CONFIGURATION MANAGEMENT OF DESIGN REQUIREMENTS FOR NUCLEAR FUEL CYCLE FACILITY

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Abstract

This study introduces a system that can confirm whether all requirements are satisfied, by systematically managing from the highest design requirements to the requirements for the lowest unit devices of the PRIDE (Pyroprocess Integrated Demonstration) facility through the mutual relationships, and effectively trace the influences of the requirement changes. As a result of verifying the validity of technology traceability with sample data input, it was confirmed that, when pyroprocess separation process is designed in Inert (Ar) gas atmosphere, from the top requirements of pyroprocess, to the capacity and electricity of Chiller unit, which is the unit process device composing Ar cooling system, and down to the requirements for the type can be effectively traced.

Introduction

PRIDE facility handling the spent fuel is a complex facility with the highest priority in the economic feasibility and stability, unlike general industrial facilities. Pyroprocess technology is mainly classified to 3 processes, head-end process, pyroprocess separation process, and system engineering process. The requirements to be complied with, related to the safety of nuclear fuel cycle facility such as PRIDE, are explained in detail in the following documents. A need to minimize security risk, proliferation hazards, and safety risks in the design of new nuclear facilities was emphasized by (Robert S. Bean et al., 2009).

Nuclear Fuel Cycle S/F System Engineering

To manage full-life cycle project of pyroprocess system, we collectively analyzed system engineering procedure suggested by internationally standardized ISO/IEC 15288 and Hanford Site material which has the experience of being applied to spent fuel facility, and newly made the system engineering technique suitable for pyroprocess system. The designed pyroprocess system engineering model is shown in Fig. 2. The top left of Fig. 2 shows the requirements in a typical V model. Top left explains the technical process suggested by ISO 15288. Nuclear fuel cycle spent fuel system engineering to be used for pyroprocess system engineering is reflected with consideration of the characteristics of head-end process, pyroprocess separation process, and system engineering process.

Conclusion

Pyroprocess system engineering and project management technology are high value technologies with big technical ripple effect toward nuclear power and general industry, so it will be born again as a competitive technology that can greatly contribute to the nuclear power industry as a technology that can guarantee the safety and economic feasibility in the nuclear power plant facility construction and safety measure field.

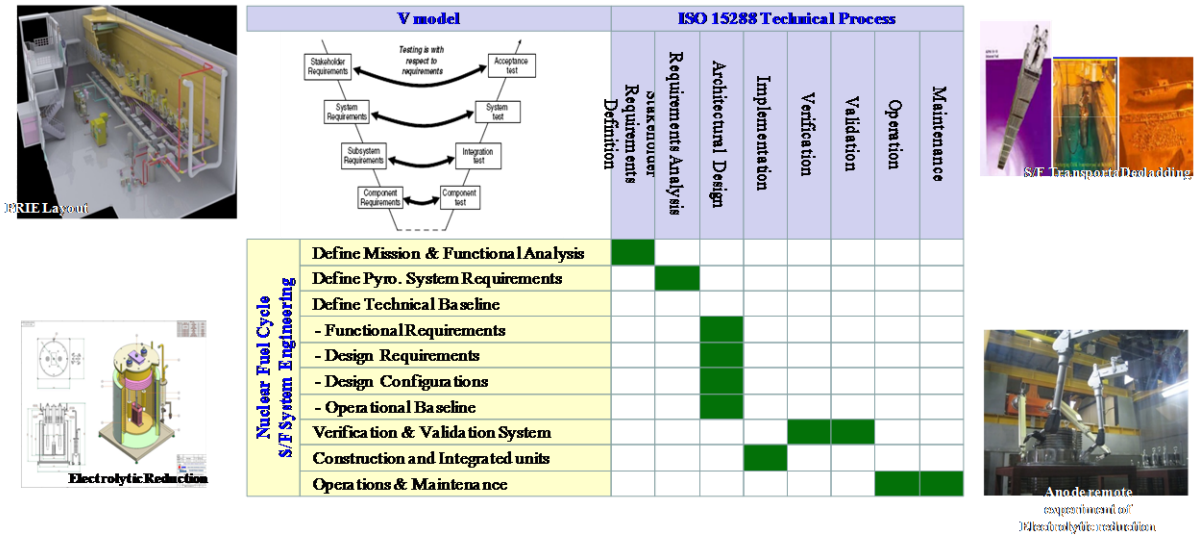

Figure 5. Nuclear fuel cycle S/F system engineering and technical process

Reference

Robert S. Bean., John W. Hockert., David J. Hebditch., 2009. Integrating Safeguards and Security with Safety into Deign. 19th Annual EFCOG Safety Analysis Workshop.