

## The Analysis of Current Job for Nuclear Industries

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### 1. Introduction

According to the national policy of the government on development of National Competency Standards (NCS) which organizes the knowledge, skills and attitudes required to perform the duties at industrial sites and field-centered manpower training through development of a learning module based on NCS, the need for research and analysis of the field-centered jobs of the nuclear industries was created.

A field-centered job system is necessary to lay the systematic ground for training professional manpower at industrial sites of national research institutes, large enterprises and small and medium-sized enterprises of the nuclear industries. This should be carried out by using Human Resources Development (HRD) and the pedagogical method.

Therefore, this research was carried out to understand and analyze the characteristics through a basic survey and a foreign case study for job analysis of the nuclear industries. A document survey and a face-to-face interview by site visit are also conducted for the nuclear industries and the final job system was derived through the verification of industrial site and nuclear power experts by analyzing the job status of the nuclear industries. The detailed R&D method and result are described later.

### 2. Methods and Results

This chapter shows the basic survey, foreign case study for job status of the nuclear industries, job analysis, the process of deriving and verifying the job system in each field and the result thereof.

#### 2.1 Basic Survey of Nuclear Industries

The job analysis and employment in the nuclear power related industry in Korea are currently based on National Competency Standards (NCS) which is developed by the government to organize the knowledge, skills and attitudes required to perform the duties at industrial sites. The basic survey is conducted to apply NCS to the domestic nuclear power supply industry and the details are as follows.

The domestic nuclear power supply industry is broadly categorized as nuclear power generation, supply,

resource, public institutions and universities. Among them, the nuclear power supply industry has five middle categories which are construction and operation of nuclear power plant, nuclear power safety, nuclear power resource, nuclear power support and management and other field.

For the scale of the nuclear industries, the small and medium-sized enterprises occupied the biggest portion which was 83% of the entire nuclear industries, mid-sized enterprises occupied 9.4% and large enterprises occupied 7.6% in order.

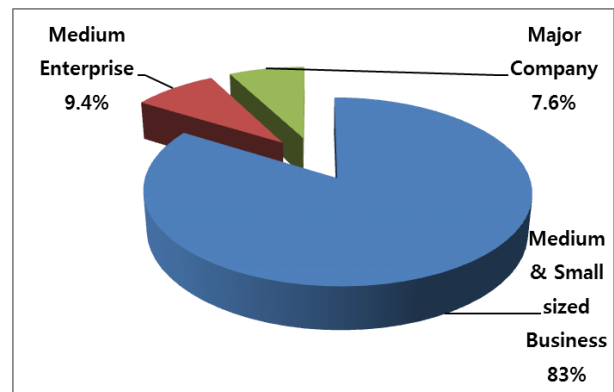


Fig. 1. Scale of nuclear industries

For the industrial classification of the nuclear industries, the manufacturing occupied the biggest portion which was 51.6%, the services occupied 21.5%, the construction occupied 16.6%, the design occupied 9% and the trade occupied the smallest portion which was 1.3%.

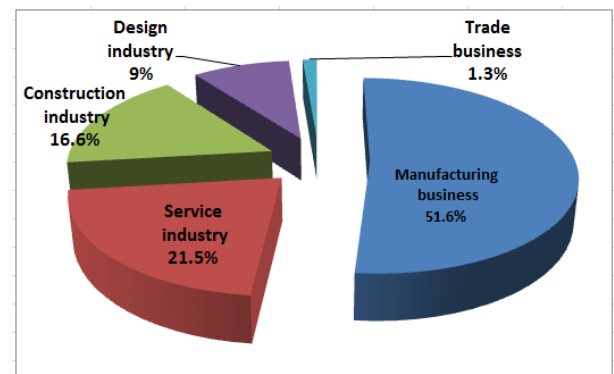


Fig. 2. Industrial classification of nuclear industries

## 2.2 Foreign Case Study & Analysis of Job Analysis of Nuclear industries

This part briefly discloses the result of research and analysis of foreign job analysis case in the U.S. and OECD/NEA following the basic survey on the domestic nuclear industries.

The fundamental job analysis in the U.S. is managed by the Office of Personnel Management (OPM) and the specific standards are established and used by each institute. The job description derived by the job analysis is used as basic data for determining the salary system, series of job and job grade.

The job analysis method used in the U.S. is collecting information of the job, setting job skills, classifications standards, Subject Matter Expert (SME) and performance standards and deriving Job Analysis Worksheet for Tasks including the importance and frequency of the corresponding task.

The job analysis in OECD/NEA is mainly managed by the Cabinet Office but unlike the job analysis in the U.S, each institute is allowed to use its discretion to customize the job analysis suited to each institute rather than uniform job analysis. The importance of job analysis in the nuclear power industry of OECD/NEA has been increased since the early 2000s when the a large number of retirement due to aging of the first generation nuclear power experts and the decline of training institutes have become issued. Nowadays, the job analysis in the nuclear power field is consistently conducted.

## 2.3 Job Analysis of Nuclear industries and Deriving Job System

We classified the domestic nuclear industries above and accordingly carried out job analysis focusing on the enterprises, institutes and industries currently running the business in the nuclear power related field.

The Focus Group Interview (FGI) was selected as the job analysis method of the nuclear industries. FGI is one way of qualitative research which is gathering the subjects of the research and having debate about the purpose of research in a unsystematic free atmosphere. FGI has an advantage of obtaining more useful information compared to interviewing the members individually and can increase the quality of result by encouraging the members to actively voice their opinion with other member's opinion.

We conducted the job analysis for the selected enterprises, institutes and industries by using this job analysis methodology and the job analysis tool developed by Korean Association for Radiation Application (KARA) and the result is as follows.

<b>construction &amp; Operation field</b>	Assessment of welding & maintenance integrity
	Temperature aging assessment (machine equipment)
	Temperature aging assessment (electric equipment)
	Construction management
	Configuration management of nuclear power plant construction
	Structure analysis and design
Operation of nuclear power generation facility	

Fig. 3. Job definition of nuclear power construction operation field

Classification	Definition of job
<b>Safety &amp; research field</b>	Safety analysis (senior level)
	Safety analysis (general level)
	Element technology of decommissioning nuclear power plant
	Nuclear power plant decommissioning
	Artificial disaster impact assessment
	Severe accident analysis
	Probabilistic safety assessment
	Radiological environment
	Nuclear power research
Nuclear fuel engineering	

Fig. 4. Job definition of safety and research field

Classification	Definition of job
<b>Support &amp; management field</b>	Fire safety
	Human engineering
	Seismic & Tectonic geology
	Health assessment
	Quality assurance of overseas business
	Technical information analysis
	Professional human behavior field
	Evaluation and examination
	Radiometric analysis
	Nuclear power plant education and training
	Nuclear power control
	Cyber security
	Treatment and disposal of radioactive waste
	Transfer and storage of radioactive waste

Fig. 5. Job definition of support and management field

Classification	Definition of job
<b>NDT &amp; Other field</b>	Non-destructive testing
	Vibration engineering
	Fluid machinery
	Nuclear power-related facility and equipment
	Machine quality assurance & management
	Calibration of measuring device
	Sales of measuring device
	Material fabrication
	Installation and maintenance of transport and unloader
	Reading and sales of TLD dosimeter

Fig. 6. Job definition of Non-destructive Testing (NDT) and other field

Classification	Definition of job
<b>Nuclear</b>	Design of new nuclear power plant

### **3. Conclusions**

In this research, we obtained various data from the basic survey for the job analysis of the nuclear industries and conducted the research on the enterprise, institute and industry list by the classification of the nuclear industries. We also carried out the case study for domestic and major foreign cases to derive the national application plan and the point of view and accordingly discovered that the job analysis of the small and medium-sized enterprises other than large enterprises and public institutes is extremely poor.

The National Competency Standards (NCS) developed in Korean nuclear power field is limited in the “operation of nuclear power generation facility” and “maintenance of nuclear power generation instrumentation and control facility”.

Korean Association for Radiation Application (KARA) has an experience of developing NCS of “radiation measurement and evaluation” and “radioactive waste management of nuclear power plant” and will develop the job system in the nuclear power supply industry field in this research to use it in the NCS development.

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