Chapter 8. Knowledge & Information Management

Governance	Assurance	Improvement
•2.1 Management system design •2.2 Management system document •2.3 Document control •2.4 Records management •2.6 Customer facing quality documents •2.9 Complies with a quality process	•3.1 Internal audit •3.2 External audit •3.9 Project Quality	•4.1 Quality Improvement

Contents

8.1 Knowledge Management

All nuclear operators have obligations under their site licence to maintain safe operation of their plant and facilities. Safe, reliable and predictable operations rely on access to, and the maintenance of, a body of specialist nuclear knowledge. This knowledge is held not only in documented information systems; it is also built into the design of plants and processes and embodied in the experienced and qualified people who are responsible for their operation.

An integrated and systematic approach needs to be applied to all stages of the knowledge cycle, including its identification, sharing, protection, dissemination, preservation and transfer. A number of features are necessary to ensure the effective management of knowledge, in particular:

- A strategic approach;
- Due attention to people and people interactions;
- Suitable processes and technology;
- The commitment of senior management.

All the departments involved need to work together and understand how all areas fit together, including human resource management, information and communication technology, document management systems, and corporate and national strategies.

There is a growing awareness among Quality professionals of the importance of managing knowledge as an asset and relevant knowledge management (KM) issues and practices. KM is a broad topic area and is addressed in a number of ways in management systems. Knowledge requirements are particularly important in relation to strategic workforce planning, competency management, process management, error prevention, learning and continuous improvement.

8.1.1 Knowledge Types

There is generally a clear distinction between data and information. However, the difference between information and knowledge is less well articulated or understood.

In normal conversation we use the word “knowledge” to describe “knowing facts” and also to describe “knowing how” to do something. In the nuclear industry, we need to “know why” things happen so that we can design and engineer safe systems, identify risks and prevent unwanted events. It is also often useful to “know who” we should go to seek expert advice and share learning.
Our knowledge is held in our minds from things we have learned over a lifetime. It comes from experience in the workplace, what we remember from our childhood and what we picked up in formal education and training. Knowledge enables us to make better decisions to create new, useful information and take action.

It is useful to identify three types of knowledge, each requires different approaches to its management (see Figure 1).

Explicit knowledge is knowledge that has been articulated or codified. In other words, it can be documented in useful forms such as operating manuals, files, reports, drawings, etc.

Implicit knowledge is the practical application of explicit knowledge, but is not yet documented, e.g. how a task is performed.

Tacit knowledge, in contrast, is held in the mind of individuals and is often unspoken and difficult to articulate and share. It includes skills, insight, intuition and judgement. The consensus amongst knowledge management professionals is that most of the knowledge in any organisations is tacit.

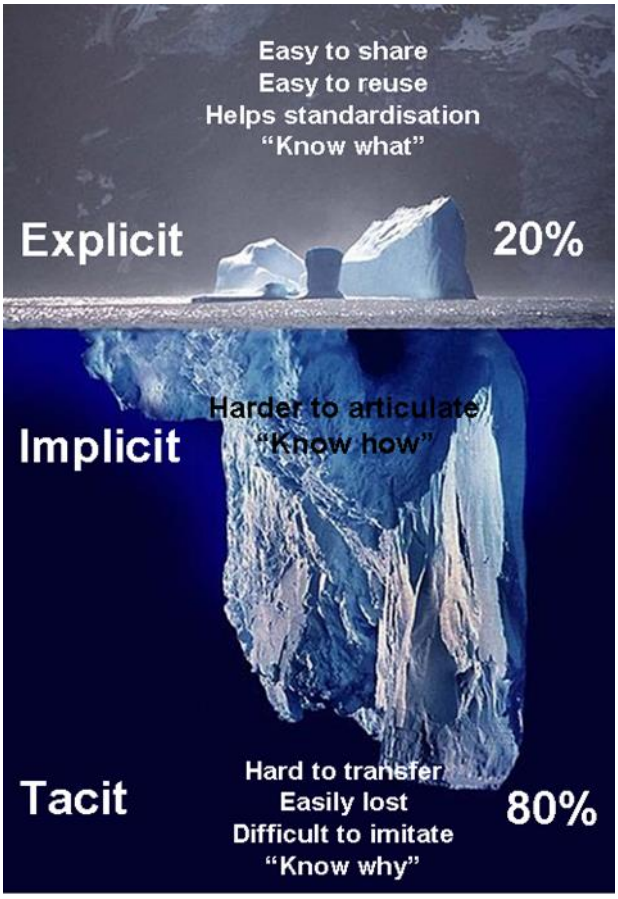

Figure 1. Explicit, implicit and tacit knowledge [background based on an original image by Uwe Kils reproduced under the Creative Commons Attribution – Share Alike 3.0 unsupported licence]

8.1.2 Knowledge and Nuclear Knowledge Management

Knowledge management (KM) is managing knowledge intelligently and systematically so that we might have the right knowledge in the right place at the right time and with the

right people. The IAEA's definition, of Knowledge Management, taken from IAEA-TECDOC-1510 [1], is:

> *"An integrated, systematic approach to identifying, acquiring, transforming, developing, disseminating, using, sharing, and preserving knowledge, relevant to achieving specified objectives."*
>
> (Source - INTERNATIONAL ATOMIC ENERGY AGENCY, Knowledge Management for Nuclear Industry Operating Organizations, IAEA-TECDOC-1510, © IAEA, Vienna (2006) page 2)

It can be inferred from the IAEA definition that developing new knowledge, learning from successes and failures, sharing knowledge with fellow employees, recording knowledge in a written and reusable form will result in improvement. However, for many reasons, these sharing and learning processes might not function automatically in organisations that do not recognise how or why knowledge should be transferred. Therefore, they have no systems or processes in place to ensure that knowledge is captured and shared. Challenges for effective and efficient knowledge management include competing instead of collaborating, divisions or 'silo-working', differences in culture, pressure of the daily challenges, lack of communication tools and places to meet, poor discipline and counter-productive incentives or objectives within the organisation. These issues result in a variety of undesirable consequences such as:

- Mistakes can be repeated because earlier ones were not recorded or analysed.
- Work is redone because people are not aware of past activities or their outcomes.
- Customer relationships are poor because knowledge is not available at the point of action.
- Costs are raised because good ideas and best practices are not shared.
- Critical knowledge is lost because one or two key employees move or leave.
- Opportunities are missed because the company learns too slowly.
- Employees are frustrated because knowledge and information is not available or difficult to find.

All these issues can be mitigated by managing the collective knowledge better. We all need to move towards a "learn before doing" methodology; this can be achieved by establishing appropriate knowledge management or learning plans for any task, project or build. Knowledge management plans can bring the following benefits:

- Identification of appropriate learning knowledge;
- Identification of actions to address shortfalls;
- Identification of actions owners responsible for establishing knowledge transfer;
- Ongoing monitoring of action progress.

Organisations should actively pursue collaboration with all suppliers in order to contribute to regular and ongoing learning. The outputs of the plans should be built into the front-end

documentation, schedules, and risk management arrangements. Knowledge management plans take the wider topic of knowledge and makes it specific and tailored to the task or project in hand.

There are more similarities than differences between the nuclear industry and other industries in the KM challenges and best practices they adopt. Knowledge will need to be transferred from generation to generation of nuclear operators and specialists. However, nuclear projects can take decades to design and build and the full lifecycle of a given facility usually exceeds any one individual's career.

The essential knowledge lies in many different organisations that need to work closely together and share what they know. A successful national programme requires the cooperation and collaboration of a large number of independent organisations through such mechanisms as supply chain alliances, R&D contracts with universities and the involvement of numerous other national agencies (see Chapter 6).

The time required for nuclear workers to meet the competence requirements (see Chapter 5) for a particular job or task is relatively long compared to other industries. Long periods of training, higher qualifications and continuous learning and development may be required. Nuclear expertise can take decades to develop, and the age profile of the workforce is relatively mature compared to other industries. There is, therefore, the need for a concerted effort to transfer specialist knowledge from one generation to the next. Graduate and apprentice schemes are allowing companies to "grow their own" and train their own people into nuclear specialists.

The CQI Nuclear Special Interest Group (NucSIG) has put in place the Nuclear Next Generation (NNG) [2] to help support, develop and grow the next generation of nuclear Quality professionals.

8.1.3 Consequences for the Different Types of Knowledge

All of the above confirm the need for nuclear organisations to adopt a robust, collaborative approach to the challenges of maintaining knowledge and developing new knowledge. With reference to Figure 1 above:

- Explicit knowledge in any given domain of knowledge, as manifested in documents, images, reports, drawings, etc., should be consolidated in one location, organised in structures recognisable and accessible by users and be easily retrievable to support its re-use.
- Implicit knowledge can also, with sufficient effort, be captured in artefacts such as files, personal network maps, concept maps, etc. These can be added to the library of explicit knowledge and also stored and found via 'expert pages' centred on individuals.
- Tacit knowledge requires a focus on peer-to-peer approaches, ensuring that the donor transfers his or her knowledge to colleagues; this is most frequently

undertaken via mentoring or 'communities of practice'. The latter are sometimes organic, emerging through a shared interest in a topic, but also sponsored by the organisation. These communities enable members to collaborate and share and validate best practices, to learn together and join forces to develop new knowledge. They help to facilitate new ideas and the sharing of experiences across organisations.

In caring for their intellectual assets, organisations need to include and balance three main approaches:

- Raise talent by developing organisational and individual skills through training, recruitment, partnerships, research and development. These activities strongly relate to the Human Resources (HR) function in the company and should ensure that the workforce holds the right competencies to meet its strategic objectives.
- Codify personal experiences and skills into information that is accessible and reusable for all employees that need to know or need to have access. This codified body of knowledge ensures continuity and consistency in operations and provides the foundation for improving business excellence.
- Diffuse knowledge through the creation of networks across organisational boundaries and beyond, to partners outside the organisation.

Therefore, through talent enhancement, codification and diffusion, tacit knowledge can be developed and shared, implicit knowledge can be codified, and explicit knowledge consolidated. Each of these approaches is more powerful when combined into a coordinated approach to managing knowledge.

8.1.4 Knowledge Management Programmes

Managing the organisation's intellectual assets in the context of maintaining a national capability requires a comprehensive and integrated KM programme consisting of the following components:

- **Knowledge Management strategy**. Sets out the business case, the value proposition and a high-level plan for direction.
- **Knowledge mapping**. The identification of the knowledge, the characterisation of its nature and when it is needed to deliver the organisation's mission
- **Knowledge risk assessment**. The introduction of both a collective risk approach that focuses on knowledge at risk in departments, teams, projects, etc. and an individual risk approach that identifies individuals who hold knowledge and the potential. vulnerability of the organisation to lost knowledge in the absence of that person
- **Knowledge sharing**. Support for communities of practice, peer-to-peer collaboration and the recognition that time taken to share knowledge and to learn from others is legitimate and beneficial.
- **Enablers**. Roles, skills and behaviours required to successfully deploy KM processes and tools.

- **IT**. Supportive information technology can enable KM to be more effective across all dimensions of knowledge.
- **Knowledge and learning culture**. Promoting a culture where knowledge is valued, treated as an asset, maintained and developed accordingly.

8.2 Records

Records form the fundamentals of both quality assurance and quality control, and form the evidence base that products and services meet their requirements. As such, records, their identification, specification, review, traceability, management, storage and retrieval is of vital importance to nuclear projects and is often underestimated or overlooked.

The nuclear industry has a number of generic obligations relating to records that it shares with other high-risk industries. There are also a number of specific issues that make records management particularly important in the nuclear industry.

- Nuclear site licensees are typically required to maintain records to demonstrate compliance with the conditions of their nuclear site licences. This requirement is reflected in the records component of procurement specifications placed on key suppliers (see Chapter 6 – Supply Chain Management).
- Records form part of the mitigation of Counterfeit, Fraudulent and Suspect Items (CFSI) from entering the nuclear supply chain and being incorporated into nuclear facilities (see Chapter 7 – Product Quality).
- Atmospheric and liquid radioactive discharges and transfers of solid radioactive waste are often regulated under the environmental permitting regulations. Records need to be maintained to demonstrate compliance with permit conditions.
- Manufacturers of safety-related plant and equipment need to provide adequate records to demonstrate conformance to design requirements. These records can include material samples.
- Nuclear safety-related plant and equipment needs to undergo appropriate active and inactive commissioning. Suitable records of commissioning activities need to be generated to confirm that the design intent has been met.
- Accurate records of construction, plant configuration, as-build condition, contamination levels, operational history and accidents are very important in the planning of maintenance and decommissioning and land remediation.
- Records relating to radioactive wastes are very important in relation to on-site storage, transport and future disposal.
- Records are required to demonstrate that a suitable end state has been achieved to enable de-licensing of a site.

In summary, the nuclear industry faces the challenge of generating and maintaining extensive, accurate and authentic records for prolonged periods of time, often for the entire lifecycle of the facility including decommissioning. These records are often referred to as Lifetime Records (LTR) or Lifetime Quality Records (LTQR).

Nuclear industry organisations need to establish effective records management arrangements as an integral part of their Quality management systems. Such arrangements typically have the following key features:

- A strong commitment from senior management and staff at all levels to disciplined records management practices.
- A clear indication of records ownership with owners aware of their responsibilities.
- An adequate infrastructure and adequate resources including trained and competent staff. Infrastructure requirements include appropriate storage facilities and equipment.
- A clear definition of records keeping responsibilities and requirements. This is normally done through the production and implementation of one or more procedures.
- The clear specification of the records to be kept, their retention period and form. This is normally done through the production of a records retention schedule.
- Defined controls to ensure that the integrity and authenticity of records are maintained during organisational and technology changes. These controls are normally defined in procedures and project plans.
- Appropriate security arrangements to prevent inappropriate access and loss. This is particularly important in relation to sensitive nuclear information.

8.2.1 General Records Management

Records keeping is important at all stages of the lifecycle of a nuclear plant. There are also onerous records requirements associated with radioactive waste storage and disposal. Careful consideration needs to be given to records requirements when procuring important items and services, as most records will be generated by the supply chain. Records requirements should be clearly specified, and controls established to ensure a proper handover of records takes place. Responsibilities for maintenance of records may be assigned to specialist organisations such as a dosimetry service or archive.

It is important to manage the transition from one type of operation to another, e.g., when changing from construction to commissioning. It is often necessary to handover, review and consolidate records as part of the change. Nuclear facilities may undergo prolonged periods in care and maintenance before final decommissioning is carried out. In these situations, the records required to aid knowledge retention require careful consideration.

A well-designed records management system is essential for each organisation with records keeping responsibilities. The important components of a records management system are:

- A records management policy;
- An appropriate organisation and competent people;
- Records management procedure(s);
- Records retention schedule;

- Suitable storage facilities and equipment to retain and retrieve physical records;
- Suitable IT infrastructure for the management of electronic records.

The elements of effective records management are discussed in more detail below.
A records management policy is valuable as an expression of senior management commitment. The policy may be discrete or integrated into other policies. Typical policy content includes:

- A high-level commitment to the importance of records management;
- Records management objectives;
- Key responsibilities for records management;
- A summary of key obligations relating to records management and a commitment to comply with them;
- A statement of the standards to which the organisation subscribes, such as BS ISO 15489-1 [3];
- A summary of records management arrangements, including references to procedures and the records retention schedule.

Not all organisations need a discrete records management policy, but a policy is required if or ISO 15489-1 [3] or ISO 30301 [4] is adopted.

Responsibilities for records management need to be clearly defined and an appropriate organisation established. A sufficiently senior manager should have responsibility for ensuring that an effective records management system is established. It may be appropriate to combine responsibility for the records management system with a broader responsibility such as Quality, information or knowledge management. Consideration needs to be given to the provision of specialist advice and services where records management requirements are extensive. Most staff have some involvement in records management and so require training in relevant procedures.

The content of records procedures varies depending on organisational needs. Factors that need to be considered include organisational infrastructure, records keeping obligations, knowledge retention, and information security requirements. The procedures need to be comprehensive and cover the whole lifetime of records from generation to final disposition. The receipt control of records should ensure that the records are complete, legible and in a form suitable for storage. Procedures typically need to cover:

- Responsibilities for the identification and control of records;
- The generation, receipt, storage and retention of records;
- The filing system to be used;
- Levels of security to protect from corruption, unauthorised access, loss or damage
- The means of making corrections to records;
- Arrangements for the review, archiving and destruction of records;
- The periodic auditing of records and records management arrangements.

A Records Retention Schedule details the type of records to be kept and their retention and review periods. The development of a comprehensive retention schedule requires a detailed consideration of the following:

- Legal and other obligations;
- Customer requirements and expectations;
- The need to demonstrate compliance with the requirements of applicable codes;
- Specifications and standards;
- Specific Quality management requirements, such as quality plans and competency records;
- Specific business process requirements;
- Knowledge retention requirements, e.g., to enable future decommissioning.

Care needs to be taken to preserve all required information but also to avoid keeping unnecessary records. Schedules can take the form of simple tables but a database may be required if requirements are extensive. IAEA GS-G-3.1 [5] Annex III recommends using the following retention times:

- Greater than 30 years;
- 30 years;
- 5 years;
- 3 years.

IAEA 50-C/SG-Q Safety Guide Q3 Annex III [6] continues to provide useful guidance on retention times for particular types of record, even though this publication has been superseded by GS-G-3.1 [5].

8.2.2 Physical Records Management

Physical records can take a number of forms, common examples are hard-copy paper documents, microfilms, radiographs, photographs and material and fabrication/manufacturing samples. Appropriate storage facilities and systems need to be established that ensure that records are:

- Identified;
- Categorised according to the retention schedule;
- Registered upon receipt;
- Readily retrievable;
- Indexed and placed in designated locations appropriate to their use;
- Stored in a controlled and secure environment;
- Subject to periodic review;
- Transferred to a secure archive at the appropriate time if retention times are prolonged;

- Destroyed in a secure manner when no longer required.

Storage facilities for physical records should be maintained to prevent damage or degradation from causes such as fire, water, air, rodents, insects, environmental conditions, earthquakes and unauthorised access. Consideration should be given to appropriate contingency arrangements, including making copies of important records.
Physical records can normally be stored under conditions of ambient temperature and humidity for periods up to five years. Long retention times may require a special facility, such as an archive that meets the temperature and humidity conditions specified in BS 4971 [7].

8.2.3 Electronic Records Management

Records may exist in electronic format throughout their lifecycle or originate in physical form and be converted to electronic format. Electronic formats can offer some significant advantages, but there are also challenges in maintaining the security and integrity of records.

Electronic records need to be subject to carefully defined procedural controls. This can be facilitated by the use of electronic document management system (EDMS). IAEA GS-G-3.1 [5] Annex 1 provides guidance on the use of an EDMS. Information security risks need to be carefully considered, and this can be aided by use of the international standard BS EN ISO/IEC 27001 [8]. Particular care is needed to ensure that the hardware and software that is used does not become obsolete. Periodic technology reviews are therefore very important, particularly where records have retention times of 30 years or more. Risks can be minimised by selection of widely used software, file formats and hardware. Special care is needed when software or hardware is upgraded to ensure that records do not become corrupted or lost.

Nuclear Site Licensees need to take special care to ensure that the authenticity of records is maintained during times of change. Changes include the conversion of physical records to electronic format and technology upgrades. BS 10008-1 [9] defines the controls to be applied when scanning paper documents to help ensure that authenticity is preserved.

8.3 Standards and Guides

8.3.1 Knowledge Management

ISO 9001 [10] requires that organisations determine and provide the knowledge needed for both the operation of processes and the delivery of product and services.

IAEA GSR part 2 [11] requires knowledge and information to be managed as a resource. There is, therefore, an obligation on senior management to determine knowledge and information requirements and ensure that these needs are met.

There is a great deal of opinion and guidance available, including more than two dozen maturity models. The publications produced by the International Atomic Energy Agency (IAEA) are the primary source for guidance and good practice, in particular IAEA TECDOC 1510 [1]. There are other IAEA guides available that provide more detailed advice and case studies, see references [12], [13] and [14].

ISO 30401 [15] has been produced to help organisations develop a management system that promotes and enables value creation through knowledge.

8.3.2 Records

ISO 9001 [10] and IAEA GSR part 2 [11] include basic requirements relating to records. ISO 9001:2015 no longer uses the term “records”. The term “documented information” was introduced as part of the common High-Level Structure (HLS) and common terms for Management System Standards. The term covers both documents and records. Requirements in ISO 9001 to keep documented information as evidence should be interpreted as a requirement to keep records. IAEA safety guide GS-G-3.1 [5] includes a significant amount of guidance on records management practices. The older superseded IAEA publication 50-C/SG-Q Safety Guide Q3 [6] still provides some useful guidance on record retention periods for different types of record. There are other IAEA publications that provide more specific guidance on records management covering topic areas such as decommissioning and waste packaging records.
Useful international and British standards are:

- BS ISO 15489-1 Information and documentation. Records management - Concepts and principles [3] is the foundation standard that codifies best practice for records management operations. It is aimed at records management professionals rather than management.
- BS ISO 30301 Information and documentation – Management systems for records – Requirements [4] is an auditable standard for a records management system. This standard is aimed at management rather than records management professionals. It fits well with a process approach and can be readily used with other management system standards such as ISO 9001.
- BS 10008-1 Evidential weight and legal admissibility of electronically stored information (ESI) – Specification [9] can be used to identify controls to ensure authenticity when converting physical records to electronic format.
- BS EN ISO/IEC 27001 Information security, cybersecurity and privacy protection. Information security management systems. Requirements [9] can be applied to the information security aspects of records management and can be applied more generally to the management of all information assets.
- BS 4971 Conservation and care of archive and library collections [7] specifies current best practice in managing archive collections.

8.4 Further Reading

There is a great deal of opinion and guidance available on knowledge management, including more than two dozen maturity models. However, the special nature of nuclear knowledge, requires a different approach that is not always reflected in much of the literature. The publications produced by the International Atomic Energy Agency (IAEA) are the primary source for guidance and good practice. The most comprehensive document is IAEA TECDOC 1510 [1] that was published in 2006. There are other IAEA guides available that provide more detailed advice and case studies. Lessons learned from IAEA KM assist visits carried out in the period 2005–2013 are summarised in the 2016 publication IAEA NG-T-6.10 [12]. The 2017 publication IAEA NG-T-6.11 [13] covers the topic of knowledge loss management. The 2022 publication IAEA NG-G-6.1 [14] provides guidance on developing and implementing a strategic knowledge management programme.

There are a number of useful Government documents on knowledge and information management such as HMG Information matters: building government's capability in managing knowledge and information [16] produced in 2008. This publication has a non-nuclear bias and discusses the requirements for managing and sharing knowledge within publicly funded programmes.

UK Nuclear Decommissioning Authority

The Nuclear Decommissioning Authority (NDA) produced a KM Policy (IMP05) and launched a KM programme in March 2013. The NDA's knowledge management approach includes:

- Ensuring that required knowledge is available to support safe and efficient decommissioning;
- Avoiding duplication of effort;
- Promoting a learning culture;
- Promoting knowledge sharing across the NDA estate.

The KM Policy was updated in 2017 [17].

The NDA has built a National Nuclear Archive at Wick in Scotland. The facility is called Nucleus (the Nuclear and Caithness Archives) and opened in February 2017. Nuclear records from across the NDA's estate will be progressively transferred to the facility. The transfer will take several years to complete. The kinds of records to be stored at Nucleus are described in the NDA Archive Acquisition Policy (IMP09) [18].

The NDA has developed a Records Retention Schedule [19] that provides a generic framework for record retention requirements within the NDA's estate.

UK Regulatory Requirements and Guides

The UK legal framework relating to management of records is made up of numerous pieces of legislation. The principal nuclear legislation is the Nuclear Installations Act 1965, Environmental Permitting Regulations 2016 (replacing Radioactive Substances Act in England and Wales), the Radioactive Substances Act 1993 (still in force in Scotland) and the

Ionising Radiation Regulations 2017. The Health and Safety Executive (HSE), Environment Agency (EA) and Scottish Environment Protection Agency (SEPA) have published joint guidance on managing information and records relating to radioactive waste [20].

- **Nuclear Site LC 6** requires the licensee to make adequate records to demonstrate compliance with the site licence conditions. There is a requirement to make adequate arrangements to preserve records for 30 years.
- **Nuclear Site LC 5** contains a specific requirement for a retention period of 50 years in the case of any consignment of nuclear matter that is stolen, lost, jettisoned or abandoned.
- **Nuclear Site LC 17** requires licensees to make and implement adequate Quality management arrangements. These arrangements need to cover records management including provision for long term retention of records.
- **Nuclear Site LC 25** requires licensees to produce adequate operational records.

There are ONR guides on:

- NS-TAST-GD-033 Duty Holder Management of Records [21];
- NS-INSP-GD-006 LC 6 Documents, Records, Authorities and Certificates [22]; and
- NS-INSP-GD-025 LC 25 Operational Records. [2].

Nuclear Site Licensees may require records to be managed on their behalf by their suppliers. However, they retain responsibility for ensuring that these records continue to be properly maintained and accessible.

8.5 References

[1] INTERNATIONAL ATOMIC ENERGY AGENCY, Knowledge Management for Nuclear Industry Operating Organizations, IAEA-TECDOC-1510, IAEA, Vienna (2006). Available at: https://www.iaea.org/publications/7515/knowledge-management-for-nuclear-industry-operating-organizations

[2] CQI, NucSIG, Nuclear Next Generation (NNG). Available at: https://cqinucsig.wixsite.com/nucsig/nuclear-next-generation.

[3] BS ISO 15489-1, Information and documentation. Records management - Concepts and principles

[4] ISO 30301, Information and documentation — Management systems for records — Requirements

[5] INTERNATIONAL ATOMIC ENERGY AGENCY, Application of the Management System for Facilities and Activities, IAEA Safety Standards Series No. GS-G-3.1, IAEA, Vienna (2006). Available at: https://www.iaea.org/publications/7467/application-of-the-management-system-for-facilities-and-activities

[6] INTERNATIONAL ATOMIC ENERGY AGENCY, Quality Assurance for Safety in Nuclear Power Plants and other Nuclear Installations Code and Safety Guides Q1-Q14, IAEA Safety Series No. 50-C/SG-Q, IAEA, Vienna (2001) Safety Guide Q3, Annex III. (Superseded)

[7] BS 4971, Conservation and care of archive and library collections
[8] BS EN ISO/IEC 27001, Information security, cybersecurity and privacy protection. Information security management systems. Requirements
[9] BS 10008-1, Evidential weight and legal admissibility of electronically stored information (ESI) – Specification
[10] ISO 9001, Quality Management Systems – Requirements
[11] INTERNATIONAL ATOMIC ENERGY AGENCY, Leadership and Management for Safety, IAEA Safety Standards Series No. GSR Part 2, IAEA, Vienna (2016). Available at: https://www.iaea.org/publications/11070/leadership-and-management-for-safety
[12] INTERNATIONAL ATOMIC ENERGY AGENCY, Knowledge Management and Its Implementation in Nuclear Organizations, IAEA Nuclear Energy Series No. NG-T-6.10, IAEA, Vienna (2016). Available at: https://www.iaea.org/publications/10849/knowledge-management-and-its-implementation-in-nuclear-organizations
[13] INTERNATIONAL ATOMIC ENERGY AGENCY, Knowledge Loss Risk Management in Nuclear Organizations, IAEA Nuclear Energy Series No. NG-T-6.11, IAEA, Vienna (2017). Available at: https://www.iaea.org/publications/10921/knowledge-loss-risk-management-in-nuclear-organizations
[14] INTERNATIONAL ATOMIC ENERGY AGENCY, Guide to Knowledge Management Strategies and Approaches in Nuclear Energy Organizations and Facilities, IAEA Nuclear Energy Series No. NG-G-6.1, IAEA, Vienna (2022). Available at: https://www.iaea.org/publications/14698/guide-to-knowledge-management-strategies-and-approaches-in-nuclear-energy-organizations-and-facilities
[15] ISO 30401, Knowledge management systems – Requirements
[16] HM Government, Information matters: building government's capability in managing knowledge and information, © Crown copyright 2008. Available at: https://webarchive.nationalarchives.gov.uk/ukgwa/+/http:/www.nationalarchives.gov.uk/documents/information-management/information-matters-strategy.pdf
[17] Nuclear Decommissioning Authority (2018) NDA knowledge management policy. Available at: https://www.gov.uk/government/publications/nda-knowledge-management-policy.
[18] Nuclear Decommissioning Authority (2017) NDA Archive Acquisition Policy. Available at: https://www.gov.uk/government/publications/nda-archive-acquisition-policy.
[19] Nuclear Decommissioning Authority (2018) NDA records retention schedule. Available at: https://www.gov.uk/government/publications/nda-records-retention-schedule.
[20] HSE, EA, and SEPA (2010) The management of higher activity radioactive waste on nuclear licensed sites Part 3d Managing information and records relating to radioactive waste in the United Kingdom: Joint guidance from the Health and Safety Executive, the Environment Agency and the Scottish Environment Protection Agency to nuclear licensees. Available at: https://www.sepa.org.uk/media/101662/part_3d_-managing_information_and_records_relating_to_radioactive-waste.pdf.

[21] ONR Technical Assessment Guide NS-TAST-GD-033 Duty Holder Management of Records. Available at: https://www.onr.org.uk/operational/tech_asst_guides/index.htm

[22] ONR Technical Inspection Guide NS-INSP-GD-006 LC6 - Documents, Records, Authorities and Certificates. Available at: https://www.onr.org.uk/operational/tech_insp_guides/index.htm

[23] ONR Technical Inspection Guide NS-INSP-GD-025 LC25 - Operating Records. Available at: https://www.onr.org.uk/operational/tech_insp_guides/index.htm

Revisions

Revision date	Description	Contributors	Editors
February 2019	Hypertext links checked and updated. Text updated to reflect GS-R-3 superseded by IAEA GSR Part 2 and updates to ISO and other standards.	John Day, Mike Kelleher, Mark Harbor, Bob Radford	Richard Hibbert
January 2023	Content and format updated by NNG.	NNG Steering Group	NNG Steering Group