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PRIMING BIOLOGICAL PROCESSES IN A WASTEWATER TREATMENT PLANTS

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Abstract

Wastewater treatment plants are important objectives to ensure the quality of sources of water . The paper presents some aspects of determining the time for priming of biological processes in wastewater treatment plants , identification of specific steps and processes priming , reducing costs and to ensure a safe exploitation.

Key words: *costs, processes priming, Romania.*

INTRODUCTION

Evolution of human society is dependent on the availability of natural resources and meet certain conditions geoclimactic minimal.
Currently, we are at a stage of development where natural resources are exploited intensively, due to increased needs resulting from population growth and living standards.
If water reserve highlights the peculiarity that the vast majority of human activities it is consumed only in terms of quality being reintroduced later in natural cycles.
An important area of human activity that consumes resources quantitative water is agriculture with irrigation segment, which generates power production and safety resources.
It is necessary to ensure the protection of water resources in physical, chemical, and biological and increasing water use in the context of increased demand and reduced volumes available.
Protection of water resources is achieved through specific measures: soil erosion control discharges of pollutants from various human activities, and through wastewater treatment.

MATERIALS AND METHODS

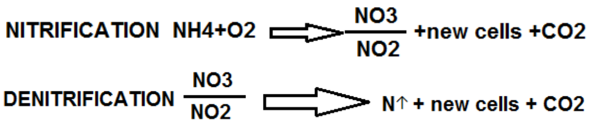
Wastewater represents all physical, chemical and biological processes by which water pollutants are removed or transformed into a more environmentally friendly form.
Treatment processes of plants made by man takes place in nature with low intensity in a process called purification.
In industrial installations aims to accelerate the process to reduce concentrations of pollutants (Iancu Paulina. 2005)
Practical in nature and in industrial plants treatment, meet processes: mixing, decantation, filtration, oxidation, reduction, absorption, adsorption, osmosis, specific biochemical processes at the cellular level.
If the treatment is not done and are discharged into water sources organic pollutants, reaching eutrophication development when nutrients because they develop important populations of algae and other life forms resistant to high concentrations of pollutants and the variation of water chemistry and oxygen levels. (M.Negulescu.1978).
Substances that influence intensity of eutrophication processes are nitrogen and phosphorus. The nature and treatment plant, reducing phosphorus absorption is achieved by the cellular level or by precipitation (phosphorus oxide) with salts of iron, aluminum, calcium etc.

Follow concentrations in water sources shows that there is a cyclical process of assimilation, fermentation and reintroduction of this element circuit.

The second important element in the process of eutrophication is nitrogen. It is believed that biological development in water sources and not only, is subject to the following aspects: Chemically speaking, support is provided by dissolving carbon from the atmosphere and result in breathing or digestion, phosphorus as a product of pollution and the subsequent transformation and nitrogen pollution that fermentation processes.

Transformation and nitrogen removal is accomplished in nitrification and denitrification processes in biochemical processes.

Specialized bacteria, convert ammonia into nitrates and nitrites in the presence of oxygen, while others provide reduced to molecular nitrogen using oxygen in metabolic processes remove carbon dioxide, thus ensuring energy for life.



Biochemical process performed by bacteria found in biologically active sludge, is the most effective process to remove nitrogen.

Other nitrogen removal processes are chemical or physical:

ammonia-nitrogen reaction with chlorine to eliminate their disadvantage as 1 g NH 4 Cl and 7.6 g are required in practice to reach 15g Cl / 1 g NH4, resulting chloramines being released into the atmosphere.

- strip at high pH> 9.5 units involves removing ammonia in the atmosphere and pollution of the environment factor.

-osmosis or ion exchange filters involves obtaining volumes with high concentrations of ammonia and other by-product water volumes in the regeneration of ion exchangers.

This paper presents the results obtained in a pilot plant to reduce nitrogen.

An important issue addressed in the paper is related to a priming stage biological process.

RESULTS AND DISCUSSIONS

The pilot plant used for water loaded with ammonium, treats wastewater from an economic, containing domestic sewage and water from washing of metal parts processing industry with a high oil contents. Ammonium concentrations are important in quantities above 15 mg / l (SC Adiss S.A.2010).

Technological chain pilot plant is (fig1):

-Mixing

-Pumping

-Pre-denitrification and carbon intake

-Nitrification

-Secondary settling stage

-Disinfection with sodium hypochlorite

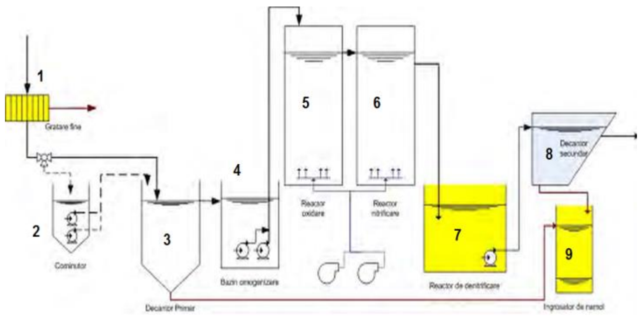


Figure 1. Water Treatment Plant Flow

Legend Figure 1:

1. Finally grills	6. Nitrification reactor
2. Cominutor	7. Denitrification reactor
3. Primary clarifier	8. Secondary clarifier
4. Mixing tank	9. Sludge thickener
5.Oxidation reactor	

Since when nitrification pH decreases, depending on the concentration of ammonia nitrogen was adopted version predenitrificare involving large volumes of circulation and thus increase the buffering capacity of denitrification step.

Ensuring the-fosferizarii is achieved by dosing FeCl3 (ferric chloride) and pH balance with soda NaOH.

The process is automated with sensors for process:

- PH monitoring and metering automation soda for pH balance

- Dissolved oxygen level monitoring and automation nitrification reaction blower operation

- Monitoring and control activated sludge concentration of biological activity

- NO3 and NH4 in reactor monitoring and automation that raw water recirculation

High frequency determination token nitrogen (ammonium-nitrate) is provided by equipment mounted in the reactor biological process. These values were verified using precision measurements standardized methods, drawing up a daily bulletins analysis, indicators monitored are: CCO-Cr, BOD5, NH4, NO3, NO2, SS, phosphorus, sulfur, hydrogen sulfide, detergents, phenols; petroleum products.

In Figures 1-7 are shown the evolutions of the main indicators of quality of treated water for the period 1 to 21 March 2012

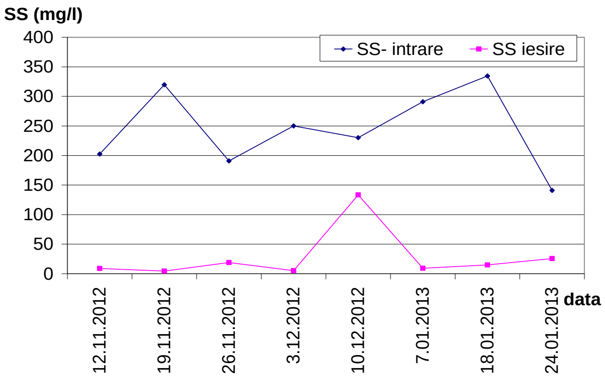


Figure 2. Evolution of concentrations of suspended solids leaving the SE entry

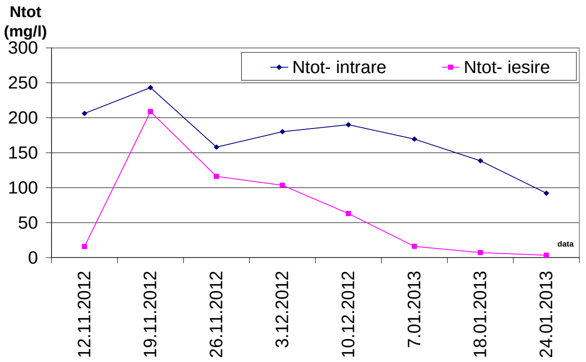


Figure 3. Evolution of chemical oxygen demand COD-Cr in SE

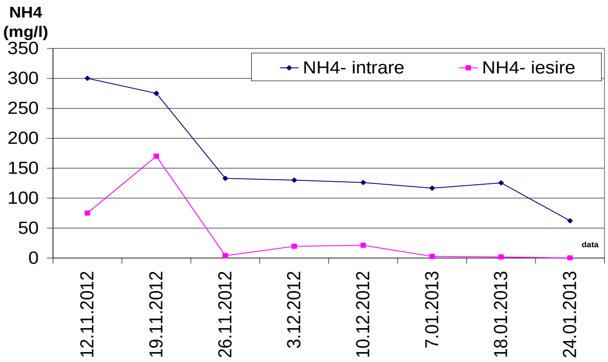


Figure 4. Evolution of total nitrogen in SE

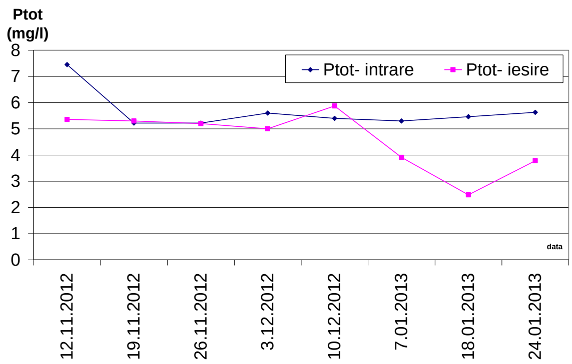


Figure 5. Evolution of ammoniacal nitrogen concentration in SE

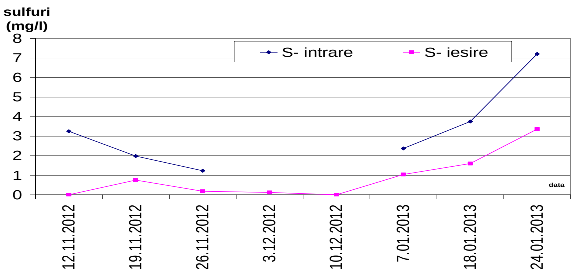


Figure 6. Evolution of phosphorus concentrations in SE

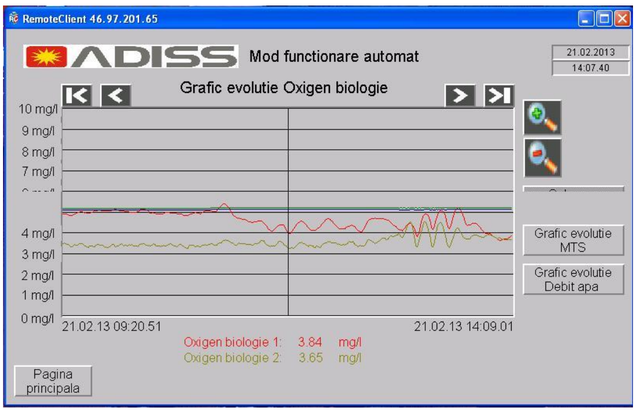


Figure 7. Evolution of sulfur concentrations in SE

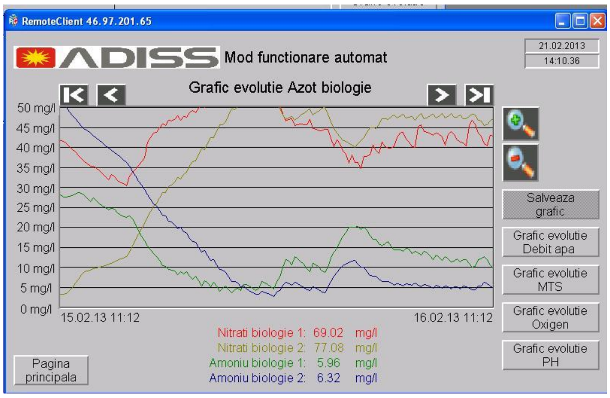


Figure 8. Evolution of sulfur concentrations in SE

In the biological process priming stands existence of distinct phases (fig. 9):

- Oxidation of ammonia nitrogen to nitrite NO2
- Complete oxidation of NH4 and NO2 to nitrate NO3
- Priming process of denitrification and nitrate removal in the form of molecular nitrogen.

Destabilization biological process showed that recovery is done in the same sequence of steps is maintained and therefore measures should be operating:

- Over-aeration, oxygenation in the first 2 stages
- Stimulation of denitrification by reducing oxidation / oxygenation and recirculation control in the last round.
- Increasing carbon in the last stage

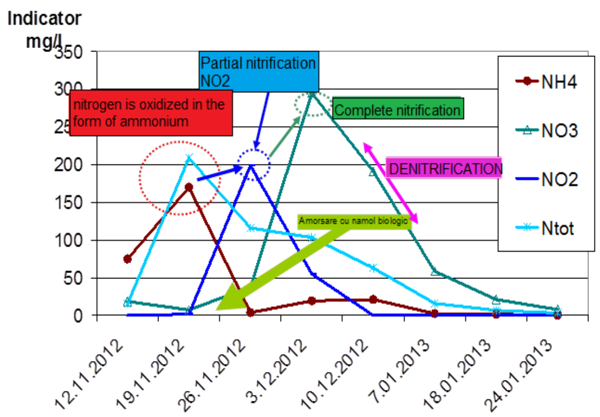


Figure 9. Nitrogen transformation in the biological priming

CONCLUSIONS

-The results highlight the need for the implementation of systems with an architecture to provide mobility service by concentrations of water pollutants from entering the water treatment station.

-Avoid overflow of high concentrations of pollutants into the environment is achieved by optimizing priming biological processes and increase recovery capacity when the biological process is destabilized because of shortfalls in service.

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