

**INTERNAL AUDITS AND QUALITY ASSURANCE
SURVEILLANCE IN NPP KRŠKO**M. Čavajda¹
I. Bračić²¹ Nuclear Power Plant "Krško", Vrbina 12, 8270 Krško, Slovenia² Enconet International d.o.o., Unska 3, 10000 Zagreb, Croatia**ABSTRACT**

This paper is describing establishment of the requirements for the development and execution of the Internal Audit and Quality Assurance Surveillance Program in the NPP Krško, to identify relevant regulatory commitment and other documents, and to exhibit different functional areas, levels and work categories and factors that impact selecting and scheduling an audit or surveillance. It is not intention of this paper to explain how and by whom an audit or surveillance has to be done.

INTRODUCTION**Internal Audit Program**

- This program establishes the requirements for a comprehensive system of scheduled and unscheduled audits to verify compliance with all aspects of the quality assurance program, Technical Specifications, and other governing programs and plans.
- The system provides for the reporting and review of audit results by appropriate levels of supervision and management.
- This comprehensive system is intended to conform with the requirements of ANSI/ASME N45.2.12-1977 "Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants".

Quality Assurance Surveillance Program

The act of observing real-time activities and/or reviewing documentation to verify conformance with specified requirements and industry good practices, and to evaluate their adequacy and effectiveness!

Relation of Quality Surveillance to two other Quality Verification Activities - Inspection and Audit

- An audit uses a wide-angle lens (QA activity)
- An inspection uses a closeup lens (QC activity)
- An quality surveillance uses a standard lens (QA and/or QC activity)

These three activities are, in fact, a snapshot at a particular point in the product, activity, or program. We have to think of the differences between the three as the size of the camera lens taking the snapshot.

LIST OF REGULATORY, COMMITMENT AND OTHER DOCUMENTS USED FOR PERFORMING AN INTERNAL AUDIT OR QA SURVEILLANCE

Regulatory requirements (NRC)

- Code of Federal Regulations (CFR)
- NRC NUREGs and Regulatory Guides
- NRC IE Bulletins, Notices, and Generic Letters

Plant-specific license and documents

- Safety Analysis Report (SAR)
- Technical Specifications
- Quality Assurance Manual
- Emergency Plan
- Security Plan
- Fire Protection Plan

NRC inspection manual (appropriate modules)

National codes and standards

- National Fire Protection Association
- National Electric Code
- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTME)
- American Society for Mechanical Engineers (ASME)

Institute of Nuclear Power Operations (INPO) "good practices" and guidelines

INPO operating experience

- Significant Operating Event Reports (SOER)
- Operating Experience Records (OER)

Other licensee-specific commitments to regulatory agencies

- Federal
- State
- Local

Plant-specific implementing procedures

- Administrative procedures
- Plant operating procedures (GOP, SOP, AOP, EOP)
- Surveillance test procedures
- Maintenance procedures
- Calibration procedures
- Radiochemistry procedures
- Emergency plan procedures
- Security instructions
- Controlled work procedures, etc.

AUDITING BY 10CFR50 APPENDIX B CATEGORIES

- I. Organization
- II. Quality Assurance Program
- III. Design Control
- IV. Procurement Document Control
- V. Instructions, Procedures, and Drawings
- VI. Document Control
- VII. Control of Purchased Material, Equipment, and Services
- VIII. Identification and Control of Materials, Parts, and Components
- IX. Control of Special Processes
- X. Inspection
- XI. Test Control
- XII. Control of Measuring and Test Equipment
- XIII. Handling, Storage and Shipping
- XIV. Inspection, Test, and Operating Status
- XV. Nonconforming Materials, Parts, or Components
- XVI. Corrective Actions
- XVII. Quality Assurance Records
- XVIII. Audits

Applicability of those 18 Quality Assurance Criteria to functional areas is shown in Table I.

AUDITING BY DIVISION (DEPARTMENT)

- Production Division
- Engineering Division
- Quality System Division
- Purchasing Department
- Stores Department
- Substation Department
- Meter Calibration Department
- Maintenance Department

AUDITING BY SUB-DEPARTMENT OR SECTION

- Production Division
 - Station Functions
 - Radiation Protection Functions
 - Technical/Administrative Services Functions
- Engineering Division
 - Licensing Functions
 - Engineering Functions
- Quality System Division
 - Operations Quality Assurance
 - Quality Assurance Services, etc.

AUDITING BY WORK CATEGORIES

- Reactor Plant Operation
- In-plant Core Management
- Nuclear Fuel Procurement
- Refueling
- Fuel Storage
- Fuel Shipping & Receiving
- Water Chemistry
- Gas Chemistry
- Radio Chemistry
- Health Physics
- Environmental Monitoring
- Surveillance Testing
- In-service Inspection
- Nuclear Material Safeguards
- Nuclear Material Accountability
- Procurement (Spare & Replacement Parts & Materials)
- Material Receiving & Qualification
- Instrument Calibration
- Tool Calibration & Qualification
- Maintenance and Repair
- Modification
- Radioactive Waste Treatment and Disposal
- Security
- Emergency Preparedness
- Fire Protection
- Administrative Controls
- In-plant Contractor Control

TYPES OF THINGS AUDITED FOR TYPICAL WORK CATEGORIES

<u>Nuclear Fuel</u>	<u>Plant Operation</u>	<u>Maintenance</u>
Procurement	Personnel Qualifications	Personnel Qualifications
Fabrication	Personnel Training	Personnel Training
Inspection	Procedures	Procedures
Packing	- Administrative	Procedure Compliance
Shipping	- AOP's	Tech. Spec. Compliance
Receiving	- SOP's	Documentation
Inspection	- EP's	Trouble reporting
Accountability	- Operations Orders	Corrective Action
Safeguards	- Surveillance Test Procedures	Inspection
Transfer	Procedure Compliance	Calibration
Refueling	Tech. Spec. Compliance	
Spent Fuel Storage	Documentation	
Spent Fuel Packaging	- Performance Data	
Inspection	- Compliance Data	
Shipping	Trouble Reporting	
Reporting	- Safety Related	
	- Non-safety Related	

Table II is showing present NPP Krško Internal Audit Program.

FOR SURVEILLANCE QA PURPOSES, DISCIPLINES ARE GROUPED AS FOLLOWS:

- Operations - typical areas may include conduct of operations during shift turnover, normal operations, startup, shutdown, tech. specs. adherence, administrative practices, reduced inventory, post transient recovery, and operator training.
- Testing and Miscellaneous programs - typical areas may include site Reactor Engineering, routine Tech Spec surveillance, ISI, IST, Fire Protection, Security, storage control, consumables control, and material handling equipment.
- Maintenance - typical areas may include Electrical, Mechanical, Pipe Fitting, welding, Instrumentation and Control, steam generator, planning and scheduling, maintenance training, corrective maintenance and preventive maintenance.
- Configuration Control - typical areas may include Nuclear Safety and Licensing, Equipment Qualification, Design and Configuration Control, Modification Control, vendor manuals, drawing control, records control, software control, procurement activities, commercial grade dedication and other item acceptance activities.
- HP/Chemistry - typical areas may include radioactive waste, ALARA, contamination control, dosimetry, environmental monitoring, primary chemistry and secondary chemistry.

FACTORS THAT IMPACT SELECTING AND SCHEDULING SURVEILLANCES ARE:

- The Activity or Process Undergoing Surveillance-Importance to nuclear safety, frequency or repetitiveness of performance, consequence of a noncompliance, training and qualification of personnel involved.
- Operating Schedules - availability of plant Technical Specifications surveillances, plant start-up testing, system lineups, failed tests, system startups, component isolations, tagging, fuel loading, and other Operations activities or evolutions.
- Maintenance Planning Schedules - availability of routine preventive and corrective plant maintenance activities, unscheduled maintenance activities, refueling outage maintenance activities and maintenance support activities.
- Plant Operation Support - availability of activities performed in support of plant operation such as effluent releases, radioactive shipments, crane testing, chemistry sampling, temporary modifications, training, procurement, testing and inspection.
- Identified Deficiencies and Concerns - Identified Deficiency Reports, Corrective Action Reports, Nonconformance Reports, Audit Finding Corrective Action Reports, Quality Assurance Observation Reports, INPO and NRC findings and other deficiency or quality concern reporting systems.
- Industry Experience - NRC inspection results, INPO good practices, ANSI, ASTM, ASME, ANS, NUREGs, Bulletins, Letters, ASQC Guidelines and other industry standards.
- Surveillance Requests -Line management requests for surveillances to look at areas of concern or to provide assessment of the reliability and efficiency of activities or processes.
- Audit Program Schedules and QC Inspection Coverage - efforts to avoid or eliminate overlap or redundant coverage.
- Followup Surveillance - Previous surveillance has indicated a need for a followup surveillance to check such items as new program implementation, use of newly revised procedures or other spinoff concerns.

Table I - APPLICABILITY OF QUALITY ASSURANCE CRITERIA TO FUNCTIONAL AREAS

FUNCTIONAL AREAS	10CFR50, Appendix B Subject Headings																		
	Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		Organization	QA Program	Design Control	Procurement Document Control	Instructions, Procedures, 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 Measure and Test Equipment	Handling, Storage and Shipment	Inspection, Test and Operating Status	Non-Conforming Materials, Parts and Components	Corrective Action	QA Records	Audits
Plant Operation	x					x	x		x		x	x	x		x	x	x	x	x
Surveillance Testing						x	x		x			x	x		x		x	x	x
Nuclear Material Accountability						x	x		x					x		x	x	x	x
I&C Calibration & Maintenance						x	x		x		x	x	x		x	x	x	x	x
Setpoint Control			x	x	x	x	x		x		x	x	x		x	x	x	x	x
Plant Security	x			x	x	x	x	x	x			x	x		x			x	x
Nuclear Fuel Procurement	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Corrective Action			x		x	x		x	x	x	x	x	x		x	x	x	x	x
Fire Protection			x	x	x	x	x				x	x			x	x	x	x	x
Procurement (Spares & Replacements)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Maintenance & Repair			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Plant Modifications			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Outside Contractors Work In-Plant	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Records Management				x	x	x	x											x	x
Safety-Related Lists				x		x	x		x									x	x
In-Service Inspection						x	x		x		x	x	x	x	x		x	x	x
Startup Testing				x		x	x		x			x	x		x		x	x	x
Core Management				x		x	x	x			x	x	x		x		x	x	x
Refueling						x	x		x		x		x	x	x	x	x	x	x
Administrative Procedures	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Personal Training & Qualification	x	x				x	x										x	x	x
Technical Specification Compliance				x		x	x		x		x	x	x		x		x	x	x
Emergency Preparedness	x					x	x		x			x	x				x	x	x
Fuel Storage						x	x		x		x		x	x	x	x	x	x	x
Fuel Shipment						x	x		x		x		x	x	x	x	x	x	x
Chemistry & Radiochemistry						x	x		x			x	x	x	x	x	x	x	x
Health Physics						x	x		x			x	x	x	x	x	x	x	x
Environmental Monitoring						x	x		x			x	x	x	x	x	x	x	x
Radwaste Management						x	x		x	x	x		x	x	x	x	x	x	x
Offsite Dose Calculations				x		x	x										x	x	x

Table II - PRESENT NNP KRŠKO INTERNAL AUDIT PROGRAM

1. CORRECTIVE ACTION
 - o CORRECTIVE ACTION SYSTEM AUDIT
 - o NONCOMFORMANCES SYSTEM AUDIT
2. NUCLEAR EMERGENCY RESPON PLAN
 - o EMERGENCY PREPAREDNESS AUDIT
3. FIRE PROTECTION
 - o FIRE PROTECTION PROGRAM AUDIT
4. SECURITY
 - o SECURITY PROGRAM AUDIT
5. TRAINING/QUALIFICATION
 - o TRAINING PROGRAM AUDIT
6. ENGINEERING
 - o DESIGN CONTROL AUDIT
 - o CONFIGURATION CONTROL AUDIT
 - o LICENSING ACTIVITIES AUDIT
 - o COMPUTER CONTROL AUDIT
7. PROCUREMENT
 - o PROCUREMENT DOCUMENT CONTROL AUDIT
 - o MATERIAL CONTROL AUDIT
 - o COMERCIAL GRADE ITEMS DEDICATION PROGRAM AUDIT
 - o HANDLING, STORAGE AND SHIPPING AUDIT
8. INSTRUCTION, PROCEDURE, DOCUMENT CONTROL AND QA RECORDS
 - o PLANT MANUAL PROCEDURE AUDIT
 - o DOCUMENT CONTROL AUDIT
 - o QA RECORDS AUDIT
9. ISI/IST
 - o INSERVICE INSPECTION (ISI) PROGRAM AUDIT
 - o BASELINE PRESERVICE INSPECTION (PSI) PROGRAM AUDIT
 - o INSERVICE SYSTEM PRESSURE TESTING AUDIT
 - o INSERVICE PUMP AND VALVE TESTING (IST) PROGRAM AUDIT
 - o SNUBBER SURVEILLANCE PROGRAM AUDIT
10. SPECIAL PROCESSES
 - o PROTECTIVE COATINGS FOR NUCLEAR FACILITIES AUDIT
 - o WELDING PROGRAM ACTIVITIES
 - o NONDESTRUCTIVE EXAMINATION (NDE) AUDIT
 - o CHEMICAL CLEANING AND FLUSHING AUDIT
11. MAINTANANCE
 - o CORRECTIVE MAINTANANCE AUDIT
 - o PREVENTIVE MAINTANANCE AUDIT
 - o PREDICTIVE MAINTANANCE AUDIT
 - o TOOL CONTROL AUDIT
 - o MEASURING AND TEST EQUIPMENT CALIBRATION AUDIT
12. OPERATION
 - o CONDUCT OF OPERATION AUDIT
 - o OPERATIONAL EXPERIENCE ITEMS REVIEW AUDIT
 - o TEMPORARY CHANGE AUDIT
 - o POST-MAINTANANCE TESTING AUDIT
 - o T/S SURVEILLANCE PROGRAM AUDIT
13. RADIOLOGICAL PROTECTION
 - o ALARA PROGRAM AUDIT
 - o CONTAMINATION CONTROL AUDIT
 - o DOSIMETRY AUDIT
 - o SURVEYS AUDIT
14. CHEMISTRY
 - o CHEMISTRY LABORATORY PRACTICES AUDIT
 - o PRIMARY AND SECONDARY CHEMISTRY AUDIT
 - o POST-ACCIDENT SAMPLING SYSTEM (PASS) AUDIT
15. ENVIRONMENTAL MONITORING
 - o ENVIRONMENTAL MONITORING AUDIT
16. RADWASTE MANAGEMENT
 - o RADWASTE MANAGEMENT AUDIT
17. OUTAGE
 - o REFUELING AUDIT
 - o SHUTDOWN OPERATION AUDIT
 - o MODIFICATION INSTALATION AUDIT
 - o ON-SITE CONTRACTOR CONTROL AUDIT