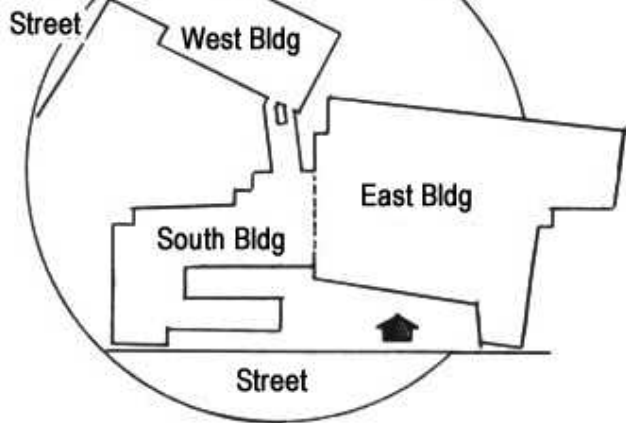
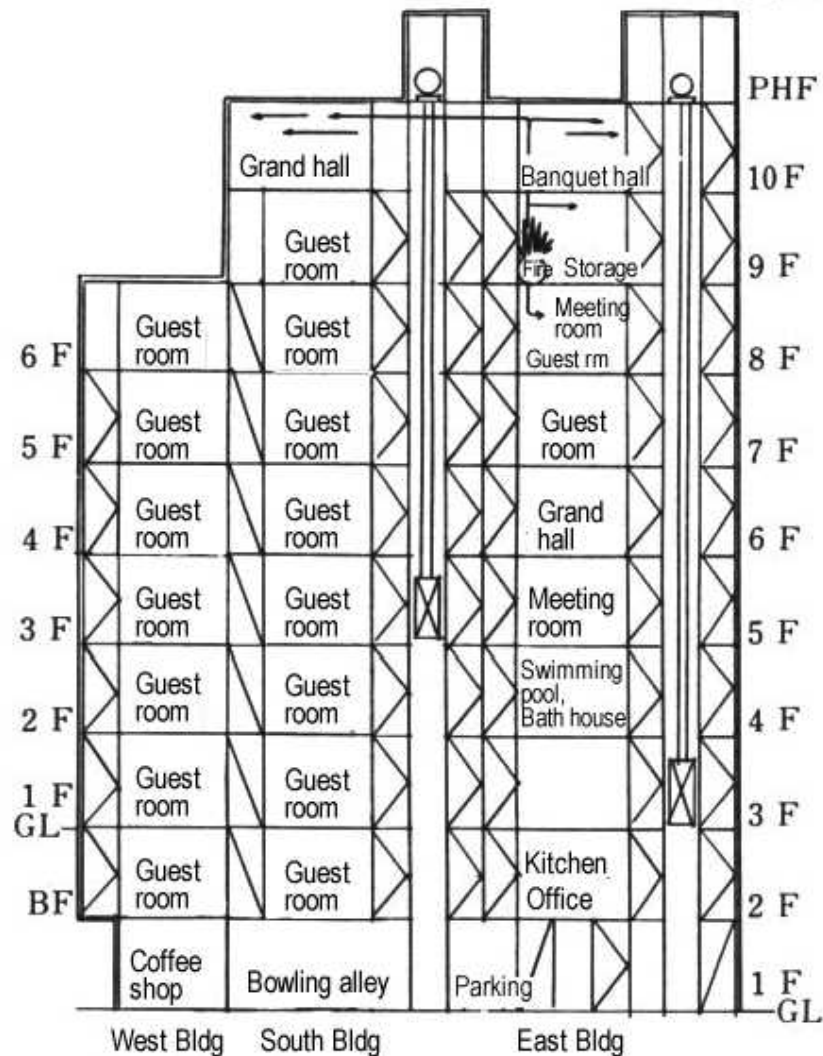
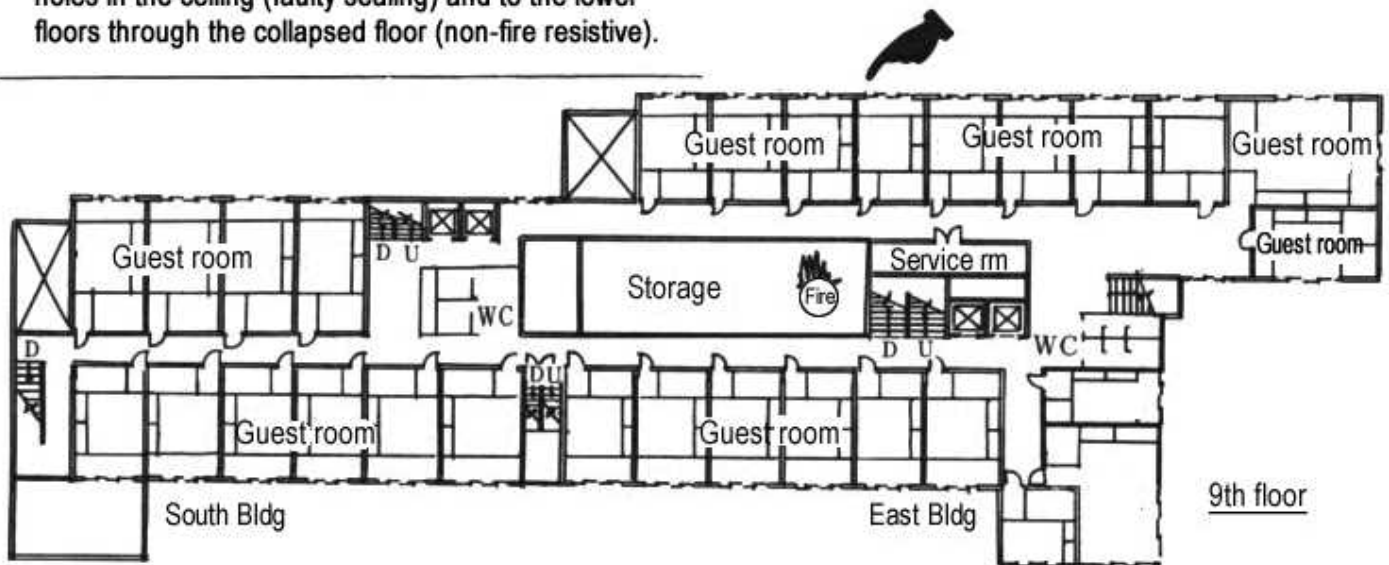


Layout



Note: Presumably, the fire spread to the upper floors through holes in the ceiling (faulty sealing) and to the lower floors through the collapsed floor (non-fire resistive).



Building Name Address	Use (as per FSA Annexed Table 1)	Date and Time of Incident	Structure and Stories Area	Extent of Damage (Damaged Area/ Total Area)	No. of Casualties
Tsuruya Hotel 6-45 Higashikaigan-cho, Atami, SHIZUOKA	Hotel (5) a	Feb. 3, 1970	Fire resistive 10 stories above ground and 1 below Building area 3,208 m ² Total floor area 24,149 m ²	All, Half, Partial , Small 2,450 m ² (10%)	Fatalities 0
		Breakout at 02:00 (approx) Detected at 03:50 Notified by emergency call Extinguished by 6:00			Injured 2 (2)

I. Summary of Fire Incident

(1) Summary This resort hotel fire originated from the 9th floor of a 10-story fire-resistive building and burned on the 8th to 10th floors of the building. Although the fire caused no fatalities, it caused significant damage on the upper floors because the fire room did not have a automatic fire detection system. Despite the fire occurring in the top part of a tall building, no fire ladder truck was dispatched. A delay in discovery and a defect in the floor slab construction caused complete destruction of the upper floors. Although the building had a voluntarily installed sprinkler system on the 10th floor, the sprinkler head did not work because the fire emerged from the ceiling. Many factors facilitated this fire in spreading.

Floor	Total area		Damaged area	Use (Purpose)	No. of persons	No. of fatalities	Fire escape equipment	Firefighting equipment
	East & South Buildings	West bldg						
R	166		166	Elevator Main room			4 sets of inside stairs 56 sets of fire extinguishers (3rd to 7th floors) 48 sets of indoor fire hydrants 36 sets of fire extinguishers (2nd to 4th floors) Sprinkler at 10th floor (Grand hall) Incomplete automatic fire detection system on the East & South Buildings (under construction) 3 sets of water pipe connections	
10	2,006		2006	Grand hall				
⑨	2,318		137	Guest rooms	39			
8	2,303	6 235	141		57			
7	2,303	5 261			38			
6	2,310	4 261			27			
5	2,183	3 261			31			
4	2,153	2 280			23			
3	944	1 282			31			
2	2,390	R1 115		Guestrooms, Kitchen	15			
1	2,501			Lobby, Games room	Workers 79(floors unknown)			
Total	(incl. annexes 877 m ²) 24,149 2,450				340	0		

(3) Origin of Fire	(4) Cause of Fire
(Floor, Room, Part, Combustibles, Habitable/Non-habitable Rooms, Present/Absent) <u>The fire emerged from the storage (122.7 m²) at the center of the 9th floor</u> ○ The circumstances are unknown; however, given the location, there were many combustible materials (tables and cushions) inside the storage room. The fire room floor (steel deck plates) collapsed due to the heat, creating holes through which the fire could spread to lower floors.	Unknown, suspected arson

(5) Fire Propagation Path	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; width: 15%;"> <p>(Location of Fire Source)</p> <p>Storage room on the 9th floor (exact location unknown)</p> </div> <div style="border: 1px solid black; padding: 5px; width: 15%;"> <p>(Propagation from Source)</p> <p>Combustible materials in the room</p> </div> <div style="border: 1px solid black; padding: 5px; width: 40%;"> <p>(Propagation to Lower Floors)</p> <p>Through holes that emerged in the floor slab that collapsed because of the fire and the heat produced from the combustible materials</p> <p>(Propagation to Upper Floors)</p> <ul style="list-style-type: none"> ◦ Through a hole (220x60 mm) that had emerged in the ceiling where the duct which had collapsed because of fire and heat had had pierced through the fire-room ceiling. ◦ Through holes (35 x 2700 mm) in the ceiling (floor slab of the 10th floor) where the clearances were never sealed off after duct construction. </div> </div>							
	<p>The storage room did not have any automatic fire detection system and no-one was around when the fire emerged. The fire burned the combustible materials inside the storage room and spread to the 10th floor via an exhaust air duct that had pierced through the floor slab of the 10th floor. This duct had fallen and created a hole for the fire to spread upward. The fire also spread through the clearance around the duct, which needed to be sealed off when the construction was completed. In addition, the floor slab (deck plates) of the storage room collapsed because of the heat and created holes for the fire to propagate through to the lower floors.</p> <ul style="list-style-type: none"> ○ Main Reasons for Propagation of the Fire <ul style="list-style-type: none"> ◦ There was no automatic fire detection system and no-one was in the room, which delayed discovery of the fire. ◦ There was a significant amount of combustible material in the room. ◦ The fire reached the large hall (10th floor) through the ceiling with sprinkler heads. ◦ Faulty construction of the floor slab (unsealed clearance) and inadequate fire resistance around the ducts and floor slab (deck plates). ○ Smoke Propagation Path <p>The smoke propagated along with the spreading flames. The vertical shaft (stairwell) was not the direct path of propagation to the other floors because the origin of the fire was the 9th floor of the 10-story building, but because of that, the significant amount of smoke probably stalled on the top floor.</p> 							
II. Summary of the Building								
(1) Built Fire Prevention Management	Construction, Completion, and Major Renovations (Completion) October 1960, (Expansion) December 1965							
	(2) Vertical Shafts	(3) Fire Prevention						
	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Stairs [X]</td> <td style="width: 50%;">Duct Spaces [X]</td> </tr> <tr> <td>Elevators [X]</td> <td>Pipe Shafts [X]</td> </tr> <tr> <td>Escalators []</td> <td>Other () [X]</td> </tr> </table>	Stairs [X]	Duct Spaces [X]	Elevators [X]	Pipe Shafts [X]	Escalators []	Other () [X]	<ul style="list-style-type: none"> ◦ The human resource manager was the fire-prevention manager. ◦ The hotel had created and submitted a fire defense plan to the local fire station. ◦ The hotel had organized an in-house firefighting team (50 members). ◦ The hotel carried out a fire drill at least once a year with the local fire station.
	Stairs [X]	Duct Spaces [X]						
	Elevators [X]	Pipe Shafts [X]						
Escalators []	Other () [X]							
The main stairwell (in the center of the building) did not have any fire compartment.								
(4) Fire Compartments	(5) Firefighting Equipment							
<ul style="list-style-type: none"> ◦ The clearance holes in the floor slab were never sealed (size of the holes: 35 x 2,700 mm). ◦ The floor slab of the 9th floor was constructed with a steel deck plate, which was not short on fire resistance. The fire inspector recommended installing a fire compartment for the fire escape facilities in May 1969. 	<ul style="list-style-type: none"> ◦ The fire inspector pointed out that the automatic fire detection system of the East and South Buildings was partially incomplete. ◦ The inspector also recommended replacing the guiding lights according to standards. 							

III. Actions Taken after Fire was Detected									
(1) First Detected	<ul style="list-style-type: none"> ◦ Detected by (Night guard) ◦ How and why (The alarm sounded from the control panel of the automatic fire detection system) ◦ Action taken (Firefighting and a 119 call after the fire location was confirmed) <hr style="border-top: 1px dashed black;"/> <p>Around 3 am, Night Guard I heard an alarm coming from the control panel of the automatic fire detection system when he was relaxing in his office after returning from his night patrol. he saw that the fire was on the 10th floor. On the way to confirm the fire, he met Night Guard N who was patrolling the 6th floor. After a quick briefing, Guard I went to confirm the fire location and tried to extinguish the fire, and Guard N ran down to notify the telephone operator of the fire. The fire location was already filled with heavy smoke. The origin of the fire was a closed storage room with no automatic fire detection system sensors; therefore, it took more than 1 hour for anyone to notice the fire.</p>								
(2) Emergency Call	<table border="0" style="width: 100%;"> <tr> <td style="width: 20%;">Emergency Call</td> <td style="width: 60%;"> Yes <input checked="" type="checkbox"/> (Telephone operator who was woken up by the guard made the 119 call.) </td> <td style="width: 20%; text-align: right;"> Time elapsed since the discovery (4) minutes </td> </tr> <tr> <td></td> <td>No <input type="checkbox"/></td> <td></td> </tr> </table> <hr style="border-top: 1px dashed black;"/> <p>Guard N was on the way to the 5th floor when he heard the local fire alarm, and then on the way to the office on the 2nd floor, he met Guard I in front of the elevator. After talking briefly about what to do, Guard N continued to run down to the office on the 2nd floor and told the telephone operator to make a 119 call.</p>	Emergency Call	Yes <input checked="" type="checkbox"/> (Telephone operator who was woken up by the guard made the 119 call.)	Time elapsed since the discovery (4) minutes		No <input type="checkbox"/>			
Emergency Call	Yes <input checked="" type="checkbox"/> (Telephone operator who was woken up by the guard made the 119 call.)	Time elapsed since the discovery (4) minutes							
	No <input type="checkbox"/>								
(3) Initial Firefighting Activities	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;"></th> <th style="width: 35%;"> Successful <input type="checkbox"/> Failed <input checked="" type="checkbox"/> </th> <th style="width: 50%;"> (Reasons or Conditions) </th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><u>Initiated</u></td> <td> <ul style="list-style-type: none"> ◦ Extinguished timing <input checked="" type="checkbox"/> ◦ Firefighting difficulties <input type="checkbox"/> ◦ Firefighting method <input type="checkbox"/> </td> <td rowspan="2" style="vertical-align: top;"> Guard I rushed to the 10th floor and used the fire extinguisher to extinguish the fire; however, he went down to the 9th floor because of heavy smoke. Two hotel staff members joined him and used the indoor fire hydrant to spray water on the origin of the fire (the storage room on the 9th floor), but their attempts failed because too much time had elapsed since the fire had emerged and the fire was already out of control. During this attempt, they used 3 indoor fire hydrants that were located on the 8th to 10th floors. </td> </tr> <tr> <td style="text-align: center;">Not Initiated</td> <td> <ul style="list-style-type: none"> ◦ Extinguished timing <input type="checkbox"/> ◦ Firefighting difficulties <input type="checkbox"/> ◦ Firefighting method <input type="checkbox"/> ◦ Other <input type="checkbox"/> </td> </tr> </tbody> </table>		Successful <input type="checkbox"/> Failed <input checked="" type="checkbox"/>	(Reasons or Conditions)	<u>Initiated</u>	<ul style="list-style-type: none"> ◦ Extinguished timing <input checked="" type="checkbox"/> ◦ Firefighting difficulties <input type="checkbox"/> ◦ Firefighting method <input type="checkbox"/> 	Guard I rushed to the 10th floor and used the fire extinguisher to extinguish the fire; however, he went down to the 9th floor because of heavy smoke. Two hotel staff members joined him and used the indoor fire hydrant to spray water on the origin of the fire (the storage room on the 9th floor), but their attempts failed because too much time had elapsed since the fire had emerged and the fire was already out of control. During this attempt, they used 3 indoor fire hydrants that were located on the 8th to 10th floors.	Not Initiated	<ul style="list-style-type: none"> ◦ Extinguished timing <input type="checkbox"/> ◦ Firefighting difficulties <input type="checkbox"/> ◦ Firefighting method <input type="checkbox"/> ◦ Other <input type="checkbox"/>
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(4) Summary of Firefighting Activities	<p>(Obstacles or Difficulties in Fire Control)</p> <ul style="list-style-type: none"> ◦ Because of the faulty floor slab that made the fire compartment incomplete, the 3 floors were engulfed in flames, which extended the area in which firefighting was needed to a much larger extent. ◦ The fire was already beyond the level where it could be controlled by portable devices, and the power outage on the 8th and above floors made firefighting efforts difficult. 								

(5) Evacuation	Means of Escape (No. of Persons)	Obstacles to Evacuation
	<ul style="list-style-type: none"> ◦ Stairs [X] (325) ◦ Elevators/Escalators [] () ◦ Escape equipment [] () ◦ Directly to ground from windows or openings [] () ◦ Rescued [X] (3 employees were rescued from 9th floor) ◦ Other (Guided, 2 people from 9th floor and 12 people from 8th floor) [X] (14) 	<ul style="list-style-type: none"> ◦ No windows [] ◦ Barred openings [] ◦ Locked emergency doors (Exits) [] Partially ◦ Alarm system [X] (Poorly controlled, Malfunctioned, Not installed) ◦ Power outage [X] (8th to 10th floors) ◦ Other []
<p>The evacuees learned about the fire from the automatic fire detection system alarm and started to evacuate. Approximately 3 to 4 hotel employees were staying on each floor and they knocked on the guest rooms to wake the guests up. Because of the significant efforts of the employees in evacuating the guests, most of the guests and employees were able to escape via the main stairs in the center of the building. On the 7th and lower floors, the evacuees found their way out without confusion because they did not experience black out conditions. On the 8th and 9th floors, respectively, 5 and 12 evacuees were trapped because of heavy smoke and black out. The firefighters guided them out, except for 3 people who were rescued from the 9th floor.</p>		
(6) Casualties	Healthy individuals (Drunk persons) Individuals in need of assistance Infants Elderly Handicapped Patients/ill persons	Obstacles to Evacuation
	None	<ul style="list-style-type: none"> ◦ No windows [] ◦ Barred openings [] ◦ Locked emergency doors (Exits) [] ◦ Alarm system [] (Poorly controlled, Malfunctioned, Not installed) ◦ Power outage [] ◦ Other []
IV. Issues and Lessons Learned		
<ol style="list-style-type: none"> 1. In order to verify that each clearance is adequately sealed, the post-construction inspection system needs to be more thorough and any defect should be corrected in a timely manner. 2. The cause of the fire spread was mainly the fallen duct (due to heat) that pierced through the floor of the fire compartment. To avoid this, it is necessary to develop some technical solutions for clearance sealing and fire-resistive support around a duct and other installations of similar nature. 3. Any floors constructed with steel deck plates need to be fire resistive. 4. The main East and South Buildings were constructed before the Fire Service Act became effective, so these buildings did not have any water pipe connections. If the hotel had installed them regardless of legal obligations, the firefighters could have utilized them to control the fire. 5. The fire broke out from a room that did not have any fire detectors, which resulted in delayed discovery and firefighting activities. 6. The voluntarily installed sprinkler system did not work as expected because the fire came from the ceiling. 		

