WATER QUALITY CONTROL

PART VI.
Polish and International regulations

1. GLOSSARY

Acute - refers to a stimulus severe enough to rapidly induce an effect; in aquatic toxicity tests, an effect observed in 96- hours or less is typically considered acute. When referring to aquatic toxicology or human health, an acute affect is not always measured in terms of lethality .

Bioaccumulation - is the process by which a compound is taken up by an aquatic organism, both from water and through food .

Biological criteria - are narrative expressions or numeric values of the biological characteristics of aquatic communities based on appropriate reference conditions. As such, biological criteria Serve as an index of aquatic community health. It is also known as bio criteria .

Chronic - defines a stimulus that lingers or continues for a relatively long period of time, often one- tenth of the life span or more. Chronic should be considered a relative term depending on the life span of an organism. The measurement of a chronic effect can be reduced growth, reduced reproduction, etc., in addition to lethality .

Criteria - are elements of State water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use. When criteria are met, water quality will generally protect the designated use .

CWA - Clean Water Act.

EMA - Environmental Management Act.

EU - European Union .

EUREAU - The European Union of National Associations of Water Services.

FWPCA - Federal Water Pollution Control Act.

IARC - International Agency for Research on Cancer.

MAC - *Maximum Allowable Concentration* defined as that concentration of an polluting substance that will not produce in any of the living organism (people, animals, etc.) exposed any disease or any deviation from normal.

NPDES - National Pollutant Discharge Elimination System.

NTU - nephelometric turbidity units.

ONRW - Outstanding National Resource Waters.

Pollution - is defined as the man-made or man-induced alteration of the chemical, physical, biological and radiological integrity of water .

Turbidity –it describes the relative clarity of the water, ranging from perfectly clear and transparent to cloudy, hazy or opaque. Turbidity in water is caused by suspended matter such as clay, silt, finely divided organic and inorganic matter, coloured organic compounds, algae and other microscopic organisms.

WFD - Water Framework Directive.

WHO - World Health Organization.

WQS - *Water quality standards* - are provisions of State or Federal law which consist of a designated use or uses for the waters of the United States, water quality criteria for such waters based upon such uses. Water quality standards are to protect public health or welfare, enhance the quality of the water and serve the purposes of the Act.

2. INTRODUCTION

Water is needed in all aspects of life. The general objectives is to make a certain adequate supplies of water of good quality are maintained for the entire population of the planet, while preserving the hydrological, biological and chemical functions of ecosystem, adapting human activities within capacity limits of nature and combating vectors of water-related diseases. [1]

We know that all life is dependent on water and that water exists in nature in many forms-clouds, rain, snow, ice, and fog. However, chemically pure water does not exist for any appreciable length of time in nature. Even while falling as rain, water picks up small amounts of gases, ions, dust, and particulate matter from the atmosphere. Then, as it flows over or through the surface layers of the earth, it dissolves and carries with it some of almost everything it touches, including that which is dumped into it by man.

These added substances may be by chance classified as biological, chemical (both inorganic and organic), physical, and radiological impurities. They include industrial and commercial solvents, metal and acid salts, sediments, pesticides, herbicides, plant nutrients, radioactive materials, road salts, decaying animal and vegetable matter, and living microorganisms, such as algae, bacteria, and viruses. These impurities may give water a bad taste, colour, odour, or turbidity, and cause hardness, corrosiveness, staining, etc.

Pure water means different things to different people. Homeowners are primarily concerned with domestic water problems related to colour, odour, taste, and safety to family health, as well as the cost of soap, detergents, "softening," or other treatments required for improving the water quality. Chemists and engineers working for industry are concerned with the purity of water as it relates to scale deposition and pipe corrosion. Regulatory agencies are concerned with setting standards to protect public health. Farmers

[1] gopher://gopher.un.org/00/conf/unced/English/a21_18.txt.

are interested in the effects of irrigation waters on the chemical, physical, and osmotic properties of soils, particularly as they influence crop production. Hence, they are concerned with the water's total mineral content, proportion of sodium, or content of ions which may have influence to plant growth.

One means of establishing and assuring the purity and safety of water is to set a standard for various contaminants. A standard is a definite rule, principle, or measurement which is established by governmental authority. The fact that it has been established by authority makes a standard inflexible, official, and legal. But this fact does not necessarily mean that the standard is fair or based on sound scientific knowledge. Where human health data or other scientific data are exposed, standards have sometimes been established on an temporary basis until better information becomes available.[2]

[2] http://www.walrus.com/~gatherer/interpret.html

3. WHO **GUIDELINES FOR DRINKING WATER QUALITY.**

An established goal of the World Health Organization (**WHO**) and its member states is that *"All people, whatever their stage of development and their social and economic conditions have the right to have access to an adequate supply of safe drinking water."* [3]

3.1 Main aspects of Guidelines.

Starting from 1958 , WHO has presented concern about drinking water and its standards, but no more than in 1984 **Guidelines for drinking water quality** challenge to evaluate the threat to health by diversity of pollutants in drinking water, which were presented in three volumes:

- First volume- R*ecommendations* – containing synthetic guidelines concerning recommended standards water quality to drink with the most important explanations and ideas of controlling the water-supply water.
- Second volume- *Health standard and other useful information* – describe all health aspects of different substances, which were taken into consideration while guidelines formation and information about its detection, indication and toxicological and epidemiological aspects of water pollutions.
- Third volume- *Water quality controlling in small settling units* – devoted to information about specific issue occurring in small settling units, mostly in country areas.

WHO also identified for the first time that as a world authority in the lead of health hazards it should recommend several universal drinking water standards, which would include such factors as availability of water to drink, geographical, socio-economical, dietary and many others that differ considerably from country to country and its regions .

[3] http://www.gaia-water.com/downloads/WHO%20Guidelines%20for%20Drinkin%20Water%20Quality%20and%20Health%20Risk.doc

As these factors influence the nature of guidelines presented in series of eight statements, it is necessary to present their characteristics[4] :

a) Recommended values determined such a concentration of water component, as to not to cause any essential risk for water consumer health while consumption during the life time.

b) Water quality ensure, that water is proper for consumption by humans, as well as for normal user, including the personal hygiene. For some particular purposes, higher water quality might be required- as for medical purposes.

c) When recommended values exceed limits, it should be a signal for, determining the cause due to remedial usage and for information of authority responsible for public health as well as advice inquire.

d) Values recommended determine the water quality eligible for many years of consumption, but it does not mean that in the place where water quality is better it should be decreased to the recommended level. In contrary, it is always necessary to increases water quality to the highest possible level.

e) Short term deviations above the guidelines values do not necessarily mean that the water is unsuitable for consumption. The amount by which, and the period for which, any guideline value can be exceeded without affecting public health depends on the specific substance involved. It is recommended that, when a guideline values is exceeded, the surveillance agency (usually the authority responsible for the public health) should be consulted for advice on suitable action, taking into account the intake of the substance from source other than drinking water (for chemical constituents),the likehood of adverse effects, the practicability of remedial measures, and similar factors

[4]World Health Organization, 1984. Guidelines for drinking water quality.Vol.1. Recommendations. Geneva.

f) In developing national drinking water standards bases on the guidelines, it will be necessary to take account of a variety of local geographical, socio-economic, dietary and industrial conditions. This may lead to national standards that differ appreciably from the guidelines values.

g) Taking into account the radioactive substances, recommended acceptable values of concentration for λ and β radiation basis on proper irradiation doses.

The diverse conditions that might influence the adaptation of different standards in different countries, consist of not only factors that influence the intake, uptake or effects of the relevant chemical compound but also the country's own risk-benefit criteria. Therefore it is necessary to emphasis that guidelines do not concern only the national standard- setting within the sphere of environmental and medical sciences but also of economic and political choice.

The guidelines are intended to replace not only the **European standards for drinking water**[5] but also the **International Standards for drinking water**[6], which have been principal over a decade.

The important aspects explained in the **Guidelines of drinking water quality** are such that the water is suitable for human consumption over the lifetime and are planned as a resources by which national drinking water standards may be independently formulated.

3.2 Groups of water quality parameters.

Water indicators are separated into six groups:

1. Microbiological indicators (for example: coli type bacteria).
2. Biological indicators (like: free living organisms- plankton and other).
3. Inorganic compound having influence on health (such as: asbestos, arsenic, bar, cyanide, mercury, nickel, silver, sodium, etc.).

[5] World Health Organization, 1970. European standards for drinking water, 2 nd ed., Geneva.
[6] World Health Organization, 1971. European standards for drinking water, 3 rd ed., Geneva.

4. Organic compound having influence on health (for example: benzene, benz(a)pyrene, carbon tetrachloride, chloroform, tetrachloroethane, etc.).
5. Esthetical indicators (such as aluminium, chlorobenzens, chlorides, copper, hardness, iron, manganese, dissolved oxygen, pH, sodium, sulphur, dissolved substances, zinc, etc.).
6. Radioactive indicators (like: total alpha activity, total beta activity).

Water quality indicators may be divided into fallowing groups:

1. Bacteriological indicators.
2. Chemical indicators having influences on health, such as:
    a) inorganic compounds,
    b) organic compounds,
    c) pesticides,
    d) disinfectant compounds, its derivatives and products of disinfections.
3. Indicators not having any influence on health, when find in water at their normal concentration.
4. Radioactive indicators.
5. Indicators, that may give reasons to complain by consumers.

The values suggested for each parameter of constituent are based on the known health-related data, taking into consideration the total body intake from sources such as air and food and take for granted a capita daily consumption of 2 litres.

As far as it consider the bacteriological values of quality these are those needed to ensure bacteriologically safe supplies of drinking water if it is piped, unpiped or bottled.

The WHO Guidelines include also chemicals that are considered potentially hazardous to human health:

- those detected relatively frequently in drinking water,
- those detected in relatively high concentrations, and
- those of international concern.

Based on these selection criteria, contaminants evaluated included chlorinated alkenes, ethylene's and benzenes, aromatic hydrocarbons, pesticides, inorganic chemicals, disinfectants, and disinfectant by-products. Only the most widely used water disinfectants were evaluated; these include chlorine, chlorine dioxide, chloramines, ozone, iodine, and their primary reaction by-products.

The problems associated with chemical constituents of drinking water arise primarily from their ability to cause adverse health effects after long-lasting periods of exposure. Of particular concern are contaminants that have increasing toxic properties, such as heavy metals; contaminants that are carcinogenic, and contaminants that may cause reproductive and developmental effects. Excessive levels of such contaminants need to be controlled; however, time is usually available to take remedial action.

3.3 Origin of guidelines values.

Guidelines were provided for biological quality, aesthetic quality, radioactivity, inorganic chemicals and organic chemicals.

The main criteria regarding water quality are based on local circumstances.

The microbiological quality of drinking water is very significant, but it must never be compromised as to provide aesthetically pleasing and acceptable water.

3.4 Water related exposure.

The guideline concentration for a range of substances in water obtained by assumption of 2 litres of drinking water consumption daily per person, more precisely 70 kg man .

These is average value, as water intake fluctuate with climate, physical activity and culture.

Above assumption clearly misjudge the consumption of water, and therefore exposure, for a substantial portion of the population. The higher intake, and so exposure rate, like it is in the case of children, that have greater fluid consumption rate, per unit weight, than adults.

This ignore individual variation and rates in excess of water, that are easily possible.

3.5 Criteria for the development of health-related guidelines.

To select groups of compounds and individual compound for consideration major to setting the WHO guidelines five decisive factor we used:

- the existence of evidence that substances are potentially hazardous,
- the concentration at which that substances are found in drinking water,,
- the frequency with which the substances or group of substances are encountered in drinking water,
- the easy with which the substances or group of substances are measure,
- the easy with which the concentration of the substances can be controlled in water.

Agreement with all five criteria was not necessary for the insertion of compound, nor were the criteria given equal weight . The substances and groups of substances were regard as three grouping:

- source contaminants,

- introduced in treatment,
- introduce during distribution.

3.6 Current guidelines of WHO. [7]

New guidelines similarly as the one from 1984 year, emphasize for esurience proper water quality in respect of microbiological character.

Latest element in last edition of guidelines is parting of new group of substances, getting to water as products of disinfections. To most of them only temporary limitations were undertaken.

New guidelines present new group of water parameters, which may cause complains from consumers and users of water, as it should be safe not only for health of above mention but it should not cause unwillingness for its drinking or using for domestic purposes. For consumers feelings are very important which they may have due to their senses-appearance, taste, and odour. If those feelings will be negative, even most safe water under the healthy parameters will awake suspicions and will be reasonable reason for customer complains. In new guidelines for those parameters no recommended values were given, only the basic one, which may cause complains from consumers and users.

Fallowing parameters were included:

- Physical parameters : colour, taste, odour, temperature, turbidity,
- Inorganic components: aluminium, ammonia, chlorides, copper, hardness, iron, manganese, dissolved oxygen, pH, sodium, sulphur, dissolved substances, zinc.
- Organic components: toluene, ethyl benzene, styrene, monochlorobenzene and other synthetic detergents.
- Disinfectant compounds, its derivatives and products of disinfections.

[7] Annex 1 - current guidelines information or it can be found on the web side: http://www.who.int/water_sanitation_health/dwq/guidelines/en/

Large amount of above mentioned parameters have health influences (mainly organic components), but it is essential in concentrations higher then those causing costumers complains. Removing of reasons to criticize from consumers point of view makes water more safety for health.

4. EUROPEAN UNION REGULATIONS CONCERNING WATER QUALITY.

European Union is an organization of European countries dedicated to increasing economic integration and strengthening cooperation among its members. The EU has a number of objectives. Its principal goal is to promote and expand cooperation among member states in economics and trade, social issues, foreign policy, security and defense, legal matters and environmental issues, like water, air and soil protection against pollutants and its improvements.

4.1 Development of standardization of water quality in European Union.

The first legal act in European Union connecting with water quality, was published inn **1975** year directive required quality of published in 1979 year about surface water for drinking purposes determination , after proper processing was related with this matter.[8] Both of the directives do not contain direct issue of water quality consumed by people, but contains regulations of quality of surface water resources, being a source of water service for people.

Initial legal act of European Union describing directly water quality was Directive 80/778/EEC[9] published in 1980 year.[10] In this directive expression of *"water used for consumption by people"* was firstly defined, as any water supplied for consumer purposes or used in comestible industries for production, processing, conservation or introducing to market products and substances designed for consumption by human and water influencing the healthy of comestible products in their final form. This directive do not deal with natural mineral waters and healthing waters accepted by legal administration of European Union.

[8] Council Directive 79/869/EEC of 9 October 1979 concerning the methods of measurements and frequencies of sampling and analysis of surface water for the abstraction of drinking water in the Member States.
[9] Annex 3 - the Directive 80/778/EEC or it can be found on the web side http://www.nfgws.ie/80778.htm
[10] Roman M.:" Standardy jakości i ochrony śródlądowych wód powierzchniowych w przepisach Unii Europejskiej i w przepisach polskich."Warszawa,1998.

Directive 80/778/EEC explain the fallowing group of *water quality indicators*:

A. Organolepthic indicators-colour, turbidity, odour, taste.

B. Physicochemical indicators –temperature, pH, conductivity, magnesium, calcium, aluminium, total hardness, dissolved oxygen, free carbon dioxide, etc.

C. Indicators regarding the undesirable substances in the excessive amounts – nitrates, nitrites, ammonium, total organic carbon, phenols, iron, zinc, copper, phosphorus, silver , etc. Some of the substances mention above might be toxic, if they are in large amounts.

D. Toxic substances indicators- arsenic, beryllium, cadmium, cyanides, chromium, mercury, nickel, lead ,etc., pesticides and its derivatives , policyclicaromatic hydrocarbons

E. Microbiological indicators – coli type bacteria, total amount of bacteria determined in the temperature of 22° C and 37°C .

Two requirement levels were introduce:

- Recommended level- exacerbate requirements and
- Absolute require level describing the maximum acceptable concentration- less demand.

Beyond the group of *water quality indicators* also the minimum desire concentrations for softened water, used for consumption purposes by human were determined. This requirements were presented as F group indicators, such as hardness, pH, alkalinity and dissolved oxygen.

After many years of modification of European Union legislations one of the most important work was done in 1991 year by the European Union of National Associations of Water Services (EUREAU) , organization which prepared special report containing the proposals of modification the directive 80/778/EEC.[11] This report included proposal of

[11] Drinking Water Directive 80/778/Eec- Proposal of Modification. Views of EUREAU. Eureau Brussels. December 1991.

additional refilling of directive by the maximum values of allowable concentrations having the scientific explanation, and adding the allowable concentration to those without them. The proposal contained also the suggestion of verification of directive according to the latest discoveries.

EUREAU is a institution of suppliers countries acting in EU. It was established in 1975 year, as to present the business of each members in the face of different EU organizations responsible for development of water provision. It is acting according to *"non profit"* rule.

This organization recommend also change of indicators groups determining the quality of water and introducing the fallowing one:

a) Microbiological indicators- number of coli bacteria.

b) Indicators having connections with health –sulphates, phosphorus, silver, nitrites, ammonium, phenols, iron, zinc, copper, arsenic, beryllium, cadmium, cyanides, chromium, mercury, nickel, lead ,etc., pesticides and its derivatives, policyclicaromatic hydrocarbons.

c) Comfort indicators- colour, turbidity, odour, taste, iron, manganese, zinc.

Proper restriction to the division and allowable concentration of substances should be fulfilled with the highest certainty, for first and second group with 100 % certainty and for the third one with rational described confidence, below 100 %.

An extra group of indicator was suggest, so called *operational* one, which do not have direct effect on health or comfort of people but are comfortable while controlling of water processing.

Report contain also the description of removal of some of parameters from the directive 80/788/EEC if their do not have any crucial effects for quality of water (free carbon dioxide, silicon, potassium, etc.), are described already by other indicators (general hardness-express by magnesium and calcium) or complex indicators, which have to be submitted by individual one (phenols, policyclicaromatic hydrocarbons, etc.)

Modification procedure of directive concern the:

- Revision of maximum allowable concentration for some of substances like sulphates, nitrates, lead, etc.
- Widening the indicators norms, by those being determined globally for separated one.
- Better way of determining the odour and taste by analytical method.
- Modification of analytical methods, range, and frequency of water monitoring .

On the basis of this report in 1993 year WHO presented new water quality *Guidelines* .In the fallowing year the EUREAU presented new report presenting the attitude to guidelines from the water suppliers and properties owners point of views, as well as the differences with the Directive 80/788/EEC. Next change in the published in 1995 year directive was corrected as to present the final result of **Directive 98/83/EC** in 1997 year.

4.2 Directive 98/83/EC about quality of water used for consumption by people.[12]

The term *"water used for consumption by people"* means that:

a) Any water in their natural state or after processing used for drinking or domestic purposes independently from their origin and the way of distribution.

b) Any water used for food production unless the governmental authorities are certain that water quality may have negative effects for human in final form of production lines.

Similar to the previous directive this do not concern the natural mineral waters and healthing waters . Ti oblige the membership countries to undertake the necessary steps, as

[12] Annex 2 - full text of Directive 98/83/EC or can be found on web side http://www.nfgws.ie/directive9883.htm

to ensure the highest water quality consumed by human without microorganisms, parasites, or other substances, which concentration may be higher then demanded.

Three main groups of parameters determining the water quality are point out:

- Microbiological parameters- numbers of *Escherichia coli* bacteria, number of bacteria settlements by the temperature of 22°C and 37°C.
- Chemical parameters- benzene, cyanides, chromium, mercury, nickel, lead, pesticides, policyclicaromatic hydrocarbons.
- Indicating parameters – ammonia, aluminium, chlorides, conductivity, pH, iron, manganese, odour, sodium, number of bacteria settlements by the temperature of 22°C, total organic carbon, turbidity, total radioactivity amount. Are used mainly for the monitoring purposes of water quality of water delivered for peoples and comestible industries for production and become the source of information for the water quality marks and additional treatment in the case, when they are below the norms.

Some parameters were removed from the directive comparing to the previous one, like temperature, calcium, magnesium, potassium, dissolved oxygen, free carbon dioxide, phenols, zinc, cobalt, silver, etc.

Also some restrictions were remit, or new one were added.

Places were drinking water quality need to be keep were define:

- In the case when water is distributed from the distributors network- in point were water flows from derive valves used by people to water collection.
- In case of water being delivered from tank-in point where it if flowing out of tank.
- Bottles or container water –in the point where it is introduce to bottle or container.
- In case of water used in comestible industries for food production-in place where water is used in the industry.

According to the directive the memberships of the European Union are oblige to introduce constant monitoring of water quality used for drinking. The group of parameters are existing that need to be taken into account while inspection monitoring and control monitoring. Minimal frequency of water sample collection and analyze of water were determined.

This act put on membership countries an responsibility of immediate action undertaking in the case when above rules are omitted. Identification of reasons and special steps rising due to restoration of water quality are the mains aims. It is essential to inform about that the consumers.

Above directive went into used twenty days after it publication , so 26 December 1998 year, at the same time the EU countries decided to introduce also necessary lows, regulations and administration decisions, needed to for the directive till five years time-until 2003 year, whit possibility of prolongation of the date, after special explication procedure.

4.3 Directive 2000/60/EC in EU.[13]

On 23 October 2000, the "Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy" or short the **EU Water Framework Directive** which is a legislative framework to protect and improve the chemical and ecological quality of all water resources such as rivers, lakes, transitional, coastal waters and groundwaters within the European Union based on the 98/83/EC Directive.

Member States had to incorporate the WFD into national law by the end of 2003. Once this had been taken place, many more steps must be taken to achieve “good status” of all European waters by 2015.

[13] Annex 4 - full text of the Directive 2000/60/EC or it can be found on the web side: http://www.wldelft.nl/issues/wfd/im/officaltextwfd.pdf

Some of the elements of the new and innovative approach to managing Europe's water resources in the WFD are:

- ambitious objectives and clear deadlines,
- the introduction of River Basin Management on a Europe-wide scale,
- the requirement for cross border co-operation in water management between countries and all involved parties,
- pollution prevention and control on the basis of the so called "combined approach"
- greater public participation in water management, and
- economic analysis of water use.

The Water Framework Directive defined clear deadlines for each of its requirements resulting in an ambitious overall timetable. The tasks that need to be carried out to reach the deadlines are many, and are causing a lot of debate both on national and international level.

5. POLISH REGULATIONS CONCERNING WATER QUALITY.

Poland, like many other Eastern European countries, suffered significant environmental damage as a result of the economic policies of the Communist period (1945-1989), which emphasized the rapid development of heavy industry. Much of this damage did not become evident until the late 1980s and early 1990s. Although environmental problems affect most of the country, the worst damage has been inflicted on the industrial region in southern Poland.

Water pollution is a serious problem throughout Poland and is caused mainly by industrial and municipal waste and acid rain. About one-third of the total length of Poland's rivers and one-quarter of the country's lakes are severely polluted. Rivers that are particularly affected include the Wisła, the Bóbr, the Nida, the Wisłoka, and the Bug. In the early 1990s the irresistible majority of the country's river water was considered undrinkable. The Baltic Sea is also heavily polluted, mainly by industrial discharges, which severely inhibits the development of its beaches for tourism.

In recent years, preventive measures have been introduced in Poland's energy, industrial sectors connected with decrease of air, water and soil pollution levels. These measures include the adoption of new regulations, heavy fines, and the installation of filtering and purification equipment. In addition, a number of political parties and citizen groups have formed around environmental issues.

5.1 Development of standardization of water quality in Poland.

As the beginning of the water quality subject in polish law the **"Basic Sanitary Rule"** from 19 July **1919** year [14] in which *"matters of water supply and removal of used water, protection of quality of water, air and soil are the subjects for the Minister of Public Health."* On this source the Ministry of Public Health published in **1921** year the general

[14] Basic Sanitary Rule-Zasadnicza ustawa sanitarna,19 July 1919 „Dziennik Praw Państwa Polskiego" from 1919 year, Nr.63 position 371.

information about the water collection for the research.[15] Next water quality regulations can be found in the act about spa from **1922** year[16] where it was stated that the necessary equipment of every spa are the *"equipment protecting the delivery in good drinking water"*. Due to this a year later a disposition of the Minister of Public Health was established for the spas having the character of public usefulness about sanitary rules, which stated the water requirements:[17]

- Physical- water should be transparent, colourless, good in taste and has the temperature of 12°C.
- Chemical- it can not contain excess of iron and nitrous salts, sodium ,potassium, ammonium, etc.
- Biological- it should not have morbific microbes, parasites and its embryos, biological indicators, characterized by the human and animal excretions.

The first basic legal act describing the problem of water quality and water used for domestic purposes was published in **1928** year, the President disposition about water supply.[18] Regulation of drinking water, used for domestic purposes, food and ice production, as well as watering place. It was determined that water used for above reasons can not :

- be source of infection of poisoning.
- Have compounds or addition that might :
    a) be harmful for halt,
    b) Have some impurities.
    c) Have negative influence for taste and appearance of water.

[15] General Rules of the Ministry of Public Health from 30 November 1921year, Nr. Z.H. 346/72/3122/21.
[16] Act from 23 March 1922 year about spa. Dziennik Ustaw RP from 1922 year, Nr. 31and Dziennik Ustaw from 1928 year, Nr. 36, position 331.
[17]Disposition of the Minister of Public Health for spas having the character of public usefulness about sanitary rules. Dziennik Ustaw RP from 1923year, Nr.32, position 1016.
[18] President Disposition from 16 March 1928 year about water supply. Dziennik Ustaw 1928year, Nr.32,position 310.

- It should be transparent, colourless and without odour.
- It can not contain:
    a) arsenic compound and heavy metals,
    b) morbific microbes, etc.

In the case when water would not fulfil above requirements the local administration should decide about the conditions of using such water, or eventual closing of the water source.

Evaluating this disposition it has to be stated that for the past time it regulated in a good way the requirements for drinking water, creating the legal fundamentals for providing safe water to people.

After that, in 1960 year new rule regarding supply of people in drinking water was distributed,[19] which divest the President disposition from 1928 year, although it took over a lot from it. According to it, Minister of Health and Welfare published in **1961** year rule about the conditions, which drinking water and domestic one should accomplish[20].

In **1977**[21] year rule was printed, containing new version of "Water Act"[22], which oblige the Minister of Health and Welfare to determined the requirements which drinking water, domestic one, food, pharmaceutics, cosmetic, ice industries, watering place should complete. More physical, chemical, bacteriological indicators were added, describing quality of water. However some of the indicators were remit.

Above mentioned law oblige till **1990** year by the Minister of Health and Welfare, when same changes and modifications were introduced to 1977 year rules. The main changes involve:

[19] Rule from 17 February 1960 year regarding supply of people in drinku\ing water. Dziennik Ustaw PRL from 1960 year, Nr.11 position 1972.
[20] Rule of Minister of Health and Welfare from 16 November 1961 year about the conditions, which drinking water and domestic one should accomplish. Dziennik Ustaw from 1961 year,Nr.59,position 333.
[21] Rule of Minister of Health and Welfare from 31 May 1977 year, about requirements which drinking and domestic water should complete. Dziennik Ustaw PRL from 1977 year, Nr.18, position 72.
[22] Rule from 24 October 1974 year. Water Act. Dziennik Ustaw from 1974 year. Nr.38,position 210.

- introducing the new annex determining organoleptic and physical-chemical requirements , which water should implement.
- Introduce additional annex stating bacteriological requirements fulfil by water, instead of those placed in the 1977 rule.
- Removal of rule dealing with water fluoride.

The published rule contain similar amount of indicators to the previous one, but they were chosen in a better way, above all for the organic substances.. Some of them were restricted, like requirements for pesticides and bacteriological content.

As a conclusion it can be said that this rule became a next step of water quality for drinking and domestic purposes formation in Poland. Nevertheless some changes were still needed, mainly because of publishing in 1993 year a new WHO Guidelines[23], therefore polish rule which based on WHO Guidelines form 1984 year do not remain feasible .

Due to that in December of 1998 year new project was suggested, adjusted to the WHO Guidelines from 1993 year and the European Union Directives from 1985 year. However in the same time new Directive of EU[24] came into use, the project was postponed and new study were undertaken as to create new rule, which will be adopted to the EU one. During the 1999-2000 period many proposal of new water quality rule were discusses, as to finally accept one, which came into use in 19 October **2000** year. [25]

5.2 Actual polish legislation dealing with water quality.

Rule from 2000 year include not only the requirements for drinking water, but also principles of water quality controlling by the Sanitary Inspection Institution. Frequency of water samples collection, preferred methods of analysis, indictors include in monitoring, which were not a subject of a past rules.

[23] Council Directive 80/778/EEC of 915 July 1980 relating to the quality of water intended for human consumption.
[24] Council Directive 98/83/EC .

What more, it do not concern the natural mineral waters , similarly to the previous one.

Three main groups of *indicators* were classified:

1) Microbiological indicators – Escherichia coli type bacteria, coli type bacteria, total amount of bacteria under the temperature of 22°C and 37°C.

2) Physicochemical indicators of :

   a) inorganic substances- ammonium, arsenic, antimony, nitrates, nitrites, barium, boron, cyanides, zinc, fluorides, chromium, aluminium, magnesium, sodium, silver, iron, etc.

   b) Organic substances – benzene, benz(a)pyrene, bromoform, chlorobenzene, chlorophenols, chloroform, carbon tetrachloride, etylbenzene, phenol, styrene, tetrachloroetane, trichlorobenzene, policyclicaromatic hydrocarbons, pesticides, etc.

3) Organoleptic indicators- colour, turbidity, water organisms, oil stains, smell, suspensions.

Some of the indicators were neglected (for example: cationic detergents, chloramines, etc.), some were added (like: antimony, barium, boron, magnesium, chromium, etc.), and some of them changed the maximum allowable concentrations(such as: ammonium, free chloride, chlorides, cyanide, iron, etc.).

Permissible amount of the radioactive substances was not determined.

Exacerbation of the requirements and increase in the number of indicators are very important not only for the supplier, but also for the consumers. The most important think is to adjust the water stations to the new water requirements. Nevertheless date of such adjustment was not specified.

Therefore new decree was needed. In **2002**[26] year Minister of Health published decree which is completely consistent with the recommendations of the Directive 98/83/EC. For

[25] Ministry of Health Disposition from4 September 2000 year . Dziennik Ustaw RP from2000year,Nr.82,position 937.
[26] Decree of the Minister of Health from 19 October 2002 year ,Dziennik Ustaw Nr. 203,position 1718.

all parameters of indicators, which were mentioned in directive, admissible ranges of standards were given in decree. Additionally national ranges of standards for fifteen parameters, including disinfection's by – products were established. Available chlorine will be determined in consumer's bib valve.

6. COMPARISON OF POLISH AND EUROPEAN UNION LEGISLATION CONCERING DRINKING WATER QUALITY.

According to the assumption, new polish legislation had to be adjusted to European Union one, tight in the Directive 98/83/EC. This aim was achieved fully.

Minister of Health sign in 19 October 2002 a decree refer to water quality by people, with fourteen days life entry. The legal principle for its edition is article 13 of Act about collective provision in water and collective sewage drain from 2001 year. This rule determine totally transformation European Union Directive 98/83/EC into polish one. All of the requirements of directive apart from organisational-administrative recommendation, because Poland is not yet a part of European Union, were comply in national rules.

In comparison to the EU directive national rules contain detail series of registration affecting the Sanitary Inspection Institution in scope of water quality for drinking purposes supervision and monitoring organisation. Likewise, way of inspection for materials used to processing and distribution of water, obligations and authorization of Sanitary Inspection Institution were specify in a better way.

Comparison of normative requirements of directive 98/83/EC with respect to decree of the Minister of Health from 2002 year:

- all parameters specified in directive 98/83/EC can be found in decree of the Minister of Health from 2002 year, and its value are consistent with those determined in directive.
- Lower national standard value in comparison to the UE requirements can be found only for cadmium, but it is compatible with the WHO guidelines.
- Higher national standard value in comparison to the UE directive is for the ammonium in water before disinfections process by chlorine usage.
- Few parameters not determined in UE, remain without standard values, like free chlorine, chloramines, magnesium, hardness, chloroform, trichlorophenol, carbon tetrachloride, etc.

In a present valid disposition, the highest allowable value in water sample for six microbiological indicators and allowable range of values for fifty eight parameters and physicochemical indicators were determined.

Against to the 2000 year directive few indicators were removed from the present one:

- inorganic substances (-5) : barium, chromium (VI), zinc, phosphorus, silver.
- Organic substances (-17): bromoform, dichlorobenzene, dichloromethane, ethylobenzene, phenol, styrene, toluene, etc.
- Organoleptic parameters (-3) : free organisms, oil stains and suspensions.

Instead of then, some new were introduced (+7) like taste, chloramines, chlorides, etc.

Turbidity determination was change into the NTU , because of that indication methods have to be change as well from spectrophotometer to nefelometric as those methods give visible differences in results while determination. It is very important for water quality determination in a case when only exceeded parameter is turbidity. All of laboratories conducting water quality measurements should be applied in turbiditymeters till entering to European Union.

Odour determination proclaim another problem. Due to epidemiological threaten it should be carried out after microbiological test, that water is free from morfibic organisms.

Chloramines and chloride derivatives were incorporate into norms, because of necessity of chlorine and dioxygenchlorine disinfections process controlling. This substances are characterised by high toxicology and mutagenic properties.

The total allowable radionuclides in water value is still not determined.

Disposition in comparison to directive possess one more group-D- for indirect disinfections products, with the exception of bromines and THM, include in UE directive.

Decision about widening the norms for those parameters was reason of the national situation . The highest threat to the consumers health make remained in the excessive amounts disinfections agents and indirect disinfections products by chlorine, ozone and

ClO_2 usage. Their beakbone is highly mutagenic, toxic and carcinogenic. All of them belong to the compounds carcinogenic to human group according to IARC .

Table1 – Comparison of WHO, European Union and Polish Water Quality Standards.

WATER QUALITY INDICATORS	WHO REQUIREMENTS FROM 1998 YEAR	POLISH LEGISLATION	DIRECTIVE 98/83/EC 1998 YEAR
I. Organoleptic indicators			
Colour mg Pt/l	15	15	acceptable
Turbidity SiO_2/l	1/5	1	acceptable
pH	6,5-8,5	6,5-9,5[1]	6,5-9,5
Smell	not heavy	acceptable	acceptable
Taste	-	acceptable	acceptable
II. Physicochemical indicators			
A. Inorganic substances [mg/l]			
Ammonia	0,5	0,5[2]-1,5[1,a]	0,5
Antimony	0,005[a,b](P)	0,005[b]	0,005
Arsenic	0,01[b](P)	0,01[b]	0,01
Nitrates	50 NO_3	50 NO_3	50 NO_3
Nitrites	0,2/0,3 (P)	0,5	0,5
Boron	0,5 (P)	1,0	1,0
Bromides	0,025[b](P)	0,025[b]-0,010(2008 year)	0,025[b]-0,010(2008 year)
Free chlorine	0,5/5 (U)	0,1-0,3	-
Chlorides	250 [a]	250[1,a]	250
Chromium	0,05 (P)	0,05	0,05
Fluorides	1,5	1,5	1,5
Aluminium	0,2 [a]	0,2 [a]	0,2
Cadmium	0,003	0,003	0,005
Magnesium	-	303)-1253')	-
Manganese mg/l	0,1/0,5 (P)	0,05	0,05
Cooper	1,0/2,0(P,U)	2,0[1,4]	2,0
Nickel	0,02	0,02	0,02
Lead	0,01	0,05 0,025(2006year) 0,01(2012year)	0,05 0,025(2006year) 0,01(2012year)

Mercury	0,001	0,001	0,001
Selenium	0,01	0,01	0,01
Nitrates	250 [a]	250 [1]	250
Sodium	200 [a]	200	200
Hardness	high	60[1,3]-500 [1]	-
Conductivity [μScm^{-1}]	-	2500 [1]	2500
Iron	0,3	0,2	0,2
B. Organic substances [µg/l]			
Akryloamid	0,5[b]	0,10 [b,6]	0,10
Benzene	1,0[b]	1,0[b]	1,0
Benzo(a)pirene	0,7[b]	0,010[b]	0,010
Bromodichloro-metane	60[b]	15[b]	-
PAH	-	Sum of PAH 0,1[9]	Sum of PAH 0,1
Chlorophenols	2,4,6 trichlorophenol 200 [b] (U)	2,4,6 trichlorophenol 200 [b]	-
Chloroform	200 [b]	30 [b]	-
Carbon tetrachloride	2,0	2,0 [b]	-
Dichloroetane	(B)	3,0	3,0
Epichlorohydryne	0,4 (P)	0,10[b]	0,10
Formaldehyde	900,0	50,0	-
Phtalane dibytylene	-	20,0	-
Heptachlor	0,03	0,03	0,03
Microcisine-LR	1	1[z]	-
Surface Active Substances (anionic)	-	200,0	-
Trichloroetylene	70,0(P)	10,0	10,0
Tetrachloroetylene	40,0	-	-
Trichlorobenzene	20,0	20,0	-
Sum of THM	-	150,0 100(2008 year)	150,0 100(2008 year)
Oxidation ($KmnO_4$)	-	5000,0	5000,0
Vinyl chloride	5[b]	0,5 [b,6]	0,5
C. Pesticides in [µg/l]			
Pesticides	-	0,1[7]	0,1
Total Pesticides	-	0,58	0,1
D. Radio active isotopes			
Tritium	-	100,0 Bq/l	100,0 Bq/l
Total dose	-	0,10mSv/r	100,0 Bq/l

Explanation:

Large differences between WHO,EU and POLISH standards are indicated by –YELLOW COLOUR OF ROWS

1) Water from battle or other containers.
2) Non chlorinated underground waters .
4) Can not be see by bare eye.
6) 1,2-dichloroetane.
7) Sum of quotient of every trihalomethane concentration to its allowable value can not exceed unity (allowable concentration for particular trihalomethane: bromoform - 100 µg/l, dibromochlorometane - 100 µg/l, bromodichlorometane - 60 µg/l, chloroform - 200 µg/l).
8) In TCU – real colour units.
9) In NTU - nefelometric turbidity units.

P - provisory values, as information about health effects are limited or there is no safety coefficient.

U -substances concentration on the level or below health criteria, influencing taste, odour and colour of water.

B – no sufficient data available for recommended value based on health criteria.

7. ENVIRONMENTAL PROTECTION AGENCY REGULATIONS CONCERNING WATER QUALITY.

The U.S. Environmental Protection Agency was established in 1970 to consolidate in one agency a variety of federal research, monitoring, standard-setting and enforcement activities to ensure environmental protection.

"… it is the national goal that, wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water... "[27]

EPA's mission is to protect human health and to preserve the natural environment--air, water, and land--upon which life depends. For more than 30 years, the EPA has been working for a cleaner, healthier environment for the American people.

7.1 Development of standardization of EPA's water quality.

The first comprehensive legislation for water quality and pollution control was the **Water Pollution Control Act of 1948** [28]. This law, passed after a half century of debate on the responsibility of the Federal Government for:

- resolving water pollution problems
- Adopted principles of State-Federal cooperative program development.
- Limited Federal enforcement authority, and provided limited financial assistance.

[27] The Clean Water Act of 1972.
[28] Water Pollution Control Act of 1948 (Public Law 845, 80th Congress).

These concepts were continued in the **Federal Water Pollution Control Act[29] of 1956** and in the **Water Quality Act of 1965[30]**. Under the 1965 Act, States were directed to develop water quality standards for interstate waters. As a result of enforcement complexities and other problems, this approach was not sufficiently effective. In the FWPCA **Amendments of 1972[31]** , Congress established a discharge permit system and provided a broader Federal role through more extensive Federal grants to finance local sewage treatment systems and through Federal (EPA) setting of technology-based effluent limitations. The 1972 Amendments extended the water quality standards program to intrastate waters and provided for implementation of water quality standards through discharge permits.

One of the 1972 FWPCA Amendments Sections established the legislative basis for the current water quality standards program. It completed the transition from the previously established program of water quality standards for interstate waters to one requiring standards for all surface waters of the United States.

Although the major innovation of the 1972 FWPCA was technology-based controls, Congress maintained the concept of water quality standards both as a mechanism to establish goals for the Nation's waters and as a regulatory requirement when standardized technology controls for point source discharges and no point source controls were inadequate. In recent years, Congress and EPA have given these water quality-based controls new emphasis in the continuing quest to improve and maintain water quality to protect the public health and welfare.

Briefly stated, the key elements of above mentioned section are as follows:

a) A water quality standard is defined as the designated beneficial uses of a water segment and the water quality criteria necessary to support those uses.

[29] Federal Water Pollution Control Act of 1956 (Public Law 660, 84th Congress).
[30] Water Quality Act of 1965 (Public Law 660, 84th Congress).
[31] Amendments of 1972 to Federal Water Pollution Control Act (Public Law 92-500).

b) The minimum beneficial uses to be considered by States in establishing water quality standards are specified as public water supplies, propagation of fish and wildlife, recreation, agricultural uses, industrial uses, and navigation.

c) A requirement specifies that State standards must protect public health or welfare, enhance the quality of water, and serve the purposes of the Clean Water Act.

d) A requirement specifies that States must review their standards at least once each 3- year period using a process that includes public participation.

e) The process is described for EPA review of State standards that might ultimately result in the promulgation of a superseding Federal rule in cases where a State's standards are not consistent with the applicable requirements of the CWA, or in situations where the Agency determines that Federal standards are necessary to meet the requirements of the Act.

The Federal Water Pollution Control Act, including the major 1977, 1981, and 1987 Amendments are commonly referred to as the **"Clean Water Act".** On 4 February of 1987, Congress enacted the **Water Quality Act of 1987**[32], making substantial additions to the Clean Water Act and directly affecting the standards program. Congress concluded that toxic pollutants in water constitute one of the most pressing water pollution problems. The Water Quality Act provided a new approach to controlling toxic pollutants by requiring *"… States to identify waters that do not meet water quality standards due to the discharge of toxic substances, to adopt numerical criteria for the pollutants in such waters, and to establish effluent limitations for individual discharges to such water bodies…".*[33]

7.2 History of EPA regulations dealing with water quality.

[32] Water Quality Act of 1987 (Public Law 100-4), 4 February of 1987.
[33] Statement of Senator Mitchell, (133 Congressional Record S733).

EPA first published a **Water Quality Standards Regulation in 1975**[34] as part of EPA's water quality management regulations. The first Water Quality Standards Regulation did not specifically address toxic pollutants or any other criteria. It simply required "appropriate" water quality criteria necessary to support designated uses. In the late 1970s and early 1980s, the public and Congress raised concerns about toxic pollutant control. EPA realized that propagating effluent guidelines or effluent standards of the Act would not comprehensively address toxic pollutants. Therefore, EPA decided to use the legislative connection between water quality standards and NPDES permits to effectively control a range of toxic pollutants from point sources. To best accomplish this process, the Agency decided to amend the Water Quality Standards Regulation to explicitly address toxic criteria requirements in State standards. Other legal and programmatic issues also necessitated a revision of the Standards Regulation. The culmination of this effort was the broadcast of the present **Water Quality Standards Regulation of 1983** [35]

The present Water Quality Standards Regulation is a much more wide-ranging regulation than its precursor. The Regulation addresses both the designated use component and the criteria component of a water quality standard. One of Regulation section requires States to review available information and *"…to identify specific water bodies where toxic pollutants may be adversely affecting water quality … and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated us"*.

Since the middle of the 1980's, EPA's annual program guidance to the States reflected the increasing emphasis on controlling toxics. States were strongly encouraged to adopt criteria in their standards for the pollutants listed in the Act.

In support of its 1983 regulation, EPA simultaneously issued program guidance entitled **Water Quality Standards Handbook**[36] . The foreword to the guidance noted that EPA's approach to controlling toxics included both chemical-specific numeric criteria and biological testing in whole-effluents or ambient waters. More detailed programmatic

[34] Water Quality Standards Regulation of 1975 (40 CFR 130.17, promulgated in 40 F.R. 55334, 2 November of 1975).
[35] Water Quality Standards Regulation of 1983 November (54 F.R. 51400, 8 November of 1983).
[36] Water Quality Standards Handbook (December 1983).

guidance on the application of biological testing was provided in the **Technical Support Document for Water Quality-based Toxics Control[37],** which presents information needed to convert chemical-specific and biologically based criteria into permit limits for point source dischargers.

State water quality standards reviews submitted began to show the effects of EPA's efforts. More and more numeric criteria for toxics were being included in State standards as well as more aggressive use of the "free from toxics" narratives in setting protective NPDES permit limits. Nevertheless, as a consequence of perceived problems in adopting numeric toxic pollutant criteria in State rulemaking proceedings, many States were unwilling to adopt numeric toxics criteria. Therefore, in 1987, Congress responded to the lack of numeric criteria for toxic pollutants within State standards by mandating State adoption of such criteria.

In response to this new congressional mandate, EPA intensify its efforts to promote and assist State adoption of water quality standards for priority toxic pollutants. EPA's efforts included the development and issuance of Guidance for State Implementation of WQS on **12 December of 1988,[38]** which contained acceptable implementation procedures for several new sections of the Act.

EPA's December 1988 guidance also addressed the timing issue. The legislative directive was clear: all State standards triennial reviews initiated after passage of the Act must include a consideration of numeric toxic criteria.

The addition of section concerning the toxins to the Clean Water Act was an clear signal to the States that Congress wanted implement this criteria in the State's water quality standards. EPA, initiated Federal broadcasting of toxic criteria for those States that had not complied with the Act.

[37] Technical Support Document for Water Quality-based Toxics Control (EPA 4414-85-032,September 1985).
[38] Guidance for State Implementation of WQS for toxic pollutants (12 December of 1988).

7.3 EPA Guidance on the Water Quality Act.

Since 1983, EPA also developed additional policies and guidance on virtually all areas of the WQS Regulation taking into consideration different aspects of water , criteria and standards, like :

- *Selection of Water Quality Criteria in State Water Quality Standards,* established EPA policy regarding the selection of appropriate water quality criteria for toxic pollutants in State water quality standards.

- *Answers to Questions on No point Sources and WQS ,* responded to two questions on no point source pollution and water quality standards.

- *EPA Designation of Outstanding National Resource Watery,* restates the basis for EPA's practice of not designating State waters as ONRW where a State does not do so.

- *Designation of Recreation Uses,* summarizes previously issued guidance, and outlines a number of acceptable State options for designating recreational uses.

- *Biological Criteria: National Program Guidance for Surface Waters,* provides guidance on the effective development and application of biological criteria in the water quality standards program.

- *National Guidance: Water Quality Standards for Wetlands ,* provides guidance for meeting the EPA priority to develop water quality standards for wetlands.

- *Policy on the Use of Biological Assessments and Criteria in the Water Quality Program,* provides the basis for EPA's policy that biological surveys shall be fully integrated with toxicity and chemical- specific assessment methods in State water quality programs.

- *Interim Guidance on Determination and Use of Water-Effect Ratios for Metals,* provides interim guidance concerning the experimental determination of water-effect ratios for metals and supersedes all guidance concerning water-effect ratios and the Indicator Species Procedure. It also supersedes the guidance in these earlier documents for the Recalculation Procedure for performing site-specific aquatic life criteria modifications.

The guidance contained in each of the above documents is either incorporated into the text of the appropriate section of this Handbook or attached as appendices The reader is directed to the original guidance documents for the explicit guidance on above mentioned topics.

7.4 Water Quality Standards.

In 1972, Congress adopted the Clean Water Act which establishes a framework for achieving its national objective *"... to restore and maintain the chemical, physical, and biological integrity of the nation's waters."* [39] Congress decreed that, where attainable, water *quality "...provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water."* [40] These goals are referred to as the "fishable and swimmable" goals of the Act.

The CWA called for states to develop water quality standards to guide the restoration and protection of all waters of the United States. Water quality standards became the focus around which most surface water quality programs revolve

The CWA allows states, tribes, and other jurisdictions to set their own water quality standards but requires that, at a minimum, they include the fishable and swimmable goals of the Act, where achievable. States must submit their standards to EPA for approval.

Water quality standards consist of three elements:

[39] Clean Water Act of 1972.
[40] Clean Water Act of 1972.

1) state designated uses are the beneficial uses that water quality should support. Where attainable, all waters should support recreation (such as swimming and surfing), aquatic life, and fish consumption. Additional important uses include drinking water supply, agriculture, industry, and navigation. Waste transport or disposal is not an acceptable designated use. States, tribes, and other jurisdictions may designate an individual water body for multiple uses. Each designated use has a unique set of water quality criteria that must be met for the use to be use.

2) *State water quality criteria* come in two forms, numeric and narrative.

A. *Numeric criteria* establish thresholds for the physical conditions, chemical concentrations, and biological attributes required to support a beneficial use. They are required where necessary to protect designated uses. Numeric criteria to protect aquatic life should be developed to address both short-term (acute) and long-term (chronic) effects. Saltwater species, as well as freshwater species, must be adequately protected. Adoption of numeric criteria is particularly important for toxicants known to be impairing surface waters and for toxicants with potential human health impacts (e.g., those with high bioaccumulation potential). Human health should be protected from exposure resulting from consumption of water and fish or other aquatic life (e.g., mussels, crayfish). Numeric water quality criteria also are useful in addressing no point source pollution problems.

B. *Narrative criteria* describe, rather than quantify, conditions that must be maintained to support a designated use. To supplement numeric criteria for toxicants, all States have also adopted narrative criteria for toxicants.

   Such narrative criteria are statements that describe the desired water quality goal, such as the following:

All waters, including those within mixing zones, shall be free from substances attributable to wastewater discharges or other pollutant sources that:

- settle to form objectional deposits.
- Float as debris, scum, oil, or other matter forming nuisances.
- Produce objectionable colour, odour, taste, or turbidity.
- Cause injury to, or are toxic to, or produce adverse physiological responses in humans, animals, or plants.
- Produce undesirable or nuisance aquatic life.

Narrative toxic criteria can be the basis for establishing chemical-specific limits for waste discharges where a specific pollutant can be identified as causing or contributing to the toxicity and the State has not adopted chemical-specific numeric criteria.

3) *Antidegradation policies* are narrative statements intended to protect existing uses and prevent water bodies from deteriorating even if their water quality is better than the fishable and swimmable goals of the Act.

7.5 Water Quality Criteria.

The term "water quality criteria" has two different definitions under the Clean Water Act. EPA publishes water quality criteria "… *that consist of scientific information regarding concentrations of specific chemicals or levels of parameters in water that protect aquatic life and human health…*" .The States may use these contents as the basis for developing enforceable water quality standards. Water quality criteria are also "…*elements of State water quality standards…*". States are required to adopt water quality criteria that will protect the designated use of a water body. These criteria must be based on sound

scientific rationale and must contain sufficient parameters or constituents to protect the designated use.

7.5.1 Criteria for Aquatic Life Protection

The development of national numerical water quality criteria for the protection of aquatic organisms is a complex process that uses information from many areas of aquatic toxicology. After a decision is made that a national criterion is needed for a particular material, all available information concerning toxicity to, and bioaccumulation by aquatic organisms is collected and reviewed for acceptability. If enough acceptable data for 48- to 96-hour toxicity tests on aquatic plants and animals are available, they are used to derive the acute criterion. If sufficient data on the ratio of acute to chronic toxicity concentrations are available, they are used to derive the chronic or long-term exposure criteria. If justified, one or both of the criteria may be related to other water quality characteristics, such as pH, temperature, or hardness. Separate criteria are developed for fresh and salt waters.

7.5.2 Criteria for Human Health Protection.

The procedures contained in this document are used in the development and updating of EPA water quality criteria and may be used in updating State criteria and in developing State criteria for those pollutants lacking EPA human health criteria.

7.5.3 Recreation Criteria.

Recreational uses of water include activities such as swimming, boating, and fishing. Often insufficient data exist on the human health effects of physical and chemical pollutants, including most toxics, to make a determination of criteria for recreational uses. However, as a general guideline, recreational waters that contain chemicals in concentrations toxic or otherwise harmful to man if ingested, or irritating to the skin or

mucous membranes of the human body upon brief immersion, should be avoided. Human health effects criteria based on direct human drinking water intake and fish consumption might provide useful guidance in these circumstances. Criteria to protect recreational uses are also available for certain physical, microbiological, and narrative "free from" aesthetic criteria.

7.5.4 Criteria for Toxicants.

Applicable requirements for State adoption of water quality criteria for toxicants vary depending upon the toxicant. The reason for this is that the 1983 Water Quality Standards Regulation and the Water Quality Act of 1987 which amended the Clean Water Act include more specific requirements for the particular toxicants listed in CWA.
For regulatory purposes, EPA has translated the 65 compounds and families of compounds into 126 more specific substances, which EPA refers to as "priority toxic pollutants." Because of the more specific requirements for priority toxic pollutants it is convenient to organize the requirements applicable to State adoption of criteria for toxicants into three categories:

- requirements applicable to priority toxic pollutants that discharge or presence affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses.

- Requirements applicable to priority toxic pollutants that have not been the subject of CWA criteria guidance section.

- Requirements applicable to all other toxicants (e.g., non-conventional pollutants like ammonia and chlorine)

7.5.5 Biological Criteria.

The Clean Water Act of 1972 directs EPA to develop programs that will evaluate, restore, and maintain the chemical, physical, and biological integrity of the Nation's waters. In

response to this directive, States and EPA have implemented chemically based water quality programs that address significant water pollution problems. However, over the past 20 years, it has become apparent that these programs alone cannot identify and address all surface water pollution problems. To help create a more comprehensive program, EPA is setting a priority for the development of biological criteria as part of State water quality standards.

The development and implementation of biological criteria requires:

- selection of surface waters to use in developing reference conditions for each designated use.

- Measurement of the structure and function of aquatic communities in reference surface waters to establish biological criteria.

- Measurement of the physical habitat and other environmental characteristics of the water resource and,

- establishment of a protocol to compare the biological criteria to biota in comparable test waters to determine whether impairment has occur-red.

CONCLUSIONS.

Water is vital for the life and health of all people and ecosystems, but around the world, both women and men lack access to adequate and safe water to meet their most basic needs. Water resources, and the ecosystems that depend on them, are under threat from pollution, overuse, land-use changes and numerous other forces. There is of course a huge diversity of needs and individual scenarios around the globe, but together we face one

common challenge: to provide water security in the 21-st century. This includes water for the thirsty, food for the hungry, protection from hazards and a sustainable environment.

The main focus of this work was to give an general thought about the past and present circumstances in which water quality issues has rise up and standardization of water quality had developed among different countries and different organisations, for that reason I had choose regulations of Poland, European Union, the World Health Organization, Environmental Protection Agency and Holland.

All of the above mentioned normalizations were developing in different conditions, taking into account concern about water quality and quantity and adjacent surroundings to understand the patterns and relationships between society and environment itself. Therefore certain outline of water regulations development and implementation can be observed. At *the first stage* following the beginning of regulation, the ecological changes are often noticed only by local society. At *the second stage*, the changes in public attitude and general environmental awareness caused several environmental studies of acidification, global change and, water level and quality. *The third stage* in the process of the regulation development was by active methods or by changes in the regulation practice and its achievement to obtain sustainable water management not only on the local scale but nowadays also on global one.

Actions to support future reform through enhanced international cooperation in particular will be a key issue for future water management. There are a number of good examples of reform, on which basis we can improve existing regulations. The future is likely to see a continuation of the types of changes to policy approaches that have emerged from the past years, with in particular a consensus on the need for more integrated approaches, stronger partnerships and a more effective focus on poverty reduction and sustainable development in water policy processes.

The legislation with regard to water, its resources, usage and protection will focus on creation of unique European or World nation with a strong bond of identity across national borders, making each citizens feel they have much, including a future, in

common. Such process can be already observed in the United States, as well as countries of European Union. The major issue is not about survival, but about development of abilities gained through many years, protection of human life, adaptation to climate changes and creation Europe and World in the 21st century.

Climate change is likely to lead to increased magnitude and frequency of precipitation-related disasters – floods, droughts, mudslides, typhoons and cyclones.

It is also predicted that climate change will degrade water quality through increased pollutant concentrations and loads from runoff and overflows of waste facilities and due to increased water temperatures. A recent study estimates that climate change actually accounts for about 20 percent of the global increase in water scarcity, the remaining 80 percent accounted for by population growth and economic development. Countries that already suffer from water shortages, such as Pakistan, India, Mexico, northern China and the countries of the Middle East and sub-Saharan Africa will be hardest strike. For that reason unique water regulations are necessary to protect water whole over the Earth Globe.

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12. Annex 2 - full text of Directive 98/83/EC or can be found on web side http://www.nfgws.ie/directive9883.htm
13. Annex 4 - full text of the Directive 2000/60/EC or it can be found on the web side: http://www.wldelft.nl/issues/wfd/im/officaltextwfd.pdf
14. Basic Sanitary Rule-Zasadnicza ustawa sanitarna,19 July 1919 „Dziennik Praw Państwa Polskiego" from 1919 year, Nr.63 position 371.
15. General Rules of the Ministry of Public Health from 30 November 1921year, Nr. Z.H. 346/72/3122/21.

16. Act from 23 March 1922 year about spa. Dziennik Ustaw RP from 1922 year, Nr. 31and Dziennik Ustaw from 1928 year, Nr. 36, position 331.
17. Disposition of the Minister of Public Health for spas having the character of public usefulness about sanitary rules. Dziennik Ustaw RP from 1923year, Nr.32, position 1016.
18. President Disposition from 16 March 1928 year about water supply. Dziennik Ustaw 1928year, Nr.32,position 310.
19. Rule from 17 February 1960 year regarding supply of people in drinku\ing water. Dziennik Ustaw PRL from 1960 year, Nr.11 position 1972.
20. Rule of Minister of Health and Welfare from 16 November 1961 year about the conditions, which drinking water and domestic one should accomplish. Dziennik Ustaw from 1961 year,Nr.59,position 333.
21. Rule of Minister of Health and Welfare from 31 May 1977 year, about requirements which drinking and domestic water should complete. Dziennik Ustaw PRL from 1977 year, Nr.18, position 72.
22. Rule from 24 October 1974 year. Water Act. Dziennik Ustaw from 1974 year. Nr.38,position 210.
23. Council Directive 80/778/EEC of 915 July 1980 relating to the quality of water intended for human consumption.
24. Council Directive 98/83/EC .
25. Ministry of Health Disposition from4 September 2000 year . Dziennik Ustaw RP from2000year,Nr.82,position 937.
26. Decree of the Minister of Health from 19 October 2002 year ,Dziennik Ustaw Nr. 203,position 1718.
27. Environmental issues handled under general laws- Nuisance Act of 1875.
28. Laws for specific environmental problems- the Surface Water Pollution Act in 1969, the Air Pollution Act in 1971.
29. General Provisions for Environmental Conservation in 1979.
30. Environmental Management Act in 1990.
31. The Clean Water Act of 1972.
32. Water Pollution Control Act of 1948 (Public Law 845, 80th Congress).

33. Federal Water Pollution Control Act of 1956 (Public Law 660, 84th Congress).
34. Water Quality Act of 1965 (Public Law 660, 84th Congress).
35. Amendments of 1972 to Federal Water Pollution Control Act (Public Law 92-500).
36. Water Quality Act of 1987 (Public Law 100-4), 4 February of 1987.
37. Statement of Senator Mitchell, (133 Congressional Record S733).
38. Water Quality Standards Regulation of 1975 (40 CFR 130.17, promulgated in 40 F.R. 55334, 2 November of 1975).
39. Water Quality Standards Regulation of 1983 November (54 F.R. 51400, 8 November of 1983).
40. Water Quality Standards Handbook (December 1983).
41. Technical Support Document for Water Quality-based Toxics Control (EPA 4414-85-032,September 1985).
42. Guidance for State Implementation of WQS for toxic pollutants (12 December of 1988).
43. Clean Water Act of 1972.
44. Clean Water Act of 1972.

can be found on given web sides

1. Annex 1- current guidelines information or it can be found on the web side: http://www.who.int/water_sanitation_health/dwq/guidelines/en/
2. Annex 2 - full text of Directive 98/83/EC or can be found on web side http://www.nfgws.ie/directive9883.htm
3. Annex 3 - the Directive 80/778/EEC or it can be found on the web side http://www.nfgws.ie/80778.htm
4. Annex 4 - full text of the Directive 2000/60/EC or it can be found on the web side: http://www.wldelft.nl/issues/wfd/im/officaltextwfd.pdf