Reliability Improvement of Commercial Grade Item Dedication due to Reduction of Domestic NPP Market

Dong Suk Lee[a]* and Jin Weon Kim[a]
[a] *Dept. of Nuclear Engineering, Chosun Univ., 309 Pilmun-Daero, Dong-Gu, Gwangju 61452*
[*] *Corresponding author: go_lds81@hanmail.net*

1. Introduction

Domestic NPPs(nuclear power plants) market has been phased out over the next 60 years, and the NPP industry is currently facing rapid changes. As a result, the manufacturers of nuclear safety related items are giving up keeping their nuclear quality assurance programs. For this reason, the quantity of items requested by CGID (Commercial Grade Item Dedication) is increasing. Therefore, this thesis describes the most important acceptance method in the CGID verification procedure

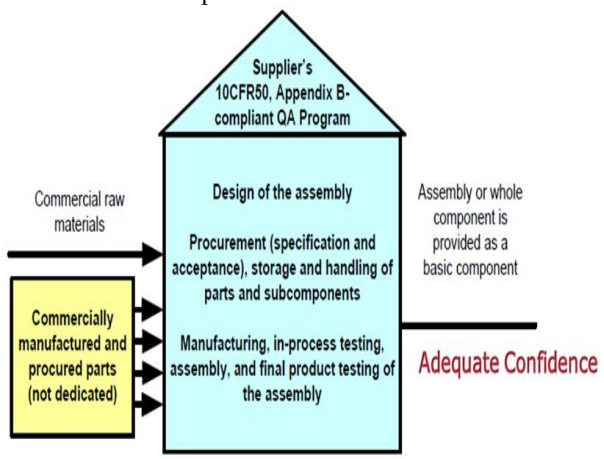

Fig. 1. Controlling an assembly or whole component under a nuclear QA program [1]

2. Methods and Results

The CGID verification procedure is applied to the technical evaluation method and the acceptance method. Particularly, the acceptance method procedure is summarized as follows [2][3]

2.1 Methods #1 "Special Tests and Inspection"

Method 1 should be used when the purchaser desires to verify critical characteristics after the item is received. The purchaser can apply this method to all commercial grade items when sufficient data exists to perform appropriate inspections and tests. However, Method 1 is most appropriate for:

(a) Items furnished from multiple suppliers,
(b) Items that are relatively simple in nature, and
(c)Items on which post-installation tests can be conducted to verify critical characteristics

The critical characteristics data is generally available in existing documents such as specifications, drawings, instruction manuals, bills of material, and catalogs. Interface with the supplier may be necessary to obtain the required data. Where sufficient data to utilize Method 1 cannot be obtained from suppliers because of proprietary considerations other method of acceptance must be considered. In summary, Method 1 is valuable because the purchaser controls the verification of selected critical characteristics utilizing special tests and inspections.

2.2 Methods #2 "Survey of Commercial Supplier"

The survey is a means by which the purchaser can take credit for commercial controls that the supplier exercises on a given item or line of replacement items. Method 2 should be used when the purchaser desired to accept commercial grade items based on the merits of a supplier's commercial quality controls. These controls may constitute quality programs, procedures, or practices. Significant technical and quality information about a supplier's line of replacement items can be obtained during the survey. This information can subsequently be used in other acceptance scenarios as necessary.
Where a supplier demonstrates adequate controls, only verification of the part number and the supplier's certificate of conformance is required during the standard receipt inspection to complete item acceptance. Maximizing reliance on the supplier's controls will minimize the need to augment acceptance with Method 1 upon receipt.

2.3 Methods #3 "Source Verification"

Method 3 involves the verification of critical characteristics by witnessing quality activities before releasing the item for shipment. The source verification is best applied to a single item or shipment of items. Although a commercial grade survey (Method 2) is intended to qualify a supplier's entire scope of commercial grade quality control activities, a source verification is more suited for items procured on an infrequent or expedited basis.

When it is confirmed during a source verification that the supplier adequately controls the critical

characteristics, only verification of the part number is required upon receipt. The item is accepted upon completion of the standard receipt inspection and documentation of the source verification results.

Table I: Example of applying - Method 3 to pump impeller

Selected critical characteristics	Source verification activities
Surface hardness	Witness heat treatment process prior to milling
Homogeneity of the blanks	Witness NDE
Dimensions/configuration	Witness NDE
Balance at design RPM	Witness supplier's balancing test for impellers

2.4 Methods #4 "Item/Vendor Performance"

Method 4 allows the purchaser to accept commercial grade items based upon a confidence in the supplied item achieved through proven performance of the item. It also allows the purchaser to take credit for item performance based upon historical verification gained from the utilization of method 1, 2, or 3 or pertinent industry-wide performance data. Method 4 can be applied to many commercial grade items.

Method 4 is a valuable means to accept commercial grade items because it relies on proven historical performance. Care should be utilized in application of this method to ensure that performance data used is directly applicable to the verification of the critical characteristics specific to the intended application.

3. Conclusions

The acceptance method may be used in combinations to effectively verify critical characteristics and produce the objective evidences necessary to provide reasonable assurance of acceptability. In summary, method 1 should be used to verify critical characteristic by performing tests or inspections upon or after receipt of an item. Method 2 and 3 should be used to take credit the controls exercised by the supplier by conducting, respectively, a supplier survey or source verification of the supplier. Method 4, once established and documented, should be used take credit for proven historical performance of the supplier/item.

REFERENCES

[1] Quality Assurance criteria for nuclear power plant and fuel reprocessing plants. 10 CFR50, Appendix 8, November 1987
[2] EPRI TR-3002002982[Guideline for the Acceptance of Commercial-Grade Items in Nuclear Safety-Related Applications
[3] EPRI TR-017218-R1, Guideline for Sampling in the Commercial-Grade Item Acceptance Process