

The creation of the American Board of Health Physics, its activities and its impact on the field of radiation protection are presented. Its significant role in maintaining standards and promoting technical competence is discussed.

# History of the American Board of Health Physics

## Establishment and Composition of the Board

Shortly after its organization in 1956, the Health Physics Society established a Committee to study the need for certification of professional health physicists and to develop plans for a certification program if desirable.<sup>1,2</sup> After an intensive study, the Committee recommended that an American Board of Health Physics be established to develop standards and procedures, to examine candidates, and to issue written proof of certification to individuals who satisfied the requirements established by the Board. The Board of Directors of the Society decided that these recommendations had merit and appointed a temporary American Board of Health Physics on November 8, 1958. The composition of the original Board and subsequent members of this group since 1958 are shown in Table 1.

Dade W. Moeller, Ph.D.

**Table 1—Members of the American Board of Health Physics 1958-1971**

Name	Term	Society
C. Maurice Patterson*	1958-1959	Health Physics Society
Elda E. Anderson*	1958-1961	Health Physics Society
William A. McAdams*	1958-1961	Health Physics Society
Lauriston S. Taylor*	1958-1962	Health Physics Society
John W. Laughlin*	1958-1963	Health Physics Society
John W. Healy	1960-1964	Health Physics Society
J. Weaver McCaslin	1961-1965	Health Physics Society
Frederick P. Cowan	1962-1966	Health Physics Society
Karl Z. Morgan	1963-1967	Health Physics Society
Robert O. Gorson	1964-1968	Health Physics Society
Arthur R. Keenet	1965-1967	Health Physics Society
Dade W. Moeller	1966-1970	Health Physics Society
Marvin M. D. Williams	1966-1970	American Association of Physicists in Medicine
William C. Reinig	1967-1971	Health Physics Society
E. Dale Trout	1968-1972	Health Physics Society
Lawerence H. Lanzl	1969-1973	Health Physics Society
Kenneth M. Morset	1969-1971	American Public Health Association
H. Wade Patterson	1968-1974	Health Physics Society
Charles A. Pelletier	1971-1975	Health Physics Society
John Hale	1971-1975	American Association of Physicists in Medicine

\*Dates of expiration of terms of original Board members selected by lot; subsequent members were elected for five-year terms.

†Resigned before completion of full term.

The temporary Board developed a set of minimum requirements for certification after carefully reviewing the professional backgrounds of one hundred selected individuals believed to be representative of those recognized as competent in health physics. These minimum requirements were submitted to the membership of the Society for comment. At the Society's Annual Meeting in June, 1959, the matter was discussed at an open meeting and there was general support for the plan.

The Board of Directors of the Society formally established the American Board of Health Physics by approving an amendment to the By-laws of the Society on October 29, 1959. Anderson, Laughlin, McAdams and Taylor were reappointed for the terms indicated in Table 1 and J. W. Healy was named to fill the vacancy left by completion of the term of C. M. Patterson. In December, 1959, W. A. McAdams was named temporary Chairman of the Board and the members of the Health Physics Society were informed of these actions and given instructions as to how to apply for certification.

## Incorporation of the Board

It was evident from the start that incorporation of the Board was essential and had to be accomplished before any certifications could be granted. Legal assistance was obtained and details for incorporation in New York State were developed and approved by the Board. The actual incorporation proved more difficult than expected, because the New York Department of State refused to take action on the matter until the charter had been approved by the Department of Education which administers all professional licensing in the state. After an investigation on its own, the Department of Education issued a certificate granting the American Board of Health Physics permission to carry on its proposed work.† Final incorporation was then approved by the Department of State, effective December 1, 1960.

† The Board was informed unofficially that the Department of State had never before granted permission to a private group to license or certify professional people.

## Purpose and Organization of the Board

The Board held three business meetings during 1960. The first was held in New York City on March 11, the second in Boston on June 30, and the third in New York on December 16. In addition, a conference was held by telephone on October 14.

At its first meeting, the Board elected its first full slate of officers (see Table 2). It was agreed that the terms of office for each member should be for the years previously specified by the Health Physics Society but that the terms should expire at the end of the calendar year, instead of at the time of the Annual Society Meeting. The names of radiological health personnel who have served as officers on the Board from 1959 through 1971 are shown in Table 2.

Other actions at the first Board meeting included the drafting of a set of By-laws which was revised at subsequent meetings, and formally approved on July 12, 1961. The By-laws set the size of the Board at a minimum of five members and a maximum of nine, with each member serving a five-year term on a rotating basis. Five members were to be selected from health physicists nominated by the Health Physics Society. Later, one additional member was selected from nominees named by the American Association of Physicists in Medicine (which became a sponsor of the Board in 1966) and one member was selected from nominees named by the American Public Health Association (which became a sponsor of the Board in 1969). Each organization sponsoring persons for election to the Board is asked to place in nomination the names of at least three persons for each vacancy and election to the Board is by majority vote of the total membership of the Board from the nominations submitted. Once elected, members of the Board act as individuals and not as representatives of any organization.

Also included in the By-laws was a list of the purposes and goals of the Board which were later amplified as follows:

1. To elevate the standards and advance the profession of health physics by encouraging its study and improving its practice;
2. To encourage and insist on the highest standards of professional ethics and integrity in the practice of health physics;
3. To determine the competence of specialists in health physics and to arrange, control, and conduct investigations and examinations to test the qualifications of voluntary candidates for certificates to be issued by the Board;
4. To grant and issue certificates in the field of health physics to voluntary applicants and to maintain a registry of holders of such certificates.

### Evaluation of Initial Applications

At its first meeting, the Board gave considerable attention to the methods to be used in appraisal of applicants for certification. It was agreed that especially well-qualified individuals who applied by December 31, 1960, could be certified without examination if they received the unanimous approval of the Board. Prior to the meeting, the

**Table 2—Officers of the American Board of Health Physics 1959-1971**

Chairman	Term
William A. McAdams	December, 1959-December 31, 1960
Elda E. Anderson	January 1, 1961-April 17, 1961*
John W. Healy	July 13, 1961-December 31, 1962
Frederick P. Cowan	January 1, 1963-December 31, 1964
Robert O. Gorson	January 1, 1965-December 31, 1966
Dade W. Moeller	January 1, 1967-December 31, 1970
H. Wade Patterson	January 1, 1971-
Vice-Chairman	Term
Lauriston S. Taylor (Position Vacant)	March, 1960-December 31, 1962
H. Wade Patterson	January 1, 1963-June 8, 1969
E. Dale Trout	June 8, 1969-December 31, 1970
	January 1, 1971-
Secretary-Treasurer	Term
John W. Healy	March, 1960-July 13, 1961
J. Weaver McCaslin	July 13, 1961-December 31, 1965
Arthur R. Keene	January 1, 1966-December 31, 1967
William C. Reinig	January 1, 1968-December 31, 1971

\*Appointment terminated due to her untimely death.

Board had agreed unanimously to certify without examination the group of 100 individuals who had served as "guinea pigs" for developing the requirements for certification. Later records of the Board show that eighty health physicists in this group accepted the Board's invitation and were certified. To simplify the appraisal of other candidates, the Board adopted a point system to be used as a guide in evaluating the education and experience qualifications of the candidates. This point system proved effective and was used during the remainder of the year.

### Application Procedures and Requirements for Certification

Concurrent with this action, the Board began to develop requirements for regular certification which have been modified through subsequent years until today the procedures are as follows.<sup>3</sup> To apply for certification, an applicant must provide information outlining his training and experience, his areas of expertise, his publications, memberships in professional societies, etc. In addition, the candidate must obtain professional reference statements concerning his character and work performance from three people, at least one of whom is a health physicist already certified by the Board. The application fee through 1967 was \$15.00 with an additional charge of \$10.00 for the certification plaque. Effective January 1, 1968, the application fee was increased to \$25.00; effective January 1, 1970, the fee was increased to \$40.00 and the charge for the certification plaque was increased to \$15.00.

To be eligible to apply for certification, an applicant must be at least 28 years of age, and have a bachelor's degree in a physical science or in a biological science with a

**Table 3—Members of the Panel of Examiners, American Board of Health Physics 1960-1971**

Name	Term
Frederick P. Cowan*	1960-1962
Robert O. Gorson*	1960-1962
Lawrence H. Lanzl*	1960-1962
Lester S. Skaggs*	1960-1962
William T. Ham*	1960-1963
James M. Smith, Jr.*	1960-1963
John F. Sommers*	1960-1964
Roger Wallace*	1960-1964
Dade W. Moeller	1962-1965
Frank E. Hoecker	1963-1965
William C. King	1963-1965
Aaron P. Sanders	1963-1965
Edward W. Webster	1963-1965
William E. Nolan*	1960-1966
William C. Reinig*	1960-1966
Myron F. Fair	1964-1966
John V. Nehemias	1964-1966
John S. Handloser	1965-1967
E. Dale Trout	1965-1967
Donald E. Barber	1966-1968
John Hale	1966-1968
Charles L. Weaver	1966-1968
Francis W. Chambers, Jr.	1967-1968
John M. Heslep	1967-1969
David R. Lavalette	1967-1969
Robert E. Yoder	1967-1969
Robert L. Junkins	1965-1970
Doyle M. Davis	1968-1970
Saul J. Harris	1968-1970
John H. Pingel	1968-1970
Edward A. Putzier	1968-1970
Gail D. Adams	1968-1971
Robert S. Hart	1968-1971
Victor M. Milligan	1968-1971
Paul L. Ziemer	1968-1971
Herbert E. Book	1969-1972
Thomas M. Gerusky	1969-1972
Robert J. Shalek	1969-1972
Michael S. Terpilak	1969-1972
Bryce L. Rich	1966-1968 and 1970-1973
George E. Cunningham	1970-1973
LaMar J. Johnson	1970-1973
Frank L. Paschal, Jr.	1970-1973
Lyle A. Carter	1971-1974
Kenneth R. Kase	1971-1974
Harold J. Moe	1971-1974
Jacob Shapiro	1971-1974

\*Members of the first Panel established in 1960.

minor in a physical science. In exceptional cases, persons who have demonstrated adequate knowledge of health physics, but who are deficient in these formal requirements may, at the discretion of the Board, be permitted to substitute experience for the academic requirements. Each applicant must be engaged in the professional practice of health physics a substantial portion of his time, and have had at least six years of responsible professional experience in health physics, of which at least three years must be in applied radiation protection work. One year of graduate work in a field closely related to health physics may be substituted for a year of experience up to a maximum of two years. All candidates are required to take a comprehensive two-part written examination and supplemental written reports may be required on radiation protection evaluations made personally by or under the supervision of the applicant. Oral examinations are used routinely to assist in deciding on the certification of individuals with examination grades which are questionable or where there is uncertainty in regard to their education and experience. At the present time (1970), about 30% of all candidates are required to take an oral examination.

Written examinations are prepared, administered and graded by a Panel of Examiners, the original membership of which was appointed at the first meeting of the Board on March 11, 1960. The original Panel consisted of ten members with each member serving a three-year term on a rotating basis. Later, the size of the Panel was increased to twelve members and, on January 1, 1969, the Panel was expanded to sixteen members, each serving a four-year term. A list of all people who have served on the Panel from 1960-1971 is shown in Table 3 and a list of all officers of the Panel during this same period is shown in Table 4.

The Panel prepared its first examination and had it approved by the Board in time for administration to fifteen candidates on June 28, 1960, in Boston, Massachusetts, during the 5th Annual Meeting of the Health Physics Society.

**Table 4—Officers of the Panel of Examiners, American Board of Health Physics 1960-1970**

Chairman	Term
Frederick P. Cowan	March 11, 1960-December 31, 1961
William C. Reinig	January 1, 1962-December 31, 1964
Dade W. Moeller	January 1, 1966-December 31, 1965
William C. Reinig	January 1, 1966-December 31, 1966
Robert L. Junkins	January 1, 1967-June 1, 1970
Bryce L. Rich	June 1, 1970-
<b>Vice-Chairman</b>	<b>Term</b>
Michael S. Terpilak	July 1, 1968-

Written examinations administered by the Panel are comprehensive and emphasize applied health physics as well as the theoretical foundations of the field. Examinations given to date have consisted of two sections, a Part I covering radiation protection fundamentals and a Part II which includes questions designed to test professional judgment and maturity and the competence of the candidates on subjects relating to practical health physics. Up through 1967, both portions of the examinations were of the essay type. Beginning in 1968, Part I was converted to multiple-choice questions which were developed by the Panel of Examiners in cooperation with the Professional Examination Service of the American Public Health Association. Financial support for this program was provided to the Board by the Bureau of Radiological Health, U. S. Department of Health, Education, and Welfare.

Also in 1968, a program was initiated through which younger health physicists were permitted to apply for early admission to Part I of the examination. The basic requirements for such admission were that they fulfill the academic requirements for applicants seeking regular certification and that they have at least two years of professional experience. The purposes of early admission to Part I were (a) to allow the recent graduate an opportunity to demonstrate his competence in the fundamentals of health physics, and (b) to encourage younger health physicists to begin to qualify for certification. Applicants who successfully complete this step in the examination procedure are required to take only Part II of the written examination when they later apply for regular certification. The success of this program is well-demonstrated by the number of candidates taking part—15 in 1968, 25 in 1969, and 31 in 1970. Application for early admission is made on the same forms as for regular certification but the fee for participating in this portion of the certification program is \$10.00.

To assist candidates in preparing for the written examination, the Panel of Examiners prepared in 1962 an "Examination Preparation Guide," a copy of which was made available to applicants and other interested individuals. Since that time, the Guide has been periodically updated so that it contains all essay questions used on previous examinations. The questions are grouped according to the following categories which represent the range of topics covered by the examinations.

1. Radioactivity and Radioactive Decay
2. Interaction of Radiation and Matter
3. Radiation Dosimetry
4. Measurement of Radiation
5. Counting Statistics
6. Radiation Biology
7. Laboratory and Facility Design
8. Waste Disposal
9. Shielding
10. Personnel Monitoring
11. Bioassay and Whole-Body Counting
12. Air Sampling and Respiratory Protection
13. Environmental Radioactivity and Surveys
14. X-ray Safety
15. Health Physics Problems (Reactors)
16. Health Physics Problems (Accelerators)
17. Nuclear Accidents and Emergencies
18. Radiation Protection Criteria and Standards

19. Professional Judgment and General Knowledge
20. Units, Terminology, and Definitions

### Characteristics, Performance, and Activities of Health Physicists Applying for Certification

Through 1970, a total of 565 health physicists had taken written examinations administered by the American Board of Health Physics. Of these, 494 were candidates for regular certification and 71 were younger health physicists who took Part I of the examination during 1968, 1969, 1970. Including the group of "founders" certified without examination at the beginning of the program, the Board had certified a total of 542 health physicists as of December 31, 1970.

Through financial support from the Division of Nuclear Education and Training, U. S. Atomic Energy Commission, and the Bureau of Radiological Health, U. S. Department of Health, Education, and Welfare, the Board initiated a statistical study in 1969 of the records of all candidates who had taken the written examination for regular certification. Preliminary data from this study<sup>4</sup> show that, at the undergraduate level, 36.8% of the candidates majored in physics and/or mathematics, 21% in chemistry, 18% in engineering, and about 7% in biology. About 20% received their undergraduate degrees from colleges in New York and California and over 60% of all candidates have attended graduate school for one year or more. For the majority (almost 65%) of these, financial support for their graduate training was provided through the Health Physics Fellowship program of the U. S. Atomic Energy Commission or the Radiological Health Specialist Program of the Bureau of Radiological Health, U. S. Department of Health, Education, and Welfare.

Records show that 25% of all applicants resided in two west coast states, California and Washington, at the time of application. Twenty-two per cent worked for the Federal Government (primarily the U. S. Atomic Energy Commission and the U. S. Department of Health, Education, and Welfare), 20% were employed at four major AEC installations (Richland, Washington; Idaho Falls, Idaho; Las Vegas, Nevada; and Aiken, South Carolina), 19% were employed by industry, 14% held appointments at academic institutions, 8% worked for state or local government agencies, and 8% were employed by one of the AEC National Laboratories (Argonne, Brookhaven, Los Alamos, or Oak Ridge). Only 2% of those applying for certification were employed by hospitals.

Overall, about 60% of the applicants have been certified, the percentage varying markedly with the amount of academic training. For those admitted under special circumstances without a college degree, 21% have been certified; for those with a bachelor's degree, the figure is 52%; for those with one year of graduate training, the figure is 62%; for those with a master's degree, it is 76%; and for those with a doctorate, the rate of certification is 80%.

With respect to the science of radiology, it is interesting to note that only 7.5% of the applicants for certification listed radiation protection activities associated with "medical radiological and fluoroscopic installations" as

their prime area of competence. Similarly, only 2.2% listed radiation protection activities associated with "therapy installations" as their prime area of competence. This lack of expertise in the radiology field is confirmed by the fact that average grades in the subject area of "x-ray safety" have ranked seventeenth in the list of twenty categories covered by the written examinations administered by the Board. Where options have been permitted, data show that candidates have tended to omit questions in this same category. Certain of these observations are to be expected since the major thrust of health physicists during the past decade has been on problems associated with the nuclear industry. As the profession matures, however, and becomes involved to a greater extent with problems such as those associated with medical and dental x-ray protection, it is obvious that those in charge of educational programs in health physics will need to place more emphasis on other problems in the field.

Other subject categories in which grades have been low include Health Physics Problems (Reactors), Bioassay and Whole Body Counting, and Radiation Dosimetry. Subject categories of highest grade performance have been Units, Terminology, and Definitions; Professional Judgment and General Knowledge; and Interaction of Radiation and Matter.

A poll in late 1969 of all health physicists certified by the Board, to which 50% responded, showed that 84% regularly attend professional society meetings at the national and local level, 60% are active in professional committee activities, and that over 61% had been promoted or assigned positions of increased responsibility during the last three years. The data also showed that 50% had presented one or more papers at national meetings and had published one or more articles in professional journals during the last three years. Interestingly enough, over 50% had taken a refresher course during the last three years and 78% had assisted in presenting courses of instruction to others. Forty-five per cent of those responding performed consulting work on either a full or part-time basis.

## Commentary

Experience has shown that the existence of a certification program has provided a professional goal, especially for younger health physicists, and has stimulated workers in this field to undertake studies that have broadened and deepened their competence. The Board has been particularly gratified during recent years by the increasing number of Chapters of the Health Physics Society that have established refresher courses for people planning to take the certification examination. That the number of people taking advantage of such courses far exceeds the number actually taking the examination indicates that the program is having benefits beyond certification itself.

Recognition of the impact of certification upon

health physics activities has been demonstrated in a number of ways. Several state health departments now require that the directors of their radiation protection programs be certified by the American Board of Health Physics; health units in many States and larger cities require that people on their approved list to conduct radiation protection surveys be certified; and two States (New York and New Jersey) have recently established State Licensing Boards for X-ray Technicians which include the requirement that members of these Boards be certified by either the American Board of Health Physics or the American Board of Radiology. Another indication of the recognition for the certification program is the fact that both the National Council on Radiation Protection and Measurements and the American National Standards Institute define "qualified experts" as "for example, persons certified by the American Board of Radiology, or the American Board of Health Physics."

Recognition of the impact of the activities of the Board is also shown by the number of requests directed to it for assistance in professional health physics matters. Such activities in recent years have included cooperating with the U. S. Civil Service Commission in developing a long-range program to have certification made a requirement for upper-level health physics positions in the federal government, cooperating with the Bureau of Radiological Health, U. S. Department of Health, Education, and Welfare, in the development of new examination materials in health physics, and supporting the Committee on Education and Training, Health Physics Society, in planning for the development of a certification program for health physics technicians.

That the American Board of Health Physics has had a significant impact on the field of radiation protection during its first ten years of activities is clear. It has demonstrated that it can be a strong factor in maintaining suitable standards and promoting technical competence in this important professional field.

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## ACKNOWLEDGMENTS

*Grateful acknowledgment is made to the Bureau of Radiological Health, U. S. Department of Health, Education, and Welfare, to the Division of Nuclear Education and Training, U. S. Atomic Energy Commission, and to the Graduate School of Public Health, Harvard University, for financial support of various portions of the programs of the Board. The author also wishes to acknowledge his appreciation to past officers of the Board who kept the detailed records upon which much of this history was based.*

Dr. Moeller is Associate Director of the Kresge Center for Environmental Health, Harvard School of Public Health, 665 Huntington Ave., Boston, Massachusetts 02115. From 1967 through 1970, he served as Chairman of the American Board of Health Physics. This paper was submitted for publication in October, 1970.