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Abstracts of papers presented at the meeting

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(U. S. Environmental Protection Agency, Atlanta, GA), William Wilkie (Tennessee Valley Authority, Muscle Shoals, AL)

A statistical analysis of selected parameters and models used for environmental pathway dose models has been performed. This analysis is one method of verifying the suitability of these parameters. An extensive literature search of available data on the parameters was conducted. The data obtained from the literature search was analyzed and the mean, most probable mean, median, deviation, and variance were tabulated for individual parameters including those for the iodine-131 cow-milk-infant thyroid dose model. The statistics developed were related to the U.S. NRC parameters and models in Regulatory Guide 1.109, since this document is widely used for nuclear power plant regulation. The uncertainty associated with the iodine-131 cow-milk-infant thyroid dose model was estimated by propagating the uncertainties of eight input parameters utilizing a multiplicative chain model.

The data are presented and analyzed followed by a discussion of the results. The suitability of the models for present and continued use is also discussed.

P/162 DETECTION OF CHANGES IN ENVIRONMENTAL RADIATION LEVELS DUE TO NUCLEAR POWER PLANT OPERATIONS. *G. G. Eichholz* and B. Kahn (Georgia Institute of Technology, Atlanta, GA 30332), A. E. Desrosiers (Battelle Pacific Northwest Laboratories, Richland, WA 99352), C. L. Wakamo (U. S. Environmental Protection Agency, Atlanta, GA 30303), W. H. Wilkie (Tennessee Valley Authority, Muscle Shoals, AL 35660), A. Strong (U. S. Environmental Protection Agency, Montgomery, AL 36101), E. Williams (South Carolina Department of Health and Environmental Control, Columbia, SC 29205)

Small variations in measured radiation levels around nuclear power plants may arise from many causes, many of which bear no relation to plant operations. To facilitate early identification of such extraneous causes, the Subcommittee recommends improvements and greater flexibility in the design of environmental surveillance programs, upgrading of analytical procedures and facilities, early notification of operators of weapons fallout events, coordination with fossil plant effluent surveillance and, possibly, establishment of a broadbased coordinating committee for the rapid dissemination of relevant information.

P/163 QUALITY ASSURANCE FOR ENVIRONMENTAL MONITORING. *Colin G. Sanderson* (Environmental Measurements Laboratory, USDOE, New York, NY 10014), Lawrence K. Cohen (Nuclear Regulatory Commission, Washington, DC 20555), Abe Goldin (Office of Radiation Programs, Washington, DC 20460), Arthur N. Jarvis (National Environmental Research Center, Las Vegas, NV 89114), Larry Kanipe (Tennessee Valley Authority, Muscle Shoals, AL 35660), Claude Sill (Health Services Laboratory, USDOE, Idaho Falls, ID 83401), Milton Trautman (Eberline Instrument Corporation, West Chicago, IL 60185), Bernd Kahn (Georgia Institute of Technology, Atlanta, GA 30332)

Quality Assurance (QA) is the summation of all programmed events imposed internally and externally in order to ensure that data being generated by a laboratory are valid. Quality Control (QC) procedures, which are generally considered to be task specific, are a very important aspect of a comprehensive QA program but individually are not a guarantee of quality. A complete program must also take into account management's responsibility to provide an organizational structure and budget so that QC can be routinely implemented, administered and reviewed. Securing qualified personnel, providing training and supervision are as important as written QC procedures and record keeping. Before samples are collected or analyses performed, procedures must be developed, tested, and adopted to ensure not only the validity of final results but also the integrity of the original sample. Sample collection, storage and preparation are just as important as the calibration of electronic counting equipment. The use of computers in the laboratory have greatly relieved the burden of routine operations but have at the same time created new areas for QC. The goal of any QA program is to maintain the quality of results within established limits of acceptance. However, QA is not complete if it only detects substandard results while not providing procedures for remedial action. It is the purpose of this document to provide a guide for the development of a comprehensive QA program. Publications will be indicated, which in most instances provide adequate detailed information.

P/164 REPORTING OF ENVIRONMENTAL RADIATION MEASUREMENTS DATA. *Ronald Colle* and Elmer H. Eisenhower (National Bureau of Standards, Washington, DC 20234), Harold H. Abee (Union Carbide Corp., Oak Ridge, TN 37830), Lawrence K. Cohen (Nuclear Regulatory Commission, Washington, DC 20555), David Ed (Department of Public Health, Springfield, IL 62761), Arthur N. Jarvis (Environmental Protection Agency, Las Vegas, NV 89114), Isable Fisenne (Environmental Measurements Laboratory, USDOE, New York, NY 10014), Morrison Jackson (Alabama Power Company, Birmingham, AL 35291), Raymond H. Johnson, Jr. (Environmental Protection Agency, Washington, DC 204660), Dale Olson (Health Services Laboratory, USDOE, Idaho Falls, ID 83401), John Peel (Division of Operational and Environmental Safety, USDOE, Washington, DC 20545)

This report is intended to serve as a practical guide to treating and reporting environmental radiation measurements data. Recommendations for a uniform method of data reporting are presented and justified. Three primary requisites are considered: proper units, an appropriate number of significant figures, and an unambiguous statement of measurement uncertainty. Present practices are summarized and evaluated, and their deficiencies are examined. To avoid confusion, it is recommended that the existing multiplicity of units used to report various radia-

tion quantities be reduced to a smaller consistent set. Use of the metric system of units is encouraged. Rules for rounding reported values to an appropriate number of significant figures are presented. The appropriate number of significant figures for a reported value is determined by the magnitude of the total uncertainty associated with the value. Guidelines are given for estimating random and systematic uncertainties, and for propagating and combining them to form an overall uncertainty. It is recommended that each reported measurement result include the value, the total random uncertainty expressed as the standard deviation, and the combined overall uncertainty. To avoid possible biases of data, all measurement results should be reported directly as obtained, including negative values. The lower limit of detection (LLD) should serve only as an *a priori* estimate of detection capability for the instrumentation, and not as an absolute level of activity that can or cannot be detected. The concept of a minimum detectable concentration (MDC) is introduced to serve as an *a priori* estimate of the capability for detecting an activity concentration by a given measurement instrument, procedure, and type of sample. Neither the LLD nor the MDC is intended to be an *a posteriori* criterion for the presence of activity.

P/165 STATISTICAL METHODS FOR ENVIRONMENTAL RADIATION DATA INTERPRETATION. *David A. Waite* (Battelle, Office of Nuclear Waste Isolation), D. H. Denham (Lawrence Livermore Laboratory), J. E. Johnson (Colorado State University), D. E. Michels (Republic Geothermal, Inc.), N. Turnage (Tennessee Valley Authority)

The interpretation of environmental radiation data encompasses those activities and operations used to draw conclusions from measurements. In general, these conclusions will extend considerably beyond the collected data to the environmental compartments which the samples or measurements were intended to represent. This report summarizes the results of an evaluation of alternative statistical methods for data treatment and interpretation.

Following a brief introduction, major Areas of Concern are discussed. Areas addressed are Experimental Design, Sampling Representativeness and Data Analysis. Within each Area of Concern the text includes a survey of present practices, an identification of potential problems with present practice, subcommittee recommendations and an illustration of recommended methods. The recommended methods were chosen to provide the best possible input into dose evaluation procedures.

In addition to containing recommendations for meeting minimum requirements in the Area of Concern, several particularly troublesome topics are discussed in the report. Among these are establishing a reliable baseline, quantifying variables in the sampling equation and handling less-than-lower-level-of-detection data. Salient features of both the report and recommended methods will be presented.

P/166 EFFECTIVE COMMUNICATION WITH THE PUBLIC. *Kenneth M. Clark* (Nuclear Regulatory Commission, Atlanta, GA 30303), James T. Alexander (U. S. Department of Energy, Oak Ridge, TN 37830), H. Richard Payne (Environmental Protection Agency, Atlanta, GA 30308), Richard R. Pierce (Duke Power Company, Charlotte, NC 28242), Roland T. Phillips (Department of Natural Resources, Environmental Protection Division, Atlanta, GA 30334), Hagan Thompson (Environmental Protection Agency, Atlanta, GA 30308)

Effective communication of radiological information to the public is one of the difficult tasks the Health Physicist must face. This report explores this problem from (a) the standpoints of an analysis of mass communication principles; (b) suggestions on how to enhance communication with the news media in specific types of situations such as accidents and television interviews; (c) suggestions on how to report environmental radiation data; and (d) some examples of simplified language which may be utilized.

Emphasis is placed on understanding the position, constraints and problems of Health Physicists being interviewed by representatives of news media, so that they may respond more intelligently. The goal is to provide a tool which will significantly increase the ability to communicate accurate and understandable radiological information to the public.

P/167 MECHANISMS FOR ENVIRONMENTAL RADIATION INFORMATION EXCHANGE. *T. W. Oakes*, J. S. Eldridge and K. E. Shank (Oak Ridge National Laboratory), W. R. Strodl (Consumers Power Company), W. D. Travers (Nuclear Regulatory Commission), S. G. Oberg (Utah State University), G. L. Love (Department of Energy), J. V. Panesko (Atlantic Richfield), J. B. Selby (Tennessee Valley Authority)

The purpose of this report is to assess the adequacy of present means for environmental radiological information exchange and to propose new techniques if needed. Over one hundred health physicists throughout the country, who are involved in environmental surveillance, were contacted for their comments and suggestions. After these contacts were made, the discussions were analyzed regarding existing communication mechanisms of other professional societies, government agencies, and information centers; these findings have been summarized and will be presented. It was concluded that strong support exists for creation of a Newsletter and that this activity could conceivably fit into a proposed environmental section of the Health Physics Society. Other possible information exchange systems will also be given. The intention to conduct symposiums, the format of the proposed Newsletter, and possible mechanisms for support for these activities, will be discussed.

P/168 CONCEPTS OF TRACEABILITY FOR RADIATION MEASUREMENTS. Elmer H. Eisenhower (Center