

ENVIRONMENTAL REGULATIONS AND POLLUTION CONTROL FOR THE
FERRO-ALLOY INDUSTRY IN JAPAN

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SYNOPSIS

This paper consists of the following five points:

- 1) the duty of ferro-alloy industry in contribution to the prosperity of mankind by contributing to the development of steel industry;
- 2) the necessity of saving energy, developing new sources of energy and effective utilization of natural resources from the standpoint of the ferro-alloy industry consuming much energy and resources of vital importance today. Such understanding of our responsibilities leads to the main topics how to cope with environmental problems;
- 3) the present situation and problems of the Japanese ferro-alloy industry, outlining how we reduced our capacity and asking for the understanding on importance of international cooperation as seen in the import of ferro-alloy to Japan;
- 4) the environmental problems, the main topics of this paper, explaining the Japanese regulations, which are the strictest in the world. Some examples of technical consideration for a clean industry in harmony with the saving of energy, the improvement of working conditions and the effective utilization of natural resources;
- 5) The importance of international cooperation based upon the common understanding to carry out our duty and responsibility, to preserve a cleaner environment for our successors and to establish a common understanding on a fair value of our products as one of the universal rules of the ferro-alloy industry.

Thank you, Mr. Chairman, for your introduction. I feel very honored and privileged to have been invited to this conference whereby we can exchange views on the current situation, the future outlook for our ferro-alloy industry and what we, in the ferro-alloy industry, have to do to contribute to the happiness of the human race as the final goal.

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First of all, I would like to express my sincere appreciation for the efforts of the hosts to prepare this meeting.

The history of our ferro-alloy industry goes back to that of the steel industry and you may agree with me that the steel industry has achieved a lot in leading other industries and in eventually contributing to the development of mankind. I firmly believe such a role of the steel industry will not change in the future.

The ferro-alloy industry played an important role in the past as a member of the steel industry and has developed together with the steel industry which will continue in the future. Our role, therefore, is very important and I think we have to make our very best efforts for the healthy development of our work with pride and responsibility.

We face many difficult problems which are all deeply involved with world politics and economy. In order to overcome such difficulties we have to do our utmost with a high and broad outlook and with the total wisdom of mankind. At the same time, we have to hand over to our successors what we have received from our predecessors with much progress and improvement. In this sense it is one of our duties to develop our technology, to assure stable and sufficient supplies and, in addition, to preserve our environment.

We have never experienced a period in our history in which we were so much concerned with energy and natural resources as we are now. Firstly, I am afraid our material culture to which we owe our prosperity and happiness has been based on unlimited usage of energy and natural resources but now we are not in a position to expect such future prosperity after the same pattern; namely, we now find ourselves in a period of review. Secondly, various aspects of energy and natural resources are now heavily influencing world politics and the economy as one of the fundamental factors.

It is true that science has made remarkable progress in the history of mankind, which has resulted in our better life and environment. But such desire for a better life has never ceased. For example, non-essential goods in the past are now regarded as essential. The result was a disaster, mass production and mass consumption of resources. Today we have come to realize that resources are limited.

Needless to say, we are an industry which consumes a lot of energy and natural resources and I believe it is essential for the future prosperity of our industry to discuss with each other how to solve and overcome the problem of energy and resources on common ground.

I would like to raise electric power as the number one subject. Our industry is heavily dependent upon power as a major source of energy. However, in the course of three oil shocks, prices have sky-rocketed, supply has been unstable and growth of oil-based thermal power is not expected any longer. Consequently, studies of new energy sources to replace oil have been made all over the world.

Under these circumstances I believe it is our duty and the needs of the times that we, in the ferro-alloy industry, should take the lead in developing "saved energy" and "substitute energy".

The movement has also started in Japan this year on a governmental scale. We are now studying the development and promotion of atomic power, geothermal

generation, wind power generation, waste-gas power generation and solar-energy utilization. At the same time the Japanese ferro-alloy industry is also making its own efforts in constructing private power stations.

Even in the energy-rich countries, I think, such strenuous efforts for the technical development to secure various sources of energy in future must be started immediately because energy is so valuable and limited world-wide. The oil price is expected to increase constantly to the level of the price of substitute energy and today we are seeing the reevaluation of hydro-power in some countries.

Now, natural resources are the second subject. Resources are also limited and have to be used effectively for the benefit of mankind. For this purpose, I believe, we, in the ferro-alloy industry, have to study the recycle of resources with much keener interest and attention. Such a study will lead to the thorough recovery and effective utilization of charged raw materials and will eventually contribute to the solution of environmental problems once we are successful in keeping every kind of industrial waste within the boundary of our own plants. You may agree when I say that the effective utilization of limited energy and resources is a starting point in solving environmental problems.

Now I would like to mention the current situation in the Japanese ferro-alloy industry very briefly. The history of the Japanese ferro-alloy industry is very old and goes back to early 1900 when we started to produce ferro-manganese. In the 1930's we produced such alloys as ferro-chromium, ferro-nickel, ferro-molybdenum, etc., in addition to bulk alloys and some of our products were exported. But it was only in the 1960's that our ferro-alloy industry achieved remarkable progress. This period corresponds to the time of increasing demand from our fast growing steel industry. We expanded our capacity well ahead of the Japanese steel industry, to assure a stable supply to domestic mills and to export the balance and in such a way we were able to contribute to the progress of the Japanese steel industry and the world steel industry as well.

1974 was a record year for the Japanese ferro-alloy industry with production of 2.45 million tons and power consumption of 12 billion KWH. The import and export this year was 160,000 tons and 270,000 tons respectively. Since then the Japanese steel industry has started to suffer from the effect of the oil shock gradually with a result of ferro-alloy production down to 1.6 million tons and power consumption of 8 billion KWH in 1978 both of which are 33% lower than that of the record year 1974.

On the other hand, imports increased to 460,000 tons in 1978 while exports dropped to 70,000 tons. Particularly heavy import of ferro-silicon and ferro-chromium during 1978 and 1979 struck our ferro-alloy industry very hard in depressing our domestic market with lower prices and the appreciation of the yen.

In order to overcome such difficulties, we concentrated our efforts firstly in cost-saving by thorough rationalization and, secondly, in curtailment of facilities with administrative guidance by the Ministry of International Trade and Industry and with good understanding of our customers. We curtailed our facilities to an extreme level based upon a reasonable quantity of imports solely to stabilize our domestic market. This work of curtailment was very hard and, I can say, heart-breaking.

In 1978, our ferro-silicon industry was nominated as a "structurally depressed industry" by the government and the total capacity has been calculated and reduced to the level of 400,000 tons by scrapping the excessive 20 pct capacity of 100,000 tons. In the case of ferro-chromium, our industry was not nominated as a "structurally depressed industry" but we are now discussing among people concerned in the same manner as ferro-silicon to reduce the existing capacity of more than 600,000 tons down to 400,000-500,000 tons by not using the less productive furnaces.

We, in the Japanese ferro-alloy industry, will never move against imports but ask for reconsideration against unreasonably low prices and unfair quantities of imports as market-disturbing factors. We are ready to accept imports in a fixed ratio of domestic requirements when the imports are made at reasonable prices and in an orderly manner because it is our wish and pleasure to achieve the prosperity of the world ferro-alloy industry by way of international co-operation.

Now I would like to touch on my today's topics of environmental problems which, I understand, have been initiated and spread all over the world by the smog in London in 1952. Today not a single country is permitted to overlook pollution. The first international step against pollution has been taken by the OECD in establishing an environmental committee under their organization and this committee made a successive study on the economical aspect of environmental policy including the Polluter Pays Principle.

In 1976, "Analysis Meeting on Environmental Policies in Japan" was held in Japan by the OECD committee and discussions took place on the situation and measures of Japanese environmental policy. The reason why this conference took place in Japan is, I gather, that Japan had remarkable success in environmental policy in a short period and created world-wide interest.

In November, 1979, at the U.N. European Economic Committee, a "Convention on long-range transboundary air-pollution" was adopted and resolved and a "Declaration on low-and non-waste technology and re-utilization and re-cycling of waste" was made for air pollution and saving of energy and resources. I mention these few developments to prove how every country is seriously concerned about environmental policy.

Today Japanese environmental regulations are said to be very severe. In 1958, the Japanese government enforced the law of waste water regulations for the first time, then followed various laws on pollution. The application of such regulations became broader and severer year by year with so many new and revised regulations concerning pollution and we were given an impression that our Diet has been changed into a special organization to discuss pollution only. Needless to say, our ferro-alloy industry is not an exception as far as environmental regulations are concerned. For example we are regulated very severely on air pollution, waste water, noise, vibration and industrial waste. Furthermore, working conditions based on labour safety and hygienic laws have been strengthened. To cope with such severe regulations the Japan Ferroalloy Association formed a Pollution Control Committee well before the time these laws were enacted in 1967. In this committee we grasp the current environmental situation, investigate pollution controls by other industries, recommend certain regulations and technical counter-measures to the authorities and discuss information on controls and regulations at various plant sites. Since 1977 we have started to work together on the utilization of slag in the field of construction and in 1979 completed a detailed report of chemical, physical and mineral researches covering 30 items. Such study is an example of utilization of resources which I mentioned before.

I have just explained how we, in the Japanese ferro-alloy industry, have overcome very severe environmental regulations. I would say our speciality lies in our technical development to solve the problems. Such technical development has been achieved by joint study and exchange of information in the association and by technical development of private enterprises. We have completed every possible measure well in advance of enforcement of laws and our ferro-alloy industry was evaluated as the most advanced in Japanese industries and received various delegates from overseas to visit our plants.

Let me explain some of the technical developments we have so far achieved:

- 1) Large scale closed type furnaces, utilization of waste gas and technical development of dust collection, particularly in the field of ferro-silicon and metallic silicon production. These kinds of technology were believed too difficult to carry out;
- 2) Collection of dust in raw materials yard, collection of fumes from hot metal and dust from various equipment;
- 3) Cleaning of waste water;
- 4) Closed circuit system;
- 5) Measures against polluted rain-water;
- 6) Improvement of working conditions;
- 7) Effective utilization of industrial waste.

I am afraid I have been too theoretical but now I will give you some practical examples and technical applications of how we are aiming at a clean industry.

The first example is the Takaoka Plant of Japan Metals and Chemicals Co., Ltd. where a "Closed system" is applied. This plant is one of the biggest manganese-alloy plants in Japan producing 250,000 tons manganese-alloys and 150,000 tons fertilizer per year with two large scale closed type furnace (38,000 KVA for ferro-manganese and 51,000 KVA for silico-manganese), one medium size open furnace (18,000 KVA for silico-manganese) and three furnaces for medium and low carbon ferro-manganese. The speciality of this plant is no disposal whatever of any kind of industrial waste outside the boundary and high working conditions achieved by the systematic combination of facilities.

The dry and wet process dust collecting equipment is installed in every place from the ore-processing, refining of metal to product-finishing.

The dry dust and wet slurry collected in each process are reconditioned together with ore fines and are then fed back into the raw materials flow in the form of pellet or sinter. This plant consumes 10,000 M³ industrial water, every day, which is repeatedly used as cooling water in the first stage and then sent to the furnace gas cleaning equipment and the other wet type dust collecting equipment. The basic waste water which is generated from the furnace gas cleaning equipment, is used for cleaning the acid gas exhausted from the sintering machine in order to adjust the PH of waste water to neutrality. Finally, they pour out the waste water in a clean state through the processes of precipitation by thickner, filtration by filter and other treatment such as PH adjustment. The slag is used for the raw material of calcium-silicate and manganese-magnesium fertilizer. The furnace CO gas after being cleaned is used for chemical purposes and for fuel in drying, sintering and pelletizing as clean energy. Utilization of the furnace CO gas amounts to 90% at Takaoka plant and equals 14,000 K& heavy oil per annum to eventually support the "blue-skies" program of the community.

Closed type furnaces are now popular on a large scale, particularly in production of ferro-manganese with 90% closed, while 60% furnaces are closed in production of ferro-chromium.

Working conditions in operating the open type furnaces are said to be poorer than in the case of closed type furnaces and the dust is normally collected by dry process bag filter after 70-100 times of dilution.

But recent technical developments lower the degree of dilution to 30-50 times by shutting the furnaces as much as possible to improve the working conditions and to use hot air for energy directly or with a heat exchanger. With such development, for example, we save yearly consumption of heavy oil by 30%, equivalent to 3,000 K ℓ in the operation of 24,000 KVA ferro-chromium furnace and improve the working conditions at the same time. We enjoy good sales of high carbon ferro-chromium slag to be used for materials of the pavement and of concrete in construction, because of the high density and massive property after being crushed.

Now, as an example of the latest technical development in Japan, I should like to introduce the highly effective operation of ferro-silicon smelting system which we installed last October at Wakagawa Plant of JMC. The capacity of the furnace is 32,000 KVA and we remodelled the open type furnace into the semi-closed type in order to get high temperature gas of 900°C-1,000°C by supplying just enough air to burn the exhaust furnace gas. With this remodelling of the furnace we expect a wider reaction zone in the furnace, a smoother consumption of raw materials and consequently a far better productivity. Furthermore we can get the electric power of 5,000 KW with the heat exchanger using the 900°C exhaust gas of this furnace. The gas through the heat exchanger is exhausted to the air after removing the dust with dry-type bag filter.

This dust, which we call silica flour, is used as raw material for water glass and for concrete for construction work. This new plant is now under smooth operation and, as I explained to you, is an example of perfect harmony of improving the working conditions, bettering the productivity and saving energy all at one time.

Well, I have enumerated a lot of points which I would like to sum up before I finish.

Firstly, our ferro-alloy industry is essential and indispensable to the steel industry which plays a fundamental role in each country and we have a duty to contribute to the future development of mankind together with the steel industry. We have to fulfill our duty in assuring the stable supply of high quality products at reasonable prices. In order to develop our ferro-alloy industry by keeping pace with steel industry, we are asked to contribute to the technical development of the steel industry with our own continuous efforts for technical innovation. There is a lot of room left for such technical innovations in the field of ferro-alloy industry and in this sense, this INFACON can be of a great use and importance.

Secondly, we have to tackle the energy problems by all means as a member of an energy consuming industry. One direction is for the development of new energy and the other is for technical innovation to save energy both of which we have to fulfill when we carry on our production. We shall be blamed if we overlook such considerations and continue to waste energy available without any definite objective in mind.

Thirdly, our raw materials are quite valuable resources and to make a thorough and effective usage of these raw materials is quite important. Our constant efforts for better recovery are as important as our research for the perfect utilization of industrial waste.

Fourthly, we have to cope with the environmental problems, which are my main topics today. We have to make our best possible efforts for the technical consideration to establish ourselves as a clean industry which we have done so far in the belief that such considerations are essential and indispensable both for the prosperity of mankind and the existence of our ferro-alloy industry. At the same time, such considerations are the needs of the times for saving energy and natural resources. With such common understanding in our mind let us promote further the environmental measures and preserve a cleaner natural environment for our successors.

Lastly I would like to raise the problem of international cooperation among our industry. Today, we are dependent internationally and our ferro-alloy industry cannot be an exception. Various problems we are now facing can be solved only from a wide and broad point of view with a better mutual understanding and cooperation based upon a firm belief. To achieve this final target, there must arise a natural and universal rule among ourselves and the establishment of reasonable prices can be one of such rules. By reasonable prices I mean such a pricing system as covering and reflecting the cost required for the technical consideration of the solution of energy and resource problems and on the establishment of our ferro-alloy industry as a clean industry.

I understand that the inflationary trend is spreading all over the world and that we have to control the cost push factors to the maximum degree in our power with the responsibility of private enterprises. We should not admit to the existence of any producer who pays no attention to pollution, who has no future outlook of energy problems and who thus disturbs the reasonable pricing formula.

Such producers will lower the status of our ferro-alloy industry and will damage our duty and responsibility to carry out a constant and stable supply to the steel industry and to contribute to prosperity. I dare say that our mutual belief and understanding are getting firmer through our daily activities and through such international congresses as INFACON which we are now attending. Let us strengthen our cooperative relationship with our own effort and let us make constant and ceaseless progress.

I would like to wish prosperity to all of you and thank you for listening.