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研究成果報告書

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東京湾岸臨海コンビナートの危険性と地震防災対策

Earthquake Risk of the Tokyo Bay Industrial Parks and Disaster Prevention Measures

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Abstract

Past earthquakes in Japan such as the 2011 East Japan earthquake have repeatedly caused a great deal of damage in industrial zones around the Tokyo Bay, including explosions and the fires of oil and gas tanks. The main reasons for the damage were the long duration of earthquake ground motion, long-period component of ground motion, soil liquefaction of man-made ground reclaimed from the sea, and large lateral displacement of quay walls and grounds.

The present report summarizes the outcomes of the survey and the research on earthquake risk of the industrial parks around the Tokyo bay, the economic loss due to the damage to industrial facilities, and of the development of strategies and measures to reduce the risk.

In the Chapter 1, the damage to industrial facilities caused by the past earthquakes such as the 2011 East Japan earthquake was investigated, and the causes of the damage were analyzed. The main causes of the damage to the industrial facilities during past earthquakes was the soil liquefaction and its caused large displacement of quay wall and the ground, the overflowing of tank oil due to the long-period components of earthquake ground motion, and huge tsunamis. This report also reviews the technical standards and laws of Japan for the reduction the earthquake damage to industrial facilities in Chapter 1.

In Chapter 2, the soil data of the man-made islands reclaimed from the Tokyo bay were collected, and the earthquake ground motion and the soil liquefaction was assessed(Chapters 4 and 5), and the displacements of grounds and quay walls was predicted(Chapter 6).

The volume of the oil overflowed from tanks due to the long-period components of earthquake ground motion was estimated in chapter7, and the diffusion of the oil spilled on the sea was analyzed. Furthermore, the fire on the sea surface of the bay was assessed in Chapter 8.

In Chapters 9 and 10, the economic loss resulting from the earthquake damage to the industrial facilities was discussed, and the strategies and the counter-measure for the reduction for the damage were developed (Chapter 10).

Finally, in Chapter 11 the activities by the research team for the public relations and the information sharing on the outcomes from this series of researches were introduced.