

American Nuclear Society

REAFFIRMED

May 10, 2013

ANSI/ANS-15.8-1995 (R2013)

**quality assurance program
requirements for research reactors**

an American National Standard

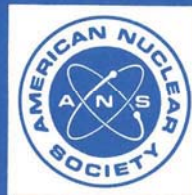
REAFFIRMED

September 14, 2005

**ANSI/ANS-15.8-1995
(R2005)**

This standard has been reviewed and reaffirmed with the recognition that it may reference other standards and documents that may have been superseded or withdrawn. The requirements of this document will be met by using the version of the standards and documents referenced herein. It is the responsibility of the user to review each of the references and to determine whether the use of the original references or more recent versions is appropriate for the facility. Variations from the standards and documents referenced in this standard should be evaluated and documented.

This standard does not necessarily reflect recent industry initiatives for risk informed decision-making or a graded approach to quality assurance. Users should consider the use of these industry initiatives in the application of this standard.



published by the
American Nuclear Society
555 North Kensington Avenue
La Grange Park, Illinois 60525 USA

This is a preview of "ANSI/ANS-15.8-1995 (...". [Click here to purchase the full version from the ANSI store.](#)

ANSI/ANS-15.8-1995

**American National Standard
Quality Assurance Program
Requirements for Research Reactors**

Secretariat
American Nuclear Society

Prepared by the
**American Nuclear Society
Standards Committee
Working Group ANS-15.8**

Published by the
**American Nuclear Society
555 North Kensington Avenue
La Grange Park, Illinois 60526 USA**

Approved September 12, 1995
by the
American National Standards Institute, Inc.

American National Standard

Designation of this document as an American National Standard attests that the principles of openness and due process have been followed in the approval procedure and that a consensus of those directly and materially affected by the standard has been achieved.

This standard was developed under the procedures of the Standards Committee of the American Nuclear Society; these procedures are accredited by the American National Standards Institute, Inc., as meeting the criteria for American National Standards. The consensus committee that approved the standard was balanced to ensure that competent, concerned, and varied interests have had an opportunity to participate.

An American National Standard is intended to aid industry, consumers, governmental agencies, and general interest groups. Its use is entirely voluntary. The existence of an American National Standard, in and of itself, does not preclude anyone from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard.

By publication of this standard, the American Nuclear Society does not insure anyone utilizing the standard against liability allegedly arising from or after its use. The content of this standard reflects acceptable practice at the time of its approval and publication. Changes, if any, occurring through developments in the state of the art, may be considered at the time that the standard is subjected to periodic review. It may be reaffirmed, revised, or withdrawn at any time in accordance with established procedures. Users of this standard are cautioned to determine the validity of copies in their possession and to establish that they are of the latest issue.

The American Nuclear Society accepts no responsibility for interpretations of this standard made by any individual or by any ad hoc group of individuals. Requests for interpretation should be sent to the Standards Department at Society Headquarters. Action will be taken to provide appropriate response in accordance with established procedures that ensure consensus on the interpretation.

Comments on this standard are encouraged and should be sent to Society Headquarters.

Published by

American Nuclear Society
555 North Kensington Avenue, La Grange Park, Illinois 60526 USA

Copyright © 1996 by American Nuclear Society.

Any part of this standard may be quoted. Credit lines should read "Extracted from American National Standard ANSI/ANS-15.8-1995 with permission of the publisher, the American Nuclear Society." Reproduction prohibited under copyright convention unless written permission is granted by the American Nuclear Society.

Printed in the United States of America

Foreword (This Foreword is not a part of American National Standard Quality Assurance Program Requirements for Research Reactors, ANSI/ANS-15.8-1995.)

The first version of American National Standard Quality Assurance Program Requirements for Research Reactors, ANSI/ANS-15.8-1976, was approved August 19, 1976, and subsequently reaffirmed December 15, 1986. It has been twenty years since the first working group started development of the standard. During this period of time, significant changes have occurred in the requirements associated with management of research reactor facilities, particularly in the degree of rigor and documentation. This edition of the standard is a complete rewrite and provides the applicable quality assurance program requirements for all phases of a facility's life.

In the process of implementing this standard with respect to the existing and varied practices in many operating facilities, it is important to recognize that:

- a. Considered use of the standard should assist in implementing regulatory requirements.
- b. The standard is intended to be a significant aid for existing and new owners or operators.
- c. The standard should be helpful for both the facility undergoing change or modification.
- d. Each provision of the standard should be used only to the extent appropriate to the individual facility.
- e. The standard is not intended to require backfitting.

With regard to this particular standard, it must be noted that research reactors have two characteristics which affect the type of quality assurance program that should be applied to them, when compared to power reactors. First, the reliability of most of the parts used in a research reactor is not relevant to the health and safety of the public since failure of the item generally shuts the system down and little else occurs. Second, the typical research reactor operates on a limited budget with its continued existence dependent upon maintaining a low-cost, reliable operation. Because of these inherent characteristics, the quality assurance program for research reactors is applied primarily to safety-related and important items, and should be graded appropriately to be economically feasible. It is the intent of this standard to state the requirements for such a program.

For those not yet exposed to modern quality assurance requirements, it is difficult to grasp the value of adequate documentation. Although documentation is not the totality of a quality assurance program, it is one element of an appropriate program for research reactors. Much of the documentation required by a quality assurance program already exists for an operating research reactor, and little additional documentation may be needed when the quality assurance program is established.

Appropriate application of a standard is very important, and a careful and comprehensive reading of this standard is highly recommended before use. Two comments are presented as aids to interpretation:

- (1) It is recognized that it is not necessary to apply the same degree of control to all items in a research reactor. Where this standard uses words such as "as appropriate" or "as necessary," these are to be interpreted as meaning variation in the degree of application.
- (2) It is not intended that this standard require modification of existing charter or licensing requirements, and should not be so interpreted.

The membership of Working Group ANS-15.8 at the time of the completion of the standard was:

T. R. Schmidt, Chairman, *Sandia National Laboratories* D. E. Hughes, *Pennsylvania State University*
A. Adams, Jr., *U.S. Nuclear Regulatory Commission* B. Q. Partain, *Los Alamos National Laboratory*
T. L. Bauer, *University of Texas, Austin* J. Razvi, *General Atomics*
M. L. Gildner, *Oak Ridge National Laboratory* W. G. Vernetson, *University of Florida*

The membership of Subcommittee ANS-15, Operations of Research Reactors, at the time of its approval of the standard was:

W. J. Richards, Chairman, *U.S. Department of Defense*
A. Adams, Jr., *U.S. Nuclear Regulatory Commission*
T. L. Bauer, *University of Texas*
S. K. Bhatnagar, *U.S. Department of Energy*
L. M. Bobek, *Worcester Polytechnic Institute*
W. J. Brynda, *Brookhaven National Laboratory*
A. F. DiMeglio, *Individual*
P. C. Ernst, *Individual*
J. P. Farrar, *University of Virginia*
D. E. Feltz, *Texas A&M University*
M. L. Gildner, *Oak Ridge National Laboratory*
D. Harris, *Rensselaer Polytechnic Institute*
E. Lee, *Oak Ridge National Laboratory*
R. E. Malenfant, *U.S. Department of Energy*
R. C. Nelson, *EG&G*
P. B. Perez, *North Carolina State University*
T. M. Raby, *National Institute of Standards and Technology*
J. Razvi, *General Atomics*
T. R. Schmidt, *Sandia National Laboratory*
M. H. Voth, *Pennsylvania State University*
R. R. Walston, *U.S. Department of Energy*

Consensus Committee N17, Research Reactors, Reactor Physics, Radiation Shielding, and Computational Methods, had the following membership at the time it reviewed and approved this standard:

T. M. Raby, Chairman
A. Weitzberg, Vice Chairman

A. D. Callihan Individual
R. E. Carter Individual
D. Cokinos Brookhaven National Laboratory
A. De La Paz Vista Technology
D. Duffey American Institute of Chemical Engineers
H. Goldstein American Physical Society
P. B. Hemmig U.S. Department of Energy
 J. W. Lewellen (Alt.)
W. A. Holt American Public Health Association
W. C. Hopkins Bechtel Power Corporation
J. E. Hyder Health Physics Society
 A. G. Johnson (Alt.)
L. I. Kopp Individual
J. Miller Institute of Electrical and Electronics Engineers, Inc.
J. E. Olhoft Individual
T. M. Raby American Nuclear Society
W. J. Richards U.S. Department of Defense
A. O. Smetana Westinghouse Savannah River Company
M. M. Ter Pogossian American College of Radiology
J. F. Torrence National Institute of Standards and Technology
D. K. Trubey Individual
S. H. Weiss U.S. Nuclear Regulatory Commission
 A. Adams, Jr. (Alt.)
A. Weitzberg Halliburton NUS Corporation
W. L. Whittemore GA Technologies, Inc.

Contents	Section	Page
1.	Introduction	1
1.1	Scope	1
1.2	Application	1
1.3	Definitions	1
2.	Design, Construction, and Modifications	2
2.1	Organization	2
2.2	Quality Assurance Program	2
2.3	Design Control	2
2.3.1	Design Requirements	3
2.3.2	Design Process	3
2.3.3	Design Verification	3
2.3.4	Design Documents and Records	3
2.3.5	Commercial Grade Items	3
2.3.6	Change Control	3
2.4	Procurement Document Control	3
2.5	Procedures, Instructions, and Drawings	4
2.6	Document Control	4
2.7	Control of Purchased Items and Services	4
2.7.1	Supplier Selection	4
2.7.2	Work Control	4
2.7.3	Verification Activities	4
2.7.4	Item or Service Acceptance	4
2.8	Identification and Control of Items	4
2.9	Control of Special Processes	5
2.10	Inspections	5
2.11	Test Control	5
2.12	Control of Measuring and Test Equipment	5
2.13	Handling, Storage, and Shipping	5
2.14	Inspection, Test, and Operating Status	5
2.15	Control of Nonconforming Items and Services	6
2.16	Corrective Actions	6
2.17	Quality Records	6
2.18	Assessments	6
2.19	Experimental Equipment	7
3.	Facility Operations	7
3.1	Organization	7
3.2	Quality Assurance Program	7
3.3	Performance Monitoring	7
3.4	Operator Experience	7
3.5	Operating Conditions	7
3.6	Operational Authority	7
3.7	Control Area	7
3.8	Ancillary Duties	7
3.9	Emergency Communications	8
3.10	Configuration Control	8
3.11	Lockouts and Tagouts	8
3.12	Test and Inspection	8
3.13	Operating Procedures	8
3.14	Operator Aid Postings	8
3.15	Equipment Labeling	8

Section	Page
4. Applicability to Existing Facilities	8
5. Decommissioning	8
6. References	9

Quality Assurance Program Requirements for Research Reactors

1. Introduction

1.1 Scope. This standard provides criteria for quality assurance in the design, construction, operation, and decommissioning of research reactors.

1.2 Application. The quality assurance program applied by the owner or operator to research reactor activities is to be consistent with the importance of these activities to safety and reliability. Activities included in the quality assurance program shall be, as a minimum, those related to the reactor safety and protection system, engineered safety features, and the applicable radiation monitoring systems as identified in the Limiting Conditions for Operations section in the Technical Specifications for a given reactor. The program applies in a graded manner to those items and activities which could affect the quality of structures, systems, and components of research reactor facilities. Activities affecting quality include siting, designing, purchasing, fabrication, handling, shipping, receiving, storing, cleaning, erecting, installing, repairing, maintaining, modifying, inspecting, testing, and operating. The program shall consider the tangible and intangible attributes of replacement costs, schedule delays, and facility availability.

The development and implementation of a research reactor facility quality assurance program begins during the design and construction phase of the facility. It focuses on the development of appropriate controls that ensure the facility is properly designed and fabricated to meet owner/operator requirements. The majority of these controls provide documentation attesting to the facility quality to support the application for an operating license or permit. These design and construction program requirements are defined in Section 2 of this standard. Following facility construction and commissioning, the focus of the quality program shifts to establishing those controls that ensure proper and reliable facility operation. All of the program provisions established during the design and construction phase remain in place, but will change in level of implementation appropriate to support facility opera-

tions. Each portion of Section 2 would be implemented only as necessary. The operating phase license or permit imposes additional requirements related to the conduct of operations. These additional program requirements are defined in Section 3 of this standard.

1.3 Definitions

The following definitions are listed to provide uniform interpretation of terms and phrases used in this and associated standards.

certified operator. An individual authorized by the chartering or licensing organization to carry out the duties and responsibilities associated with the position requiring the certification.

commissioning. The process during which constructed reactor structures, components, and systems are made operational and verified to meet design requirements.

corrective action. Measures taken to rectify conditions adverse to quality and, where necessary, to prevent repetition.

document. Any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, or results.

experiment. Any operation, hardware, or target (excluding devices such as detectors, foils, etc.), that is designed to investigate non-routine reactor characteristics or that is intended for irradiation within the pool, on or in a beamport or irradiation facility, and that is not rigidly secured to a core or shield structure so as to be a part of their design.

licensed operator. See certified operator.

maintenance. Those activities necessary to maintain operability or restore systems to within specified design limits. Maintenance consists of repair, rework, replacement, adjustment, cleaning, or other actions necessary to maintain an item in or restore an item to acceptable condition.