

Comparative Characteristic Analysis of Treated water Efficiency Before and After Treatment in Desalination plant

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ABSTRACT: Water is important and precious as it fulfils the basic necessity of life. Water scarcity is most important concern of 21st century. Freshwater resources are limited and while desalination can potentially provide unlimited supply of freshwater produced from infinite oceans. Desalination capacity has rapidly increased in the last decade because of the increase in water demand and a significant reduction in desalination cost as a result of significant technological advances, especially in the reverse osmosis process. Reverse osmosis (RO) is best known for its use in desalination (removing the salt from sea water to get fresh water), but since early 1970 it has also been used to purify freshwater for medical, industrial and domestic applications. The aim of this research was the performance study of reverse osmosis plants for water desalination in Ramanadhapuram. In this study the concentration of a number of physical (pH,DO), chemical (Sodium, Calcium, Potassium) quality parameters of seawater, raw and treated water of Ramanad water desalination plants were determined and performance of desalination plants for seawater and coastal ground water desalination were studied and characteristics analysis of sea water and fresh water is also be studied by laboratory test by using pH meter, Flame photometer, DO meter.

KEYWORDS: Desalination, RO, Fresh water production, Characteristics.

I. INTRODUCTION

For human life, a sufficient amount of water adequate quality is essential. Seawater desalination offers a promising option for the supply of portable water. Even today, under developed countries and developing countries face a huge water scarcity. The ground water quality problems present today are caused by contamination and by over exploitation, or by combination of both. The only nearly inexhaustible sources of water are the oceans, which, however, are of high salinity. It would be feasible to address the water-shortage problem with seawater desalination. According to world health organisation(who), the permissible limit of salinity in water is 500 parts per million(ppm) and for special cases up to 1000 ppm, while most of the water available on earth has salinity up to 10000 ppm, and seawater normally has salinity in the range of 35000-45000 ppm in the form of total dissolved salts. The purpose of a desalination system is to clean or purify brackish water or seawater and supply water with total dissolved solids within the permissible limit of 500 ppm or less. Presently, the total global desalination capacity is around 66.4 million m³/day and it is expected to reach about 100 million m³/day by 2016 of the global desalted water, 63.7% of the total capacity is produced by membrane process and 34.2% by thermal process. The desalination source water is split with about 58.9% from seawater and 21.2% from brackish ground water sources, the remaining percentage from surface water and saline wastewater.

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II. STUDY AREA

The Pannaikulam plant is a water desalination plant in Pannaikulam, at Ramanad on coast of the Bay of Bengal. It is located at 20.8km west of the city centre along the east costal road. In 1999 the pannaikulam plant was constructed by BHEL at an area of 4 acres which having 150 m³/day capacity, built at a cost of Rs. 57.7933 crore, The plant is one of the desalination plant in the Ramanathapuram city after the 3800 m³/day capacity plant at Narippaiyur and the pannaikulam desalination plant has a capacity to treat 150 m³/day of raw water. The plant working continuously day and night and supplies 150000 lit water per day to the 20 villages. The annual cost of maintenance of plant is Rs.26.26 lakhs.

PANAIKULAM DSP 150 M³/DAY CPACITY FLOW DIAGRAM

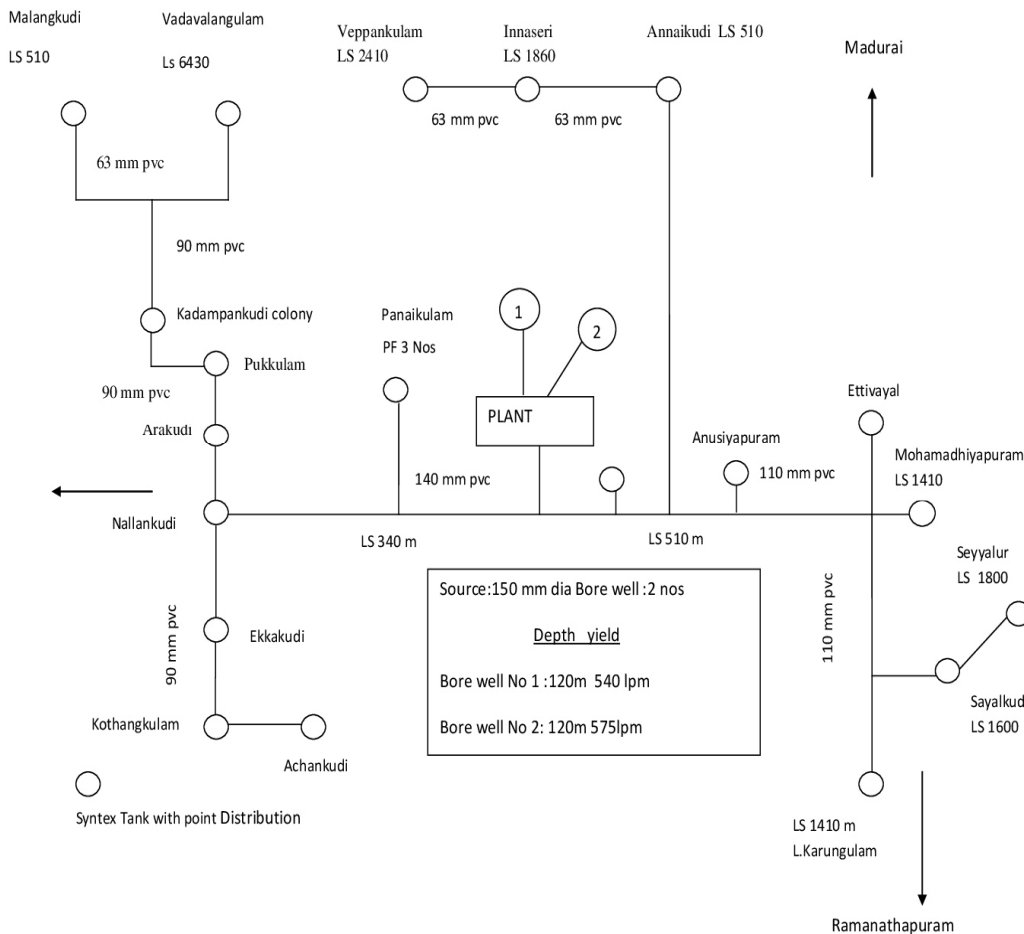


Figure-1:Flow diagram for water supply to pannaikulam and around villages

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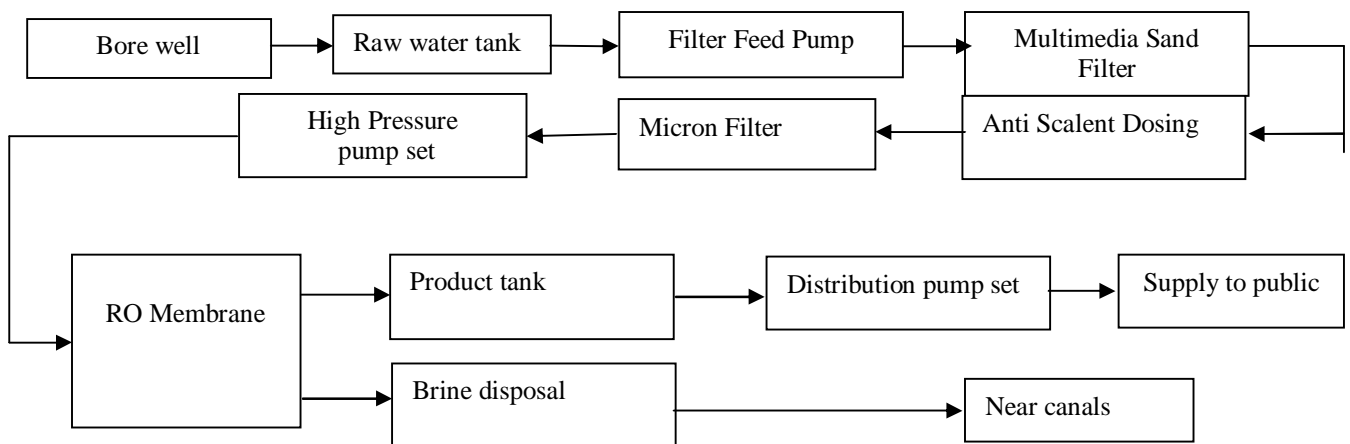
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III. METHODOLOGY

Flow diagram for Purification -150m³/day Capacity Desalination plant layout in -PANAIKULAM



IV. PARAMETER ANALYSIS

In nearly coastal area the seawater is intrude in to ground and to reach the ground water through sand, generally the sand naturally act as filtering medium, so that approximately 30 % of the salinity is filtered by sand medium. So the salinity in pumping water nearer coastal area is less than the seawater, the raw water from the ground is pumped by bore well and it stored in to raw water tank, is having an capacity of 75000 lit, then stored raw water is feed in to multimedia sand filter by using low pressure or filter feed pump at a pressure of 30 kg/cm², multimedia sand filter has red soil ,pebbles and carbon , it removing large size particles in the raw water then water is feed in to Micron filter before that the anti scalent dosing is provided, in micron filter more than 5μ size particles are removed from raw water. after it to add a Flowgan 100 chemical to control pH to 7 and helps to prevent the membrane from clogging, the chemical added raw water is passed in to reverse osmosis membrane by High pressure pump set, in this there are 5 vessels and each having 2 membrane connecting parallel and totally had 10 membrane, which are 8 inches diameter and 40 inches length and has 0.001μm holes for removing the salt content present in water. In Reverse Osmosis process the fresh water is forced in to one side of the vessels, the raw water is travel through the membrane, its removing the salt and other micro organisms before water leave from membrane, and the Braine water (contain removed salts and micro organism) is disposed in to nearer canals and pure water is stored in to product water tank, then the product water is transport in to the village around the plant by using centrifugal pump.

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IV.RESULT AND DISCUSSION

TABLE - 1

SL.NO	WATER SAMPLE	WATER PARAMETER	ACCEPTABLE LIMIT	PERMISSIBLE LIMIT	WEEK-1	WEEK-2	WEEK-3	WEEK-4
1.	SEA WATER	pH	-	-	7.74	7.30	7.60	7.81
2.		DO (mg/lit)	-	-	8.1	7.7	8.0	7.5
3.		Ca (mg/lit)	-	-	OFR	OFR	OFR	OFR
4.		K (mg/lit)	-	-	OFR	OFR	OFR	OFR
5.		Na(mg/lit)	-	-	OFR	OFR	OFR	OFR

TABLE-2

SL.NO	WATER SAMPLE	WATER PARAMETER	ACCEPTABLE LIMIT	PERMISSIBLE LIMIT	WEEK-1	WEEK-2	WEEK-3	WEEK-4
1.	RAW WATER	pH	-	-	7.65	7.10	7.40	7.70
2.		DO (mg/lit)	-	-	6.8	6.5	6.7	6.2
3.		Ca (mg/lit)	-	-	36	43	50	30
4.		K (mg/lit)	-	-	48	25	30	20
5.		Na(mg/lit)	-	-	OFR	OFR	OFR	OFR

From TABLE -1 in sea water sodium, potassium and calcium are in out of range. and DO in sea water is above 7 because the sea water exposure in environment so amount of oxygen dissolved in sea water is high. in marine aquaculture the permissible level of pH is above 5 to below 9,our pH result is with in permissible limit.

From TABLE-2 the sea water is intrude through sand, here sand just act like as retaining wall for salinity ,so the capacity of raw water is increase positively due to this our test result for raw water capacity is change positively from out of range.

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TABLE-3

SL.NO	WATER SAMPLE	WATER PARAMETER	ACCEPTABLE LIMIT	PERMISSIBLE LIMIT	WEEK-1	WEEK-2	WEEK-3	WEEK-4
1.	PRODUCT WATER	pH	6.5-8.5	6.5-8.5	7.0	6.70	6.88	7.10
2.		DO (mg/lit)	-	-	7.9	7.8	7.7	7.6
3.		Ca (mg/lit)	75	200	14	16	18	8
4.		K (mg/lit)	-	-	12	8	10	4
5.		Na(mg/lit)	-	200 As per WHO International standard guidance value	124	110	138	147

Due to sudden changes of climatic condition, snow fall precipitation and less rain fall, infiltration water level is very less so that the above TABLE-3 the values goes to Permissible limit or Acceptable limit.



Figure-2 : DO Test in Laboratory

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Figure-2: pH Test in Laboratory



Figure-3: Sodium, Potassium, Calcium by Flame photometer Test

VI. CONCLUSION

Pannaikulam desalination plant located at a distance of 20 km from sea shore; in between the seawater intrude in to groundwater through sand due to this the raw water character change positively. In addition, now a days various methods and Techniques available for improving ground water quality. If the ground water quality is improved, the raw water capacity must be positively high according to this the product water efficiency is to be improved, so the life time of the desalination plant will be increased.

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