ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Water Treatment Plant

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Abstract:

Surface water and ground water pollution problem of combating the science and engineering of the fundamental principles of the user's application before the consumption treatments do not pose a risk to health is needed to make sure that the environment in which is a branch of engineering . Poor water quality and health risks to consumers from microbiological, chemical, physical or radiological could cause contamination. This can cause the spread of contagious and can be fatal many of which affect all parts of the population, that leads to infectious diseases in general because Microbiol ogical contamination, are extremely important for human health.

Chemical pollution has long-term effects on health trends. Most treatment plants and microbiological contaminants in water so they belong in large part to promote the survival of micro-organisms that have affected the physical elements are designed to remove. Are removed in the process of water treatment, have been previously removed from the type of non-deposition of the filter media to remove particles to pass through. It falls color, and chemical properties of water are changing.

I. INTRODUCTION:

Pumps: water source or pipes or pumps, the tanks must be addressed. To avoid adding contamination of water, the physical infrastructure of appropriate materials and pollution incident does not happen, that it should be built. Exam: The first step in the manner of surface water may interfere with later purification steps, sticks, leaves, trash and other large particles as to remove large debris. Most deep groundwater does not need screening before other purification steps.

Storage: even the water from the river to allow natural biological purification to take place for a period of a few days to several months can be stored in the reservoir banks. Treatment is by slow sand filters, this is especially important. Pool buffer against short periods of drought or water supply provided accident during a temporary source of pollution in the river to allow to be maintained. Pre-chlorination: many plants and chlorination of water pipe and collection work on the prose contained to lower growth. So to a large extent of the potential negative effects of its characteristics it has been closed. Fine solids, micro-organisms and organic materials and techniques to remove soluble inorganic type is widely available. Method is processed, the quality of that water, and the treatment cost and quality of the water treatment process will depend on the expected standards. High Lakes and reserves: the common river system and high reserves located in the Amazon rain usually above any human habitation are sited and opportunities to reduce pollution can be surrounded by a buffer zone. Bacteria and pathogen levels are usually low, but some bacteria, protozoa or algae are present. Where Highland Forest or peaty, humic acids can color the water. Many high-resource settings that need low pH. A collection of rivers and canals and low land: surface water will be less massive bacterial load of ground and even algae, suspended solids and dissolved constituents of a variety of possibilities. Generation air cooled water in the atmosphere and water vapor extracted from the air by condensing water can provide high quality drinking water, which is a new technique. Stock wind that brings rain water harvesting or fog, especially

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concentrated in the drought weather and little precipitation, fog, can be used in areas where.

Desalination of seawater by distillation or reverse osmosis.

Surface Water: Freshwater bodies that are open to the atmosphere and are not designated as groundwater are classified in the USA for regulatory and water purification purposes as surface water.

II. METHODOLOGY

A. PH Adjustment

Pure water 7 (no alkaline or acidic) has a pH near. Sea water from 7.5 to 8.4 (moderately alkaline) pH value can take. Hot water extensive sewage or land and investments on land basin (acid rain), depending on the impact of pollution pH7), lime, soda ash, or sodium hydroxide to raise the pH in the water purification process. Raising water-tight, lime increases the concentration of calcium ion. Alkaline water works effectively, and will also lead pipes, lead pipes and fittings from the tin being dissolved lead, helps to reduce the risk of takimauinati and flocculation process helps to create. Alkaline significantly reduced iron water pipe corrosion. Acid (carbonic acid, hydrochloric acid or sulfuric acid) to lower the pH to alkaline waters in some circumstances can be added. This means that it is not necessary, alkaline water (pH above 7.0) in water lead or copper plumbing system is not a solution. Protection of metal surfaces and which dissolve in water to reduce the possibility of toxic metals calcium carbonate precipitate the ability of the water pH, mineral content, temperature, and alkalinity and calcium concentration is a function.

B. Coagulation and flocculation

One of the first steps in a conventional water purification process is the addition of chemicals to assist in the removal of particles suspended in water. Particles can be inorganic such as clay and silt or organic such as algae, bacteria, viruses, protozoa and natural organic matter. Inorganic and organic particles contribute to the turbidity and color of water.

The addition of inorganic coagulants such as aluminum sulfate (or alum) or iron (III) salts such as iron (III) chloride cause several simultaneous chemical and physical interactions on and among the particles. Within seconds, negative charges on the particles are neutralized by inorganic coagulants. Also within seconds, metal hydroxide precipitates of the aluminum and iron (III) ions begin to form. These precipitates combine into larger particles under natural processes such as Brownian motion and through induced mixing which is sometimes referred to as flocculation. The term most often used for the amorphous metal hydroxides is “floc.” Large, amorphous aluminum and iron (III) hydroxides adsorb and enmesh particles in suspension and facilitate the removal of particles by subsequent processes of sedimentation and filtration. Organic polymers were developed in the 1960s as aids to coagulants and, in some cases, as replacements for the inorganic metal salt coagulants. Synthetic organic polymers are high molecular weight compounds that carry negative, positive or neutral charges. When organic polymers are added to water with particulates, the high molecular weight compounds adsorb onto particle surfaces and through interparticle bridging coalesce with other particles to form floc. PolyDADMAC is a popular cationic (positively charged) organic polymer used in water purification plants.

C. Sedimentation

Waters exiting the flocculation basin may enter the sedimentation basin, also called a clarifier or settling basin. It is a large tank with low water velocities, allowing floc to settle to the bottom. The sedimentation basin is best located close to the flocculation basin so the transit between the two processes does not permit settlement or floc break up. Sedimentation basins may be rectangular, where water flows from end to end, or circular where flow is from the centre outward. Sedimentation basin outflow is typically over a weir so only a thin top layer of water that furthest from the sludge exits.

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In 1904, Allen Hazen showed that the efficiency of a sedimentation process was a function of the particle settling velocity, the flow through the tank and the surface area of tank. Sedimentation tanks are typically designed within a range of overflow rates of 0.5 to 1.0 gallons per minute per square foot (or 1.25 to 2.5 meters per hour). In general, sedimentation basin efficiency is not a function of detention time or depth of the basin. Although, basin depth must be sufficient so that water currents do not disturb the sludge and settled particle interactions are promoted. As particle concentrations in the settled water increase near the sludge surface on the bottom of the tank, settling velocities can increase due to collisions and agglomeration of particles. Typical detention times for sedimentation vary from 1.5 to 4 hours and basin depths vary from 10 to 15 feet (3 to 4.5 meters). Inclined flat plates or tubes can be added to traditional sedimentation basins to improve particle removal performance. Inclined plates and tubes drastically increase the surface area available for particles to be removed in concert with Hazen's original theory. The amount of ground surface area occupied by a sedimentation basin with inclined plates or tubes can be far smaller than a conventional sedimentation basin.

D. Sludge Storage and Removal

As particles settle to the bottom of a sedimentation basin, a layer of sludge is formed on the floor of the tank. This layer of sludge must be removed and treated. The amount of sludge that is generated is significant, often 3 to 5 percent of the total volume of water that is treated. The cost of treating and disposing of the sludge can be a significant part of the operating cost of a water treatment plant. The sedimentation tank may be equipped with mechanical cleaning devices that continually clean the bottom of the tank or the tank can be periodically taken out of service and cleaned manually.

E. Floc Blanket Clarifiers

A subcategory of sedimentation is the removal of particulates by entrapment in a layer of suspended floc as the water is forced upward. The major advantage of floc blanket clarifiers is that they occupy a smaller footprint than conventional sedimentation. Disadvantages are that particle removal efficiency can be highly variable depending on changes in influent water quality and influent water flow rate.

F. Dissolved air flotation

When particles to be removed do not settle out of solution easily, dissolved air flotation (DAF) is often used. Water supplies that are particularly vulnerable to unicellular algae blooms and supplies with low turbidity and high colour often employ DAF. After coagulation and flocculation processes, water flows to DAF tanks where air diffusers on the tank bottom create fine bubbles that attach to floc resulting in a floating mass of concentrated floc. The floating floc blanket is removed from the surface and clarified water is withdrawn from the bottom of the DAF tank.

III. Topography

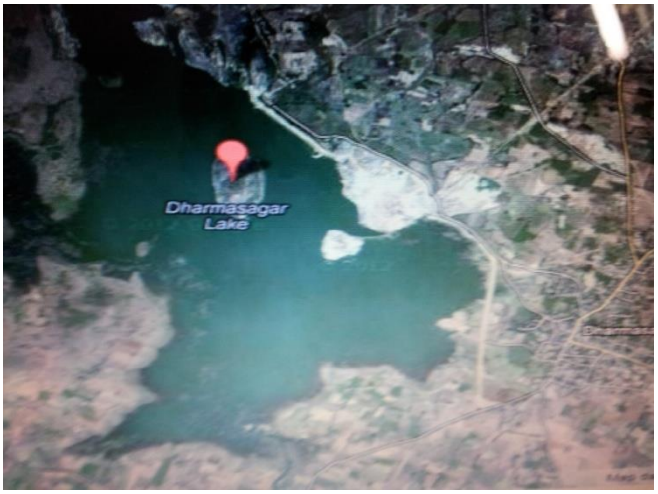

Figure: 3.1 Google map

The location of the site as per GPS longitude 18.004713° and latitudes79.428577°. The lake occupies an area of 1200 acres, the lake is located about 3km distance from Dharmasagar village. The water treatment plant is constructed at a higher elevation on Downstream so as to supply water to the scarcity habitations by gravity in particular. Rural Water supply department has taken up a

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comprehensive scheme namely Integration of Drinking Water Project with lift irrigation scheme Devadula in Warangal District.

Covering 335 problematic habitations consisting of 5.32 lacks population. There is a permanent B.M carried over from GTS B.M situated at the site of the water supply project under execution. The guide instructed us to carry over DCBM from the existing permanent B.M to chemical house and to establish a temporary B.M. Accordingly the temporary B.M was established by taking fly levels.

Station	Back Sight	Intermediate Sight	Force Sight	Height of instrument	Reduced Level	Remarks
B.M	0.61			325.235	324.625	Bench mark
A	0.325		3.055	322.505	322.18	In front of water tank
B	0.59		2.865	320.23	319.64	Beside the pipe
C	0.12		3.265	317.085	316.965	Beside the tree
D	0.720		2.530	315.275	314.555	In front of W.W tank
E			2.485		312.79	At chemical house

Table: 3.1

In case of Rise and Fall method for Reduction of level, following arithmetic checks are applied to verify calculations.

B.S. - F.S. =11.835

Last R.L. - First R.L. =11.835

$$\Sigma \text{B.S.} - \Sigma \text{F.S.} = \text{Last R.L.} - \text{First R.L.} \quad (3.1)$$

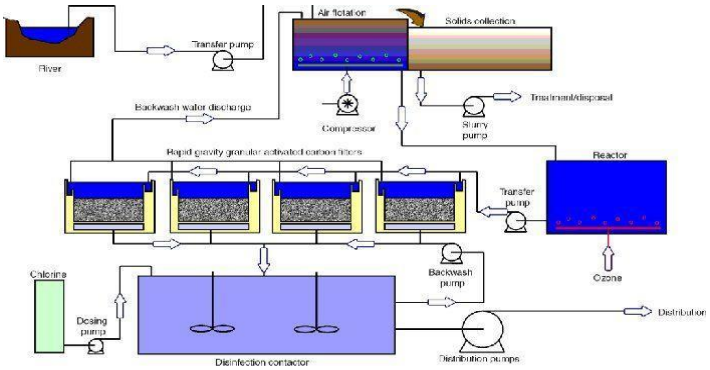

Figure: 3.1 Layouts

IV. CONCLUSION

Contamination of drinking water by water treatment chemicals and construction materials may be controlled by the application of Indian standard specifications and regulations on the quality of the water. The project work dealt is very helpful for a city to provide a properly planned and organized water treatment plant as well as conducting further research regarding Distribution system facilities. In a district where the lot of scarcity is observed especially in rural areas this kind of water treatment and distribution project proves to bring out high standards of quality of water by serving clean water for domestic usage being economical.

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