

Tom 55(69), Fascicola 1, 2010

Groundwater quality and pollution control

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Abstract: Water has a primordial role in the apparition and maintaining of life and also in the development of human communities along history. In a general definition, water pollution represents the direct or indirect change of its normal composition, as result of human activity, in such extent that is affecting all other possibilities to use the water in its natural state. Water pollution implies the biological, physical and chemical pollution and causes, finally, the alteration of the environmental balance.

Keywords: drinking water, underground water, quality parameters.

1. INTRODUCTION

Water is an important element for life and human community development.

The fact that the first life forms arose in the aquatic environment, the first settlements appeared around water courses or standing water to access the benefits. Importance of water is given by the fact that it is in each tissue and organ of all creatures, both human and community development over time.



Nowadays, drinking water source is surface water but groundwater.

Surface waters have a very diverse and highly variable composition in time.

Parameters that influence the composition of these waters are: the nature of rock is composed only of water along the course, tributaries and precipitation, controlled or accidental discharges of sewage, physical, chemical and biological occurring.

Groundwater constitutes the largest reservoir of freshwater in the world, representing more than 97% of all available fresh water reserves in the world.

Groundwater parameters are composed of relatively constant. They are characterized by high mineralization, rich in carbon dioxide and low oxygen concentration.

Water pollution is, according to some writers, directly or indirectly change the normal composition of water due to human activities that affect any other use of this water could be used in its natural state.

- Leaks from storage tanks and underground pipelines, especially oil;
- Pesticides and herbicides managed agricultural work moving through the ground is carried by rainwater or irrigation to groundwater;
- Chemical fertilizers and runoff from livestock factories;
- Waste and household waste
- Sprinkled salt on the roads in winter, which is carried by ground water from rain and melting snow;
- Deposition of atmospheric pollutants, acid rain

Water pollutants are the products of any kind containing solid, liquid or gaseous conditions and concentrations that can change water characteristics, making a harmful health

Groundwater quality is determined by geological structure of the layer crossed and hydrodynamic factors.

Pollution of groundwater depends on environmental characteristics of the porous blade penetration to the groundwater, the characteristics and quantity of pollutants.

After its origin, groundwater pollution may be:

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- puncted, due to the uncontrolled discharge and storage of pollutants, and poor operation of extraction facilities;

- linear, which is manifested along roads, railways, waterways and wastewater discharge channels;

- diffuse, resulting from application of fertilizers and plant protection products.

2. CONSEQUENCES OF POLLUTION AND WATER PROTECTION

The local human life, water is used both as food and daily to ensure personal hygiene. On average, 24 hours, an adult man consumes food for two 10L water.

Water smell comes from volatile substances contained as a result of decomposing organic matter load, pollution with chemicals or sewage. The water contains many organic substances, chemical or even sewage smell is more easily perceived.

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Water color can give an indication of the quality change as:

- copper or brown colored water coming from the distillation of coal mixed with industrial waters containing iron;

- dark brown waters are waters from pulp mills;

- are iron-rich waters from tanneries and dark green or black;

- iron ions give a yellow water;

- copper ions gives a blue water;

- water containing colloidal clay has a yellow brown.

3. WATER QUALITY AND PROTECTION:

Water quality is determined by standards, because that shows the importance of safety of life and for economic activities.

In Romania are in force: STAS 1342 - 91 for drinking water quality, STAS 4706 - 88 for surface waters, STAS 9450 - 73 for irrigation water needed

Hygiene standards for swimming pools and organized a series of decrees, for remarks.

Express themselves through water quality indicators stabilized and calculated result of analysis performed.

Determine groundwater:

- pH;

- Fixed residue

- CCO.

In some cases still analyzing the water content of these substances: detergents, pesticides, non-ferrous metals, phenols, hydrocarbons, chlorine,

nitrogen, fluorine, iodine, iron, manganese, indicators of eutrophication, etc.

Organoleptic indicators are: water color, taste and smell. Suspensions in water is determined by sedimentation and is expressed in ml / l.

a) Self-purification of water:

Is achieved by physical and physical-chemical and biological and biochemical processes. They are:

- sedimentation of heavier materials, sedimentation, which is influenced by temperature, speed drainage etc.;

- by the action of solar radiation (UV) with antibacterial effects;

- through chemical reactions of oxidation, reduction, neutralization that occur between chemicals in the water;

- even only by chemical reactions between the chemicals in polluted water.

Biological and biochemical processes consist primarily of competition polluting their water and flushing water.

Thus, water released their seeds in water a series of metabolites with antibiotic action against germs pollutants, leading eventually to the disappearance of food nutritional support imbued pathogen pollution.

b) Water Protection

Surface water and groundwater protection is to maintain and improve quality and productivity of their natural order to avoid negative environmental impacts, human and material assets:

- Prohibiting random waste disposal of any kind which could pollute the water and, above all, sewage, municipal and industrial. They must be collected and removed by sewage systems or local collection facilities;

- Construction of treatment plants for retention and degradation of organic pollutants in sewage of towns and livestock units before their removal in water;

- Destruction of pathogens by disinfection of wastewater contained in institutions (hospitals), slaughterhouses, meat industry facilities;

- Endowment restraint systems and collection of radioactive substances in waste water;

- Construction of stations or specific treatment systems of industrial wastewater to the apprehension and neutralization of potentially toxic chemicals;

- Control of solid waste disposal, so they are not trained or fought in surface water sources or groundwater.

4. GROUNDWATER QUALITY CONTROL IN ROMANIA

Groundwater quality in Romania is still at an inappropriate level, due to slow Self-purification, and over half (58%) of Romania's surface is vulnerable to nitrate pollution, according to a report presented by the National Administration Romanian Waters (NARW).

The most affected are rural areas where, because of lack of minimum facilities to municipal facilities, liquid waste reaching underground, both directly (through our pervious waterproof, ditches and trench) and indirectly through slow infiltration (from deposits of manure, household waste pits improvised).

According to report by ANAR for the European Commission about how to implement the directive on the protection of waters against pollution caused by nitrates from agricultural sources in the years 2004-2007, areas vulnerable to nitrate pollution were perimeters of 251 localities in 34 counties and 10 river basins, and 1,217,147 hectares (about 8.2% of the total land area).

a) Average and maximum values below the limit

For the implementation of Directive 91/676/EEC on the protection of waters against pollution by nitrates (nitrogen) from agricultural sources, National Administration "Romanian Waters" is responsible for monitoring the quality of groundwater and surface water affect identification and cadastre waters affected by nitrate pollution or likely to be exposed to such pollution, to establish and / or review of areas vulnerable to nitrate pollution from agricultural sources. In this respect, are monitored nitrate concentrations in surface waters and groundwater in sections / drilling control and is checking the condition of eutrophication of waters (freshwater and coastal waters). Concentration limits for nitrate in water is 50 mg / l, given the standards.

The latest report by the European Commission is based on tests conducted by the National Administration "Romanian Waters" 1301 corresponding to a number of sections for surface water and 1373 numbers of monitoring points for groundwater.

In terms of concentrations of nitrogen derived from agricultural activities and reflected in groundwater quality, ANAR report by the European Commission on their implementation of Directive 91/676/EEC, shows that 89.22% of points the monitoring values average below 50 mg / l and 75.31% of them below that maximum. High nitrogen concentrations recorded in the groundwater in the plain area (Romanian Plain, Western Plain) and less in the plateau (Plateau of Moldavia and Transylvania Depression hilly). ANAR monitor nitrate concentrations of groundwater into sections / drilling control and check the status of eutrophic waters (fresh and coastal waters). Concentration limits for nitrate in water is 50 mg / l, given the standards.

The two major sources, with significant weight in nitrogen pollution of groundwater by continuous washing soil impregnated with nitrogen oxides from rainfall and irrigation water and surface water (rivers, lakes) in which wastewater was discharged loaded with nitrogen.



Fig 1. Groundwater quality classes in terms of nitrogen concentration

These two sources, which are of quasi-permanently, are added to the random nature, arising from the application of chemical fertilizers on some categories of farmland. It's also exceeded, especially in large chemical plants platforms (or the former combined), but they are generally point, typically found in their premises, however, being quite serious danger of contamination of aquifers in the area, owing to the hydrodynamic and hydraulic conductivity of the water.

In addition to farming, an important contribution to nitrogen and nutrient pollution in general and have a human agglomerations that are not consistent in terms of collection systems (sewage) treatment plants and (failing that, lack of speed scrubbing operation, malfunction).

5. Groundwater Short Courses

The widespread interest in groundwater has seen the offering of many two- and three-day training courses dealing with various aspects of the problem.

There are very few one-week courses.. The advantages of a longer course include time to cover and absorb more aspects of this expanding field and the opportunity for in-depth technical learning.. Groundwater legislation, natural attenuation, risk assessment, wellhead protection techniques, monitoring equipment, DNAPL research, remediation alternatives and applications of computers have grown to such an extent in the last several years that intensive one week courses, with a few early evening sessions, are needed to adequately cover all of these new developments.

