

Analysis of Radiation Accident of Non-destructive Inspection and Rational Preparing Bills

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1. Introduction

Recently, non-destructive inspection company is increased and demand of non-destructive inspection from industries is increased in our country, the number of workers for non-destructive inspection is increased, too. But, as increasing of workers and companies, there is increasing of licensing for Radioisotopes (RI) and of accidents.

Especially, after 2006, according to enactment of Non-destructive Inspection Promotion Act, the number of non-destructive inspection companies and corresponding accident is increased sharply.

In this research, it includes characteristic analysis of field of the non-destructive inspection. And from the result of analysis, the purpose of this research is discovering reason for 'Why there is higher accident ratio in non-destructive inspection field, relatively' and preparing effective bill for reducing radiation accidents.

2. Methods and Results

2.1 Analysis of Domestic Research Case

In domestic research, there is 'Study on the safety management of radiation: centering on the radiation workers in medical institutions'[1]. The main content of this study is; 1) survey for radiation related worker 2) grade for safety management by classified subjects (by sex, age, education background, career etc.).

According to this study, the average grade of attitude and action on the radiation safety management is higher with older age, longer career, and higher education background workers.

But this study is limited to medical radiation worker.

2.2 Accident Case Analysis

Because there is no data specialized to non-destructive inspection, it has to use only statistical data.

After enactment of Non-destructive Inspection Promotion Act(2006), as Fig 1. Shown, 58% of accident is from the field of non-destructive inspection. Accident in field of non-destructive inspection is dominant.

Also, from Fig 2, five cases of accidents of non-destructive inspection field are loss accident and two cases are radiation over exposure accident.

The cause of radiation over exposure case is improper maintenance, negligent of safety check, not wearing equipment, and deficiency of understanding for tool.

First two parts are related to employer. Third part is related to both employer and worker. Last part is related to worker education state.

The kind of cause of loss accident is; accidental event for one case and carelessness for four cases.

As a result, 86% of non-destructive inspect field accident is come from deficiency of education.[2]

According to '2011 nuclear safety yearbook'[3], number of radiation worker classified by type of business field is shown as Table 1. As Table 1. shown, the number of non-destructive inspection field is increased every year. And average dose is highest relative to other industries.

According to '2009 Occupational Employment Survey'[4], the average education background of non-destructive inspect worker is 'high school diploma'. Because non-destructive inspect can conduct by anyone who got a non-destructive inspect license, it is less related to education background.

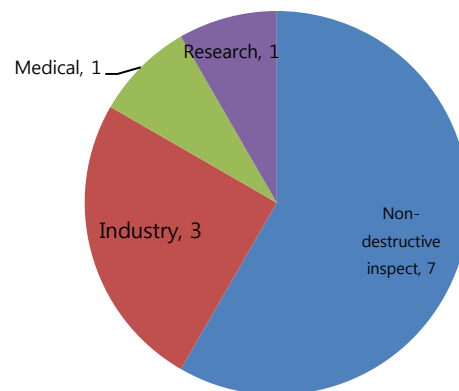


Fig 1. Classification of accident in each business field from 2006 to 2010

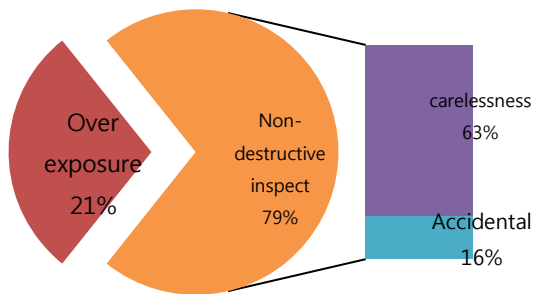


Fig 2. Classification of non-destructive inspect accident according to the cause, from 2006 to 2010

3.3.2 최근 5년간 업종별 종사자수 및 피폭방사선량 현황

(단위 : mSv, 명)

업종별	2007년		2008년		2009년		2010년		2011년	
	종사자수	평균선량	종사자수	평균선량	종사자수	평균선량	종사자수	평균선량	종사자수	평균선량
의료기관	3,111	1.22	3,344	1.00	3,523	0.97	3,833	0.99	4,133	0.96
산업체	5,083	0.76	5,136	0.23	5,123	0.09	5,464	0.10	5,456	0.03
비파괴검사	4,976	2.65	5,323	2.71	5,726	2.25	5,852	2.43	6,075	2.39
생산·판매	959	0.89	1,116	1.20	1,172	0.43	1,243	0.67	1,573	0.53
연구기관	2,024	0.25	1,955	0.08	2,069	0.05	2,062	0.07	2,139	0.05
교육기관	4,451	0.27	4,645	0.09	4,617	0.05	4,876	0.05	4,954	0.05
공공기관	494	0.37	348	0.11	381	0.03	466	0.02	827	0.61
군사기관	37	0.99	256	0.14	257	0.06	236	0.05	241	1.81
원전	11,366	1.13	10,855	0.94	14,118	1.15	13,236	1.20	14,758	0.80
합계	32,501	1.12	32,978	0.95	36,986	0.92	37,268	0.96	40,156	0.81

* 합계의 종사자수는 업종별 중복 인원이 포함된 인원수임

Table 1. Number of worker and average dose classified by type of business field from 2007 to 2011

3. Analysis and conclusion

The number of worker for non-destructive inspect is increased steadily and non-destructive inspect worker take highest dose. Corresponding to these, it must be needed to prepare bills to protect non-destructive inspect workers.

By analysis of accident case, there are many case of carelessness that tools are too heavy to carry it everywhere workers go. And there are some cases caused by deficiency of education that less understanding of radiation and poor operation by less understanding of structure of tools.

Also, there is no data specialized to non-destructive inspect field. So, it has to take information from

statistical data. Because of this, it is hard to analyze non-destructive inspect field accurately.

So, it is required to; 1) preparing rational bills to protect non-destructive inspect workers 2) non-destructive inspect instrument lightening and easy manual which can understandable for low education background people 3) accurate survey data from real worker.

To accomplish these, we needs to do; 1) analyze and comprehend the present law about non-destructive inspect worker 2) understand non-destructive inspect instruments accurately and conduct research for developing material 3) developing rational survey to measuring real condition for non-destructive inspect workers.

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- [4] OES: Occupational Employment Survey, 2009