Revival from Earthquake Disaster and Asbestos Problems

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1. Introduction

Asbestos are used mostly in building materials, for instance sprayed asbestos, cement boards, and so on. At big earthquake disaster, these buildings are destroyed and there are risks that Asbestos will spread in the air.

This paper describes the risk of Asbestos at two big earthquake disasters in Japan, and how to prevent the Asbestos disaster at earthquake disaster.

2. The Asbestos damage at the Hanshin-Awaji Earthquake disaster

2.1 The damages of the Hanshin-Awaji Earthquake disaster (1995)

The damages of the Hanshin-Awaji Earthquake disaster are as follows [1].

- Damage about person ; Death 6,401 persons, Missing 3 persons, Injured 40,092 persons
- Death Reason ; Building Crush 88%, Fire 10% (80% of death is elder people)
- Building Damage ; Completely Destroyed 111,123 buildings 191,617 households, Half Destroyed 137,289 buildings 257,313 households

2.2 The victim of Asbestos

In 2008 and 2009, two demolition workers fell the Mesothelioma. One worker engaged the demolition work of the Hanshin-Awaji Earthquake disaster. He never engaged the demolition work before this earthquake. Another person was the sale

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staff of construction company. After 13 years, the victims of Asbestos were appeared.

2.3 The measure by government

Immediately after the earthquake, the local governments didn't recognize the risk of Asbestos fly. At January 31th 1995, the Environmental Agency (as of today the Ministry of Environment) started to awaken the attention about the risk of Asbestos. And at February 6th 1995, the Environmental Agency started to survey the Asbestos in the air. These measures were too late. After these surveys, the Environmental Agency announced that the density of Asbestos in the air at earthquake area were high at some points in February and March, but after April the density of Asbestos were almost same to the general urban environment. But according to the measurement of the density of Asbestos near the demolition place by NPO, Crocidolite was measured as a quite high density (160-250 f/l).

2.4 The problems of buildings demolition

As for the measurement of buildings demolition, the national government and local government were too late. At July, local government decided and informed the manual for demolition of sprayed Asbestos used in buildings. Citizen and also building demolition workers didn't know the risk of Asbestos and they were defenseless for Asbestos. They didn't use the masks for Asbestos. And the building demolition didn't use the water spray and caused a lot of dust.

Table 1. The usage of sprayed Asbestos in destroyed buildings (March 1995) [2)]

Category	The number of buildings	The possibility of Asbestos usage
Buildings which confirmed Asbestos usage	25	Certain
Buildings which confirmed sprayed material usage and constructed before 1975	15	High
Buildings constructed by steel frame and constructed before 1975 (the usage of sprayed material is not confirmed)	104	Medium
Buildings didn't constructed by steel frame and constructed before 1975 (the usage of sprayed material is not confirmed)	335	Low
Others	745	Few
Total	1,224	

Table 2. Removal of Asbestos in Kobe city (September 1995) [3)]

Category		The number of buildings
Confirmed the Asbestos usage in the buildings before demolition and removed the Asbestos		42
Confirmed the Asbestos usage in the buildings after demolition and removed the Asbestos		2
Confirmed the Asbestos usage in the buildings, but demolished without Asbestos removal	Stopped the demolition by local government recommendation and remove the Asbestos	5
	Stopped the demolition by local government recommendation but almost finished and only disposed the Asbestos	4
	At the local government recommendation, demolitions were finished already	4

At the Hanshin-Awaji Earthquake disaster, the measures of prevent the Asbestos disaster were very poor.

3. The risk of Asbestos fling of the Great East Japan Earthquake disaster

3.1 The damages of the Great East Japan Earthquake disaster (2011)

The damages of the Great East Japan Earthquake disaster are as follows [4)]. These damages are mostly caused by tsunami.

- Damage about person ; Death 15,822 persons, Missing 3,926 persons, Injured 5,942 persons
- Death Reason ;Death by Drowning 92.5% (60% of death is elder people)
- Building Damage ; Completely Destroyed 118,516 buildings, Half Destroyed 180,700buildings

Figure 1. The building destroyed by Tsunami

3.2 The survey of the densities of Asbestos in the air

By the survey of the Ministry of Environment, the densities of Asbestos in the air at earthquake damaged area were as usual. This survey held in the Miyagi pref., Fukushima pref., and Ibaraki pref.. The survey points were 15 points.

The survey by the Ritsumeikan Asbestos Research Project and another bodies indicated less than 10f/l at 47poins.

These results don't show the risk of Asbestos fly. But we have to observe closely.

3.3 Sprayed Asbestos in the destroyed building

The Ritsumeikan Asbestos Research Project found two buildings which are used sprayed Asbestos, one was Crocidolite and another was Amosite. These buildings were not covered.

Figure 2. Crocidolite in the destroyed building

Figure 3. Amosite in the destroyed building

3.4 Asbestos in the rubble

After the Tsunami, a lot of factories were destroyed. These factories used the boards including Asbestos. The rubble of the boards including Asbestos is stocked in the stockyards. In the stockyards, the rubble of the boards including Asbestos is crashed to small pieces. There is the risk of Asbestos fly.

Figure 4. Roof boards including Asbestos

Figure 5. The boards including Asbestos in the stockyards of rubble

3.5 The Asbestos risk of the Great East Japan Earthquake disaster

As for the Great East Japan Earthquake disaster, the risk of Asbestos disaster is lower than the Hanshin Awaji Earthquake. But there are two risks for fly Asbestos. One is the sprayed Asbestos in the buildings damaged by Tsunami, another is the boards including Asbestos. The sprayed Asbestos is open to the air in the buildings damaged by Tsunami and spread in the rubble. The boards including Asbestos are crushed and stocked in the stockyards of huge rubble.

4. The prevention of Asbestos disaster at the disaster

4.1 The Manual decided by the Ministry of the Environment

After the Hanshin Awaji Earthquake, the Ministry of the Environment decided and informed "the Manual of dealings about prevention fly of Asbestos dust at the disasters" in Aug. 2007. But local governments who mention about this manual in local master plan for disaster damage prevention are 13.7%. The local government policies are insufficient.

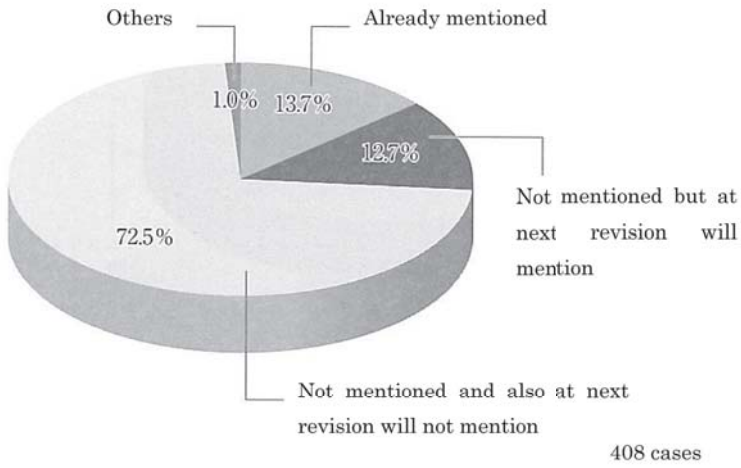

Figure 6. Local governments who mention about the manual in local master plan for disaster damage prevention

4.2 The proposal by Ritsumeikan Asbestos Research Project

In 2010, after 15 years from "the Hanshin Awaji Earthquake", Ritsumeikan Asbestos Research Project announced the ten proposals as follows about the prevention of Asbestos disaster at earthquake in the symposium.

◆ Recognition of Asbestos problems by citizens, national government, local government, enterprises

(1) Recognize the need and importance of Asbestos risk and prevention of Asbestos damages by citizens, national government, local government, enterprises

◆ Measures in the Hanshin-Awaji Earthquake disaster area

(2) Making the comprehensive plan of health monitoring about Asbestos disease for the demolition workers

◆ Measures at normal time

(3) Investigation about the Asbestos used buildings, information, and proceeding of the removal of Asbestos

(4) Completeness of the measures of Asbestos fly and disposal at building demolitions

◆ Measures at earthquake time

(5) Wear the mask

(6) Completeness of the measures of Asbestos fly and safety of workers at destroyed building demolitions

(7) Systematic environmental survey after earthquake

(8) Mention about the manual of the Ministry of the Environment in local master plan for disaster damage prevention and practice

◆ Measures for future

(9) Pursuit the Non-Asbestos social

(10) Establishment of the organization which survey and make the measure about Asbestos problems comprehensively

5. Conclusion

In Japan, the measures of prevent the Asbestos damage at earthquake are almost established. But the practices of the measures are not enough. And it is very important to take the measures of prevent the Asbestos damage in normal time. These facts suggest us the importance of the completeness of measure to prevent Asbestos disaster at earthquake, and also suggest the importance of continuous effort to built Non-Asbestos society at normal time.

Notes

1）Hyogo Prefecture Web Site http://web.pref.hyogo.jp/hukkou/jyoukyou/data17-03.pdf
2）Nakaji S (2008) The environmental monitoring for citizen (in Japanese) , At-works
3）*Ibid.*
4）2011.10.7 National Police Agency

Reference

Miyamoto K, Morinaga K, Ishihara K (eds) (2011) No end Asbestos disaster (in Japanese) , Iwanami-shoten