus, consultant to the Irish Department of Communications, Natural and Marine Resources, have become the ICES roving ambassadors to EC/EU countries and have given several presentations in support of ICES and the IEEE open consensus process in standards setting. Dr. Michael Murphy serves as ICES liaison to the Bioelectromagnetics Society (BEMS) and attends meetings of the BEMS Board of Directors. Dr. Murphy was awarded the 2004 IEEE Standards Association International Award for his contributions to expanding world-wide recognition of ICES.

2. Detailed Reports

Detailed reports of TC-34 and TC-95 activities follow. A draft of the TC P&Ps is contained in Annex A.

ICES AdCom

Office	Name	Affiliation
Chairman	Ronald C Petersen	R. C. Petersen Associates, LLC
Vice Chairman	Dr. Ralf Bodemann	Siemens AG
Past Chairman/Executive Secretary	Dr. Eleanor Adair	Independent Consultant
Chairman Emeritus	Dr. John Osepchuk	Full Spectrum Consulting
Treasurer	Arthur Varanelli	Raytheon Company
Chairman, International Liaison Committee	Dr. Michael Murphy	Air Force Research Laboratory
Chairman, Membership Committee	Dr. Tom McManus	Consultant to the Dept of Communications, Marine and Natural Resources, Ireland
Vice Chairman TC-34	Kathy MacLean	APREL Laboratories

Detailed Report – TC 34

1. Scope

The scope of Technical Committee 34 (TC-34) is “the development of product performance standards relative to the safe use of electromagnetic energy for specific products that emit electromagnetic energy at frequencies between 0 and 300 GHz, i.e., the frequency range covered by the basic restrictions and maximum permissible exposure (MPE) values developed by the IEEE International Committee on Electromagnetic Safety (ICES).”

Standards developed by TC-34 are expressed in terms of easily measured parameters, e.g., output power, current, voltage, which are derived from the basic restrictions and MPE values found in the latest revisions of IEEE Stds C95.1 and C95.6. Included in the scope are standards, guides and recommended practices that describe measurement and computational protocols for determining compliance with the basic restrictions and derived limits (MPEs) found in the IEEE C95 standards and in other relevant national and international standards and guidelines. This committee was originally a collaborative effort between IEEE and the Electromagnetic Energy Association (EEA); the EEA was disbanded in August 2001.

2. Membership Rosters

(See Tables 1-4.)

3. Meetings (2004-2006)

Main Committee:

- June 17, 2004 – Washington, DC, in conjunction with the semi-annual ICES (TC-95) meetings and the BEMS Annual Meeting
- June 27, 2005 – Dublin Ireland, in conjunction with the semi-annual ICES TC-95 meetings and the BEMS Annual Meeting
- June 2006, Cancun, Mexico (tentative)

Subcommittee 1 (Recreational marine radar):

- June 17, 2004 – Washington DC (informal)
- June 2005 – Dublin Ireland (informal)
- June 2006 – Cancun, Mexico (tentative)

Subcommittee 2 (Wireless handset certification):

- February 24 -26, 2004 – Rome Italy, including joint meeting with IEC TC106, Project Team 62209 (Feb 26)
- May 13-14, 2004 – Rockville, MD
- Jan 18-19, 2005 – Rockville, MD
- May 2, 2005 – by teleconference
- June 27-28, 2005 – Dublin Ireland, including joint meeting with IEC TC106, Project Team 62209 (June 28)
- September 13, 2005 – by teleconference

- November 7-10, 2005 – Ottawa, Ontario, including joint meeting with IEC TC106, Project Team 62209 (November 9-10)
- February 15 2006 – by teleconference
- April 6-7 2006 - Stockholm, Sweden
- June 9-10, 2006, Cancun, Mexico
- September 2006 – by teleconference
- December 2006 - Rockville, MD, USA

Subcommittee 3 (RF protective garments):

- June 2004 –Washington, DC (informal)
- June 2005 – Dublin Ireland (informal)
- December 8, 2005 – San Antonio, TX
- June 2006 – Cancun, Mexico (tentative)

4. Main Committee and Subcommittee Status

Main Committee

Additional representatives from outside the US have been added to the committee (including the Chairman of CENELEC) – see Tables 1 - 5 for membership information). The first standard developed by TC-34, IEEE Std 1528-2003, “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques,” was approved at the June 2003 SASB meeting; 1528a, “Amendment 1: Includes CAD File for Human Head Model (SAM Phantom),” was approved at the September 2005 SASB meeting.

TC-34 Leadership

Position	Name
Chair-	Ronald C Petersen
Vice-Chair	Kathy MacLean
Secretary	John M. Osepchuk
Treasurer	Arthur Varanelli
Chair –SC-1	Arthur Varanelli
Co-chairs – SC-2	Mark Douglas, Wolfgang Kainz
Chair – WG-1	Mark Douglas
Chair – WG-2	Wolfgang Kainz
Chair SC-3	Richard A. Tell

Subcommittee 1 (Recreational Marine Radar)

In 1997 the current chair of SC-1 met with FCC Office of Engineering and Technology (OET) Senior Scientist Dr. Robert Cleveland to discuss their interest in standards relating to recreational marine radar. Dr. Cleveland indicated that an IEEE product performance standard would address FCC RF exposure concerns and that the FCC would encourage the development of such a standard. Following this meeting and expressed interest by the FDA Center for Devices and Radiological Health (CDRH) in small boat radar as a consumer electronic product, TC-34 Subcommittee 1 (SC-1) was established to consider the development of a standard to address the safety aspects of these devices. The standard would include measurement techniques for assessing exposure, rules of thumb for mounting radars based on average output power, and other practical guidance. Potential members from pleasure-boat radar manufacturers were identified and agreed to participate on SC-1 once a clear objective was defined (see Table 2 for membership information). Over the past 5 years members of SC-1 met informally a number of times, and also met with FCC and FDA/CDRH staff. During this time, however, emphasis by the federal agencies has shifted to other devices, e.g., article surveillance and anti-theft devices. Moreover, the work of SC-2 (wireless handsets) was of paramount importance to both the FDA and the FCC and with the limited resources of both agencies, their effort has been devoted to completing the wireless handset standard (IEEE Std 1528-2003) and Amendment 1 to 1528 (P1528a). Although a PAR for a small-boat radar standard has not yet been submitted, a dialog has been established with all interested parties identified in Table 2 and who will be invited to a meeting sometime in 2006 to consider options for an IEEE product performance standard. One option will be to disband the subcommittee because of lack of interest or expressed lack of need for a standard.

Subcommittee 2 (Certification of Wireless Handsets).

Subcommittee 2 was established in February 1997 to develop standard protocols for certifying that certain portable wireless devices, such as hand-held radio transceivers, wireless LANs and similar devices, meet specific absorption rate (SAR) criteria. Initially two working groups were established within SC-2 to develop measurement (WG-1 – P1528) and computational (WG-2 – P1529) protocols for certifying that hand-held mobile phones meet the prescribed SAR limits of IEEE Std C95.1 and other standards and guidelines, e.g., ICNIRP. Although the scope of SC-2 covers a variety of devices, it initially focused on a recommended practice (P1528) devoted exclusively to handsets used for personal wireless communication services. The first standard (IEEE Std 1528-2003) specifies protocols for the measurement of the peak spatial-average SAR in the head of users of certain hand-held radio transceivers that are used for personal wireless communications, operate in the 300 MHz – 3 GHz frequency range, and are intended to be operated while held against the ear. Specifically, this recommended practice describes the concepts, measurement techniques, instruments, calibration techniques, phantom models for SAR system validation, and limitations of systems used for measuring the radio frequency (RF) electric field strength for purposes of determining the spatial-peak mass-averaged SAR, e.g., per 1 gram or 10 grams of tissue, in simulated tissue models, including homogeneous anatomical models of the human head. Some of the protocol requirements of IEEE Std 1528-2003 have been incorporated into IEC Std 62209 and “Supplement C” of the FCC Office of Engineering and Technology (OET) Bulletin 65. The standard is also expected to be adopted by the FCC by reference. Because of the urgency, the major activity of TC-34/SC-2 was the work of WG-1 (IEEE Std 1528-2003 and Amendment 1 – 1528a-2005). Although WG-2 developed a partial draft of a complementary standard based on numerical techniques, this draft was put on hold and the PAR (P1529) withdrawn pending completion of 1528-2003.

Effective September 30, 2005, Howard Bassen (USFDA/CDRH), Chair of SC-2 since it was established, stepped down as Chair. SC-2 is now co-chaired by Wolfgang Kainz (USFDA/CDRH) and Mark Douglas (Motorola Research Laboratories). The membership of SC-2 now stands at approximately 75, with many members from Europe and the Far East (see Table 3 for membership information). Approximately one-fourth to one-third of the membership has attended each of the subcommittee/working group meetings held since August 1997. (Additional meetings, Editorial WG meetings, are much smaller and attended mainly by the section editors of the P1528 and P1529 drafts.) In addition, a Standards Harmonization Working Group was established that meets with other product-standards developers (ARIB, CENELEC TC106X and IEC TC106). (See Table 3a for membership information.) These committees are also developing similar standards for measurement protocols. While the IEC and CENELEC standards and the IEEE standard are in complete harmony, IEEE Std 1528 is by far the most comprehensive and detailed of the three documents.

Subcommittee 2-Working Group 1

The primary tasks of WG 1 in 2005 were to expand the 1528 standard. Major accomplishments of WG 1 include the following:

- A joint meeting was held with IEC TC-106 – PT 62209 (Procedure to measure the specific absorption rate (SAR) in the frequency range of 300 MHz to 3 GHz – Part 1: Hand-held mobile wireless communication devices) to harmonize each group’s standard on

measurement of SAR in head phantoms exposed to wireless handsets. This was completed successfully in Feb 2004.

- An international inter-comparison of measured SAR in a rectangular, dielectric-filled phantom was initiated in 2003. Participants included many labs associated with the Mobile Manufacturers' Forum (MMF). The MMF sponsored this project that involved measurements taken in labs of MMF members in Asia, Europe, and North America. This inter-comparison was completed successfully in Feb 2004. A paper has been written on the design and results and was submitted to the *IEEE Transactions on Microwave Theory and Techniques*.
- An amendment to IEEE Std 1528-2003 was revised according to comments collected from SC-2 members. The amendment is entitled, "IEEE 1528a - Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques - Amendment 1: CAD file for Head Model (SAM)". The amendment was approved at the September 2005 SASB meeting.
- A PAR for Amendment 2 of IEEE Std 1528-2003, entitled, "IEEE P1528b - Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques. Amendment 2: Additional Procedures for SAR Measurement at 3 - 6 GHz," was approved at the September 2005 SASB meeting. This PAR extends the frequency range of 1528-2003 to 6 GHz (from 3 GHz).
- Several joint meetings were held between ICES TC-34 WG-1 and IEC PT 62209. The two committees are developing similar standards, and the purpose of the joint meetings is to ensure that the standards are harmonized

Subcommittee 2-Working Group 2

Because of the focus on completing IEEE Std 1528-2003, work on P1529 (computational techniques) has been slow. WG-2 was recently reconstituted and met several times since January 2003 to begin updating and completing the draft (now approximately 50% complete). Major accomplishments of WG-2 include the following:

- Explored the needs for additional computational compliance standards and a computational standard for active implantable medical devices was proposed. A teleconference with ADVAMED and implant manufacturers followed. Implant manufacturers, specifically Medtronic, made it clear that currently a computational standard for active implantable medical devices is not needed. Implant manufacturers and ADVAMED met later during the year again and concluded that a specific standard is not required at this time because of the following reasons:
 - Industry experience is limited at this point as MICS equipment is currently being developed
 - The development of a standard might be more appropriate a few years down the road as the industry understands computations modeling better
 - Current FCC requirements are sufficient;
 - The ultra low power of the AIMD MICS technology - the SAR values for

WG-2 agreed that to reevaluate this decision in the future as circumstances change and as the industry accumulates more experience with devices of this type. The industry will maintain a dialog with WG 2 and remain alert for additional information that might warrant industry participation in the development of a computational standard for SAR.

- Proposed a new concept for computational compliance standards. The new concept is based on a document defining the general requirements for using the Finite Difference Time Domain (FDTD) method for computational compliance. Standards for specific compliance needs can be developed building on these general requirements. WG-2 proposed the development of P1528.1, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices, 30 MHz - 6 GHz: General Requirements for using the Finite Difference Time Domain (FDTD) Method for SAR Calculations,” and P1528.2, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices, 30 MHz - 6 GHz: Specific Requirements for Finite Difference Time Domain (FDTD) Modeling of Vehicle Mounted Antennas.” PARs P1528.1 and P1528.2 were approved at the September 2005 SASB meeting. Detailed outlines for P1528.1 and P1528.2 have been developed by WG-2.
- Proposed an additional computational standard P1528.3, titled “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices, 30 MHz - 6 GHz: Specific Requirements for Finite Difference Time Domain (FDTD) Modeling of Mobile Phones/Personal Wireless Devices.”
- Commenced work on developing a protocol for inter-comparison of various numerical simulation tools and head models, including the SAM (Specific Anthropomorphic Mannequin) phantom developed by members of SC-2/WG-1. The CAD file for SAM, which will be included with IEEE Std 1528a-2005, has also been adopted by IEC (P62209). A number of other head models will be compared by WG-2 members via an inter-laboratory comparison program. The purpose of this program is to assess the overall uncertainty and accuracy of the numerical simulation software now being used throughout the world by comparing SAR distributions in each of the head models.
- Released (July 1, 2005) “Draft Protocol for the Computational Comparison of the SAM Phantom to Anatomically Correct Models of the Human Head.”

Subcommittee 2-Working Group 3 (inactive)

A new working group (WG-3) was established at the May 2002 meeting to explore interest in a standard for certifying body-mounted devices and extending the frequency range covered by IEEE Std 1528 from 3 to 6 GHz. There was little interest by the FCC and others in extending the scope of 1528 to include body-worn devices. Instead, the decision was made to enter into a “Category D” Liaison” relationship with IEC TC106/ PT 62209 for the following reasons:

- The IEC project team is already developing a draft addressing these issues (Part 2 of P62209),
- There are a number of TC-34 subcommittee members who are also members of IEC PT62209. It was agreed that a “Category D” liaison would be the most expeditious route

to follow, i.e., working with IEC rather than working in parallel (to develop an amendment to IEEE Std 1528). The IEC SMB approved the “Category D” liaison in November, 2002.

Subcommittee 3 (Evaluation of RF Protective Clothing)

SC-3 was established at the June 1998 SCC-34 Annual Meeting to develop protocols for characterizing RF-protective garments. The federal agencies, garment manufacturers, their representatives and a number of academics joined the subcommittee (see Table 4 for membership information). Currently several manufacturers supply such garments and each tests according to their own in-house protocols. The garment manufacturers and the FCC, OSHA and NIOSH (who consider the use of protective garments as a means for controlling exposure) have encouraged the development of standardized procedures for testing the effectiveness of such garments.

The first official meeting of SC-3 was held on January 27, 1999 in Ft. Lauderdale, FL. At this meeting, it was agreed that the subcommittee should develop a draft "Recommended Practice for Evaluating the Performance Characteristics of RF Protective Clothing." The following scope was suggested:

“This Recommended Practice applies to clothing that is worn to protect persons from excessive exposure to radiofrequency electromagnetic fields. It addresses SAR, induced and contact current reduction, and surface arcing issues. While providing guidance on matters related to but not limited to flammability, durability, comfort, heat stress, and visual acuity, this recommended practice does not address applicable industrial textile requirements.”

A rough outline of a Recommended Practice was produced by May 30, 1999 for discussion at the second meeting of the subcommittee held on June 18, 1999 in Long Beach, CA. Lengthy discussion during the second meeting suggested the need to revisit the overall outline prior to submitting a PAR. Informal meetings were held in 2001, 2002, 2003, 2004 and 2005 to try to reach consensus on the outline but so far the scope is tentative. The next meeting is scheduled immediately before the December 2005 TC-95 meeting in San Antonio, TX. A decision will be made at this meeting to either move forward with a timeline and mature outline or disband the working group because of a lack of interest.

5. PARs (SC-2)

Subcommittee 2 (certification of wireless handsets) is the only TC-34 subcommittee that has submitted PARs. SC-1 and SC-3 are expected to submit a PAR when and if a clear objective and need for each standard is established.

The following TC-34/SC-2 PARs have been approved:

P1528b (Approved September 2005)

Title: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques. Amendment 2: Additional Procedures for SAR Measurement at 3 – 6 GHz

Project scope: The scope of this project is to specify protocols for the measurement of the peak spatial average SAR in a simplified model of the head of users of handheld radio transceivers used for personal wireless communications services and intended to be operated while held next to the ear. It applies to contemporary and future devices with the same

operational characteristics as contemporary devices that operate in the 300 MHz–6 GHz frequency range and provides a conservative estimate of the peak spatial average SAR representative of that which would be expected to occur in the heads of a significant majority of persons during normal use of these devices, but which may not be the absolute maximum value that could possibly occur under every conceivable combination of head size, head shape, handset orientation, and spacing relative to the head.

Project purpose: The purpose of this project is to extend the frequency range of IEEE 1528 to include the frequency range 3 – 6 GHz. This extension would bring the total applicable frequency range of IEEE 1528 to be 300 MHz – 6 GHz. Recommendations are needed for the measurement resolution, the probe geometry, the phantom specifications, the dielectric parameters of tissue equivalent liquids, and other measurement parameters.

P1528.1 (Approved September 2005)

Title: Recommended Practice for Determining the Peak Spatial Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices, 30 MHz - 6 GHz: General Requirements for using the Finite Difference Time Domain (FDTD) Method for SAR Calculations

Project scope: This recommended practice describes the concepts, anatomical models for compliance assessments, techniques, validation procedures, uncertainties and limitations of the finite-difference time-domain technique (FDTD) when used for determining the spatial peak specific absorption rate (SAR) in standardized human anatomical models exposed to wireless communication devices. Recommendations for standardized anatomical models and general benchmark data for these models are provided. Specific SAR limit values (basic restrictions) are not included since these are found in other documents, e.g., IEEE C95.1-200X.

Project purpose: The purpose of this recommended practice is to specify numerical techniques and standardized anatomical models used for determining the spatial peak specific absorption rates (SAR) in the human body of users for wireless communication devices. SAR is determined by applying Finite Difference Time Domain (FDTD) techniques to simulate the field conditions produced by wireless devices in anatomically correct models of the human anatomy. Intended users of this practice will be (but will not be limited to) wireless communication device manufacturers and wireless service providers that are required to certify that their products comply with the applicable SAR limits, and government agencies.

P1528.2 (Approved September 2005)

Title: Recommended Practice for Determining the Peak Spatial Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices, 30 MHz - 6 GHz: Specific Requirements for Finite Difference Time Domain (FDTD) Modeling of Vehicle Mounted Antenna Configurations

Project scope: This recommended practice describes the concepts, techniques, vehicle models, validation procedures, uncertainties and limitations of the finite-difference time-domain technique (FDTD) when used for determining the spatial-peak specific absorption rate (SAR) in standardized human anatomical models exposed to vehicle mounted antennas. Recommended vehicle models and general benchmark data for these models are provided. Antenna locations, operating configurations, exposure conditions and positions of persons

exposed to the vehicle mounted antennas are defined. Intended users of this practice will be (but will not be limited to) wireless communication devices manufacturers, service providers for wireless communication that are required to certify that their products comply with the applicable SAR limits and government agencies. Specific SAR limit values (basic restrictions) are not included since these are found in other documents, e.g., IEEE C95.1-200X.

Project purpose: The purpose of this recommended practice is to specify numerical techniques, anatomical models, and vehicle models used for determining the spatial peak specific absorption rates (SAR) in the human body when exposed to vehicle-mounted antennas used by wireless communication devices. SAR is determined by applying Finite Difference Time Domain (FDTD) techniques to simulate the field conditions produced by wireless devices in standardized anatomically correct models of the human anatomy.

6. Drafts

SC-2 (Working Group 1: Measurement Techniques)

The final draft of IEEE Std 1528a was approved at the SASB September 2005 meeting.

SC-2 (Working Group 2: Computational Techniques)

Partial first working drafts of P1528.1 and P1528.2 have been prepared. Important decisions have been made and parameters defined, e.g., head model, electrical properties of the dielectric phantom head material, distance between the handset and the head, measurement positions.

Section authors for P1528.1 and P1528.2 will provide first drafts 2 weeks before next TC-34 SC-2 meeting in Stockholm, Sweden (3-5 April 2006). The drafts for 1528.1 and 1528.2 are due 22 March 2005. A PAR for 1528.3 will be submitted in time to be considered at the March 2006 SASB meeting and a first partial draft of the standard will be discussed at the April 2006 Stockholm meeting.

7. Website (SC-2)

A website and reflector was set up several years ago for SC-2 and operates successfully. All meeting minutes, action items, motions, and drafts are posted on the web – SC balloting is carried out electronically. The site has recently been updated and reorganized. Public areas contain links to other sites important for SC-2 activities, e.g., the USAF Dosimetry Handbook, Tables of Dielectric Properties of Tissues (Gabriel), schedules for meetings. A private area contains draft sections of the practice, the results of measurements on canonical models, etc.

The website URL is: <http://grouper.ieee.org/groups/scc34/sc2/>

8. Objectives and goals for the past year and the TC's performance relative to meeting these goals and objectives.

- Publish amendment IEEE 1528a. (2nd Q 05) – Met
- Submit PAR for IEEE 1528b. (3rd Q 05) – Met
- Hold ICES TC-34 SC-2 meetings, including joint meetings with IEC 62209 to foster harmonized measurement standards (4th Q 05) - Met
- Complete outline for a recommended practice for the evaluation of RF-protective garments. (3rd Q 05) – Not met (ongoing – project may be dropped)

- Develop scope and outline for a recommended practice for small boat radars or abandon project. (3rd Q 05) – Not met (ongoing – project may be dropped)
- Submit PAR for recommended practice on small boat radars – dependent on above outcome. (3rd Q 05) – Not met (ongoing – project may be dropped)
- Submit PAR for recommended practice on RF protective clothing. (3rd Q 05) – Not met (ongoing – project may be dropped)
- Hold Ninth Annual Meeting of main committee. (2nd Q 05) – Met
- Complete outline and submit PAR for proposed P1528.1 “Recommended Practice for Determining the Peak Spatial Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices, 30 MHz - 6 GHz: General Requirements for using the Finite Difference Time Domain (FDTD) Method for SAR Calculations.” Replaces P1529. (2nd Q 05) – Met
- Complete outline and submit PAR for proposed P1528.2 “Recommended Practice for Determining the Peak Spatial Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices, 30 MHz - 6 GHz: Specific Requirements for Finite Difference Time Domain (FDTD) Modeling of Vehicle Mounted Antenna Configurations.” (4th Q 05) – Met
- Complete outline and submit PAR for proposed 1528.3, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices: Specific Requirements for Modeling Communication Devices Used in Combination with Vehicles.” (4th Q 05) – – Not met (ongoing – scope will be modified)
- Explore the need for a standard for the assessment low-frequency magnetic field security devices. (2nd Q 04) – Ongoing
- Meet with IEEE staff to explore fund-raising possibilities to support TC-34 and TC-95. (1st Q 05) – Ongoing
- Invite implant manufacturers to participate in the development of a “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices: Specific Requirements for Modeling Medical Implants Using the Medical Implant Communications Service (MICS).” (1st Q 05) – Met

9. Current levels of activity with milestones indicated

- Complete outline for a recommended practice for the evaluation of RF-protective garments. (3rd Q 06)
- Develop scope and outline for a recommended practice for small boat radars or abandon project. (3rd Q 06)
- Submit PAR for recommended practice on small boat radars – dependent on above outcome. (3rd Q 06)
- Submit PAR for recommended practice on RF protective clothing. (3rd Q 06)

- Develop 1st Draft of 1528b. (4th Q 06)
- Hold Tenth Annual Meeting of main committee. (2nd Q 06)
- Complete 1st working draft of P1528.1 “Recommended Practice for Determining the Peak Spatial Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices, 30 MHz – 6 GHz: General Requirements for using the Finite Difference Time Domain (FDTD) Method for SAR Calculations.” (2nd Q 06)
- Complete outline and submit PAR for proposed P1528.2 “Recommended Practice for Determining the Peak Spatial Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices, 30 MHz – 6 GHz: Specific Requirements for Finite Difference Time Domain (FDTD) Modeling of Vehicle Mounted Antenna Configurations.” (2nd Q 06)
- Complete outline and submit PAR for proposed 1528.3, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices: Specific Requirements for Modeling Communication Devices Used in Combination with Vehicles.” (2nd Q 06)
- Explore the need for a standard for the assessment low-frequency magnetic field security devices. (2nd Q 06)
- Complete the process of establishing an umbrella AdCom with oversight over TC-34 and TC-95. (1st Q 06)
- Complete revision of TC-34 P&Ps. (1st Q 06)

10. IEEE Staff support requirements

In the past, secretarial services for SC-2 provided by the Cellular Telecommunications and Internet Association (CTIA) are now provided by volunteer committee members. Support in setting up meetings at IEEE Piscataway has been required in the past; availability of the IEEE Staff Engineer at meetings held at IEEE is desirable. Since Bill Ash is the Staff Engineer for both TC-34 and TC-95, his attendance at the semi annual/annual TC-34 meetings is appropriate. His engineering background and broad knowledge of IEEE procedures is invaluable to this committee.

11. Summary of other activities

Liaison with other committees

Liaison with ICES occurs via the circulation of drafts, common membership and common meetings of TC-34 and ICES. Liaison with CENELEC, IEC, ARIB and other standards developing organizations is via common membership, sharing of drafts and meetings with members of the SC-2 harmonization WG, and “Category D” liaisons. Coordination has also been established with IEEE societies, e.g., EMC-S via representation on the Standards and Advisory Coordination Committee (SACCom).

12. Committee Operating Procedures

(See Annex A)

13. Membership

See Tables 1-4 and attached Excel file for detailed membership information (TC-34 Main Committee)

Table 1
TC-34 Membership: Main Committee (November 2006)

	LAST NAME	FIRST NAME	MI	AFFILIATION	INTEREST*
1.	Adair	Eleanor	R.	Independent Consultant	GI
2.	Aslan	Edward		L-3 Microwave NARDA.	P
3.	Babij	Tadeusz	M.	Florida International University	GI-(A)
4.	Baron	David		AIHA Representative	P
5.	Bassen	Howard		FDA/CDRH	GI-(G)
6.	Beard	Brian		FDA/CDRH	GI-(G)
7.	Bell	Clark	H	HF Plus	U
8.	Chadwick	Philip		MCL	GI
9.	Chan	Kwok	W	FCC Laboratory	GI-(G)
10.	Chou	C.K.		Motorola, Inc.	P
11.	Cleveland	Robert	F.	FCC, Office of Eng. & Technology	GI-(G)
12.	Curtis	Robert	A.	OSHA - USDOL	GI-(G)
13.	Dini	David		Underwriters Laboratory	U
14.	Douglas	Mark		Motorola research Labs	P
15.	Foster	Kenneth	R.	Univ. of Pennsylvania	GI-(A)
16.	Gandhi	Prof. Om	P.	Univ. of Utah, Dept. of Elec. Eng.	GI-(A)
17.	Guy	Arthur	W.	Bioelectromagnetics Consulting	GI
18.	Hare	Ed		American Radio Relay League	GI
19.	Joyner	Kenneth		Motorola Australia Pty, Ltd	P
20.	Kainz	Wolfgang		FDA/CDRH	GI-(G)
21.	Kim	Nam		Chungbuk National University	GI-(A)
22.	Kuster	Niels		IT'IS	GI
23.	MacLean	Kathy		APREL Laboratories-SSI	U
24.	Mason	Patrick	A.	USAF/AFRL/HEDR	GI-(G)
25.	Osepchuk	John	M.	Full Spectrum Consulting	GI
26.	Petersen	Ronald	C.	R C Petersen Associates LLC	GI
27.	Santomaa	Veli	A	Independent Consultant	GI
28.	Scanlon	William	G.	Center for Comm Eng	GI-(A)
29.	Tell	Richard	A.	Richard Tell Assoc. Inc.	GI
30.	Thansandote	Art		Health Canada	U
31.	Toropainen	Anssi		Nokia Research Ctr.	P
32.	Varanelli	Arthur	G.	Raytheon Company	P

GI = General Interest

GI (A) = General Interest (Academic)

GI (G) = General Interest (Government)

P = Producer

U = User

Table 2

TC-34 Membership: Subcommittee 1 (Small Boat Radar)

	LAST NAME	FIRST NAME	MI	AFFILIATION
1.	Adair	Eleanor	R	Independent Consultant
2.	Bell	Clark	H	HF Plus
3.	Dini	David		Underwriters Laboratory
4.	Mantiply	Ed		FCC
5.	Osepchuk	John	M	Full Spectrum Consulting
6.	Petersen	Ronald	C.	R. C. Petersen Associates
7.	Varanelli	Arthur	G	Raytheon Company

Table 3 (a)

TC-34 Membership: Subcommittee 2 (Certification of Wireless Handsets)

(International Harmonization WG)

	LAST NAME	FIRST NAME	MI	AFFILIATION
	Chou	C-K		Motorola Research Labs
	Cleveland	Robert	F	FCC/OET
	Nicol	Stuart		Aprel Laboratories

Table 3

TC 34 Membership: Subcommittee 2 (Certification of Wireless Handsets)

	LAST NAME	FIRST NAME	AFFILIATION
1.	Balzano	Quirino	University of Maryland
2.	Bassen	Howard	FDA/CDRH (HFZ 133)
3.	Baylis	Lawrence	Medtronic
4.	Beard	Brian	FDA/CDRH (HFZ 133)
5.	Berger	Stephen	TEM Consulting
6.	Bronaugh	Edwin	EdB EMC Consultants
7.	Buris	Nicholas	Motorola Labs
8.	Burkhart	David	Underwriters Laboratories, Inc.
9.	Cardinal,PhD	Paul	Research in Motion

	LAST NAME	FIRST NAME	AFFILIATION
10.	Case	David	Cisco Systems Corporate Compliance
11.	Chan	Kwok	FCC Laboratory
12.	Chen	Ji	University of Hawaii
13.	Choi	Hyung-Do	ETRI
14.	Chou	C.K.	Motorola, Inc.
15.	Christ	Andreas	It'IS ETHZ
16.	Cleveland	Robert	FCC
17.	Cunningham	James	7 Layers, Inc.
18.	Davis	Christopher	University of Maryland
19.	Dorgan	Michael	IDX Systems, Inc.
20.	Douglas	Mark	Motorola, Inc.
21.	Enger	Ken	Motorola, Inc.
22.	Faraone	Antonio	Motorola, Inc.
23.	Farlow	Charles	Medtronic
24.	Foster	Kenneth	Univ. of Pennsylvania
25.	Gabriel	Sami	Vodafone Group Services Ltd.
26.	Gajda	Greg	Rad.Prot.Bureau/Health Canada
27.	Gandhi	Om	Univ. of Utah
28.	Graff	Bill	AmericanTCB, Inc
29.	Grangeat	Christophe	Alcatel
30.	Harrington	Tim	FCC
31.	Hauswirth	Steve	Motorola
32.	Heirman	Donald	Don HEIRMAN Consultants
33.	Ivans	Veronica	Medtronic
34.	Kainz	Wolfgang	USFDA/CDRH
35.	Kang	Gang	
36.	Kasper	Brian	Industry Canada
37.	Kee	Victor	Ultratech
38.	Keshvari	Jafar	Nokia
39.	Kuster	Niels	It'ls
40.	Laramie	Dan	Nokia
41.	Lazzi	Gianluca	North Carolina State University
42.	Lee	Ae-kyoung	ETRI
43.	Li	C.	Kyocera Wireless
44.	Loader	Benjamin	National Physical Laboratory
45.	Lu	Lin	Kyocera Wireless
46.	Luebbers	Raymond	Remcom Inc
47.	MacLean	Kathy	APREL Laboratories

	LAST NAME	FIRST NAME	AFFILIATION
48.	Mason	Patrick	USAF/AFRL/HEDR
49.	Moller	Paul	Motorola, Inc.
50.	Mullen	Richard	Panasonic/Matsushita
51.	Nappert	Hughes	Industry Canada
52.	Ng	P.	Rogers Cantel, Inc.
53.	Nicol	Stuart	APREL Laboratories
54.	Noboru	Ono	Sony Ericsson Japan
55.	Okoniewski	Michael	University of Calgary
56.	Onishi	Teruo	NTT DOCOMO
57.	Papadopoulos	J.	Audiovox
58.	Petersen	Ronald	R C Petersen Associates LLC
59.	Phillips	James	Motorola, Inc.
60.	Picard	Stephane	IC GC CA
61.	Plicanic	Ramadan	Sony Ericsson Mobile AB
62.	Pokovic	Katja	Schmid & Partner Eng. AG
63.	Saito	Shinji	Panasonic
64.	Schulteis	Geoff	Airprime Inc
65.	Seabury	David	
66.	Seidman	Seth	USFDA/CDRH
67.	Shah	Yogi	Guidant
68.	Siegbahn	Martin	Ericsson
69.	Stuchly	Maria	University of Victoria
70.	Toropainen	Anssi	Nokia Research Center
71.	Walton	Nerina	Nokia
72.	Whalen	Stephen	Motorola
73.	Wojcik, Ph.D.	Jacek	Spectrum Sciences Institute
74.	Wu	Dr. Wen-Lieng	Motorola
75.	You	Feng	Nokia

Table 4**TC-34 Membership: Subcommittee 3 (Effectiveness of RF Protective Garments)**

	LAST NAME	FIRST NAME	MI	AFFILIATION
1.	Anderson	Vitas		TVNZ Australia Pty Ltd.
2.	Baron	David		AIHA Representative
3.	Bruckner	Gunter		Teracom Components Inc.
4.	Chou	C.K.		Motorola, Inc.
5.	Cohen	Jules		Jules Cohen P.E.
6.	Curtis	Robert	A.	OSHA - USDOL
7.	Davis	Edward	B.	Euclid Garment Manufact
8.	Frazier	William	F	Laurence Behr Assoc
9.	Joyner	Ken	H.	Motorola Australia Pty Ltd.
10.	Kanda	Michael		Motorola Research Labs
11.	Kuster	Niels		IT'IS
12.	Maurer	Stewart		RF & ELF Consultant
13.	Meier	Matthias		Motorola GmbH
14.	Needy	Robert		Naval Surface Warfare Ctr.
15.	Olsen	Richard	G.	Independent Cons
16.	Petersen	Ronald	C.	R C Petersen Associates
17.	Rowley	Jack		Telstra Research Labs
18.	Siekmann	Harald		HVBG - BIA
19.	Simm	Jamie		IMMAD Broadcast Services
20.	Taylor	Scott		Nortel
21.	Tell	Richard	A.	Richard Tell Assoc. Inc.
22.	Zakharia	Deanna		Motorola FLRes Laboratory

Detailed Report – TC-95

1. Scope

The scope of ICES TC-95 is:

“Development of standards for the safe use of electromagnetic energy in the range of 0 Hz to 300 GHz relative to the potential hazards of exposure of man, volatile materials, and explosive devices to such energy. It is not intended to include infrared, visible, ultraviolet, or ionizing radiation. The committee will coordinate with other committees whose scopes are contiguous with TC-95.” (The scope remains the same as the scope of SCC-28.)

2. Membership Roster

(See Tables 1-6)

Several members of TC-95 have been inactive and their continuing status is currently being addressed by the Membership Committee. In terms of stakeholders, the membership continues to be well balanced. About 50% of the TC-95 membership are IEEE members, with a fewer number of SA members. This is to be expected and defended in view of the interdisciplinary nature of our membership. TC-95 is grateful for their voluntary contributions under conditions where it would be an unreasonable imposition to require IEEE membership. However, IEEE SA membership is required of all TC-95 leadership (e.g., Committee and Subcommittee Chairs, Co-chairs) and encouraged for all members.

3. Meetings (2004-2006)

Main Committee:

June 2004, Washington, DC

December 2004, San Antonio, TX

June 2005, Dublin Ireland

December 2005, San Antonio, TX

June 2006, Cancun Mexico – tentative

December 2006 (TBD)

Subcommittee 1 (Measurements and computation):

June 2004, Washington, DC

January 2005, Rockville, MD

September 2005, Teleconference

November 2005, Teleconference

January 2006, Rockville, MD – tentative

June 2006, Cancun, Mexico – tentative

December 2006 (TBD)

Subcommittee 2 (Warning signs, symbols and hazard communication):

June 2004, Washington, DC
 December 2004, San Antonio, TX
 June 2005, Dublin Ireland
 December 2005, San Antonio, TX
 June 2006, Cancun Mexico – tentative
 December 2006 (TBD)

Subcommittee 3 (Safety levels – 0-3 kHz):

June 2004, Washington, DC
 December 2004, San Antonio, TX
 June 2005, Dublin Ireland
 December 2005, San Antonio, TX
 June 2006, Cancun Mexico – tentative
 December 2006 (TBD)

Subcommittee 4 (Safety levels – 3 kHz to 300 GHz):

January 2004, Ft Lauderdale, FL (SC-4 Editorial Committee)
 June 2004, Washington, DC
 September 2004, Rosslyn, VA (SC4 Editorial Committee)
 January 2005, Ft Lauderdale, FL (SC-4, Editorial Committee)
 June 2005, Dublin Ireland
 July 2005, Rosslyn, VA (SC-4, Editorial Working Committee)
 December 2005, San Antonio, TX,
 June 2006, Cancun Mexico – tentative

Subcommittee 5 (Safe distances from antennas during blasting operations):

June 2004, Washington, DC
 December 2004, San Antonio, TX
 June 2005, Dublin Ireland
 December 2005, San Antonio, TX
 June 2006, Cancun Mexico – tentative
 December 2006 (TBD)

4. Main Committee and Subcommittee Status

Main Committee

A major effort during the past several years has been to increase the membership of ICES, particularly non-U.S. members. TC-95 now has members from Australia (4), Bulgaria (1), Canada (4), China (1), Finland (3), France (1), Germany (1), Greece (3), Hungary (1), Ireland (4), Israel (1), Italy (3), Japan (1), Korea (2), Malaya (1), the Netherlands (2), New Zealand (1), Poland (1), Sweden (1), Slovenia (1), South Africa (2), Switzerland (3), Thailand (1), the United Kingdom (8) and the United States (69).

The following members have been added to TC-95 since the last annual report:

Name	Affiliation	Country
Max Amman	Dublin Institute of Technology	IE
Ian Brooker	Sensormatic	UK
Leon du Toit	Directorate Radiation Control, Dept of Health	ZA
Jeff Holley	Florida Power and Light	US
Nam Kim	Chungbuk National University	KR
David Nelson	Michigan Technical University	US
Kwan-Hoong Ng	University of Malaya, Dept of Radiation	MY
Paolo Ravazzani	Italian Nat Res Council	IT
Dun Sik Yoo	Elect & Telecom Res Inst	KR

The TC-95 mailing list now approaches 350, including the many observers on the Subcommittees. Five years ago, the long-standing practice of sending hard copies of our extensive documents through the mail to our global mailing list was discontinued – all communications are now via e-mail and the Internet. The ICES Website contains both open and private sites for TC-95 and its subcommittees. Subcommittee 4 makes all agendas, meeting minutes, white papers, RF research database, draft standard documents, and many special reports available to all, with certain proprietary or working documents available only to members of the subcommittee on private sections of the site. The TC-95 SC-4 literature database, containing more than 2400 titles, now appears on the WHO website and is also accessible to all.

During the past year, one new standard, one revised standard and one reaffirmation were approved by the SASB. Specifically, IEEE C95.1-2005, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,” and IEEE C95.7-2005, “IEEE Recommended Practice for Radiofrequency Safety Programs” were approved. C95.1-2005 replaces IEEE C95.1-1991: 1999 edition (including Amendment 2); C95.7 is a new standard. IEEE Std C95.2-1999, “IEEE Standard for Radio Frequency Energy and Current Flow Symbols” was reaffirmed.

TC-95 Leadership

Office	Name	Affiliation
Chairman	Ronald C Petersen	R. C. Petersen Associates, LLC
Vice Chairman	Dr. Ralf Bodemann	Siemens AG
Past Chairman/Executive Secretary	Dr. Eleanor Adair	Independent Consultant
Chairman Emeritus	Dr. John Osepchuk	Full Spectrum Consulting
Treasurer	Arthur Varanelli	Raytheon Company
Chairman, International Liaison Committee	Dr. Michael Murphy	Air Force Research Laboratory
Chairman, Membership Committee	Dr. Tom McManus	Independent Consultant
Chairman, SC-1	Howard Bassen	US FDA Center for Devices and Rad. Health
Chairman, SC-2	Richard Tell	Richard A Tell Associates, Inc.
Co-Chairman, SC-3	Dr. Phillip Chadwick	Microwave Consultants Ltd.
Co-Chairman, SC-3	Thanh Dovan	SPI PowerNet Pty. Ltd.
Co-Chairman, SC-4	Dr. C-K Chou [†]	Motorola Research
Co-Chairman, SC-4	Dr. John D'Andrea [†]	Naval Research Center
Co-Chairman, SC-5	G. A. (Drew) Koban	Naval Surface Warfare Ctr.
Co-Chairman, SC-5	Robert Needy	Naval Surface Warfare Ctr.

[†]. Now that the revision of IEEE Std C95.1-1991 "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz" has been approved, Co-Chairman Chou and D'Andrea are stepping down. Dr. Art Thansandote, Health Canada, RF Safety Programme, has accepted the position of Co-Chairman; Marvin Ziskin, MD, Temple Univ. Medical School, has also been asked to serve as Co-Chairman.

Subcommittee 1:

Subcommittee 1 is in the process of developing a new standard, PC95.3.1, "Recommended Practice for Measurements and Computation of Electric, Magnetic and Electromagnetic Fields With Respect to Human Exposure to Such Fields, 0 - 100 kHz," which will extend the frequency range of ICES measurement standards. A partial working draft has been completed – action items have been assigned to the subcommittee members with the goal of completing a first draft during the 1st Q, 2006.

Subcommittee 2:

Subcommittee 2 has responsibility for two standards (C95.7-2005 and C95.2-1999). C95.2 was reaffirmed at the September 2005 SASB meeting; C95.7 was approved at the September SASB meeting. At this time there are no PARs for new or existing projects.

Subcommittee 3:

Subcommittee 3 has responsibility for C95.6-2002. At present, no major revisions of this standard are anticipated but key members of SC-3 continue open dialog with members of other organizations with similar guidelines, e.g., the International Commission on Non-Ionizing Radiation Protection (ICNIRP) to iron out philosophical differences in the rationale for each of the standards and guidelines. In addition members of SC-3 are in the process of exploring the development of an application guide” as an adjunct to C95.6-2002.

During the past two years, members of SC-3 have presented four short courses on C95.6-2002; two in the US, one in Canada and one in Ireland. Each was very well received. The attendees are mainly from the power utilities and government agencies.

Subcommittee 4:

Subcommittee 4 has responsibility for the C95.1 standard. This standard was first published as an USASI standard in 1966 and revisions were published as ANSI standards in 1974 and 1982. In 1991 a revision was published as an IEEE standard. It was reaffirmed in 1997, a corrigendum published in 1999 and an amendment in 2004. The latest revision, C95.1-2005 was approved by the SASB at the September 2005 meeting. The revision is the result of a major effort by SC-4 to fully review and evaluate the relevant scientific literature. There are no PARs for new or existing projects.

Subcommittee 5:

Subcommittee 5 is responsible for C95.4-2002 (IEEE Recommended Practice for Determining Safe Distances from Radio Frequency Transmitting Antennas When Using Electric Blasting Caps during Explosive Operations). The standard is now being reviewed – there are no PARs for new or existing projects.

5. PARs

The only active PAR is the SC-1 PAR for a new standard project – PC95.3.1 (Approved December 2003)

Title: Recommended Practice for Measurements and Computation of Electric, Magnetic and Electromagnetic Fields With Respect to Human Exposure to Such Fields, 0 - 100 kHz

Project scope: This recommended practice describes 1) methods for measuring external electric and magnetic fields and contact currents to which persons may be exposed, 2) instrument characteristics and the methods for calibrating such instruments, and 3) methods for computation and the measurement of the resulting fields and currents that are induced in bodies of humans exposed to these fields. This recommended practice is applicable over the frequency range of 0 to 100 kHz.

Project purpose: The purpose of this recommended practice is to describe preferred measurement techniques and computational methods that can be used to ascertain compliance with contemporary standards for human exposure to electric and magnetic fields in the frequency range of 0 to 100 kHz such as IEEE Stds C95.1, C95.6 and similar standards. This

document is intended primarily for use by engineers, biophysicists, and other specialists who are familiar with basic electromagnetic (EM) field theory and practice, and the potential hazards associated with exposure to EM fields. It will also be useful to bioeffects researchers, instrument developers and manufacturers, those developing calibration systems and standards, and individuals involved in critical hazard assessments or surveys.

6. Objectives and goals for the past year and the TC's performance relative to meeting these goals and objectives.

- Complete the restructuring of ICES; establish an AdCom to administer ICES activities, including fundraising. – 1st Q 2005. (Partially met – AdCom has not been completely populated)
- Initiate fundraising, with the guidance of the IEEE staff, so that critical travel, support for special projects and meetings, support for visiting scientists and experts, and other critical needs can be met – 2nd Q 2005. (Partially met)
- Continue international expansion led by Drs. McManus and Murphy. Introduce new leadership with emphasis on non- U.S. and younger members – ongoing.
- Institute a new policy of annual or semi-annual citations of merit for volunteers who have made substantial contributions to ICES projects – 1st Q 2005. (Met – IEEE Standards Medallion awarded to three TC-95 members)
- Continue to strengthen liaisons with ICNIRP, IEC, WHO, COST 281, TABD, etc. – ongoing
- Attempt to carry out a third closed leadership meeting with ICNIRP, possibly during the June 2005 meetings in Dublin – 2nd Q 2005. (Not met – ICNIRP is extremely sensitive to formal meetings with organizations that may have the appearance of “commercial vested interests”)
- Complete arrangements for summer meetings of ICES and Subcommittees, in conjunction with the June 2005 meetings of the Bioelectromagnetics Society in Dublin, Ireland, – 2nd Q 2005. (Met)
- Initiate sponsor balloting of the revision of C95.1 “Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz” – 2nd Q 2005. (Met)
- Pursue the project on publicizing ICES and C95.1 standards in the literature, with the assistance of IEEE staff – 2nd Q 2005. (On going)
- Reassess the plans for an electronic newsletter in recognition of ICES objectives – 2nd Q 2005. (On going)
- Reassess the methods of dealing with requests for interpretation of standards documents and the role of IEEE staff – 2nd Q 2005. (Ongoing – a special supplement to the journal *Bioelectromagnetics* devoted entirely to the SC-4 literature evaluation and the ICES history and process was published in December 2003.)
- Update the ICES website, provide FTP service for subcommittee activities – 1st Q, 2005. (Ongoing)

- Complete 1st draft of new project “Recommended Practice for Measurements and Computations with Respect to Human Exposure to Electric and Magnetic Fields, 0 to 100 kHz” – 3rd Q 2005. (Partially met)
- Complete sponsor balloting on PC95.7 “Recommended Practice for Radiofrequency Safety Programs,” – 2nd Q 2005. (Met)
- Complete draft of commonly used terms – 2nd Q 2005. (Ongoing)
- Conduct additional short courses on the C95.6 standard. (Met)
- Develop a guide for the application of the new C95.6 standard – 3rd Q 2005. (Ongoing)
- Complete subcommittee balloting on revision of C95.1 – 2nd Q 2005. (Met)
- Complete draft of the revision of C95.1 for sponsor ballot – 1st Q 2005. (Met)
- Complete sponsor balloting of the revision of C95.1 – 2nd Q 2005 (Met – 3rd Q 2005)
- Publish revision of C95.1 – 4th Q 2005. (Met - standard approved in September)
- Review plans for future activities related to electro-explosive devices – Ongoing.

7. Current levels of activity with milestones indicated

- Work with the ICES AdCom, with the guidance of the IEEE staff, to develop a fundraising program to support critical travel, support for special projects and meetings, support for visiting scientists and experts, and other critical needs – 2nd Q 2006.
- Continue international expansion led by Drs. McManus and Murphy. Introduce new leadership with emphasis on non-U.S. and younger members – Ongoing
- Strengthen liaisons with ICNIRP, IEC, WHO, COST 281, etc. – Ongoing
- Arrange for summer 2006 meetings of TC-95 and its subcommittees – 1st Q 2006.
- Pursue the project on publicizing ICES and C95.1 standards in the literature, with the assistance of IEEE staff – 2nd Q 2006.
- Reassess the plans for an electronic newsletter in recognition of ICES objectives – 2nd Q 2006.
- Attempt to carry out a third closed leadership meeting with ICNIRP, possibly during the June 2006 meetings in Cancun – 2nd Q 2006.
- Update the TC-95 website, include SC sections, provide FTP service for subcommittee activities – 1st Q, 2006
- Complete 1st draft of new project “Recommended Practice for Measurements and Computations with Respect to Human Exposure to Electric and Magnetic Fields, 0 to 100 kHz” – 1st Q 2006.
- Complete draft of commonly used terms – 2nd Q 2006
- Complete guide for the application of C95.6 – 3rd Q 2006.
- Review plans for future activities related to electro-explosive devices (SC-5) – ongoing.

8. IEEE Staff

Support in setting up meetings at IEEE Piscataway has been required in the past; availability of the IEEE Staff Engineer at meetings held at IEEE is desirable. Since Bill Ash is the Staff Engineer for both TC-34 and TC-95, his attendance at the semi annual/annual TC-34 meetings is appropriate. His engineering background and broad knowledge of IEEE procedures is invaluable to this committee.

9. Other Activities:

Members of ICES TC-95 are continually involved in a wide spectrum of activities that relate to standards setting including research, education, and drafting of regulations. Members participate in the governmental activities in many nations, as well. These include the FCC and FDA in the US and the EU/EC in Europe. TC-95 members participate in the broad activities of the WHO and its EMF Project as well as the European EBEA, and in various other meetings around the world. In the future, ICES members will be represented at a number of international meetings including the International Conference on Electromagnetic Fields, Health and Environment, 27-29 April 2006, Madeira Island, Portugal and the Bioelectromagnetics School at Erice, 1-8 October 2006, Erice, Sicily, Italy.

10. Committee Operating Procedures

(See Annex A)

11. Membership

See Tables 1-6 and attached Excel file for detailed membership information (TC-95 Main Committee)

This report was prepared and submitted by:

Ron Petersen
Chairman, ICES/
November 29, 2005

Membership

Table 1 –TC-95 Membership (August, 2004), Main Committee

	LAST_NAME	FIRST_NAME	MI	AFFILIATION	COUNTRY	INT CATEGORY
1.	Adair	Eleanor	R.	Independent Consultant	US	GI
2.	Altman	Melvyn	R.	FDA/CDRH	US	GI (G)
3.	Ammann	Max	J	Dublin Institute of Technology	IE	GI (A)
4.	Anderson	Vitas		THL Australia Pty Ltd	AU	P
5.	Aslan	Edward		L-3 Microwave NARDA.	US	P
6.	Balzano	Quirino		Independent Consultant	US	GI (A)
7.	Baron	David		AIHA Representative	US	GI
8.	Bassen	Howard		FDA/CDRH	US	GI (G)
9.	Bavin	John		Consumers Energy	US	GI
10.	Bellier	Pascale		Health Canada	CA	GI (G)
11.	Bergeron	John	A.	Independent Consultant	US	GI
12.	Black	David	R		NZ	GI
13.	Blick	Dennis	W.	Independent Consultabt	US	GI(G)
14.	Bodemann	Ralf		Siemens AG	DE	U
15.	Brecher	Aviva		DOT/RSPA Volpe Ctr.	US	GI(G)
16.	Brooker	Ian		Tyco Safety Products, Sensormatic	IE	P
17.	Bushberg	Jerrold	T.	U. of California, Davis	US	GI (A)
18.	Chadwick	Philip		MCL	UK	GI
19.	Chesnick	Scott		National Heart Lung Blood Institute	US	GI (G)
20.	Chiang	Huai		Zhejiang Medical University	CN	GI (A)
21.	Chiusano	Stephen		Lawrence Livermore Nat'l Lab.	US	U
22.	Chou	C.K.		Motorola, Inc.	US	P
23.	Cleveland	Robert	F.	FCC, Office of Eng. & Technology	US	GI (G)
24.	Coghill	Roger	W.	Coghill Research Labs	UK	U
25.	Cohen	Jules		Jules Cohen P.E.	US	GI
26.	Curtis	Robert	A.	OSHA - USDOL	US	GI (G)
27.	D'Andrea	John	A.	Naval Health Research Ctr.	US	GI (G)
28.	de jager	Linda		School of Health Technology	ZA	GI (A)
29.	DeFrank	John	J.	USACHPPM	US	GI (G)
30.	DeLorge	John	O.	Indpendent Consultant	US	GI
31.	Dini	David		Underwriters Laboratory	US	U

	LAST_NAME	FIRST_NAME	MI	AFFILIATION	COUNTRY	INT CATEGORY
32.	d'Inzeo	Guglielmo		La Sapienza University of Rome	IT	GI (A)
33.	Dovan	Thanh		SPI PowerNet Pty. Ltd.	AU	U
34.	Durrenberger	Gregor		ETH	CH	GI (A)
35.	DuToit	Leon		Department of Health	ZA	GI (G)
36.	Erdreich	Linda	S.	Exponent	US	GI
37.	Fastman	Stewart	M.	American Insurers	US	U
38.	Feero	William	E.	Independent Consultant	US	GI
39.	Foster	Kenneth	R.	Univ. of Pennsylvania	US	GI (G)
40.	Gajsek	Peter		Institute of Public Health	SI	GI (G)
41.	Gandhi	Om	P.	Univ. of Utah, Dept. of Elec. Eng.	US	GI (A)
42.	Gardner	Robert	C.	MOD D S&F Pol	UK	U
43.	George	David	L.	Unisys Corp.	US	U
44.	Grandolfo	Martino		Laboratorio di Fisica	IT	GI
45.	Guy	Arthur	W.	Bioelectromagnetics Consulting	US	GI
46.	Haes, Jr.	Donald	L.	Consultant	US	U
47.	Halkiotis	Konstantinos		Greek Atomic Energy Commission	GR	GI (G)
48.	Hanna	Bob		DCMNR, Ireland	IE	GI (G)
49.	Hare	Ed		American Radio Relay League	US	U
50.	Hatfield	James	B	Hatfield & Dawson	US	U
51.	Heirman	Donald	N.	Don HEIRMAN Consultants	US	GI
52.	Heroux	Paul		McGill University	CA	GI (A)
53.	Holley	Jeff	L	Florida Power and Light	US	U
54.	Ikehata	Masateru		Railway Technical Research Institute	JP	GI (A)
55.	Israel	Michel		National Centre of Hygiene	BL	GI (G)
56.	Ivans	Veronica		Medtronic Inc.	US	U
57.	Jaffa	Kent	C.	Pacificorp	US	U
58.	Johnston	Sheila		Independent Consultant	UK	GI
59.	Joyner	Ken	H.	Motorola Australia Pty Ltd.	AU	P
60.	Kandel	Shaiela		SOREQ NRC	IL	GI (G)
61.	Karabetsos	Efthymios		Greek Atomic Energy Commission	GR	GI (G)
62.	Kemp	Ray		Galson Sciences Limited	UK	GI
63.	Kim	Nam		Chungbuk National University	KR	GI (A)
64.	King	James	J.	Department of the Navy	US	GI (G)
65.	Klaenberg	B. Jon		USAF	US	GI (G)
66.	Koban	George	A.	Naval Surface Warfare Center	US	GI (G)
67.	Koepfinger	Joseph	L.	Consultant	US	GI
68.	Kuster	Niels		IT'IS Foundation	CH	GI (A)

	LAST_NAME	FIRST_NAME	MI	AFFILIATION	COUNTRY	INT CATEGORY
69.	LaMastra	Anthony		American Iron & Steel Inst.	US	GI
70.	Lang	Sakari		Nokia Research Ctr.	FI	P
71.	Leonowich	John	A.	Battelle Pacific NW Nat. Lab	US	GI (G)
72.	Leszczynski	Dariusz		STUK-Rad and Nuclear Rad Lab	FI	GI (G)
73.	Lin	James	C.	University of Illinois	US	GI (A)
74.	Maletskos	C.J.		National Council for Rad.	US	GI
75.	Manatrakul	Nisakorn		Ministry of Public Health	TH	GI (G)
76.	Manning	Michael		IndeXsar, Ltd	UK	U
77.	Mason	Patrick	A.	USAF/AFRL/HEDR	US	GI (G)
78.	Maurer	Stewart		RF & ELF Consultant	US	U
79.	McManus	Tom		Dept Comm, Nat & Mar Res	IE	GI (G)
80.	McNamee	James	P.	Health Canada	CA	GI (G)
81.	Meltz	Martin	L.	Dept of Rad Oncology	US	GI (A)
82.	Montgomery	Noel	D.	Air Force Research Laboratory	US	GI (G)
83.	Moore	Michael	R.	Oak Ridge National Lab	US	GI (G)
84.	Mukhopadhyay	Amitabha		Con Edison	US	U
85.	Murphy	Michael	R.	Directed Energy Bioeffects	US	GI (G)
86.	Nelson	David		Michigan Technical University	US	GI (A)
87.	Ng	Kwan-Hoong		Dept of Radiation	MY	GI (G)
88.	Osepchuk	John	M.	Full Spectrum Consulting	US	GI
89.	Pakhomov	Andrei	G.	McKesson Bio Services	US	GI
90.	Paul	William	F.	Int. Brotherhood of Elect. Workers	US	U
91.	Persson	Bertil	R.	Lund University	SE	GI (A)
92.	Petersen	Ronald	C.	R C Petersen Associates	US	U
93.	Ravazzani	Paolo		Italian Nat Res Council	IT	GI (A)
94.	Reilly	J. Patrick		Metatec Associates	US	GI
95.	Repacholi	Michael	H.	World Health Organization	CH	GI
96.	Roberts	Brad	J.	US Army CHPPM	US	U
97.	Root	Ervin	D.	Alliant Energy	US	U
98.	Samaras	Theodoros		Aristotle University of Thessaloniki	GR	GI (G)
99.	Santomaa	Veli	A	Independent Consultant	FI	GI
100.	Scanlon	William	G.	Queens University, Belfast	UK	GI (A)
101.	Sheppard	Asher	R.	Asher Sheppard Consulting	US	U
102.	Sirugo	Jon	H	Southern California Edison	US	U
103.	Stolwijk	Jan A.	J.	Yale University	US	GI (A)
104.	Swicord	Mays	L.	Motorola	US	P
105.	Szmigielski	Stanislaw		Mil Inst of Hyg and Epidemiology	PL	GI (G)

	LAST_NAME	FIRST_NAME	MI	AFFILIATION	COUNTRY	INT CATEGORY
106.	Tang, MD	Rosa	M	UTMB, Galveston	US	GI
107.	Tattersall	John		DSTL	UK	GI (G)
108.	Tell	Richard	A.	Richard Tell Assoc. Inc.	US	U
109.	Tenforde	Thomas	S.	Battelle Pacific NW Lab.	US	GI
110.	Thansandote	Art		Health Canada	CA	U
111.	Thuroczy	Gyorgy		Nat Res Inst for Radiobiology	HU	GI (G)
112.	Utteridge	Tammy		Institute of Medical & Veterinary Science	AU	GI (A)
113.	van Rongen	Eric		Health Council of the Netherlands	NL	GI (G)
114.	Varanelli	Arthur	G.	Raytheon Company	US	P
115.	Wagenaar	Femme-Michelle		PhoneVision International	NL	GI
116.	Wuart	Joe		France Telecom R&D	FR	P
117.	Williams, Jr.	Louis	A.	Louis A. Williams Jr. & Associates	US	U
118.	Yoo	Done-Sik		Elect & Telecom Res Inst	KR	GI (A)
119.	Zipse	Donald	W.	Zipse Electrical Eng., Inc.	US	GI
120.	Ziskin, MD	Marvin	C.	Temple Univ. Medical School	US	GI (A)

- GI General Interest
- GI (A) General Interest – Academic
- GI (G) General Interest – Government
- P Producer
- U User

Table 2 – SC-1 (Techniques, Procedures, Instrumentation and Computation)

	LAST NAME	FIRST NAME	MI	AFFILIATION	COUNTRY
1	Adair	Eleanor	R.	Independent Consultant	US
2	Anderson	Vitas		TVNZ Australia Pty Ltd.	AU
3	Aslan	Edward		L-3 Microwave NARDA.	US
4	Babij	Tadeusz	M.	Florida International University	US
5	Balzano	Quirino		Independent Consultant	US
6	Baron	David		AIHA Representative	US
7	Bassen	Howard		FDA/CDRH	US
8	Bergeron	John	A.	Independent Consultant	US
9	Bodemann	Ralf		Siemens AG	DE
10	Brecher	Aviva		DOT/RSPA Volpe Ctr.	US
11	Chan	Kwok	W	FCC Laboratory	US
12	Chou	C.K.		Motorola, Inc.	US
13	Cleveland	Robert	F.	FCC, Office of Eng. & Technology	US
14	Cohen	Jules		Jules Cohen P.E.	US
15	Cox	Diane		US Navy, NHRC	
16	Curtis	Robert	A.	OSHA - USDOL	US
17	Dovan	Thanh		SPI PowerNet Pty. Ltd.	AU
18	Fastman	Stewart	M.	American Insurers	US
19	Feero	William	E.	Independent Consultant	US
20	Frazier	William	F	Laurence Behr Associates, Inc. (LBA)	US
21	Gandhi	Prof. Om	P.	Univ. of Utah, Dept. of Elec. Eng.	US
22	Guy	Arthur	W.	Bioelectromagnetics Consulting	US
23	Hammer	Wayne	C.	SPAWAR Systems Ctr. Charleston	US
24	Hare	Ed		American Radio Relay League	US
25	Hatfield	James	B	Hatfield & Dawson	US
26	Hubbard	Roy		Technology Services International)	ZA
27	Hurt	William	D.	USAF	US
28	Iskra	Steve		Telstra Corp	
29	Ivans	Veronica		Medtronic Inc.	US
30	Johnston	Sheila		Independent Consultant	UK
31	Khalil	Kathy		SPAWARSYSCEN Charleston	US
32	Kim	Jin Suk		ETRI	KR

	LAST NAME	FIRST NAME	MI	AFFILIATION	COUNTRY
33	Kumbier	Werner		Narda Safety Test Solutions	DE
34	Kuster	Niels		IT'IS	CH
35	Leonowich	John	A.	Battelle Pacific NW Nat. Lab	US
36	Lotz	Gregory		NIOSH	US
37	Luebbers	Raymond		Remcom Inc.	US
38	MacLean	Kathy		APREL Laboratories-SSI	CA
39	Mantiplay	Ed		FCC/OET	US
40	Maurer	Stewart		RF & ELF Consultant	US
41	Misakian	Martin		Nat. Inst. of Standards & Technology	US
42	Moore	Michael	R.	Oak Ridge National Lab	US
43	Needy	Robert		Naval Surface Warfare Ctr.	US
44	Olsen	Richard	G.	Independent Consultant	US
45	Osepchuk	John	M.	Full Spectrum Consulting	US
46	Persson	Bertil	R.	Lund University	SE
47	Petersen	Ronald	C.	R C Petersen Associates	US
48	Roberts	Brad	J.	US Army CHPPM	US
49	Rogers	Walt		Veridian Eng/RFR Branch	US
50	Rowley	Jack		Telstra Research Labs	AU
51	Santomaa	Veli	A	Independent Consultant	FI
52	Schueller	Michael		Mannesmann Mobilfunk Gmbh	DE
53	Seabury	David		Chase Systems Inc.	US
54	Tell	Richard	A.	Richard Tell Assoc. Inc.	US
55	Thansandote	Art		Health Canada	CA
56	Umbdenstock	Donald	J.	Sensormatic Electronics Corp.	US
57	Varanelli	Arthur	G.	Raytheon Company	US
58	Watanabe	Soichi		CRL, Ministry of Telecommunications	JP
59	Watkins	Cleveland	F.	Independent Consultant	US
60	Williams, Jr.	Louis	A.	Louis A. Williams Jr. & Associates	US
61	Woods	Richard	W.	Sensormatic Electronics	US
62	Zirix	John		Microwave Department	US
63	Zollman	Peter		Vodafone Group R&D	UK

Table 3 – SC-2 (Terminology, Units of Measurements and Hazard Communication)

	LAST NAME	FIRST NAME		AFFILIATION	COUNTRY
1.	Adair	Eleanor	R.	Independent Consultant	US
2.	Anderson	Vitas		TVNZ Australia Pty Ltd	AU
3.	Aslan	Edward		L-3 Microwave NARDA.	US
4.	Baron	David		AIHA Representative	US
5.	Bassen	Howard		FDA/CDRH	US
6.	Bellier	Pascale		Health Canada	CA
7.	Biby	Richard	P.	Crown Castle International	US
8.	Black	David	R	Suite 6, Gillies Clinic	NZ
9.	Bodemann	Ralf		Siemens AG	DE
10.	Boyer	Jim		Lawrence Livermore National Labs	US
11.	Brecher	Aviva		DOT/RSPA Volpe Ctr.	US
12.	Bushberg	Jerrold	T.	Dir. Health Physics	US
13.	Charlow	Kevin	J	NISE	US
14.	Chou	C.K.		Motorola, Inc.	US
15.	Cleveland	Robert	F.	FCC, Office of Eng. & Technology	US
16.	Coghill	Roger	W.	Coghill Research Labs	UK
17.	Cohen	Jules		Jules Cohen P.E.	US
18.	Conover	David		NIOSH Contractor	US
19.	Curtis	Robert	A.	OSHA - USDOL	US
20.	D'Andrea	John	A.	Naval Health Research Ctr.	US
21.	DeFrank	John	J.	USACHPPM	US
22.	Erdreich	Linda	S.	Exponent	US
23.	Everist	Donald	G	Cohen, Dipell and Everist	US
24.	Fahy-Elwood	Alice		Consultant	US
25.	Gajda	Greg		Health Canada	CA
26.	Gettman	Ken		National Elect Manufact Assoc.	US
27.	Guy	Arthur	W.	Bioelectromagnetics Consulting	US
28.	Haes, Jr.	Donald	L.	Consultant	US
29.	Hammer	Wayne	C.	SPAWAR Systems Ctr. Charleston	US
30.	Hare	Ed		American Radio Relay League	US
31.	Hatfield	James	B	Hatfield & Dawson	US
32.	Heynick	Louis	N.	Independent Consultant	US
33.	Hubbard	Roy		Tech Services International	ZA

	LAST NAME	FIRST NAME		AFFILIATION	COUNTRY
34.	Ivans	Veronica		Medtronic Inc.	US
35.	Johnson	Robert	E.	L-3 Microwave NARDA	US
36.	Johnston	Sheila		Independent Consultant	UK
37.	Joyner	Ken	H.	Motorola Australia Pty Ltd.	AU
38.	Kantner	Kimberly		AT&T	US
39.	Khalil	Kathy		SPAWARSYSCEN Charleston	US
40.	Kierl	Bill		Motorola	US
41.	Klauenberg	B. Jon		USAF	US
42.	Koban	George	A.	Naval Surface Warfare Center	US
43.	Kumbier	Werner		Narda Safety Test Solutions	DE
44.	Kuster	Niels		IT'IS	CH
45.	Lathrop	Janet		Resource Strategies, Inc	US
46.	Leonowich	John	A.	Battelle Pacific NW Nat. Lab	US
47.	MacLean	Kathy	M	APREL Laboratories	CA
48.	Mantipty	Ed		FCC/OET	US
49.	Maurer	Stewart		RF & ELF Consultant	US
50.	Meltz	Martin	L.	Dept of Radiation Oncology	US
51.	Mercer	Christopher		Vodacom Pty Ltd	ZA
52.	Minnecci	Gerry		NJ Turnpike Authority	US
53.	Murphy	Michael	R.	Air Force Research Laboratory	US
54.	Nappert	Hughes		Industry Canada	CA
55.	Needy	Robert		Naval Surface Warfare Ctr.	US
56.	Norman	Larry		Pike Electric	
57.	Olsen	Richard	G.	Independent Consultant	US
58.	Osepchuk	John	M.	Full Spectrum Consulting	US
59.	Persson	Bertil	R.	Lund University	SE
60.	Petersen	Ronald	C.	R C Petersen Associates	US
61.	Proctor	Ken	R.	US Army	US
62.	Roberts	Brad	J.	US Army CHPPM	US
63.	Rogers	Walt		Veridian Eng/RFR Branch	US
64.	Rowley	Jack		Telstra Research Labs	AU
65.	Scanlon	William	G.	Center for Comm Eng	UK
66.	Seabury	David		Chase Systems Inc.	US
67.	Smith	Matthew		Dade Moeller & Associates	US
68.	Strickland	Richard		RF Safety Solutions	US

69.	Tell	Richard	A.	Richard Tell Assoc. Inc.	US
70.	Testagrossa	Paul	A	Lucent Technologies Inc.	US
71.	Thansandote	Art		Health Canada	CA
72.	Ulcek	Jerry		FCC	US
73.	Vanetta-Richard	Anne		Lucent Technologies Inc	US
74.	Varanelli	Arthur	G.	Raytheon Company	US
75.	Wagenaar	Femme-Michelle		PhoneVision International	NL
76.	Williams, Jr.	Louis	A.	Louis A. Williams Jr. & Associates	US
77.	Ziskin, MD	Marvin	C.	Temple Univ. Medical School	US

Table 4 – SC-3 (Safety Levels with Respect to Human Exposure, 0-3 kHz)

	LAST NAME	FIRST NAME	MI	AFFILIATION	COUNTRY
1.	Adair	Eleanor	R.	Independent Consultant	US
2.	Adlkofer	Franz		VerUm Foundation	DE
3.	Bailey	William	H.	Exponent Inc.	US
4.	Barker	J. Richard		General Cable	US
5.	Baron	David		AIHA Representative	US
6.	Bassen	Howard		FDA/CDRH	US
7.	Bavin	John		Consumers Energy	US
8.	Bellier	Pascale		Health Canada	CA
9.	Bergeron	John	A.	Independent Consultant	US
10.	Black	David	R	Suite 6, Gillies Clinic	NZ
11.	Bodemann	Ralf		Siemens AG	DE
12.	Boeggeman	Charles	J.	PECO Energy Co.	US
13.	Brecher	Aviva		DOT/RSPA Volpe Ctr.	US
14.	Carberry	Robert	E.	Northeast Utilities	US
15.	Chadwick	Philip		MCL	UK
16.	Chikamoto	Kazuhiko		Japan Nus Co. Ltd. (JANUS)	JP
17.	Coghill	Roger	W.	Coghill Research Labs	UK
18.	Curtis	Robert	A.	OSHA - USDOL	US
19.	Dale	Steiner	J.	ABB Power T&D Company	US
20.	Daly	James	M.	General Cable	US
21.	D'Andrea	John	A.	Naval Health Research Ctr.	US
22.	de jager	Linda		School of Health Technology	ZA
23.	DeFrank	John	J.	USACHPPM	US
24.	d'Inzeo	Gugliemo		La Sapienza University of Rome	IT
25.	Dovan	Thanh		SPI PowerNet Pty. Ltd.	AU
26.	Feero	William	E.	Independent Consultant	US
27.	Fichtenberg	David	S	State of Washington, Med Asst Ad	US
28.	Gandhi	Prof. Om	P.	Univ. of Utah, Dept. of Elec. Eng.	US
29.	Gettman	Ken		National Electrical Man Assoc.	US
30.	Gibney	Kelly	B	Retired	CA
31.	Goldberg	Georges		Advisory Comm. on Elect Comp	CH
32.	Goulet	Daniel		Hydro-Quebec	CA
33.	Haes, Jr.	Donald	L.	Consultant	US

	LAST NAME	FIRST NAME	MI	AFFILIATION	COUNTRY
34.	Hammer	Wayne	C.	SPAWAR Systems Ctr. Charleston	US
35.	Hernandez	Martin	A.	Florida Power & Light Co.	US
36.	Herz	Michael	C.	Pacific Gas & Electric Co.	US
37.	Heynick	Louis	N.	Independent Consultant	US
38.	Hicks	Danny	O.	South Carolina Electric & Gas Co.	US
39.	Hubbard	Roy		Technology Services Intl (TSI)	ZA
40.	Ikehata	Masatero		Railway Technical Research Institute	JP
41.	Ivans	Veronica		Medtronic Inc.	US
42.	Jaffa	Kent	C.	Pacificorp	US
43.	Johnston	Sheila		Independent Consultant	UK
44.	Karabetsos	Efthymios		Greek Atomic Energy Commission	GR
45.	Kautz	Richard	W.	Ford	US
46.	Koepfinger	Joseph	L.	Consultant	US
47.	Kuster	Niels		IT'IS	CH
48.	Lathrop	Janet		Resource Strategies, Inc	US
49.	Leonowich	John	A.	Battelle Pacific NW Nat. Lab	US
50.	Leszczynski	Dariusz		STUK-Radiation & Nuclear Rad Lab	FI
51.	Manatrakul	Nisakorn		Ministry of Public Health	TH
52.	Lotz	Gregory		NIOSH	US
53.	Mason	Patrick	A.	USAF/AFRL/HEDR	US
54.	McCourt	Robert	W.	PSE&G	US
55.	McManus	Tom		Dept of Comm, Marine and Nat Res	IE
56.	McNamee	James	P.	Health Canada	CA
57.	Merritt	James	H.	USAF Research Lab	US
58.	Murphy	Michael	R.	Air Force Research Laboratory	US
59.	Needy	Robert		Naval Surface Warfare Ctr.	US
60.	Osepchuk	John	M.	Full Spectrum Consulting	US
61.	Paul	William	F.	Int. Brotherhood of Elect.Workers	US
62.	Petersen	Ronald	C.	R C Petersen Associates	US
63.	Pittman	Steve		Potlach Pulp and Paperboard	US
64.	Podhrasky	Robert	J.	Garrett Metal Detectors	US
65.	Polson	Peter		Ausa Research	US
66.	Proctor	Ken	R.	US Army	US
67.	Ravazzani	Paolo		Italian National Research Council	IT
68.	Reilly	J. Patrick		Metatec Associates	US

	LAST NAME	FIRST NAME	MI	AFFILIATION	COUNTRY
69.	Roberts	Brad	J.	US Army CHPPM	US
70.	Rogers	Walter		AFRL (Veridian)	US
71.	Root	Ervin	D.	Alliant Energy	US
72.	Samaras	Theodoros		Aristotle University of Thessaloniki	GR
73.	Sawdon	Dave		IBM Global Services	UK
74.	Sheppard	Asher	R.	Asher Sheppard Consulting	US
75.	Sirugo	Jon	H	Southern California Edison	US
76.	Slesin	Louis		Microwave News	US
77.	Sliney	David		US Army CHPPM	US
78.	Swicord	Mays	L.	Motorola	US
79.	Szmigielski	Stanislaw		Military Institute of Hygiene and Epi.	
80.	Tell	Richard	A.	Richard Tell Assoc. Inc.	US
81.	Thansandote	Art		Health Canada	CA
82.	Thuroczy	Gyorgy		Nat Research Inst of Radiobiology	HU
83.	van Rongen	Eric		Health Council of the Netherlands	NL
84.	Varanelli	Arthur	G.	Raytheon Company	US
85.	Wagenaar	Femme-Michelle		PhoneVision International	NL
86.	Watkins	Cleveland	F.		US
87.	Wiert	Joe		France Telecom R & D	FR
88.	Williams, Jr.	Louis	A.	Louis A. Williams Jr. & Associates	US
89.	Woods	Richard	W.	Sensormatic Electronics	US
90.	Yandek	Edward	M.	GE Lighting	US
91.	Zipse	Donald	W.	Zipse Electrical Eng., Inc.	US
92.	Ziskin	Marvin	C.	Temple Univ. Medical School	US

Table 5 – SC-4 (Safety Levels with Respect to Human Exposure, 3 kHz-300 GHz)

	LAST NAME	FIRST NAME	MI	AFFILIATION	COUNTRY
1	Adair	Eleanor	R.	Independent Consultant	US
2	Allen	Stuart	G.	Nat'l Rad. Protection Board	UK
3	Altman	Melvyn	R.	FDA/CDRH	US
4	Ammann	Max	J	Dublin Institute of Technology	IE
5	Anderson	Vitas		TVNZ Australia Pty Ltd.	AU
6	Aslan	Edward		L-3 Microwave NARDA.	US
7	Babij	Tadeusz	M.	Florida International University	US
8	Bailey	William	H.	Exponent Inc.	US
9	Baron	David		AIHA Representative	US
10	Bassen	Howard		FDA/CDRH	US
11	Bellier	Pascale		Health Canada	CA
12	Bergeron	John	A.	Independent Consultant	US
13	Black	David	R	Suite 6, Gillies Clinic	NZ
14	Blick	Dennis	W.	AFRL/HEDR (Veridian)	US
15	Bodemann	Ralf		Siemens AG	DE
16	Brecher	Aviva		DOT/RSPA Volpe Ctr.	US
17	Bushberg	Jerrold	T.	Dir. Health Physics	US
18	Chadwick	Philip		MCL	UK
19	Chesnick	Scott		National Heart Lung Blood Institute	US
20	Chiang	Huai		Zhejiang Medical University	CN
21	Chikamoto	Kazuhiko		Japan NUS Co, Ltd	JP
22	Chou	C.K.		Motorola, Inc.	US
23	Cleveland	Robert	F.	FCC, Office of Eng. & Technology	US
24	Cobb	Brenda		Air Force Res Labs	US
25	Coghill	Roger		Coghill Res Labs	UK
26	Cohen	Jules		Jules Cohen P.E.	US
27	Curtis	Robert	A.	OSHA - USDOL	US
28	Cyr	Howard	W	FDA/CDRH	US
29	D'Andrea	John	A.	Naval Health Research Ctr.	US
30	de jager	Linda		School of Health Technology	ZA
31	DeFrank	John	J.	USACHPPM	US
32	deLorge	John	O	Ind Consultant	US

	LAST NAME	FIRST NAME	MI	AFFILIATION	COUNTRY
33	Dini	David		Underwriters Laboratory	US
34	d'Inzeo	Gugliemo		La Sapienza University of Rome	IT
35	Dovan	Thanh		SPI PowerNet Pty. Ltd.	AU
36	Durrenberger	Gregor		ETH	CH
37	Elder	Joe	A	Motorola	US
38	Erdreich	Linda	S.	Exponent	US
39	Fahy-Elwood	Alice	K	Ind Consultant	US
40	Fastman	Stewart	M.	American Insurers	US
41	Fichtenberg	David	S	State of Washington, Med Asst Ad	US
42	Foster	Kenneth	R.	Univ. of Pennsylvania	US
43	Futch	James		Florida Dept. of Health	US
44	Gajsek	Peter		Inst of Public Health	SI
45	Gandhi	Prof. Om	P.	Univ. of Utah, Dept. of Elec. Eng.	US
46	Gardner	Robert	C.	MOD D S&F Pol	UK
47	George	David	L.	Unisys Corp.	US
48	Gettman	Ken		National Electrical Manufact Assoc.	US
49	Goldberg	Georges		Advisory Comm. on EMC	CH
50	Haes, Jr.	Donald	L.	Consultant	US
51	Halkiotis	Konstantinos		Greek Atomic Energy Commission	GR
52	Hammer	Wayne	C.	SPAWAR Systems Ctr. Charleston	US
53	Hatfield	James	B	Hatfield & Dawson	US
54	Healer	Janet		NTIA	US
55	Heirman	Donald	N.	Don HEIRMAN Consultants	US
56	Heroux	Paul		McGill University	CA
57	Heynick	Louis	N.	Independent Consultant	US
58	Hubbard	Roy		Tech Services International (TSI)	ZA
59	Hurt	William	D.	USAF	US
60	Ikehata	Masatero		Railway Technical Research Institute	JP
61	Ilieva	Michael	D		
62	Israel	Michel		National Centre of Hygiene	BL
63	Ivans	Veronica		Medtronic Inc.	US
64	Johnston	Sheila		Independent Consultant	UK
65	Joyner	Ken	H.	Motorola Australia Pty Ltd.	AU
66	Kandel	Shaiela		SOREQ NRC	IL
67	Kantner	Kimberly		AT&T	US

	LAST NAME	FIRST NAME	MI	AFFILIATION	COUNTRY
68	Karabetsos	Efthymios		Greek Atomic Energy Commission	GR
69	Kean	John		BTS IEEE	US
70	Klaenberg	B. Jon		USAF	US
71	Koepfinger	Joseph	L.	Consultant	US
72	Lang	Sakari		Nokia Research Ctr.	FI
73	Leonowich	John	A.	Battelle Pacific NW Nat. Lab	US
74	Leszczynski	Dariusz		STUK-Radiation & Nuclear Rad Lab	FI
75	Lin	James	C.	University of Illinois	US
76	Lotz	Gregory		NIOSH	US
77	Maletskos	Costas	J	National Council for Rad.	US
78	Mantily	Ed		FCC/OET	US
79	Manatrakul	Nisakorn		Ministry of Public Health	TH
80	Mason	Patrick	A.	USAF/AFRL/HEDR	US
81	Maurer	Stewart		RF & ELF Consultant	US
82	McKenzie	Raymond	J	Telstra Research Laboratories	AU
83	McManus	Tom		Dept of Comm, Marine and Nat Res	IE
84	McNamee	James	P.	Health Canada	CA
85	Meltz	Martin	L.	Dept of Radiation Oncology	US
86	Montgomery	Noel	D.	Air Force Research Laboratory	US
87	Moore	Michael	R.	Oak Ridge National Lab	US
88	Morrissey	Joe		Motorola	US
89	Murphy	Michael	R.	Air Force Research Laboratory	US
90	Needy	Robert		Naval Surface Warfare Ctr.	US
91	Osepchuk	John	M.	Full Spectrum Consulting	US
92	Pakhomov	Andrei	G.	McKesson Bio Services	US
93	Persson	Bertil	R.	Lund University	SE
94	Petersen	Ronald	C.	R C Petersen Associates	US
95	Polson	Peter		Ausa Research	US
96	Proctor	Kenneth	R	US Army HQ CECOM	US
97	Ravazzani	Paolo		Italian National Research Council	IT
98	Reilly	J. Patrick		Metatec Associates	US
99	Roberts	Brad	J.	US Army CHPPM	US
100	Rogers	Walter	R	Veridian Engineering	US
101	Ruscio	Bruce		Joint Programs Office, MMR	US
102	Rybak	Terence		General Motors Proving Grnd.	US

	LAST NAME	FIRST NAME	MI	AFFILIATION	COUNTRY
103	Samaras	Theodoros		Aristotle University of Thessaloniki	GR
104	Santomaa	Veli	A	Independent Consultant	FI
105	Scanlon	William	G.	Center for Comm Eng	UK
106	Schwan	Herman	P.	Independent Consultant	US
107	Sheppard	Asher	R.	Asher Sheppard Consulting	US
108	Sliney	David	H	US Army-CHPPM	US
109	Stolwijk	Jan A.	J.	Yale University	US
110	Swicord	Mays	L.	Motorola	US
111	Szmigielski	Stanislaw		Military Institute of Hygiene and Epi.	
112	Tattersall	John		DSTL	UK
113	Tell	Richard	A.	Richard Tell Assoc. Inc.	US
114	Tenforde	Thomas	S.	Battelle Pacific NW Lab.	US
115	Thansandote	Art		Health Canada	CA
116	Thuroczy	Gyorgy		Nat Research Inst of Radiobiology	HU
117	Tofani	Santi		Servizio Di Fisica Sanitaria	IT
118	Utteridge	Tammy		Inst of Med & Veterinary Science	AU
119	van Rongen	Eric		Health Council of the Netherlands	NL
120	Varanelli	Arthur	G.	Raytheon Company	US
121	Wachtel	Howard		University of Colorado	US
122	Wagenaar	Femme-Michelle		PhoneVision International	NL
123	Weller	Robert	D.	Hammett & Edison, Inc.	US
124	Whitmore	Jamaal	A	US navy Bur Med & Surgery	US
125	Williams, Jr.	Louis	A.	Louis A. Williams Jr. & Associates	US
126	Wiat	Joe		France Telecom R & D	FR
127	Woods	Richard	W.	Sensormatic Electronics	US
128	Zipse	Donald	W.	Zipse Electrical Eng., Inc.	US
129	Ziskin	Marvin	C.	Temple Univ. Medical School	US

Table 6 – SC-5 (Safety Levels with Respect to Electro-Explosive Devices)

	FIRST NAME	LAST NAME	MI	AFFILIATION	COUNTRY
1.	Adair	Eleanor	R.	Independent Consultant	US
2.	Babij	Tadeusz	M.	Florida International University	US
3.	Balzano	Quirino		Independent Consultant	US
4.	Bean	John		Naval Surface Warfare Center	US
5.	Colville	Frank		U.S. Army CHPPM	US
6.	DeFrank	John	J.	USACHPPM	US
7.	Hammer	Wayne	C.	SPAWAR Systems Ctr. Charleston	US
8.	Harmon	Ray		EG&G	US
9.	Hatfield	James	B	Hatfield & Dawson	US
10.	Joyner	Ken	H.	Motorola Australia Pty Ltd.	AU
11.	Koban	George	A.	Naval Surface Warfare Center	US
12.	Leidel	David		Halliburton Energy Services	US
13.	Petersen	Ronald	C.	R C Petersen Associates	US
14.	Roberts	Brad		CHPPM	US
15.	Stuart	James		Franklin Applied Physics	US
16.	Thompson	Ramie		Franklin Applied Physics	US

ANNEX A**IEEE INTERNATIONAL COMMITTEE****on****ELECTROMAGNETIC SAFETY (SCC-39)****TECHNICAL COMMITTEE OPERATING PROCEDURES**

These Operating Procedures outline the orderly transaction of business of the SCC-39 Technical Committees (TC-34 and TC-95), which shall act as sponsors for individual standards projects. For the development of standards, openness and due process must apply, which means that any individual with a direct and material interest who meets the requirements of these P&Ps has a right to participate by

- a) Expressing a position and its basis,
- b) Having that position considered, and
- c) Appealing if adversely affected.

Due process allows for equity and fair play. In addition to openness, due process requires balance, i.e., the standards development process should strive to have a balance of interests and not be dominated by any single interest category. However, for the IEEE Standards Sponsor (Committee) ballot, there shall be a balance of interests without dominance by any single interest category. Balloting shall be in accordance with Clauses 8 and 9 of these procedures and with Subclause 5.4 of the *IEEE-SA Standards Board Operations Manual*.

Although these procedures are approved by the IEEE-SA Standards Board, the latest version of several documents take precedence in the following order:

- New York State Not-for-Profit Law
- IEEE Certificate of Incorporation
- IEEE Constitution
- IEEE Bylaws (Includes IEEE Standards Association Bylaws)
- IEEE Policy and Procedures Manual
- IEEE Board of Directors Resolutions
- IEEE-SA Standards Association Operations Manual
- IEEE-SA Board of Governors Resolutions
- IEEE-SA Standards Board Bylaws
- IEEE-SA Standards Board Operations Manual
- IEEE SCC-34 Operating Procedures
- Robert's Rules of Order (revised)

TC-34 Scope

ICES TC-34 was approved by the IEEE Standards Board in June 1995 (as SCC-34) and merged with SCC-28 (now TC-95) in 2005 as a technical committee of ICES (SCC-39) TC-34. The scope of TC-34 is:

“Development of product performance standards relative to the safe use of electromagnetic energy for specific products that emit electromagnetic energy at frequencies greater than 3 kHz. The Committee shall coordinate with other Committees whose scopes are contiguous with TC-34.”

TC-95 Scope

ICES TC-95 was established in 1960 as the USASI C95 Committee and approved as IEEE SCC-28 in 1990 under the sponsorship of the IEEE Standards Board. In 2001 use of the name “International Committee on Electromagnetic Safety” was approved and the committee was merged with SCC-34 (now TC-34) in 2005 as ICES (SCC-39) TC-95. The scope of TC-95 is:

“Development of standards for the safe use of electromagnetic energy in the range of 0 Hz to 300 GHz relative to the potential hazards of exposure of man, volatile materials, and explosive devices to such energy. It is not intended to include infrared, visible, ultraviolet, or ionizing radiation. The committee will coordinate with other committees whose scopes are contiguous with TC-95.”

If the scope of a TC changes, the rules in the *IEEE-SA Standards Board Operations Manual* concerning change of scope shall be followed.

1. Organization of the committees¹

The Committees shall consist of a Chair, Vice-Chair, Secretary and its members. Each Committee shall have a title, scope, and an interest classification system for its members. . When staff resources permit, the Committees should be supported by a Standards Staff Liaison

The membership shall be sufficiently diverse to ensure reasonable balance without dominance by a single interest category. Care shall be taken to ensure all interest categories are represented to the extent possible (see Subclause 4.5).

2. Responsibilities of the Committees

The Committees shall be responsible for the following:

- a) Proposing, developing and initiating ballots on proposed IEEE Standards within the scope of the Committee
- b) Voting on approval of proposed IEEE Standards within its scope

¹ Unless otherwise stated, “Committee” means Technical Committee.”

- c) Maintaining the standards developed by the Committee in accordance with *IEEE-SA Standards Board Operations Manual*
- d) Responding to requests for interpretations of the standard(s) developed by the Committee
- e) Acting on other matters requiring committee action as provided in these procedures
- f) Cooperating with other appropriate standards developing organizations
- g) Protecting against actions taken in the name of the Committee without Committee authorization
- h) Reporting annually to the IEEE-SA Standards Board
- i) Communicating with the ICES AdCom and the IEEE-SA Standards Board on specific activities as needed

2.1 Executive Committee

The Executive Committee (EXCOM) shall consist of the Committee Chair, Vice-Chair and Executive Secretary, the Chair of the Membership Committee, the Chair of the International Liaison Committee and the Treasurer who shall:

- a) Direct the activities of the Committee and its Subcommittees.
- b) Review all applications for membership.
- c) Interact with the IEEE and the ICES AdCom on general matters such as fund raising, publication, education, and policy and procedure.
- d) Aid the Chair and the ICES AdCom in submitting proposed standards documents, after approval by the Committee, with supporting documentation, to the IEEE Standards Board for review and approval as IEEE Standards documents.
- e) Develop policies and activities to enhance the international harmonization of standards within the scope of the Committee, develop appropriate liaison and collaboration with other international and national organizations and work towards improved broad international consensus on such standards.
- f) Maintain and authorize for presentation and content public access web sites and private member only access web sites hosted on the IEEE computer.

The Staff Liaison and Past Chair shall be ex-officio members of the Executive Committee.

3. Officers

There shall be a Chair, a Vice-Chair, Secretary and Treasurer of each Technical Committee. The Chair and Vice-Chair are each appointed by the IEEE-SA Standards Board Chair; the term of appointment shall be one year, renewable annually. The Treasurer and Secretary are appointed by the Committee Chair for a term of up to three

(3) years and may serve consecutive terms. The IEEE-SA Standards Board Chair has the authority to remove an officer.

These officers shall be a member of any grade of the IEEE and a member of the IEEE-SA and shall organize the Committee, oversee the Committee's compliance with these procedures, and submit to the AdCom proposed standards approved by the balloting group, with supporting documentation, for IEEE-SA Standards Board review and approval as IEEE standards. Officers shall read the training material available through IEEE Standards Development Online

The Secretary shall record and have published minutes of each meeting in such a manner that, once approved, are available to the public. The Secretary shall be a member of the IEEE-SA.

IEEE-SA Standards Staff Liaison may provide administrative work including maintenance of adequate records including the committee roster.

3.1 Removal of officers

An officer may be removed by approval of two-thirds of the members of the Committee or at the discretion of the ICES AdCom and the IEEE-SA Standards Board Chair. Grounds for removal shall be included in any motion to remove an officer of a Committee.

3.2 Responsibilities of Committee officers

3.2.1 Chair

The Chair shall

- a) Lead the participants according to all of the relevant policies and procedures
- b) Form subgroups, as necessary

The Chair also shall

- a) Be objective
- b) Entertain motions, but not make motions
- c) Not bias discussions
- d) Delegate necessary functions
- e) Ensure that all parties have reasonable opportunity to express their views
- f) Set goals and deadlines and adhere to them
- g) Be knowledgeable in IEEE standards processes and parliamentary procedures and ensure that the processes and procedures are followed
- h) Seek consensus of the Committee as a means of resolving all issues
- i) Prioritize objectives to best serve the group and the goals

3.2.2 Vice-Chair

The Vice-Chair shall carry out the Chair's duties if the Chair is temporarily unable to do so or chooses to recuse him- or herself (i.e., to give a technical opinion).

3.2.3 Secretary

The Secretary shall

- a) Distribute the agenda at least 14 calendar days before meeting
- b) Record and publish minutes of each meeting within 60 calendar days of the end of meeting
- c) Create and maintain the membership roster and submit to the ICES AdCom and the IEEE Standards Department annually
- d) Schedule meetings in coordination with the Committee Chair with at least 30 calendar days notice
- e) Be responsible for the management and distribution of Committee documentation
- f) Maintain lists of unresolved issues, action items, and assignments

3.2.4 Treasurer

The Treasurer shall

- a) Maintain a budget
- b) Control all funds into and out of the Committee's financial account
- c) Follow IEEE policies concerning standards meetings and finances
- d) Read the *IEEE Financial Operations Manual*].

4.0 Membership

4.1 Committee membership

1. The Committee members are appointed by one or more of the following:
 - a) The Committee Chair,
 - b) The ICES AdCom
 - c) An IEEE Society,
 - d) The IEEE-SA Standards Board
2. Subcommittee members are appointed by the chair of the subcommittee.
3. Members may be terminated at the request of the Chair.

4. An interested Society of the IEEE may designate members to a Technical Committee who will serve as the official representative of the Society upon approval of the Chair.
5. The IEEE-SA Standards Board and the ICES AdCom may designate official representatives of outside organizations. A representative may have an alternate serve in his/her absence.
6. Membership in the IEEE-SA is encouraged for all Committee members.

The membership of a Technical Committee shall observe the following policies:

Each member is expected to attend meetings as required by these procedures. The Secretary records attendance for members who attend at least 50% of a meeting's duration. Attendance at a meeting via teleconferencing and/or electronic means, e.g., Internet conferencing, shall count towards the attendance requirements.

4.2 Application

A request for membership on Technical Committee shall be addressed to the Committee Chair indicating the applicant's direct and material interest in the Committee's work and qualifications and willingness to participate actively.

A request for membership on a subcommittee shall be addressed to the Subcommittee Chair indicating the applicant's direct and material interest in the Subcommittee's work and qualifications and willingness to participate actively.

4.3 Review of membership

The Chair of a Technical Committee and the Chairs of the Subcommittees shall review the membership rosters annually. Members are expected to fulfill the obligations of active participation. When a member is found in habitual default of these obligations, the Chair shall consider the matter for appropriate action, which may include termination of membership.

Active participation in the work of the Committee and Subcommittees is a prerequisite to continuing membership. Failure to participate in committee activities for one year without specific written notification to the Secretary of the Committee or Subcommittee shall be deemed grounds for termination from the Committee or Subcommittee.

4.4 Observers and individual experts

Individuals and organizations having an interest in a Technical Committee's work may request listing as observers. Observers shall be advised of the Committee activities, may attend meetings, and may submit comments for consideration, but shall have no vote. A Technical Committee may also select individual experts to assist it. Individual experts shall be subject to approval by vote of the ExCom and shall have all rights and privileges of a Committee member.

4.5 Interest categories

All appropriate interests that might be directly and materially affected by the standards activity of the Committee shall have the opportunity for fair and equitable participation without dominance by a single interest. Each member shall propose his/her own interest category as appropriate and in accordance with the Committee's established categories. The interest categories shall be established or revised by a vote of the Committee upon recommendation by the Executive Committee. The categories of producer, user, and general interest will be used when determining balance. The Chair shall address any issues of balance on Balloting Groups.

4.6 Membership roster

The Secretary shall maintain a current and accurate Committee roster of members and shall distribute it to the members upon request. All changes to the roster shall be forwarded to the Chair immediately. The roster shall include the following:

- a) Title of the Technical Committee and its designation
- b) Scope of the Committee
- c) Officers
- d) Members: for all, list name, email address, affiliation and if available mailing address and IEEE Society(ies).
- e) For each subcommittee and working group—title, chair, and names and e-mail addresses and affiliations of all members.

5. Subcommittees and working groups created by the Technical Committee

When one or more subcommittees are formed to expedite the work of a Technical Committee, their formation (and later disbandment) requires recommendation by the ExCom, approval by a majority of the voting members of the Technical Committee and approval of the ICES AdCom. The formation and disbandment of other subgroups (working groups, technical subcommittees, editorial committees, writing groups, etc.) requires approval by the majority of the voting members of the Technical Committee or subcommittee (as applicable). The Chairperson of a Subcommittee shall be appointed by the Technical Committee Chair, with the approval of the ExCom.

The subgroups shall follow rules as specified by the Technical Committee. In matters not covered in these Operating Procedures, the subgroup is free to vote upon appropriate rules.

The scope, duties, and membership of all subgroups shall be reviewed by the Committee annually. The charge to the subgroup shall clearly state which of the following complementary activities is appropriate:

1. The subgroup is responsible for the definitive content of one or more documents and for responding to views and objections thereon. Such subgroups shall maintain a membership roster and shall comply with the provisions for voting on the standard(s).
2. The subgroup is responsible for assisting the Technical Committee (for example, drafting all or a portion of a document, drafting responses to comments, drafting positions on standards, or other purely advisory functions).

The disbandment of subgroups requires approval by a majority vote of the eligible members of the Committee

The duties of the officers of the subgroup are the same as that for the Committee officers. Meetings of subgroups may be held as decided upon by the members or chair of the subgroup.

5.1 Approval of Standards

Draft Standards and any substantive change in the content of a standard proposed by a subcommittee shall be referred to the Committee for approval. The Committee may form and delegate approval authority to a balloting group.

6. Termination of a Technical Committee

A proposal to terminate an ICES Technical Committee may be made by a directly and materially affected interest. The proposal shall be submitted in writing to the Technical Committee Secretary, the ICES AdCom, and to the IEEE-SA Standards Board and shall include at least the following:

1. Reasons why the Committee should be terminated
2. The name of the organization(s) that will assume responsibility for maintenance of any existing IEEE Standard(s) that are the responsibility of the Committee

7. Meetings

Technical Committee and Subcommittee meetings shall be held, as decided by the appropriate Committee or Subcommittee Chair, or by petition of 10 or more members, to conduct business, such as making assignments, receiving reports of work, considering draft standards, resolving differences among subgroups, and considering views and objections from any source. A 30 calendar-day notice, including an agenda, shall be distributed to all members, observers, and experts for face-to-face meetings and a 14 calendar day notice including an agenda, shall be distributed to all members, observers, and experts for electronic meetings.

The Committee may charge a meeting fee to cover services needed for the conduct of the meeting. The fee shall not be used to restrict participation by any interested parties.

All IEEE Standards development meetings are open to anyone who wishes to attend. Some meetings may require payment of an attendance fee to help cover costs.

7.1 Quorum

There shall be a quorum for conducting business at a meeting. If a quorum is not present, actions may be taken subject to confirmations by letter ballot, as detailed in Subclause 7.2. (See latest edition of *Robert's Rules of Order*.) A quorum is considered to be a majority of the voting members of the Committee. If a quorum is not present at a meeting, the Chair may choose to conduct certain business of the meeting via e-mail, fax or letter ballot, as appropriate.

8. Vote

8.1 Actions requiring approval by a majority of the Committee membership

Approval of the following actions require an approval vote from a majority of those votes cast from those entitled to vote at the time of a vote (either at a meeting or by electronic ballot), provided a quorum is present.

These actions include

1. Adoption of new or revised Committee procedures, interest categories, or revisions thereof
2. Formation of a subgroup, including its scope and duties
3. Disbandment of subgroups
4. Approval of minutes
5. Approval of public statements
6. Approval of change of the Committee scope
7. Approval of termination of the Committee
8. Position Statements for Standards

Notification of the potential for action shall be included on any distributed agendas for meetings. Final action on items (1) and (6) and (7) above require approval by the ICES AdCom and the IEEE-SA Standards Board.

8.2 Voting between meetings

The Committee shall be allowed to conduct Committee business between meetings at the discretion of the Chair by use of a letter or electronic ballot. If such actions are to be taken, they shall follow the rules of IEEE Bylaw I-300.4(4).

8.3 Proxy voting

Proxy voting is not permitted except on subcommittee ballots where entity voting has been instituted to ensure balance.

8.4 Vote of alternate

Alternate voting only applies to entity voting on subcommittees. An alternate's vote is counted only if the designated representative fails to vote.

8.5 Actions requiring approval by seventy-five percent of those voting of the Committee and Subcommittee membership

The following action requires receipt of an electronic ballot from at least 75% of the voting members of the Committee and the Subcommittee with approval by at least 75% of those voting affirmative or negative. All negative ballots shall be recorded and an attempt made for their resolution.

1. Approval of a new or revised standards project

The following action requires receipt of an electronic ballot from at least 75% of the voting members of the Committee with approval by at least 75% of those voting affirmative or negative. All negative ballots shall be recorded and an attempt made for their resolution.

2. Approval of a new or revised standards project
3. Reaffirmation of an existing standard

8.6 Balloting on standards

The Technical Committees act as the balloting bodies for ICES standards. In order to vote on a document at the Sponsor level, each voting member shall have paid the appropriate fees associated with balloting privileges or have been approved by the SA-Standards Board as an invited expert.

Each voting Committee member or Subcommittee member voting on a draft standard shall vote one of the following positions:

- (1) Affirmative
- (2) Negative with reasons (the reasons for a negative vote shall be given and should include specific wording or actions that would resolve the objection)
- (3) Negative without Comments
- (4) Abstain

9. Balloting group for a standard

For approval of proposed standards, the Technical Committee and the Subcommittee responsible for the standard shall form a balloting group. The Committee balloting groups shall be formed using the invitation process in accordance with the *IEEE-SA Standards Board Operations Manual*, Subclause 5.4.2.

The criteria for approval of a new or revised standard project or a reaffirmation of an existing standard shall be as described in the *IEEE-SA Standards Board Operations Manual*, Subclause 5.4.3.

10. Communications

All Committee officers should use ICES letterhead if available, or email notification, when corresponding on behalf of Committee activities.

10.1 Formal Internal communication

If correspondence between technical committees, subcommittees or between working groups of different subcommittees involves issues or decisions (that is, non-routine matters) affecting other technical committees or subcommittees, copies shall be sent to all affected technical committee and subcommittee chairs, secretaries, and the ICES AdCom officers.

10.2 External communication

Inquiries relating to the Technical Committee should be directed to the Chair, and members should so inform individuals who raise such questions. All replies to inquiries shall be made through the Chair.

10.3. Public statements for standards

All Committee public communications shall comply with the policies of the *IEEE-SA Standards Board Operations Manual*.

10.4 Informal communications

Informal communications shall not state that they are a formal position of the IEEE, the IEEE-SA, or the Committee.

10.5 Position statements to be issued by other entities

If a Technical Committee wishes to go to another IEEE entity (as defined in Section 15 of the *IEEE Policy and Procedures*) to have that entity offer a position statement on a standards matter, they shall do so after agreement from the ICES AdCom and the IEEE-SA Standards Board and after informing the IEEE-SA BOG. Upon Technical Committee and AdCom approval, proposed position statements that need to be issued by other IEEE entities shall be forwarded to the IEEE-SA Standards Board Secretary for further action.

10.6. Standards publicity

The Committee is encouraged to prepare press releases and other forms of publicity to promote their activities. See Subclause 5.1.5 of the *IEEE-SA Standards Board Operations Manual* for further instructions.

11. Interpretations

Written inquiries requesting interpretations of the Committee's IEEE approved standards shall be responded to by the Interpretations Working Group. The policies of Subclause 5.9 of the *IEEE-SA Standards Board Operations Manual* shall be followed. Revisions to the standard resulting from requests for interpretations shall be processed in accordance with the procedures of the IEEE-SA Standards Board and the Technical Committee. Copies of all requests for interpretations and subsequent responses shall be forwarded to the ICES AdCom and the Secretary of the IEEE-SA Standards Board.

11.1 Interpretations Process

The Vice-Chair of each Technical Committee shall serve as the Committee designee for receipt of requests for interpretation submitted to the IEEE-SA Standards Board Secretary. Copies of each request shall be distributed to the members of the Technical Committee ExCom by the Vice Chair, together with a form to indicate the adjudged nature of the request (explanation only, bona fide interpretation, other). Requests judged to be for explanation only shall be directed to an appropriate member of the Committee or its subcommittees for a response to the requester in the name of ICES.

Categories of requests, such as for modification of an existing standards document, consultation, etc., shall be listed as agenda items for the next meeting of the Technical Committee ExCom. The discussion of such agenda items and the preparation of a response shall be the responsibility of the Technical Committee Vice-Chair with the concurrence of the full ExCom.

Written inquiries judged to be bona fide interpretations shall be forwarded to the Chair of the appropriate Interpretations Working Group for processing.

Each subcommittee of a Technical Committee that generates an IEEE standard shall create an Interpretations Working Group following publication of the standard. Each Interpretations Working Group shall consist of a Chair and approximately 5-10 subcommittee volunteers whose areas of expertise or affiliation are representative of the subcommittee. Membership on the Interpretations Working Group shall be for a term of 5 years, renewable once at the request of the member.

The Interpretations Working Group Chair shall be the Subcommittee designee for receipt of requests for interpretation forwarded by the Committee Vice-Chair. Upon receipt of such a request, this designee shall select a working group member (or members) to be responsible for the preparation of a draft response. Upon completion, the draft shall be circulated to the full Interpretations Working Group by the Chair with comments and/or revisions to be returned in a timely fashion. The resolution of comments and/or suggested revisions shall be by the drafters of the response in consultation with the Chair of the Interpretations Working Group, and a final draft for ballot prepared. The final draft response shall be approved by the full working group in accordance with the standard IEEE-SA consensus process, which shall include attempts to reconcile negative ballots.

Following approval, the Chair of the Interpretations Working Group shall forward the response to the individual who made the original request for interpretation. Copies of the response, together with the roster of the Interpretations Working Group, shall be sent to the Secretary of the IEEE-SA Standards Board, the IEEE Staff Liaison, the ICES Secretary, and the Vice-Chair of the Technical Committee.

Revisions to the standard resulting from requests for interpretations shall be processed in accordance with the procedures of the IEEE-SA Standards Board and of these procedures.

12. Appeals

The Committee recognizes the right of appeal. Technical appeals will be heard and decided by the appropriate Subcommittee or the Technical Committee. Procedural appeals will be referred to the IEEE Standards Board. (See Section 5.8 of the *IEEE Standards Operations Manual* for further details.)