PRESENTATION

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In addition to material covered in the synopsis (above) and the summaries of RAPID Projects #1 and #2 in Appendix B, William Feero made the following points and clarifications. This material was reviewed by the presenter for accuracy.

In the first task for RAPID Project #1—selection of field parameters—Feero stressed the idea of asking the right question: what field parameters should be quantified to supply data for biologists? The identification of parameters was based on hypotheses identified at a meeting sponsored several years ago by the National Institute for Occupational Safety and Health (NIOSH). The identified parameters provided guidance for what was needed in the measurement protocols.

Feero emphasized that a large number of the parameters they identified have been measured in several studies using wave-capture instrumentation. These include occupational measurements by NIOSH and Battelle Northwest Laboratories NW, plus residential measurements in the EPRI 1000-home study and the EPRI Long-term Wire Code Study.

As noted in the synopsis, the classification scheme developed for appliances was a four-digit code related directly to the appliance itself, and cast in terms of orders of magnitude. The purpose of the code was not to develop specific numbers that an epidemiologist might need to carry out research, but to act as a "pointer" for the characteristics from appliances including magnitude frequency, spatial and temporal variability, and polarization.

Feero reported that the guidelines developed in RAPID Project #2 (conducted by Pam Bittner of Magnetic Measurements) applied to environments, such as an industrial site. RAPID Project #2 focused on magnetic (not electric) fields (appropriate, in Feero's view, as strong electric fields exist only in very select environments).

Feero noted that RAPID Project #2 stressed the importance of defining goals for the study, identifying the audience and the circumstances that initiated the study—all of which affect what issues should be addressed and how the study should be carried out. Desired output and final data use are important factors to determine in defining a protocol, as is focus on locations where people work ("you want to make measurements in the space you expect to find people"). This approach also enables a research project to be carried out with minimal effort for maximum amount of useful data.

SUMMARY OF DISCUSSION

As noted by the presenter, William Feero, information on source and environment characterization is available from RAPID project reports (see Appendix B for enhanced Executive Summaries) that can support or complement points raised during the discussions. The discussion summaries below are augmented with this information, as appropriate. The summary below was prepared from the symposium transcript.

Discussants noted that, in the United Kingdom, higher electric and magnetic fields were seen outside the home (rather than inside). Exceptions to this observation were high fields from video terminals and arcade games. In addition, as noted in the presentation of Topic #9 and the RAPID-sponsored University of Bristol study, low internal fields in the United Kingdom seem to make it an ideal place to investigate the contribution of appliance fields to PE.

Feero had noted that strong electric fields exist only in very specific environments in the electric utility industry. However, one discussant pointed out that many homes abutted rights-of-way where outdoor electric field exposures could be quite high.

Qualifications for performing field characterization measurements were discussed. Knowledge and instrumentation have advanced to the point that it is possible to develop protocols and training regimens so that technically oriented personnel can perform surveys. There is also information available for professionals, such as industrial hygienists, to develop and perform field assessment programs on their own, without calling on an EMF expert. Feero stressed the importance of training and protocols in performing a full characterization of the field parameters in an environment.

RAPID Project #1 developed a scheme for classifying appliances in terms of EMF exposure properties. Participants discussed whether it was both possible and worthwhile to develop a source catalog of source characteristics that could be used for risk assessment. The use of a simpler protocol than that outlined in RAPID Project #1 would depend on a narrowly defined goal for the characterization of fields from appliances. Feero also indicated that a catalog could be developed, but would require considerable funding.

It was noted that RAPID Projects #1 and #3 have included extensive source measurements, and that a data set of appliance measurements was available on the RAPID EMF Measurements Database (www.emf-data.org). The EMF Measurements Database also includes measurements for office workers and in passenger vehicles. It was noted that RAPID Project #3 had estimated the contribution of area fields versus point sources in five different environments: offices, hospitals, machine shops, grocery stores, and schools.

In response to a question on what percentage of TWA comes from equipment, Feero indicated that appliances do play a role but it depends on the appliance and the individual. One discussant noted that assessing the contribution of appliances also requires knowing or modeling the time

spent near appliances. Development of time/activity exposure models moves us closer to risk assessment.

In response to a question about significant observations of fields in RAPID Projects #1 and #2, Feero noted that the power frequency dominated in the 20 appliances they measured supporting the validity of TWA power frequency fields as a measure of exposure. However, he also indicated that certain tools or appliances with strong fields, such as hand drills, have both high-frequency fields and intermittency, meaning that much more than TWA is needed to capture their exposure characteristics.

As in previous discussions, the strategy for bringing closure to whether a health hazard exists or not was discussed in the context of what parameters you measure from a source or in an environment, in the absence of a biophysical model. The discussant emphasized the need to better bound the scope of investigation. Feero indicated that he felt that power frequencies had been fairly well examined but that was not the case for other parameters.

One commenter advocated a caution in talking about risk or exposure assessment in the absence of clear definitions of identified risk or what constitutes exposure, especially in interpreting results tied to TWA.

In response to a query about the value of undertaking a small-scale study of exposures in cars, Feero noted that his organization is undertaking such a study, and that it bears investigation as part of research attempting to capture exposures in the entire electromagnetic environment (not just under transmission lines).

Submitted written comments on this topic are found in Appendix C.