

Chapter 3.

The Process of Investigation of the Cause of Minamata Disease and of Decision of the Pollution Source (Part 2)

--Circumstances during the period from July 1959 when the organic mercury hypothesis reported by the Kumamoto University Research Group to May 1965 when Minamata disease in Niigata Prefecture was officially reported via the agreement with the present of money in token of the company's sympathy --

1. Presentation of the organic mercury hypothesis by the Kumamoto University Research Group and responses of Chisso to the presentation

(1) Presentation of the organic mercury hypothesis by the Kumamoto University Research Group

There were some factors involved with the attention paid to organic mercury by the Kumamoto University Research Group. Prof. Takeuchi and Asst. Prof. Tokuomi paid special attention to the consistency of their results with clinical symptoms and pathological findings of organic mercury poisoning, which were reported by Hunter and Russell, and started conducting the research narrowing down organic mercury from the fall of 1958 onward. In Japan as well, there have been some findings of agricultural chemicals concerning lower alkyl mercury poisoning in those days, but the poisoning has not been assessed in relation to Minamata disease.

A variety of heavy metals have ever been postulated as a candidate for the causative agent, but mercury was not detected because it had been volatilized by heating during pretreatment. After organic mercury was suspected as a causative agent, mercury levels were began to determine. Dithizone colorimetry, which allows the determination of concentrations with a detection limit of as low as 0.1 ppm, has been established to some extent as the method of quantifying the total mercury level in those days.. However, it took much time for the acquirement of pretreatment skills for specimens; it required ca. 3 months for Prof. Shoji Kitamura and his co-workers to become proficient in the method of analyzing the total mercury. There has been no technique for analysis which allows the precise quantification of organic mercury in those days. The efforts to reproduce symptoms and pathological findings of Minamata disease have been continued with animal experiments by administration of alkyl mercury.

The organic mercury hypothesis was not approved soon within the Kumamoto University Research Group, because the hypothesis of selenium, thallium, and manganese was advocated as members of the Public Welfare Science Research Group in July 1958.

At the meeting of the Kumamoto University Research Group on July 14, 1959, Prof. Takeuchi and Asst. Prof. Tokuomi reported the organic mercury hypothesis from the pathological and clinical standpoints. Prof. Kitamura also reported that mercury was discharged from Chisso, showing the data on the following tendency: the contamination level with mercury in the sediment of Minamata Bay decreased as the site of the determination became more distant from the outfall, with the peak, 2,000 ppm (wet weight), at the mud of the Hyakken outfall.

From the standpoint of the Kumamoto University Research Group, it was concluded that "Minamata disease is a disease of the nervous system induced by ingestion of the fishes and shellfishes caught in the district, and special attention has become paid to mercury as the toxic substance contaminated fishes and shellfishes". In July 22 of the year, the following item confirmed by the Research Group was officially presented: "it has become common to think that the causative agent for Minamata disease is the mercurial compound, particularly organic mercury". However, at this time, further study is needed as to what kind of mercurial compound is the causative agent. It has also been concluded that there was no direct relationship between the causative agent and mercuric chloride, which was used in the process of vinyl chloride production in Chisso. In the Research Group, Prof. Kuheita Miyagawa has still insisted the thallium

hypothesis.

(2) Fishing people's demands for compensations

When the organic mercury hypothesis was announced officially on July 22, 1959, the patients and fishing people, who had suspected the factory wastes as the cause of the disease from the beginning of the outbreak, confirmed that Chisso was the source of the causative agent of Minamata disease because there were no places other than Chisso, which discharged mercury. The fishing people urged first Chisso to pay indemnifications.

In August 6 of the year, fish dealers held a demonstration with the MFCA to the Chisso Minamata plant, and demanded payment of one hundred million yen for compensation to fishery, complete removal of sludge, and establishment of drainage disposal facilities. At the negotiation on August 12, the fishing people, who got angry at the unsatisfactorily progressing negotiations, broke into the place of the negotiation. On August 17 as well, the fishing people broke into the place of the negotiation, and at last the police were called out. Eventually, the dispute was brought to an end under the payment of ¥35,000,000 for compensation to fishery on the 29th day of the month through the intermediary of the Mayor and the Prefectural Assembly.

On August 19 of the year, the following proposal by the Shin Nippon Chisso Labor Union(SNCLU) was carried at the general meeting of representatives, since the company's workers (laborers) and fishing people are based on the fundamental attitude to the problem with fishing people as the same workers: the workers support struggles of fishing people as a rule.

However, from September 1959 onward immediately after the decision, there were patients of the disease among the fishing people at the mouth of the Minamata River and at Tsunagi on the northern side. The disease in cats were also confirmed in Izumi City and Shishi-jima Island on the southern side. Since these events suggested the wide-ranging contamination of the Shiranui Sea, the demand of the fishing people on the seashore of the Shiranui Sea for cessation of waste water drainage has been accelerated. On October 17 of the year, the Kumamoto Prefectural Alliance of Fishing Cooperatives held an indignation meeting, and demanded the Government the establishment of the Water Pollution Prevention Act, the specification of the Shiranui Sea as a designated sea area, and the investigation of the cause of Minamata disease. the Kumamoto Prefectural Alliance of Fishing Cooperatives demanded cessation of the operation before the completion of drainage disposal facilities, as well as compensation for fishery and payment of money in token of the plant's sympathy. However, since Chisso rejected all negotiations for these demands, 1,500 fishing people thronged to the plant, and stocks were thrown at the place. The police were called out.

At the end of October of the year, when movements of fishing people showed a tense situation at the same time with the field survey by the investigation team sponsored by the Diet (the Diet Investigation Team), the Governor of Kumamoto Prefecture, Kosaku Teramoto, visited Minamata for the first time after 1956 when Minamata disease was officially discovered.

On November 2, 1959, the Diet Investigation Team conducted the field survey of Minamata for the first time. The team, whose leader was Tetsuzo Matsuda, was composed of 8 Dietmen (Lower House Committee on Agriculture, Forestry and Fisheries, Committee on Social and Labour Affairs, and Committee on Commerce and Industry). At the same time, ca. 2,000 fishing people gathered at Minamata and appealed to the Diet Investigation Team. Thereafter, the fishing people held an indignation meeting and proposed a collective bargaining to the plant. Since the proposal was rejected, they broke into the plant, and the trouble developed into the affair in which at least 100 persons were injured.

In response to the affairs by the fishing people, SNCLU held an urgent representative conference on November 4. On the 6th of November, SNCLU demanded the Prefectural Government absolute opposition to cessation of the operation of the plant, early investigation of the cause of the disease, and countermeasures against patients and fishery. The union demanded the company the early completion of drainage disposal

facilities, cooperation for the investigation of the cause, and modest correspondence to the Kumamoto Prefectural Alliance of Fishing Cooperatives. Furthermore, the union carried the following resolution with one consent: the Kumamoto Prefectural Alliance of Fishing Cooperatives was requested to reflect the acts of violence.

(3) A petition of opposition to the cessation of drainage was presented to the Prefectural Governor by the Minamata City Government and various groups of the district

In response to the affairs by the fishing people on November 2, 1959, the Minamata City Assembly carried a resolution of the early investigation of the cause of Minamata disease, negation of acts of violence, measures to relieve patients and fishing people, and the early completion of drainage disposal facilities by Chisso. In the resolution, the Assembly requested to avoid cessation of the operation of Chisso, because very serious results will be induced if the operation was ceased.

On the 7th of the month, representatives of the Mayor, the City Assembly, the Chamber of Commerce and Industry, Agricultural Cooperative Association, and the Labor Union appealed to the Governor with the resolution.

The Family Association of Suikosha, which was founded as consumers' cooperative of the Minamata plant of Shin Nippon Chisso Fertilizer Co. Ltd. proposed a written petition to the Governor and the Chairman of the Kumamoto Prefectural Alliance of Fishing Cooperatives as of November 9, 1959. The content was as follows: Solution by acts of violence would be absolutely neglected; countermeasures against factory wastes should be established by the plant as early as possible; generous consideration by the prefectural authorities is strongly needed for discharge of factory wastes not to be ceased.

Intention of Chisso, which has much influence on Minamata City from the aspects of finance and man-power, appears to have been reflected in these movements, but the consciousness of a community bound together by common fate with Chisso, which has long percolated among the citizens of Minamata, may have facilitated these movements.

(4) Approach of the Government

On October 21, 1959, MITI guided Chisso to return the drainage for the waste water drained from the process of acetaldehyde production, i.e., the mouth of the Minamata River via the Hachiman Pool, back to the Hyakken Seaport and to complete the establishment of drainage disposal facilities within the year or by January of next year.

In response to the petition to the Diet from the Kumamoto Prefectural Assembly and the PFF, the problem with Minamata disease was dealt with at the meeting of the Committee on Agriculture, Forestry and Fisheries of the Lower House on October 22, 1959. The Committee decided there to conduct the field survey as early as possible.

The Diet Investigation Team visited Kumamoto on November 1, 1959 to hear the opinions of the Prefectural Assembly and the Kumamoto University Research Group. On the following day, the 2nd, they visited Minamata for the field survey; they heard demands from Minamata Disease Patient's Families Mutual Aid Society and the Kumamoto Prefectural Alliance of Fishing Cooperatives, and made on-site inspections of Minamata Bay and the Chisso plant.

MITI guided Chisso to complete facilities for waste water management as early as possible and to investigate the cause of the disease in cooperation with the organizations interested on November 10, 1959. Furthermore, MITI indicated to plants of acetaldehyde and vinyl chloride production all over the country to investigate waste water (particularly, the mercury content in the waste water). However, "secrecy was presented as to this investigation in view of the present situation in which the problem with Minamata disease was developing into a political issue".

On “the liaison conference of ministries concerning food poisoning in Minamata” on the following day, the 11th, Takeo Akiyama, the Chief of Light Industries Bureau, MITI, attended, and launched a counterattack to the organic mercury hypothesis by delivering copies of a report made by Prof. Raisaku Kiyoura, (Applied Chemistry) Tokyo Institute of Technology, to the effect that “There is no marked difference in the mercury level between Minamata Bay and the seawater of bays along the cities of other districts or factory areas, and evidence of the organic mercury hypothesis is not valid”.

On the following day, the 12th, circumstances, under which the organic mercury hypothesis was developed, were explained and the opposite opinion of Chisso to the hypothesis was introduced as the report on the investigation by the Diet Investigation Team at the meeting of the Committee on Agriculture, Forestry and Fisheries and the Committee on Social and Labour Affairs. The Diet Investigation Team suggested the ministries and offices interested to conduct survey and studies for investigation of the cause, to establish the sea areas investigated, to dredge and reclaim Minamata Bay, to increase study expenses for sectional meetings for food poisoning in Minamata, and to complete countermeasures against medical care and welfare for patients.

In January 1959, a Special Task Group on Minamata Food Poisoning was established in the Food and Sanitation Investigation Committee, the Ministry of Health and Welfare. The committee was composed mainly of the Kumamoto University Research Group, Institute of Public Health, and National Institute of Health Sciences. Kenshi Wanibuchi, the President of Kumamoto University, was the representative on the committee. A joint committee of these groups, which was held under the name of the Food and Sanitation Investigation Committee on November 12, submitted a report showing that “the major cause of Minamata disease was a sort of organic mercury compound”, but the source of generation was not described. The window, at which the investigation of the cause of Minamata disease was dealt with, was changed to the Economic Planning Agency, because the investigation by the Ministry of Health and Welfare alone would be difficult in the future. It was decided for many-sided studies to be conducted by the ministries and offices interested, and the special sectional committee of food poisoning in Minamata was suddenly dissolved. The disorganization was not informed in advance even to Kenshi Wanibuchi, the representative on the committee.

In November 1959, the Fisheries Agency demanded the Chisso Minamata plant to cease drainage of factory wastes and to approve on-the-spot-inspections for the purpose of collecting samples from the factory wastes, but Chisso rejected the demand on inquiry to MITI.

<Column> *Ex-president of Kumamoto University, Kenshi Wanibuchi, who was enraged by the approach of government officials*

Kenshi Wanibuchi, who was the representative on the special sectional committee of food poisoning in Minamata of the Food and Sanitation Investigation Committee, Ministry of Health and Welfare, Ex-president of Kumamoto University, attended on the liaison conference of ministries concerning Minamata disease at Matsumotoro on November 11, 1959. Asst. Prof. Haruhiko Tokuomi, who accompanied him on that occasion, has written the state of the conference in his diary. The following is cited from “Minamatabyo Nikki (the day book of Minamata disease)” by Tokuomi.

“November 11, 1959. Fine, Slightly cold. Attended on the liaison conference of ministries concerning Minamata disease at Matsumotoro in Hibiya from 1:30 PM. MITI did explaining of the plant’s conduct in vindication from beginning to end, and all ministries recriminated against each other. The Minamata City Government also vindicated the plant’s conduct. Everyone moved for his/her own benefit. Wanibuchi withdrew from the place in indignation. Matsumotorou is an elegant building in the Meiji era style before it was burnt, and was located in the grove of Hibiya Park. Since the conference was held as the liaison conference of ministries under the auspices of Management and Coordination Agency, clerks in charge of the ministries related to Minamata disease, i.e., Ministry of Health and Welfare, Ministry of Home Affairs, and

MITI appeared to have attended on the conference. I comprehensively explained the achievements of past studies, showing that organic mercury poisoning due to factory wastes was considered as the cause of the disease. Then, a person in charge of chemical industries, who is the Director of Light Metal Industries Bureau of MITI, rattled on, saying that “There are many chemical factories of this kind in and outside Japan. If Chisso was the prime mover, similar diseases should have occurred to date. You say organic mercury poisoning, but inorganic mercury is used as a catalyst in the process of industry. The process in which inorganic mercury becomes organic is not clear. Therefore, your explanation is unconvincing.” Wanibuchi, who listened to the opinion tongue-tied, suddenly stood up, and said, “Research groups have long demonstrated this real situation after years of hard application. You have not intended to help them. What are you doing to deny sweepingly the explanation?” He was infuriated and threw away an ashtray in front of him. He left the room indignantly. I was very frightened, and gathering up his baggage and my documents, I left the room to follow him immediately. I gave thought again to Wanibuchi, a gentle and calm person, who showed his nerve as a person of the *Meiji* era.”

<Column> *Attitude of MITI toward protection of Chisso*

Part of the attitude of MITI in those days has been described in the words of an assistant manager, who proceeded to the Economic Planning Agency from MITI. [Cited from Chapter 6: The truth kept from the public eye, “the water discharge did not stop” in vol. 3 “Declarations by the engineers of the Chisso Minamata plant”: “What occurred in Japan 50 years after the war?” (NHK Data Collection Group) Nippon Hoso Kyokai Publishers, 1995].

In those days, Takuzo Kumita proceeded to the Water Maintenance Section of the Economic Planning Agency as an assistant manager from MITI, and prepared a draft of countermeasures. The Water Maintenance Section has just been established. There were only few careers of the Economic Planning Agency; it consisted mainly of employees of MITI, Ministry of Health and Welfare, Ministry of Construction, and Ministry of Agriculture, Forestry and Fisheries, who were sent on loan. There was a great deal of argument about the countermeasures every night.

Kumita has also regarded factory wastes as the cause of Minamata disease, saying as follows. “There were really a number of patients. Frankly speaking, the causal relationship was already overt. I thought so, personally. Really, the factory wastes generated mercury. The mechanism underlying the change from inorganic mercury to organic mercury may not yet have been traced academically, but it cannot be said that there was no causal relationship.”

The employees of the Ministry of Agriculture and Forestry including Fishery Agency, who were sent on loan, have insisted to arrest the water drainage, but Kumita was called almost every week by the T-I Minister’s Secretariat and was eagerly indicated as follows.

“‘Hold out!’ he says. ‘Resist the anti-Chisso!’ When I said that the drainage had better be ceased, I was severely persuaded, saying, ‘What are you saying? If the operation of Chisso was ceased now, or if the industry of such a scale was arrested, high growth of Japan may be impossible. You should manage to avoid the cessation of the Chisso plant’s operation.’”

Eventually, the Economic Planning Agency and MITI took no measure to regulate water quality or cease the water drainage concerning mercury, and the waste water from the Chisso plant continued to be flown out. Water quality regulation was conducted on the seashore of Minamata in 1969 after the acetaldehyde plant was scrapped by the Chisso plant.

(5) *Mediation for compensations by the Kumamoto Prefectural Governor*

At urging of such a tense situation, the Governor Teramoto established a committee on Mediation for Fishery Disputes in the Shiranui Sea on November 24, 1959, and started mediating the disputes. On the

following day, the 25th, Minamata Disease Patient's Families Mutual Aid Society also demanded Chisso to pay ¥230,000,000 as compensation to 78 victims, on the basis of the following conclusion: "It is the social fact that the outbreak of Minamata disease was responsible for the waste water from your plant". Chisso took a firm attitude toward the demand, explaining, "We cannot pay any money as compensation to any patient because it has not been confirmed whether Minamata disease was caused by the factory wastes". Therefore, the Benefit Society started staging a sit-down demonstration in front of the main gate of the Minamata plant on November 28. The Society presented a petition to the Kumamoto Prefectural Governor, which demanded mediation the Committee on Mediation for Fishery Disputes in the Shiranui Sea. On December 12, the Committee including the Prefectural Governor and the Minamata Mayor launched out for mediation.

Chisso insisted the Governor the following as the conditions of the mediation: The payment is not intended for compensation but a present of money in token of their sympathy because the cause of the disease has not been determined; the payment of the present of money will be discontinued when it is confirmed that Chisso is not responsible for the cause of the disease; even if it is revealed that Chisso is responsible for the outbreak of the disease, Chisso will not pay any additional money. The Governor believed that the outbreak of the disease will stop if the facilities for waste water management were completed. He thought that on this occasion, it would be wiser to obtain the amount of payment as compensation according to workmen's accident compensation insurance, and so on. Thus, the Governor agreed to Chisso under these conditions.

The patients considerably resisted to the amount of payment based on the draft of mediation; they thought that the amount was too small. However, Chisso did not agree to the demand from patients, insisting that the cause of the disease remained unknown.

Chisso conducted the ceremony for the completion of the facilities for condensation and deposition management of waste water on December 24. On the following day, the 25th, Chisso inked an agreement with the Kumamoto Prefectural Alliance of Fishing Cooperatives on the mediation draft including the payment of ¥35,000,000 as compensation and financing of ¥65,000,000. On December 30, Minamata Disease Patient's Families Mutual Aid Society, which has taken into consideration the poverty of daily living of the patients' families, also signed a contract with Chisso on the present of money in token of their sympathy, which included payment of an annuity of ¥100,000 to each adult patient and payment of ¥30,000 to each minor-aged patient.

On this occasion, the subjects of the payment of the present of money in token of the company's sympathy were certified at "the Screening Council for Minamata Disease Patients". On December 25, i.e., immediately before the contract with the Benefit Society was signed, the Ministry of Health and Welfare temporarily held the Conference.

In Article 5 of the contract, the following item was included: "Even when the outbreak of the Minamata disease was determined later to have been derived from the factory wastes, new payment as compensation will not be required".

(6) Counterarguments of Chisso and Japan Chemical Industry Association against the organic mercury hypothesis offered by the Kumamoto University Research Group

A. Counterarguments of Chisso and Japan Chemical Industry Association against the organic mercury hypothesis

When the organic mercury hypothesis was presented by the Kumamoto University Research Group in July 1959, Chisso prepared "An opinion of the plant about the so-called organic mercury hypothesis" without delay, and presented it to the Special Committee of Countermeasures Against Minamata Disease in the Kumamoto Prefectural Assembly on August 5, 1959.

In this opinion, Chisso offered a counterargument as follows: Acetaldehyde and acetic acid have been

produced with mercury used as a catalytic agent since 1932, and vinyl chloride has been produced with mercury used as a catalytic agent since 1949. Therefore, the mercury has been partly discharged and accumulated in Minamata Bay. However, it is inorganic mercury. In addition, there have been no reports discussing the possibility of organic mercury being generated in the mid-course of the production process. Agricultural chemicals of organic mercury are rather problematic. The organic mercury hypothesis is problematic from the aspect of common sense of chemistry, and is merely inference.”

Moreover, on September 28, 1959, Chisso reported “The points (Summary) to which Chisso could not consent about the organic mercury hypothesis” in order to offer a counterargument against the hypothesis by listing the following reasons: The mechanism underlying the change from inorganic mercury to organic mercury remains unsolved regarding the hypothesis; there are the same kinds of plants using mercury over the world, but why does the disease occur only in Minamata? The military stores of all kinds (explosive compounds) abandoned and committed at the termination of the war are strongly suspected of being the reason for the sudden outbreak from 1954 on; there is much variation in the level of mercury in the liver, and there is almost no difference in the range of concentration between the cats with manifestation of Minamata disease and those without the manifestation; the theory is unreliable, because the research group has shown that clinicopathological findings closely resembling those of Minamata disease were obtained even from manganese, selenium, and thallium.

On August 24, 1959, Prof. Kiyoura of Tokyo Institute of Technology visited Minamata and investigated the seawater of Minamata Bay. On the 29th of the month, he had an interview at a press conference in Minamata City, reporting, “the contamination of the seawater of Minamata Bay with mercury is not so serious, and the mercury hypothesis should be carefully announced”.

On September 9, the Director of the Japan Chemical Industry Association, Takeharu Oshima, visited Minamata, and reported that the explosive compounds of the ex-navy, which had been abandoned in the Bay at the termination of the war, were responsible for the disease on the 28th day of September when Chisso offered the counterargument. With regard to the explosive compounds, the Kumamoto University Research Group has already referred to the persons interested in those days and confirmed that such fact did not exist on February 1957. Chisso has also asked them the circumstances in early September, 1959. In spite of that, Chisso advertised extensively the explosive hypothesis. They actually conducted investigation of the sea bottom, but obtained no results supporting the theory.

Since the mass media extensively dealt with the counterarguments against the organic mercury hypothesis, which involved scholars who were believed to be central authorities, the representatives of the patients and families, who had negotiations for compensation on the basis of the organic mercury hypothesis established by Kumamoto University, lost self-confidence. They told, “Our anxiety that the cause might remain unclear let us have made an agreement with Chisso about the payment a present of money in token of the company’s sympathy.”

B. The experiment on No. 400 cat by Hosokawa and the response of Chisso to the data

Chisso has also started experiment on cats since May 1957; the Technology Division cooperated with Chisso Hospital under a guidance of Hosokawa, the Director of the hospital. Hosokawa, who knew the organic mercury hypothesis, started conducting the experiment on cats, in which waste water from the processes using mercury, i.e., the process of acetaldehyde production and the process of vinyl chloride, was directly sprayed on the foods given to the cats, in July 1959.

The experiment was a determinant, which would demonstrate that the factory wastes are the direct cause of Minamata disease if it occurred. Therefore, Hosokawa initiated the experiment on his own responsibility without consultation to other physicians or the Technology Division, and only “the waste water concerned” was described on the labels of the cat experiment.

On October 6, 1959, the onset was observed in the “No. 400” cat maintained with foods on which the

waste water from the process of acetaldehyde production was directly sprayed. Hosokawa reported this fact to the managing staff of the Technology Division of the plant, but official presentation was avoided by mutual consent.

On November 30, Hosokawa was reported by the plant to discontinue all new studies in the company because the company decided that they would cooperate with the research groups of Kumamoto University and so on in the future. The continuation of the cat experiment was also prohibited. However, there was no cooperation of the company with the studies by the Kumamoto University.

Chisso arranged the counterarguments, which had been offered against the organic mercury hypothesis, with the detailed internal data, and prepared "A view against the organic mercury hypothesis as the causative agent for Minamata disease". On November 2, the copies of the view were delivered to the Lower House Investigation Team and so on. In this view, the onset in the No. 400 cat was not described, and the following conclusion was drawn: "In the case in which the factory wastes were directly administered to animals (cats), the failure in inducing Minamata disease indicates the absence of toxic substances themselves in the waste water.....".

The methylmercury compound as the causative agent for Minamata disease will be clarified later to be secondarily generated in the process of acetaldehyde production and to flow out into sea areas with the waste water. In those days, however, the Kumamoto University Research Group was urged by Chisso to demonstrate the change from inorganic mercury to organic mercury in the natural world without recognition of the results of the cat experiment in the Chisso plant or the possibility of the methylmercury compound being secondarily generated. The Group was further urged to do more difficult experiments and studies.

(7) Movements of the establishment of "Cyclator (Circulation and sedimentation flow system) "

A. Establishment of "Cyclator"

After the Kumamoto University Research Group declared the organic mercury hypothesis in July 1959, Minamata disease became a social problem, and fishing people strongly required the establishment of complete sanitation facilities for the waste water. MITI also guided Chisso in the completion of facilities for waste water management as early as possible in October of the year. As a measure to counter these movements, Chisso ordered a system of management of condensation and deposition (Trade name, "Cyclator") from a manufacturer specialized in the management of waste water at a cost of ca. a hundred million yen.

B. Social influence of the establishment of "Cyclator"

Akiyama, the Chief of Light Industries Bureau, MITI, notified Chisso of the early establishment of facilities for waste water management and cooperation in the investigation of the cause of the disease on November 10 of the year. The "Cyclator", which was scheduled to be completed in March next year, was completed after only 3 months of construction work, i.e., on December 19, 1959.

A ceremony for the completion of the system was conducted on a large scale on December 24 of the year, i.e., immediately before the contract for a present of money in token of the company's sympathy was signed. Fukuoka, the Director of Trade and Industry Bureau, and the Kumamoto Prefectural Governor were invited to the ceremony. The President of Chisso, Kiichi Yoshioka, drank the so-called "post-management water" at the ceremony. Even with the performance, Chisso declared openly that the waste water management became completed by accomplishment of "Cyclator".

However, early in 1960, the new incidence of Minamata disease in Yudo was reported, and the efficacy of "Cyclator" was doubted in some newspapers. In response to this, Chisso brought to Prof. Katsuro Irukayama samples from pre-management waste water and those from the waste water managed by

“Cyclator” (Chisso distinguished the former and latter groups of samples in writing), and asked to determine mercury levels. Prof. Irukayama reported without confirmation of the samples that the sample groups showed mercury levels of 20 ppm and 0 ppm, respectively. Thereafter, he repeatedly described the effect of “Cyclator” to remove mercury in his subsequent articles, believing in the removal effect of “Cyclator”.

As revealed by testimonies in the legal action (at the first trial) in the Kansai district in 1985, the main function of “Cyclator” was to clear turbid waste water so that it would be nice to look at, and the function to remove mercury was not needed to “Cyclator”, according to Tetsuo Ide, a designer for the system of the manufacturer specialized in the management of waste water. To begin with, the way of design of the system requested by Chisso was as follows: the system will treat waste water in the four facilities for airtight furnaces of phosphoric acid, sulfuric acid, heavy oil gasification, and carbide, and will ensure turbidity of 50 degrees or lower, color of 50 degrees or lower, and pH 8-9. The system was not designed to treat waste water in the processes of acetaldehyde or vinyl chloride, which uses mercury. As a consequence, part of the mercury adsorbed to the suspension material could be removed, but the system was not designed to remove the methylmercury compound dissolved in water.

A designer for the system heard the performance of the President of Chisso at the ceremony, i.e., drinking of “the post-management water”, and thought that the performance would produce illusions in people’s minds as if the System produced drinking water. He was disgusted with the performance.

When the waste water, in which mercury was dissolved, was actually flown into the “Cyclator” during test working, Chisso knew the absence of the removal effect of the system, and the waste water in the process of acetaldehyde production was sent to the “Hachiman Pool”, not “Cyclator”.

However, the propagation by Chisso, which showed that waste water became safe by the completion of “Cyclator”, had much influence on investigators and the mass media, as well as the citizens; the propagation induced them to believe that the outbreak of Minamata disease terminated. The Prefectural Governor, Kosaku Teramoto, also spoke reflectively in memoranda as follows: “When Cyclator started operating, I thought that the disease would not develop any more.Some years later, I knew, for the first time, that Cyclator was useless for removal of organic mercury. I cannot help saying that the efficacy of the system is unknown.”

Kurland, who visited Minamata again for investigation of Minamata disease on February 16 and 17, 1960, declared openly that the results of the additional tests conducted by NIH supported the organic mercury hypothesis established by the Kumamoto University Research Group. He described the Chisso’s sanitation facilities as well, and indicated that toxic substances were not removed by “Cyclator”.

[Comments] The waste water in the processes of production of acetaldehyde and acetic acid was discharged to the Hyakken Seaport through an iron scrap tank. In December 1959, construction of “cyclator” and “Sedifloater” (system for management of minute particles such as soot) was completed, but assessment of the procedure, with which mercury was subjected to the circulation use within the building site, was initiated, because mercury could not completely be removed by “cyclator”. As a tentative measure, mud discharge has been collected in the Hachiman Pool for mud discharge via the acetic acid pool and the mud discharge pit of “cyclator” since January 1960. From August 1960 onward, drainage of acetaldehyde and vinyl chloride was separated from the draining system in the internal circulation system. However, the residue drainage and cleaning drainage were flown into the Hachiman Pool for mud discharge.

<Column> *Advisory opinions of Kurland about Minamata disease*

Kurland and his co-workers reported Minamata disease in *World Neurology* in November 1960 (vol.1 370) as followings:

We believe that sufficient information is now available to present some constructive recommendations regarding the Minamata Bay and other areas in which similar conditions may prevail.

1. There is evidence that fish and shellfish from Minamata Bay are still toxic at the present time, and the ban on fishing in that area should continue to be enforced until, by appropriate animal experiments, the seafood is found to be safe.
2. The disturbing disclosure that several recent cases have occurred some distance from Minamata Bay among fishermen and their families (Fig.8), which presumably resulted from ingestion of free-swimming fish that migrated from the bay area, dictates the urgent need for a study to insure accurate diagnosis and laboratory confirmation of newly developing cases in the area.
3. A detailed study should be made of the ecology of the shellfish and free-swimming fish in Minamata Bay.
4. Tests should be undertaken to determine the precise chemical from in which the toxic agent exists in seafood, and the mechanism by which it is incorporated into this from.
5. A means of removing mercury-containing silt from the bottom of Minamata Bay, particularly near the effluent drainage canal where most of the mercury appears to be concentrated, seems indicated. This might require dredging the upper layers of silt in the vicinity of the old effluent channel and removing these to a safe inland storage area.
6. The possibility of employing distillation rather than washing to purify vinyl chloride should be explored. Since mercury may also be a serious contaminant of air, safeguards to insure that safe levels in the air are not exceeded after distillation will also be required. If it is economically feasible, local health authorities should encourage plants not already doing so to reclaim mercury from all spent catalyst. An alternative chemical process use of mercury in this manufacturing procedure.
7. Further case-finding studies, epidemiologic investigations, and chemical determinations for mercury and other possible toxic agents in fish and bottom specimens are necessary in the Galveston Bay area, as well as in the vicinity of other vinyl plants in Japan and other countries.
8. The experimental study of the use of chelating agents in the earliest stages of acute intoxication in animals may provide data which would be useful in early treatment if further human cases occur.

[Comments] With regard to "vinyl plants" described in Item 7, Kurland recognized it mistakenly; the terms should have been plants of acetic acid or acetaldehyde.

<Column> *Kurland's hypothesis suggesting that the cause of the disease is in the process of vinyl chloride*

In 1958, Leonard T. Kurland, the Director of the Epidemiology, Division of National Institutes of Health (NIH) in the U.S., heard outbreaks of a strange nervous disease in the Minamata district from Shukuro Araki of Kyushu University School of Medicine (Emeritus Prof. at present), who was in the U.S. for study. Kurland went to Minamata in September of the year. He analyzed the samples collected from Minamata, and next year he reported to suspect alkyl mercury as the cause of Minamata disease from the results of the analysis.

When the organic mercury hypothesis was reported in July 1959, Chisso admitted the use and discharge of mercury. However, Chisso insisted that the mercury is inorganic and organic mercury has not been flown out. If organic mercury as the causative agent was not discharged from the plant, it must be obliged to think that the inorganic mercury flown out in the sea became organic for some reason. This is the problem with so-called "conversion to organic mercury", which became the biggest heart of the problem thereafter. However, the possibility of such a way to comprehend the problem having been induced by Chisso is not ruled out.

Kurland visited Japan again in 1960, and obtained information and samples from Prof. Tadao Takeuchi of Kumamoto University School of Medicine. He analyzed the samples and those sent subsequently through Araki, and declared openly his opinion supporting the organic mercury hypothesis in the journal, "World Neurology" (November Issue, 1960). In this article, he showed some countermeasures against the cause of

Minamata disease on the assumption that the cause of Minamata disease exists in the process of vinyl chloride production at the Chisso Minamata plant. In the process of vinyl chloride production, inorganic mercury is used as a catalyst, but there is no possibility of methylmercury being secondarily generated in the process. From this point, Kurland presumed that inorganic mercury converts into methylmercury in the seawater. At that time, the investigators of Kumamoto University have considered in a similar way.

As for the problem with the source of generation of the substance, Prof. Irukayama and his co-workers eventually ascertained, during the period from 1961 to 1962, that methylmercury was generated in the process of acetaldehyde production at the Minamata plant and was flown out.

Even though the problem with organic change of mercury remained unsolved, it was sufficiently meaningful for narrowing down the problem to indicate that the Chisso plant, in which the largest amount of mercury is used, is the plant of acetaldehyde. However, such indication was not offered from the Kumamoto University Research Group. Conversely, Prof. Takeuchi and Kurland paid attention only to the process of vinyl chloride production. They did not change the recognition even after Chisso reported to the Kumamoto Prefectural Assembly the amount of mercury used in the process of acetaldehyde production in 1959. The fact is that precise knowledge of the process of production in the plant did not prevade among the medical investigators in those days, and information disclosed by the plant did not reach them.

Methylation of inorganic mercury in the natural world started from the mistaken speculation by Kurland. Jernelov in Sweden, who has continued to study in order to demonstrate the methylation, discovered by using mud of an aquarium that inorganic mercurial ion was actually methylated. He reported the discovery at the 1st Toxicity Conference in Rochester in 1968.

The methylation phenomenon in the natural world was confirmed in experiments on bacteria by Magos (1964) and Prof. Kitamura (1969). Environmental pollution due to methylation of inorganic mercury becomes an issue all over the world at present.

2. Breakup of the special sectional committee of food poisoning in Minamata in the Food and Sanitation Investigation Committee after the report in November 1959 and movements of the Tamiya Committee of the Japan Chemical Industry Association and Minamata Disease General Investigation and Research Liaison Council established in January 1960

(1) Breakup of the special sectional committee of food poisoning in Minamata in the Food and Sanitation Investigation Committee, Ministry of Health and Welfare

At a joint committee of the investigation groups, which was held under the name of the Food and Sanitation Investigation Committee on October 6, 1959, Wanibuchi, the representative on the special sectional committee of food poisoning in Minamata, reported the hypothesis of organic mercury intoxication as an interim report according to the contents reported by the Kumamoto University Research Group in July 1959.

On November 12 of the same year, the Standing Committee (Chairman: Prof. Katsuma Abe of Keio University) of the Food and Sanitation Investigation Committee reported to the Health and Welfare Minister that "Minamata disease, which is a toxic disease mainly showing disturbances in the central nervous system, is caused by massive consumption of fishes and shellfishes in Minamata Bay and in the surrounding areas, and the main cause of the disease is the organic mercury compound of a certain type", enumerating 8 points as reasons. Thus, the special sectional committee of food poisoning in Minamata was disorganized. The Chairman Abe talked, "factory wastes are highly suspected of having caused the disease, but the unsolved problem should be entrusted to the ministries and offices interested because the investigation is limited at the Board of Investigation". The special sectional committee was unexpectedly disorganized, and the representative on the committee, Wanibuchi, spoke reflectively, "The report is an interim at all, ...I have

thought that the final report should be offered after at most the source of generation of the substance is clarified. I was very surprised at the breakup which was ordered after the report". From this onward, investigation of the cause has been left to the new council comprised of various ministries and offices interested.

The Health and Welfare Minister, Yoshio Watanabe, presented the report offered at the Food and Sanitation Investigation Committee to the Cabinet meeting on the following day, the 13th, but no consent was obtained at the Cabinet meeting, because the T-I Minister, Hayato Ikeda, offered a counterargument, saying, "It would be premature to draw a conclusion that organic mercury was flown out from the plant".

[Comments] In the report, the Investigation Committee concluded that the cause of Minamata disease is the organic mercury compound for the following 8 reasons, which were reported at the special sectional committee of food poisoning in Minamata (Representative: Kenshi Wanibuchi, the Ex-president of Kumamoto University):

1. As the main symptoms of the disease, patients are disabled, and have the narrowing visual field and dull senses. These symptoms closely resemble clinical pictures of intoxication with the organic mercury compound.
2. On autopsy of the victims of the disease, the cerebellum and the visual center were revealed to have been damaged. These findings are observed in autopsy cases of organic mercury compound intoxication.
3. The urinary concentration of mercury in the patient affected with the disease is higher than that in the healthy people.
4. According to the results of chemical analysis in the victims of the disease, mercury levels in the brain, liver, and kidney are higher than those in the dead cases associated with other diseases.
5. The mercury concentration in the mud of the sea bottom of Minamata Bay is much higher than that for other places.
6. A large amount of mercury was detected in the body of *hibarigaimodoki* (a kind of black shell) collected in the district. When the shells were given to cats, they showed the same clinical pictures as those of Minamata disease.
7. The mercury concentrations in organs, particularly the brain, of the cats that died as a result of experiments and the cats affected with Minamata disease were higher than those for other cats.
8. When the organic mercury compound, e.g., the dimethyl mercurial compound or mercury ethylphosphate, was given to animals, they showed the same clinical pictures as those of Minamata disease.

(2) Minamata Disease General Investigation and Research Liaison Council of the Government

After the breakup of the special sectional committee of food poisoning in Minamata in the Food and Sanitation Investigation Committee, Minamata Disease General Investigation and Research Liaison Council (The Supervision of the Economic Planning Agency, MITI, Ministry of Health and Welfare, and the Fisheries Agency) was established. The first conference on the liaison council was held on February 26, 1960.

Two from Kumamoto University, i.e., Prof. Makio Uchida (Dpt. Biochemistry) and Prof. Kitamura, were involved with the council. Prof. Kiyoura of Tokyo Institute of Technology offered a counterargument against the report by Prof. Uchida, saying that mercury is not necessarily the cause of the disease.

At the second conference on April 12 of the year, Prof. Kiyoura presented "the hypothesis of noxious amine". In response to the hypothesis, the Kumamoto University Research Group offered a counterargument against the hypothesis on the 16th day of the month.

At that time, the council started in the expectation that the conference would be held 6 or 7 times. No conclusion was drawn, and the conference has not been held since the 4th conference was held on March 6, 1961. The inspection of the cause of Minamata disease by the Government was not conducted. After all, the council resulted in playing only the role to obscure the organic mercury hypothesis.

(3) *The Tamiya Committee of Japan Chemical Industry Association*

At the end of 1959 the dispute about the contract for a present of money in token of the company's sympathy was settled. From the 35th year of Showa (1960) on, Chisso did not oppose openly the organic mercury hypothesis, as guided by MITI. Instead of Chisso, Japan Chemical Industry Association took upon itself the responsibility of offering counterarguments and raising objections against the organic mercury hypothesis. As the place where the Association plays the role, the Association prepared "the Tamiya Committee".

Instead of Chisso, the industry groups started moving in on the problem with Minamata disease, probably because they were apprehensive about the possibility that the influence of the organic mercury hypothesis, i.e., the theory showing that the plant is the cause, spreads not only Chisso but also other domestic plants of the same kind.

In September 1959, Oshima, the Director of the Japan Chemical Industry Association, has already insisted the explosive hypothesis. The Association established in December of the year the special committee on vinyl chloride and acetic acid in the Industrial Wastes Countermeasures Commission for the purpose of countering waste water related to the problem with Minamata disease.

On April 8, 1960, the Association established "Minamata Disease Research Consultation Group" as an affiliated organization of the special committee on acetic acid; the chairman of the meeting was Takeo Tamiya, the President of the Japanese Association of Medical Sciences, and prominent members were collected for the meeting. The meeting was named "Tamiya Committee" after the name of the chairman. The Association emphasized that the establishment is the means by which the Association measures itself against Minamata disease from neutral and scientific viewpoints.

[Comments] The main members of the committee were Emeritus Prof. Yoshito Kobayashi of The University of Tokyo (Pharmacology) and Prof. Shigeo Okinaka of The University of Tokyo School of Medicine (Internal Medicine) as advisers, Prof. Haruo Katsunuma of The University of Tokyo School of Medicine (Public Health) as Vice Secretary General, and Prof. Tadashi Yamamoto of Institute of Infectious Diseases, The University of Tokyo, Asst. Prof. Mamoru Saito of The University of Tokyo School of Medicine (Pathology), and Prof. Yoshihiko Ohyagi of Tokyo University of Education (Analytical Chemistry) as committee men. Prof. Raisaku Kiyoura and Prof. Kikuji Tokita of Toho University (Pharmacology), who reported "the organic amine hypothesis" at the 2nd conference of Minamata Disease General Investigation and Research Liaison Council held on the 12th day of April, also participated in the committee. Kumamoto University School of Medicine was also requested to attend to the committee, but Dean Kansuke Sera of (Forensic Medicine) rejected it, and they did not participate in the committee until 1961 when the Dean changed to Prof. Masachika Kutsuna (Anatomy).

From April 1961 onward, the Ministry of Health and Welfare arrested a subsidy for aiding researches and continued a subsidy for aiding only the outgoings related to medical expenses. Therefore, the research funds for the Kumamoto University Research Group have contained a Government (Ministry of Education) subsidy for aiding scientific researches limited for only one year and the research funds by Public Health Service (PHS) through the good offices of Kurland of NIH.

Prof. Sera, who has been Dean of Kumamoto University School of Medicine and the Leader of the Kumamoto University Research Group, has rejected to participate in the Tamiya Committee, but in April 1961 when the Dean changed to Prof. Kutsuna, some attempts were made to improve the antagonism of the research group against Chisso; the group decided to accept aids from Chisso. From September 1961 onward, the Kumamoto University Research Group also participated in the Tamiya Committee.

In 1962 Prof. Irukayama and his co-workers of Kumamoto University reported an article entitled "Organic mercury in the residues of mercury used at the Minamata plant of acetic acid", demonstrating that the methylmercury compound has been secondarily generated at the Chisso plant. It describes to the effect that the research funds are partly derived from NIH and the Tamiya Committee.

The Tamiya Committee had much social influence because the investigators, who were taking the initiative in the medical world, started investigating the cause of the disease. Under these circumstances, Prof. Kiyoura and Prof. Tokita reported the hypothesis of toxic amine as the hypothesis different from the organic mercury hypothesis. These investigators insisted that there are various theories on the cause of the disease and no definite hypothesis on the cause has been established. Their opinion was reported in the mass media as it was, and made the organic mercury hypothesis to become a relative concept. Eventually, the establishment of the toxic amine hypothesis gave an impression that the cause of the disease remains unsolved. In this regard, the Tamiya Committee of the Japan Chemical Industry Association had much influence on regression of investigation of the cause of Minamata disease, and the committee provided a reason for having allowed the outbreak of second Minamata disease in Niigata.

3. Social function of the contract of the victims with Chisso about a present of money in token of the company's sympathy

(1) Contract of the victims with Chisso about a present of money in token of the company's sympathy

On December 30, 1959, a mediation draft on compensations for patients (the so-called contract about a present of money in token of Chisso's sympathy) was agreed to and signed between the representative of Minamata Disease Patient's Families Mutual Aid Society and Chisso.

In the contract about the present of money in token of the company's sympathy, Article 4 and Article 5 were combined; i.e., Article 4, "The former (Chisso) can cease delivery of presents of money in token of the company's sympathy at the month when Minamata disease is determined not to be derived from the factory wastes from the former in the future," and Article 5, "The latter (patients) will not request new payment of indignifications even after it would be determined in the future that Minamata disease is derived from the factory wastes from the former". Usually, items of relinquishing the victims' claim for presents of money in token of Chisso's sympathy are included in those of compromise, but an explanatory note as follows will not be included: "even after it will be determined that the disease is derived from the factory wastes". The "presents of money in token of Chisso's sympathy" by Chisso was very small from the current viewpoint; at that time as well, "the amount was extremely low, as compared to wages of laborers, the amount consumed and expanded at home, the amount calculated by assessment of the amount compensated for damages in cases of fatal and physical invasion by traffic accidents, and the amount in other cases of accident compensation" (A judgment paper on the primary action in Kumamoto Prefecture).

The announcement of the organic mercury hypothesis in 1959 was followed by counterarguments by Chisso, presentation of the hypothesis different from the organic mercury hypothesis by authoritative academical persons, breakup of the special sectional committee of food poisoning in Minamata in the Food and Sanitation Investigation Committee, establishment of Minamata Disease General Investigation and Research Liaison Council, completion of "Cyclator", settlement of compensations for fishery, and a contract with Chisso about a present of money in token of the company's sympathy. Such a series of movements indicate the structure of "termination of the problem with Minamata disease" at this period, which aimed at being realized within the year. Despite the fact that the problem essentially needed the elucidation of the basic cause, the affair was regarded as having been solved by the payment of the money in token of the company's sympathy. The concern of the mass media to the problem with Minamata disease also came to an end, and the problem was socially kept from the public as the cause was left unconfirmed.

Since the problem with Minamata disease in Kumamoto was ended as it remained obscure, no remarkable countermeasures have been considered thereafter, and there was the outbreak of the secondary Minamata disease in Niigata 6 years later.

[Comments] The efficiency of the contract about the present of money in token of the company's sympathy was contested at law thereafter. In 1973, the plaintiff gained the case on the judgment of the primary action in Kumamoto, which indicated that the contract about the present of money in token of Chisso's sympathy was ineffective because of contravention to the public order and morals on the basis of the state that the extremely small amount of the money in token was paid to patients and, instead, the company induced the patients to have disclaimed all reparations payment, taking advantage of patients' ignorance and economical poverty.

(2) The beginning of the Minamata disease certification system for the people affected

At the Screening Council for Minamata Disease Patients, which was organized with the opportunity of the contract about the present of money in token of the company's sympathy, the subjects of the receipt of the present of money in token of the company's sympathy, which should be essentially decided between the parties concerned, are assessed and decided by the specialists asked by the Government.

According to the judgment by private medical care institutions, it was taken into consideration that any consent would not be obtained from Chisso. Therefore, "the Screening Council for Minamata Disease Patients" was extraordinarily established for the first time in the Public Health Bureau, Ministry of Health and Welfare in December 1959, and scientific research funds sponsored by the Ministry of Health and Welfare were paid for medical expenses. In September 1961, the council was reorganized, and "the Screening Committee for Minamata Disease Patients" (the Supervision, the Health Dept. of the Kumamoto Prefectural Government) was inaugurated in Kumamoto Prefecture. In March 1964, "the Screening and Certification Committee for Minamata Disease Patients" was established according to the Kumamoto prefectural ordinances.

Regulations were prepared at the 1st meeting of the Screening Council for Minamata Disease Patients in February 1960. According to the regulations, the Minamata disease patients, who demand presents of money in token of the company's sympathy, or the family members were to offer the presents with written opinions of physicians-in-charge, and the decision was to be made unanimously by all members of the Conference.

(3) Certification of Minamata disease patients after the contract about the present of money in token of the company's sympathy

According to the Minamata disease certification system for the affected people, which was regulated in the contract about the present of money in token of the company's sympathy, 79 people, who had been discovered before establishment of the system, were certified to be Minamata disease patients. In 1960 and 1961, 8 and 1 patients were respectively certified to have had Minamata disease. Since then, however, only an infant has been certified in 1964, with the exception of certification of patients with fetal Minamata disease. There have been no reports by medical care institutions of the district, which have discussed the incidence of suspected Minamata disease, during the approximately 5-year period from 1965 to 1969, and no meeting of the Board has been held during the period.

During the period as well (1965-1969), waste water containing the methylmercury compound was continuously flown out from the Chisso plant, but the advertisement for the waste water, which showed that it is safe with the "cyclator" set, has exercised precaution to lower the citizens' guard.

Under the situation of the Medical Examination Society for Minamata Disease Patients in 1960, any case other than the cases that have all typical symptoms of Minamata disease was not certified to have Minamata disease. Furthermore, the thinking on termination of the affair of Minamata disease has spread the local community, and there have been discriminations in the local community. Therefore, it is not socially easy to newly apply the certification for the disease. Eventually, the certification itself was suppressed. Thus, there were patients in the wide-ranging areas, who had potentially symptoms as the influence of the

methylmercury compound, but these patients were dealt with as if they had not existed.

Table 4. The changes in screening for the certification of Minamata disease

Name	The Screening Council for Minamata Disease Patients	The Screening Committee for Minamata Disease Patients	The Screening and Certification Committee for Minamata Disease Patients	The Pollution – Related Health Damage Certification Council
Organization	December 25, 1959 (Tentatively)	September 14, 1961 (Tentatively)	March 31, 1964 (Institutionalization, Establishment of ordinances)	December 27, 1969 (Based on Law Concerning the Relief of Pollution – Related Health Damage)
Supervisory office	The Public Health Bureau, Ministry of Health and Welfare	Health Dept. of the Kumamoto Prefectural Government	Kumamoto Prefectural Governor (Health Dept.)	Asked to the Prefectural Government (Health Dept.) by the Health and Welfare Ministry
Objective	Evaluation of patients with true Minamata disease and necessary investigation Examination for the appropriateness of admission to and discharge from the Minamata disease wards (substantial institution for the certification)	do. (However, not held until November 29, 1962)	Evaluation of true Minamata disease patients, and accompanying investigation (the change to absolute institution for the certification)	The special measures for the relief of damages to health, which urgently require to be relieved, are adopted.
Procedure	The supervisory Director of the Prefectural Medical Dept. asks evaluation. In actuality, only the applicants by the patients themselves or their family members, which accompany written opinions of physicians-in-charge, are received (Based on the decision made at the Conference for Medical Examination of Minamata Disease Patients on February 3, 1960).	The Head of the Minamata Public Health Center asks the evaluation. do.	Reply to the questions requested on the evaluation by the Governor	After the patient's application
Committee member	Seven members	10 members (3 members were added because of the examination of fetal Minamata disease patients) Haruhiko Tokuomi, MD (Asst. Prof. of the First Dept. of Internal Medicine, Kumamoto University School of medicine) Tadao Takeuchi, MD (Prof. of the Second Dept. of Pathology, Kumamoto University School of medicine) Takeo Takada, MD (Prof. of the Dept. of Pediatrics, Kumamoto University School of medicine) Yoshitaka Harada, MD (Asst. Prof. of Pediatrics, Kumamoto University School of medicine) Noboru Ohashi (Director of Minamata Municipal Hospital) Isaoshi Mishima (Sub-Director of Minamata Municipal Hospital) Masamoto Ukiike (President of the Medical Association in Ashikita-gun, Minamata City) Iwao Ogawa (Director of the Chisso Minamata Plant Hospital) Naoya Hamazaki, MD (the Director Health Department of the Kumamoto Prefectural Government) Hasuo Ito (Head of the Minamata Public Health Center)	10 members	

Prepared from “*Nintei-Seido eno Chosen (the Challenge to the Certification System)*” edited by Minamata Disease Study Group

(4) Detection of patients with fetal Minamata disease

The abnormally high incidence of symptoms resembling those of cerebral palsy in children has been revealed since the first half of the period from 1955 to 1964 in the districts where many patients had been observed in Minamata. The relation of the high incidence to Minamata disease has been suspected. In March 1959, Prof. Kitamura and his co-workers reported 9 patients, describing, "There are relatively many children with abnormal findings, who show symptoms like those of cerebral palsy, among the infants who were born from 1955 onward in the areas surrounding Minamata Bay". This is the first report on fetal Minamata disease. Next year, Prof. Kitamura added 5 patients, clarifying that the frequency was abnormally high, 7.5 to 11.9%.

Prof. Sukenori Nagano and his co-workers of the Dept. of Pediatrics, Kumamoto University School of Medicine, also conducted precise examinations on 15 patients, indicating that "The cause of the disease lies in the fetal stage, which is closely related to Minamata disease from an epidemiological viewpoint, and the mercury level in hairs of affected child is high". However, it was postponed for the conclusion to be drawn, since there were no findings that were definitely different from those on general cases of cerebral palsy.

In March 1961, one of the patients, a 2.5-year-old girl, died. On the autopsy by Prof. Takeuchi and his co-workers, it was concluded that the condition was Minamata disease developing in the fetus. The condition was certified to be fetal Minamata disease in August. In the same year, Asst. Prof. Tokuomi and his co-workers also conducted precise examinations on the 7 patients, describing, "The sites of encephalopathy, which are assumed from these symptoms, are extremely wide-ranging; it includes most parts of the central nervous system, i.e., cerebral cortex, basal ganglia, brainstem, and the cerebellum. This finding closely resembles that on the sites of lesions observed on autopsy of pediatric patients with Minamata disease". They described about the one autopsied case as well, describing, "the possibility of congenital Minamata disease having occurred was confirmed from the epidemiological and clinical findings on child patients with so-called cerebral palsy that occurred frequently in the districts where the incidence of Minamata disease was high, and from the findings on the autopsied case".

From 1961 onward, the Dept. of Neuropsychiatry also participated in the investigation including the analysis of clinical manifestations and comparison with those of cerebral palsy of other causes. As a result of the investigation, it was concluded that the 16 patients found in Minamata "had the same disease of the same cause". These patients were diagnosed as having Minamata disease via the placenta from the following findings: the incidence rate is extraordinarily high; the sites and period of the occurrences are consistent with those of Minamata disease; the mothers of the patients have eaten fishes and shellfishes in large quantities during pregnancy; their mothers have had mild nervous symptoms including sensory disturbance; many of their family members have had Minamata disease.

In September 1962, a girl aged 6 years and 4 months also died, and Prof. Takeuchi conducted again autopsy of the patient. From pathological findings, this case was also diagnosed as Minamata disease developed in the fetal stage (in October). For this reason, 16 patients, whose diagnoses have been reserved by this time, were certified to have had fetal Minamata disease by the Screening Committee for Minamata Disease Patients on November 29, 1962.

It has been revealed that the frequency of abortion and stillbirth was high in the former half of the period from 1955 to 1964, when the pollution was serious. The male to female ratio of the babies born during the period also changed. These phenomena suggest that exposure to the causative agent in the embryonal stage has resulted in abortion and stillbirth.

In Niigata, the Prefectural Government guided earlier the women of childbearing age in the conception control on the basis of the outbreak of fetal Minamata disease in Kumamoto Prefecture. Only one case of fetal Minamata disease has been reported in Niigata Prefecture.

[Comments] In the primary action concerning Minamata disease in Niigata Prefecture, 6 of the women

with Minamata disease, who were guided in the conception control have requested to receive the amount compensated for damages. The 6 women included a woman who had undergone sterilization and two who had undergone termination of pregnancy. In the decision, ¥500,000 and ¥300,000 were approved to be paid as the amounts compensated for sterilization and others, respectively.

<Column> *Fetal Minamata disease*

With regard to the discovery of intoxication occurring via the placenta, Minamata disease is the first one of the whole world. The discovery of fetal Minamata disease was a new type of chemical toxicity. This was the affair from which the future of mankind would be foreseen. Thereafter, fetal Minamata disease or fetal methylmercury poisoning occurred in Niigata, the U.S., and Iraq.

Prof. Takeuchi defined the disease as fetal Minamata disease because it was the poisoning, which developed in the fetus. Clinically, however, it may be called congenital Minamata disease, because fetal infection and poisoning are also regarded as being “congenital”.

There have been no data that show definitely the number of the patients with the fetal case among Minamata disease patients. According to Masazumi Harada, 64 patients with fetal Minamata disease have been confirmed and 13 of them died.

It was confirmed in animal experiments as well that methylmercury passes through the placenta, and it was also clarified that methylmercury induces encephalopathy to the offspring via the breast milk.

The methylmercury level in the preserved umbilical cord of patient who was considered to have fetal Minamata disease was as high as at least 1.0 ppm, but some cases including pediatric patients with Minamata disease and children with intellectual disturbance and healthy children in the districts of outbreaks of Minamata disease showed the levels higher than those in the controls. Strictly, it is difficult to differentiate pediatric Minamata disease from fetal one in many cases, because the pollution of fishes and shellfishes continued even after the birth.

(5) *Medical countermeasures against Minamata disease patients*

In December 1958, the ward used tentatively for Minamata disease patients was constructed in the Minamata Municipal Hospital, and in July 1959 the construction of the ward for exclusive use was completed. On January 20, 1964, the construction of the Yunoko Hospital (200 beds), affiliated with Minamata Municipal Hospital was begun as the rehabilitation center for Minamata disease patients by using reduction financing of reserves for kosei nenkin plan (government-managed pension plan for corporate employees) under the initiative of the Ministry of Health and Welfare. The hospital was opened on March 7, 1965. This hospital was the first public special hospital for rehabilitation in Japan.

(6) *Labor dispute of Chisso-- the stabilized wage disputes*

To facilitate the self-renewal of Chisso to petrochemical industries, Chisso proposed the “steady wages” system to the trade union in April 1962.

Since the trade union rejected the proposal, a keen labor-management dispute has started and developed a great disturbance, which would divide the city in two parts by the union’s division; the union was divided, and it became an issue regarding the point as to which party the shops and citizens would support. The dispute terminated in January 1963, but thereafter a deep-rooted feeling of confrontation remained among the citizens as well as the workers of Chisso. During this period, Minamata disease did not draw concern of citizens and was over shadowed.

<Column> *Labor-management dispute in Chisso, which divided Minamata City in two parts*

The peak of acetaldehyde production was over in the Chisso Minamata plant, and Chisso, which was behind other companies in the management because of the transformation to petrochemical industries, proposed “steady wages” as a part of the measures to promote rationalization of the management to the trade union (of Chisso) in April 1962. According to the proposal, the improvement of wage level by the degree equivalent to that for other companies in the same field was preliminarily promised, and instead, the union had to resign its right of labor dispute and to cooperate with Chisso in the draft of rationalization. The negotiations between the union and the company were broken off, and the trade union rejected the proposal and came out on a strike (called “Fight for steady wages”). In response to this, the company locked out the workers as members of the union, and at the same time, undermined the solidarity of the member workers of the union to establish the second union, The Chisso labor union (2nd union).

Supporters of the General Council of Trade Unions of Japan gathered the first union (old union) under the control of (Japanese Federation of Synthetic Chemistry Workers Unions) Unions from all over the country. On the other hand, the new union forced the workers to work and started undermining the solidarity of the old union. Thus, the antagonism became intensified. At that time, a number of citizens, who included the Chisso’s employees, the family members and relatives, companies related to Chisso, and customer shops, supported individual movements by clarifying their own positions between these parties. Therefore, feelings of confrontation, such as exclusion, hatred, etc., developed among the citizens based on different positions, as well as between the unions. The antagonism developed the dispute by which the local community was divided in two parts.

After all, the dispute was controlled through the conciliation of the Regional Labor Committee in Kumamoto in January 1963. The production at the Chisso plant was normalized after the 9-month disordered period, but feelings of confrontation, which were reflected by division of the trade union and the subsequent discriminative treatments of the old union by Chisso, persisted. Without healing of the antagonism among the citizens, which was left in the district, there is no end to the antagonism among some people.

On the other hand, Minamata disease died from the memory of the public as a matter of citizens’ concern during the period of the fight for steady wages.

4. Survey of mercury level in hairs in Kumamoto Prefecture during the 3-year period after 1960

On October 1960, the Kumamoto Prefectural Institute of Public Health started conducting the survey of mercury level in hairs of the inhabitants along the shore of the Shiranui Sea, in response to the findings observed by Prof. Kitamura of the Dept. of Public Health of Kumamoto University School of Medicine, which showed that mercury level in hairs provides an effective indicator of the development of Minamata disease. This survey was continued for 3 years; the survey in each year included ca. 1,000 inhabitants. The survey was extremely valuable as that on the inhabitants of the polluted district.

The survey was designed to know the risk of the development of Minamata disease at both individual and regional levels by determining the rise and fall in mercury level in hairs and to prevent the new patient.

The results of the survey were reported every year in an annual report of the Health Institute, and the distribution according to mercury level in hairs and mean levels were declared openly. At present, the results of the survey on individuals are reported to the inhabitants themselves. At that time, however, the results were not used for application to the certification, because the results of the analysis of mercury level in hairs of each inhabitant, who offered the sample and was eagerly to know the results of the analysis, were not reported to the inhabitant.

In the Goshonoura island across the Shiranui Sea from Minamata, there have been no applications to the certification, but the survey conducted in 1960 revealed that the mercury level in hairs was abnormally high, exceeding 200 ppm, in 4 inhabitants.

Thereafter, the First Dept. of Internal Medicine, Kumamoto University School of Medicine, delivered questionnaire surveys to the inhabitants of the Goshonoura district, who showed 80 ppm or higher, on the basis of the results of the survey by the Health Institute, and investigated subjective symptoms. As a result, some “occasionally” complained of “numbness”, and even the inhabitants with high mercury levels in hairs showed almost no symptoms. However, the inhabitants who showed the highest mean level of 920 ppm (430 ppm at the root and 1,855 ppm at the tip), complained of the stiff hands and so on [they could not fasten buttons; their *zoris* (Japanese sandals) easily slipped off; etc.]. They were suspected of having had nervous symptoms, but no confirmation was made because the Goshonoura island was far from Kumamoto City and hard of access.

At this time, the public’s interest on Minamata disease in Kumamoto has languished, and the survey on mercury level in hairs was brought to an end 3 years after the initiation.

[*Comments*] At that time, Minamata was far from Kumamoto City, and the investigators of Kumamoto University thought that the place was hard of access. Furthermore, the sea route was needed to the approach to the Goshonoura island.

The Kumamoto Prefectural Government and the Kagoshima Prefectural Government initiated health screening of inhabitants from 1971 at the patients’ urging to request investigation against appeals of dissatisfaction with the Government. No extensive health screening has been conducted by either Prefectural Government before the year.

<Column> *An excellent indicator of exposure to mercury: mercury level in hairs*

The determination of mercury level in hairs is an important testing method, which was revealed to be useful by its wide-ranging use in Japan including Niigata prefecture, taking advantage of the opportunity presented by Minamata disease. The method is widely used all over the world.

With regard to methylmercury poisoning, it has not been known first that investigation of methylmercury in hairs is very useful. However, Prof. Kitamura of the Dept. of Public Health, Kumamoto University School of Medicine, took a hint from the accidental transfer of arsenic to hairs in arsenic intoxication, and determined mercury level in hairs. It was revealed that the mercury level in hairs is very useful as an indicator of exposure to the causative agent for Minamata disease.

In Canada and Sweden, there have been data on blood level of mercury in those days, but nobody has considered about the determination of mercury level in hairs.

No pain is induced by collection of hair samples, and it is also easy for hair samples to be stored for a long time. If the level was determined precisely by dividing the hair into some parts from the root, the situation of the time-course exposure to mercury will also be revealed.

In some studies based on the similar conception, the mercury levels in the past have also been determined by using feathers of the birds kept at museums in Sweden, since about 1966.

The presence or absence of environmental pollution may be debated from the data of the determination of levels in the seawater and rivers water, but even if any toxic substance was not detected at a certain time point, it would not be concluded that there has been no pollution in the past time. When the toxicity of a substance is cumulative, it is effective to determine in birds’ feathers and hairs of mankind and animals, as well as to determine the levels in living things of high orders of food chains. The considerably high ability to analyze is necessary for the determination of environmental changes, but the distribution of pollution in the past time will be determined if an indicator reflecting the pollution of the site was exactly obtained.

5. *The statement by Prof. Irukayama and his co-workers about the extraction of organic mercury from factory wastes in the process of acetaldehyde production*

(1) *Confirmation of the methylmercury compound in the factory wastes by the Technology Division of the Chisso Minamata plant*

Shunichi Ishihara of the Technology Division of the Chisso Minamata plant confirmed by paper chromatography in July 1961 that the alkyl mercury compound is contained in the factory wastes in the process of acetaldehyde production, and ascertained in December of the year that the extracted crystal was the methylmercury compound. However, the result was not reported to outsiders of Chisso.

(2) *Extraction of organic mercury by Prof. Irukayama and his co-workers of the Kumamoto University Research Group*

In November 1961, Prof. Uchida and his co-workers of the Kumamoto University Research Group reported at the meeting of the Japanese Biochemical Society for that methyl sulfide methylmercury ($\text{CH}_3\text{HgSCH}_3$) was extracted from *Hibarigaimodoki* in Minamata Bay.

In about 1962, Prof. Irukayama and his co-workers, who had followed up the source of generation of organic mercury, noticed that they had looked over organic mercury in the stage of preparation of samples, and started analyzing the mercury sediment untreated, which had been obtained from the Chisso plant.

Chisso has brought forth a counterargument to say that they have never discharged organic mercury, but Prof. Irukayama and his co-workers reported the article (submitted to *Nisshin Igaku*) entitled, "Organic mercury in the mercury sediment from the Minamata acetic acid plant", showing that methylmercury chloride (CH_3HgCl), which was considered the causative agent, was extracted from the mercury sediment from the (acetaldehyde) acetic acid plant and from the short-necked clams in Minamata Bay. Thus, organic mercury as the causative agent was extracted at last.

At a briefing session of the Kumamoto University Research Group, which was held with research funds from PHS on February 16, 1963, Prof. Irukayama reported that organic mercury salt was detected from the mercury sediment produced in the process of acetaldehyde production in the Minamata plant.

(3) *Approach of the Government and so on to the report on extraction of organic mercury*

Kumamoto *Nichinichi Shimbun* (The Kumamoto Daily News) scooped this report as the news, showing, "The Kumamoto University Research Group reported in connection with the cause of Minamata disease. Bound to organic compound in the process of production. Prof. Irukayama detected a toxic substance." Since the news were scooped, the public's attention has been unanimously paid to the substance. On this occasion, Kumamoto *Nichinichi Shimbun* (The Kumamoto Daily News) got the following comment of the Chief Public Prosecutor Teiji Ikeda of the Kumamoto Direct Public Prosecutor's Office regarding the penal responsibility of Chisso: "We have not touched about this problem, but we must be much concerned about it if some conclusion was drawn." This was the only case in which the prosecution gave comment, but thereafter there have been no movements of the prosecution.

On the basis of these news items, a Dietman, Fujitarou Fujita, made an inquiry concerning measures to cease discharge of organic mercury from the plant to the sea at a meeting of the Committee on Social and Labour Affairs, the Upper House on February 19, 1963. The Director Yoshiaki Igarashi of the Environmental Health Bureau of the Ministry of Health and Welfare, replied to the effect that "the circumstances of the district must be adequately investigated, and necessary countermeasures will be assessed because new opinions were reported", but the Government did not behave concretely to consider the countermeasures. The Minamata Disease General Investigation and Research Liaison Council was in a

resting stage from the 4th meeting held in March 1961 onward, and nobody requested to open the meeting again. The answer to the inquiry was also made by the Ministry of Health and Welfare, not the Economic Planning Agency which was the sponsor of the liaison council.

On February 20, 1961, the Kumamoto University Research Group declared about the cause of Minamata disease openly that the future tasks for confronting the group include the following point: the toxic substance is the methylmercury compound, but the substance extracted from the shellfishes in Minamata Bay is slightly different from that extracted from the mercury sediment from the acetic acid plant in terms of the structural formula.

In January 1964, Prof. Hirotsugu Shiraki of The University of Tokyo (Neuropathology) reported a summary of the research of Minamata disease, which was entitled, "Minamata disease--With special reference to the hypothesis of the origin of organic mercury--", to a scientific journal, "Kagaku (Science)". It summarized the circumstances of the period from the outbreak of Minamata disease to the detection of the methylmercury compound in the mercury sediment from the acetic acid plant by Prof. Irukayama, with references to the literature. The summary drew a conclusion that Minamata disease in Kumamoto was clearly caused by the methylmercury compound discharged from the Chisso plant.

In 1964 the Chief Michio Hashimoto of the Environmental Pollution Section of the Ministry of Health and Welfare insisted to solve the problem with the cause of the disease as early as possible because the article of Prof. Shiraki was declared openly in "Kagaku". However, the Ministry of Health and Welfare could not decide to investigate the cause, because the decision was believed to be made by Minamata Disease General Investigation and Research Liaison Council, which was managed by the Economic Planning Agency. Under these circumstances, all reports by Kumamoto University were planned to be newly published in book form in both Japanese and English languages with the research expenses in the Ministry of Health and Welfare. It was approved at the assessment of the budget of the Finance Ministry in December 1964 that the achievements of past studies, which included the report by Prof. Irukayama and his co-workers in 1962, were compiled and published. In March 1966, it was published as "Minamata disease--A study on organic mercury poisoning--" by the Kumamoto University Research Group for Minamata Disease.

6. Report on Minamata disease at the international conferences

Minamata disease was introduced at the 7th International Congress of Neurology, which was held in Rome in September 1961. Asst. Prof. Tokuomi, Prof. Uchida, Prof. Takeuchi, and Prof. Kitamura reported the results of the studies by Kumamoto University, which showed that the causative agent was the methylmercury compound.

In September 1962, Prof. Kiyoura reported "the hypothesis of amine" at the 1st International Conference of the Water Pollution Prevention (WPCF = Water Pollution Committee Federation) held in London. Moore, who discussed there, had some doubts about the hypothesis. He confirmed preliminarily the results of the studies by Kumamoto University, and he offered a counterargument against the hypothesis.

The 2nd WPCF was held in Tokyo in 1964. Prof. Irukayama was going to present a report on Minamata disease at the conference, but according to Jun Ui who attended the meeting of the Secretariat, this presentation was left over by the request of the Secretariat, which asked to withdraw this report on this occasion, because this problem was too politically hot.

At the 3rd WPCF held in Munich in September 1966, Prof. Irukayama and Ui presented again the reports on Minamata disease in Kumamoto and Minamata disease in Niigata, respectively. Thus, it was commonly recognized among the investigators of water pollution that the causative agent for Minamata disease is the methylmercury compound contained in the factory wastes.