

Setagaya Ward, Tokyo: NTT Underground Cable Conduit



1. Characteristics of the fire

A fire broke out within an NTT (Nippon Telegraph and Telephone) underground telecommunications cable conduit. Workers had been cutting into a lead pipe with a blowtorch. They forgot to extinguish the flame, igniting a sheet placed over the cables for protection and, eventually, the cables themselves. With heat and extremely heavy smoke hindering firefighting efforts, it required 5 hours to extinguish the fire. The fire knocked out telephone and online banking services for an extended period, demonstrating a point of weakness within the information technology era.

2. Overview of the fire outbreak

(1) Time and date of emergence

Approximately 11:30, Friday, November 16, 1984

(2) Time and date of detection

11:52, Friday 16, 1984 (emergency call to fire department)

(3) Time and date brought under control

04:37, Saturday 17, 1984 15:52

3. Overview of fire origin

(1) Location

Underground conduit, 3-4 Taishido, Setagaya-ku, Tokyo, Japan

(2) Origin

Within an underground cable conduit owned by NTT (Nippon Telegraph and Telephone)

(3) Structure at origin, etc.

(1) Structure

Reinforced concrete

(2) Dimensions

Tunnel: 2.65 m wide x 2.35 m high

(4) Installation of firefighting equipment, etc.

None (there was a gas pressure remote monitoring system, which monitors gas pressure within the cables; and, at the time of the outbreak, it recorded abnormal values as a result of cable damage).

4. Weather conditions

(1) Weather

Cloudy

(2) Wind direction, speed

Northeasterly, wind speed 3.5 m/s

(3) Temperature, humidity

Temperature 14.6°C, humidity 65.0%

(4) Weather warnings, etc.

None

5. Cause of fire

(1) Ignition source

Blowtorch flame

(2) Route

Blowtorch left unattended

(3) Ignited substances

Protective sheet placed on top of telephone cables

6. Fire damage

(1) People

(1) Fatalities

None

(2) Injured

None

(2) Property

(1) Building where the fire emerged

a. Extent of fire loss

b. Area of fire loss

Total of 104 telephone cables (233,800 subscriber lines)

Total extension: 14,600 m (380 mm² of tunnel wall)

(2) Spread to other buildings

None

7. Fire route (progression)

(1) Overview of outbreak location

The fire occurred in an underground conduit (tunnel) at a point approximately 130 m from the No. 3 Setagaya Telephone Exchange. The conduit was 2.65 m wide and 2.35 m high. An aisleway of approximately 0.8 m wide ran down the center. Placed along the sides were a total of 42 telephone cables, 24 on the north side and 18 on the south side.

(2) Situation up to the outbreak

Employee B and Employee C of Telecommunications Construction Company A were using a blowtorch to cut open a lead pipe shielding connection points between telephone cables. Upon doing

so, they found the location of a broken wire and, to discuss how to repair it, left the tunnel. It has been determined that they did not fully extinguish the blowtorch before leaving.

(3) Progression up to fire detection

Employee K (47 years old), who works in a building across the road from the Setagaya Telephone Exchange, was at work in his office on the 4th floor of that building when he noticed smoke coming from a ventilation opening within the exchange grounds and, soon afterward, from other ventilation openings as well.

(4) Notification of fire department

An employee at the Setagaya Telephone Exchange noticed the fire and called the fire department.

(5) Initial firefighting attempts

None

(6) Evacuation

The two employees in the vicinity of the fire source were informed of the fire early on and escaped on their own.

(7) Casualties

None

8. Activities of firefighting units

(1) Dispatched units, etc.

(1) Dispatched vehicles: 56 (on station)

(2) Dispatched personnel: 291 (on station)

(2) Firefighting and rescue activities

(1) Firefighting activities

a) The fire could not be fought immediately upon its discovery because heat and thick smoke made it impossible to discern the situation. Thus, initial activities consisted of (1) opening manholes so as to ascertain the situation and (2) accounting for personnel.

b) Firefighting/cooling activities began 1 hour and 34 minutes after detection, whereupon firefighters started to extinguish flames and cool the area while blowing air through manholes. Because of extreme heat within the conduit, however, the firefighters soon switched over to foam. After the fire was brought under control, water was run into the conduit to cool it down, and smoke was drawn out. It took 16 hours and 45 minutes from the time of detection to bring the fire under control.

(2) Rescue activities

a) There were 4 workers within the conduit on the day of the outbreak. At the time of the outbreak, 2 workers in the vicinity of the fire source had gone above ground to discuss work procedures, and the other 2 workers were working in an area far removed from the location of the fire. This, together with the fact that 2 were informed of the fire in its initial stages, allowed them to escape on their own. Thus, there was no need for rescue activities.

b. Four minutes after detection, the Setagaya 1, 2 and ladder (rescue) units arrived on the scene, searching for possible victims, confirming ventilation openings, and setting exhaust vents; approximately 38 minutes after detection, the Meguro rescue unit arrived; and approximately 40 minutes after detection, the Shoto rescue unit arrived. An attempt was made to enter the conduit to ascertain the extent of the fire, but firefighters abandoned that effort because of (1) heavy smoke inside and (2) a confirmation that all have been accounted for.

PHOTO

9. Problems, lessons

(1) The structure of such conduits and the manner in which flammable cables are laid inside them make it exceedingly difficult to fight any fires that may occur within them. Also, the societal impact of telecommunication conduit fires can be immense, as damage to the cables can interrupt telephone service over great areas. As it is somewhat predictable that such a fire could have an immense social impact, NTT earlier prepared a set of accident prevention policies that, for instance, stipulate that care be taken when using blowtorches within a conduit. Furthermore, to promote worksite safety, workers are instructed prevent careless mistakes by “pointing and calling,” by which they point at the task and call out “okay,” thereby focusing attention on it. This fire could be said to have occurred because such warnings were not observed.

(2) The fire points to the following issues:

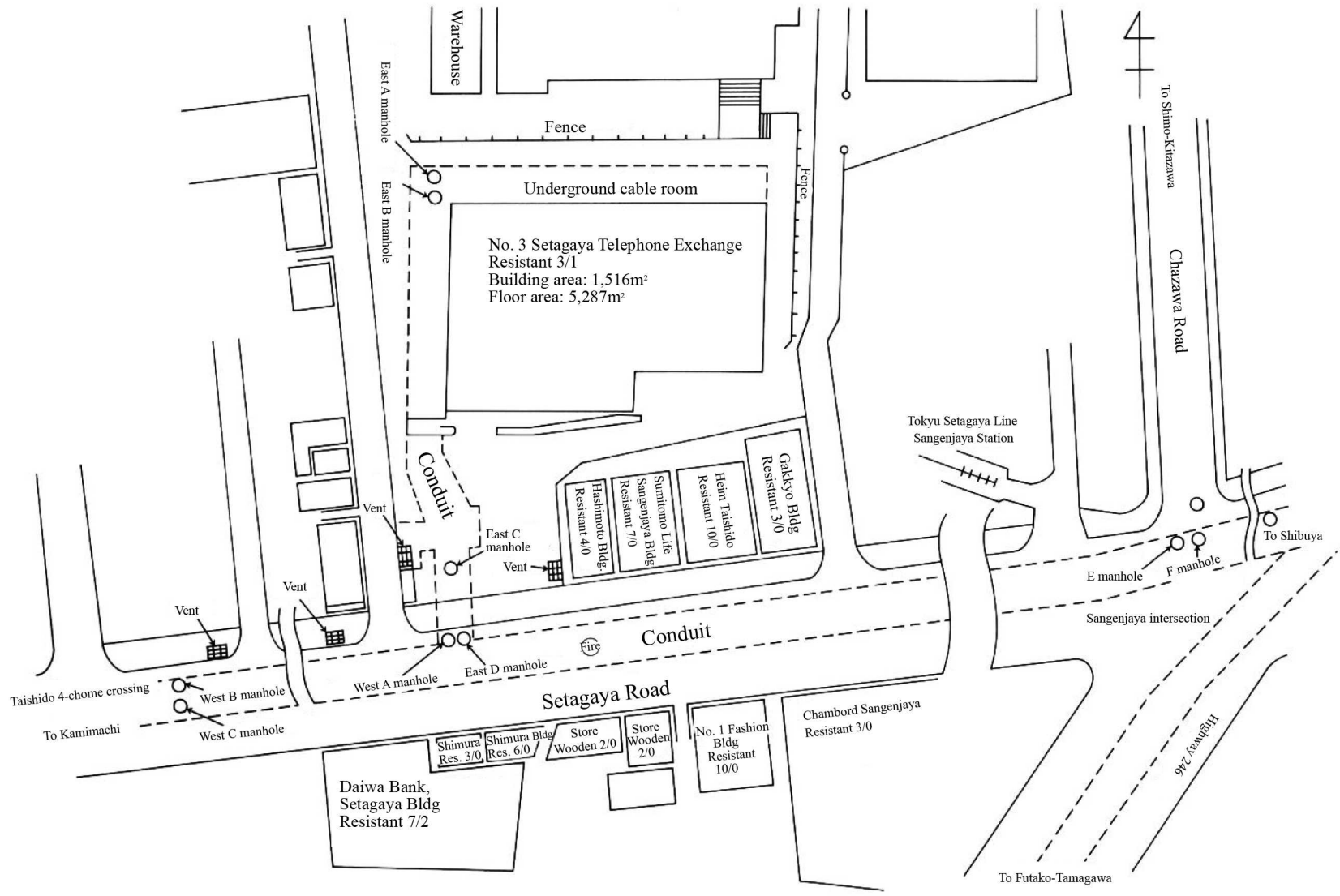
(1) A fire within a conduit in front of a telephone exchange interrupted service for 90,000 lines over a prolonged period.

(2) The fire spread along cable within the conduit and took a long time to extinguish.

(3) Dedicated lines (for online bank services, etc.) were also damaged by the fire and took a long time to repair.

So as to prevent this sort of fire from happening again, a Conduit Fire and Accident Countermeasure Committee was established. This committee, comprised of academics, fire officers, and concerned administrators, examines a variety of fire prevention/fighting measures, including the utilization of fire resistant cables

10. Documents



10. Materials

