

The Application of Long Term Asset Management (LTAM) Strategy of KHNP

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1. Introduction

In KHNP, 20 units of Nuclear Power Plants (NPP) are operating and 6 units are under construction. As increase of the number of power plants and operating year, it is needed to develop the integrated cost-effective asset management. Long Term Asset Management (LTAM) strategy is the process by which the nuclear power plants integrate operations, maintenance, engineering, regulatory, and economic planning activities. This paper introduces the application of LTAM strategy of nuclear power plants.

2. LTAM

2.1 Equipment Reliability Process

Equipment reliability (Equipment Reliability) process of nuclear plants shows in Fig.1 [1]. ER process is one of an integrated set of processes for the operation and support of nuclear plants. This process includes activities normally associated with such programs as reliability centered maintenance (RCM), preventive maintenance (periodic, predictive, and planned), maintenance rule, surveillance and testing, life cycle management (LCM) planning and equipment performance and condition monitoring. In ER process, LCM integrates aging management and economic planning to optimize the operation, maintenance, and service life of systems, structures and components (SSCs).

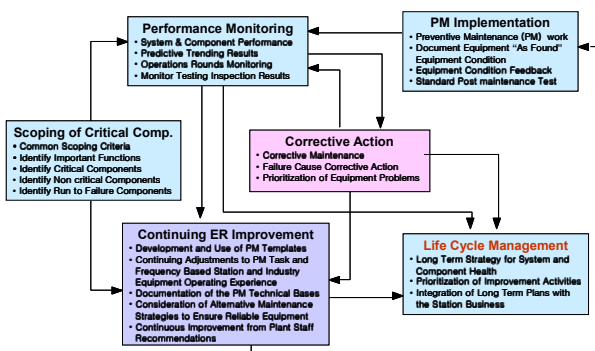


Figure 1. Equipment Reliability Process.

2.2 The purpose of LTAM

Figure 2 shows the purpose of LTAM. There are 4 purposes to achieve LTAM strategy, and the most importance purpose is safety of nuclear plants. To

achieve given purposes, LTAM strategy improve plants condition, maximize plant value and optimize operation life.

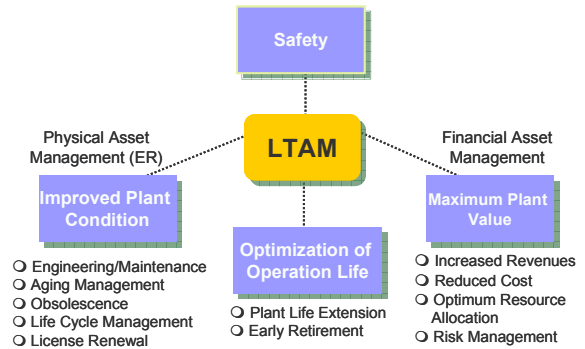


Figure 2. The purpose of LTAM.

2.3 LTAM strategy Process

LCM is a long-range plan for preventive maintenance, replacement, refurbishment and/or redesign of an SSC important to safety and reliability that optimizes the SSC's contribution to plant value. LTAM is the process that establishes long term asset management strategy for major equipment to apply LCM process [2].

Figure 3 shows LTAM strategy flowchart. The first step in SSC Level LCM is to identify the SSCs important to plant safety, availability and economics and select SSCs for LCM. The second step (technical evaluation) should consider the performance and aging assessment for the operating history both of the SCC at the plant in which it is installed and of SSCs in similar applications throughout the industry. The third step is economic evaluation by which failure rate and cost data

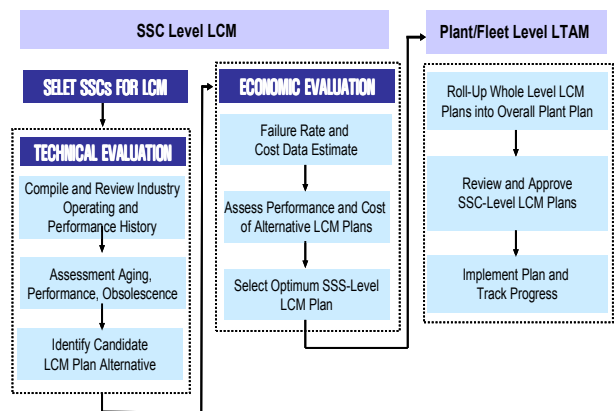


Figure 3. LTAM Strategy Flowchart.

estimation, and identify candidate LCM plan alternatives. The last step is plant/fleet level LTAM that roll-up whole level LCM plants.

3. The Application of LTAM for KHNP

3.1 Screening Process of SSCs

The SSCs were selected to apply LTAM for major equipment of power plants. Figure 4 shows the screening process to select SSC for KHNP LTAM strategy [3]. This process has 2 steps. The first step is initial classification of SSCs. In plant SSCs list, SSCs should initially classification. Next step, it is decided the priority of SSCs by technical evaluation (Delphi method) for initially classification of SSCs. This LTAM strategy is applied to model NPP.

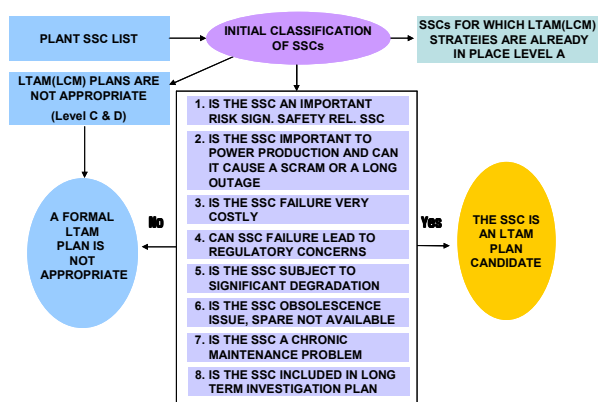


Figure 4. Screening Process to Select SSCs for LTAM.

The FID (Functional Important Determination) was investigated to select SSCs for 1st step. Table 1 shows the result of level A & B for model NPP FID. Among 100,000 equipments in the FID, level A & B equipments are approximately 15,000. Structures are referred O&M of model NPP and international experience independently because structure doesn't classify in FID.

Table 1 Level A & B SSCs in Model NPP

Group	Selection Basis	Screening Result		Selected Equipment
FID	Level A & B*	Machinery	3,000	Total 15,000 equipment
		Electricity	5,000	
		I&C	7,000	

Level A : Critical SSCs

Level B : Important SSCs

The candidate SSCs were selected for applying to one of following 7 screening criteria.

- SSCs for Long & Middle Term Investment Planning of the Entire KHNP NPPs
- SSCs of LCM Implementation and LCM Sourcebook for individual NPPs in US

- SSCs requested to EPRI for publishing LCM Sourcebook
- Top 20 SSCs of Preventive Replacement Implementation in US NPPs
- More than \$ 1,000,000 purchasing price
- SSCs of Benchmarking NPPs (Exelon's LTAM Strategy)
- Review Result from Final Report for I&C Facility Improvement in KHNP NPPs

In the 2nd step, the priority of SSCs was decided by technical evaluation for candidate SSCs. The SSCs were evaluated using Delphi method in EPRI method [3].

4. Conclusion

The LTAM strategy will be introduced for safety, performance, and economic concerns of NPP. LTAM strategies were under development for model. The candidate SSCs were decided using screening process for machinery, electricity, I&C, and structure. The SSCs were compiled and reviewed plant operating, aging assessment, performance history, and current maintenance plan.

REFERENCES

- [1] INPO AP-913, Equipment Reliability Process Description, 2001.
- [2] EPRI, Life Cycle Management Planning Sourcebook – Overview Report, 1003058, December 2001.
- [2] EPRI TR-1000806, Demonstration of Life Cycle Management Planning for Systems, Structure, and Components, 2001.