

Aging Management and License Renewal Support Services

Background

Aging management is a technical process that provides reasonable assurance that the aging of important nuclear power plant systems, structures and components (SSC) is being managed so they will continue to perform their intended function(s). Outside the United States, the aging-management process is being utilized to confirm the aging-management elements of the International Atomic Energy Agency's (IAEA) Periodic Safety Review (PSR) process. Most member states require a PSR review once every 10 years for continued plant operation. In the United States, the aging-management process provides compliance with the requirements for obtaining a renewed operating license. License renewal is a regulatory process that allows a nuclear plant in the United States to extend its operating license for an additional 20 years (beyond the 40 years of its original license). Whether applied to the PSR or license renewal, this process provides an extremely cost-effective way to assure available generation capability into the future.

The guidelines for a PSR are contained in IAEA Safety Guide No. NS-G-2.10, and the requirements for a license renewal application are contained in the Code of Federal Regulations, 10CFR54. Both the IAEA and the U.S. Nuclear Regulatory Commission (NRC) have developed implementation guidance to support the development of aging-management documentation and the review process. The primary focus of the process is to demonstrate that aging of important safety-related equipment is recognized, has been evaluated, and will be adequately managed to support equipment functionality through the extended operating period.

Description

Westinghouse support for aging-management activities covers a spectrum of evaluations required for preparing aging-management deliverables.

Time-limited aging analyses are calculations that address the cumulative effects of thermal and mechanical cycling, neutron exposure and thermal embrittlement. One of the requirements of both the IAEA guidance and 10CFR54 is that these calculations must be re-evaluated to include the extended period of operation. These are the same calculations performed as part of the original plant design, and as the original equipment manufacturer (OEM) for many international plants and the majority of the U.S. nuclear fleet, Westinghouse and its engineers are uniquely qualified to address the extended-life issue.

Aging-management reviews are comprehensive evaluations of structures and components to identify potential aging degradation effects and to monitor the aging-management programs in place to mitigate any adverse consequences. Westinghouse can provide expert consultation and aging-management project leadership to help initiate and design an aging-management program, or provide the technical expertise to perform aging-management evaluations along with on-site personnel support to augment an aging-management team.

A critical aspect of aging-management reviews is the identification of the materials used in the fabrication of components. Frequently, this information must be retrieved from original manufacturing specifications, drawings or quality records in order to provide the basis for subsequent evaluation. As the OEM, Westinghouse has immediate access to these specifications.

As part of the environmental report, severe accident mitigation alternatives (SAMAs) must be evaluated. Again, Westinghouse engineers skilled in using probability risk assessment methodology are ideally suited for performing this evaluation.

Westinghouse aging-management support services include:

- Expert consultation for aging-management project design, leadership and peer review
- Executive, management and technical personnel training in aging-management principles and processes
- Experience and support of plant-life extension cost analyses and justifications
- Time-limited aging analyses and related calculations
- Aging-management project scoping and screening evaluations
- Aging-management reviews
- Component fabrication information to support aging-management reviews
- Fatigue evaluations, including environmental effects
- SAMA evaluation for the environmental report
- Technical evaluations for impact of aging-management conclusions on upratings and steam-generator replacement evaluations
- Staffing support
- Aging-management program (AMP) reviews and AMP updates
- Risk-based in-service inspection activities in support of inspection commitments

Benefits

In the course of performing the aging-management support service, Westinghouse offers the following:

- Extension of the plant operating term beyond the initial term (usually 40 years)
- Leverage approvals (by IAEA member states or NRC) on previous aging-management projects
- Application of customer-implemented and proven-successful aging-management processes, including use of generic procedures and process enhancing software that are customized for plant-specific application
- Utilization of Westinghouse's extensive aging-management expertise and history of being the nuclear steam supply system (NSSS) vendor and major component supplier
- Utilization of Westinghouse-developed aging-management reviews, five of which received NRC approval, for referencing in license applications

- Provision of optional licensing support
- Access to technical evaluations of industry- and plant-specific operating experience, with emphasis on expert inputs from Westinghouse engineers on major NSSS component operating experience

Integrated Services

In addition to the traditional aging-management process-related services described above, Westinghouse's technical breadth in hardware, software and engineering services provides one-stop shopping for a myriad of additional products and services that are complementary to nuclear plant-life extension. These products and services, which can be combined into integrated packages or provided as stand-alone offers, include:

- Aging-management/license renewal commitment implementation services
- Life-cycle management services
- Nuclear plant SSC inspection services
- Radiation analysis services
- Risk-informed in-service inspection support
- In-service inspection interval extension support
- Probabilistic fracture mechanics analyses
- Licensing support services
- Aging-management software/database
- Long-term operation/asset management services and software
- Fatigue monitoring (WESTEMS™) services and software
- Equipment LIFETIME™ monitoring
- Reactor vessel surveillance capsule withdrawal, testing and analysis
- Excure detectors and analysis support services
- Major component repair and replacement (replacement steam generator, reactor vessel head, weld overlays, etc.)
- Equipment Reliability (AP-913) support services
- Risk-informed in-service inspection support
- Materials reliability program implementation support
- Nuclear materials science support
 - Hot and cold lab services, including hot cell

For additional details, flysheets exist for most of these stand-alone products and services.

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