A Survey of Waste Sewage Water Recovery Process by Potential Methodology in Water Treatment

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Abstract: ***Nowadays we are dealing with one of the most challenging problem insufficient of water facility to both rural and urban areas. Most of the method deals with re-usage of the waste water in the form of filtration. In existing system reuse the waste water from our daily usage areas in static ways. Our proposed system shares the methods in the way of non static ways in progress. In the way of static usage of water facility treatment process mainly depends on organization status, people usage and machine independent. By the way of the proposed system rectify these problems in sequential order.***

Keywords: Eaton, *Flocculation, OIC, OIT*

1. Introduction

Water is unique source as a local service. It is essential to survive the human life municipal *ownership,* and the ensuring responsibilities, should provide a high degree of public accountability in relation to the local water system. Municipalities need to ensure that their water systems are adequately financed. Over the long term schedule, safety depends on stable and adequate financing to maintain the water system's infrastructure and its operational capacity to supply high quality water consistently.

1.1 Water Facilities Areas

Surface water - Surface water is mainly taken from rivers, lakes or reservoirs which are replenished by rain and snow.

Rivers -It may flow through farmland, industrial areas, sewage discharge zones and other districts which may cause harmful contamination and/or affect taste, odor, clarity and color. Depends upon the season the river water quality will vary throughout the year.

Lakes and reservoirs –Generally lakes have better water quality than rivers. Descriptive contaminants will 'settle out' in lakes. However, lakes and reservoirs are subject to plant and algae growth, which can give lake water unpleasant taste or odor.

Groundwater-Groundwater is defined as water that occurs beneath the surface of the earth can be found in most parts of Ontario. It gathers in aquifers, the layers of sand gravel and rock through which water seeps from the surface. Sand and gravel aquifers are usually the most suitable for public water systems because water is more plentiful. Aquifers such as sandstone and lime.

1.2 Operator Responsibilities

Drinking water system operators play a vital role in providing safe drinking water to our society. To check the critical situation of the operator in the drinking water system such as adjusting equipment, determine chemical dosages, maintaining the stocks, report to the higher authority.

Drinking Water Emergency:

A drinking water emergency is a potential situation or service interruption that may result in the loss of the ability to maintain a safe supply of drinking water to consumers.

1.3 Role and Responsibilities Municipal Operators

It is important that members of municipal council and municipal officials with decision-making authority over the drinking water system understand the usage of customer usage purpose.

- To meet the customers and discuss about the water requirements and get their feedbacks from the customers.
- To conduct the review periodically.
- To place the staff and provide the training regularly without any disturbance.

1.4 Types of Drinking Water System Operators

Overall Responsible Operator (ORO) - It is designated by the owner. The ORO has overall operational responsibility for the system and must have an operator's certificate to match the classification of the facility.

Operator-in-Charge (OIC)–It is designated by the owner or operating authority, OIC can direct move with other operators and set operational parameters in the system periodically and has the authority to make operational decisions.

Operators- These are the persons who adjust processes, equipment or the flow, pressure or quality of water in the system. Operators must hold a valid operator's certificate or work under the direct on-site supervision of a certified operator.

Operator-in-Training (OIT) - To training the new operators who can operate a drinking water system. They cannot be designated as an ORO or OIC.

1.5 Hazards Affecting Drinking Water

Hazards occur due to human activities in the way of natural or technological events. Natural events include floods, ice storms, drought and spring run-off. Technological events could include equipment failure or a power outage. Human activities that could lead to a drinking water risk include vandalism, terrorism, chemical spills and construction accidents. Four different types of hazards that may affect drinking water are biological, chemical, physical and radiological:

Biological Hazards
- It include bacterial, viral and parasitic organisms, such as E.coli, Giardia and Cryptosporidium
- It may be considered the most significant drinking water health risk because effects are acute
- It can cause illness within hours

Chemical Hazards
- It include toxic spills, heavy metals, dissolved gases like radon, pesticides, nitrates, sodium and lead, chemical hazards can come from source water or occur in the treatment and distribution system.

Physical Hazards
- It include sediments that can carry smicrobiological hazards and interfere with disinfection process, biofilms and pipe materials
- It provide result from contamination and/or poor procedures at different points in the delivery of water to the consumer

Radiological Hazards
- Generally naturally occurring chemicals such as radon or uranium. Most frequently occur in groundwater.
- It may arise from man-made or natural sources

2. Existing Methodologies

2.1 Ontario principle

Ontario states that municipalities manage and govern municipal drinking water systems in a variety of ways [2]. By the way of the people who are subject to the statutory standard of care within their corporation depend on specific facts related to individual situations. The following ontario components are discussed in the below figure 1.

Ontario's drinking water protection consists of eight components:
- To generate source-to-tap focus
- To arrange legislative and regulatory framework
- To maintain regulated health-based standards drinking water
- To perform reliable testing
- Periodically perform strong action on incidents
- To maintain mandatory licensing, operator certification and training requirements
- To improvement tool kit
- To maintain proper relationship with Partners, dealers, suppliers.

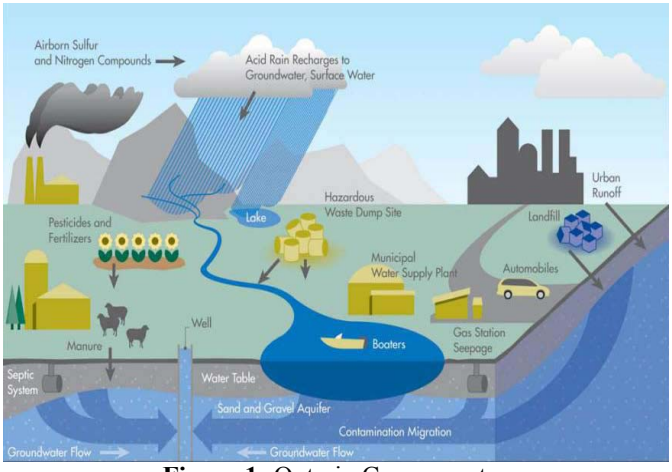

Figure 1: Ontario Components

2.2 Eaton's Filtration

Eaton's filtration process is one of the familiar techniques in water filtration [4]. It helps municipalities provide safe and reliable pure drinking water for future generations. Separations done by the eaton automatic self cleaning strainer or tubutory backwashing system followed by one or more steps that include eaton filter bag or cartridge filtration. The goal of Eaton 's filtration process is support municipalities in the way of further enchancements like economic growth, quality of life and provide vital resources.

2.3 Drinking Water Treatment Processes

To describe the drinking water treatment process are shown in below figure 2.

Intake and screen:
Intake structures are used to draw water from lakes, reservoirs or rivers. Screens are used to remove large debris from raw water, such as logs or fish, or other unwanted matter. Screens can also be designed for coarse or fine matter.

Coagulation:
Coagulation is a chemical process that causes smaller particles to bind together and form larger particles [1]. Coagulation process is used to improve the removal of particles through sedimentation and filtration in the drinking-water treatment process.

Flocculation:
Flocculation is the gathering together of fine particles in water by gentle mixing after the addition of coagulant chemicals to form larger particles that can then be removed by sedimentation and filtration.

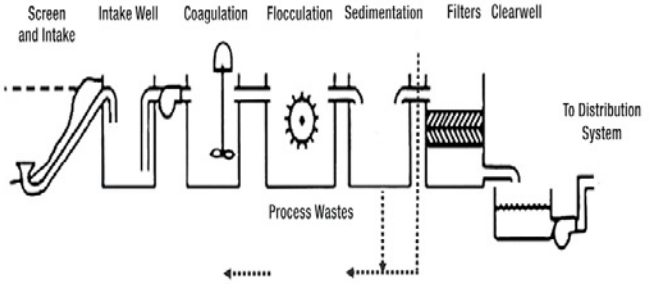

Figure.2 Water Treatment Process

Clarification:
The purpose of clarification is to remove suspended solids prior to filtration [2]. In Ontario, the most common method of clarification used is sedimentation or allowing suspended material to settle using gravity.

Filtration:
The purpose of filtration is to remove particles from the water not removed during clarification by passing the water through a granular or membrane filter that retains all or most of the solids on or within itself.

Disinfection:
Usually the addition of chlorine to raw or filtered water to remove or inactivate human pathogens such as bacteria and protozoa in water and viruses.

2.4 Policies in Municipal Drinking Water

2.4.1 Quality Management System (QMS)
To develop QMS related to drinking water system.QMS is one of the backbones of the quality management system. The policy must include following commitments to:

- Maintenance and continual improvement
- To provide safe drinking water to the customer
- Applicable legislation and regulation

Operational plan include basic information about the drinking water and process the risk management. In QMS share the roles, responsibility and authority. The procedure for the annual review adequacy and monitoring the reports during emergency situations includes owner's commitment to the continual improvement through corrective action.

2.4.2 DWQMS
DWQMS mainly based on a PLAN, DO, CHECK and IMPROVE methodology [4].The cyclic process of DWQMS are described in the figure 3. PLAN requirements of the standard typically specify policies and procedures that must be documented in the operational plans for the drinking water system.

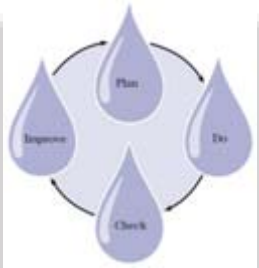

Figure 3: Cyclic process of DWQMS

DO requirements specify that the policies and procedures that must be implemented. CHECK and IMPROVE requirements of the standard are reflected in the requirements to conduct internal audits and management reviews.

2.4.3 Licensing Policy

For a drinking water system to receive its license [6], the owner and operator must have in place.

- A drinking water works permit
- An accepted operational plan
- An accredited operating authority
- A financial plan and permit to take water.

2.5 Existing Treatment Systems
Generally simple wastewater treatment technologies can be designed to provide low cost sanitation and environmental protection while providing additional benefits from the reuse of water [5]. They are mostly used in natural and terrestrial systems. Depend upon this system it is further divided into three principal types:

- Mechanical treatment systems
- Aquatic systems
- Terrestrial systems

2.5.1 Mechanical Treatment Systems
- It mainly used in natural processes in an well constructed environment.
- Suitable lands are used to describe the implementation.

2.5.2 Aquatic System
- It is represented by lagoons.
- Lagoon-based treatment systems can be supported by additional pre- or post-treatments using constructed wetlands, aqua-cultural production systems, and/or sand filtration.

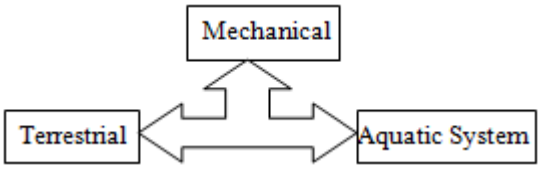

Figure 4: Methods of Existing system

2.5.3 Terrestrial systems
- It makes use of the nutrients contained in waste waters. It converts the biologically nutrients into less forms of biomass
- Usage of chemical such as methane gas production, alcohol production or cattle feed supplements

3. Proposed Method

In proposed system consists of three process generally, these processes are given in the below figure.5 treatment process of proposed system.

- Preliminary treatment
- Primary (physical) treatment
- Secondary (biological) treatment.

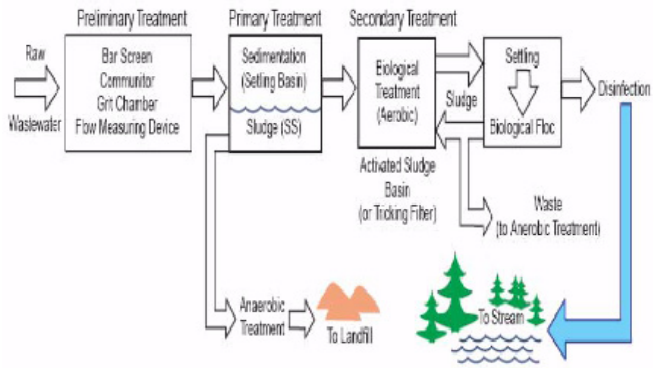

Figure 5: Treatment Process

First step, wastewater should receive primary (physical removal/settling) and secondary (biological) treatment, which can be followed by disinfection before discharge. More advanced processes may be required for special wastes. When the effluent from secondary treatment is unacceptable, a third level of treatment, tertiary treatment, can be employed. There are many basic types of sewage treatment plants employing both primary and secondary treatment stages that are in use today for treating large quantities of sewage.

3.1 Methodology to collect Waste Water

3.1.1 Sewage Water

- The purpose of a sewage collection system is to remove wastewater from points of origin to a treatment facility or place of disposal.
- The collection system consists of the sewers and plumbing necessary to convey sewage from the point(s) of origin to the treatment system or place of disposal.
- Sanitary sewage collection systems should be designed to remove domestic sewage only.
- Surface drainage is excluded to avoid constructing large sewers and treating large volumes of sewage diluted by rainwater during storms.
- Sewers which exclude surface drainage are called sanitary sewers,
- To collect surface drainage in combination with sanitary sewage are called combined sewers.

3.1.2 Drying beds

- Digested sludge is placed on drying beds of sand where the liquid may evaporate or drain into the soil
- The dried sludge is a porous humus like cake which can be used as a fertilizer base
- A trickling filter is a fixed bed, biological filter that operates under aerobic conditions.
- Pre-settled wastewater is 'trickled' or sprayed over the filter.
- As the water migrates through the pores of the filter, organics are degraded by the biomass covering the filter material.

3.1.3 Sewage Oxidation ponds

Sewage oxidation ponds offer economical secondary sewage treatment with relatively low initial cost. These ponds are 0.8–1.2 m in depth and may be used singly in parallel. Their ability to absorb shock loads and ease of operation and maintenance make them desirable treatment units. Biological life in ponds uses the organic and mineral matter in the sewage for food to produce more stable products. The products often stimulate abundant growth of algae and other vegetation. Solution of oxygen from the atmosphere, and the ability of vegetation to produce oxygen when exposed to sunlight; help maintain aerobic conditions as shown in below figure.6 sewage oxidation process.

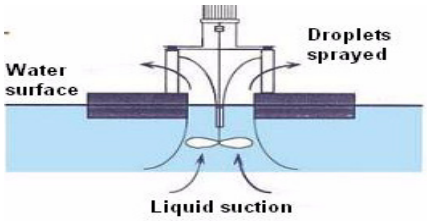

Figure 6: Sewage Oxidation Ponds

The lagoons will develop an odor similar to freshwater ponds in wooded areas. Allowable loading can vary from 125–2000 persons per hectare depending upon the location. Where complete treatment is to be provided by ponding, the cells are known as raw sewage lagoons, with depths of 1–1.5 m and reduced loading.

4. Conclusion

In this paper discuss the re-usage of drinking water from sewage areas. Existing system implements some procedures, techniques and principles like Ontario, Eaton etc. Proposed work introduces new process and methods for the purpose of the drinking water treatment process and rectify the defects in the way of low cost and low manual work without any side effects. In future, our proposed process enhances high improvement for scientific research.

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