

Development of low-and non-waste technologies in China

Yan Hongbang¹

(Received December 11, 1989)

Abstract—Water pollution is one of the most serious environmental problems in China. In order to reduce the discharge of waste water per RMB 1000 Yuan of the industrial output value, the author offered a proposal on the development of low-and non-waste technologies as follows: 1. Changing distribution and structures of industrial production; 2. Innovation in techniques and eliminating industrial wastewater in the process of manufacture; 3. Comprehensive utilization of wastes and wastewater; 4. Strengthening environmental management and supervision of industrial enterprises.

Keywords: environmental protection; water pollution; industrial wastewater; low-and non-waste technologies.

The water pollution is one of the most serious environmental problems in China. At present the water pollution is mainly from industrial productive activities. The discharge of wastewater throughout the country in 36.7 billion tons, and 73 percent of which is industrial wastewater in 1988. According to the forecasts this situation would not be changed until the end of this century. Consequently, industrial wastewater control is an important measure for water environmental protection. Since our economy remains undeveloped and the government is unable to invest in water pollution treatment on large scale, we have adopted a policy of taking prevention as the main task and combining prevention with treatment as regards water pollution situation in China. The policy calls for innovating in technologies, making use of resources rationally and eliminating pollution in the process of manufacture. Besides, advanced, highly effectual and economical treating plants are used to replace those with high consumption of energy, inefficiency and occupation of a large acreage. Under the guidance of the policy, the discharge of industrial wastewater throughout the country basically has remained the same level as that at the beginning of the 80s, though the gross value of industrial output has increased sharply; and industrial pollution has not expanded obviously. The Figure 1 shows that the discharge of wastewater per RMB 1000 Yuan of the industrial output value dropped remarkably. In order to reduce the discharge of wastewater per RMB 1000 Yuan of the industrial output value we have taken the following measures:

¹National Environmental Protection Agency, No. 115, Xizhimennei Nanxiaojie, Beijing 100035, China.

Cutting down the discharge of industrial wastewater by changing distribution and structures of industrial production

The discharge of industrial wastewater is closely related to the distribution and structures of industrial production. In order to decrease the discharge of industrial wastewater, we have used reasonable technologies with low-and non-pollution to replace those with terrible waste and pollution. As to those enterprises with serious pollution and at unsuitable location, they are instructed to close, stop, amalgamate, move away or change their products within a deadline. From 1980 to 1985 more than 12000 enterprises with high consumption of energy and terrible pollution were closed, stopped, amalgamated, moved away or their products were changed in China. In Shanghai 70 electroplate mills have been merged into 3 electroplate centers and 100 thousand tons of electroplating effluent per year have lessened. In Tianjin 122 electroplate mills have been dismantled and 400 thousand of electroplating effluent per year have lessened. In Beijing 475 electroplate mills and 66 heat treatment plants have been dismantled. A lot of industrial products with terrible pollution were eliminate in petrochemical works, nonferrous metal works, machining mills, light industry mills and so on (Fig. 1).

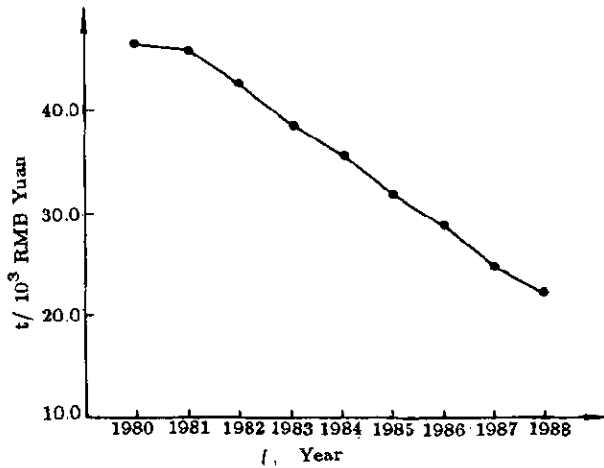


Fig. 1 Discharge amount of wastewater per RMB 1000 Yuan of industrial output value

Innovating in techniques and eliminating industrial wastewater in the process of manufacture

For reducing discharge of wastewater we have used aircooling systems to replace water-cooling systems in oil refinery or metallurgical industry.

The indirect condensation process was transformed into the direct condensation and catalysts were changed, with the result that the loss of aniline in wastewater has decreased 200 tons per year in Nanjing Chemical Plant. A polyacrylate was applied to a size and the water pollution from the size was removed in Shanghai Printing and Dyeing mill.

A electro-osmosis technology was used instead of the mercury electrolytic process for extracting reagents and the mercury pollution was removed in Beijing Chemical Plant.

The phenolic laminate technology was improved and the water pollution from phenol was cut down in Beijing Timber Mill.

The depilation technology with enzyme was used to reduce sulfide pollution.

In a certain factory of the PLA Navy a electroplate assembly line without wastewater effluent by computer control was developed. The line is different from traditional rinse technologies of electroplates. It is on the basis of the matter balance theory. The line can save water and matter and does not discharge wastewater as well. This line has been used in Yantai Alarm Clock Factory.

Some paper mills have resorted to the employment of the ammonium sulphite digestion hoping to solve the pollution problem by utilizing their pulping waste liquors for irrigation and fertilizing purposes.

Some paper mills have adopted urea and a little catalysts instead of caustic soda, utilizing their pulping waste liquors for irrigation and fertilizing.

Some pharmaceutical factories have adopted chloroacetic acid to replace a alanine, changed nine process into six processes and reduced five kinds of pollutants in waste water and one third of the wastewater discharged in the vitamin B production.

Nine processes have been changed into one process, so the discharge of wastewater has been reduced by 80 percent in the olive green dye production.

In reprocessing plant three cycles have been changed into two cycles and four kinds of waste water have been eliminated. The four walls of the hot cell are covered by a certain kind of stripable coat or plastic film, and on the floor a certain kind of absorb material such as waste paper or cloth is laid. By replacing these protective materials regularly only will occur a litter solid waste rather than a vast quantity of waste cleaning solution. All in all, less-poisonous or poisonless raw materials are used in production so that amount of pollutants produced and industrial wastewater disposed is greatly reduced.

Comprehensively utilizing wastes and turning wastewater into resource

The state encourages enterprises to carry out comprehensive utilization of resources and give priority to the production and building activities which are utilizing resources comprehensively. The state will grant tax reductions or exemptions on and apply a preferential pricing policy to products manufactured by utilizing waste gas, waste water and waste residues as main materials. And, the profits originating there from need not be turned over to the higher authorities but will be used by the manufactures concerned to control the pollution and improve the environment. These policies have promoted greatly utilizing waste gas, wastewater and waste residues.

Nanyang alcohol distillery has used distillers' grains wastewater to make marsh gas for offering more than 27000 house holds and do forage yeast over 3 tons per day for raising

chickens, cows and pigs and so on. Kaishantun Chemical Fiber Pulp Mill has built 6 sets of comprehensive utilization equipment, produced alcohol, calcium lignosulfonate and active carbon and so on from liquid waste and reduced the quantity of the pollutants by 60 percent.

Some paper and pulp mills have used black liquid of straw pulp to produce furfural, alkali lignin and manganese carbonate.

Some coking factories have used wastewater with phenol to extract yellow prussiate of potash.

Beijing Third Chemical Plant has used crystallization by stages to recover sodium formate in production of pentaerythritol and reduced 92 percent of organic waste.

Twelve synthetic ammonia factories have installed extraction equipment of carbon black from heavy oil and recovered 30000 tons of carbon black and 26700 tons of heavy oil per year.

Shenyang Paint Production Factory has adopted a set of extraction equipment to recover over 95 percent of phenol from butyric acid.

Jilin Dye Production Mill has used the mother liquor containing 25 percent of Na_2SO_4 to replace NaCl and cut down over 2000 tons of NaCl and 45 percent of acid wastewater.

There are 20 percent of nitrogenous fertilizer factories that have adopted closed cycling systems and saved 500 million tons of water per year throughout the country.

Some other manufacturers like Baoshan Steelworks and Capital Steelworks have also put closed cycling systems into operation. At present time, the rate of the reuse of industrial effluent is over 73 percent in metallurgical industry of the whole country.

Strengthening environmental management of industrial enterprises

Strengthening environmental management of industrial enterprises is the economic and effective way of preventing these enterprises from further damaging the environment and controlling water pollution. Since 1985 our government has gradually strengthened the environmental management, and shifted the emphasis of environmental protection from "treating effluents" onto "intensifying environmental supervision and management". In order to bring the pollution which is going to occur under control basically, we have enchain environmental management. A practice of reporting the assessment of its impact on the environment nearby is required before a project is newly built, expanded or reconstructed. And, the waste treating equipment along with its principal project must simultaneously be designed, installed, and put into operation.

In some big and medium sized enterprises appropriate environmental protection setups have organized.

On the other hand, in the field of industrial production, stress has been put on enforcing equipment management.

The planning of environmental protection of enterprises has been worked up and the enterprises have been examined regularly. The propaganda and education in environmental protection has greatly improved the quality of the cadres working in factories, mines and enterprises.

The responsibility system for protecting the environment in term of economics has been implemented in enterprises. Personal economic interests are integrated with environmental protection items, thus stimulating the staff and employees to commit themselves to the prevention and treatment of environmental pollution.

SUMMARY

At present, the discharge of industrial wastewater has basically remained the same level as that at the beginning the 80s, though the gross value of industrial output have increased sharply in China.

To this end, four measures have been adopted:

1. Changing distribution and structures of industrial production;
2. Innovation in techniques and eliminating industrial wastewater in the process of manufacture;
3. Comprehensive utilization of wastes and wastewater;
4. Strengthening environmental management and supervision of industrial enterprises.

REFERENCES

- The Environmental Protection Law of The People's of China (For trial implementation)
The Water Pollution Prevention and Control Law of The People's Republic of China