industries. Amidst the collapse of restrictions imposed by social status, such enterprises were undertaken in order to vie with the samurai class that had been in control up to then.

Iwashita describes how manufacturers of Japanese silk goods on Amami Oshima (an island between Kyushu and Okinawa) managed, under a declining demand for Japanese attire, to produce high-quality, diversified goods that met with the favour of consumers by working for the revival on a higher plane of traditional techniques that had gone out of use, making the most of local conditions, and by establishing strict quality control in materials and products.

8B. POLLUTION

1. Pollution in Japan: introduction -- Jun Ui
2. The Ashio copper mine incident -- Kichiro Shoji and Masuro Sugai
3. Pollution in postwar Japan -- Yoshiro Hoshino
4. Minamata disease: case study -- Jun Ui
5. Arsenic poisoning from powdered milk: case study -- Kichiro Shoji and Masuro Sugai
6. CO gas poisoning at Miike: case study -- Yoshiro Hoshino and Nobuko Iijima
7. The Kochi pulp incident: case study -- Jun Ui
8. The structure of social disaster -- Nobuko Iijima
9. Conclusion -- Jun Ui

In the introduction, Ui says that pollution is not just one of the many results of industrialization but rather a built-in component of a social system with a rapid economic growth orientation. This is clear from analysis of the factors giving rise to pollution, among which he names (1) the fact that industrial capital is without its own ethics and is reluctant to take upon itself the social responsibility for sources of pollution, (2) the fact that government is inclined to protect businesses in order to cultivate international competitiveness and protect national interests and is not sufficiently sensitive to the human rights of victims of pollution, (3) the fact that science and technology are apt to be used as tools for control of the public, and (4) the fact that the idea of human rights has not yet completely taken root even in present-day Japan.

As a result, (1) companies that represent a source of pollution deny the fact, (2) they contrive in all sorts of ways to weaken and dispel protest activities when they can no longer deny the truth, (3) they next muster all the "scientific evidence" they can for the purpose of making as low an assessment of the damage as possible, and (4) although the sources of pollution in most cases can be seen to have given rise to work accidents

and occupational diseases within the companies themselves before affecting the outside community, the company labour unions tend to stress their complementary role with respect to management rather than working actively for the human rights and health of their members. Ui points out that the starting point for the denunciation of pollution has to be an awareness on the part of its victims that they are in fact victims of it.

He also points out that at present science can only go so far toward proving cause-and-effect relationships in pollution cases and that the tendency is to underestimate the victims' testimony in the settlement of pollution disputes.

In the paper by Shoji and Sugai the Ashio copper mine pollution case, which occurred at the end of the nineteenth century, is taken up as a classical example of pollution. In those days copper mining served the national purpose of earning foreign exchange as well as being an industry that supported the military by providing it indispensable materials. This being the case, the authorities suppressed protests by farmers whose forests and paddy fields in the vicinity of the mine were damaged by stack gas and wastewater from the smelter, and their demands for redress were ignored. The organized protest movement was stifled. It is true that the government and the company made efforts to block pollution, but the damage did not stop at that.

Almost half a century later, in 1958, the embankment of the mine's waste dump broke, and large quantities of waste material flowed out, and in 1971 cadmium was detected in rice grown nearby. The Furukawa Co., Ltd., which operated the mine then, had to admit its responsibility for the first time and has taken various new technological measures to improve the situation, including the elimination of air pollution by stack gases.

Hoshino's paper discusses the differences between prewar and postwar pollution in Japan. Before the war there had been only four industrial areas in Japan, but as a result of rapid economic growth after the war, practically the whole Pacific coast became one continuous industrial belt, and such a high density of industrial plants had the effect of destroying the environment. With technological innovation, "visible" pollutants (such as particulate dust in smoke emanating from factories) has been eliminated to a considerable extent, but "invisible" pollutants (such as sulphur dioxide gas) have become a new and serious problem. Since, however, it is harder to identify "invisible" pollutants, they tend to accumulate before anything is done about them, which makes the damage all the worse. This being the case, Hoshino stresses the importance of paying attention to changes in ecological systems, including flora and fauna, and early indications of detrimental effects on humans.

Next, four representative cases of pollution in postwar Japan were discussed by each of the writers.

(1) Minamata disease (Ui). This has been a kind of pollution in which heavy metals contained in wastewaters discharged by the Minamata plant of the Chisso Corporation (a nitrogen fertilizer manufacturer) were absorbed by fish, with the result that those who ate such fish got methyl mercury poisoning. Such poisoning attacked the victim's nervous system, paralysing him and leading to death in the most serious cases, and as yet no effective treatment has been found. Although the first victim came to light as early as 1956, it took a long time for the new disease to be recognized as such, and even after the cause was identified, the company refused to accept responsibility. However, when victims with the same symptoms under the same conditions were discovered in Niigata in 1965, it was no longer possible to deny the cause-and-effect relationship involved.

From that point various activities in support of the victims began, but it should be noted that the victims themselves assumed a posture of independent action instead of relying on political parties or other organizations or arbitration by neutral entities. They finally won, after a long series of independent negotiations and civil lawsuits. However, local governments assisted the company in arranging loans so that it could pay the damages. This resulted in administrative involvement in officially recognizing individual victims, a move disliked by the victims themselves.

(2) Arsenic poisoning from powdered milk (Shoji and Sugai). When in 1955 an industrial stabilizer containing arsenic was mistakenly mixed in the powdered milk produced at the Tokushima plant of Morinaga Milk Industry, many babies who were fed the milk, chiefly in western Japan, suffered arsenic poisoning, some of them even dying from it. Fourteen years after the incident, a follow-up survey of the victims was carried out by professors at the Okayama University Faculty of Medicine, and when the findings were announced, the families of the victims staged a campaign to boycott Morinaga products as well as instituting a civil lawsuit against the company. This resulted in the establishment, at the expense of the company, of the Hikari Association, a foundation for the purpose of ensuring the mental and physical development of the nearly fourteen thousand victims and helping them become self-reliant members of society by providing them monetary compensation, medical care, education, occupational training, etc.

(3) The coal dust explosion and CO gas poisoning at Miike (Hoshino and Iijima). Around 1960 Mitsui's Miike Coal Mine began to step up its production without increasing the number of its workers, in an attempt to compete with cheap imported oil. In the process, the number of safety personnel was sharply reduced, with a corresponding increase in the number of work accidents. No measures were taken to prevent coal dust explosions, and no safety training was provided the miners. In 1963 the worst finally happened. The derailing of a mine car caused an initial explosion which was followed by a secondary explosion in a corollary about one kilometre away.

In coal dust explosions, besides those who die directly from the explosion and accompanying flames, many more people are killed by carbon monoxide and other poisonous gases that fill the mine shaft after the explosion. Many, at the very least, suffer the lingering effects of carbon monoxide poisoning. In this case there were more than four hundred dead and eight hundred victims of gas poisoning.

Already dissatisfied with the pittance offered by the company as condolence, the attitude of the victims and their families was hardened still more by the decision of the Ministry of Labour to discontinue work accident insurance payments after the three-year period stipulated by the Work Accident Insurance Law regardless of the physical and mental condition of the victims at that time, declaring them to be "cured." The miners resolutely demanded adequate rehabilitation of the victims and new jobs for them. Such demands were finally met in 1971. Then, in 1973, the victims and survivors of those who died took the step of instituting a collective damage suit with the full backing of the Miike Labour Union.

(4) The Kochi pulp incident (Ui). When it started operating in 1951, the sulphite pulp plant in the city of Kochi began to give off high concentrations of sulphur dioxide as well as discharging sulphite pulp effluents. The local fishing industry was soon adversely affected and later, in 1970, the damage spread from polluted sludge accumulated at the mouth of the river when a typhoon left the entire city flooded. Local activists staged protests against such destruction of the environment, but negotiations with the plant got nowhere. Finally, with the overwhelming support of the citizens of Kochi, the activists broke off negotiations and took physical action, blocking off the factory wastewater outlet responsible for the pollution, and the next year the plant was forced to close down.

Social disasters include three mutually related stages starting from occupational diseases, to pollution on a wider societal scale, and then to consumer hazards, and the scope of damage widens at each stage. In order to minimize and remedy such damage, it is necessary above all that the actual damage and its significance be correctly assessed. In spite of this, the problem of such social damage is usually ignored by the companies responsible for it, the administrative authorities and scholars, and by researchers in general, as pointed out by Iijima in her paper. This paper is worthy of attention as an attempt to elucidate the structural mechanism of social disasters (i.e., the social effects of work-related disasters).

According to Iijima, social disasters cause damage on four levels: (1) to life and limb and health, (2) to livelihood, (3) to personality, and (4) to the local community and environment. As it extends to each of these levels, the damage becomes progressively wider and more serious. The extent of the damage on each of these four levels is assessed in terms of five damage amplification factors: (1) the extent of impairment of health, (2) the position and role of the victim within his family, (3) the social

status of the victim, (4) the extent of support given by groups to which the victim belongs, and (5) the degree of interest shown by the companies responsible for damage, administrative authorities, medical personnel, scholars, the general public, the media, etc. By studying the levels and extent of damage in various social disasters, one will discover that many circumstances resulting from damage have a certain common structure. This structure of damage gets progressively more serious, going from the destruction of life and limb and health to the destruction of the structure of livelihood and on to the collapse of the personality. In conclusion, Iijima says that the breaking of such a structure of damage depends on action taken by the victims themselves and their supporters.

In his concluding paper on the problem of pollution, Ui defines pollution as a "negative impact of technology." Furthermore, he says that in order to prevent and resolve pollution problems it is necessary that the victims speak out and participate in active movements to obtain redress and that their fellow citizens enhance their awareness of the importance of human rights and respect for human life. He goes on to point out that the hardest hit by pollution are the weak and the poor in society, and there is the possibility of creating a new poor because of pollution by taking away their means of livelihood. There is also the need to guarantee the freedom of speech of the victims and their continued participation in society by institutional means.

9. VOCATIONAL EDUCATION

1. Economic development and education: introduction -- Toshio Toyoda
2. A history of vocational education -- Mamoru Sato
3. The Sendai Vocational Apprentice School -- Mamoru Sato
4. The Hiroshima Worker Training School and the Minami-Tsuru Weaving School -- Johzen Takeuchi
5. The Seto Ceramics School -- Eiichi Yamashita
6. The Aizu Lacquerware Apprentice School -- Arata Haneda
7. The Anjo Agricultural and Forestry School -- Eiichi Yamashita
8. The Fukushima Commercial School -- Arata Haneda
9. The Miyakonojo Commercial School and the Beppu Technical Apprentice School -- Haruo Yamagishi
10. Development of vocational education -- Mamoru Sato
11. The growth of company personnel training in the industrialization process -- Ryoichi Iwauchi
12. Company personnel training in the small industry -- Akihisa Takaguchi
13. Japanese vocational education: past and present -- Toshio Toyoda