

NRG experience in support of ageing management, LTO and PSR of NPPs and research reactors

Keywords: ageing management, long term operation (LTO), periodic safety review (PSR)

NIC, Amsterdam, 8-9 June 2022

Robert Krivanek
International Ageing Management and
LTO Projects Manager, NRG

Frederic Blom
Manager Nuclear Compliance and Projects, NRG



Nuclear. For life.

Robert Krivanek

He received his master and Ph.D. degrees in mechanical and nuclear engineering. He has more than 27 years of experience in nuclear industry. Since 1994 he was with CEZ in the Czech Republic in various positions in operations, engineering and nuclear safety. His main focus was on ageing management and preparation of NPPs for long term operation (LTO). Since 2012 he served for the International Atomic Energy Agency (IAEA) in Vienna as an ageing management and LTO programme manager.

Since October 2021, he has been with NRG in the Netherlands as a manager for international ageing management and LTO activities. His work includes NRG business development in support of NPPs and regulators and management of NRG projects in this area.

Unfortunately, Robert cannot participate at the Nuclear Innovation Conference due to planned surgery but he is enthusiastic in international cooperation in ageing management and LTO preparation.



Nuclear. For life.

Frederic Blom

Frederic graduated at University of Twente (Netherlands) in mechanical engineering and obtained his Ph.D. at EPF-Lausanne in Switzerland. Before joining NRG he has worked in radar development and large diesel engine production.

He started working for NRG in 2002. He is manager of nuclear complaints and projects and lead consultant for key LTO projects at NRG. He launched the development of TULIP LTO, the LTO consultancy services of NRG. Since 2006 many LTO programmes have been developed using TULIP LTO, starting with the successful LTO demonstration for Borssele NPP, then contributions to the LTO programmes of Ringhals, Oskarshamn, Olkiluoto, Atucha and Trillo NPPs.

At the Nuclear Innovation Conference, Frederic will act as moderator of LTO session presentations and panel session. He is looking forward to meeting and linking professionals in the ageing management and LTO area, reinforcing existing connections and making new contacts in the LTO network.



Nuclear. For life.

**NRG provides
services in ageing
management and
LTO under brand
name**



TULIP LTO covers:

- Ageing management and LTO
- Methodologies development
- Scope setting
- Ageing management reviews
- AMPs
- TLAAs
- PSR
- Data management
- In line with IAEA safety standards



NRG ageing management and LTO projects and experience



- Borssele, The Netherlands
 - Ringhals, Sweden
 - Olkiluoto, Finland
 - Atucha, Argentina
 - Oskarhamn, Sweden
 - Trillo, Spain
 - Koeberg, South Africa
-
- HFR, The Netherlands
 - IAEA SALTO
 - IAEA IGALL
-
- PIONEER, National R&D



NRG

ageing management and LTO support



Focus areas

1. Capacity building in ageing management, LTO and PSR
2. Technical support, calculations, analyses, project management support
3. Preparation of facilities personnel for review missions such as SALTO, OSART
4. Support in resolution of missions findings

NRG ageing management and LTO support



Our clients

Operators and regulators of NPPs
and research reactors:

- In early phase of operation
- Preparing for LTO
- In LTO period improving ageing management to further operate



NRG TULIP AM and LTO components

- Ageing management and LTO project management/ overall support
- Scope setting
- Ageing management review
- Ageing management programmes
- Time limited ageing analyses
- Review of plant programmes
- Development of documentation



Nuclear. For life.

Ageing management and LTO project management and overall support

- Support in NPP ageing management or LTO project initiation, definition and execution
- Support in establishment of NPP organization
- Data collection and record keeping

- Support of NPP in communication with regulator
- Support of NPP in SALTO missions preparation
- Safety case risk assessment
- Prioritization of LTO corrective actions based on risk significance



Nuclear. For life.

Scope setting of SSCs for ageing management and LTO assessment

- Development of methodology and criteria
- Safety classification
- Performance of scope setting
- Walkdowns to identify in-scope SSCs
- Commodity groups development
- Data management
- Use of PSA for scope setting



Nuclear. For life.

Ageing management review (AMR)

- Development of methodologies (mechanical, electrical and I&C and civil)
- Assessment of in-scope SSCs current conditions
- Identification of ageing effects and degradation mechanisms
- Identification of the appropriate AMP
- Reporting results



Nuclear. For life.

Ageing management programmes (AMPs)

- Development of methodology
- Review of existing AMPs
- Development or improvement of AMPs (using AMR results)
- Implementation of AMPs
- Reporting results



Nuclear. For life.

Time limited ageing analyses (TLAAs)

- Development of methodology
- Identification of TLAAs in NPP documentation (design basis documentation, Safety Analyses Report, technical specifications)
- Revalidation of TLAAs
- Reporting results



Nuclear. For life.

Review of plant programmes

- Review of existing plant programmes for LTO:
 - maintenance
 - in service inspection
 - surveillance and monitoring
 - equipment qualification
 - water chemistry
 - corrective actions programme
- Improvement of existing plant programmes for LTO



Nuclear. For life.

Development of documentation

- Development and improvement of NPP procedures and processes based on results of ageing management and LTO assessment
- Update of Safety Analysis Report
- Development of safety case for regulator
- Development of licensing renewal application



Nuclear. For life.

Other related NRG support areas

- Technological obsolescence management
- Equipment qualification
- Periodic Safety Review (PSR) preparation and conduct
- Deterministic safety analyses
- Probabilistic safety analyses (full scope)
- Environment impact assessment (EIA)



Nuclear. For life.

Why use support of NRG in ageing management and LTO preparation?

- Knowledgeable and motivated team
- Significant experience accumulated since 2006
- Successful LTO projects in multiple countries
- Deep knowledge of IAEA safety standards and other guidance



Nuclear. For life.

More information



Contact our LTO team

Frederic Blom

Manager Nuclear Compliance & Projects

T. [+31 \(0\)6 13102730](tel:+3120613102730)

M. blom@nrg.eu



Robert Krivanek

International Ageing Management and LTO Projects

Manager

T. [+316 15321927](tel:+31615321927)

M. krivanek@nrg.eu



Nuclear. For life.