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# **Legal Protection of the Environment from Pollution by Dangerous Industrial Wastes**

**M. M. Brinchuk\***

The problem of preventing the pollution of the natural environment by chemical substances is an extremely urgent one. Not only is there danger of causing substantial social and economic damage, but equally important, there is the threat of radical changes in the chemical status of the human living environment and of other types of biological communities, jeopardizing the very survival of life on this planet. This paper will consider the procedures within the USSR's current legal system for ensuring ecologically sound storage and disposal of toxic industrial solid and liquid wastes.

The scope of the problem of protecting the environment from industrial wastes can be best appreciated by example. The smelting of one thousand tons of steel entails emission into the atmosphere of forty tons of solid particles, thirty tons of sulphur dioxide, and approximately fifty tons of carbon monoxide. The manufacture of every one thousand tons of sulphuric or nitric acid results in emission of up to twenty tons of sulphur dioxide or nitric oxide. Overall, ten to twenty percent of the total quantity of wastes produced by the non-ferrous metal and chemical industries and other sectors of the economy have toxic properties.<sup>1</sup>

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1. See, e.g., B. Laskorin, B. Gromov, A. Tsygankov & V. Senin, *Problemy Razvitiya Bezotkhodnykh Proizvodstv* [Problems in the Development of Waste-free Manufacturing Processes] 57 (1981).

## I. Legal Principles for Disposal of Toxic Industrial Wastes

The most general requirements concerning the correct disposal of toxic industrial wastes are contained in the USSR Law on Protection of the Atmosphere,<sup>2</sup> the Fundamental Principles of Water Legislation of the USSR and Union Republics,<sup>3</sup> and the corresponding acts of republic legislation. More detailed regulation is contained in the Fundamental Principles of Legislation of the USSR and Union Republics on Public Health,<sup>4</sup> and the Statutes for State Sanitary Inspection in the USSR.<sup>5</sup> Individual statutes, called "enforceable enactments," are developed and stipulated in special documents including: sanitary regulations concerning the storage, transport, rendering harmless, or burial of toxic industrial wastes on the grounds of an enterprise, and maximum acceptable quantity of toxic compounds in industrial wastes stored in collecting basins outside the grounds of an enterprise. The measures and requirements for protecting the environment contained in these acts are differentiated as a function of the potential danger of an industrial waste. In accordance with USSR All-Union Standard 12.1.007076, "Harmful Substances. Classification and General Safety Requirements," all toxic wastes are to be divided into four classes on the basis of degree of danger: (1) extremely dangerous (wastes in this class include mercury chloride sublimate, chromium, benzpyrene, potassium cyanide, and others); (2) highly dangerous (cuprous chloride, lead nitrate); (3) moderately dangerous (lead oxide, nickel sulphate, acetophenone, carbon tetrachloride); (4) and slightly dangerous (manganese dioxide, calcium chloride, and others). The class and degree of danger of a toxic waste is determined using a computational algorithm based on maximum acceptable concentration of chemical substances in the soil,

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2. Journal of the USSR Supreme Soviet, No. 27, 528 (1980), *reprinted in* II W. Butler, *Collected Legislation of the USSR and Constituent Union Republics* (1979).

3. Journal of the USSR Supreme Soviet, No. 50, 566 (1970), *reprinted in* W. Butler, *The Soviet Legal System* 483-497 (1978).

4. Journal of the USSR Supreme Soviet, No. 52, 466 (1969), *reprinted in* II W. Butler, *Collected Legislation of the Constituent Union Republics* (1979, Supp. 1980).

5. *Collected decrees of the USSR*, No. 16, 86 (1973).

LD<sub>50</sub>, concentration of components in the total amount of waste, solubility of chemical components in water, and volatility. Legal stipulations for collecting and accumulating, storing, transporting, and disposing of a given toxic substance are based on the properties and characteristics used to assign it to a danger class. Thus, the issue of the classification of toxic wastes is of important legal significance.

## II. Approaches to Disposing of Dangerous Industrial Wastes

The USSR has developed two approaches to the disposal of dangerous industrial wastes. These approaches are based on how the wastes have been produced, their toxicological properties and state of aggregation. One of the approaches involves the collection and storage of wastes in special collecting basins. These are specially treated containers outside the grounds of the enterprise, the bottom and sides of which have been treated to prevent filtration and pollution of the soil and surface and ground water. As a rule, such collecting basins are used by enterprises producing many tons of wastes (e.g., chemical enterprises). Depending on the type of wastes, they can be subdivided into tailing and sludge ponds, industrial run-off collectors, sedimentation pools, or evaporator pools.

The second approach involves rendering harmless and burying solid and semisolid toxic industrial waste in specially treated dumps. Any industrial wastes containing toxic components, but especially those containing extremely and highly dangerous substances and compounds, are transported to these dumps and rendered harmless. In principle, the ministries and departments decide on the question of the burial of toxic wastes when it is not possible to utilize them, render them harmless, or decrease the level of toxic components to the third danger class moderately dangerous. Collection basins are used for the less dangerous wastes — those in the second, third, and fourth classes.

The issue of the maximum concentration of toxic substances in industrial wastes stored in collecting basins has significant implications. The maximum concentration of such

substances is also determined by using computational algorithms. These are based on the principle that the maximum permissible accumulation of industrial wastes will be different for each natural region since each region differs in the capacity to accept, assimilate, and neutralize pollutants. Pollution of the atmosphere, surface and ground water, and soil with harmful substances contained in wastes must not reach levels dangerous to the health of the population and natural life. The maximum acceptable quantity of a toxic compound in a collector basin is taken to be the minimal level for computationally determining quantities in assessing the impacts of this compound on the atmosphere, surface and ground water.

### III. Environmental Protection Measures and Requirements in Disposal of Toxic Industrial Wastes

The major environmental protection measures for disposing of toxic industrial wastes at dumping grounds and in collecting basins concern the planning, selection, design, and construction of sites, the collection and accumulation of wastes, the transport to the dumping ground, the methods of rendering them harmless, their burial, and the rules governing use of the dumping grounds and collecting basins. Legislation stipulates that these be located in isolated, undeveloped, well-ventilated areas not flooded by precipitation, snow melt, or high water. Engineering facilities for rendering toxic wastes harmless must be designed for such sites so as to preclude the possibility of polluting settled or recreational areas, sources of drinking, agricultural or industrial water supplies, mineral springs, and open bodies of water or ground water.

The legislation currently in force pertaining to land allocation is implemented by the executive committee of the local Council of People's Deputies. The preliminary issue of allocating a tract of land is coordinated with the interested state nature protection agencies of the USSR Ministry of Geology, USSR Ministry of Irrigation and Water Conservation, USSR Ministry of Public Health, USSR Ministry of Fisheries, and the USSR State Agro-Industrial Committee.

The size of the sanitary protection zone between waste

collecting basins and dumping sites on the one hand, and inhabited areas, livestock farms, enterprises preparing agricultural feed on the other, is determined in coordination with sanitation and public health agencies on the basis of specific local conditions. The width of the sanitary protection zone for dumping sites is three thousand meters, while the size of the comparable zone for collecting basins varies as a function of the danger class of the industrial wastes it contains. For highly dangerous wastes this zone must be one thousand meters in width, for moderately dangerous—five hundred meters, and for slightly dangerous—three hundred meters. In special cases the width of the zones may be established in coordination with the sanitation and public health service to be three thousand meters, as for dumping sites.

There are also rules which specify what distance dumping sites must be from agricultural lands and transit routes—not less than two hundred meters, from forests and tree farms not designated for recreational use—not less than fifty meters and from fish hatchery projects—not less than two thousand meters. It is recommended that dumps be located in areas where ground water lies more than twenty meters below ground and is covered with relatively impermeable rock to prevent pollution of ground water. Regulations also forbid the location of waste burial dumps in territories designated for housing construction, industrial expansion, recreational use, or in river valleys, ravines, etc. All of these requirements must be considered and followed when sites are selected for toxic waste dumps and collecting basins and when tracts of land are allocated.

A number of nature protection measures concern the design of burial dumps for toxic industrial wastes. The dumps are designed and built for the industrial regions of one or a number of cities. In certain republics of the union, depending on specific conditions, dumps are built to serve the entire territory of a republic. In accordance with safety legislation, waste burial dumps must be located on land set aside for this purpose for estimated use over a period of twenty to twenty-five years.

In the USSR, waste dumps differ depending on the type

of toxic wastes they receive from industries belonging to one or another industrial ministry. For this reason, dumps are under the control of the appropriate ministries and ispolkoms (executive committees) of the local Council of People's Deputies. Thus, each waste burial dump has its own particular specifications for observing nature protection measures while it is in use.

Legal and technical specifications for use of the dumping ground and related nature protection activities are governed by regulations coordinated with local safety and public health services. These regulations specify precisely the chemical composition, physical properties, state of aggregation, flammability, and explosiveness of toxic wastes that can be accepted by the waste dump.

Data on the amount of waste a dumping site will handle is needed in the designing of the sites themselves, as well as to plan work which will render the wastes harmless. In order to obtain such data, the ministries, departments, and enterprises inventory non-utilized wastes to determine the amounts in each of the four danger classes generated over a given period (i.e., day, year). The inventory data is coordinated with the dumping site administration, safety and public health agencies, and is then supplied to planning organizations for design or administration of the dump which will receive that waste for burial.

Activities of industrial enterprises related to the collection, storage and transportation to dumps for burial are regulated by standards set in nature protection and safety regulation. However, since the enterprises have full legal responsibility for performing all of these operations involving toxic wastes, the general legal standards have been specified and elaborated in official regulations. The enterprises are guided by regulations of two types: (a) those concerning the collection, storage, packaging, and transport of wastes so as to preclude their dispersion (into the atmosphere), scattering, spilling, spontaneous combustion, or explosion; and (b) regulations concerning safety measures, fire prevention and industrial hygiene for personnel involved in the collection, storage, transport, and delivery of toxic wastes to the dump for burial.

Industrial wastes accumulate continuously during the manufacturing process. Dangerous wastes that accumulate in the production divisions of an enterprise during a work shift or day are packaged in accordance with their danger classifications as stipulated by sanitary rules: extremely dangerous in steel tanks; highly dangerous in polyethylene sacks; moderately dangerous in paper bags. All wastes are weighed, recorded in a waste accounting journal, and sent to the enterprise's storage yard. These requirements are based on the fact that when harmful substances contained in wastes stored in open and closed containers are emitted into the environment, the emissions must not exceed thirty percent of the maximum acceptable atmospheric concentration of substances for work areas or maximum acceptable levels of pollution of soil and surface and ground waters. The maximum quantity of wastes allowed to be stored in the storage yard is determined by the enterprise in coordination with nature protection agencies, based on the danger classification of the wastes, their aggregation state, volatility, and the potential for chemical reactions.

Since the burial dumps for toxic industrial wastes are located a substantial distance from the sources producing these wastes, transportation of these wastes is also of ecological significance. Thus, the means and devices for storing toxic wastes prevent environmental pollution not merely in the area where the industrial wastes are generated and collected, but also during their transport to the burial dump. Environmental requirements for transport of wastes specify that this must occur in vehicles specially designed to preclude the possibility of loss along the route and pollution of the environment. All work associated with loading and unloading wastes must be mechanized.

#### IV. Rendering Toxic Waste Harmless

Legal responsibility for environmental pollution by industrial wastes belongs first to the enterprise before the wastes are delivered to dump officials, and then to the appropriate dump officials after delivery. Industrial wastes are officially transferred to the dump with a special passport. The passport



contains data on all wastes brought to the dump, the chemical properties of their components, and a short description of safety measures for handling them while they are being buried or burned. A passport must be presented at each trip of the vehicle for each type of waste and be signed by responsible officials of the enterprise.

Rendering toxic wastes harmless at the dump is accomplished using specific measures established by law which depend on the danger classification of the substances and their state of aggregation. The major techniques are burial, combustion, and neutralization.

In accordance with safety rules, burial of extremely dangerous minimally soluble wastes takes place in a foundation pit, the bottom and walls of which are lined and reinforced by concrete slabs or a compacted clay layer no less than one meter thick. It is recommended that small quantities of water soluble wastes of this class be buried in foundation pits in steel tanks with walls ten millimeters thick. Solid and semi-solid wastes, containing toxic water with highly and moderately dangerous soluble substances, should be buried in foundation pits with bottom and sides reinforced by a clay layer one meter thick. Solid wastes containing slightly dangerous substances are stored in layers in accordance with a special chart, and each layer is levelled and compacted. No special measures are used for their burial. The foundation pits filled with wastes are reinforced with a compacted layer two meters thick, after which they are covered with a waterproof covering of tar, resin, etc.

It is recommended that toxic liquid wastes which are extremely, highly, and moderately dangerous be dehydrated into a pastelike state at the enterprises before transport to the dump. Combustible toxic wastes are burned at a temperature of 1000-1200 degrees Celsius in furnaces built at the dumps. Gas and dust scrubbers prevent pollution of the atmosphere while this is occurring.

To prevent environmental pollution during the use of toxic waste dumps and collecting basins, legislation stipulates that certain technological measures be taken in their planning and construction. In particular, the perimeter of their grounds

must be surrounded by a circular channel to catch rain water and melt-off. Dumps must be surrounded by a wall at least 1.5 meters high and 3-3.5 meters wide in order to prevent toxic wastes falling into the channel or surrounding area.

Observance of the legal measures for environmental protection during performance of all types of operations to dispose of toxic industrial wastes and during operation of toxic industrial burial dumps and collecting basins is subject to prophylactic and operational monitoring. This is the job of the nature protection agencies of the USSR Ministry of Geology, Ministry of Public Health, Ministry of Fisheries, certain other ministries, and the laboratory service of the dumps. In particular, the safety, public health, and laboratory services of the dump monitor the levels of toxic substances contained in the wastes being buried, in the ground water, in the bodies of water close to the dump, in the soil of the territory adjacent to the dump, in the plants surrounding the dump, and also in the atmosphere within a radius of three thousand meters. Reports on the state of ground water, soil and the atmosphere in the region of the dump are submitted annually by the head of the dump to the Geological Administrations of the union republics, local State Hydrometeorological Committees, and public health agencies. If an elevated concentration of dangerous substances is detected in the media being monitored, the cause must be established and special measures taken to put an end to the environmental pollution.