ICES

International Committee on Electromagnetic Safety

ICES (SCC-39) Annual Report: 2007 – 2008

Includes

Technical Committee 34 (Product Safety Relative to the Safe Use of Electromagnetic Energy)

and

Technical Committee 95 (Safety Levels with Respect to Human Exposure to Electric, Magnetic and Electromagnetic Fields)

21 May 2008

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ICES (SCC-39) Annual Report: 2007 – 2008

1. Administrative Committee (AdCom)

1.1 ICES Scope

"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 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 AdCom Membership

The membership of the AdCom is shown below in Table 1; additional "at large" members are being sought, particularly from outside the US.

1.3 Highlights (2007-2008)

Continuing activities with the World Health Organization EMF Project and the International Commission on Non-Ionizing Radiation Protection (ICNIRP) 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 participates in the important international meetings, e.g., the WHO EMF Project/IAC (International Advisory Committee) meetings), PIERS (Progress in Electromagnetics Research Symposium, URSI (Union Radio-Scientifique Inter-nationale), ITU (International Telecommunications Union), IEC (International Electrotechnical Commission), ICNIRP, IEEE EMB-S, and the Bioelectromagnetics Society (BEMS) Annual Meetings, during which ICES representatives have given presentations about the role of ICES in international standard setting. ICES members also play a role in drafting public documents on contemporary RF safety issues, e.g., the former Chair of the ICES Membership Committee, Tom McManus, was the main author of the WHO Model Legislation document, which included finding common ground where different opinions existed.

ICES was invited by special invitation to present at many ICNIRP Commission meetings. Michael Murphy, Chairman of the ICES Membership Committee represented ICES at the ICNIRP Commission Meeting in San Antonio in 2005 and Art Thansandote, Co-chairman of TC95/SC4 represented ICES at the ICNIRP Collaboration Meeting in Chicago in May 2006, ICES Chairman Ralf Bodemann and other ICES members represent ICES at ICNIRP meetings worldwide.

Highlights during the past two years include:

- A new standard, C95.7-2005, "IEEE Recommended Practice for Radio Frequency Safety Programs" was approved at the September 2005 SASB meeting and published in March

2006. This document provides the elements of an RF safety program that will be useful to those implementing IEEE C95.1-2005.

- 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 accepted at the September 2005 SASB meeting and approved by the SASB in October 2005, published in April 2006, and approved by ANSI in November 2006. Following approval by the SASB, this standard was appealed – the appeal was heard by the Appeals Panel at the March 2006 SASB meetings and the appeal was denied.

- 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 and published in February 2006.

- The Administrative Committee (AdCom) met in San Antonio, Piscataway. London and Dallas and several times between these meetings by teleconference. In addition to its other duties, the ICES AdCom plans and arranges the meetings of TC 34 and TC 95 and their subcommittees. It approves (or rejects) applications for membership on the ICES technical committees. Dr. Ralf Bodemann of Siemens AG in Germany, who serves as ICES Chairman, Dr. Tom McManus, consultant to the Irish Department of Communications and Natural and Marine Resources, former Membership Committee Chairman Dr. Sheila Johnston, an independent consulting neuroscientist from Ireland and current ICES Membership Committee Chairman, and Dr. Michael Murphy, US Air Force Research Laboratory, have become the ICES roving ambassadors to the EU member states and have each given several presentations in support of ICES and the IEEE open consensus process for standards setting. Dr. C-K Chou of Motorola Laboratories has given numerous presentations on the IEEE ICES standards throughout the Far East. Dr. Michael Murphy also serves as ICES liaison to the Bioelectromagnetics Society (BEMS), the pre-eminent Society on the study of the interaction and effects related to the exposure of living systems to electric, magnetic and electromagnetic fields at frequencies below 300 GHz. He and Dr. Sheila Johnston both serve on the BEMS Board of Directors.

1.5 Policies and Procedures

The ICES Policies and Procedures were accepted by AudCom and the SASB at the June 2007 meeting.

1.6 ICES Website

Members of the AdCom have been working to complete a new ICES website (http://www.ices-emfsafety.org/), which will include separate sections for TC-34 and TC-95. Each section will have private and public sections for the main committees and the subcommittees; FTP service for subcommittee activities will be included. ICES owns the above domain. The goal is to complete the website by the end of 2008.

Table1—ICES AdCom

OFFICE	NAME	AFFILIATION	COUNTRY	EMAIL
Chairman	Dr. Ralf Bodemann	Siemens AG	DE	ralf.bodemann@siemens.com
Vice Chairman	Kenneth Gettman	NEMA	US	ken_gettman@nema.org
Executive Secretary	Ronald C Petersen	R C Petersen Associates LLC	US	r.c.petersen@ieee.org
Treasurer	Arthur Varanelli	Independent Consultant	US	avaranelli@comcast.net
Chairman, Membership Committee	Dr. Michael Murphy	Air Force Research Laboratory	US	michael.murphy@brooks.af.mil
Chairman TC-34	Dr. Wolfgang Kainz	USFDA/CDRH)	US	wolfgang.kainz@fda.hhs.gov
Chairman TC-95	Dr. C-K. Chou	Motorola Labs	US	ck.chou@motorola.com
Chairman Emeritus	Dr. John Osepchuk	Full Spectrum Consulting	US	jmosepchuk@comcast.net
At Large Member	Dr. Eleanor Adair	Independent Consultant	US	eadair@comcast.net
At Large Member	Dr. Sheila Johnston	Independent Consulting Neuroscientist	IE	sajohnston@eircom.net
At Large Member	Dr. Tom McManus	Consultant to the Dept of Communications, Marine and Natural Resources	IE	mcmanustom@eircom.net
IEEE Staff Liaison	Bill Ash	IEEE Standards	US	w.ash@ieee.org

2. Technical Committee-34

2.1 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); EEA was disbanded in August 2001.

2.2 Reorganization

The structure and activities of TC-34 were recently examined and a decision was made to re-organize the committee. Originally, TC-34 consisted of the following three subcommittees: SC-1 (Pleasure-boat radar), SC-2 (SAR evaluation), and SC-3 (Effectiveness of RF-protective clothing). Initially there was considerable interest in the activities of SC-1 and SC-3, but this interest has dwindled during the past few years. The decision was made to disband SC-1 and ask the EMB-S Committee on Man and Radiation (COMAR) to consider drafting a technical information statement on pleasure boat radar, and disband SC-3 until interest increases. SC-2 was divided logically into two subcommittees—SC-1 (SAR evaluation—measurement techniques) and SC-2 (SAR evaluation—numerical techniques). SC-2 includes the following four working groups: WG-1 (General requirements for using the FDTD method for SAR calculations); WG-2 (Specific requirements for FDTD Modeling of vehicle mounted antenna configurations); WG-3 (Specific requirements for FDTD modeling of mobile phones/personal wireless devices); and WG-4 (Requirements for using the finite-element method for SAR Calculations, specifically vehicle-mounted antennas and personal wireless devices). The two subcommittees and their working groups are very active and hold face-to-face meetings and teleconferences several times per year. The face-to-face meetings are usually held in conjunction with IEC TC106/PT62209, which has a similar scope and with whom TC-34 has a Category D Liaison.

2.3 Membership Rosters

(See Tables TC-34-1 thru TC-34-4.)

2.4 Meetings (2007-2008)

- Feb. 20-21, 2007, Columbia, MD (SC-2)
- June 15-17, 2007 – Kanazawa, Japan including joint meeting with IEC TC106, Project Team 62209 (SC-2)

- August. 21, 2007 – by teleconference (SC-2)
- October 15-17, 2007 – Silver Spring, MD (SC-2)
- October 18, 2007 – Round-table Discussion on Development of SAR Evaluation Standards to Support Emergent Wireless Personal Communication Devices and Technologies, Silver Spring, MD (SC-2)
- December 11, 2007 – by teleconference (SC-2)
- February 11-14, 2008 – Plantation, FL including joint meeting with IEC TC106, Project Team 62209 (SC-2)
- April 17, 2008 – by teleconference (SC-2)
- May 13 – 18, 2008 – Shanghai, China: The 2nd International Conference on Bioinformatics and Biomedical Engineering (ICBBE 2008) May 16 – 18, 2008 (SC-1 and SC-2)
- August 19, 2008 – by teleconference (SC-1 and SC-2)
- October 22 – 24, 2008 – Paris France (SC-1 and SC-2)
- December 2008 (date TBD) – by teleconference (SC-2)

2.5 Subcommittee activities

2.5.1 Subcommittee 1 (SAR evaluation – measurement techniques)

- Joint meetings were held (and continue to be held) with IEC TC-106 – PT 62209 to work on the draft standard IEC 62209-2: Human exposure to radio frequency fields from handheld and body-mounted wireless communication devices – Human models, instrumentation, and procedures – Part 2: Procedure to determine the specific absorption rate (SAR) for mobile wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)
- An international inter-comparison of computed SAR in an anthropomorphic, dielectric-filled head phantom was initiated in 2007. The project involved numerical simulations taken in nine labs in Asia, Europe, and North America. This inter-comparison will be completed in June 2008. A journal publication will be written on the results.
- **P1528b:** Amendment 2 of IEEE Std 1528-2003 extends the frequency range of 1528-2003 to 6 GHz (from 3 GHz). A draft of this amendment was prepared for voting by the subcommittee in April 2007. 285 comments were submitted – the subcommittee has responded to most of the comments and new research projects have been initiated to respond to others. Because of the large number of changes resulting from ballot resolution, it was decided to revise the standard rather than complete the amendment. A request to withdraw P1528b and a PAR for the revision of 1528-2003 was submitted to NesCom in May 2008.
- **P1528:** Work has begun on the revision of IEEE 1528 (which also extends the frequency range of SAR measurement standards up to 6 GHz) with the

collaborative efforts of IEC P62209. In addition, SC-1 is collaborating with PT62209 toward the development of standards for devices held within 20 cm of the body (including body-worn, hand-held and desktop devices). It has been proposed that this work should be directed towards a jointly developed standard bearing a dual IEC/IEEE logo. This would further strengthen the harmonization of the two standards committees and eliminate unnecessary duplication.

2.5.2 Subcommittee 2 (SAR evaluation – numerical techniques)

- **P1528.1:** The section on the evaluation of the numerical uncertainty of FDTD simulations of 1528.1 has been finalized. It defines general methods for assessing the contribution of typical uncertainties of the FDTD technique, such as absorbing boundary conditions, grid resolution, etc., on the numerical model. The validation of the numerical model of the device under test requires basic experimental evaluation.

- The section for the code validation of 1528.1 has been finalized. It describes novel methods to evaluate the accuracy of standard FDTD implementations and possible extensions. Moreover, a set of generic benchmarks has been defined which allow the correct functioning of the FDTD simulation platform. Reference results for all benchmarks have been provided.

- A particular geometry, the "SAR Star", has been defined. It tests the implementation of the SAR averaging algorithm defined in IEEE 95.3 for symmetry, averaging in edges and pointed structures as well as gaps.

- A task force has been formed to provide guidelines on power normalization considering antenna mismatch, power regulation, digital modulation etc.

- An annex on anatomical modeling and representation of biological tissue has been added to 1528.1.

- A study group has been formed to analyze techniques for SAR calculation and averaging for planar and stair-cased surfaces considering alignment and tissue content of the cube as well as numerical uncertainties.

- **P1528.2:** A working group was formed to identify the uncertainties associated with numerical evaluation of peak 1 g and 10 g average SAR and define the procedures and recommendations to minimize those uncertainties as applied to P1528.2 and P1528.3. The results of the initial work performed by this group indicates that many details of SAR computations and SAR averaging need to be specified and defined to minimize the uncertainty of the simulations.

- The draft of P1528.2 has been updated with definitions for specific benchmark test configurations for code validation and prerequisites for valid compliance simulations.

- The computational study on human body exposure evaluation has started with the goal to quantify the numerically evaluated SAR variation based on the visible human body model in standing and sitting positions.

- The specific approach to evaluate uncertainness in P1528.2 has been proposed which take into account the uncertainties of numerical SAR evaluation in bystander and passenger standards reference models, uncertainty associated with numerical modeling of vehicle in the typical standard exposure conditions and uncertainty associated with modeling the specific vehicle mount antennas.

- A separate project has started to derive reasonably conservative exposure models in 1528.2 as applied to the passenger exposure. The emphasis in this study is to understand the effect of certain mechanical features in the car that could affect exposure (e.g. metal seats, windshield printed antennas and defoggers).

- The bystander and passenger models which are based on the Visible Human model have been defined specifically for P1528.2 as a standard model. Both models have been articulated using specialized software to produce adequate bystander and seated man geometries applicable for P1528.2 exposure evaluation.

- The draft standard configurations for bystander and passenger exposure modeling have been defined. They include the standard vehicle model and specific pavement models that conservatively take into account the effect of the ground on bystander exposure.

- **P1528.3:** The activity of the past year mainly focused on the planning, preparation and launching the CAD cell phone inter-laboratory comparison study. Because the study includes usage of CAD models of the mobile phones, which contain sensitive information from the mobile phone manufacturers, the process of signing Non Disclosure Agreements (NDAs) between the participating labs and the CAD file providers took extensive time and was the main cause of the delay in starting the study. After the NDAs were finalized, the study was started on June 2007. During this period one face-to-face meeting and two conference calls were arranged to discuss the inter-lab study progress and the draft status of P1528.3. A mid-term study survey was carried out to check for possible problems of the participants with the provided CAD models and the protocol. The development of a generic model to validate the protocol was also on the agenda that was presented at the Shanghai meeting on 13 May 2008.

- There has not been much change in the P1528.3 draft during past year. There have been some discussions and inputs regarding the uncertainty section, but it is agreed that the changes will be considered together with the P1528.1 uncertainty section. The actual drafting process will continue after the 1st phase of inter-laboratory study is completed.

- Besides developing the generic model, this year's activity includes the completion of the CAD inter-lab comparison study. A workshop is planed to be organized in fall 2008, where each lab will present their detailed results and discuss all challenges and difficulties faced during the process of the study. It is expected that the results of that workshop will provide valuable inputs to for the development of P1528.3.

- **P1528.4:** PAR P1528.4 was on the NesCom May 2008 Continuous Processing agenda. In April 2006 the Working Group decided that there should be a PAR and a Recommended Practice on methods other than Finite Difference Time Domain; a representative of Ansoft Corporation took the lead. In February 2007 the Working Group decided that P1528.4 should concentrate on the Finite Element Method. The PAR and an early version of a Recommended Practice have been produced that cover the same topics as P1528.1, P1528.2 and P1528.3 combined. The P1528.4 draft closely follows the earlier PARs and frequently refers to them, while changing FDTD specific guidelines into FEM-specific guidelines. As the P1528.1, P1528.2 and P1528.3 continue to grow and evolve, so will those of P1528.4.

2.6 TC-34 PARs

2.6.1 SC-1 PARs

2.6.1.1 P1528b (Approved September 2005)

The committee decided that based on the considerable number of changes in the draft amendment, it would be more appropriate to revise the standard rather than publish another amendment. Therefore1528b, is being withdrawn and is listed under "Withdrawal Requests" on the June 2008 NesCom agenda – it will be replaced with P1528, listed under "PARs for Revision of Standards" on the same agenda.)

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

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.

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.

2.6.1.2 P1528 (On NesCom June 2008 agenda)

Title: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques

Scope: 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.

Purpose: The purpose of this recommended practice is to provide a protocol for the measurement of the peak spatial-average SAR in an anatomical model of the human head of users of wireless handsets intended to be operated while held next to the ear. It provides the users with standardized and accepted protocols, measurement and validation techniques, and means for estimating the overall uncertainty in order to produce valid and repeatable data. Specific SAR limit values are not included since these are found in other documents, e.g., IEEE Std C95.1 and the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines.

2.6.2 SC-2 PARs

2.6.2.1 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

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.

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.

2.6.2.2 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

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.

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.

2.6.2.3 P1528.3 (Approved March 2006)

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 Mobile Phones/Personal Wireless Devices

Scope: The scope of this project is to describe the concepts, techniques, 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. These models are exposed to personal wireless devices, e.g. mobile phones. It recommends and provides guidance on modeling of personal wireless devices and provides

benchmark data for simulation of such models. It defines model contents and provides guidance on meshing and test positions at the anatomical models. This document will not recommend specific SAR values since these are found in other documents, e.g., IEEE C95.1-2005.

Purpose: The purpose of this document is to specify numerical techniques, and anatomical models to determine spatial peak specific absorption rates (SAR) in the human body of persons exposed to personal wireless devices. SAR will be determined by applying Finite Difference Time Domain (FDTD) techniques to simulate the field conditions produced by wireless devices. It will use standardized anatomically correct models of the human anatomy.

2.6.2.4 P1528.4 (Approved by NesCom 2 May 2008)

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: Requirements for Using the Finite-Element Method for SAR Calculations, specifically involving Vehicle Mounted Antennas and Personal Wireless Devices

Scope: The scope of this recommended practice is to describe the concepts, techniques, models, validation procedures, uncertainties and limitations of the Finite-Element Method when used for determining the peak spatial average specific absorption rate (SAR) in standardized models of the human anatomy exposed to wireless communication devices, in particular vehicle-mounted antennas and personal wireless devices such as hand-held mobile phones. Guidance on modeling such devices and benchmark data for simulation are provided. It defines model contents, guidance on meshing and test positions at the anatomical models. This document does not recommend specific SAR values since these are found in other documents, e.g., IEEE C95.1-2005.

Purpose: The purpose of this document is to specify numerical techniques, anatomical models, and other models of the human anatomy and vehicles to determine the peak spatial average specific absorption rates (SAR) in the human body of persons exposed to wireless communication devices, in particular vehicle-mounted antennas and personal wireless devices, such as hand-held mobile phones. SAR is determined using a Finite-Element simulation of the electromagnetic field conditions produced by wireless devices in standardized models of the human anatomy. 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.

2.7 Drafts

2.7.1 SC-1 (Measurement Techniques)

A draft of P1528b (Amendment 2) was prepared and balloted by the subcommittee in April, 2007. It was decided at that time that it would be appropriate to revise the standard instead of providing an amendment because of the number of issues addressed. The PAR for P1528b has been withdrawn and a PAR submitted for the

revision of IEEE 1528-2005. A draft of the revision will be balloted by the subcommittee this year.

2.7.2 SC-2 (Computational Techniques)

Partial first working drafts of P1528.1, P1528.2 and 1528.3 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.

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

2.8.1 SC-1 (Measurement techniques)

2.8.1.1 Objectives (2007)

- Hold ICES TC-34 SC-2 meetings, including joint meetings with IEC 62209 to foster harmonized measurement standards. (Met)
- Complete first draft of IEEE 1528b (Amendment 2) for subcommittee voting in 2007. (Not met – P1528b will be withdrawn and the standard will be revised instead)
- Develop scope and outline for a recommended practice for small boat radars or abandon project. (Not met – project dropped)
- Submit PAR for recommended practice on RF protective clothing. (Not met - project dropped)
- Explore the need for a standard for the assessment low-frequency magnetic field security devices. (Not met – ongoing)
- Complete revision of TC-34 P&Ps – 1st Q 07. (Completed. Included in ICES P&Ps – Accepted by AudCom)

2.8.1.2 Current levels of activity with milestones indicated

- Complete balloting draft of the revision of IEEE 1528-2003 (4th Q 08)
- Withdraw PAR for IEEE P1528b (2nd Q 08)
- Submit PAR for IEEE P1528-2005 revision (2nd Q 08)
- Continue to explore the process for jointly developed standards with IEC: for the following: maintenance of IEC 62209-1 and the revision of IEEE 1528-2003; and draft IEC62209-2 and IEEE 1528.
- Explore the need for a standard for the assessment low-frequency magnetic field security devices. (2nd Q 08)

2.8.2 SC-2 (Numerical techniques)

2.8.2.1 Objectives (2007)

- Complete 1st working draft of P1528.1. (Met)

- Complete 1st working draft for P1528.2. (Met)
- Complete 1st working draft for 1528.3. (Met)
- Develop a healed version of the SAM CAD files. A new approach is needed to solve the problem of a unified and healed SAM CAD model. (Ongoing)
- Submit PAR for new standard (P1528.4) to address numerical analyses techniques other than FDTD, e.g., the Finite Element Method as soon as it becomes more clear which direction the work develops. (Met)

2.8.2.2 Current levels of activity with milestones indicated

- Complete 2nd working draft of P1528.1 (4th Q 08)
- Complete 2ndt working draft for P1528.2 (4th Q 08)
- Complete 2nd working draft for 1528.3, (4th Q 08)
- Develop 1st working draft of P1528.4 (4th Q 08)
- Develop a healed version of the SAM CAD files. A new approach is needed to solve the problem of a unified and healed SAM CAD model.

2.9 Website

A website and reflector was set up several years ago for SC-2 (now SC-1 and 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 subcommittee 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/

A reflector was also set up. The address is stds-tc34sc2@ieee.org

2.10 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. Bill Ash is the Staff Engineer for both TC-34 and TC-95—his engineering background and broad knowledge of IEEE procedures is invaluable to this committee.

2.11 Liaison with other committees

Liaison with other committees occurs via the circulation of drafts, common meetings and common membership on committees such as CENELEC, IEC, ITU, ARIB and other standards developing organizations, and through a “Category D” liaison with IEC TC106/PT62209. Coordination has also been established with IEEE societies, e.g., EMC-S via representation on the Standards and Advisory Coordination Committee (SACCom).

2.12 Issues: Joint IEC/IEEE development project: IEC 62209 and IEEE 1528

TC-34 is seeking IEC approval of IEEE P1528 and IEC P62209 as a joint IEC/IEEE standards development project.

Rationale: IEC TC106/PT62209 and IEEE TC-34/SC-2 (now SC-1) have worked hand in hand to develop IEC 62209-1-2005 "Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices - Human Models, Instrumentation, and Procedures - Part 1: Procedure to Determine the Specific Absorption Rate (SAR) for Hand-held Devices used in Close Proximity to the Ear (Frequency Range of 300 MHz to 3 GHz)" and IEEE 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" and are now working together to develop Part 2 of 62209 and the revision of 1528. During the development of IEEE 1528-2003 and IEC62209-1-2005, a large number of TC-34 members also participated on the IEC PT, sharing drafts to ensure harmonization. Thus the two existing standards were developed jointly by many of the same people but issued separately as two distinct standards. PT62209 is now working on Part 2 of the standard (to address body-mounted radios); TC-34 has a Category D Liaison with PT62209 for development of this project and is working with the IEC PT. Both groups have to a large extent common membership (45% of the 62209 PT are TC-34/SC-1 members; 40% of TC-34/SC-1 are members of PT62209). Moreover, during the past two years, the TC-34 WG and PT62209 have held 6 face-to-face meetings and a number of joint teleconferences. While these are dedicated to PT62209 business, or TC-34 business (to limit the time), the discussion topics are common to both WGs and members of both WGs participate.

These are important standards to the wireless communications industry and harmonization is key. Having a single dual logo standard is important for a variety of reasons and both 62209 Project Team Leader and the leadership of TC-34/SC-1 believe that IEC 62209 and IEEE 1528 are ideal candidates for such a project.

2.13 Membership

See Tables TC-34-1 through TC-34 4 for TC-34 membership information and the attached Excel file for detailed membership information.

Table TC-34-1

TC-34 Leadership

OFFICE	NAME	AFFILIATION	EMAIL
Chair-	Dr. Wolfgang Kainz	US FDA/CDRH	wolfgang.kainz@fda.hhs.gov
Vice- chair	Dr. Mark Douglas	Motorola Labs	mark.douglas@motorola.com
Secretary	Dr. John M. Osepchuk	Full Spectrum Consulting	jmosepchuk@comcast.net
Treasurer	Arthur Varanelli	Independent Consultant	avaranelli@comcast.net
Chair – SC-1 (SAR evaluation—measurement techniques)	Dr. Mark Douglas	Motorola Labs	mark.douglas@motorola.com
Chair – SC-2 (SAR evaluation—numerical techniques)	Dr. Wolfgang Kainz	FDA/CDRH	wolfgang.kainz@fda.hhs.gov
Chair – WG-1 (P1528.1)	Andreas Christ	ETHZ	christ@itis.ethz.ch
Chair – WG-2 (P1528.2)	Giorgi Bit-Babik	Motorola Labs	goga.bit-babik@motorola.com
Chair – WG-3 (P1528.3)	Martin Siegbahn	Ericsson	martin.siegbahn@ericsson.com
Chair – WG-4 (P1528.4)	Martin Vogel	ANSOFT	mvogel@ansoft.com

Table TC-34-2

TC-34 Membership: Main Committee (May 2008)

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4.	Baron	David		AIHA Representative	U	US	d.baron@ieee.org
5.	Bassen	Howard		FDA/CDRH	GI-(G)	US	Howard.bassen@fda.hhs.gov
6.	Beard	Brian		FDA/CRH (HFZ 133)	GI-(G)	US	bbb@cdrh.fda.gov
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GI = General Interest

GI (A) = General Interest (Academic)

GI (G) = General Interest (Government)

P = Producer

U = User

Table TC-34-3

TC-34 Membership: Subcommittee 1 (Measurement Techniques)

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Table TC-34-4

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3. Technical Committee -95

3.1 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 before reorganization.)

3.2 TC-95 Membership Roster

(See Tables TC-95-2 through Table TC-95-7 and attached Excel file.)

With the leadership of Dr. Sheila Johnston (former Membership Chairman), and Dr. Michael Murphy, International Liaison Chairman and Membership Chairman, the non-US membership of ICES continues to grow. During the period covered by this report, six new members were added to TC-95.

Several members of TC-95 have been inactive or have changed e-mail address and can no longer be contacted; their continuing status is now 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, not all of which are 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 is encouraged for all members.

3.3 Meetings (2007-2008)

3.3.1 Main Committee

- March 2, 2007: London, England
- November 30, 2007: Irving TX
- June 8, 2008: San Diego, CA
- December 2008: San Antonio TX (Tentative – Date and location TBD)
- June 2009: (Venue TBD)

3.3.2 Subcommittee 1 (Measurements and Computation)

- February 28, 2007: London, England
- Feb 7, 2008: Teleconference
- Feb 19, 2008: White Oak Maryland
- Sept 2008: White Oak Maryland: (Date TBD)

- December 2008: San Antonio TX (Tentative – Date and location TBD)
- June 2009: (Venue TBD)

3.3.3 Subcommittee 2 (Warning Signs, Symbols and Hazard Communication)

- March 1, 2007: London, England
- November 28, 2007: Irving, TX
- August 2008 – Venue TBD
- December 2008: San Antonio TX (Tentative – Date and location TBD)
- June 2009: (Venue TBD)

3.3.4 Subcommittee 3 (Safety Levels – 0-3 kHz)

- February 28, 2007: London, England
- November 2007: Irving, TX (date TBD)
- June 2008 – San Diego, CA (date TBD)
- December 2008: San Antonio TX (Tentative – Date and location TBD)
- June 2009: (Venue TBD)

3.3.5 Subcommittee 4 (Safety Levels – 3 kHz to 300 GHz)

- March 1, 2007 – London, England
- November 29, 2007: Irving, TX
- June 7, 2008: San Diego, CA
- December 2008: San Antonio TX (Tentative – Date and location TBD)
- June 2009: (Venue TBD)

3.3.6 Subcommittee 5 (Safe Distances from Antennas during Blasting Operations)

- November 28, 2007 – Irving, TX
- June 2008 – San Diego, CA (Date TBD)
- December 2008: San Antonio TX (Tentative – Date and location TBD)
- June 2009: (Venue TBD)

3.4 Main Committee and Subcommittee Status

3.4.1 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), Malaysia (3), the Netherlands (2), New Zealand (1), Poland (1), Sweden (1), Slovenia (1), South Africa (2), Switzerland (3), Thailand (1), the United Kingdom (7) and the United States (65), i.e., approximately 45% of the main committee membership is from outside the US.

The TC-95 mailing list now approaches 350, including the many observers on the Subcommittees. Eight 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; meeting minutes are posted on the ICES website. The ICES Website (http://www.ices-emfsafety.org/index.php5) contains both open and private pages for TC-95 and its subcommittees and links to TC-34 and its subcommittees. All agendas, approved meeting minutes, white papers, RF research databases, draft standard documents, and many special reports are publicly available; certain proprietary or working documents are available only to members of the subcommittees on private sections of the site. The TC-95/SC-4 literature database, containing more than 2500 titles, which now appears on the WHO website, is also publicly available (http://www.who.int/peh-emf/research/database/IEEEdatabase/).

During the past year, two reaffirmations were approved by the IEEE SASB and two reaffirmations are on the June RevCom agenda. The reaffirmations are:

- C95.6-2002(2007): IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0–3 kHz. (Approved December 2007.)
- C95.4-2002(2008): IEEE Recommended Practice for Determining Safe Distances from Radio Frequency Transmitting Antennas When Using Electric Blasting Caps During Explosive Operations. (Approved March 2008.)
- 1460-1996(2002): IEEE Guide for the Measurement of Quasi-Static Magnetic and Electric Fields. (On June 2008 RevCom agenda.)
- IEEE C95.3-2002: IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz–300 GHz. (On June 2008 RevCom agenda.)

3.4.2 Subcommittee 1 (Measurement and Computation)

Subcommittee 1 has responsibility for IEEE C95.3 and IEEE 1460 and is now 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 balloting draft during the 3rd Q 2008.

IEEE Std C95.3-2002 “Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields with Respect to Human Exposure to Such Fields, 100 kHz-300 GHz” was approved for reaffirmation by ballot in Dec. 2007 and is now on the June 2008 RevCom agenda. IEEE 1460 “Guide for the Measurement of Quasi-Static Magnetic and Electric Fields” also was balloted for reaffirmation and is also on the June 2008 RevCom agenda. IEEE 1460 will be incorporated into PC95.3.1 and will be withdrawn following approval of PC95.3.1; C95.3 will be incorporated into the revision of C95.3-2002.

3.4.3 Subcommittee 2 (RF Warning Symbols, Safety Programs and Hazard Communication)

Subcommittee 2 has responsibility for the following standards: C95.7-2005 and C95.2-1999(2006). C95.2 was reaffirmed at the September 2005 SASB meeting; C95.7 was approved at the same SASB meeting and published in March, 2006. At this time there are no PARs for new or existing projects. Plans are underway to develop a short-course describing the implementation of an RF safety program based on C95.7.

Several new documents are planned that would demonstrate the application of C95.7-2005 for RF safety programs for different work scenarios. It is anticipated that these new documents would become guides, or amendments to C95.7.

There is still some interest in compiling a glossary of terms used in ELF and RF safety. A number of such terms have been compiled over the tears by SC-2 and by the EMB-S Committee on Man and Radiation (COMAR). The subcommittee is also considering developing a standard for safety programs where exposure may occur at frequencies below 100 kHz.

3.4.4 Subcommittee 3 (Safety Levels – 0 to 3 kHz)

Subcommittee 3 has responsibility for C95.6-2002. During the past five 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.

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 interests, 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(2007). There are no PARs for new or existing projects. C95.6 will eventually be incorporated into the revision of IEEE C95.1-2005 (see below).

3.4.5 Subcommittee 4 (Safety Levels – 3 kHz -300-GHz)

Subcommittee 4 has responsibility for the C95.1 standard. This standard was first published as a 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 and published in April 2006. The revision is the result of a major effort by SC-4 to fully review and evaluate the relevant scientific literature. An amendment (PC95.1a) is being developed to address the following issues: ceiling values to the induced and contact current limits; distinguish between peak power density and localized exposure; and correct other technical issues that have been brought to the attention of SC-4. A PAR has been submitted and is on the June 2008 NesCom agenda. It is expected that sponsor balloting will occur early in the fall of 2008 and the draft will be submitted to RevCom in time for consideration at the December 2008 meeting. Revision of C95.1-2005 will begin after Amendment 1 is approved. IEEE C95.6 will be incorporated into this revision. Following approval of the revision of

C95.1, which will now cover the frequency range of 0 to 300 GHz, C95.6 will be withdrawn.

SC-4 is now pursuing the investigation of relationships between localized tissue temperature increase and peak spatial-average SAR (100 kHz to 3 GHz) or power density (3 GHz to 300 GHz) as a basis for a decision on the need to revise the localized exposure limits at frequencies from 100 kHz to 300 GHz. All evidence indicates that established adverse effects are thermal in nature and, therefore, changes in temperature under localized exposure conditions is important with respect to devices that produce such exposures, e.g., mobile telephones. The results would provide a scientifically sound basis for the current SAR limits for localized exposure or the basis for a change.

An ad hoc committee has been established to address bio-effects at THz frequencies. This is the continuation of a joint effort between members of SC-4 and ANSI ASC Z136 (laser safety) that began informally in 2000. While there was little data in 2000, there is a growing body of data that can be used to provide additional science-based support for reaffirming or revising the maximum permissible exposure values at 300 GHz (the upper frequency of IEEE C95.1 and the lower frequency of ANSI Z136.1).

3.4.6 Subcommittee 5 (Safe Distances from Antennas during Blasting Operations)

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 was reaffirmed at the March 2008 SASB meeting. There are no PARs for new or existing projects.

3.5 PARs

The only active TC-95 PARs are PC95.3.1 (Approved December 2003) and PC95.1a (on the June 2008 NesCom agenda).

3.5.1 SC-1 PARs

PC95.3.1 (Approved December 2003, extension approved December 2007):

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 to100 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.

3.5.2 SC-4 PARs

PC95.1a (On NesCom June 2008 agenda)

Title: Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz - Amendment: Amendment 1: Specifies Ceiling Limits for Induced and Contact Current, Clarifies Distinctions between Localized Exposure and Spatial Peak Power Density, and Corrects Other Known Errors in C95.1-2005

Scope: This amendment specifies ceiling values for induced and contact current, clarifies the distinctions between “localized exposure” and “spatial peak power density,” and corrects other known technical and editorial errors.

Purpose: The purpose of this amendment is to provide ceiling values for induced and contact current that appeared in IEEE Std C95.1, 1999 Edition, but were inadvertently omitted in IEEE Std C95.1-2005, and to clarify the distinctions between “localized exposure” and “spatial peak power density, and correct other known errors.

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

- Work with the ICES AdCom, with the guidance of IEEE staff, to develop a fund-raising program to support critical travel, special projects and meetings, visiting scientists and experts, and other critical needs – 4th Q 2007. (Ongoing)

- Continue international membership expansion led by Drs. McManus, Johnston and Murphy. Introduce new leadership with emphasis on non-US members, women and younger members. (Ongoing)
- Strengthen liaisons with ICNIRP, IEC, WHO, COST 281. (Ongoing)
- Arrange for 2008 meetings of TC-95 and its subcommittees – 4th Q 2007. (Met)
- Pursue the project on publicizing ICES and C95.1 standards in the literature and at international meetings. (Ongoing)
- Complete the TC-95 portion of the ICES website (http://www.ices-emfsafety.org/), include subcommittee sections, and provide FTP service for subcommittee activities – 4th Q, 2007. (Partially met)
- Complete subcommittee balloting draft of PC95.3.1 "Recommended Practice for Measurements and Computations with Respect to Human Exposure to Electric and Magnetic Fields, 0 to 100 kHz" – 4th Q 2007. (Not met)
- Complete draft of commonly used terms – 2nd Q 2008. (Not met)
- Complete guide for the application of C95.6 – 3rd Q 2007. (Not met)
- Publish general interest paper on C95.1-2005 (e.g., in *IEEE Spectrum*) and technical paper (e.g., in *Health Physics*) – 4th Q 2007. (Partially met)
- Complete reaffirmation ballots on IEEE 1460, C95.3, C95.4 and C95.6 – 3rd Q, 2007. (Met)
- Submit PAR for C95.1a (Amendment 1) – 4th Q, 2007. (Met – submitted 2nd Q 2008)
- Complete draft, subcommittee balloting and sponsor balloting on C95.1a – 4th Q 2008 (Ongoing)
- Organize first meeting of the SC-4 "THz ad hoc" with key members of ANSI ASC Z136 (laser safety) to discuss new data and address issues relating to the interface (300 GHz) between IEEE C95.1-2005 and ANSI Z136.1-2007 – 1st Q, 2008. (Met)

3.7 Current levels of activity with milestones indicated

- Work with the ICES AdCom, with the guidance of the IEEE staff, to develop a fund-raising program to support critical travel, support for special projects and meetings, support for visiting scientists and experts, and other critical needs – 4th Q 2008.
- Continue international expansion led by Drs. McManus, Johnston 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 2009 meetings of TC-95 and its subcommittees – 4th Q 2008.
- Pursue the project on publicizing ICES and C95.1 standards in the literature and at international meetings – Ongoing.

- Complete the TC-95 portion of the ICES website (http://www.ices-emfsafety.org/), include subcommittee sections, provide FTP service for subcommittee activities – 4th Q, 2008
- Complete subcommittee balloting draft of PC95.3.1 "Recommended Practice for Measurements and Computations with Respect to Human Exposure to Electric and Magnetic Fields, 0 to 100 kHz" – 3rd Q 2008
- Complete sponsor balloting draft of PC95.3.1 – 4th Q 2008
- Complete draft of commonly used terms – 1st Q 2009
- Complete guide for the application of C95.6 – 3rd Q 2009
- Complete draft, subcommittee balloting and sponsor balloting on C95.1a – 4th Q 2008
- Submit PAR and begin the revision of C95.1-2005 (incorporating C95.6) – 2nd Q 2009
- Submit PAR and begin revision of C95.3-2002 (incorporating C95.3.1) – 3rd Q 2009

3.8 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 engineering background and broad knowledge of IEEE procedures is invaluable to this committee.

3.9 Other Activities:

Members of ICES TC-95 are continually involved in a wide spectrum of activities that relate to standard-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, the EU/EC in Europe, and Standard setting bodies in China. 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.

3.10 Issues

3.10.1 Recognition of C95 measurement standards by IEC TC106

ICES has twice submitted without success C95.3-2002 to the IEC for consideration as an IEC/IEEE dual logo standard. The issue seems to focus on objections by a number of EU countries who are looking for a standard that specifically addresses EC Directives, e.g., CENELEC standards. It is unlikely that further attempts will succeed as the C95.3 is due to be revised.

3.10.2 Interaction with ICNIRP

ICES has tried unsuccessfully to coordinate activities with the International Commission on Non-Ionizing Radiation Protection (ICNIRP). ICNIRP, a group of 14 individuals develops safety limits for exposure to electromagnetic energy over the frequency range of 0 to 300 GHz, i.e. the same frequency range as IEEE C95.6 (0 – 3 kHz) and C95.1 (3 kHz – 300 GHz). The ICNIRP process for developing guidelines is closed, uncertain, and relies on claims of "no commercial vested interests" to maintain "credibility," especially within the EU states. Members of the ICES AdCom have met several times with members of ICNIRP (twice at ICNIRP's request) to

discuss methods of coordination but attempts at sharing documents are one-way only. ICES will continue to discuss the IEEE standards and process at major international fora to help recruit key scientists and engineers who have no other way of participating in setting safety standards. Indications are that there may be a closer relationship with ICNIRP in the future. This stems from an issue in the EU whereby an EC Worker Safety Directive to implement ICNIRP in the workplace has been set back four years (until 2012) because MRI operators performing certain interventional procedures would be exposed to low frequency magnetic fields in excess of the ICNIRP limits. The relevant ICNIRP limits are far more restrictive than those of IEEE C95.6 and the incorporation of extremely large safety factors in the ICNIRP limits has never been explained. Some of these issues may be discussed at a roundtable symposium on exposure standards at the 2008 meeting of the Bioelectromagnetics Society. Ric Tell and C-K Chou (TC-95 Chair) are scheduled to represent ICES and Paolo Vecchia (ICNIRP Chair) and James Lin will represent ICNIRP. This roundtable will provide a forum to promote further harmonization of the two major international standards.

3.10.3 IEEE C95.1, C95.6 and C95.7 – Publicly available documents?

Since about 1994, IEEE C95.1-1991 has been the basis for NATO Standardization Agreement (STANAG) 2345 "Evaluation and Control of Personnel Exposure to Radio Frequency Fields - 3kHz to 300 GHz." This was encouraged by the US members of the STANAG Ad Hoc (mostly from the Air Force – with a few members of ICES). Most of the NATO nations are EU members and are inclined to follow the EC Directive "Worker Safety Directive 2004/40/EC of the European Parliament and of the Council of 29 April 2004 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields)." Included in the Directive are references to the ICNIRP guidelines. However, that Directive has just been delayed 4 years due to MRI compliance issues. There is a chance that the STANAG, as an international document, could be used in the interim (IEEE rather than ICNIRP limits). The issue is that since IEEE Stds C95.1, C95.6 and C95.7 are public health and safety documents (not specifications or performance standards), they should be publicly available on the web at no expense. If they are, NATO could incorporate these standards into the STANAG by reference instead of incorporating tables and values as it does now. Representatives of DoD and members of ICES have met with IEEE staff to discuss the issue and are trying to work out a suitable arrangement – which may include licensing fees for unlimited use of the standards.

3.11 Membership

See Tables TC-95-1 through Table TC-95-7 for committee and subcommittee membership information and the attached Excel file for detailed membership information for TC-95 Main Committee.

This report was prepared and submitted by:

Ron Petersen

Executive Secretary, ICES

May 21, 2008

Table TC-95-1

TC-95 Leadership

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Table TC-95-2

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

U User

Table TC-95-3

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Table TC-95-4

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Table TC-95-5

TC-95 Membership: SC-3 (Safety Levels with Respect to Human Exposure, 0-3 kHz)

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Table TC-95-6

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Table TC-95-7

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