A Study on Classification Cases in UAE BNPP Focused on Physical Breakdown Structure for the Establishment of Intelligent Export Control System

Seung-hyo Yang, Jae-woong Tae, Dong-hoon Shin
Korea Institute of Nuclear Nonproliferation and Control, Nuclear Export Control Div., Yusungdae-ro 1534, Yusung-gu, Daejeon, Korea, 305-348
Corresponding author: nucleo@kinac.re.kr

1. Introduction

The international society has standardized strategic item export control through UNSC Resolution 1540 [1], and as a nuclear supplier due to its exporting commercial nuclear power plants to UAE, Korea is required to take unlimited liability to reinforce the international nuclear nonproliferation system. Thus, by reflecting NSG Guidelines (INFCIRC/254) [2] on its domestic acts [3], the Korean government classifies thousands of items and technologies related to nuclear power plants exported to UAE and carries out export licenses thoroughly.

However, NSG Export Control Guidelines apply a special concept called EDP as a control list standard. NSG and the international society haven't suggested a clear standard for EDP, but recommended every member of NSG to establish their own standard and control strategic item export [4].

As a result, it is hard to sustain objectivity and consistency in examining thousands of items and technologies related to nuclear power plants through the existing methods that classifies strategic items with limited human resources. Its long processing time may bring about a financial burden to the related companies as well. Accordingly, it is more required to establish Intelligent eXport Control System (IXCS) [5] than ever before so that a great many of strategic items can be effectively processed.

To provide basic data used to establish IXCS, this study analyzed classification cases of Braka Nuclear Power Plant (BNPP) in UAE mainly focusing on Physical Breakdown Structure (PBS).

2. Methods and Results

Including the nuclear reactor exported to UAE, a nuclear power plant consists of NSSS (Nuclear Steam Supply System) surrounding a nuclear reactor, turbine and power generating systems that receive and use steam to spin a power generator, engineered safety systems, power transmission and distribution systems, instrumentation and control systems and other auxiliary systems.

There are over 100 kinds of systems included in a nuclear power plant, and each system is composed of about 100,000 devices and about 2 million parts. Therefore, Physical Breakdown Structure (PBS) is applied to their nuclear power plant construction projects for a systematic management of items and technologies.

Since PBS is associated with Export Control Classification Number (ECCN) on Notice on Trade of Strategic Items [6], this study attempted to statistically analyze classification cases based on PBS and seek a possibility if the results could be used for the development of IXCS.

2.1 Results of Analyzing the Entire Present Classification Requests

This study selected strategic item classification requests from April, 2010 to July, 2012 related to commercial nuclear plants exported to UAE as analysis subjects. Out of all the 2,069 requests, non-strategic items were 1,655 (80%) and strategic items were 414 (20%). The present states are as shown in Table I.

The most requested systems out of all the classification requests were No.400s, which accounted for 53%. Excluding requests that didn't provide PBS information (750 cases), the percentage of No.400s reached up to 83%. It seemed because most of the primary systems were designated as the NSG control list.

It is a problem that the requests without PBS information reached up to 36% (750 cases). To PBS information more actively, it is needed to induce exporters to mandatorily provide PBS information when applying for strategic item classification of nuclear power plant-related items.

Table I: Present States of Classification for Each PBS

PBS	Strategic	Non-Strategic	Total
37~311	1	22	23
400, 410, 412	28	73	101
420, 422	24	146	170
430, 431, 433	203	217	420
440, 441	0	139	139
450, 451	7	264	271
521~657	1	14	15
710~841	7	173	180
-	143	607	750
Total	**414**	**1655**	**2069**

2.2 Results of Analyzing the Strategic Item Classification Rate

This study focused on the ratio of strategic items in

No.400s that account for over 80% out of all the classification requests with PBS information included. The results are as shown in Fig. 1. 51% of No.431 (reactor coolant systems), 35% of No.412 (reactor inner structure systems), 24% of No.420 (nuclear fuel systems) and 33% of No.433 (reactor coolant gas vent systems) were classified into strategic items. Considering the fact that only 4% of all the classification requests for other numbers except No. 400s were classified into strategic items, it is clear that systems (No.400s) connected to the primary cooling systems or related systems were more likely to get classified into strategic items, about 9 to 10 times higher.

No.451 (chemical and optimum control systems) accounted for over 10% out of all requests, but only 3% out of them were classified into strategic items, which were considerably lower than the other 400s systems. It seemed because No.451 systems were excluded from NSG Trigger List although they were the primary systems.

With such a strategic item classification rate for each PBS sufficiently used for the present classification as well as the establishment of IXCS, it will greatly contribute to increasing the efficiency of the present strategic item classification process.

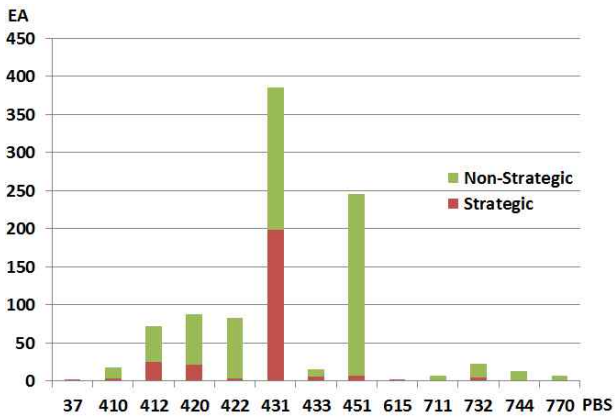

Fig. 1. The Ratio of Strategic Items for Each PBS

2.3 Results of Analyzing the Weight of Strategic Items

This study analyzed the weight of strategic items based on PBS. The results are as shown in Fig. 2. Out of all the 414 cases of strategic items, No.431 (reactor coolant systems) accounted for the highest percentage, 70%, followed by No.412 (reactor inner structure systems), 9%, and No.420 (nuclear fuel systems), 8%. The other systems were below 2% each, whose weight was considerably low.

By ranking every strategic item based on each PBS, the results above can be used to set up priorities and importance when the strategic item classification criterion is developed. This classification criterion for each system can be applied to a future IXCS, further giving practical helps to examiners.

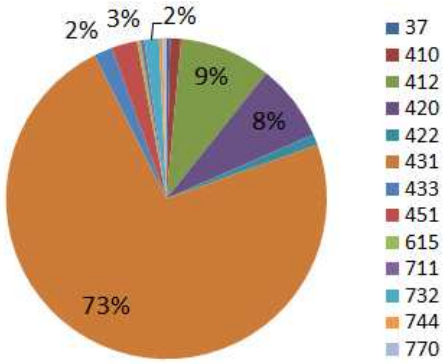

Fig. 2. The Weight of Strategic Items for Each PBS

3. Conclusions

Due to commercial reactors exported to UAE and research reactors exported to Jordan, the number of classification requests is rapidly increasing in Korea. Therefore, it is required to develop IXCS that can assist an efficient and consistent decision on a great many classification request.

This system will be developed to present the possibility that items could be strategic through analyzing characteristics (e.g. name, function, use, purpose, duplication, relation to nuclear activities, etc.).

The result in this study that analyzed the linkage between PBS code and items, one of characteristics (use) cited above, will be used as weighting factor to classify items for developing the system. (e.g. PBS code 431 has weighting factor 0.7.)

In addition, it can be more efficient to sort items which are likely to be strategic among all requests before processing classification requests growing exponentially. It is concluded that the linkage between PBS code and items will be used as filtering factor to select items which could be strategic accordingly.

Henceforth, it is plan to derive highly reliable statistical results between PBS code and items through ongoing collecting and analyzing classification cases. The result will be applied as weighting and filtering factor for developing IXCS.

REFERENCES

[1] Olav njolstad, “Nuclear Proliferation and International Order: Challenges to the Non-Proliferation Treaty”, Routledge, 2010.
[2] IAEA, Guidelines for Nuclear Transfers, INFCIRC/254 /Rev.10/Part1, 2011.
[3] The National Assembly of the Republic of Korea, “Foreign Trade Act”, Act No.11873, Jun.7, 2013.
[4] JaeWoong Tae, DongHoon Shin, A Study on the Systematization of Commodity Classification, Transaction of Korean Nuclear Society Autumn Meeting, Oct.25-26, 2012.
[5] Conceptual Design on the System Architecture of Intellectual Export Control System (IXCS), KINAC, 2013
[6] Ministry of Trade, Industry & Energy, “Notice on Trade of Strategic Items”, Notice No.2013-39, May.31, 2013.