



**CSA  
Group**

**N286-12**

# Management system requirements for nuclear facilities

Currently in preview, click buy full version

# Legal Notice for Standards

Canadian Standards Association (operating as “CSA Group”) develops standards through a consensus standards development process approved by the Standards Council of Canada. This process brings together volunteers representing varied viewpoints and interests to achieve consensus and develop a standard. Although CSA Group administers the process and establishes rules to promote fairness in achieving consensus, it does not independently test, evaluate, or verify the content of standards.

## Disclaimer and exclusion of liability

This document is provided without any representations, warranties, or conditions of any kind, express or implied, including, without limitation, implied warranties or conditions concerning this document’s fitness for a particular purpose or use, its merchantability, or its non-infringement of any third party’s intellectual property rights. CSA Group does not warrant the accuracy, completeness, or currency of any of the information published in this document. CSA Group makes no representations or warranties regarding this document’s compliance with any applicable statute, rule, or regulation.

IN NO EVENT SHALL CSA GROUP, ITS VOLUNTEERS, MEMBERS, SUBSIDIARIES, OR AFFILIATED COMPANIES, OR THEIR EMPLOYEES, DIRECTORS, OR OFFICERS, BE LIABLE FOR ANY DIRECT, INDIRECT, OR INCIDENTAL DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES, HOWSOEVER CAUSED, INCLUDING BUT NOT LIMITED TO SPECIAL OR CONSEQUENTIAL DAMAGES, LOST REVENUE, BUSINESS INTERRUPTION, LOST OR DAMAGED DATA, OR ANY OTHER COMMERCIAL OR ECONOMIC LOSS, WHETHER BASED IN CONTRACT, TORT (INCLUDING NEGLIGENCE), OR ANY OTHER THEORY OF LIABILITY, ARISING OUT OF OR RESULTING FROM ACCESS TO OR POSSESSION OR USE OF THIS DOCUMENT, EVEN IF CSA GROUP HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES.

In publishing and making this document available, CSA Group is not undertaking to render professional or other services for or on behalf of any person or entity or to perform any duty owed by any person or entity to another person or entity. The information in this document is directed to those who have the appropriate degree of experience to use and apply its content, and CSA Group accepts no responsibility whatsoever arising in any way from any and all use of or reliance on the information contained in this document.

CSA Group is a private not-for-profit company that publishes voluntary standards and related documents. CSA Group has no power, nor does it undertake, to enforce compliance with the contents of the standards or other documents it publishes.

## Intellectual property rights and ownership

As between CSA Group and the users of this document (whether it be in printed or electronic form), CSA Group is the owner, or the authorized licensee, of all works contained herein that are protected by copyright, all trade-marks (except as otherwise noted to the contrary), and all inventions and trade secrets that may be contained in this document, whether or not such inventions and trade secrets are protected by patents and applications for patents. Without limitation, unauthorized use, modification, copying, or disclosure of this document may violate laws that protect CSA Group’s and/or others’ intellectual property and may give rise to a right in CSA Group and/or others to seek legal redress for such use, modification, copying, or disclosure. To the extent permitted by licence or by law, CSA Group reserves all intellectual property rights in this document.

## Patent rights

Attention is drawn to the possibility that some of the elements of this standard may be the subject of patent rights. CSA Group shall not be held responsible for identifying any or all such patent rights. Users of this standard are expressly advised that determination of the validity of any such patent rights is entirely their own responsibility.

## Authorized use of this document

This document is being provided by CSA Group for informational and non-commercial use only. The user of this document is authorized to do only the following:

If this document is in electronic form:

- load this document onto a computer for the sole purpose of reviewing it;
- search and browse this document; and
- print this document if it is in PDF format.

Limited copies of this document in print or paper form may be distributed only to persons who are authorized by CSA Group to have such copies, and only if this Legal Notice appears on each such copy.

In addition, users may not and may not permit others to

- alter this document in any way or remove this Legal Notice from the attached standard;
- sell this document without authorization from CSA Group; or
- make an electronic copy of this document.

If you do not agree with any of the terms and conditions contained in this Legal Notice, you may not load or use this document or make any copies of the contents hereof, and if you do make such copies, you are required to destroy them immediately. Use of this document constitutes your acceptance of the terms and conditions of this Legal Notice.



# ***Standards Update Service***

*N286-12*

*June 2012*

**Title:** *Management system requirements for nuclear facilities*

**Pagination:** **47 pages** (xii preliminary and 35 text), each dated **June 2012**

To register for e-mail notification about any updates to this publication

- go to **shop.csa.ca**
- click on **CSA Update Service**

The **List ID** that you will need to register for updates to this publication is **2421924**.

If you require assistance, please e-mail [techsupport@csagroup.org](mailto:techsupport@csagroup.org) or call 416-747-2233.

Visit CSA Group's policy on privacy at [csagroup.org/legal](http://csagroup.org/legal) to find out how we protect your personal information.

Currently in preview, click buy full version

N286-12  
***Management system requirements  
for nuclear facilities***



**CSA  
Group**

™A trademark of the Canadian Standards Association, operating as "CSA Group"

*Published in June 2012 by CSA Group  
A not-for-profit private sector organization  
5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6  
1-800-463-6727 • 416-747-4044*

***Visit our Online Store at [shop.csa.ca](http://shop.csa.ca)***



CSA Group prints its publications on Rolland Enviro100, which contains 100% recycled post-consumer fibre, is EcoLogo and Processed Chlorine Free certified, and was manufactured using biogas energy.

To purchase standards and related publications, visit our Online Store at [shop.csa.ca](http://shop.csa.ca) or call toll-free 1-800-461-6727 or 416-747-4044.

ISSN 1978-1-55491-966-6

© 2012 CSA Group

All rights reserved. No part of this publication may be reproduced in any form whatsoever without the prior permission of the publisher.

# Contents

Technical Committee on Management Systems *viii*

Subcommittee on Management System Requirements for Nuclear Facilities *x*

Drafting Task Force on Management System Requirements for Nuclear Facilities *xi*

Preface *xii*

## **0 Introduction** 1

0.1 Background 1

0.2 The management system 2

## **1 Scope** 2

## **2 Reference publications** 3

## **3 Definitions** 3

## **4 Generic requirements for the management system** 5

4.1 Application 5

4.1.1 General 5

4.1.2 Management system principles 5

4.1.3 Graded approach 5

4.2 Safety culture 5

4.3 Business planning 6

4.4 Organization 6

4.5 Resources 6

4.5.1 General 6

4.5.2 Human resources 6

4.5.3 Financial resources 6

4.6 Communication 6

4.7 Information management 6

4.7.1 Documentation of the management system 6

4.7.2 Information 7

4.7.3 Documents 7

4.7.4 Records 7

4.8 Work management 7

4.8.1 Work planning 7

4.8.2 Work control 7

4.8.3 Independent verification of work 8

4.9 Problem identification and resolution 8

4.10 Change 8

4.11 Assessment 8

4.11.1 Self-assessment 8

4.11.2 Independent assessment 8

4.12 Use of experience 8

4.13 Continual improvement 8

## **5 Specific requirements for uranium mines and mills** 9

5.1 Application 9

5.2 Site selection 9

5.3	Design	9
5.3.1	General	9
5.3.2	Inputs	9
5.3.3	Requirements	10
5.3.4	Design	10
5.3.5	Documents	10
5.4	Supply chain	10
5.4.1	General	10
5.4.2	Purchasing requirements	10
5.4.3	Supplier acceptability	10
5.4.4	Provision of the purchasing requirements to suppliers	11
5.4.5	Supplier selection and award	11
5.4.6	Supplier-customer relationship	11
5.4.7	Verification of services	11
5.4.8	Receipt and inspection of items	11
5.4.9	Segregation and disposition of problem items	11
5.4.10	Storage and handling	11
5.5	Construction	12
5.6	Commissioning	12
5.6.1	General	12
5.6.2	Commissioning activities	12
5.6.3	Commissioning results	12
5.7	Turnover	12
5.8	Operations	12
5.8.1	General	12
5.8.2	Operational control	12
5.8.3	Maintenance	12
5.9	Decommissioning	13
<b>6</b>	<b>Specific requirements for uranium processing and fuel manufacturing facilities</b>	<b>13</b>
6.1	Application	13
6.2	Site selection	13
6.3	Design	13
6.3.1	General	13
6.3.2	Inputs	13
6.3.3	Requirements	14
6.3.4	Design	14
6.3.5	Documents	14
6.4	Safety analysis	14
6.5	Supply chain	14
6.5.1	General	14
6.5.2	Purchasing requirements	14
6.5.3	Supplier acceptability	15
6.5.4	Provision of the purchasing requirements to suppliers	15
6.5.5	Supplier selection and award	15
6.5.6	Supplier-customer relationship	15
6.5.7	Verification of services	15
6.5.8	Receipt and inspection of items	15
6.5.9	Segregation and disposition of problem items	15
6.5.10	Storage and handling	16
6.6	Construction	16
6.7	Commissioning	16
6.7.1	General	16
6.7.2	Commissioning activities	16

6.7.3	Commissioning results	16
6.8	Turnover	16
6.9	Operations	16
6.9.1	General	16
6.9.2	Operational control	16
6.9.3	Monitoring	17
6.9.4	Maintenance	17
6.10	Decommissioning	17
6.11	Research and development	17

## **7 Specific requirements for high energy reactor facilities** 17

7.1	Application	17
7.2	Site selection	17
7.3	Design	17
7.3.1	General	17
7.3.2	Inputs	18
7.3.3	Requirements	18
7.3.4	Tools	18
7.3.5	Design	18
7.3.6	Documents	18
7.4	Safety analysis	18
7.4.1	General	18
7.4.2	Control	19
7.4.3	Safety analysis tools	19
7.5	Configuration management	19
7.6	Supply chain	19
7.6.1	General	19
7.6.2	Purchasing requirements	19
7.6.3	Supplier acceptability	20
7.6.4	Provision of the purchasing requirements to suppliers	20
7.6.5	Supplier selection and award	20
7.6.6	Supplier-customer relationship	20
7.6.7	Verification of services	20
7.6.8	Receipt and inspection of items	21
7.6.9	Segregation and disposition of problem items	21
7.6.10	Storage and handling	21
7.6.11	Planning for replacement parts	21
7.7	Construction	21
7.7.1	General	21
7.7.2	Prerequisite	22
7.7.3	Activities	22
7.7.4	Documents	22
7.8	Commissioning	22
7.8.1	General	22
7.8.2	Prerequisites	22
7.8.3	Control of commissioning activities	22
7.8.4	Documents	23
7.8.5	Commissioning results	23
7.9	Operating	23
7.9.1	General	23
7.9.2	Oral communication	23
7.9.3	Plant status control	23
7.9.4	Surveillance	24
7.9.5	Surveillance testing	24

- 7.9.6 Procedure use and adherence 24
- 7.9.7 Emergency procedures 24
- 7.9.8 Infrequently performed operations 24
- 7.9.9 Maintenance 25
- 7.9.10 Systems health monitoring 25
- 7.9.11 Chemistry control 25
- 7.10 Decommissioning 25
- 7.11 Common requirements 25
- 7.11.1 Completion assurance 25
- 7.11.2 Turnover 26
- 7.11.3 Research and development 26

## **8 Specific requirements for research and isotope processing facilities 26**

- 8.1 Application 26
- 8.2 Site selection 26
- 8.3 Design 26
- 8.3.1 General 26
- 8.3.2 Inputs 26
- 8.3.3 Requirements 27
- 8.3.4 Design 27
- 8.3.5 Documents 27
- 8.4 Safety analysis 27
- 8.5 Supply chain 27
- 8.5.1 General 27
- 8.5.2 Purchasing requirements 27
- 8.5.3 Supplier acceptability 28
- 8.5.4 Provision of the purchasing requirements to suppliers 28
- 8.5.5 Supplier selection and award 28
- 8.5.6 Supplier-customer relationship 28
- 8.5.7 Verification of services 28
- 8.5.8 Receipt and inspection of items 29
- 8.5.9 Segregation and disposition of problem items 29
- 8.5.10 Storage and handling 29
- 8.6 Construction 29
- 8.7 Commissioning 29
- 8.7.1 General 29
- 8.7.2 Commissioning activities 29
- 8.7.3 Commissioning results 29
- 8.8 Turnover 29
- 8.9 Operations 30
- 8.9.1 General 30
- 8.9.2 Operational control 30
- 8.9.3 Monitoring 30
- 8.9.4 Maintenance 30
- 8.10 Decommissioning 30
- 8.11 Research and development 30

## **9 Specific requirements for radioactive waste management facilities 30**

- 9.1 Application 30
- 9.2 Site selection 31
- 9.3 Design 31
- 9.3.1 General 31
- 9.3.2 Inputs 31
- 9.3.3 Requirements 31

---

9.3.4	Design	31
9.3.5	Documents	31
9.4	Safety analysis	32
9.5	Supply chain	32
9.5.1	General	32
9.5.2	Purchasing requirements	32
9.5.3	Supplier acceptability	32
9.5.4	Provision of the purchasing requirements to suppliers	33
9.5.5	Supplier selection and award	33
9.5.6	Supplier-customer relationship	33
9.5.7	Verification of services	33
9.5.8	Receipt and inspection of items	33
9.5.9	Segregation and disposition of problem items	33
9.5.10	Storage and handling	33
9.6	Construction	33
9.7	Commissioning	33
9.7.1	General	33
9.7.2	Commissioning activities	34
9.7.3	Commissioning results	34
9.8	Turnover	34
9.9	Operations	34
9.9.1	General	34
9.9.2	Operational control	34
9.9.3	Monitoring	34
9.9.4	Maintenance	34
9.10	Decommissioning	35
9.11	Research and development	35

---

**Figures**

<b>1</b>	— Simplified model of a management system	2
----------	---	---

# ***Technical Committee on Management Systems***

<b>P. Young</b>	Scarborough, Ontario	<i>Chair</i>
<b>R. Schewaga</b>	AREVA Resources Canada Inc., Saskatoon, Saskatchewan	<i>Vice-Chair</i>
<b>A. Ashton</b>	Bruce Power, Tiverton, Ontario	<i>Associate</i>
<b>R. Barnes</b>	ANRIC Enterprises Inc., Toronto, Ontario	
<b>J. Brown</b>	GE-Hitachi Nuclear Energy Canada Inc., Peterborough, Ontario	
<b>K. Cassells</b>	SNC Lavalin Nuclear Inc., Oakville, Ontario	
<b>E. Clavel</b>	Candu Energy Inc., Mississauga, Ontario	
<b>E. Creaser</b>	Province of New Brunswick, Department of Public Safety, Fredericton, New Brunswick	
<b>T. Davies</b>	NB Power Corporation, Lepreau, New Brunswick	<i>Associate</i>
<b>F. Dobri</b>	Cameco Corporation, Port Hope, Ontario	
<b>W. Gowans</b>	Toronto, Ontario	
<b>M. Kotb</b>	Régie du bâtiment du Québec, Montréal, Québec	
<b>J. Krane</b>	Bruce Power, Tiverton, Ontario	
<b>P. Lahaie</b>	Canadian Nuclear Safety Commission, Ottawa, Ontario	
<b>J. Lotoski</b>	Ontario Power Generation Inc., Toronto, Ontario	
<b>L. O'Connor</b>	Courtice, Ontario	
<b>K. MacGibbon</b>	NB Power Corporation, Lepreau, New Brunswick	

<b>J. Walker</b>	Atomic Energy of Canada Limited, Chalk River, Ontario	
<b>M. Phipps</b>	Strategic Inc., Oakville, Ontario	<i>Associate</i>
<b>S. Geddes</b>	CSA Group, Mississauga, Ontario	<i>Project Manager</i>
<b>A. Kwong</b>	CSA Group, Mississauga, Ontario	<i>Project Manager</i>

In addition to the members of the Technical Committee, the following individuals made valuable contributions to the development of the standard:

**E. Desgagné**

**J. Doucette**

**V Grant**

**H Liot**

**S. Dua**

**T. Shin**

**B. Sandhu**

# ***Subcommittee on Management System Requirements for Nuclear Facilities***

<b>R. Barnes</b>	ANRIC Enterprises Inc., Toronto, Ontario	
<b>E. Clavel</b>	Candu Energy Inc., Mississauga, Ontario	
<b>F. Dobri</b>	Cameco Corporation, Port Hope, Ontario	
<b>W. Gowans</b>	Toronto, Ontario	
<b>J. Krane</b>	Bruce Power, Tiverton, Ontario	
<b>P. Lahaie</b>	Canadian Nuclear Safety Commission, Ottawa, Ontario	
<b>J. Lotoski</b>	Ontario Power Generation Inc., Toronto, Ontario	
<b>K. MacGibbon</b>	NB Power Corporation, Lepreau, New Brunswick	
<b>R. Schewaga</b>	AREVA Resources Canada Inc., Saskatoon, Saskatchewan	
<b>P. Young</b>	Scarborough, Ontario	
<b>S. Geddes</b>	CSA Group, Mississauga, Ontario	<i>Project Manager</i>
<b>A. Kwong</b>	CSA Group, Mississauga, Ontario	<i>Project Manager</i>

# ***Drafting Task Force on Management System Requirements for Nuclear Facilities***

<b>J-R. Dufour</b>	Bécancour, Québec	
<b>W. Gowans</b>	Toronto, Ontario	
<b>P. Lahaie</b>	Canadian Nuclear Safety Commission, Ottawa, Ontario	
<b>R. Schewaga</b>	AREVA Resources Canada Inc., Saskatoon, Saskatchewan	
<b>P. Schultz</b>	Canadian Nuclear Safety Commission, Ottawa, Ontario	
<b>P. Young</b>	Scarborough, Ontario	
<b>S. Geddes</b>	CSA Group, Mississauga, Ontario	<i>Project Manager</i>
<b>A. Kwong</b>	CSA Group, Mississauga, Ontario	<i>Project Manager</i>

# Preface

This is the second edition of CSA N286, *Management system requirements for nuclear facilities*. It supersedes the previous edition, published in 2005 under the title *Management system requirements for nuclear power plants*. The scope of this edition expands beyond nuclear power plants to include nuclear facilities as defined by this Standard.

Users of this Standard are reminded that civilian nuclear facilities in Canada are subject to the provisions of the Canadian Nuclear Safety and Control Act and Regulations. The Canadian Nuclear Safety Commission (CNSC) can therefore impose requirements additional to those specified in this Standard.

In addition, other national or international standards or guides may be used, where applicable, within this management system.

This Standard was prepared by the Drafting Task Force on Management System Requirements for Nuclear Facilities and was overseen by the Subcommittee on Management System Requirements for Nuclear Facilities, under the jurisdiction of the Technical Committee on Management Systems and the Strategic Steering Committee on Nuclear Standards, and has been formally approved by the Technical Committee.

## Notes:

- (1) Use of the singular does not exclude the plural (and vice versa) when the sense allows.
- (2) Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.
- (3) This Standard was developed by consensus, which is defined by CSA Policy governing standardization — Code of good practice for standardization as “substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity”. It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.
- (4) To submit a request for interpretation of this Standard, please send the following information to [inquiries@csagroup.org](mailto:inquiries@csagroup.org) and include “Request for interpretation” in the subject line:
  - (a) define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;
  - (b) provide an explanation of circumstances surrounding the actual field condition; and
  - (c) where possible, phrase the request in such a way that a specific “yes” or “no” answer will address the issue.Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization and are available on the Current Standards Activities page at [standardsactivities.csa.ca](http://standardsactivities.csa.ca).
- (5) This Standard is subject to periodic review, and suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to [inquiries@csagroup.org](mailto:inquiries@csagroup.org) and include “Proposal for change” in the subject line:
  - (a) Standard designation (number);
  - (b) relevant clause, table, and/or figure number;
  - (c) wording of the proposed change; and
  - (d) rationale for the change.

# N286-12

## ***Management system requirements for nuclear facilities***

### **0 Introduction**

**Note:** The information in [Clause 0](#) is informative.

#### **0.1 Background**

This Standard identifies management system requirements for nuclear facilities. It integrates the requirements from management system standards for health, safety, environment, security, economics, and quality.

The CSA N-Series of Standards provides an interlinked set of requirements for the management of nuclear facilities. CSA N286 provides overall direction to management to develop and implement sound management practices and controls, while the other CSA nuclear Standards provide technical requirements and guidance that support the management system.

CSA N286 is based on a set of 12 principles. The principles are supported by generic requirements ([Clause 4](#)). The Standard then presents the specific requirements ([Clauses 5 to 9](#)) that are applicable to the life cycle of nuclear facilities.

While this edition of CSA N286 was being planned, it was recognized that many of the same management system requirements apply not only to each life-cycle phase of a nuclear facility but also to all aspects of the management of the facility, including health, safety, environment, security, economics, and quality. It was also recognized that life-cycle phase activities may be delegated to suppliers and, therefore, the requirements of this Standard apply to these suppliers. In addition, a graded approach, commensurate with risk, may be defined and used when applying the requirements of this Standard.

Before this Standard was drafted, two preparatory activities were undertaken that included an industry scan of applicable reference documents and a condition assessment to determine the impact and value of a management system that integrates the requirements from management system standards for health, safety, environment, security, economics, and quality. The conclusion of the industry scan was the trend in standards to move towards a more holistic approach of management, with the focus on providing direction to top management for creating purpose and commitment, capability, process definition and control, performance monitoring, and continual improvement. The conclusion of the condition assessment was that most nuclear facilities were being required to carry programs to comply with as many as ten different management, management system, or quality assurance standards. Most of these standards were directed at the same purpose, but requirements were not harmonized. This led to the conclusion that a single standard would be more effective with the purpose of establishing a management system standard that integrates the requirements from management system standards for health, safety, environment, security, economics, and quality. This edition both permits and recommends that organizations develop a single management system that integrates all management system requirements for health, safety, environment, security, economics, and quality (including quality assurance).

During the preparation of this Standard, stakeholders indicated that safety needs to be strongly emphasized. As a result, a new principle was established: "Safety is the paramount consideration, guiding decisions and actions; supported by requirements (see [Clause 4.2](#))."

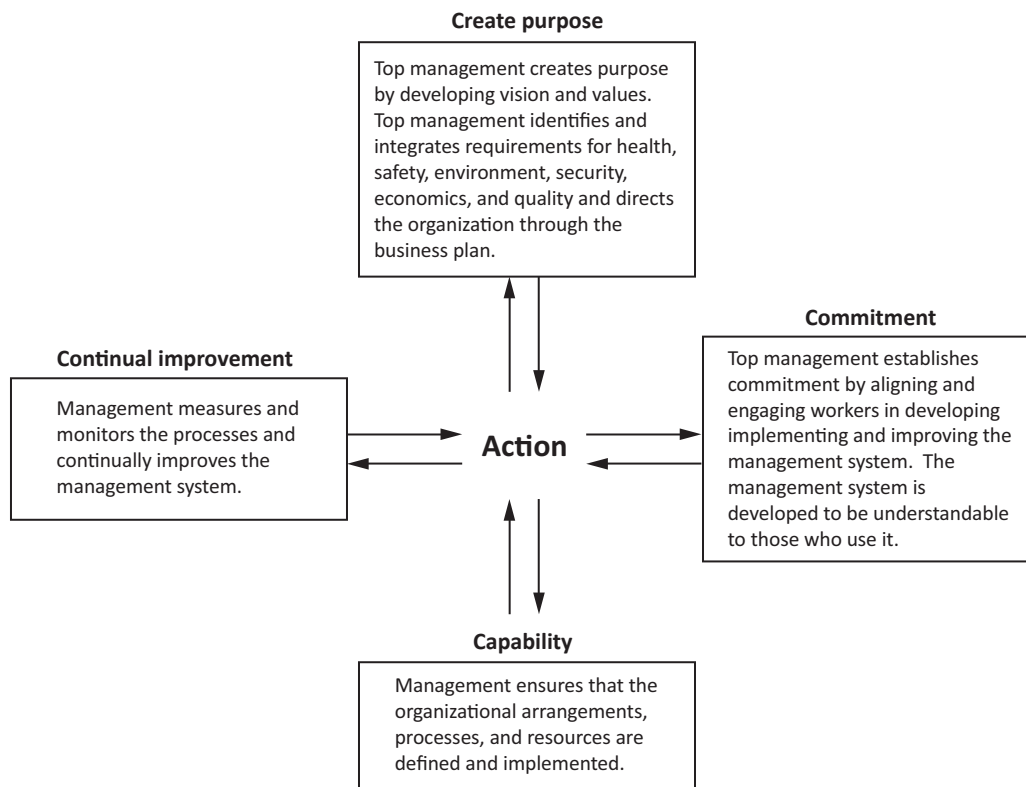
This edition continues the approach taken in CSA N286-05 to only state requirements a single time, recognizing that

- (a) there is a requirement to document and implement the management system;
- (b) work is accomplished through adherence to management system documents that detail requirements and acceptability of the work, and that there is objective evidence of successful completion;

- (c) the technical requirements of codes, standards, acts, regulations, licenses etc. are addressed in the management system and are not replicated in this Standard; and
- (d) competency is a common industry term that requires a worker to be both qualified and capable to perform the work.

## 0.2 The management system

The management system brings together in a planned and integrated manner the processes necessary to satisfy the requirements that must be met to achieve business success and sustainability. [Figure 1](#) shows a simplified model of a management system.



**Figure 1**  
**Simplified model of a management system**  
 (See [Clause 0.2.](#))

## 1 Scope

### 1.1

This Standard applies to the top management with overall accountability for the nuclear facility.

### 1.2

This Standard integrates the management system requirements for health, safety, environment, security, economics, and quality.