LEGISLATION ASPECTS OF CURATIVE, MINERAL AND THERMAL WATERS DISPOSAL AFTER THEIR UTILIZATION

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ABSTRACT

V príspevku sú spracované legislatívne pohľady na likvidáciu liečivých minerálnych, termálnych vôd po ich využití v podmienkach Slovenskej republiky. Ďalej je uvedené zatriedenie liečivých, minerálnych a termálnych vôd z pohľadu Zákona o vodách spolu s aplikáciou ďalšej vyhlášky ustanovujúcej prípustné znečistenia vôd pri ich vypúšťaní a spôsoby likvidácie.

KEY WORDS

curative water, mineral water, thermal water, surface waters, ground waters, ways of disposal,

KĽÚČOVÉ SLOVÁ

liečivé, minerálna, termálne, geotermálne vody, povrchové vody, podzemné vody, spôsoby zneškodňovania

INTRODUCTION

Slovakia is rich on mineral and thermal water occurrences. They are utilized in spas and for recreation purposes, geothermal waters also as energy source and the most important of them are curative waters use mainly in spas. Their special properties bring specific problems, mainly in facilities using them. The problems include corrosion, incrustation, turbidity in pools or baths. Subsequently, after their utilization, they become wastewaters. There often rise problems with their dumping.

From the standpoint of the National Law no. 138/1973 (Water Law) §2, article 2 [2] the curative and mineral waters are defined as special waters. The conditions of utilizing and their protection is handled by the national law no. 277/1994 about health care in course of later amendments. The Water Law deals with the special waters only if the law it specifies expressly. Discharging of special waters to surface and ground waters is referred by § 23, section 2 of the Water Law. The indicators of the degree of water contamination are set by the Slovak Government. They are defined in the Regulation of the Slovak Government no. 242/93. [4].

The abundance of the curative, mineral and thermal waters reflects complex hydrogeological settings of the Western Carpathians. The miscellaneousness of these waters properly expresses conditions of their origin and is reflected in wide range of dissolved substances, what is expressed by the total dissolved solids value (TDS). For example, the mineral waters originating from Neogene marine sediments of the Carpathian Fore-deep reach TMW up to 35 $g.l^{-1}$. Mineral waters of the Flysch belt have even wider value of TDS 35 - 50 $g.l^{-1}$. Similarly, in the sediments of Neogene sediments of the Vienna, Danube, South-Slovakian and East-Slovakian basins there occur mineral thermal waters that are weakly- up to highly-mineralized brine waters. The most complete review of composition of the mineral waters of Slovakia is given in literature [3]. From the standpoint of the origin, this waters, under conditions of the Western Carpathians, have meteoric and marinogenic origin [1].

The purpose of the Water Law is the general protection of the surface and ground waters as an important part of the environment and non-replaceable raw material resource. For authorization of the disposing of the special waters, the water managing authority is restricted

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by the Water Law and conditions stated in the above-mentioned Regulations of the Slovak Government. For defining of the indicators of the contamination, the emission-polluting principle is applied, which equalize producers of wastewaters with respect to recipient. The values of the emission indicators of the contamination, suggested for our conditions, take in respect the present state of the engineering level of waste water purification. For decision making about discharging of waste waters and special waters the emission indicators that concerns the concentration of the components in the discharged waters are obligate for water management authorities. However, according to the local conditions the water management authority can set even more strict indication values.

The emission indicators are determined by two values; one value is valid till 2004 and the second more strict value is valid since 2005. Recently a revision of the Water Law is under preparation. It should solve the deformations of the recent law as well as incorporated European standards concerning waters.

THE WAYS OF DISPOSAL

One of the main principle of the Water Law is disposing of waste and special waters in such a way, that the quality of surface and ground water would be not threaten. For this reason the legislative regulations improved the conditions of waste and special water discharges to surface and ground waters. They concern mainly the content of the polluting components. They defined kind and amount of the harmful matters present in surface and ground waters and particularly in streams used for water supply.

The evaluation of the produced contamination is performed with respect to obligatory Regulation of the Slovak Government no. 242/93 and STN 75 7143 (Slovak technical standard). For a given facility operator, the ecologically acceptable way of disposal of used curative, mineral as well as thermal waters must be proposed and realized in accordance with legal regulations of the environment protection. It is based on the mixing equation for c_{242}, c_{STN} - c_v, where

$$cv = \frac{(Q_{355}.c_{90}) + (q_g.c_g)}{(Q_{355} + q_g)} \qquad (g.l^{-1}) \qquad (1)$$

c_{242} - Regulation of the Slovak Government no. 242/93, which defines indicators of the acceptable contamination of water supply sources and other surface water streams ($g.l^{-1}$)

c_{STN} - STN 75 7143 Water quality for irrigation ($g.l^{-1}$)

Q_{355} - 355-day flow rate in a surface stream - recipient ($l.s^{-1}$)

q_g - recommended discharge flow rate of curative, mineral or thermal water ($l.s^{-1}$)

c_{90} - evaluated indicator of a surface stream quality with 90% exceeding probability ($g.l^{-1}$)

c_g - evaluated indicator of discharged water quality ($g.l^{-1}$)

c_v - resulting indicator in a recipient after water mixing ($g.l^{-1}$)

In legislative regulations, beside kind and amounts of polluting components, there are also defined basic indicators, which can not be violated or exceeded when authorization of wastewater discharging into surface waters is issued. Among such indicators belong:

- biological state of waters expressed by a contamination index (saprobity) lower than 2.3 in case of water supply river, and biological state of waters expressed by a contamination index lower than 2.3 in case of other surface waters,
- state enabling normal life of trout fishes in water supply river and carp fishes in other surface waters,
- stink-free state in the case of water supply river and reservoirs, and slight allogenic stink in the case of other waters,
- state at witch color changes are not visible in layers 10 cm thick in the case of water supply rivers,
- temperature up to 20°C in the case of trout waters and water supply rivers and up to 26°C in the case of other surface waters,
- intact natural purification capacity of surface waters [2].

Monitoring of recipients in places where used curative, mineral and other thermal waters are discharged serves for monitoring of an influence of the produced contamination on a surface stream with inspection of the limit values.

With respect to maximal protection of the environment during disposing of special waters we can use the following approaches:

Direct discharge into recipient. Depends upon water disposal capacity of a surface stream, i.e. acceptable amount of components that can be discharged into the stream at the given flow rate. According to the defined indicators of the acceptable amount of pollutant in water supply rivers and other surface stream the water disposing capacity of a water supply river is lower than capacity of other surface streams. Using the water supply rivers for disposal of special and other thermal waters is restricted by water management goals of the proper surface stream as a source of potable or other waters.

Discharging into sewage. This approach is used mainly at places where sewage network exists. As result of human activities large volumes of purified wastewaters is discharged into recipient. When sewage water is diluted by special wastewaters, there must be met assumption, that concentration of individual pollution indicators would be within an acceptable limit after mixing.

Discharging into recipient after diluting with ground waters. A diluting of special and thermal waters with suitable ground waters prior to their discharging into surface water as recipient is used when a nearest water stream does not have suitable dilution capacity. It means, that the surface stream is not capable to eliminate the concentration of the pollutant by its natural purification capacity.

Straight discharge into surface stream, if a stream flow rate is sufficient. There is also possibility of draining of water from nearby suitable surface streams or reservoirs.

Disposal by reinjection. This approach is possible to consider in the case if none suitable surface stream is available. The reinjection of special waters into original aquiferous collector is ecologically very friendly. However, it belongs to most expensive approaches.

Discharging into recipient after physical-chemical treatment. Here belong so called other approaches of disposal of special and other thermal waters: demineralization of waters by reverse osmosis, electrodialysis, distillation, freeze, and others [5].

Wastewaters discharged from sanitary facilities, operational and administrative objects have character of ordinary sewage, occasionally with increased content of detergents. Their purification is performed on common mechanical – biological sewage plants or municipal sewage plants. In the case of mixing of sewage waters with special waters the purification is in most cases possible in common mechanical - biological sewage plants.

CONCLUSION

Using curative, mineral and thermal waters in specific regions must be concerned of ecologically acceptable exploitation of these waters with using of all modern technical possibilities.

Proposals and ways of water treatment for disposal of the mentioned water types depends in a great extend upon their flow rate and physical-chemical composition. Also upon local and regional settings of water management conditions, suitability of water streams, sewage networks or recipients.

The curative and mineral waters have their place in the Water Law no. 138/73, mainly from the standpoint of these special waters discharging into surface or ground waters they are controlled by this law and its regulations. Therefore it is not possible to use the waters without respecting the law, and this is necessary to keep on mind also during projection of their utilization. The contributions concerns also topics that are subject of the research no 1/7135/20, which has been held at the Department of Sanitary Engineering, Faculty of Civil Engineering, Slovak University of Technology, Bratislava.

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LEGISLATÍVNE ASPEKTY LIKVIDÁCIE LIEČIVÝCH, MINERÁLNYCH A TERMÁLNYCH VÔD PO ICH VYUŽITÍ

RESUME

Autor sa zaoberá legislatívnymi predpismi pre vypúšťanie liečivých minerálnych a termálnych vôd. Ich využívanie je možné v kúpeľných, rekreačných zariadeniach a taktiež ako energetický zdroj.

Nakoľko Slovenská republika patrí medzi štáty s vysokým výskytom minerálnych a termálnych vôd je aj otázka ich zaradenia riešená v Zákone č. 138/9373, Zb. o vodách. Zákon ich zaraďuje medzi vody zvláštne. Ukazovatele prípustného stupňa znečistenia vôd nadväzujúce na vodný zákon upravuje Nariadenie vlády č. 242/1993.

Likvidácie zvláštnych vôd, ktoré sa po využití stávajú odpadovými vodami je možná vypúšťaním do podzemných alebo povrchových vôd.

Z pohľadu ochrany životného prostredia sú vhodnými nasledovné spôsoby: priame vypúšťanie do recipientu, vypúšťanie do splaškovej kanalizácie, vypúšťanie do recipientu po nariadení podzemnými vodami, priame vypúšťanie do povrchového toku bez úpravy, ako aj po úprave a reinjektáž.

Akceptovanie uvedených legislatívnych predpisov je nutné hlavne z pohľadu súčasných, ale budúcich užívateľov tohoto prírodného bohatstva štátu, kontrolovaného štátnym orgánom. Bez ohľadu na to, či sa jedná o kontrolu štátnymi orgánmi, každý vodohospodár musí mať na zreteli ochranu vodného bohatstva krajiny, jej fauny, flóry a zachovať kvalitu zvláštnych vôd pre budúce generácie.

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