

7.14 Development Planning and Examples of Countermeasure

7.14.1 Overview

In Japan, development of industrial areas on land reclamation along sea sides is promoted and operations on coastal industrial areas are typical characteristics of Japanese industry. Air pollution in these areas and various countermeasures were instituted by stages. Industrial development planning should not be overlooked when considering air pollution problems in Japan.

7.14.2 The Negishi Bay Industrial Area Development and the Yokohama Type Agreement on Pollution Control

Negishi Bay is located on the coast south of Yokohama Harbor and led in the fishery industry in olden days. In 1898, Okuda Naohiro applied to the Kanagawa Prefectural governor with a sea reclamation plan for this area. However, the plan put to the Yokohama Board of Aldermen for discussion in 1910, the plan set in front of the Ministry of Home Affairs in 1940, and the International Sightseeing Base Plan in 1951 etc., were all unsuccessful. Then, the "First Stage Plan of Negishi Bay Reclamation Project" was approved in 1957 by the Yokohama Board of Aldermen and was finally begun in 1959. It was the area containing 6,105,000 square meters of land reclaimed for an industrial area gathered with many large factories, during the first and second stages of the project, that air pollution became a problem (Fig. 7.14.1¹⁾). The problem materialized, especially, when, in 1964, Tokyo Electric Power Company requested Yokohama City to agree on the construction of a 530,000 Kw coal firing thermal power plant of the Electric Power Development Company, the project forwarded with a coal policy outline decided upon in a cabinet meeting in 1962, in part of the area to be advanced by Tokyo Electric Power Company. Yokohama citizens who had experienced air pollution from coal-firing electric thermal plants were naturally opposed to this. Yokohama mayor Ichio Asukata did not have the administrative authority to regulate air pollutants emission. But he agreed to it under his proposal conditions using two articles contained a land sale contract. The first article was that, in case of reselling or loaning to a third party, the agreement of Yokohama City was required. The second article was that in case of reselling or loaning the reclaimed land to a third party, even after the land was deliver from the city, the agreement of Yokohama City was also required. Namely, Yokohama City closed "gentlemen's agreement" with the Electric Power Development Company, which obligated the to discuss with Yokohama City and carry out pollution control measures as conditions for the Electric Power Development Company to get permission for land use from the city. The city requested Tokyo Electric Power to close a similar contract to operate the first liquefied natural gas firing thermal plant in Japan at this site. This type of agreement on environmental pollution control is known as the "Yokohama Type."²⁾ and spread throughout the countryside. Further, Electric Power Development adopted high efficiency electrostatic precipitator with sulfuric acid adding system in flue gas to adjust the electric resistivity of dust investigated by Lodge corporation in Limited kingdom, and promoted a perfect air pollution control measure meeting the specific conditions of regulation on stack height and air pollution concentration in the flue. Also, Nippon Oil Refining Corp.(Negishi oil refinery), which occupies most of the area

of the Negishi Bay industrial area and is called the founder, executed measures such as using high quality, low sulfur fuels, adoption of low NOx burners, the electrostatic precipitator and so on⁴⁾.

7.14.3 The Yokkaichi Petroleum Complex Plan and the Air Pollution Problem

In 1956, Showa Yokkaichi City Oil Company began the construction on a petroleum refinery with daily volume of 40,000 barrels at the 100 hectare site of the Navy's former No.2 Fuel Arsenal complex on the coast of Ise Bay. Then, the complex began operations by supplying raw materials to a factory group from this in 1957. Mitsubishi Petrochemical Corporation completed the Yokkaichi plant to produce 22,000 tons of ethylene annually in 1959 and Chubu Electric Power Company started operations of the first heavy oil firing thermal power system in Japan at its Mie plant (125,000 Kw) in 1961. Since then, the various factories have been established at the No.1 Industrial Zone as listed in Table 7.14.1. Responding to a plan made by the Ministry of International Trade and Industry, Yokkaichi City in Mie Prefecture reclaimed about 90 hectares of land and, in 1963, Daikyo Oil Company and Chubu Electric Company started operations on this reclaimed land in the No.2 Industrial Area. Yokkaichi City has developed into a preeminent petrochemical industry area in Japan. However, as a symbol of huge advanced economic growth, the complex encumbered with environmental pollution problems such as air pollution. In April 1960, a complaint was lodged by the council of residents of the Shiohama area which neighbors the No.1 Industrial Area of Yokkaichi, requesting to Yokkaichi City to take countermeasures stating that "It is impossible to sleep with the factory noise and gas, even at night," and of "Nausea and irritation from the odor of gas." In October of the same year, a pollution countermeasures section was founded and Yokkaichi City established a pollution control committee. Then, Professor Yoshida Katsumi of the Mie Prefectural Medical College and Professor Mizuno Hiroshi of Nagoya University took charge of the committee, and an investigation of air pollution and its influence on health damage was begun. In March of 1961, the sulfur dioxide concentration in the atmosphere was measured a value per hour beyond 1 ppm with a maximum of 1.64 ppm, and, in the summer of the same year, residents of the Isozu area complained of coughing, throat irritation and intense asthma from the wind coming from the factory. Professor Yoshida reported from his study of these symptoms and concluded that the sulfur dioxide and sulfuric acid mist affected the cilia cells and this could progress to bronchitis, pneumonia and pulmonary emphysema. An anti-pollution movement rose, and in October, the coordinated Yokkaichi council of residents decided to claim an early solution and the improvement of the control equipment. In November 1960, Mie Prefecture and Yokkaichi City began a systematic investigation on air pollution. Their report of 1962 warned that the health damage would increase if the air pollution situation did not improve early in the Isozu area. Professor Yoshida made it clear in his epidemiological survey that more damage to health was observed in the area polluted with higher amounts of sulfur dioxide. According to the starting of operation of the No.2 Industrial Area in 1963, the mayor of Yokkaichi, standing in the forefront of the residents, promised to hit on some countermeasures, but this area was not specified in the Soot and Smoke Emission Regulation Law of 1962, so it was specified by a research by Kurokawa Mission in 1966. However, this administrative action did not bring the improvement. And the construction of high stack was promoted, in order to avoid the pollution under gusty condition that was pointed out by Ito Kyoji, director of Applied Weather Development National Weather Institute member of Kurokawa Mission, but it expanded the polluted area.

In the Shiohama area where respiratory organ diseases increased from around 1961, the council of residents was burdened with the whole medical payments and requested public money. It is believed that some deaths occurred from the air pollution in 1964 and in December of the same year, the mayor of Yokkaichi expressed the intent to appropriate public money. In 1965, the "Yokkaichi Pollution-related Medical Treatment Investigation Meeting" was started and public money for medical payments was made available. After that, as the number of patients continued to increase and with no change in the scope of the occurrence except by going to trial, nine Isozu residents filed suit against six companies in the No.1 Industrial Area in September 1967. The plaintiff's successful lawsuit in the long trial of four years and ten months produced much administrative reconsideration, and caused a sense of crisis in business circles because their positions on environmental protection were being questioned. A shift came for the Yokkaichi area with a proclamation on the regulation of total sulfur oxide emissions in 1972 called the Mie Prefecture pollution prevention ordinance, and the quantity of sulfur oxides emitted into the atmosphere which was more than 100,000 tons annually decreased phenomenally to 17,000 tons. The mortality rate of the residents from complaints of pulmonary obstruction decreased from the peak of 1975, too. Incidentally, as for the countermeasures against sulfur oxides, exhaust gas desulfurizing equipment accounted for 30% and other methods included conversion to low-sulfur fuel.

Table 7.14.1 The main businesses at the No. 1 Complex at Yokkaichi City

Company Name	Main products at the time
Showa Yokkaichi Petroleum Yokkaichi Refinery	Gasoline, kerosene, fuel oil
Mitsubishi Chemical Industry Yokkaichi factory	Carbon black
Japan Synthetic Rubber Yokkaichi factory	Synthetic rubber
Ajinomoto Tokai factory	Monosodium glutamate
Yokkaichi Synthesis Yokkaichi factory	Surface-active agents
Japanese Butanol Yokkaichi factory	Butanol
Chubu Electric Power Mie thermal power plant	Electric power
Mitsubishi Petrochemical Yokkaichi plant	Ethylene, polyethylene, polypropylene
Mitsubishi Monsanto Yokkaichi plant	Styrene family of resins
Matsushita Electric Works Yokkaichi factory	Heat hardening resins
Mitsubishi Edogawa Chemical Yokkaichi Factory	Hydrogen peroxide
Petrochemical Burdish Yokkaichi factory	Blister polystyrene
Ishihara Sangyo Kaisha Yokkaichi factory	Titanium oxide, agricultural chemicals

7.14.4 The Significance and Air Pollution Counter Measures of the Ogishima Project ⁷⁾

NKK, has been established to have the aim to found the first steel pipe production in Japan in 1912, started blast furnace operations in 1919 at its steel pipe manufacturing plant in Kawasaki, then began operations of the Thomas converter in 1938, prospered and became the leader in the integrated steel work.

The Ogishima project involved the company's Keihin works on a 3,940,000 square-meter site, producing 5.5 million tons (rude steel) annually through 7 blast furnaces. The site made Kawasaki and Yokohama, Kanagawa Prefecture on the coast of Tokyo Bay the dispersion area. NKK moved the Keihin Steel Mills to a 5.5 million square-meter site on newly constructed Ogishima Artificial Island in Tokyo Bay and concentrated Steel Mills

production on two blast furnaces, keeping the same production weight as had been produced with seven blast furnaces. This project was the steel mill replacement plan and carried out in order to promote the modernization of steel production facilities and the improvement of countermeasures on environmental pollution such as air pollution. Furthermore, this project was regarded as last large scale blast furnace construction in this century. And the agreement on pollution prevention contracted between Kanagawa Prefecture, Yokohama City, Kawasaki City and NKK to promote the pollution control measure, mainly air pollution became more famous this project. This Ogishima project began in the end of 1971, and in 1976 a switch was made to two base systems, the establishment of No.1 Ogishima blast furnace and existing Mizue blast furnace. Then, over period of eight long years, the fire of Mizue blast furnace was extinguished and the operation of No.2 blast furnace in Ogishima was started in 1979. Following this, the introduction of an energy saving system and the countermeasure for air pollution attracted attention together in the rationalization still manufacturing facilities. There measures included the 132000m³/h flow rate all exhaust gas processing systems for the sintering furnaces which consists of the electrostatic precipitator, desulfurization and denitration equipments for flue gas, countermeasure for the fire particles in a raw material yard, a dry process quenching method for coaks oven, an efficient blast furnace and converter dust collecting systems and adaptation of low sulfur fuel and gas fuel.

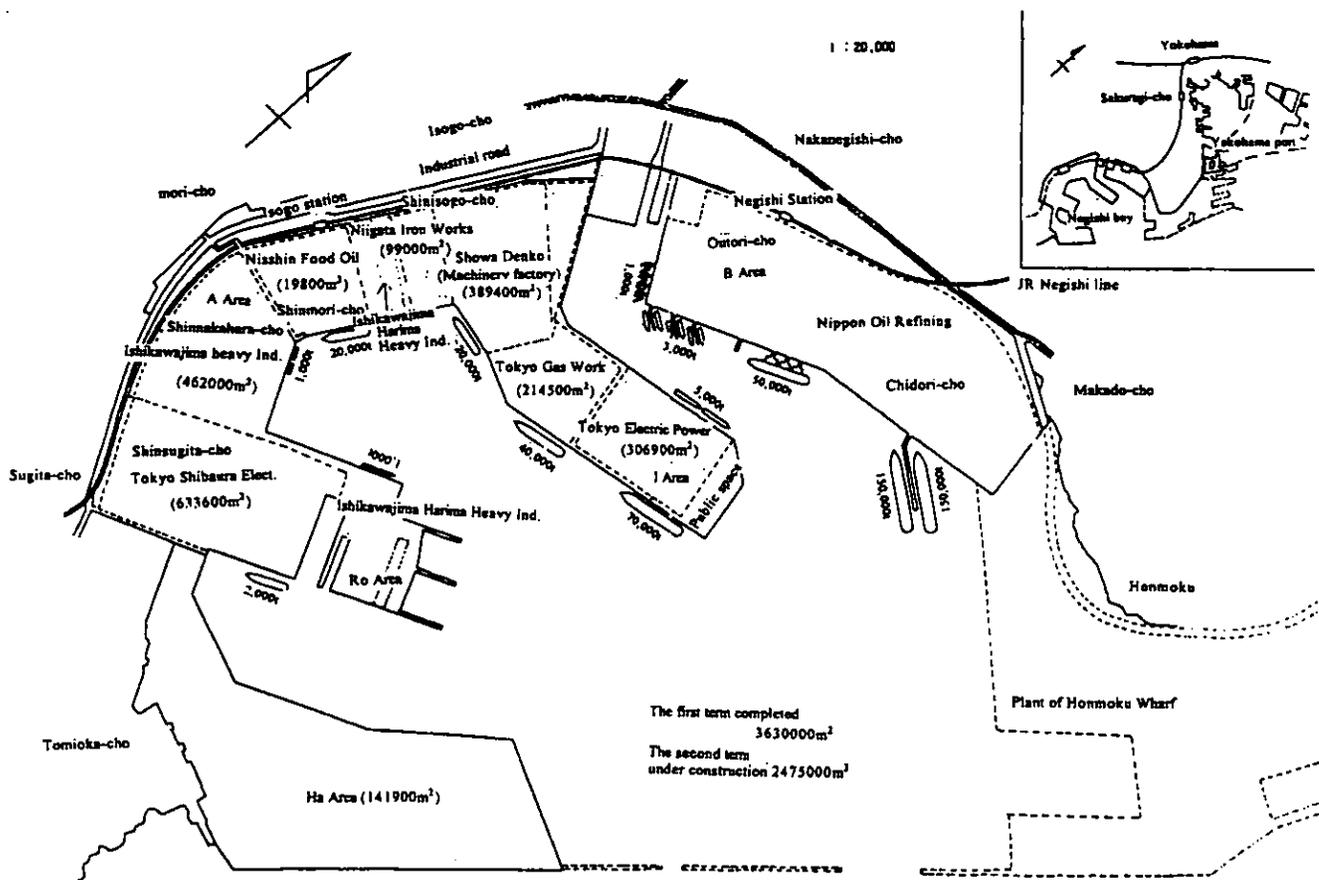


Fig. 7.14.1 The Negishi Bay Industrial Zone Reclaimed Area