

LICENSE RENEWAL PROCESS

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ABSTRACT

The purpose of this paper is to provide information about license renewal process, as defined by Nuclear Regulatory Commission (NRC).

The Atomic Energy Act and NRC regulations limit commercial power reactor licenses to an initial 40 years but also permit such licenses to be renewed. This original 40-year term for reactor licenses was based on economic and antitrust considerations – not on limitations of nuclear technology. Due to this selected time period, however, some structures and components may have been engineered on the basis of an expected 40-year service life.

The NRC has established a timely license renewal process and clear requirements codified in 10 CFR Part 51 and 10 CFR Part 54, that are needed to assure safe plant operation for extended plant life. The timely renewal of licenses for an additional 20 years, where appropriate to renew them, may be important to ensuring an adequate energy supply during the first half of the 21st Century.

License renewal rests on the determination that currently operating plants continue to maintain adequate levels of safety, and over the plant's life, this level has been enhanced through maintenance of the licensing bases, with appropriate adjustments to address new information from industry operating experience. Additionally, NRC activities have provided ongoing assurance that the licensing bases will continue to provide an acceptable level of safety.

This paper provides additional discussion of license renewal costs, as one of key elements in evaluation of license renewal justifiability. Including structure of costs, approximately value and two different approaches, conservative and typical.

Current status and position of Nuclear Power Plant Krško, related to license renewal process, will be briefly presented in this paper. NPP Krško is designed based on NRC Regulations, so requirements from 10 CFR 51, and 10 CFR 54, are applicable to NPP Krško, as well.

Finally, this paper will give an overview of current status of license renewal process in NPP's across the USA. List of NPP's with renewed license, or whose application is currently under review or whose applications are expected in near future, will be provided.

Keywords

License Renewal, 10 CFR 51, 10 CFR 54, Krško NPP

1 INTRODUCTION TO LICENSE RENEWAL

The Atomic Energy Act and NRC regulations limit commercial power reactor licenses to an initial 40 years but also permit such licenses to be renewed. This original 40-year term for reactor licenses was based on economic and antitrust considerations – not on limitations of nuclear technology. Due to this selected time period, however, some structures and components may have been engineered on the basis of an expected 40-year service life.

The NRC has established a timely license renewal process and clear requirements codified in 10 CFR Part 51 and 10 CFR Part 54, that are needed to assure safe plant operation for extended plant life. The timely renewal of licenses for an additional 20 years, where appropriate to renew them, may be important to ensuring an adequate energy supply during the first half of the 21st Century.

2 LICENSE RENEWAL PRINCIPLES

Two key principles for the license renewal process and application requirements for commercial power reactors are listed below:

- a) The first principle of license renewal is that with the exception of age related degradation and possibly a few other issues related to safety only during extended operation of nuclear power plants, the existing regulatory process is adequate to ensure that the licensing bases of all currently operating plants provide and maintain an acceptable level of safety.
- b) The second principle of license renewal is that the licensing basis (for specific plant) must be maintained during the renewal term in the same way and to the same extent as for the original licensing period. This could be accomplished through a program of ageing management.

3 APPLICATION

Prior to submission of a renewal application, a potential applicant (license holder) should have analyzed the aging effects in sufficient detail to conclude that the plant can be operated safely during the period of extended operation (up to 20 years). The application for license renewal is the general document in which the applicant (licensee) provides the information needed to understand the basis upon which this conclusion has been reached.

The license renewal application includes general information and technical information in accordance with 10 CFR Part 54. As well, the application should contain all necessary technical information and other evaluations about the different plant aging processes and activity plan how the licensee will manage or mitigate those aging effects.

Mentioned information should be prepared and presented with enough details to permit the regulatory body (NRC in USA, or SNSA in Slovenia) to determine whether the effects of aging will be managed adequately that the plant could be safely operated during the period of extended operation in accordance with normal operation regulations.

The regulatory body staff then performs a safety review of the application (and attachments), and draws conclusions about whether the plant can be operated during the period of extended operation in accordance with plant operation regulation.

The general information contained in the license renewal application is much the same as that provided with the initial operating license application.

The regulations at 10 CFR 54.21 require that each application for a renewal license for a nuclear plant should include following information:

- (a) Technical Information
 1. Current License Basis
 2. Integrated Plant Assessment
 3. Time-Limited Aging Analyses
 4. Final Safety Analysis Report
- (b) Technical Specifications

Environmental Review

Each license renewal applicant must include a supplement related to the environmental impact (in form of the report) which contains an analysis of the plant's impact on the environment if allowed to continue operation beyond the initial license. The regulatory body then performs reviews of environmental impacts of operating life extension in accordance with 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." This review is in "parallel track" from the safety reviews of the technical information. Environmental requirements for the renewal of power reactor operating license are contained in NRC's regulations, 10 CFR Part 51.

Review Time

It is expected that the regulatory body will complete the review of the application within 30 months.

A nuclear power plant licensee may apply for a license renewal as early as 20 years or as late as 5 years before the expiration of its current license.

Inspection Program

Prior to the approval of an application for a renewed license the license renewal inspection program should be implemented.

The inspection program should verify that an applicant meets the defined requirements and has implemented license renewal programs and activities fully consistent with their license renewal application.

The objectives of license renewal inspection activities are to review the documentation, implementation, and effectiveness of the programs and activities related to an applicant's license renewal program to verify that there is assurance that the effects of aging will be adequately managed in the way that the intended function of components and structures within the scope of license renewal will be maintained consistently during the period of extended operation.

Table 1. Costs estimation

Estimation of the costs for License renewal (millions of Y1994 US\$)		
	Conservatively	Typical
Waste disposal costs	37	3,5
On-site labor cost	269	21
Capital costs	155	53,5
Total location (on-site) costs	461	78
Off-site labor costs	38	13
Replacement energy costs	155	52
10 CFR 54 influenced costs	/	10
Total estimated costs	654	153

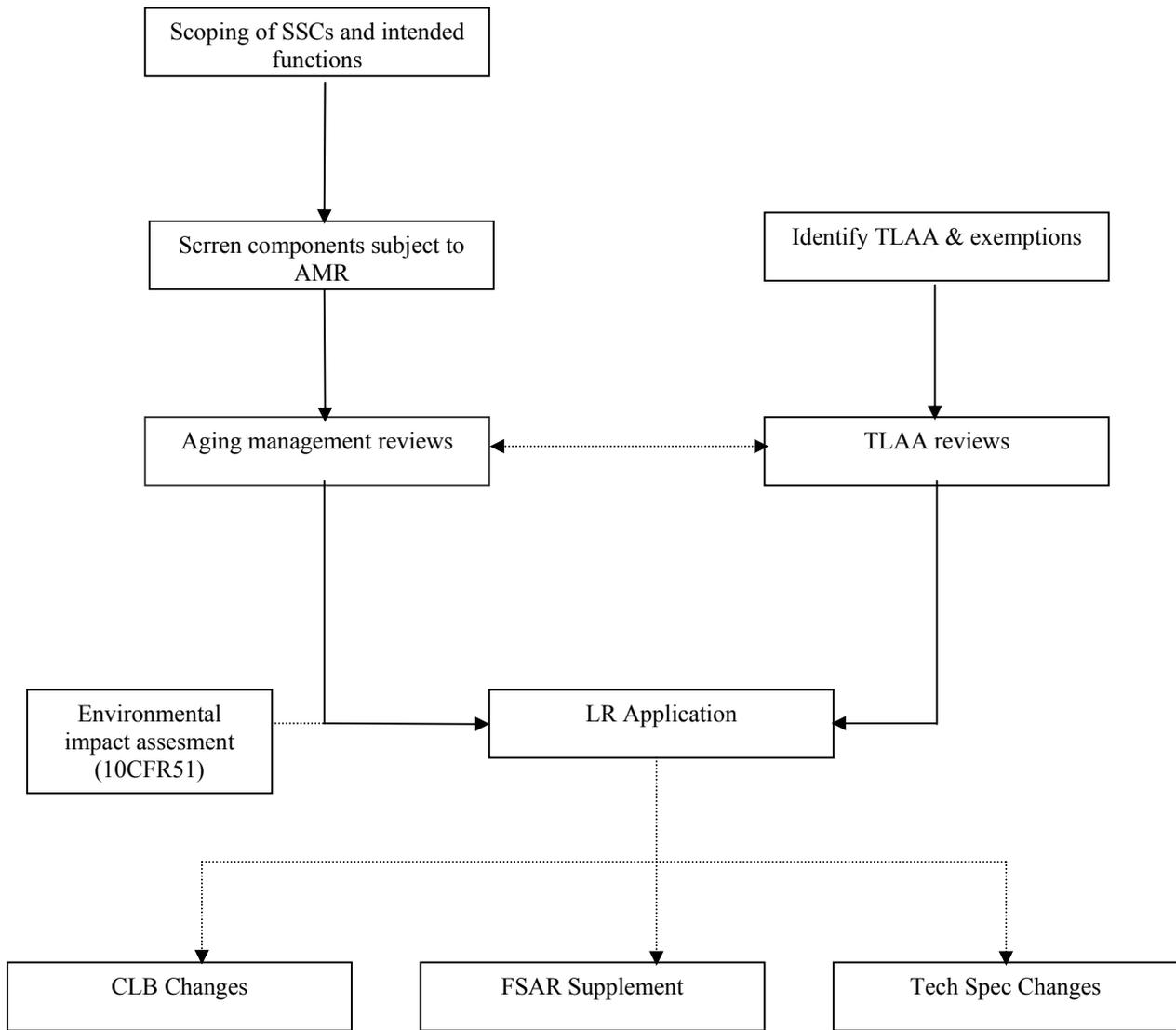


Figure 1. Block diagram of major elements of License Renewal Application (10 CFR Part 54)

4 BRIEF NECESSARY PROGRAMS COMPARISON BETWEEN REFERENCE PLANT (CALVERT CLIFFS NPP) AND KRŠKO NPP

Calvert Cliffs NPP (CCNP) is chosen as reference NPP for brief comparison with Krško NPP and the CCNPP's application for license renewal is used as a basis for probably scope determination in case of decision that Krško NPP will apply for license renewal (base on U.S. regulations), *Table 2.*

Programs comparison (current status) is based on estimation obtained from CCNPP License Renewal Application [7.] and from Krško NPP report [4.].

Table 2. Necessary programs to be addressed in License Renewal Application (as stated in CCNPP application and current status at Krško NPP)

CCNPP Programs	NE Krško Programs (current status)
Maintenance (Preventive)	Preventive Maintenance Program
Maintenance (Corrective)	Maintenance Rule Program and Scoping Reports
Maintenance Standards Program	
Fatigue Monitoring	Fatigue Monitoring Program
Inservice Inspection	In-Service-Inspection Program
Environmental Qualification	Environmental Qualification Program
Motor-Operated Valve Program	Motor-Operated Valve Program
Protective Coating and Painting	Protective Coatings Program
Tank Internal Inspection Program	Civil / Structural Inspection Program
Functional Testing	In-Service Testing Program
Post-Maintenance Testing	
Eddy Current Testing	
Engineering Test Procedures	Documentation Control Program
Age-Related Degradation Inspection	Erosion-Corrosion Program
	Service Water Corrosion Program
Materials Testing and Evaluation	Quality Classification Program
Loose Parts Monitoring	GL 88-05 Activities
Performance Evaluation Program	Chemistry Program
Performance Evaluation Program (Operations)	Regulatory Commitment Tracking Program
Plant Lay-up and Equipment Preservation	Environmental Compliance Program
Electronic Cable Degradation	Flow Accelerated Corrosion Program
Pressure Test Procedures	Configuration Management Program
Plant Tours	Pressurized Thermal Shock Monitoring Program
Surveillance Test Procedures	Fire Protection / Appendix R Program
System Walkdowns	
Thermography	
Vibration Monitoring	
Thermal Performance Monitoring	
Operator Rounds	
Lube Oil Analysis	
Additional Baseline Walkdowns	
Caulking and Sealant Inspection Program	
Cast Austenitic Stainless Steel Evaluation Program	
Stress Relaxation Analysis	
Buried Pipe Inspection Program	
Check Valve Reliability	
Evaluation of the Thermal Fatigue Effects on Systems Requiring AMR for LR	

5 CURRENT STATUS OF LICENSE RENEWAL IN U.S.A.

In the following table, the current status of license renewal processes for U.S. NPPs is given. Per NRC data from May 2003, 55 of 104 licensed plants are committed to the license renewal (53%).

Table 3. US NPPs License Renewal Application status (May 2003.)

NPPs with License issued and date of issuance	
Calvert Cliffs, Units 1 and 2	23.03.2000.
Oconee Nuclear Station, Units 1, 2 and 3	23.05.2000.
Arkansas Nuclear One, Unit 1	20.06.2001.
Edwin I. Hatch Nuclear Plant, Units 1 and 2	15.01.2002.
Turkey Point Nuclear Plant, Units 3 and 4	06.06.2002.
North Anna, Units 1 and 2	20.03.2003.
Surry, Units 1 and 2	20.03.2003.
Peach Bottom, Units 2 and 3	07.05.2003.
NPPs which are sent the Application for License Renewal and date when the Application is received by NRC	
McGuire, Units 1&2, and Catawba, Units 1&2 – Joint application	14.06.2001.
St. Lucie, Units 1 and 2	30.11.2001.
Fort Calhoun Station, Unit 1	11.01.2002.
H.B. Robinson Nuclear Plant, Unit 2	17.06.2002.
R.E. Ginna Nuclear Power Plant, Unit 1	01.08.2002.
V.C. Summer Nuclear Station, Unit 1	06.08.2002.
Dresden, Units 2 and 3	03.01.2003.
Quad Cities, Units 1 and 2	03.01.2003.
NPPs from which the Applications are expected and expected date of Application	
Farley, Units 1 and 2	September 2003.
Arkansas Nuclear One, Unit 2	October 2003.
Nine Mile Point, Units 1 and 2	October 2003.
D.C. Cook, Units 1 and 2	November 2003.
Browns Ferry, Units 1, 2 and 3	December 2003.
Millstone, Units 2 and 3	January 2004.
Not Publicly Announced (Unit 1 and 2)	February 2004.
Beaver Valley, Units 1 and 2	September 2004.
Not Publicly Announced	October 2004.
Brunswick, Units 1 and 2	December 2004.
Davis – Besse	December 2004.
Pilgrim, Unit 1	December 2004.
Not Publicly Announced	March 2006.
Susquehanna, Units 1 and 2	July – Sept. 2006.
Entergy Plant	July 2006.

6 CONCLUSION

Based on analysis of the U.S. Regulations, already approved applications for NPPs license renewal in U.S.A., good practices, industry experiences and lessons learned it is clear that the license renewal is efficient and regulatory and industry fully support process for life extension of the NPPs as well as accepted methods for maintain and (in some cases) increase the energy production capacity with reasonable investments (low costs-high benefits - low US\$/kW). Also, current status of the Krško NPP facility, implemented activities as well as planned activities provide realistic framework for the start of the activities which will lead to the formal decision if and when the license renewal activities will start and when the application should be submitted to the regulatory body (SNSA). Of course, the appropriate feasibility study should be prepared. As already stated in this paper, formal application should be submitted as early as 20 years or as late as 5 years before the expiration of its current license and in Krško NPP case that means between year 2003. and 2018.

REFERENCES

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