

AN AMERICAN NATIONAL STANDARD

Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants

ANSI/ASME N45.2.23 -1978

SPONSORED AND PUBLISHED BY

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

United Engineering Center 345 East 47th Street New York, N. Y. 10017

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether he has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. American National Standards are subject to periodic review and users are cautioned to obtain the latest editions.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of publication. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

This standard was approved by the American National Standards Committee N45 and its Secretariat, and it was subsequently approved by the American National Standards Institute on April 20, 1978.

No part of this document may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

Copyright © 1978 by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
All Rights Reserved
Printed in U.S.A.

FOREWORD

(This Foreword is not a part of American National Standard Requirements for Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants.)

This Standard delineates requirements for the qualification of quality assurance program audit personnel for nuclear power plants. The Standard was developed by the American National Standards Committee N45 on Reactor Plants and Their Maintenance. This Committee has been chartered to promote the development of standards for the location, design, construction, and maintenance of nuclear facilities, including equipment, methods, and components.

In April 1970, the N45 Committee established a Subcommittee N45-3 to guide the preparation of nuclear quality assurance standards. This Subcommittee is responsible for establishing guidelines and policy to govern the scope and content of the various standards; monitoring the status of standards in process; recommending preparation of additional standards; and approval of standards prior to their submittal to the N45 Committee for balloting.

In October 1972, the N45-3 Subcommittee was renumbered N45-2, and the work groups of that Subcommittee were renumbered accordingly.

In January 1974, the N45-2 Subcommittee of the American National Standard N45 established a work group N45-2.23 on qualification of auditors. The purpose of this work group was to prepare a standard for general industry use that would define the qualification of quality assurance program audit personnel for nuclear facilities. The work group was composed of representatives of key segments of the nuclear industry, including NRC, utilities, reactor suppliers, equipment manufacturers, architect-engineers, and consultants. The Standard contained herein was developed from this activity. The initial draft of this Standard was prepared January 25, 1974.

In 1975, the N45-2 Subcommittee and its work groups was reorganized into the ASME Committee on Nuclear Quality Assurance and began operating under the accredited ASME Procedures for Nuclear Projects which received accreditation on January 15, 1976. The ASME Committee on Nuclear Quality Assurance was chartered to develop the overall nuclear quality assurance codes and standards for nuclear power plant design, construction, and operation.

In order to keep abreast of progress in the industries concerned, National Standards are subject to periodic review. Suggestions for improvement will be welcomed at all times.

All inquiries regarding this Standard should be addressed to the Secretary, Committee on Nuclear Quality Assurance, The American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, New York 10017.

**AMERICAN NATIONAL STANDARDS COMMITTEE N45
Reactor Plants and Their Maintenance**

OFFICERS

Sol Burstein, Chairman

S. A. Bernson, Vice-Chairman

COMMITTEE PERSONNEL

AMERICAN FEDERATION OF LABOR AND CONGRESS OF INDUSTRIAL ORGANIZATIONS

P. R. Shoop, International Brotherhood of Electric Workers, Washington, D.C.

AMERICAN NUCLEAR SOCIETY

J. S. Moore, Westinghouse Electric Corporation, Pittsburgh, Pennsylvania

J. R. Rohfs, North American Rockwell, Canoga Park, California

AMERICAN SOCIETY OF CIVIL ENGINEERS

A. A. Ferlito, Ebasco Services, New York, New York

C. B. Miczek, Stone and Webster Engineering Corporation, Boston, Massachusetts

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, THE

E. C. Bailey, Commonwealth Edison Company, Chicago, Illinois

V. S. Boyer, Philadelphia Electric Company, Philadelphia, Pennsylvania

H. F. Brush, Bechtel Corporation, San Francisco, California

S. Burstein, Wisconsin Electric Power Company, Milwaukee, Wisconsin

AMERICAN WELDING SOCIETY

J. R. Mc Guffey, Union Carbide Corporation, Oak Ridge, Tennessee

H. E. Broadbent, Alternate, American Welding Society, Miami, Florida

ATOMIC INDUSTRIAL FORUM, INC.

D. W. Berger, Babcock & Wilcox, Lynchburg, Virginia

EDISON ELECTRIC INSTITUTE—ELECTRIC LIGHT AND POWER GROUP

R. W. Clement, Consolidated Edison Company of New York, Incorporated, New York, New York

G. A. Olson, Alternate, Edison Electric Institute, New York, New York

HEALTH PHYSICS SOCIETY

T. J. Burnett, Oak Ridge National Laboratory, Oak Ridge, Tennessee

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS

M. I. Olken, American Electric Power Service Corporation, New York, New York

J. C. Russ, General Electric Company, San Jose, California

INSTRUMENT SOCIETY OF AMERICA

H. C. Copeland, Douglas United Nuclear, Incorporated, Richland, Washington

T. M. Clement, Alternate, Douglas United Nuclear, Incorporated, Richland, Washington

MANUFACTURING CHEMISTS' ASSOCIATION, INCORPORATED

R. D. Hill, Exxon Nuclear Company, Incorporated, Bellevue, Washington

NUCLEAR ENERGY PROPERTY INSURANCE ASSOCIATION

J. J. Carney, Nuclear Energy Property Insurance Association, Hartford, Connecticut

TRAVELERS INSURANCE COMPANY, THE

F. W. Catudal, The Travelers Insurance Company, Hartford, Connecticut

ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

R. E. Yoder, Energy Research and Development Administration, Washington, D.C.

M. P. Norin, Energy Research and Development Administration, Washington, D.C.

U.S. NUCLEAR REGULATORY COMMISSION

R. B. Minogue, U.S. Atomic Energy Commission, Washington, D.C.
W. M. Morrison, Alternate, U.S. Atomic Energy Commission, Washington, D.C.

U.S. ENVIRONMENTAL PROTECTION AGENCY

J. E. Martin, U.S. Environmental Protection Agency, Rockville, Maryland
E. D. Harward, Alternate, U.S. Environmental Protection Agency, Rockville, Maryland

INDIVIDUAL MEMBERS

S. A. Bernsen, Bechtel Corporation, San Francisco, California
W. F. Ferguson, Oak Ridge National Laboratory, Oak Ridge, Tennessee
D. L. Leone, Sargent & Lundy, Chicago, Illinois
H. Lichtenberger, Combustion Engineering, Incorporated, Windsor, Connecticut
I. H. Mandil, MPR Associates, Incorporated, Washington, D.C.
Donald Vanderburg, Yankee Atomic Electric Company, Westboro, Maryland

Subcommittee Personnel on Nuclear Quality Assurance (N45-2)

R. L. Dick, Chairman, Duke Power Company, Charlotte, North Carolina
J. W. Anderson, Secretary, Oak Ridge National Laboratory, Oak Ridge, Tennessee
B. G. Avers, General Public Utilities Services Corporation, Parsippany, New Jersey
R. S. Bain, Pacific Gas & Electric Company, San Francisco, California
G. Basile, United States Testing Company, Incorporated, Hoboken, New Jersey
A. Bleiweis, United Engineering & Constructors, Boston, Massachusetts
S. G. Caslake, Westinghouse Electric Corporation, Pittsburgh, Pennsylvania
A. W. Crevasse, Tennessee Valley Authority, Chattanooga, Tennessee
H. F. Dobel, Babcock & Wilcox, Lynchburg, Virginia
W. F. Ferguson, Oak Ridge National Laboratory, Oak Ridge, Tennessee
D. Gans, Jr., Stone and Webster Engineering Corporation, Boston, Massachusetts
J. W. Hallowell, Westinghouse Electric Corporation, Pittsburgh, Pennsylvania
A. K. Hasija, Mealu/Nelia Engineering Department, New York, New York
E. J. Hemzy, Commonwealth Edison Company, Chicago, Illinois
W. C. Herman, Ebasco Services, Incorporated, New York, New York
J. H. Hicks, Babcock & Wilcox, Lynchburg, Virginia
G. S. Keeley, Consumers Power Company, Jackson, Michigan
W. P. Kelleghan, Tennessee Valley Authority, Knoxville, Tennessee
F. W. Knight, Westinghouse Electric Company, Pittsburgh, Pennsylvania
M. E. Langston, U.S. Atomic Energy Commission, Washington, D.C.
D. G. Long, General Electric Company, San Jose, California
W. M. Morrison, U.S. Atomic Energy Commission, Washington, D.C.
G. M. Schierberg, Stone & Webster Engineering Corporation, Lycoming, New York
J. E. Wahler, Combustion Engineering, Windsor, Connecticut
D. B. Weaver, Tennessee Valley Authority, Knoxville, Tennessee
R. G. Wunderlich, Gulf General Atomic, San Diego, California

Working Group on Qualifications of Auditors (N45-2.23)

R. Wachniak, Chairman, Babcock & Wilcox Company
G. R. Hosack, Secretary, General Electric Company
R. A. Abbott, American Society for Quality Control
W. T. Agerter, Nuclear Services Corporation
J. N. Babcock, Jr., United Engineers & Constructors, Incorporated
H. R. Banks, Carolina Power & Light Company
T. R. Colandrea, General Atomic Company
B. G. Good, Pacific Gas & Electric Company
C. Q. Hills, Consumers Power Company
F. B. Hyland, Westinghouse Electric Corporation
F. J. Long, U.S. Nuclear Regulatory Commission
J. F. Vessely, Florida Power & Light Company
**J. Weber*, Nuclear Services Corporation

*Resigned.

CONTENTS

	Page
1. INTRODUCTION	1
1.1 Scope	1
1.2 Applicability	1
1.3 Responsibility	1
1.4 Definitions	1
1.5 Referenced Documents	1
2. QUALIFICATIONS OF AUDITORS AND LEAD AUDITORS	1
2.1 General	1
2.2 Qualification of Auditors	1
2.3 Qualification of Lead Auditors	2
3. MAINTENANCE OF QUALIFICATION	3
3.1 General	3
3.2 Maintenance of Proficiency	3
3.3 Requalification	3
4. ADMINISTRATION	3
4.1 Organizational Responsibility	3
4.2 Qualification Examination	3
5. RECORDS	4
5.1 General	4
5.2 Certification of Qualification	4
5.3 Updating of Lead Auditors Records	4
5.4 Record Retention	4
6. REVISION OF ANSI STANDARDS REFERRED TO IN THIS DOCUMENT	4
APPENDIX A RECORD OF LEAD AUDITOR QUALIFICATIONS	5

AMERICAN NATIONAL STANDARD

**QUALIFICATION OF QUALITY ASSURANCE PROGRAM AUDIT
PERSONNEL FOR NUCLEAR POWER PLANTS****1. INTRODUCTION****1.1 Scope**

This Standard provides requirements and guidance for the qualification of audit team leaders, henceforth identified as a "Lead Auditor", who organizes and directs audits, reports, audit findings, and evaluates corrective action.

This Standard also provides requirements and guidance for the qualifications of individuals, henceforth referred to as "Auditor", who participate in an audit, such as technical specialists, management representatives, and auditors-in-training.

1.2 Applicability

The requirements of this Standard apply to Auditors and Lead Auditors who perform audits for the plant owner, contractors, or other organizations participating in activities affecting the quality of structures, systems, and components of nuclear power plants which are subject to audit in accordance with requirements of ANSI N45.2. This Standard shall be used in conjunction with the requirements of ANSI N45.2.12.

1.3 Responsibility

The organization or organizations responsible for implementation of the applicable requirements of this standard shall be identified and the scope of their responsibilities and authorities shall be documented. The work of establishing practices and procedures and providing the resources in terms of personnel, equipment, and services necessary to implement the requirements of this Standard may be delegated to other organizations, and such delegations shall also be documented. It is the responsibility of each of these organizations to comply with the practices and procedures so established and to conform with the applicable requirements of this Standard.

1.4 Definitions

The following definitions are provided to assure uniform understanding of selected terms as they are used in this Standard. Other terms and definitions are contained in ANSI N45.2.10.

1.4.1 Auditor. Any individual who performs any portion of an audit, including Lead Auditors, technical specialists, and others such as management representatives and auditors-in-training.

1.4.2 Lead Auditor. An individual qualified to organize and direct an audit, report audit findings, and evaluate corrective action.

1.4.3 Audit. A documented activity performed in accordance with written procedures or checklists to verify, by examination and evaluation of objective evidence, that applicable elements of the quality assurance program have been developed, documented, and effectively implemented in accordance with specified requirements. An audit should not be confused with surveillance or inspection for the sole purpose of process control or product acceptance.

1.5 Referenced Documents

Documents that are referenced in this Standard are identified at the point of reference and described in Section 6 of this Standard.

2. QUALIFICATIONS OF AUDITORS AND LEAD AUDITORS**2.1 General**

This Section delineates the qualifications of Auditor and Lead Auditors.

2.2 Qualification of Auditors

The responsible auditing organization shall establish the audit personnel qualifications and the requirements for the use of technical specialists to accomplish

the auditing of the quality assurance programs. Personnel selected for quality assurance auditing assignments shall have experience or training commensurate with the scope, complexity, or special nature of the activities to be audited. Auditors shall have, or be given, appropriate training or orientation to develop their competence for performing required audits. Competence of personnel for performance of the various auditing functions shall be developed by one or more of the following methods:

2.2.1 Orientation to provide a working knowledge and understanding of ANSI B45.2, this Standard, and the auditing organization's procedures for implementing audits and reporting results.

2.2.2 Training programs to provide general and specialized training in audit performance. General training shall include fundamentals, objectives, characteristics, organization, performance, and results of quality auditing. Specialized training shall include methods of examining, questioning, evaluating, and documenting specific audit items and methods of closing out audit findings.

2.2.3 On-the-job training, guidance, and counseling under the direct supervision of a Lead Auditor. Such training shall include planning, performing, reporting, and followup action involved in conducting audits.

2.3 Qualification of Lead Auditors

An individual shall meet the requirements of paragraphs 2.3.1 through 2.3.5 prior to being designated a Lead Auditor.

2.3.1 Education and Experience. The prospective Lead Auditor shall have verifiable evidence that a minimum of ten (10) credits under the following scoring system have been accumulated.

2.3.1.1 *Education (4 credits maximum)*. Associate degree from an accredited institution score one (1) credit or if the degree is an engineering, physical sciences, mathematics, or quality assurance, score two (2) credits or,

a bachelor degree from an accredited institution score two (2) credits or if the degree is in engineering, physical sciences, mathematics, or quality assurance, score three (3) credits; in addition score one (1) credit for a master degree in engineering, physical sciences, business management, or quality assurance from an accredited institution.

2.3.1.2 *Experience (9 points maximum)*. Technical experience in engineering, manufacturing, construction, operation, or maintenance, score one (1) credit for each full year with a maximum of five (5) credits for this aspect of experience.

If two (2) or more years of this experience have been in the nuclear field, score one (1) additional credit, or,

if two (2) or more years of this experience have been in quality assurance, score two (2) additional credits, or,

if two (2) or more years of this experience have been in auditing, score three (3) additional credits, or,

if two (2) or more years of this experience have been in nuclear quality assurance, score three (3) additional credits, or,

if two (2) or more years of this experience have been in nuclear quality assurance auditing, score four (4) additional credits.

2.3.1.3 *Other Credentials of Professional Competence (2 credits maximum)*. Certification of competency in engineering, science, or quality assurance specialties issued and approved by a State Agency, or National Professional or Technical Society, score two (2) credits.

2.3.1.4 *Rights of Management (2 points maximum)*. The Lead Auditor's employer may grant up to two (2) credits for other performance factors applicable to auditing which may not be explicitly called out in this standard. Examples of these factors are leadership, sound judgment, maturity, analytical ability, tenacity, past performance, QA training courses.

2.3.2 *Communication Skill*. The prospective Lead Auditors shall have the capability to communicate effectively, both written and oral. These skills shall be attested to in writing by the Lead Auditor's employer.

2.3.3 *Training*. Prospective Lead Auditors shall have training to the extent necessary to assure their competence in auditing skills. Training in the following areas shall be given based upon management evaluation of the particular needs of each prospective Lead Auditor.

2.3.3.1 *Knowledge and understanding of ANSI N45.2, its associated Standards, particularly ANSI N45.2.12, and other nuclear-related codes, standards, regulations, regulatory guides, as applicable.*

2.3.3.2 General structure of quality assurance programs as a whole and applicable elements such as organization; design control; procurement document control; instructions; procedures and drawings; document control; control of purchased material equipment and services; identification and control of materials, parts and components; control of special processes; inspection; test control; control of measuring and test equipment; handling, storage and shipping; inspection, test, and operating status; nonconforming materials, parts, or components; corrective action; quality assurance records; audits; and quality information feedback.

2.3.3.3 Auditing techniques of examining, questioning, evaluating and reporting; methods of identifying and following up on corrective action items; and closing out audit findings.

2.3.3.4 Audit planning in the quality-related functions for the following activities: design, purchasing, fabrication, handling, shipping, storage, cleaning, erection, installation, inspection, testing, statistics, non-destructive examination, maintenance, repair, operation, modification of nuclear facilities or associated components and safety aspects of the nuclear facility.

2.3.3.5 On-the-job training to include the elements of audit activity as described in ANSI N45.2.12.

2.3.4 Audit Participation. The prospective Lead Auditor shall have participated in a minimum of five (5) quality assurance audits within a period of time not to exceed three (3) years prior to the date of qualification, one audit of which shall be a nuclear quality assurance audit within the year prior to his qualification.

2.3.5 Examination. The prospective Lead Auditor shall pass an examination which shall evaluate his comprehension of and ability to apply the body of knowledge identified in paragraph 2.3.3. The test may be oral, written, practical, or any combination of the three types. The development and administration of the examination shall be in accordance with Section 4 of this Standard.

3. MAINTENANCE OF QUALIFICATION

3.1 General

The maintenance of proficiency established in this Section shall apply to the Lead Auditor only.

3.2 Maintenance of Proficiency

Lead Auditors shall maintain their proficiency through one or more of the following: regular and active participation in the audit process; review and study of codes, standards, procedures, instructions, and other documents related to quality assurance programs and program auditing; participation in training programs. Based on management annual assessment, management may extend the qualification, require retraining, or require requalification. These evaluations shall be documented.

3.3 Requalification

Lead Auditors who fail to maintain their proficiency for a period of two years or more shall require requalification. Requalification shall include retraining in accordance with the requirements of paragraph 2.3.3, reexamination in accordance with paragraph 2.3.5, and participation as an Auditor in at least one nuclear quality assurance audit.

4. ADMINISTRATION

4.1 Organizational Responsibility

Training of auditors shall be the responsibility of the employer. The responsible auditing organization shall select and assign personnel who are independent of any direct responsibility for performance of the activities which they will audit. The Lead Auditor shall, prior to commencing the audit, concur that assigned personnel collectively have experience or training commensurate with the scope, complexity, or special nature of the activities to be audited.

4.2 Qualification Examination

The development and administration of the examination for Lead Auditor required by paragraph 2.3.5 is the responsibility of the employer. The employer may delegate this activity to an independent certifying agency, but shall retain responsibility for conformance of the examination and its administration to this Standard. Integrity of the examination shall be maintained by the employer or certifying agency through appropriate confidentiality of files and, where applicable, proctoring of examinations. Copies of the objective evidence regarding the type(s) and content of the examination(s) shall be retained by the employer in accordance with the requirements of Section 5.

5. RECORDS

5.1 General

Records of personnel qualifications for Auditors and Lead Auditors performing audits shall be established and maintained by the employer.

5.2 Certification of Qualification

Each Lead Auditor shall be certified by his employer as being qualified to lead audits. This certification shall, as a minimum, document the following:

- (a) Employer's name
- (b) Lead Auditor's name
- (c) Date of certification or recertification
- (d) Basis for qualification (i.e., education, experience, communication skills, training, examination, etc.)
- (e) Signature of employers' designated representative who is responsible for such certification

An example of a format for documenting the records of a Lead Auditor is given in Appendix A.

5.3 Updating of Lead Auditors' Records

Records for each Lead Auditor shall be maintained and updated annually.

5.4 Record Retention

Qualification records shall be retained as required by ANSI N45.2.12 and maintained as required by ANSI N45.2.9.

6. REVISION OF AMERICAN NATIONAL STANDARDS REFERRED TO IN THIS DOCUMENT

When any of the following Standards referred to in this document are superseded by a revision approved by the American National Standards Institute, the revision is not mandatory until it has been incorporated as a part of this standard.

Revision to the referenced Standards, and revisions to this Standard issued after the date of a specific contract invoking this Standard may be used by mutual consent of the purchaser and the supplier.

- N45.2 Quality Assurance Program Requirements for Nuclear Power Plants
- N45.2.9 Requirements for Collection, Storage and Maintenance of Quality Assurance Records for Nuclear Power Plants
- N45.2.10 Quality Assurance Terms and Definitions
- N45.2.12 Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants

N45.2.23 APPENDIX A (Sample Format)

RECORD OF LEAD AUDITOR QUALIFICATIONS EMPLOYER:	NAME	DATE
2.3.1 QUALIFICATION POINT REQUIREMENTS	CREDITS	
2.3.1.1 EDUCATION – University/Degree/Date –	– 4 Credits Max.	
1. Undergraduate Level 2. Graduate Level		
2.3.1.2 EXPERIENCE – Company/Dates	– 9 Credits Max.	
Technical (0-5 pts.) and Nuclear Industry (0-1 pt.), or Quality Assurance (0-2 pts.), or Auditing (0-1 pt.)		
2.3.1.3 PROFESSIONAL ACCOMPLISHMENT – Certificate/Date	– 2 Credits Max.	
1. P.E. 2. Society		
2.3.1.4 MANAGEMENT – Justification/Evaluator/Date	– 2 Credits Max.	
Explain:		
Evaluated by: (Name & Title)	Date	
	Total Credits	
2.3.2 AUDIT COMMUNICATION SKILLS		
Evaluated by: (Name & Title)		Date
2.3.3 AUDIT TRAINING COURSES		
Course Title or Topic		Date
1.		
2.		
2.3.4 AUDIT PARTICIPATION		
Location	Audit	Date
1.		
2.		
3.		
4.		
5.		
2.3.5 EXAMINATION	Passed	Date
5.2 AUDITOR QUALIFIED CERTIFIED BY (Signature and Title)		Date Certified
3.2 ANNUAL EVALUATION (Signature and Date)		