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Procurement Engineering Process for Commercial Grade Item Dedication

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1. Introduction

Procurement Engineering Process for commercial grade item dedication plays an increasingly important role in operation management of Korea Nuclear Power Plants. The purpose of the Procurement Engineering Process is the provision and assurance of a high quality and quantity of spare, replacement, retrofit and new parts and equipment while maximizing plant availability, minimizing downtime due to parts unavailability and providing reasonable overall program and inventory cost.

In this paper, we will review the overview requirements, responsibilities and the process for demonstrating with reasonable assurance that a procured item for potential nuclear safety related services or other essential plant service is adequate with reasonable assurance for its application.

This paper does not cover the details of technical evaluation, selecting critical characteristics, selecting acceptance methods, performing failure modes and effects analysis, performing source surveillance, performing quality surveys, performing special tests and inspections, and the other aspects of effective Procurement Engineering and Commercial Grade Item Dedication. The main contribution of this paper is to provide the provision of an overview of Procurement Engineering Process for commercial grade item.

2. Role and Accountabilities

2.1 General Role and Accountabilities for Procurement Engineering

Procurement Engineering is not officially defined in regulations, standards, or codes. For effective support to nuclear power plants Procurement Engineering is typically recognized as the activities associated with preparing purchase requisitions, purchase orders, drawings, contracts, specifications, instructions, and acceptance methods used to define requirements for purchasing and accepting parts and equipment for safety related service.

- Review or classification of items as safety related, non-safety related or some other functional category
- Generation and development of Acceptance or quality verification requirements
- Evaluation of alternate items for safety, fit, function, interface, and interchangeability for replacement items
- Determination and completion of functional analysis and failure modes and effects, as necessary, for replacement or new items to determine that an item either may be procured as a non-safety related functional item, or an item must be procured for ultimate safety related function
- Determination of prudent, cost-effective, and licensing based method to procure items if for ultimate use in safety related functions

2.2 Overall Procurement Engineering Process, Concepts, Requirements, and Approval

The USNRC defines Dedication Entity as follows in Title 10 Code of Federal Regulations Part 21, subsection 3 (10CFR21.3). [1]
When applied to nuclear power plants licensed pursuant to 10 CFR Part 50, dedicating entity means the organization that performs the dedication process. Dedication may be performed by the manufacturer of the item, a third-party dedicating entity, or the licensee itself. The dedicating entity is responsible for identifying and evaluating deviations, reporting defects and failures to comply for the dedicated item, and maintaining auditable records of the dedication process.

2.3 Requirement

The dedication Entity is required to perform the technical evaluation and the acceptance process as defined below:

The dedication process (including both a technical evaluation and acceptance method) of verifying that a commercial grade item (including equipment, parts, materials and services) is acceptable or suitable, with reasonable assurance, for Quality Class Q or Safety Related (SR) service as defined by the utilities (equivalent to USNRC Basic Component).

The verification or dedication process activities performed by the “dedicating entity” may consist of one or more of the following four methods (or combinations therof). [2]

1) special tests and inspections
2) commercial grade survey or evaluation of supplier
3) source verification or process item inspection
4) acceptable supplier/item performance record.

2.3 Procedures for Approval

The Dedication Entity must perform the Commercial Grade Item Dedication under the provisions of 10CFR50 Appendix B.[3] The approval must meet 10CFR21 and the regulatory inspection guidance of USNRC. Consequently, the selection of the Dedication Entity must include the followings.

- a thorough assessment of the Dedication Entity capability, conducted by experts in Commercial Grade Item Dedication requirements,
- a special focus on verifying technical competence of the supplier,

- a review of completed Dedication Packages with the requirement to confirm adequacy of the Dedication Process, and
- a review that must include Mechanical, Electrical, and I&C equipment.

2.4 Employees

All Employees who are performing Procurement Engineering tasks are responsible for applying sound engineering analysis, and reasonable assurance techniques. The Employee, including the Procurement Engineer and any reviewer or auditor, are to assure that the acceptance process does achieve equivalence or equivalent performance to an item procured as a 10CFR 50 Appendix B and 10 CFR21 item to meet the required function with reasonable assurance. This demonstrates the commercial grade item dedication is sufficient for the item to be designated as a Basic. The process shall also consider the USNRC Generic Letters 89-02 and 91-05, and perspectives of Inspection Procedure 38703 and EPRI TR-102260.

2.5 Individual Functions

The Individual assigned responsibility for any activities in Procedure shall have the training, qualifications, competence, and management specific approval necessary to perform effectively their assigned tasks including specific Procurement Engineering and Commercial Grade Item Dedication knowledge. Many job titles or descriptions can exist for the professionals providing or supporting the Procurement Engineering Evaluation Process. Consequently, the six individual functions are normally organized necessary to be performed, not the job title or seniority of the technical position an individual may have.

3. Procedure Development

We have overview the procurement engineering process for the commercial grade item dedication and develop the working steps as follows. The first step establishes the need for an item considering the item's safety function/classification. The most important information is a detailed technical description of the item needed, and clearly stated details for where that item will be used (i.e., safety function, harsh environment, etc.). The second step is the determination or creation of adequate technical and quality procurement requirements to procure an item. [4] If adequate requirements do not exist, they must be established. The third step is selection of a procurement scenario and Supplier. Determination is given to item (or service) suppliers meeting the established technical and quality procurement requirements. Consideration is also given to whether the utility or the supplier quality assurance program will be applied to the procurement of the item. Subsequent to meeting established technical and quality requirements, then item cost, availability, and commercial terms are considered. The fourth step is establish acceptance criteria and acceptance methods. [5] The acceptance criteria to provide reasonable assurance that the item meets the established technical and quality procurement requirements are established as per the appropriate procedure of Clause 3 (the critical characteristics for both design and acceptance for Commercial Grade Item Dedication). In addition, acceptance methods 1, 2, 3, 4, or a combination of methods, are selected to provide objective evidence that acceptance criteria have been met. The fifth step is preparation and placement of the purchase order. The Commercial Grade Item Dedication process (this may be a team effort) determines and supplies technical and quality procurement requirements for incorporation into the purchase order as per standard process. Commercial terms, including requirements for certification are also included, and the purchase order is placed with the selected supplier. This step also includes resolution of any exceptions to purchase order requirements taken by the supplier. The final step is commercial grade item acceptance. This step is the successful completion of the documented acceptance criteria and requirements which generate the objective evidence that acceptance criteria have been met as indicated the following figure.

4. Conclusion

In this paper, we have overviewed and developed the working steps of Procurement Engineering Process for Commercial Grade Item Dedication. This working steps will be applicable to develop the specific detailed procurement engineering related procedures for operating nuclear power plant in korea.

The key provisions of the Procurement Engineering function tasks are the Commercial Grade Item Dedication equivalency to 10 CFR 50 Appendix B and item safety classification/item procurement classification and four generally recognized acceptance methods.

REFERENCES

[1] 10 CFR Part 21, Reporting of Defects and Non-compliance.

[2] 10 CFR 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants.

[3] EPRI NP-5652, Final Report (NCIG-07) Nuclear Issues Group and Electric Power Research Institute NCIG/EPRI), Guideline for Utilization of Commercial Grade Items in Nuclear Safety-Related Applications, June 1988.

[4] EPRI NP6406, (NCIG-11), "Guidelines for the Technical Evaluation of Replacement Items in Nuclear Power Plants", August 1989.

[5] EPRI NP-6629, (Project Q101-18) Final Report, "Guidelines for the Procurement and Receipt of Items for Nuclear Power Plants", May 1990 (NCIG-15)