NOTES & REFERENCES

Module 13

QUALITY ASSURANCE

OBJECTIVES:

After completing this module you will be able to:

13.1 State the goal of a NPP's Quality Assurance (QA) Program. ⇔ *Page 1*

13.2 Name the document which describes a NPP's QA program in detail. ⇔ *Page 2*

13.3 Name the standards documents on which a CANDU plant's QA program is based. ⇔ *Page 2*

13.4 Given any of the quality principles governing CANDU operations, give an example of its application in the SS job duties. ⇔ *Pages 2-5*

QA PROGRAM GOAL AND BASIS

Definition: *Quality Assurance* is a planned and systematic pattern of actions designed to provide adequate confidence that items and services will be of the required quality.

The QA Program is a management tool designed to ensure safe and reliable operation of CANDU stations. The Siting Guide mandates a life-cycle QA program for CANDU plants. The Design and Construction QA programs ensure that the station *can* be operated safely; the Operational QA program ensures that the station *is*, in fact, operated safely.

The goal of a NPP's QA Program is to ensure that work is always done properly. Performing work correctly is important in all O&M activities, especially those performed on safety related systems. Hence, as a minimum, a NPP's QA program ⇔ *Obj. 13.1*

NOTES & REFERENCES

addresses all O&M activities performed on safety related equipment and systems.

Obj. 13.2 ⇔

The station **QA Manual** describes the program for achieving and assuring quality work on safety related systems, whether performed by station personnel or by contractors. At Management's discretion, the QA program may be extended to other work at the station. The OP&P require that QA activities be carried out according to the station QA manual. Implementation of the QA program is integrated into station procedures.

Obj. 13.3 ⇔

The station QA Program is based on recognized quality principles, and is designed to satisfy the requirements of CSA standard N286. In general, the QA program is intended to ensure that the required quality of products and services is properly defined and efficiently achieved in all phases of the project—design, procurement, construction, commissioning, operation and decommissioning. Simple, established quality principles provide a disciplined approach to achieving economically the required level of safety, reliability, maintainability, environmental protection, and performance. In particular, an operating NPP's QA program must meet the requirements of the CSA standard N286.5, *Operations QA for Nuclear Power Plants.* CSA 286.5 is one of a series of standards which covers all aspects of a NPP's life cycle. The N286 series is listed below:

N286.0	Overall QA Program Requirements
N286.1	Procurement QA Program Requirements
N286.2	Design QA Program Requirements
N286.3	Construction QA Program Requirements
N286.4	Commissioning QA Program Requirements
N286.5	Operations QA Program Requirements

Obj. 13.4 ⇔

QUALITY PRINCIPLES

A typical set of 13 quality principles*) is listed and discussed below. These principles govern all activity in the nuclear generation business, but the commentary below emphasizes examples of their application in the tasks and functions performed by the Shift Supervisor.

* CSA standard N286.5 features 16 quality principles, but the 13 listed here cover the same scope.

QP1 Define goals, objectives and policies, and ensure they are understood.

Key to the SS's effectiveness as the senior crew supervisor is his ability to translate station policies into concrete goals and objectives for the shift crew, to communicate clearly his expectations regarding safety, production, and quality of work, and to verify that his expectations are understood.

NOTES & REFERENCES

NOTES & REFERENCES

QP2 Specify roles and responsibilities and ensure they are understood and accepted.

The SS ensures that crew members understand and accept their roles and responsibilities, and abide by the limits of their authority.

QP3 Specify and communicate results to be achieved, and identify and allocate resources to achieve them.

Each shift, in consultation with his crew supervisors, the SS sets the work priorities and allocates resources, taking into account both the daily work plan and emergent work requirements.

QP4 Hold individuals accountable for the work they do.

The SS holds crew members accountable for meeting his expectations and provides appropriate feedback. Good performance is rewarded, and corrective action taken in the event of poor performance.

QP5 Ensure people are competent at the work they do.

The SS maintains sufficient numbers of properly qualified personnel on his crew, and ensures that only properly qualified people are assigned to do work. For example, only SDS qualified Control Maintainers are assigned work on a SDS.

QP6 Ensure the right people have the right information at the right time.

The SS ensures that crew members communicate effectively with each other, and with other work groups—eg, that shift turnovers, logs, deficiency reports to appropriate work groups, and work reports are complete and accurate. The SS facilitates information sharing between work group supervisors at the daily planning meeting. The SS ensures that up-to-date procedures are available to crew members. The SS reports abnormal incidents to the Operations Manager and to various Regulatory authorities within prescribed time frames.

QP7 Seek and use relevant experience.

When problems arise, the SS contacts support staff for assistance. The SS reviews operating experience reports, including significant event reports, in order to benefit from lessons learned by others. When authorizing non routine jobs, the SS seeks out technical support staff, supervisors and workers with relevant experience, as required.

NOTES & REFERENCES

QP 8 Plan and control work.

Each shift, the SS consults with his supervisors, and sets the work priorities for the crew. The SS approves removal of safety related equipment from service, and controls maintenance thereon via the work authorization process. The SS also authorizes certain high-profile operations, such as resetting a trip channel, removing the GSS, and raising reactor power.

QP9 Use the right material, equipment and processes and control any changes to them.

The SS approves pressure boundary work, including the repair method, materials used, and post maintenance QC tests. The SS ensures that approved materials, tools, procedures and work practices are used by the shift crew for operations and maintenance activities. The SS approves installation of substitute replacement parts, and deviations from approved procedures, including use of non standard chemicals.

QP10 Verify work to ensure that it meets requirements.

Definition: ***Verification*** is the act of reviewing, inspecting, testing, or checking to determine and document that items, processes, services or documents conform to specified requirements. The verification of a document by signature means that the person is knowledgeable in detail with the contents of the document and accepts responsibility for the detailed correctness of the document.

The SS personally verifies some key documents and activities, typically including safety deficiency reports, control room panel check sheets, safety system test sheets, trip set point adjustments, and the application of the GSS.

In some cases, the SS (or another supervisor) assigns a qualified person to verify independently an operation or maintenance activity. Some standard procedures have *independent verification* as a built-in feature, such as work protection, trip set point calibration, and some safety system tests.

Field verification that work has been performed correctly is necessary where errors could compromise nuclear safety. Usually the supervisor verifies the work, but if the supervisor has been personally involved in the work, or if he lacks the necessary skills, then independent verification by a third party may be required. Note that post maintenance tests do not normally eliminate the need for field verification. For example, most safety system tests do not accurately confirm set point calibrations. Nor does test running a pump necessarily confirm the availability of all flow paths—it may also be necessary to field verify the position of some safety related valves.

NOTES & REFERENCES

QP11 Identify and remedy deficiencies and their causes.

The SS establishes his expectation that crew members will not indefinitely work around problems, but will promptly report deficient equipment and procedures. The SS promotes frank and open communication, so that root causes of deficiencies, including inappropriate human action, can be identified without fear of reprisal. Of course, willful negligence of duty is another issue, and the SS will address this via the discipline process, as required.

QP12 Control the production, use, storage and retrieval of essential documents and records.

The SS must ensure that the unit and radiological logs are maintained at an acceptable level of detail, accuracy and legibility. Similarly, the SS must set the standard for other documents completed by the shift crew, including shift turnover records, panel check sheets, safety system test forms, jumpers, work permits, work reports, deficiency reports, the shift report, and event reports.

Good records are essential to finding the root causes of incidents and to communicating lessons learned, to avoiding operating and maintenance errors, and to evaluating equipment reliability. Good document control is prerequisite to success in following other quality principles, such as QP6 and QP8. Not only must products and services meet specifications, but also auditable records must be retained to document that this was the case.

QP13 Periodically review management and work processes to maintain and improve their effectiveness and efficiency.

The SS should periodically assess his crew's performance, to identify any quality problems, and to initiate any required improvements to shift management and work processes.

The station QA program effectiveness is formally reviewed by the Quality Assurance Review Committee at least annually. This review considers station performance results, quality improvements achieved, use of operating experience, and the status of corrective action plans addressing audit findings. The QA program effectiveness is also assessed independently of Line Management, by external auditors.

The SS is responsible for facilitating QA audits of management and work processes—eg, for providing the auditors access to shift crew members, to the work face, and to documents and records under his jurisdiction.

ASSIGNMENT

NOTES & REFERENCES

1. Carefully prepare detailed answers to the Module 13 learning objectives.

2. Describe the application of each of the quality principles to the overhaul of a boiler feed pump.

3. Relate each of the quality principles to the safety culture model of Figure 2.1.

4. Explain the impact of a station's QA program on the respective reactor safety key effectiveness areas listed in Module 2.

Prepared by: G.Jager

Revised by: L. Haacke

Date: January 1997