

Youth Training Center Fire Incident

1. Summary

ç° Location : Hwasung, Kyunggi Province

ç° Date & Time of Fire : at approximately 00:30, Wed., June 30, 1999

ç° Origin of Fire : Dormitory Room 301

ç° Cause of Fire : Ignition by mosquito coils(Police estimate)

ç° Loss : 2nd and 3rd levels of the dormitory were totally destroyed

ç° Casualties : 23 deaths and 5 injuries

2. The Building

The Sea Youth Training Center, in the west coast of Hwasung, Kyunggi Province some 70 km south west of Seoul. It opened in March 1999 and comprised of three buildings, two of which were used as living quarters. The small recreation spot, located on top of a small mountain facing the West Sea, is usually used by kindergarten and primary school children in groups.

In total plottage of 11,605§³, there were a dormitory(1,763§³), restaurant(658§³), and an office(156§³) in the camp area, and it was permitted to use on December 10, 1998.

The dormitory in which the fire began was constructed on a sloping hill so that it appeared to be a 3-story building in a front view and a 2-story building seen from a swimming pool behind the building.

The dormitory was a temporary structure of which first level was made of

concrete blocks and second and third level was made of metal shipping containers of 4m;6m. The dormitory had total 52 rooms, with 2 rows of 13 containers for each story.

The interior wall and ceiling of the container rooms were put over by plywoods of 3mm to which Styrofoams of 30mm were added. And the exterior of the rooms were finished with wooden boards.

The floor of the rooms was covered with vinyl board. The corridor walls of the dormitory were added by plywoods covered with plaster boards. And there was carpets on the corridor floor.

Opening into a door to the room, there was a closet for footwear on the right and a washing room of 2.3m;1.2m on the left, and another door leading into a sleeping room. All the doors were made of wood.

In each room there was a window at opposite side of the entrance to the room and an airconditioner on the wall. It was said that the airconditioner was not in operation when the fire broke out.

Lots of kindergarten and elementary school children had used this camp with a fine view overlooking the sea. Figure 1 shows the arrangement of the buildings and other facilities in this camp. In figure 2 you can see fire spread direction and a ground plan of the dormitory.

Figure 1. Arrangements of the Camp

3. The Fire

According to part time workers who were at the camp office, "at around 01:30, electric lights in the office has suddenly gone out, so we went out to find thick smokes arising from the Room 301 at the end of the dormitory in which many children had been sleeping."

A kindergarten principal who was in the room in front of the Room 301

said, "when I and other teachers were talking about the next day's recreational program we heard screams from the outside, so we went out and found thick smokes soaring from the entrance of the Room 301. We tried to open the door into the room, but flames were so intense that we could not rescue the children," the principal said.

There were a lot of witnesses on the scene at the time of the fire. But their statements were so different from themselves according to their locations at the time of the fire and their positions to the fire that comprehensive analysis on the causes to the fire were required. Police announced the fire first started in the Room 301, based on the fire situations and witnesses' statements. Figure 2 shows the fire routes and a ground plan of the third level of the dormitory.

Total 530 people including 496 children and 34 teachers were in the Youth camp at the time of the fire.

4. Fire Fighting Operations

The fire was reported at approximately 01:41. When the first unit dispatched from Seosin fire station, 9km away from the camp, arrived at the scene, the fire had already engulfed the dormitory so that the first unit and other units which arrived at the camp 20 minutes after the first unit could do little against the fire.

Figure 2. Fire spread direction and the ground plan

Approximately 01:30, kindergarten teachers and other people who recognized the fire rushed into the dormitory trying to rescue the children. But by that time, toxic gases from burning Styrofoams and wooden board spread through main corridor already were filled in all through the corridor to make it very difficult for the rescue operation. Three people including one elementary school teacher were killed in this efforts of saving children.

5. The Damage

Total 23 people, including 19 kindergarten students, 1 teacher, and 3 recreation instructors, were killed and 5 others were injured by this fire. All 18 children in Room 301 and 1 child in Room 223 died in this fire. It was reported that badly damaged 18 deaths in Room 301 were found close to the window.

The third and second levels of the 3-story building were completely destroyed by the fire. Steel frames of 52 shipping containers were also bent and destroyed. Some of the interior finishes and entrance doors between Rooms 213 and 216, and between Rooms 313 and 315 were partly damaged by the fire. Since the strut of the third level's corridor was made of iron pipes, it was easily burnt down.

Table 1. Fire Situations and Responses

Time	Situations	Measures
00:30	fire broke out(supposed)	
01:30	fire recognized	
01:41	first fire report received	lights in teachers' room gone out
01:50	fire spread	fire swept through 2nd and 3rd floors
01:59	1st unit arrived	one pumper arrived, 9km
02:07	2nd unit arrived	one pumper and tanker arrived, 15km
02:10	Inter-Regional Response Order No.1	from Osan Fire Dept., around 30km
02:18	many fire trucks arrived	away from the scene

Picture 1. Camp dormitory from the playground

Picture 2. Camp dormitory from the swimming pool

Picture 1 is the frontal view and picture 2 is a view from behind the dormitory, in which the front side of the first level and parts of second level's wall remained little damaged.

The first level made of concrete blocks was separated from other levels so that it had little fire damage except for partly burned wooden boards of the exterior wall. It was determined that the brand which had fallen from the second and third levels ignited the floor and spread in U type. Fire department estimated the fire caused more than £Ü72 million in terms of property damage.

6. The Analysis

(1) The building

Training Center Buildings including this Youth Training Centers located in the outskirts of cities are not required to have fire resistant structure. However, as this camp is classified into higher than two-story building by the Enforcement Ordinance of the Construction Act and is boarding more than 500 children, it is recommended that it be constructed with fire resistant structure for the purpose of fire prevention. NFPA 101, *Life Safety Code* rules that an educational occupancy shall have at least one hour fire resistance rating. The second and third levels of this camp were a temporary structure made of shipping containers of 1.6mm thick. The containers which had no fire resistance features had been easily destroyed by the fire. The building was falsely recorded as a steel frame building in the official building register.

The second and third levels of the dormitory had 2 rows of 13 containers

for each row in each level. Because the containers were not fixed to columns and not connected with each other, they were exposed to the risk of collapse by storms and floods.

It is desirable for Youth Training Centers to use non-combustible materials in order to reduce fire loads and toxic gases in a fire so that children could evacuate the building safely in an emergency condition. However, this camp building was built with containers of which walls were composed of wooden boards and Styrofoams to result in catastrophic casualties.

(2) Fire protection systems

Buildings in the Sealand Youth Training Center were required to install manual fire alarm systems by Enforcement Decree of the Fire Services Law. However, the camp installed an automatic notification system instead of the alarm system on the grounds that it was used for boarding children and located far away from a fire station. But the automatic notification system had not been maintained properly so that it didn't work when the fire broke out. Undetected the fire was not controlled at its early stage and made the evacuation delayed to result in large casualties. The possible reasons for the automatic notification system didn't work were that the detectors which had been maintained improperly couldn't detect the fire and the fire alarm control panel was off due to its malfunction. In conclusion, it shall be emphasized that installation of appropriate fire protection systems as well as proper maintenance works in normal times were key factors to guarantee the systems' normal function in a fire.

There were 15 ABC fire extinguishers in the building at the time of the fire. But it was reported that many of the extinguishers didn't work due to their bad conditions. The camp's location at the seaside made it easy for dry chemicals in the extinguishers to lump due to corrosion by salt contents and high humidity. Therefore, the charging pressure and conditions of the dry chemicals needed to be checked regularly.

(3) Failure of early fire fighting efforts

The fire was not suppressed in its early stage for its delayed recognition and a long distance to the nearest fire stations. And it was reportedly said that fire engines response was delayed by obstacles on the road leading to the camp. As often pointed out in large cities, it was revealed that road width for fire engines should be secured.

Regions far away from fire stations shall use volunteer fire fighters to suppress fires in its early stage.

(4) Lack of safety mind

The camp was permitted to use in spite of violating the law and run in utter negligence to the safety. For mostly used by young children, the camp should have been constructed with safety in mind from the building planning stage, but this kind of safety mind had been laid aside by the blind pursuit of commercialism.

Children died in this fire were kindergarten students under age seven, who were unable to cope with emergency situations by themselves. Therefore, the teacher's negligence for caring the children was also pointed out to contribute to the tragic loss of young lives.

(5) Insurance

Sealand Youth Training Center was insured against fire for £Ü450 million. The camp also insured the third party liability for maximum £Ü100 million per one person but the liability was limited for maximum payable amount per one accident with £Ü200 million. Therefore, the £Ü200 million should be shared by all the casualties to the disaster.

Although the S kindergarten was insured by Comprehensive Insurance for Infantile Educational Organization, the insured amount payable was limited at maximum £Ü10 million.

The owner of the camp and the said kindergarten should have insured on the basis of Probable Maximum Loss estimation to secure proper compensation in an accident. But they just took out insurances far short of the actual compensations needed.