

LEGAL REGULATIONS IN THE FIELD OF POLYCHLORINATED BIPHENYLS MANAGEMENT

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Abstract. *Polychlorinated biphenyls are a type of persistent organic pollutants that have been produced all over the world due to their favorable physicochemical properties. After the prohibition of their production and use, they have become a serious problem in terms of the destruction of existing quantities bearing in mind their wide and varied application. They are still capable of being released into the atmosphere today. As they are still present in the environment, an important issue of the environmental protection policy is the legal regulation of polychlorinated biphenyls management. On the international level, the Stockholm, Basel and Rotterdam Conventions are particularly important. On the national level, the Law on Chemicals, the Law on Waste Management and the Rulebook on Restrictions and Prohibitions on the Production, Placing on the Market and Use of Chemicals are of particular importance in this area.*

Key words: *polychlorinated biphenyls, environment, protection, international regulations, national legislation*

1. INTRODUCTION

Polychlorinated biphenyls (PCBs) are a group of toxic substances classified as persistent organic pollutants (POPs) which represent a major environmental hazard. Their commercial production began in the 1930s. Due to their favorable physical and chemical properties, they were produced all over the world from 1930 until 1977 in the USA, until 1983 in China, until the mid-1980s in Europe, until 1993 in the Russian Federation, and from 1954 until 1972 in Japan. After the prohibition of their production and use, they have become a serious problem in terms of the destruction of existing quantities bearing in mind their wide and varied application [1].

Nowadays, PCBs can be emitted into the environment for a number of reasons - poor maintenance of hazardous waste sites containing PCBs, illegal or improper disposal of

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PCB waste such as old transformer fluids, leaks or discharges from electrical transformers containing PCBs, disposal of consumer products containing PCBs in municipal or other landfills that are not intended for the disposal of hazardous waste. Due to their high persistence in the environment, metabolic inertness and lipophilicity, these chemicals are still present in the environment. Therefore, they are still significant from the aspect of health and the environment regardless of the world ban on their production.

In terms of the physical characteristics of polychlorinated biphenyls, they can range from a colorless oily liquid to a more viscous dark liquid to a yellow and black resin, depending on the level of chlorine substitution. At temperatures below 15°C and normal atmospheric pressure, they are in a solid state in the form of white powder. They form vapours that are heavier than air but are not explosive. Also, they have low electrical conductivity, high thermal conductivity and high resistance to thermal and photodegradation, and are easily transported through the atmosphere over long distances. It is interesting to note that Polychlorinated biphenyls (PCBs) are considered "persistent organic pollutants. They are poorly soluble in water, but well soluble in fats and most inorganic solvents. In the food chain, they demonstrate the capacity to bioconcentrate and biomagnify. [2].

The properties of PCBs listed above enable them to cross large distances, which creates global problems. PCBs can travel great distances in a number of ways, including the atmosphere (in the form of vapor, sorbed on suspended particles or dissolved in water droplets of clouds), rivers and oceans (dissolved in water or sorbed on suspended particles), in the tissues of migratory animals, and anthropogenic transport in the form of various products or waste.

They are detected in all environmental media: water, soil, sediment, air, and living organisms. Even though anthropogenic sources of these compounds have been greatly reduced in recent decades, the prevalence of PCBs in abiotic and biotic material, atmospheric transport and cyclic movements still represent a significant source of human exposure. Even several decades after their restriction, atmospheric levels of PCBs are still significant, which indicates that they are still released into the atmosphere from primary (evaporation from outdated or damaged equipment) or secondary emission sources (contaminated soil, water) [1].

2. INTERNATIONAL LEGAL REGULATIONS

The properties of persistent organic pollutants (POPs), including PCBs, allow them to travel long distances, which has created a problem of global proportions. In order to solve this problem, the international community adopted the Stockholm Convention on Persistent Organic Pollutants whose main goal is to limit or prohibit the production, use, emissions, import and export of these substances. The production and use of PCBs are also regulated by the Basel and Rotterdam Conventions.

The part of the Stockholm Convention [3] that refers to polychlorinated biphenyls defines that each signatory country shall:

(a) With regard to the elimination of the use of polychlorinated biphenyls in equipment (e.g. transformers, capacitors, or other receptacles containing liquid stocks) by 2025, subject to review by the Conference of the Parties, take action in accordance with the following priorities:

(i) Make determined efforts to identify, label and remove from use any equipment that contains more than 10% polychlorinated biphenyls or has a volume greater than 5 litres;

- (ii) Make determined efforts to identify, label and remove from use any equipment that contains more than 0.05% polychlorinated biphenyls and a volume greater than 5 litres;
- (iii) Endeavour to identify and remove from use any equipment that contains more than 0.005% polychlorinated biphenyls and a volume greater than 0.05 litres;
- (b) Consistent with the priorities in subparagraph (a), promote the following measures to reduce exposures and risk to control the use of polychlorinated biphenyls:
 - (i) Use only in intact and non-leaking equipment and only in areas where the risk from the environmental release can be minimised and quickly remedied;
 - (ii) Not use in equipment in areas associated with the production or processing of food or feed;
 - (iii) When used in populated areas, including schools and hospitals, all reasonable measures to protect from electrical failure which could result in a fire, and regular inspection of equipment for leaks;
- (c) Notwithstanding paragraph 2 of Article 3, ensure that equipment containing polychlorinated biphenyls, as described in subparagraph (a), shall not be exported or imported except for the purpose of environmentally sound waste management;
- (d) Except for maintenance and servicing operations, do not allow recovery for the purpose of reuse in other equipment of liquids with polychlorinated biphenyls content above 0.005 %;
- (e) Make determined efforts designed to lead to environmentally sound waste management of liquids containing polychlorinated biphenyls and equipment contaminated with polychlorinated biphenyls having a polychlorinated biphenyls content above 0.005%, in accordance with paragraph 1 of Article 6, as soon as possible but no later than 2028, subject to review by the Conference of the Parties;
- (f) Endeavor to identify other articles containing more than 0.005 % polychlorinated biphenyls;
- (g) Provide a report every five years on progress in eliminating polychlorinated biphenyls and submit it to the Conference of the Parties;
- (h) The reports described in subparagraph (g) shall, as appropriate, be considered by the Conference of the Parties in its reviews relating to polychlorinated biphenyls. The Conference of the Parties shall review progress towards the elimination of polychlorinated biphenyls at five-year intervals or another period, as appropriate, taking into account such reports.

The Republic of Serbia confirmed its commitment to the policy expressed by the Stockholm Convention and passed the Law on Ratification of the Stockholm Convention on Persistent Organic Pollutants [4].

The Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and its Disposal [5] is an international treaty designed to reduce the movement of hazardous waste between countries, and especially prevent the transfer of hazardous waste from developed countries to less developed countries. The Convention also aims to minimize the rate and toxicity of generated wastes, ensure their environmentally sound management as close as possible to the source of production and assist least developed countries in the environmentally sound management of hazardous and other wastes they generate.

As in the case of the previous concession, Serbia passed the Law on Ratification of the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal [6].

The aim of the Rotterdam Convention [7] is to promote shared responsibility and cooperation between contracting parties in the field of international trade in certain hazardous

chemicals in order to protect human health and the environment from potential harm and contribute to the use of those chemicals in a manner acceptable for the environment. It can be achieved by the easier flow of information about their properties, managing the national decision-making process on import and export and communicating these decisions to other contracting parties.

Serbia ratified this convention by adopting the Law on the Ratification of the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade with Annexes [8].

3. NATIONAL LEGAL REGULATIONS

In addition to the aforementioned laws on ratification, the most important legal acts which regulate the field of polychlorinated biphenyls in Serbia are: the Law on Chemicals, the Law on Waste Management, and the Rulebook on Restrictions and Prohibition of the Production, Placing on the Market and Use of Chemicals.

The Law on Chemicals [9] regulates the integrated management of chemicals, classification, packaging, and labeling of chemicals, the integral register of chemicals and the register of chemicals placed on the market, restrictions and prohibitions on the production, placing on the market and use of chemicals, import, and export of certain dangerous chemicals, permits for trade activities and use of particularly dangerous chemicals, placing detergents on the market, systematic monitoring of chemicals, data availability, supervision and other issues of importance for the management of chemicals [10].

The Law on Waste Management [11] regulates the types and classification of waste, waste management planning, waste management entities, responsibilities and obligations in waste management, organization of waste management, management of special waste streams, conditions and procedures for issuing permits, cross-border movement of waste, reporting on waste and databases, financing of waste management, supervision, as well as other issues of importance for waste management. Waste containing PCBs is collected separately [10].

The law regulates the prohibition of filling transformers with PCBs; reuse of PCB waste; obtaining PCB from PCB waste by recycling; temporary storage of PCBs, PCB waste, or devices containing PCBs for more than 24 months before ensuring their disposal or decontamination; incineration of PCBs or PCB waste on ships; and using devices containing PCBs if they are not in proper working order or if they are leaking. Also, the owner or other holder of PCBs and PCB waste is obliged to ensure their disposal, i.e. decontamination, in the manner prescribed by this law. The owner or other holder of a device in use that contains PCBs or has the possibility of being contaminated with PCB content, is obliged to perform a PCB content test in a laboratory accredited for testing PCB content.

The owner or other holder of a device containing more than 5 dm³ of PCB is obliged to report the device to the line ministry, and submit a plan for the replacement, which includes disposal and decontamination of the device, ensure disposal, i.e. their decontamination, and notify the ministry of any changes to the device's data within three months from the date of the change. The persons who perform the disposal are obliged to issue a certificate specifying the properties and quantities of the PCB to the holders who deliver the used PCB. Before the delivery, the owner or other holder of PCBs, PCB waste, or devices containing PCBs is obliged to take all precautionary measures to avoid the risk of fire, which includes keeping them away from flammable products.

The devices containing less than 5 dm³ PCBs, which are integral parts of other devices, have to be removed and separately collected, recycled, or disposed of, after the end of the use of the device of which they are an integral part. All the devices containing PCBs and the facilities in which they are located, as well as decontaminated devices, have to be labeled. A person who collects, treats, decontaminates, or disposes of PCB waste must have a permit, keep records of the amount collected, treated, or disposed of and submit the data to the Agency. The Agency keeps a register of devices in use that contain PCBs, the data of which are public.

The Rulebook on Restrictions and Prohibition of the Production, Placing on the Market and Use of Chemicals prescribes restrictions and prohibitions on the production, marketing and use of chemicals, prohibited or permitted ways of use, as well as other conditions for the production, placing on the market and use of substances, mixtures or products which represent an unacceptable risk to human health and the environment [12]. Restrictions and prohibitions apply to certain dangerous substances, mixtures, or products; persistent organic pollutants; the total content of volatile organic compounds in certain coatings (paints and varnishes) that are applied to buildings, their equipment, and built-in parts, as well as in certain agents and coatings for the repair of road vehicles or their parts during repair, conservation or decoration outside production facilities.

4. CONCLUSION

Polychlorinated biphenyls (PCBs) are a group of very stable chlorinated aromatic hydrocarbons. Before 1980, PCBs were widely used in electrical equipment such as transformers, generators and capacitors, as well as in fluorescent light fittings, electric motors, ceiling fans, and dishwashers. Due to the persistence in the environment of PCBs and the serious health concerns associated with these chemicals, the importation and manufacture of PCBs in many countries has been banned [13].

Many countries of the world have legally regulated the management of polychlorinated biphenyls as an important segment of the management of environmental protection in general. For example, Ireland has Management Plan for Polychlorinated Biphenyls (PCBs) [14], in 2020. the Scottish Government published a consultation on proposals to update the regulations that apply to the management and disposal of equipment contaminated with Polychlorinated Biphenyls (PCBs) in Scotland [15], etc. Furthermore, PCB Elimination Network (PEN), as part of UNEP, published PCB Management Guidance - Maintenance, Handling, Transport and Interim Storage of Liquids Containing PCB and Equipment Contaminated with PCB [16].

In view of the foregoing, certain challenges can be observed in connection with the management of PCB waste in the Republic of Serbia. The lack of infrastructure for waste treatment in Serbia opened the possibility for export to authorized and registered facilities in the EU (incinerators, facilities for physical and chemical treatment, salt mines, etc.) as the final disposal of waste. Companies that export waste are from the field of pharmaceutical industry and electric power industries. Also, laboratory waste from some medical institutions is exported. PCB waste is exported to the greatest degree.

Some substations still use PCB (pyralene oil) as a cooling medium, which must be stopped, and PBS must be permanently disposed of in accordance with the law. In the previous period, this waste was mainly exported for treatment. There are several authorized companies from the private sector that collect and export PCB waste for treatment under the

Law on the Ratification of the Basel Convention. One mobile plant for the decontamination of PCB-contaminated equipment has been built in the Republic of Serbia and this process was chosen for the future treatment of PCB waste.

The Environmental Protection Agency reports that 165.42 t of waste containing PCBs was produced in 2020. 17]. Out of this amount, oils for insulation and heat transfer and hydraulic oils containing PCBs comprise 57.53 t, and transformers and capacitors containing PCB waste components and construction and demolition waste containing PCBs amount to 107.88 t.

Hazardous construction and demolition waste includes construction and insulation materials containing asbestos, sealants containing PCBs, glazes containing PCBs, construction and demolition waste containing mercury, other construction and demolition waste containing hazardous substances, etc. Most of the construction and demolition waste is deposited or, more often, disposed of together with municipal waste at municipal unsanitary landfills [1].

Based on the “polluter pays” principle, the waste generator is in charge of collecting and disposing of PCB-containing devices when they become waste. There is no separate collection system for waste containing PCBs. One operator is licensed to treat waste oils containing PCBs. Thirteen other companies have a permit for the treatment of some types of waste containing PCBs but do not perform the treatment.

During a longer period of time and with more data available, the Republic of Serbia could focus on establishing a central plant for the incineration of hazardous and medical waste. Residues such as packaging waste contaminated with hazardous substances (e.g. packaging waste contaminated with pesticides, chemical substances, PCBs, etc.) that must not be burned in cement plants require this type of treatment. Otherwise, this waste must be exported for permanent disposal.

Bearing in mind all of the above, it can be concluded that polychlorinated biphenyls represent a significant problem in terms of their impact on health and the environment due to their persistence and mobility in the environment, bioaccumulation and biomagnification in the food chain and toxicity [1]. To address this issue, it is necessary to follow international and national legal regulations that prohibit the production, use, emission, import and export of these substances, to eliminate the use of PCBs in equipment by 2025 and ensure environmentally acceptable management of waste liquids containing PCBs and contaminated equipment by 2028.

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PRAVNA REGULATIVA U OBLASTI UPRAVLJANJA POLIHLOROVANIM BIFENILIMA

Polihlorovani bifenili pripadaju grupi jedinjenja poznatoj kao perzistentne organske zagađujuće supstance koji su se, zahvaljujući svojim povoljnim fizičko-hemijskim osobinama, proizvodili širom sveta. Zbog široke i raznovrsne primene, oni su, nakon zabrane proizvodnje i korišćenja, postali veliki problem sa aspekta uništenja postojećih količina, a i danas se mogu emitovati u životnu sredinu. Kako su oni prisutni u životnoj sredini i danas, značajno pitanje politike zaštite životne sredine jeste pravno uređenje upravljanja polihlorovanim bifenilima. Na međunarodnom planu posebno su značajne Stokholmska, Bazelska i Roterdamska konvencija. Na nacionalnom planu za ovu oblast su naročito od značaja Zakon o hemikalijama, Zakon o upravljanju otpadom i Pravilnik o ograničenjima i zabranama proizvodnje, stavljanja u promet i korišćenju hemikalija.).

Ključne reči: *polihlorovani bifenili, životna sredina, zaštita, međunarodni propisi, nacionalno zakonodavstvo*