Slovenské elektrárne

PWR Prague 2026

SLOVENSKÉ ELEKTRÁRNE

MO34 Project Lessons Learned – Quality Management System Processes



PWR Prague 2026 - NEW PWR BUILD

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Introduction

Resiliency in context of construction and quality



Every organization shall build up a management system which will withstand every storm

The management system shall become a foundation for the Integrated management system including HSE and Quality

Quality as a main pillar

Resiliency in context of construction and quality

IAEA-TECDOC-1910

GQM Nuclear Advisors



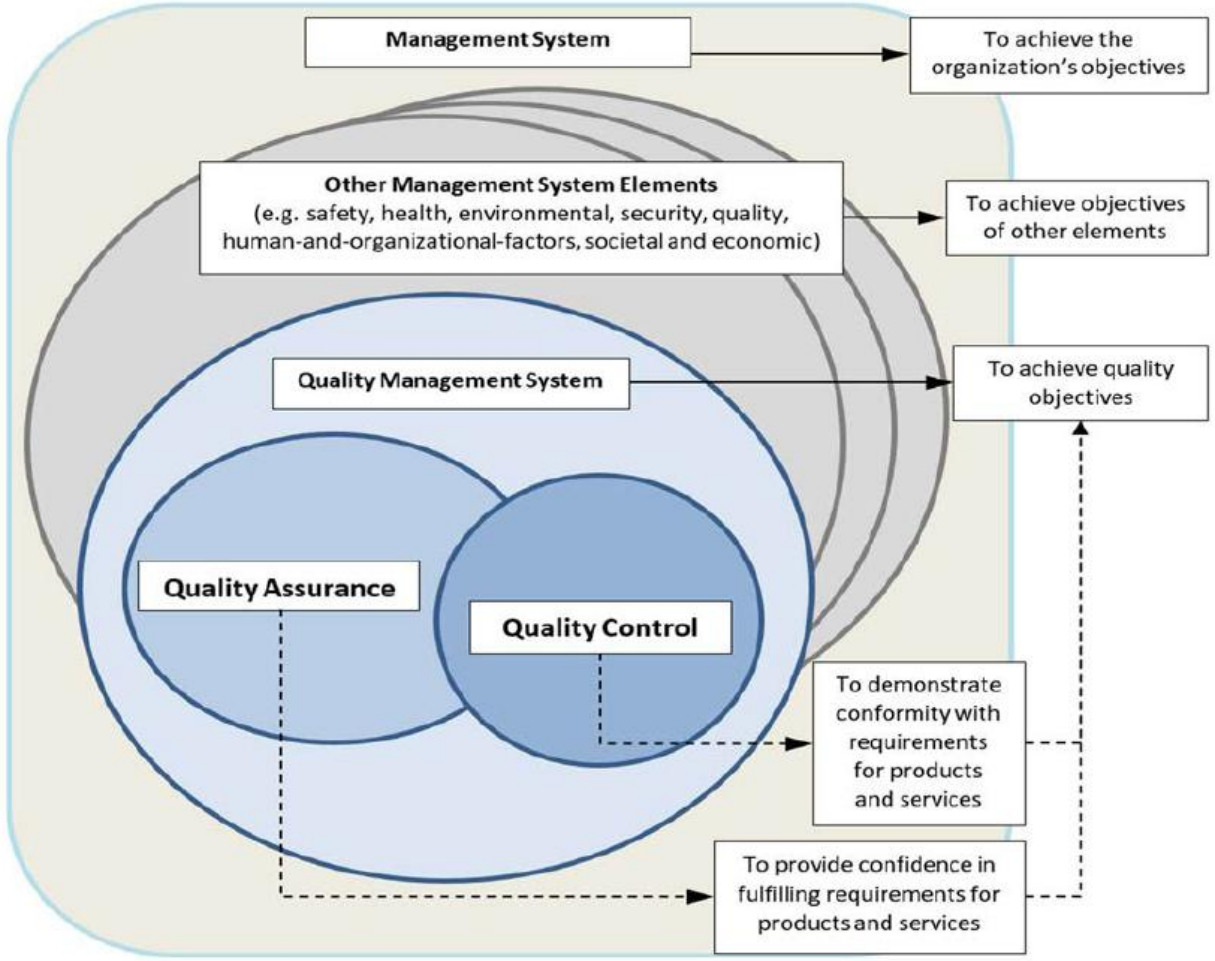


FIG. 3. A high-level illustration of connections between quality assurance, quality control and the management system of nuclear facilities.

U.S. Study – 7 NPP Sites 1982 – 83 (ref. GQM Nuclear Advisors)

Build Program	Case Study	Major Quality Problems	Utility	Online Dates
Marble Hill Cancelled	A	Yes	Public Service of Indiana	Proposed 1973. $2.2 billion failed design/build program closed 1984
St. Lucie 2	B	No	Florida Power & Light	R1 03/01/76 R2 06/10/83
Diablo Canyon	C	Yes	Pacific Gas & Electric	R1 05/07/85 R2 03/13/86
South Texas	D	Yes	Houston Lighting & Power	R1 08/25/88 R2 06/19/89
Vogtle 1 & 2	E	No	Georgia Power	R1 06/01/87 R2 05/20/89
Palo Verde	F	No	Arizona Public Service	R1 01/28/86 R2 10/19/86 R3 01/08/88
W. H. Zimmer Cancelled	G	Yes	Cincinnati Gas & Electric	Proposed 1969. $3.4 billion failed design/build program converted to coal 1984

NUREG 1055 „Improving Quality and the Assurance of Quality in the Design and Construction of Nuclear Power Plants“ - 1984

(ref. GQM Nuclear Advisors)

- Inadequate Quality Inspection Documentation
- Inadequate reporting of non-conformances
- Drawing deficiencies
- Inadequate specifications
- Materials control deficiencies
- Inadequate procedures and instructions
- Procedure violations
- Inadequate licensee audits
- Inadequate corrective action program

- rising standards of excellence
- treatment of quality assurance as a management tool, not a substitute for management
- improved trend analysis & identification of root causes of quality problems
- program of comprehensive third-party audits of present & future construction projects
- heavier emphasis on team inspections & resident inspectors
- more attention to management issues
- improved diagnostic & trending capabilities
Inadequate licensee audits


WITHOUT A STRONG QUALITY FOUNDATION ...
UNSAFE CONDITIONS
POOR SOIL NO GROWTH
SAFETY
ENVIRONMENT
COSTS
SCHEDULE
PERFORMANCE
QUALITY
MORE RISKS
HIGHER COSTS
DELAYS
POOR PERFORMANCE
... NOTHING SUSTAINABLE CAN BE BUILT.


... WITH A STRONG QUALITY FOUNDATION
SAME PLANT. A DIFFERENT FUTURE.
SAFE WORKPLACE
CLEAN ENVIRONMENT
OPTIMIZED COSTS
ON SCHEDULE
HIGH PERFORMANCE
LOCAL PRODUCTS
TRADITION (SLIVOVICE)
FRESH FOOD HEALTHY LIFE
QUALITY
SAFETY (BOZP)
ENVIRONMENT
COSTS (EFFICIENCY)
SCHEDULE (ON TIME)
PERFORMANCE (LONG-TERM)
QUALITY IS THE FOUNDATION. EVERYTHING ELSE GROWS ON IT.
NUCLEAR ENERGY FOR A BETTER TOMORROW

Approaches to improving resiliency



ORGANIZATIONAL RESILIENCE

Strong internal leadership and governance structures

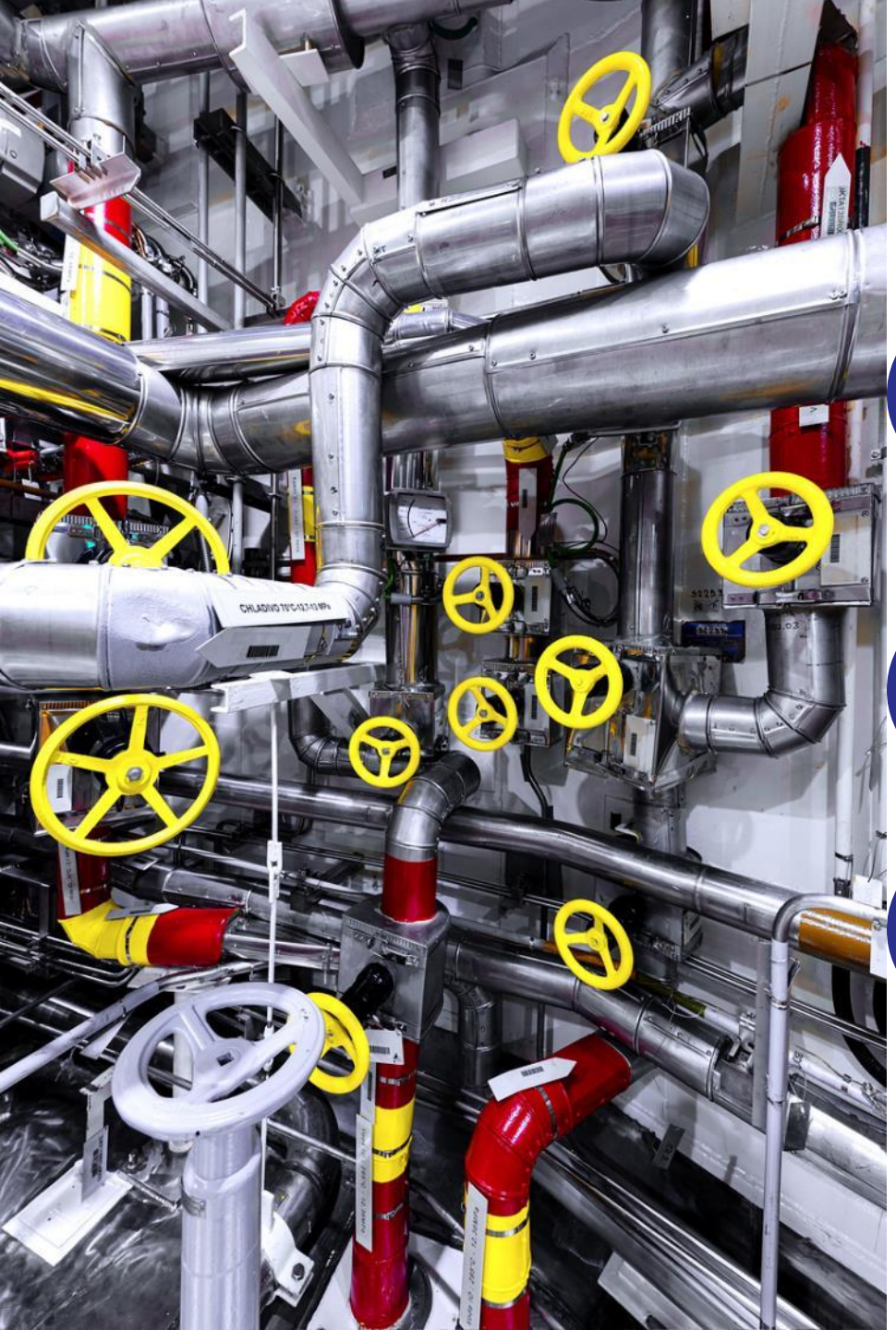
- Processes, competences and responsibilities are in place
- Process documents are understood and followed
- Leader promote cooperation, knowledge, fast changes and decision making based on nuclear safety principles

Strong interface management with contractors and authorities

- Trust but verify towards contractors
- Open and transparent communication
- Considering all stakeholders as partners, not as enemies

Integration of quality and safety culture across all levels

- „Optioneering" – multiple choice decision management
- Sharing good practices internally and externally
- Independence of safety and quality from core products and services delivery



TECHNICAL AND PROCESS RESILIENCE

Design Verification and Validation process

- 4 eyes principle (cold eye)
- Specialists / experts instead of „I know everything“
- Chief Architect Engineer

Usage of digital solutions

- Avoid fragmentation of different databases
- Management of Master Data
- High level modern IT tools including the AI

Designer qualification

- Not every engineer is a „Designer“
- Practice makes the Master
- National legislation



SUPPLY CHAIN AND VENDOR MANAGEMENT

Triangle pillars for Vendors

- Qualification
- Development
- Assessment

Oversight

- Design
- Manufacturing
- Construction
- Quantity surveying / Contract management

Stock

- Having required material at required time
- Commercial Grade Dedication
- Obsolescence

Lessons learned from Mochovce 34 Project (QMS Unit)

QUALITY MANAGEMENT SYSTEM

01

Independence of Quality managers/directors and internal auditors

02

CAPA / NCR Management

Root-cause analysis throughout all stages of the project

03

Data driven decision making and a dashboard with perfomance indicators



CONTINUOUS IMPROVEMENT

SAFETY CULTURE

Reporting

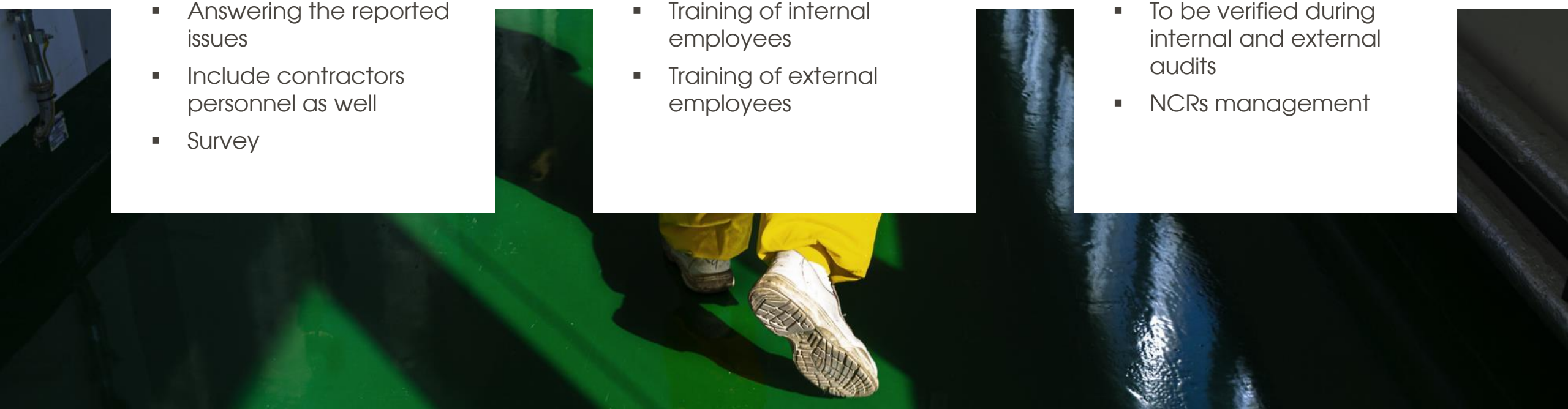
- Safety culture box
- Answering the reported issues
- Include contractors personnel as well
- Survey

Training

- Newcomers
- Training of internal employees
- Training of external employees

Promotion & Verification

- Visualization
- To be verified during internal and external audits
- NCRs management



DESIGN

01

Design Freeze

Insufficient design preparation and premature freezing of the detail design causes the need to issue, approve and implement thousands of DD modifications during the construction

02

Design Coordination

Insufficient coordination of the DD between individual suppliers and professions and, causes numerous collisions on the construction site between equipment installed and planned for installation from different suppliers

PROCUREMENT

01

Kick-off meeting

An initiation meeting shall be organised with every new Contractor on site including all the necessary units

02

Decision criteria

Shall be well defined in the Purchase Technical Specification

03

Quality requirements

To be included in the Purchase Technical Specification and verified during incoming inspection



PRODUCTION

Supervision over Contractors



Epecially parallel works shall be properly managed

Hold points and Witness points

Preservation and maintenance



Program to be developed at the beginning of the project and well followed and maintained

Progress reports

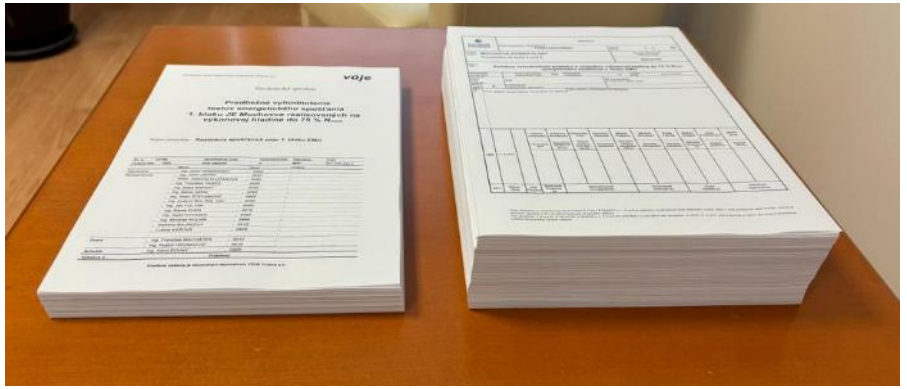


Including information on the Quality of the final product/service (incl. environmental conditions)

DOCUMENTATION CONTROL

Master database
One to rule them all

Process changes
New revision and communication
Quality as the Process Interface Master



Familiarization

Management is responsible to make sure that the personnel has been familiarized with the necessary documentation (and understood....)

NON-CONFORMANCE MANAGEMENT

Disposal



Nonconforming product disposed of (scrapped or otherwise rendered worthless) before root cause analysis is completed

Committee



To appoint representatives from all the units

First filter

Follow-up?

Timely resolution



The longer remains the NCR open, the complicated resolution

Q&A

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