TREATMENT OF WATER BASED ON SRP (SLUDGE REAGENT PORDUCT) TECHNOLOGY

Contributions

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BACK GROUND AND SUMMERY

The Central Pollution Control Board (CPCB) is a statutory organization under the aegis of Ministry of Environment & Forests (MoEF), Govt. of India.

The Central Pollution Control Board serves as an apex organization in the country, as technical wing of MoEF and provides technical assistance to the State Pollution Control Boards, Pollution Control Committees for implementation of the provisions of various pollution control legislations in the country.

CPCB laboratories play an important role in assessing the status of environment comprising analysis of water, air and soil analysis and analysis of biotic components.

CPCB laboratories are also involved in various R&D projects related to pollution control activities and obtained eight patents on pollution control technology.

The Central Pollution Control Board (CPCB) in collaboration with Dr. S. K. Biswas (Ex Advisor of Rajiv Gandhi Water Mission , Ministry of Water Resources and Investigator of SRP Technology) has conducted a R&D Project entitled **"Treatment of Water and Wastewater using Sludge-Reagent-Product (SRP) Technology"** to tackle the problem of huge amount of sludge generated from the water works which use alum for precipitation of colloidal particles by coagulation and flocculation process.

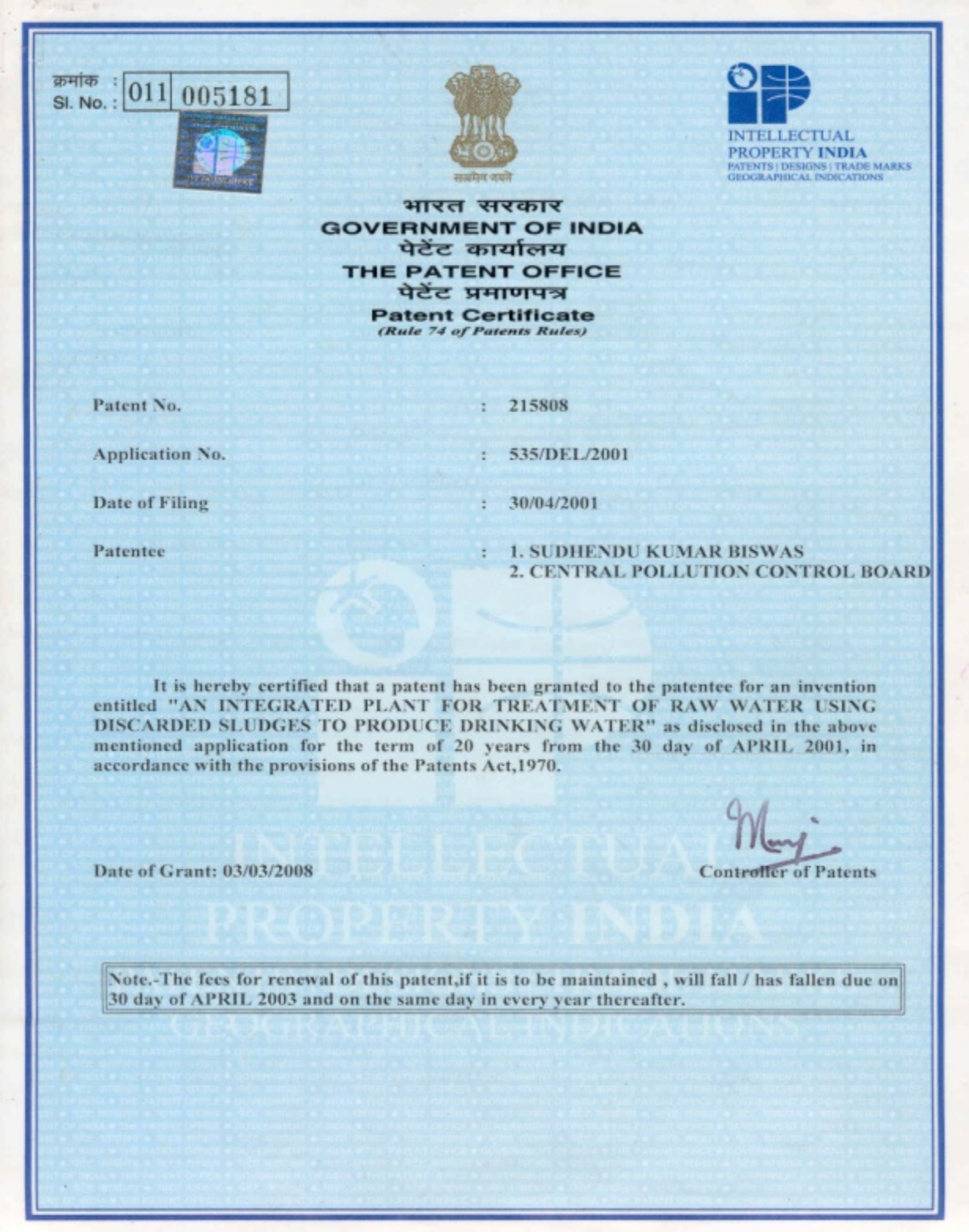
While dealing with the sludge problem, CPCB came with an innovative idea of regenerating and recycling the alum along with positive charged colloidal particle in water treatment process.

As this, innovated technology is concerned with drinking water supply, a number of laboratory experimental works had been performed for four years i.e. during 1998 – 2001, by CPCB,

The basic research of Dr. S. K. Biswas i.e. recycling of alum and colloidal particle was further renovated by CPCB i.e. batch process to continuous recycle process by which this technology can be used commercially in water treatment plant.

For this purpose, a laboratory scale working model was set-up in CPCB for conducting treatability studies with SRP Technology.

This treatment technology entitled "**An Integrated Plant for Treatment of Raw Water Using Discarded Sludges to Produce Drinking Water"** has been patented vide Indian Patent No. 215808 (Filed in April 2001 and Granted **in March 2008.**



क्रमांक : 011 005181
Sl. No. :

सत्यमेव जयते

INTELLECTUAL PROPERTY INDIA
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Patent Certificate
(Rule 74 of Patents Rules)

Patent No.	:	215808
Application No.	:	535/DEL/2001
Date of Filing	:	30/04/2001
Patentee	:	1. SUDHENDU KUMAR BISWAS 2. CENTRAL POLLUTION CONTROL BOARD

It is hereby certified that a patent has been granted to the patentee for an invention entitled "AN INTEGRATED PLANT FOR TREATMENT OF RAW WATER USING DISCARDED SLUDGES TO PRODUCE DRINKING WATER" as disclosed in the above mentioned application for the term of 20 years from the 30 day of APRIL 2001, in accordance with the provisions of the Patents Act,1970.

Date of Grant: 03/03/2008

Controller of Patents

Note.-The fees for renewal of this patent,if it is to be maintained , will fall / has fallen due on 30 day of APRIL 2003 and on the same day in every year thereafter.

Figure-1 shows: Scan copy of SRP technology Patent Certificate

Based on the above ground work the MoU was executed between CPCB and DJB for Construction and Operation 0.5 MLD Pilot Water Treatment Plant based on SRP technology at Bhagirathi Water Treatment Plant, Gokulpuri, Yamuna Vihar Delhi.

The drinking water quality of SRP-Technology based Pilot-Plant has been tested(Analysis) by L&T (for Delhi Jal Board) and CPCB . The water quality of Pilot Plant is at par with the water quality, generated from conventional treatment process.

INTRODUCTION

In all urban and rural areas drinking water is supplied after treating raw water from surface and/or ground sources. When the source is surface water, it invariably needs treatment with coagulants as prerequisite for filtration in Rapid/Slow sand filter. In case the turbidity is very high, plain sedimentation is an economic proposition before coagulation / flocculation.

The cost of the coagulant does substantially contribute to the cost of production of drinking/domestic water, as the quantity of coagulant(s) required for flocculation vary between 40 mg/l to 150 mg/l. By any account, at present market price of alum or any other coagulant, the cost of water purification is enormous.

AIM OF THE STUDIES:- Recycling and reusing of discarded sludge along with charged colloidal particle as alum by using SRP Technology .

SCOPE FOR STUDIES IN CPCB LABORATORY

- To determine optimum dose of alum required in Conventional Treatment Process;
- To develop a methodology for recovery of alum from discarded sludge;
- To determine efficiency of the Product, called Sludge-Reagent-Product as coagulant in removal of turbidity from raw water;
- To determine the quantity of fresh coagulant to be added to the Sludge Reagent Product (SRP) to maintain 100% efficiency of the Continuous Treatment Process;
- Construction & continuous operation of Laboratory Scale Working Model Plant based on SRP technology.

- Characterization of treated water, Conventional Technology as well as SRP Technology, and comparison of treated water quality with drinking water Quality Standard;

- Economically viability and cost comparison for the conventional and SRP Technologies.

SCOPE OF WORK:

Construction and Operation of Pilot Water Treatment Plant Based on SRP Technology at Bhagirathi Water Treatment Plant, Delhi Jal Board ,Gokulpuri, Delhi.

The detail scope as follows:

- Technical specification preparation for, Electrical, Mechanical, Civil Construction items of 0.5 MLD Pilot Water Treatment Plant Based on SRP technology at Bhagirathi Water Treatment plant Gokulpuri.

- Supervision of pilot plant construction works.

- Technical operation of pilot plant (in collaboration with DJB) during trial running of plant i.e for alum dose optimization , SRP production and SRP dose optimization ,discarded sludge disposal.

- Raw and treated water quality evaluation as per drinking water standard.

- Economically viability and cost comparison for the conventional and SRP Technologies.

Principle of Water Treatment Technology (Conventional):

Aluminum sulfate, a.k.a. "filter alum" , is commonly used as a coagulant in water treatment systems and less frequently in waste treatment systems. In water treatment it is used primarily for the removal of tiny particles (called colloids, measured as total suspended solids) in the raw water which are too small to settle by gravity in a reasonable length of time. Another contributing factor as to why small particles are difficult to settle out is that VERY small particles commonly possess a negative surface charge. As a result, they will not adhere to each other if brought into contact since like charges repel. Such colloidal systems are termed "stable". The process of causing the colloidal particles to settle out is called "destabilization". "Coagulation" is defined as any process used to destabilize colloidal systems.

There are two primary theories regarding the exact mechanism by which coagulants actually cause the removal of colloids in water (or wastewater). One theory involves neutralization of the surface charge on the particle so that they can adhere to each other forming particles large enough to settle by gravity in a reasonable time. This theory is rather complex and somewhat esoteric. It will not be covered here. The other mechanism, which we will we discuss, is often referred to as the "sweep floc" theory. This theory simply postulates that the coagulant(s) added form a precipitate (a solubility product is exceeded) which settles by gravity in a reasonable time. These coagulant floc particles then collide with and drag colloids down with them. From an operational standpoint the process of coagulation is divided into several steps. These are (1.) flash mixing (2.) flocculation and (3.) settling.

Flash mixing is the process by which the coagulant is added to the water or wastewater and then thoroughly mixed so that it is distributed as evenly as possible in the water. Obviously coagulation isn't going to occur in regions of the water where the coagulant doesn't get distributed. The second stage in the process is flocculation. During flocculation the water-colloid-coagulant mixture is stirred in order to ehance contact between floc particles and colloids as well as between floc particles themselves. This allows the floc particles to grow in size so they will settle faster. Finally, once the floc particles have grown large enough they are allowed to settle, hopefully dragging out most of the colloids with them. Each of these processes have specific design procedures and limitations which must be met.

The chemistry of alum coagulation When alum is added to water it undergoes the reaction below. The alum reacts with bicarbonate to form aluminum hydroxide, a precipitate.

1. $Al_2(SO_4)_3*18H_2O + 3Ca(HCO_3)_2 <=====> 2Al(OH)_3 + 6CO_2 + 3CaSO_4 + 18H_2O$

precipitate gas salt "alum or filter alum" alkalinity as $CaCO_3$ The insolubility product of aluminum hydroxide, $Al(OH)_3$ is :

$$\frac{[Al]\cdot([OH])^3}{[Al(OH_3)]} = 1.26\cdot10^{-33}$$

The equation can also be written as shown below which recognizes that calcium bicarbonate and calcium sulfate are soluble and do not necessarily exist as distinct molecules but only as ions.

2. $Al_2(SO_4)_3*18H_2O + 3Ca^{+2} + 6HCO^{3-} <=====> 2Al(OH)_3 + 6CO_2 + 3Ca^{+2} + 3SO_4^{-} + 18H_2O$

The term "alum" refers to aluminum sulfate $Al_2(SO_4)_3$. However the number of water molecules bound to the central molecule can vary substantially (3 to 24 waters). While this has no effect on the behavior of the coagulant it is necessary to know in order how much bound water is present in order to compute the number of moles or equivalents of alum.

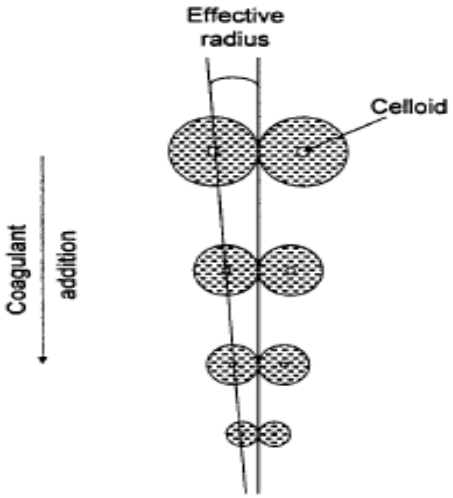
The alum reacts with the bicarbonate molecule. In the reaction above bicarbonate is shown associated with Ca^{+2} in order to preserve charge neutrality. For most waters with a pH of 6-8 the bicarbonate is measured as alkalinity.

The reaction produces carbon dioxide, CO_2, as a gas. This CO_2 will then react with water producing carbonic acid H_2CO_3. The carbonic acid will partially dissociate producing bicarbonate, carbonate and H^+. Thus, the pH of water to which alum is added will drop, but not very greatly, since carbonic is a weak acid.

Details of Colloidal physics:

Coagulation and flocculation are used to remove the insoluble and colloidal heavy metal precipitates formed during the precipitation step. Colloidal heavy metal precipitates are tiny particles that possess electrical properties, which create repelling forces and prevent agglomeration and settling. Coagulation is the process of making the particle less stable by neutralizing its charge, thus encouraging initial aggregation of colloidal and finely divided suspended matter. Particles no longer repel each other, and can be brought together.

(A) : When suspended in water, the charge on organic and inorganic colloids is typically negative. Because of electrostatic forces, the negative colloid charge attracts positive ions. Figure 1A. illustrates how coagulants reduce the electric charges on the colloidal surfaces, allowing colloidal particles to join.



b. Flocculation is the process of bringing together the destabilized or “coagulated” particles to form a larger agglomeration of floc by physical mixing or addition of chemical coagulant aids, or both.
Figure 1B : illustrates the bridging of agglomerated colloidal particles to form settable flocs.

A. Colloids can also be destabilized through the addition of polyelectrolytes,

which can bring the system to the isoelectric point without a change in pH.
These polyelectrolytes are 10 to 15 times more effective than alum as a coagulant; however, they are considerably more expensive.
B. The coagulation and flocculation processes typically include the following four steps:
• If necessary, adding alkalinity (bicarbonate has the advantage of providing alkalinity without raising pH).

• Adding the coagulant and coagulant aid to the influent after precipitation.
• Rapid mixing of the coagulant throughout the liquid.

• Adding the coagulant aid, followed by slow and gentle mixing to allow for contact between small particles and subsequent agglomeration into larger particles.
The overall success of the coagulation and flocculation processes depends on the flocculating and settling characteristics of the particles.

Principle of SRP Technology : The Aluminum Sulphate in raw water reacts with bicarbonate to form aluminum hydroxide, which is insoluble in water. This aluminum hydroxide settle down along with colloidal particles as sludge . From the settled sludge the aluminum sulphate is regenerated by adding SRP chemical in a particular ratio at a particular pH of sludge generated from water treatment process .

Methodology

LABORATORY STUDY:

1.Determination of optimum dose of coagulant (alum) required in Conventional Technology.

Since the turbidity of river water varies seasonally, a wide range of turbid waters were prepared by mixing river-bed sediment obtained from up-stream of Wazirabad Barrage with the river water. All experiments were performed using raw water from river Yamuna up-stream of Wazirabad Barrage.

The optimum dose of alum required for a particular turbid sample was determined following the methods laid-down in Jar-Test-Study. Various stages adopted in dose optimization are shown in **Fig. No. 2.**

The stages are as under:

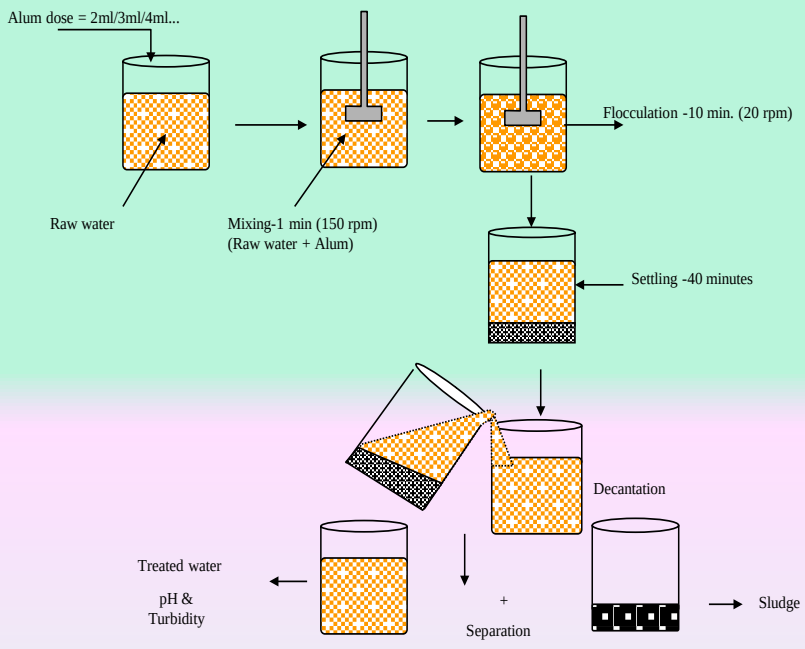


FIGURE-2: STAGES IN OPTIMISATION OF ALUM DOSE

Figure -3 shows : Alum dose optimization , using Jar Test Apparatus.

Figure-3 shows the optimum dose of alum required for various turbidity of water by Conventional Technology.

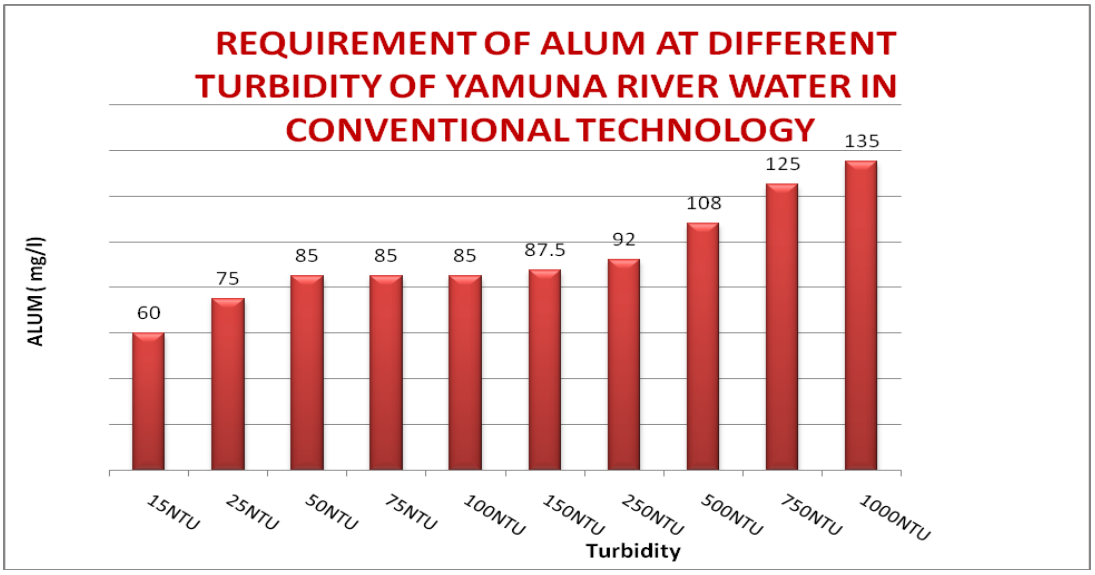


Figure- 4 : Shows optimized dose/ concentration of alum required at different turbidity of raw water.

(i) Measured quantities of raw water of specified turbidity were taken in a series of beakers;

(ii) Stock solution of commercial alum was added to the raw water in increasing order;

(iii) The solutions were mixed rapidly at 150 rpm for one minute in a Jar-Test-Apparatus followed by slow mixing (Flocculation) at 20 rpm for 10 minutes;

(iv) After 40 minutes of settling the supernatant (treated water) was decanted carefully so that the settled sludge was not disturbed;

(v) The turbidity and pH of the supernatant were recorded;

(vi) The optimum dose of alum was selected based on the maximum removal of turbidity with minimum alum dose.

2.**Alum recovery process (Preparation of Sludge-Reagent-Product)**

- Raw water of a specified turbidity (75 NTU) with a specified volume (1 liter) is treated with optimized dose of alum;
- The sludge is transferred into a small beaker (25 ml capacity);
- Reagent is added to the sludge and pH is adjusted to about 1.8;
- This is followed by a rapid mixing of sludge and reagents for 3 minutes in a magnetic stirrer;
- The Product is allowed to settled for 30 minutes;
- The liquid part of the Product, called Sludge Reagent Product SRP(L) is decanted. This part contains the recovered alum in association with colloids;
- The solid part of the product consists basically of discrete particles and is discarded as waste.

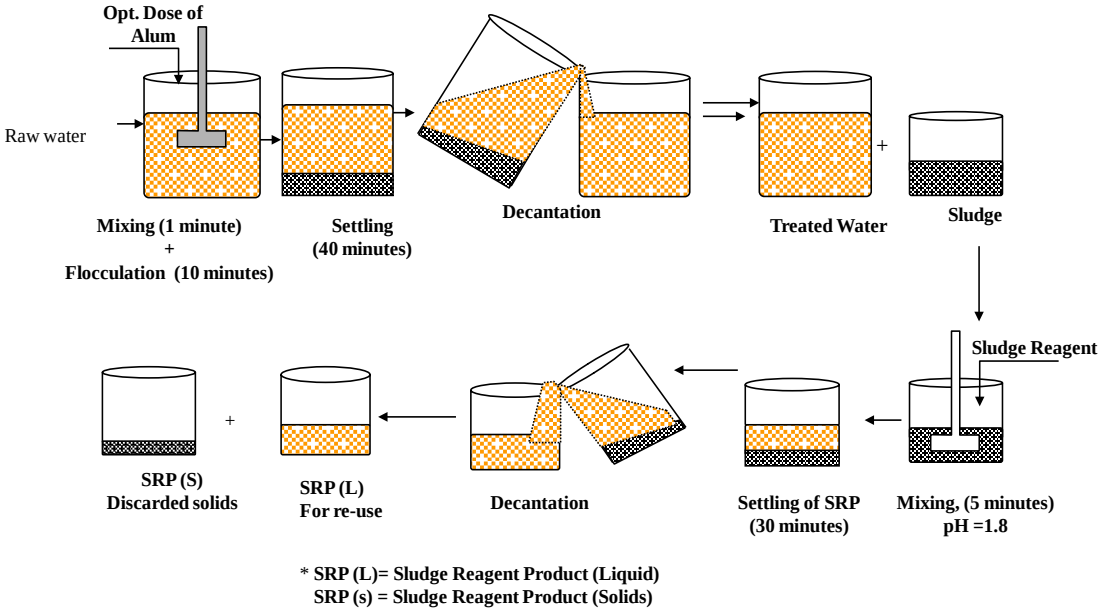


Figure No 5: Shows the Alum recovery process i.e, Preparation of Sludge-Reagent-Product

Results & Discussion

Determination of Treatment Efficiency of Sludge-Reagent-Product when recycled repeatedly.

The treatment efficiency of SRP(L) was tested by repeated use of SRP(L) in place of alum more than 6 times without using fresh alum. In this laboratory testing sludge generated by using SRP (L) again and again used for production of SRP(L) of 1^{st},2^{nd}, 3^{rd} ,4^{th} ,5^{th} ,6^{th} & 7^{th} cycle etc. as shown in flow sheet **Figure No.-7.**

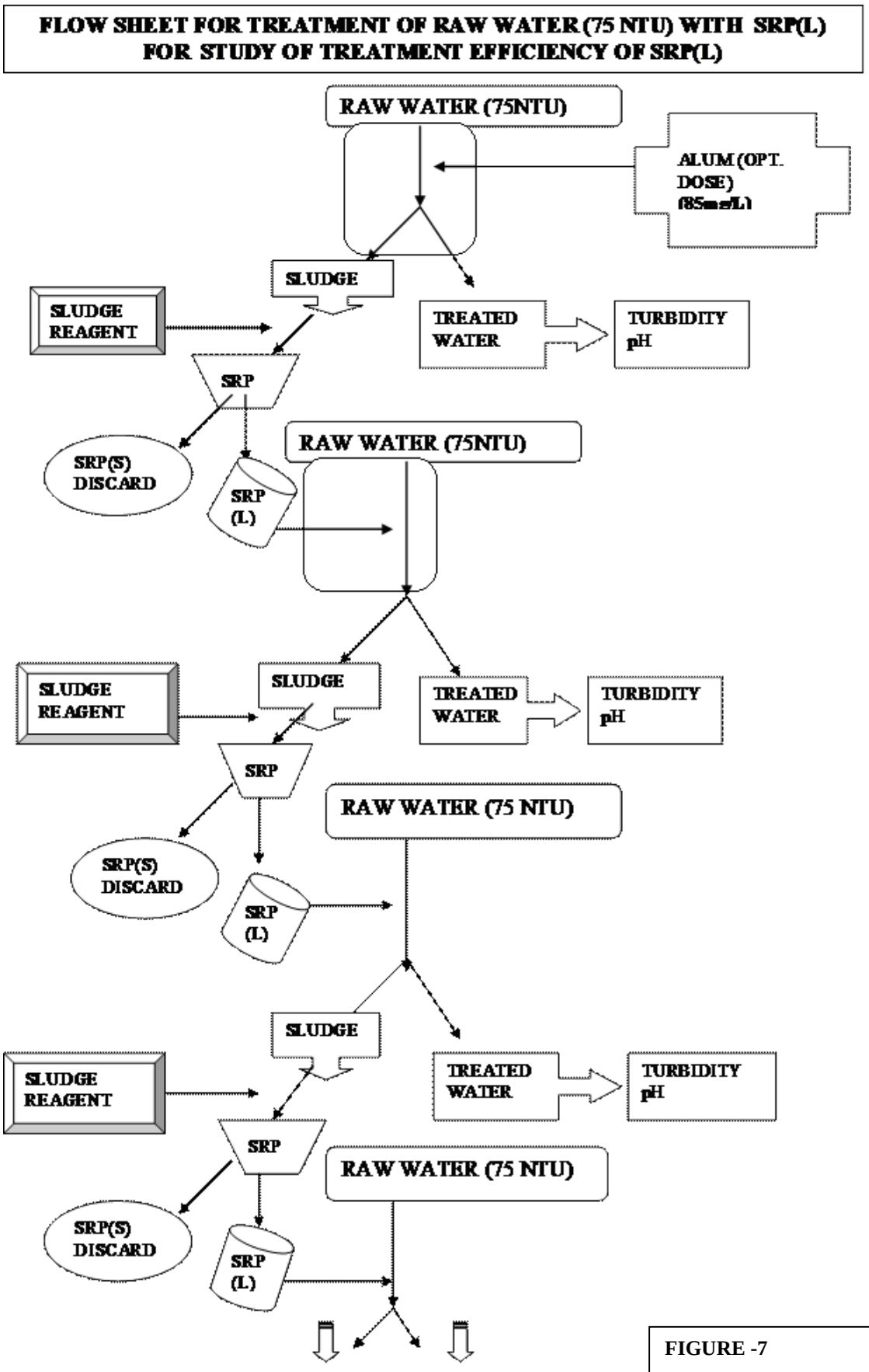

FLOW SHEET FOR TREATMENT OF RAW WATER (75 NTU) WITH SRP(L)
FOR STUDY OF TREATMENT EFFICIENCY OF SRP(L)
RAW WATER (75NTU)
ALUM (OPT. DOSE)
SLUDGE
SLUDGE REAGENT
TREATED WATER
TURBIDITY
pH
SRP
SRP(S) DISCARD
SRP (L)
RAW WATER (75NTU)
SLUDGE
SLUDGE REAGENT
TREATED WATER
TURBIDITY
pH
SRP
RAW WATER (75 NTU)
SRP(S) DISCARD
SRP (L)
SLUDGE
SLUDGE REAGENT
TREATED WATER
TURBIDITY
pH
SRP
RAW WATER (75 NTU)
SRP(S) DISCARD
SRP (L)

FIGURE -7

Table–1 shows the treatment efficiency of SRP(L) to treat the raw water of turbidity of 15 – to- 1000NTU.

Sr. No.	Int. NTU	O	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
1.	15	1.2	0.9	1.1	1.9	2.3	3.4	4.2	5.8	7.5	9.4
2.	25	1.1	0.8	1.1	1.3	1.6	1.9	2.2	2.8	6.0	9.0
3.	50	1.8	1.2	1.8	2.2	2.8	4.1	4.8	5.2	8.2	12.5
4.	75	1.6	1.8	2.3	2.8	3.6	5.6	6.8	9.6	12.8	17.5
5.	100	1.7	2.0	2.8	2.7	6.4	10.0	15.9	28.6	30.7	39.6
6.	150	1..3	2.5	3.3	5.9	9.8	14.8	26.9	38.5	45.6	-
7.	250	2.6	6.5	7.8	12.5	25.6	32.7	38.5	50.2	-	-
8.	500	3.1	8.8	13.6	23.5	51.8	59.9	110.2	-	-	-
9.	750	4.3	15.2	23.6	40.7	98.7	146.0	-	-	-	-
10.	1000	6.4	18.7	28.8	46.5	86.8	98.5	118.6	-	-	-

Figure-5 shows the process flow sheet, to determine the treatment efficiency of Sludge-Reagent-Product (L)

- The Sludge-Reagent-Product (L) produced from discarded sludge is used for treatment of raw water in lieu of alum;
- The sludge produced from SRP(L) treated water is again used as raw material for production of SRP(L);
- The process is repeated for six to ten times;
- The parameters namely pH and turbidity of raw water to be treated by SRP are recorded. Based on the turbidity of treated water, the treatment efficiency of SRPs' are calculated.

In the recovery process , the alum loss it's efficiency varies from 5 to 20 % , based on the turbidity i.e from 20 NTU to 2000 NTU. To maintain 100 % efficiency of recycled / recovered alum , the fresh alum was added at different concentration & different percentages for fresh alum (addition) dose optimization purpose.

Table 2 depicts the determination of quantity of fresh alum required alongwith SRPs (L) to maintain 100% Treatment Efficiency in treating Raw Water.

TABLE-2 : OPTIMISATION OF FRESH ALUM DOSE REQUIRED TO MAINTAIN 100 % EFFICIENCY OF TREATMENT WHEN SRPs' ARE USED AS COAGULANT IN LIEU OF ALUM.

S. No.	NTU	% *FA	0th Cycle	1st Cycle	2nd Cycle	3rd Cycle	4th Cycle	5th Cycle	6th Cycle	7th Cycle	8th Cycle	9th Cycle	10th Cycle	11th Cycle	12th Cycle	13th Cycle	14th Cycle	15th Cycle	16th Cycle	17th Cycle
1	75	8 %	0.8	0.7	0.60	0.8	0.80	0.90	0.90	1.25	1.15	1.36	1.53	1.58	1.65	1.68	1.75	1.70	1.70	2.0
2	75	9 %	0.9	0.9	0.85	0.78	0.95	1.60	1.15	1.25	1.30	1.25	1.35	1.36	1.35	1.48	1.53	1.65	1.65	1.85
3	***75***	***10 %***	***0.8***	***0.75***	***0.60***	***0.65***	***0.70***	***0.80***	***0.60***	***0.70***	***0.85***	***0.85***	***0.85***	***0.90***	***0.75***	***0.86***	***0.65***	***0.80***	***0.78***	***0.80***
4	75	11 %	0.8	0.9	0.55	0.78	0.85	0.86	0.93	1.01	0.95	0.90	0.95	1.12	1.12	1.24	1.10	0.95	1.30	1.25
5	75	12 %	0.9	1.1	1.15	128	0.95	1.08	0.93	1.15	1.28	1.16	1.28	1.09	1.31	1.05	1.20	1.08	1.12	1.28
6	75	13 %	0.9	1.1	1.21	1.08	1.05	1.10	0.95	1.15	0.98	1.00	0.98	0.95	1.31	1.11	1.08	1.11	1.10	1.26

* FA = **Fresh Alum**

➢ As it is observed that SRP process is losing efficiency ranging from 3 to 20 % when SRP(L) alone is used as coagulant. To compensate the loss, fresh quantity of alum is added alongwith SRP(L) and the combination of SRP(L) and fresh alum are recycled for 17 times;

- The pH and turbidity of water treated by SRP(L) plus fresh alum are observed and based on the lowest turbidity of treated water, the best combination of SRP(L) and fresh alum is selected.

Figure-7: shows the process flow sheet for treatment of raw water (75 NTU) with SRP(L) with optimum fresh alum doses (10 %) in a continuous treatment process.
The raw water of turbidity 75 NTU is treated with SRP(L) alongwith additional fresh alum and the treatment process are repeated for twenty times to observe the treatment efficiency of SRP(L) and alum. The range of fresh alum added was 8 % to 13% of original quantity of alum. It is observed from Table-2 that, the treatment efficiency of SRP(L) plus 10% fresh alum is equivalent to the treatment efficiency of optimum dose of alum.

Conventional treatment technology for treatment of raw water from Surface Sources- Figure No. 8.

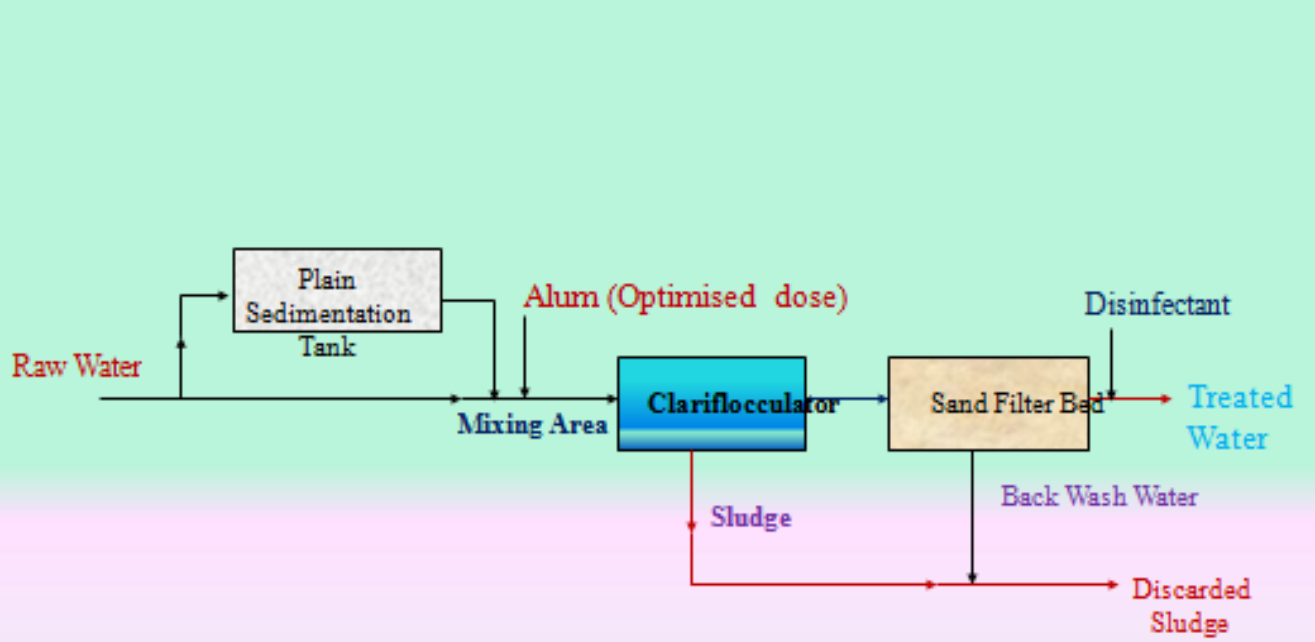


FIGURE-: CONVENTIONAL WATER TREATMENT SYSTEMS

Characterization of treated water with Conventional Technology and SRP Technology.

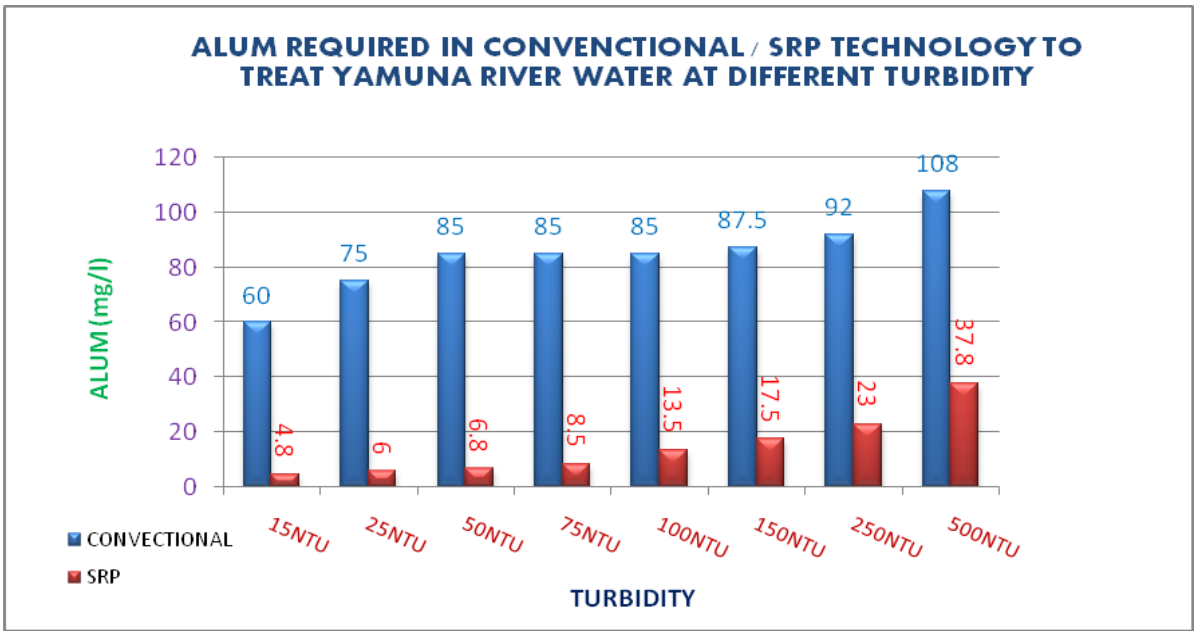
Table-3: Physico-Chemical Characteristics of Raw Water and Treated Water (Treatment by Conventional and SRP Technology in Lab scale working model .) Vis-a-Vis the prescribed drinking water standard.

S. No.	Characteristics	Raw Water Characteristics (50 NTU) Yamuna River water	Water Treated with Alum (Conventional Technology)	Water Treated with SRP(L) + Fresh Alum (20^{th} cycle) (SRP Technology)	Drinking Water Standards IS-10500 (1991)
1.	pH	8.15	7.75	7.70	6.5-8.5
2.	Turbidity	50	0.80	1.1	5-10
3.	Alkalinity	144	108	133	200-400
4.	Calcium	42	52	48	75-200
5.	Magnesium	9.72	7.29	4.86	30-100
6.	Total Hardness	160	135	170	300-600
7.	Sulphate	30.1	73.66	47.44	200-400
8.	Fluoride	0.209	0.168	0.141	1.0-1.5
9.	Chloride	22	21	22	250
10.	Nitrate	0.278	0.039	0.019	45-100
11.	Colour	-	Colourless	Colourless	5-25
12.	Odour	Soily smell	Unobjectionable	Unobjectionable	Unobjectionable
13.	Taste	-	Agreeable	Agreeable	Agreeable
14.	Aluminum (Al)	0.077	0.0787	0.08873	0.03-0.2
15.	COD	11	Nil	Nil	-
16.	BOD	6	Nil	Nil	-
17.	TDS	264	265	284	500
18.	TSS	125	Nil	Nil	-
19.	Zinc	0.03	0.01	0.02	5
20.	Iron	5.11	0.12	0.12	0.3-1
21.	Copper	Nil	Nil	Nil	0.05-1.5
22.	Chromium	Nil	Nil	Nil	0.05
23.	Nickel	Nil	Nil	Nil	-
24.	Lead	Nil	Nil	Nil	0.05
25.	Pesticides	Nil	Nil	Nil	Absent

Table-3 shows physico-chemical characteristics of raw water (50 NTU) of river Yamuna, treated water (by Conventional and SRP Technology) and Drinking Water Quality Standards. From table it is observed that the physico-chemical characteristics of treated water, treated by SRP technology is as good as Conventional Technology and meet the Drinking Water Quality Standards.

(1) Cost Analysis of SRP Technology

Figure-9 shows the requirement of alum in Conventional Technology and SRP Technology to treat river water at different turbidity.



From the **figure-10** it is observed that there is saving of alum of about 70- 92 % in SRP Technology compared to Conventional Technology.

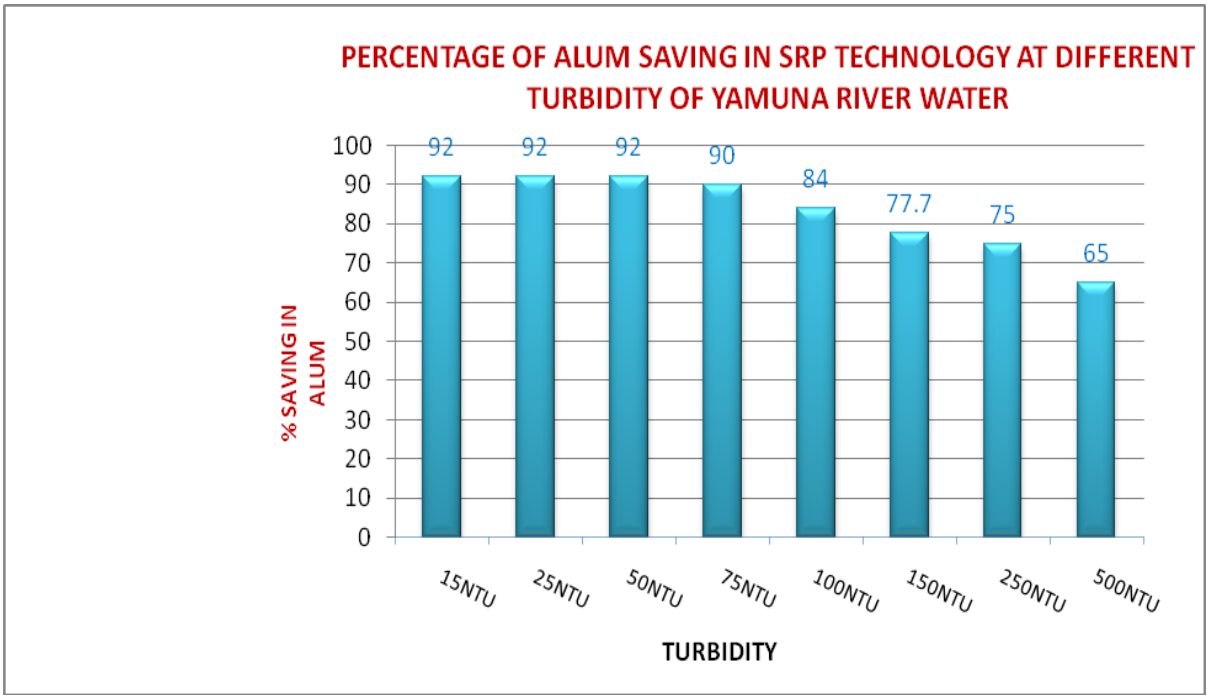
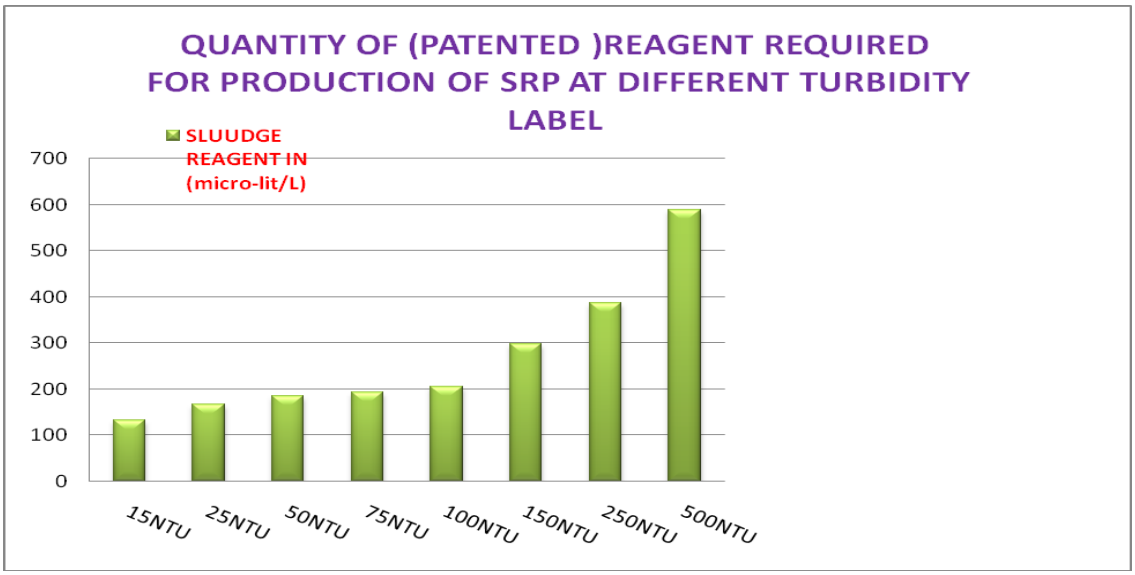


Figure-11shows the quantity of reagent required to produce SRP at different turbidity of river water.



From **Figure -10** it may be observed that the percentage of chemical saving vary inversely as the increase in turbidity of raw water. However, as the turbidity of river

water varies between 15 to 50 NTU at-least during nine months of the year (except three months during rainy season), the chemical saving during this period is around 78 %. During three months of the rainy season, Coagulation/ Flocculation process will be preceded by plain sedimentation to reduce the turbidity of raw water to around 250 NTU. Chemical saving will be to the tune of 60 % during this period.

Table- 4: Treatment efficiency of Sludge Reagent Product (L) to treat Raw Water having Turbidity of 75 NTU.

SL. No.	No. of recycle	Turbidity of treated water (NTU)	Treatment efficiency compared to opt. dose of alum	Loss of treatment efficiency in each subsequent cycle
1	0-Cycle Treated with opt. dose of alum)	1.6	100	-
2	1stCycle (Treated with SRP'L')	1.8	99.7	0.3
3	2nd Cycle (Treated with SRP'L')	2.3	99.0	1.0
4	3rd Cycle (Treated with SRP'L')	2.8	98.4	1.6
5	4th Cycle (Treated with SRP'L')	3.6	97.3	2.7
6	5th Cycle (Treated with SRP'L')	5.6	94.6	5.4
7	6th Cycle (Treated with SRP'L')	6.8	92.9	7.1
8	7th Cycle (Treated with SRP'L')	9.6	89.1	10.9
9	8th Cycle (Treated with SRP'L')	12.8	84.7	15.3
10	9th Cycle (Treated with SRP'L')	17.5	78.5	21.7
11	10th Cycle (Treated with SRP'L')	25.3	67.7	32.3
12	*Mean loss in efficiency in each cycle = 9.83 % (say, 10 %)			

LABORATORY SCALE WORKING MODEL OF SRP BASED TREATMENT TECHNOLOGY

PILOT PLANT STUDY FOLLOWED BY LABORATORY WORKING MODEL STUDY.

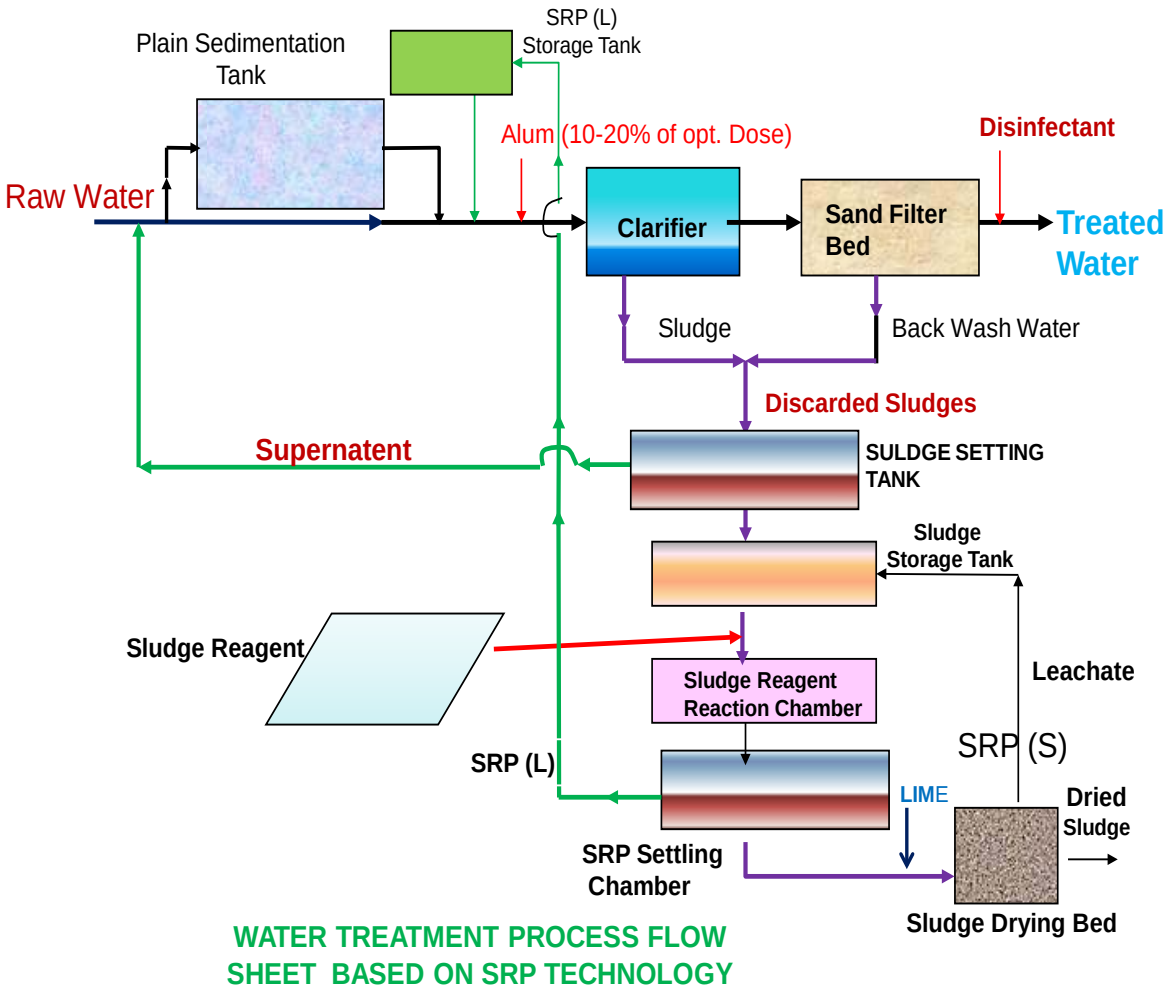
0.5MLD PILOT WATER TREATMENT PLANT BASED ON SRP TECHNOLOGY

After successful laboratory scale (working model)study on SRP based water treatment technology , Central Pollution Control Board had executed one MoU with Delhi Jal Board for Construction and operation (fully funded by CPCB)of 0.5 MLD Pilot Water Treatment Plant based on SRP technology at Bhagirathi Water Treatment Plant , Gokulpuri, Delhi.

The successful operation of Pilot Water Treatment Plant(based on patented SRP technology) for duration of one and half years, has been completed by M/s Hydrotech, Delhi (Contractor of Pilot Plant)with technical consultation of CPCB & DJB.

The drinking water quality of SRP-Technology based Pilot-Plant has been tested (Analysis) by L&T (for Delhi Jal Board) and CPCB . The water quality of Pilot Plant is at par with the water quality, generated from conventional treatment process. The detail treated water (based on SRP & Conventional treatment technology) comparative Analysis report (for 13 months of operation) is enclosed in ,**Annex-I**.

Figure-11 shows, flow sheet for SRP Based Water Treatment Technology



The different components of 0.5 MLD capacity pilot water treatment plant installed and operated at Bhagirathi Water Treatment Plant (DJB) Gokulpuri Delhi, shown in PLATE NO. 1 to No.11

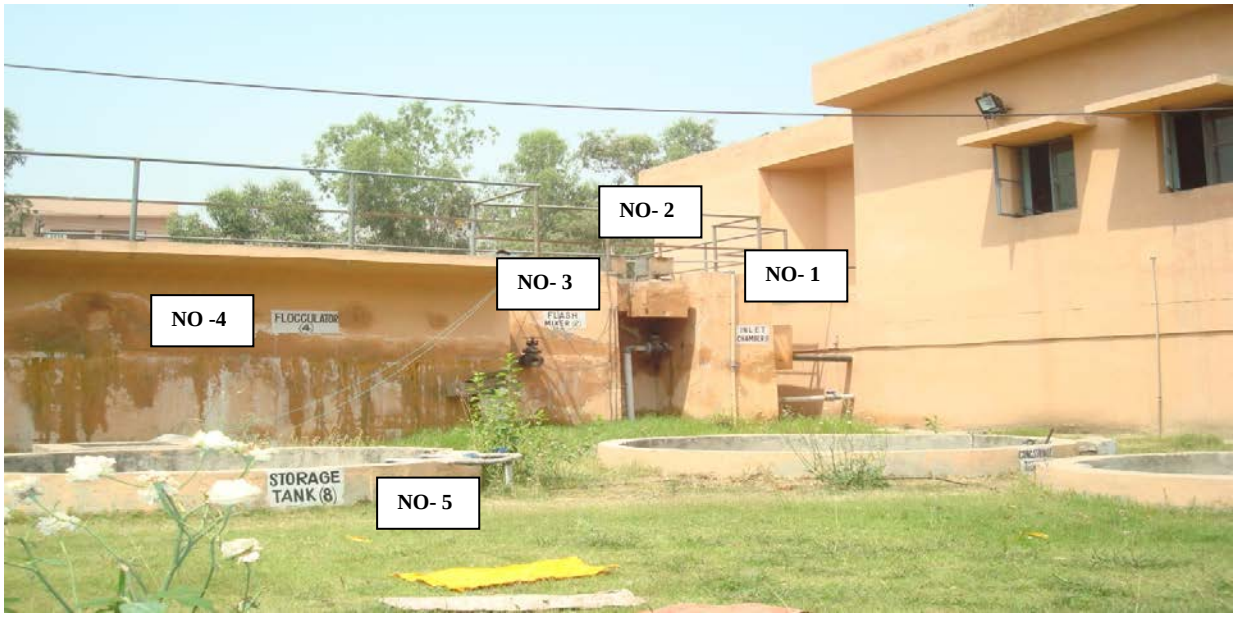
PLATE-1

PILOT WATER PLANT OVER VIEW

PLATE-2

PILOT PLANT TOP VIEW

PLATE-3



PILOT PLANT PICTURE SHOWING : (NO-1)INTAKE WATER POINT, (NO-2)ALUM / SRP DOSING TANK, (NO-3)FLASH MIXING CHAMBER, (NO-4)FLOCCULATOR & (NO-5) SLUDGE STORAGE TANK.

PILOT PLANT PICTURE SHOWING : BACK WASH WATER STORAGE TANK, SLUDGE STORAGE TANK, SLUDGE THICKNNER TANK, SLUDGE NUTRALIZATION TANK. SLUDGE DRYING BED.

PLATE-4

SLUDGE COLLECTION TANK OF PILOT PLANT

PLATE-5

SRP PRODUCTION PROCESS IN PILOT PLANT

PLATE-6

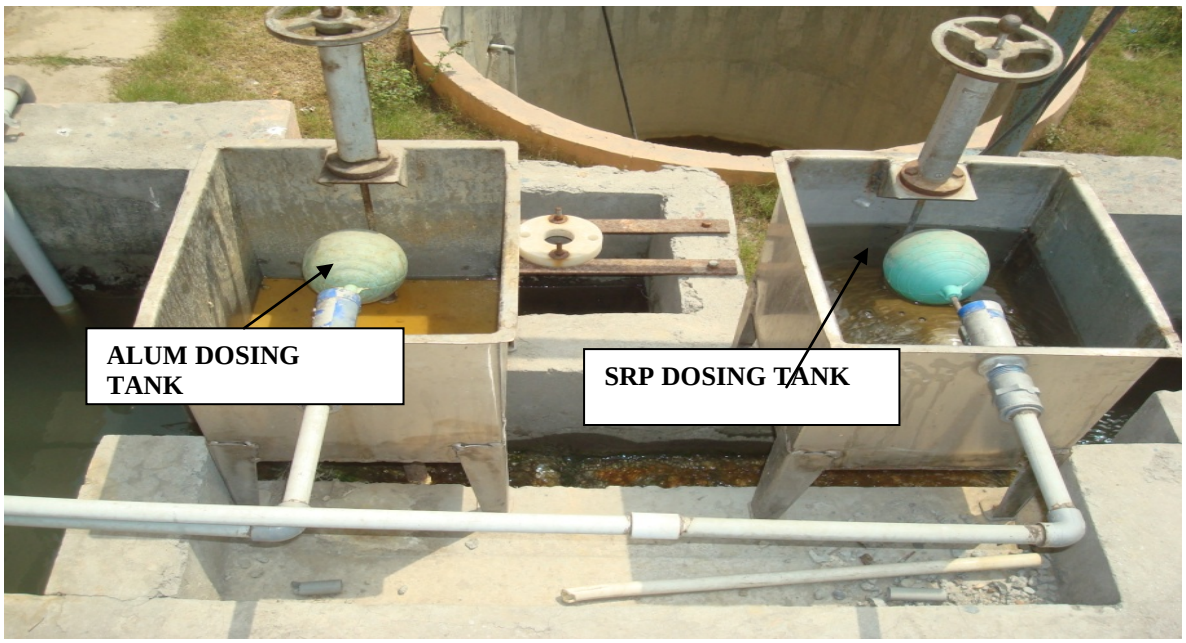


PLATE-7

INLET CHAMBER AND FLASH MIXTURE ALONG WITH SRP & ALUM DOSING TANK

PLATE-8

PILOT PLANT TREATED WATER OUT- LET

PLATE-9

LIME TREATMENT OF SLUDGE

PLATE-10

SLUDGE DRYING BED OF PILOT PLANT

ADVANTAGES OF SRP TECHNOLOGY

- The reduction in volume of sludge substantially (70 – 80%);
- Reduction in alum consumption 80 – 90 %
- In Conventional Technology 10 % flocculated water is discarded as sludge, which is almost fully reused in SRP Technology;
- Reduction in cost of treatment by about 65 %;
- Recycling of aluminum ions reduce pressure on the limited resources of raw material necessary for the production of alum;
- In Conventional Technology, a huge quantity of alum contaminated sludge is disposed of to natural water bodies, there by causing ecological imbalance in water bodies. In SRP technology, sludge discharge is only 0.05 to 1 % in solid form which can be easily disposed of by sanitary land filling. This will help to maintain ecological balance;
- The process is simple and does not involve use of much additional equipment for implementation.

Annex-I

Treated Water Quality Based on Conventional Vs SRP Technology

APRIL 2013

Date	Bhagiathi WTP					SRP Based Pilot WTP		
	Raw Water Quality		Final Treated Water Qualiy			Final Treated Water Qualiy		
	pH	Turbidity (NTU)	pH	Turbidity (NTU)	RFC(mg/l)	pH	Turbidity (NTU)	RFC(mg/l)
1/4/2013	7.87	41.71	7.61	0.88	1.45	7.60	0.90	1.20
2/4/2013	7.84	38.33	7.61	0.86	1.48	7.59	0.89	1.22
3/4/2013	7.84	41.17	7.63	0.87	1.47	7.60	0.89	1.21
4/4/2013	7.84	47.29	7.62	0.86	1.46	7.60	0.88	1.21
5/4/2013	7.82	48.88	7.63	0.86	1.46	7.61	0.88	1.20
6/4/2013	7.84	58.04	7.62	0.87	1.47	7.59	0.91	1.20
7/4/2013	7.84	51.54	7.63	0.86	1.51	7.60	0.87	1.21
8/4/2013	7.84	46.13	7.63	0.86	1.49	7.60	0.89	1.22
9/4/2013	7.84	44.29	7.63	0.87	1.50	7.59	0.89	1.20
10/4/2013	7.85	41.29	7.64	0.86	1.51	7.60	0.87	1.21
11/4/2013	7.84	56.08	7.63	0.87	1.49	7.59	0.88	1.22
12/4/2013	7.84	92.75	7.62	0.87	1.47	7.59	0.89	1.20
13/4/2013	7.83	64.88	7.62	0.87	1.50	7.58	0.89	1.21
14/4/2013	7.84	61.75	7.62	0.87	1.48	7.58	0.90	1.22
15/4/2013	7.85	53.58	7.48	0.87	1.50	7.49	0.90	1.20
16/4/2013	7.84	51.38	7.63	0.87	1.49	7.60	0.91	1.21
17/4/2013	7.83	50.46	7.63	0.87	1.49	7.60	0.91	1.22
18/4/2013	7.84	53.17	7.62	0.87	1.51	7.61	0.91	1.22
19/4/2013	7.83	51.71	7.63	0.87	1.50	7.59	0.91	1.20
20/4/2013	7.83	49.46	7.62	0.88	1.49	7.60	0.90	1.21
21/4/2013	7.84	50.79	7.63	0.88	1.49	7.59	0.92	1.22
22/4/2013	7.84	53.13	7.62	0.88	1.50	7.58	0.92	1.20
23/4/2013	7.84	50.25	7.62	0.86	1.48	7.59	0.91	1.20
24/4/2013	7.84	45.88	7.63	0.88	1.50	7.60	0.91	1.21
25/4/2013	7.83	44.54	7.62	0.86	1.51	7.58	0.90	1.22
26/4/2013	7.83	53.38	7.63	0.86	1.49	7.58	0.88	1.22
27/4/2013	7.83	57.92	7.63	0.86	1.52	7.59	0.88	1.20
28/4/2013	7.84	59.00	7.63	0.88	1.51	7.58	0.91	1.21
29/4/2013	7.83	72.04	7.64	0.88	1.49	7.57	0.90	1.21
30/4/2013	7.83	81.08	7.63	0.88	1.50	7.58	0.91	1.20
Average	**7.84**	**53.73**	**7.62**	**0.87**	**1.49**	**7.59**	**0.90**	**1.21**

MAY	2013

	Bhagiathi WTP					SRP Based Pilot WTP		
Date	Raw Water Quality		Final Treated Water Qualiy			Final Treated Water Qualiy		
	pH	Turbidity (NTU)	pH	Turbidity (NTU)	RFC(mg/l)	pH	Turbidity (NTU)	RFC(mg/l)
1/5/2013	7.83	80.29	7.63	0.87	1.48	7.58	0.89	1.21
2/5/2013	7.84	70.33	7.63	0.87	1.47	7.56	0.89	1.20
3/5/2013	7.84	61.33	7.62	0.87	1.47	7.60	0.90	1.20
4/5/2013	7.84	58.33	7.63	0.87	1.46	7.58	0.91	1.20
5/5/2013	7.84	56.88	7.49	0.87	1.46	7.58	0.90	1.21
6/5/2013	7.84	50.29	7.62	0.86	1.47	7.60	0.92	1.20
7/5/2013	7.84	45.04	7.64	0.87	1.48	7.59	0.90	1.20
8/5/2013	7.84	43.38	7.63	0.87	1.48	7.58	0.89	1.25
9/5/2013	7.83	44.54	7.63	0.87	1.47	7.57	0.89	1.20
10/5/2013	7.83	44.00	7.63	0.88	1.46	7.57	0.91	1.20
11/5/2013	7.83	41.63	7.63	0.86	1.46	7.58	0.92	1.21
12/5/2013	7.83	43.79	7.63	0.88	1.45	7.57	0.90	1.20
13/5/2013	7.83	45.08	7.63	0.87	1.47	7.59	0.89	1.21
14/5/2013	7.85	45.71	7.63	0.88	1.46	7.57	0.89	1.20
15/5/2013	7.84	35.29	7.63	0.87	1.46	7.58	0.89	1.20
16/5/2013	7.84	27.04	7.64	0.86	1.46	7.56	0.88	1.21
17/5/2013	7.84	21.50	7.63	0.88	1.46	7.58	0.89	1.22
18/5/2013	7.83	20.08	7.63	0.88	1.48	7.57	0.90	1.20
19/5/2013	7.83	305.00	7.63	0.81	1.47	7.55	0.94	1.21
20/5/2013	7.83	152.75	7.63	0.89	1.45	7.50	0.95	1.20
21/5/2013	7.84	97.63	7.63	0.88	1.44	7.49	0.90	1.20
22/5/2013	7.84	116.08	7.63	0.86	1.46	7.45	0.94	1.21
23/5/2013	7.84	106.75	7.63	0.87	1.46	7.46	0.95	1.22
24/5/2013	7.83	224.46	7.63	0.87	1.47	7.46	0.95	1.20
25/5/2013	7.83	257.75	7.63	0.88	1.47	7.45	0.96	1.21
26/5/2013	7.84	439.83	7.61	0.87	1.47	7.45	0.96	1.21
27/5/2013	7.84	508.71	7.62	0.88	1.46	7.43	0.95	1.22
28/5/2013	7.83	504.79	7.62	0.87	1.47	7.43	0.94	1.23
29/5/2013	7.84	547.38	7.63	0.87	1.46	7.40	0.95	1.20
30/5/2013	7.84	574.67	7.63	0.88	1.47	7.40	0.96	1.21
31/5/20123	7.85	427.88	7.62	0.87	1.46	7.40	0.97	1.23
Average	**7.84**	**167.26**	**7.62**	**0.87**	**1.46**	**7.52**	**0.92**	**1.21**

JUNE	2013

	Bhagiathi WTP					SRP Based Pilot WTP		
Date	Raw Water Quality		Final Treated Water Qualiy			Final Treated Water Qualiy		
	pH	Turbidity (NTU)	pH	Turbidity (NTU)	RFC(mg/l)	pH	Turbidity (NTU)	RFC(mg/l)
1/6/2013	7.83	323.58	7.63	0.87	1.47	7.48	0.92	1.20
2/6/2013	7.85	305.38	7.61	0.87	1.47	7.50	0.93	1.21
3/6/2013	7.85	225.50	7.62	0.87	1.47	7.56	0.93	1.20
4/6/2013	7.84	228.04	7.62	0.85	1.47	7.60	0.93	1.22
5/6/2013	7.84	372.38	7.63	0.87	1.47	7.58	0.94	1.21
6/6/2013	7.83	482.25	7.47	0.86	1.46	7.70	0.93	1.20
7/6/2013	7.84	460.75	7.60	0.87	1.46	7.58	0.93	1.20
8/6/2013	7.84	585.13	7.59	0.88	1.47	7.60	0.95	1.21
9/6/2013	7.85	726.67	7.58	0.86	1.47	7.58	0.95	1.20
10/6/2013	7.56	543.75	7.58	0.87	1.47	7.49	0.95	1.22
11/6/2013	7.85	459.63	7.61	0.86	1.46	7.51	0.92	1.20
12/6/2013	7.84	597.83	7.62	0.88	1.47	7.50	0.95	1.21
13/6/2013	7.84	855.13	7.64	0.88	1.47	7.49	0.92	1.20
14/6/2013	7.84	943.67	7.64	0.87	1.49	7.48	0.92	1.22
15/6/2013	7.84	1030.58	7.63	0.87	1.48	7.45	0.91	1.21
16/6/2013	7.85	894.29	7.61	0.87	1.47	7.55	0.95	1.20
17/6/2013	7.88	682.63	7.61	0.88	1.47	7.58	0.92	1.21
18/6/2013	7.84	739.17	7.60	0.88	1.47	7.55	0.92	1.22
19/6/2013	7.84	809.54	7.61	0.89	1.48	7.56	0.92	1.20
20/6/2013	7.83	761.38	7.62	0.91	1.48	7.50	0.93	1.20
21/6/2013	7.83	565.17	7.61	0.92	1.46	7.48	0.93	1.20
22/6/2013	7.80	3313.13	7.59	0.89	1.47	7.49	1.0	1.21
23/6/2013	7.82	3202.25	7.62	0.88	1.48	7.46	0.98	1.20
24/6/2013	7.83	2792.38	7.63	0.88	1.48	7.47	0.99	1.22
25/6/2013	7.85	2332.92	7.58	0.87	1.46	7.48	1.0	1.22
26/6/2013	7.84	2299.13	7.53	0.86	1.47	7.49	1.0	1.20
27/6/2013	7.84	2807.50	7.57	0.88	1.46	7.45	0.98	1.20
28/6/2013	7.83	2965.25	7.56	0.89	1.46	7.49	0.99	1.21
29/6/2013	7.83	1727.43	7.56	0.89	1.46	7.50	1.00	1.21
30/6/2013	7.84	3064.29	7.48	0.88	1.48	7.40	0.99	1.22
Average	**7.83**	**1236.56**	**7.60**	**0.88**	**1.47**	**7.52**	**0.95**	**1.21**

JULY	2013

	Bhagiathi WTP					SRP Based Pilot WTP		
Date	Raw Water Quality		Final Treated Water Qualiy			Final Treated Water Qualiy		
	pH	Turbidity (NTU)	pH	Turbidity (NTU)	RFC(mg/l)	pH	Turbidity (NTU)	RFC(mg/l)
1/7/2013	7.84	2684.04	7.46	0.88	1.47	7.40	1.0	1.22
2/7/2013	7.83	2361.83	7.49	0.88	1.47	7.38	1.0	1.21
3/7/2013	7.83	2384.50	7.50	0.88	1.49	7.35	0.99	1.20
4/7/2013	7.83	2029.79	7.52	0.88	1.47	7.40	0.99	1.22
5/7/2013	7.84	1676.08	7.58	0.88	1.48	7.45	0.96	1.20
6/7/2013	7.84	1663.50	7.60	0.88	1.48	7.40	0.97	1.20
7/7/2013	7.85	1721.92	7.56	0.87	1.47	7.48	0.99	1.22
8/7/2013	7.84	1492.38	7.53	0.87	1.47	7.50	0.98	1.21
9/7/2013	7.86	2150.52	7.56	0.89	1.46	7.40	0.99	1.21
10/7/2013	7.83	1702.69	7.60	0.89	1.44	7.42	0.98	1.20
11/7/2013	7.83	925.08	7.53	0.89	1.47	7.45	1.00	1.20
12/7/2013	7.84	1644.60	7.51	0.90	1.46	7.40	1.00	1.22
13/7/2013	7.84	788.33	7.51	0.89	1.45	7.43	0.98	1.21
14/7/2013	7.83	519.88	7.48	0.90	1.46	7.40	0.99	1.20
15/7/2013	7.84	1320.71	7.48	0.89	1.46	7.43	1.00	1.21
16/7/2013	7.84	2318.42	7.48	0.90	1.46	7.44	1.0	1.22
17/7/2013	7.84	2370.67	7.47	0.90	1.46	7.45	0.99	1.20
18/7/2013	7.84	940.32	7.46	0.89	1.44	7.40	1.0	1.22
19/7/2013	7.84	2737.75	7.46	0.90	1.46	7.40	0.98	1.21
20/7/2013	7.83	2644.79	7.46	0.90	1.46	7.43	0.10	1.22
21/7/2013	7.83	1992.21	7.46	0.89	1.46	7.38	0.98	1.20
22/7/2013	7.84	1713.67	7.45	0.89	1.46	7.30	0.97	1.20
23/7/2013	7.85	1645.92	7.47	0.86	1.45	7.35	0.96	1.21
24/7/2013	7.84	1572.33	7.48	0.89	1.46	7.32	0.10	1.22
25/7/2013	7.84	1666.67	7.51	0.89	1.46	7.35	0.97	1.20
26/7/2013	7.84	1489.79	7.48	0.88	1.45	7.32	0.98	1.21
27/7/2013	7.84	2307.54	7.53	0.90	1.46	7.35	0.99	1.21
28/7/2013	7.84	2837.79	7.51	0.89	1.46	7.32	1.00	1.20
29/7/2013	7.84	1756.42	7.49	0.88	1.44	7.38	1.00	1.22
30/7/2013	7.84	1535.58	7.52	0.87	1.46	7.35	1.00	1.21
31/7/2013	7.84	1390.71	7.53	0.89	1.46	7.38	1.00	1.22
Average	**7.84**	**1776.75**	**7.51**	**0.89**	**1.46**	**7.39**	**0.93**	**1.21**

AUGUST	2013

	Bhagiathi WTP					SRP Based Pilot WTP		
Date	Raw Water Quality		Final Treated Water Qualiy			Final Treated Water Qualiy		
	pH	Turbidity (NTU)	pH	Turbidity (NTU)	RFC(mg/l)	pH	Turbidity (NTU)	RFC(mg/l)
1/8/2013	7.84	1197.88	7.51	0.89	1.46	7.48	0.98	1.20
2/8/2013	7.84	1666.75	7.49	0.89	1.46	7.52	0.95	1.20
3/8/2013	7.84	1839.17	7.37	0.89	1.45	7.49	0.96	1.21
4/8/2013	7.85	1546.08	7.53	0.89	1.46	7.47	0.96	1.22
5/8/2013	7.85	1859.21	7.52	0.88	1.45	7.49	0.96	1.21
6/8/2013	7.85	2088.50	7.50	0.87	1.46	7.50	0.99	1.20
7/8/2013	7.89	2427.25	7.47	0.88	1.45	7.45	0.95	1.20
8/8/2013	7.88	3928.00	7.41	0.88	1.46	7.43	0.95	1.22
9/8/2013	7.90	3550.04	7.42	0.88	1.45	7.45	0.99	1.21
10/8/2013	7.88	3049.00	7.43	0.88	1.41	7.42	0.98	1.20
11/8/2013	7.90	3359.79	7.43	0.89	1.45	7.45	1.00	1.21
12/8/2013	7.60	2988.33	7.43	0.88	1.46	7.48	1.00	1.22
13/8/2013	7.90	2817.92	7.44	0.88	1.45	7.51	1.00	1.21
14/8/2013	7.90	3905.71	7.44	0.89	1.45	7.42	0.99	1.20
15/8/2013	7.90	3830.78	7.44	0.88	1.46	7.43	0.98	1.21
16/8/2013	7.90	3323.50	7.44	0.89	1.46	7.45	0.99	1.22
17/8/2013	7.88	3184.00	7.44	0.88	1.46	7.46	0.98	1.20
18/8/2013	7.98	3218.42	7.45	0.77	1.46	7.49	0.99	1.22
19/8/2013	7.92	2855.42	7.45	0.88	1.46	7.49	1.00	1.21
20/8/2013	7.90	2937.29	7.45	0.87	1.46	7.52	1.00	1.21
21/8/2013	7.90	2760.88	7.46	0.87	1.46	7.51	0.95	1.20
22/8/2013	7.90	2688.17	7.45	0.88	1.47	7.48	0.99	1.21
23/8/2013	7.89	2676.79	7.44	0.88	1.47	7.43	0.98	1.22
24/8/2013	7.89	2676.88	7.44	0.87	1.46	7.45	0.98	1.20
25/8/2013	7.91	2568.04	7.44	0.88	1.46	7.55	0.99	1.20
26/8/2013	7.91	2192.13	7.45	0.87	1.47	7.52	1.00	1.22
27/8/2013	7.90	2123.92	7.47	0.87	1.46	7.55	1.00	1.20
28/8/2013	7.90	1785.83	7.49	0.88	1.48	7.49	0.96	1.21
29/8/2013	7.90	1430.71	7.51	0.88	1.46	7.45	0.95	1.22
30/8/2013	7.91	1375.29	7.46	0.88	1.46	7.48	0.99	1.20
31/8/2013	7.91	1321.00	7.44	0.88	1.47	7.43	0.99	1.21
Average	**7.88**	**2599.16**	**7.45**	**0.88**	**1.46**	**7.48**	**0.98**	**1.21**

	SEPTEMBER			2013				
	Bhagiathi WTP					SRP Based Pilot WTP		
Date	Raw Water Quality		Final Treated Water Qualiy			Final Treated Water Qualiy		
	pH	Turbidity (NTU)	pH	Turbidity (NTU)	RFC(mg/l)	pH	Turbidity (NTU)	RFC(mg/l)
1/9/2013	7.85	981.28	7.49	0.87	1.48	7.72	0.95	1.20
2/9/2013	7.85	974.44	7.50	0.86	1.46	7.71	0.91	1.21
3/9/2013	7.54	989.79	7.47	0.87	1.47	7.70	0.98	1.22
4/9/2013	7.84	933.17	7.50	0.87	1.46	7.70	0.97	1.22
5/9/2013	7.84	833.77	7.48	0.87	1.47	7.68	0.98	1.20
6/9/2013	7.84	673.40	7.48	0.88	1.47	7.75	0.85	1.21
7/9/2013	7.84	550.40	7.48	0.89	1.48	7.70	0.89	1.21
8/9/2013	7.84	463.58	7.48	0.88	1.47	7.68	0.89	1.20
9/9/2013	7.85	438.90	7.51	0.88	1.47	7.75	0.88	1.22
10/9/2013	7.84	354.08	7.50	0.88	1.48	7.70	0.87	1.20
11/9/2013	7.85	242.79	7.51	0.87	1.46	7.68	0.89	1.22
12/9/2013	7.83	191.69	7.53	0.88	1.47	7.65	0.85	1.20
13/9/2013	7.85	179.58	7.52	0.88	1.48	7.63	0.89	1.21
14/9/2013	7.84	191.75	7.51	0.88	1.45	7.63	0.87	1.21
15/9/2013	7.84	190.10	7.55	0.88	1.47	7.65	0.91	1.20
16/9/2013	7.85	181.35	7.56	0.87	1.47	7.63	0 .90	1.22
17/9/2013	7.84	184.02	7.56	0.87	1.47	7.60	0.92	1.21
18/9/2013	7.84	158.74	7.58	0.89	1.47	7.65	0.87	1.20
19/9/2013	7.84	131.02	7.45	0.88	1.47	7.62	0.88	1.20
20/9/2013	7.84	113.71	7.60	0.89	1.47	7.60	0.89	1.22
21/9/2013	7.83	104.58	7.63	0.89	1.47	7.62	0.87	1.21
22/9/2013	7.84	120.96	7.64	0.91	1.48	7.63	0.89	1.21
23/9/2013	7.86	253.91	7.64	0.90	1.47	7.62	0.89	1.20
24/9/2013	7.84	728.29	7.58	0.87	1.46	7.63	0.88	1.22
25/9/2013	7.83	337.50	7.59	0.87	1.47	7.65	0.89	1.21
26/9/2013	7.83	246.63	7.57	0.88	1.48	7.73	0.90	1.21
27/9/2013	7.83	162.92	7.58	0.88	1.47	7.69	0.91	1.20
28/9/2013	7.83	159.88	7.58	0.88	1.47	7.69	0.90	1.20
29/9/2013	7.84	156.54	7.58	0.88	1.47	7.78	0.91	1.22
30/9/2013	7.84	161.38	7.56	0.87	1.47	7.75	0.92	1.22
Average	**7.83**	**379.67**	**7.54**	**0.88**	**1.47**	**7.67**	**0.90**	**1.21**

	OCTOBER			2013				
	Bhagiathi WTP					SRP Based Pilot WTP		
Date	Raw Water Quality		Final Treated Water Qualiy			Final Treated Water Qualiy		
	pH	Turbidity (NTU)	pH	Turbidity (NTU)	RFC(mg/l)	pH	Turbidity (NTU)	RFC(mg/l)
1/10/2013	7.85	154.00	7.57	0.87	1.47	7.78	0.95	1.20
2/10/2013	7.84	203.58	7.59	0.88	1.47	7.75	0.93	1.20
3/10/2013	7.84	172.71	7.57	0.88	1.47	7.69	0.90	1.22
4/10/2013	7.83	152.38	7.50	0.89	1.47	7.70	0.93	1.21
5/10/2013	7.84	161.33	7.59	0.88	1.48	7.65	0.91	1.22
6/10/2013	7.84	172.96	7.58	0.88	1.47	7.73	0.91	1.20
7/10/2013	7.84	166.92	7.58	0.88	1.47	7.72	0.90	1.20
8/10/2013	7.84	165.71	7.58	0.88	1.47	7.78	0.92	1.21
9/10/2013	7.84	158.08	7.59	0.88	1.47	7.75	0.91	1.22
10/10/2013	7.84	160.50	7.46	0.88	1.47	7.72	0.91	1.21
11/10/2013	7.84	160.63	7.61	0.88	1.47	7.71	0.92	1.22
12/10/2013	7.84	158.67	7.60	0.88	1.53	7.72	0.93	1.21
13/10/2013	7.84	152.08	7.58	0.89	1.47	7.73	0.90	1.20
14/10/2013	7.85	139.63	7.59	0.88	1.46	7.75	0.93	1.21
15/10/2013	7.84	136.25	7.60	0.88	1.48	7.73	0.93	1.22
16/10/2013	7.83	110.21	7.58	0.88	1.47	7.72	0.92	1.21
17/10/2013	7.84	60.46	7.57	0.87	1.47	7.70	0.89	1.20
18/10/2013	7.83	46.25	7.57	0.89	1.47	7.70	0.89	1.21
19/10/2013	7.84	39.04	7.60	0.89	1.48	7.68	0.90	1.22
20/10/2013	7.83	38.67	7.59	0.88	1.48	7.68	0.93	1.22
21/10/2013	7.85	34.42	7.58	0.88	1.48	7.71	0.92	1.20
22/10/2013	7.84	32.04	7.63	0.88	1.48	7.70	0.87	1.20
23/10/2013	7.84	30.13	7.63	0.87	1.47	7.75	0.88	1.21
24/10/2013	7.84	31.54	7.60	0.88	1.48	7.73	0.87	1.21
25/10/2013	7.84	28.46	7.60	0.88	1.47	7.70	0.87	1.20
26/10/2013	7.84	30.63	7.60	0.88	1.47	7.70.	0.89	1.20
27/10/2013	7.83	30.21	7.60	0.88	1.48	7.73	0.89	1.21
28/10/2013	7.83	30.00	7.60	0.87	1.46	7.75	0.88	1.22
29/10/2013	7.84	30.96	7.60	0.88	1.48	7.73	0.89	1.22
30/10/2013	7.84	30.42	7.60	0.88	1.46	7.70	0.89	1.20
31/10/2013	7.84	28.21	7.60	0.88	1.47	7.71	0.90	1.21
Average	**7.84**	**96.44**	**7.59**	**0.88**	**1.47**	**7.72**	**0.90**	**1.21**

	NOVEMBER			2013				
	Bhagiathi WTP					SRP Based Pilot WTP		
Date	Raw Water Quality		Final Treated Water Qualiy			Final Treated Water Qualiy		
	pH	Turbidity (NTU)	pH	Turbidity (NTU)	RFC(mg/l)	pH	Turbidity (NTU)	RFC(mg/l)
1/11/2013	7.84	129.04	7.60	0.88	1.47	7.58	0.91	1.22
2/11/2013	7.89	139.71	7.60	0.89	1.47	7.55	0.90	1.22
3/11/2013	7.90	139.00	7.58	0.89	1.48	7.54	0.89	1.20
4/11/2013	7.91	126.92	7.55	0.88	1.47	7.50	0.89	1.20
5/11/2013	7.96	113.13	7.58	0.90	1.45	7.55	0.91	1.21
6/11/2013	7.91	78.71	7.56	0.88	1.47	7.56	0.92	1.20
7/11/2013	7.90	57.29	7.56	0.89	1.47	7.58	0.91	1.22
8/11/2013	8.14	49.63	7.57	0.90	1.46	7.60	0.91	1.21
9/11/2013	8.31	62.00	7.56	0.90	1.47	7.60	0.93	1.20
10/11/2013	8.31	47.54	7.57	0.90	1.47	7.62	0.95	1.21
11/11/2013	8.25	42.75	7.62	0.89	1.47	7.58	0.92	1.22
12/11/2013	8.24	37.58	7.61	0.89	1.47	7.61	0.92	1.20
13/11/2013	8.35	33.58	7.59	0.92	1.46	7.71	0.92	1.21
14/11/2013	8.83	32.73	7.59	0.90	1.47	7.51	0.90	1.21
15/11/2013	7.85	263.25	7.58	0.88	1.47	7.50	0.90	1.20
16/11/2013	7.84	90.88	7.58	0.88	1.47	7.50	0.90	1.22
17/11/2013	7.84	55.67	7.60	0.88	1.48	7.58	0.95	1.22
18/11/2013	7.84	59.25	7.59	0.88	1.46	7.57	0.94	1.20
19/11/2013	7.84	70.42	7.45	0.88	1.47	7.56	0.94	1.20
20/11/2013	7.84	69.63	7.59	0.88	1.48	7.55	0.94	1.21
21/11/2013	7.84	102.96	7.59	0.88	1.47	7.58	0.93	1.21
22/11/2013	7.84	161.83	7.59	0.89	1.46	7.55	0.92	1.22
23/11/2013	7.84	154.54	7.60	0.89	1.24	7.50	0.92	1.20
24/11/2013	7.84	214.38	7.61	0.9	1.48	7.52	0.95	1.21
25/11/2013	7.84	229.13	7.59	0.87	1.46	7.56	0.95	1.22
26/11/2013	7.85	191.00	7.59	0.88	1.46	7.53	0.95	1.22
27/11/2013	7.84	149.79	7.60	0.89	1.46	7.55	0.92	1.22
28/11/2013	7.84	124.04	7.59	0.88	1.46	7.62	0.92	1.20
29/11/2013	7.84	103.13	7.59	0.88	1.48	7.63	0.91	1.22
30/11/2013	7.85	85.50	7.59	0.88	1.46	7.68	0.90	1.20
Average	**7.97**	**107.17**	**7.58**	**0.89**	**1.46**	**7.57**	**0.92**	**1.21**

DECEMBER	2013

	Bhagiathi WTP					SRP Based Pilot WTP		
Date	Raw Water Quality		Final Treated Water Qualiy			Final Treated Water Qualiy		
	pH	Turbidity (NTU)	pH	Turbidity (NTU)	RFC(mg/l)	pH	Turbidity (NTU)	RFC(mg/l)
1/12/2013	7.84	85.38	7.51	0.88	1.46	7.45	0.90	1.20
2/12/2013	7.84	94.63	7.49	0.89	1.46	7.55	0.91	1.20
3/12/2013	7.84	77.33	7.37	0.88	1.45	7.45	0.92	1.21
4/12/2013	7.85	103.75	7.53	0.89	1.46	7.58	0.91	1.22
5/12/2013	7.83	69.71	7.52	0.88	1.45	7.48	0.90	1.20
6/12/2013	7.85	67.25	7.50	0.89	1.46	7.40	0.91	1.20
7/12/2013	7.85	64.13	7.47	0.89	1.45	7.40	0.90	1.21
8/12/2013	7.85	42.83	7.41	0.88	1.46	7.41	0.89	1.22
9/12/2013	7.85	37.63	7.42	0.89	1.45	7.45	0.92	1.21
10/12/2013	7.84	38.96	7.43	0.89	1.41	7.39	0.89	1.20
11/12/2013	7.85	51.74	7.43	0.88	1.45	7.45	0.88	1.20
12/12/2013	7.84	50.71	7.43	0.89	1.46	7.55	0.85	1.21
13/12/2013	7.85	45.38	7.44	0.89	1.45	7.50	0.90	1.22
14/12/2013	7.84	46.63	7.44	0.89	1.45	7.50	0.90	1.21
15/12/2013	7.85	43.58	7.44	0.89	1.46	7.53	0.90	1.20
16/12/2013	7.85	41.50	7.44	0.88	1.46	7.50	0.91	1.21
17/12/2013	7.86	40.88	7.44	0.90	1.46	7.51	0.91	1.22
18/12/2013	7.85	39.04	7.45	0.89	1.46	7.51	0.85	1.22
19/12/2013	7.85	40.00	7.45	0.89	1.46	7.52	0.85	1.21
20/12/2013	7.85	36.08	7.45	0.90	1.46	7.52	0.86	1.20
21/12/2013	7.86	37.00	7.46	0.90	1.47	7.43	0.86	1.21
22/12/2013	7.85	32.08	7.45	0.89	1.47	7.43	0.86	1.21
23/12/2013	7.85	34.96	7.44	0.89	1.47	7.39	0.86	1.21
24/12/2013	7.85	36.00	7.44	0.90	1.46	7.40	0.89	1.20
25/12/2013	7.86	38.17	7.44	0.90	1.46	7.49	0.88	1.20
26/12/2013	7.86	36.29	7.45	0.90	1.47	7.49	0.86	1.22
27/12/2013	7.85	37.29	7.47	0.89	1.46	7.50	0.85	1.22
28/12/2013	7.85	37.46	7.49	0.90	1.48	7.51	0.88	1.20
29/12/2013	7.86	37.54	7.51	0.90	1.46	7.50	0.89	1.21
30/12/2013	7.85	32.25	7.46	0.90	1.46	7.45	0.88	1.21
31/12/2013	7.85	32.25	7.44	0.87	1.47	7.51	0.89	1.22
Average	**7.85**	**47.44**	**7.45**	**0.89**	**1.46**	**7.48**	**0.89**	**1.21**

	JANUARY			2014				
	Bhagiathi WTP					SRP Based Pilot WTP		
Date	Raw Water Quality		Final Treated Water Qualiy			Final Treated Water Qualiy		
	pH	Turbidity (NTU)	pH	Turbidity (NTU)	RFC(mg/l)	pH	Turbidity (NTU)	RFC(mg/l)
1/1/2014	7.86	29.04	7.61	0.90	1.47	7.70	0.92	1.20
2/1/2014	7.27	28.88	7.49	0.90	1.47	7.68	0.92	1.20
3/1/2014	7.86	29.08	7.65	0.90	1.46	7.60	0.95	1.21
4/1/2014	7.86	29.33	7.55	0.90	1.47	7.45	0.92	1.21
5/1/2014	7.85	29.54	7.62	0.90	1.46	7.55	0.95	1.22
6/1/2014	7.86	29.96	7.63	0.89	1.44	7.56	0.92	1.20
7/1/2014	7.85	31.08	7.63	0.89	1.47	7.45	0.90	1.21
8/1/2014	7.86	29.67	7.64	0.90	1.47	7.56	0.90	1.22
9/1/2014	7.85	29.58	7.63	0.90	1.47	7.48	0.92	1.22
10/1/2014	7.85	29.04	7.63	0.90	1.47	7.56	0.95	1.20
11/1/2014	7.87	29.50	7.63	0.90	1.47	7.52	0.95	1.21
12/1/2014	7.86	29.29	7.30	0.89	1.46	7.55	0.95	1.22
13/1/2014	7.85	28.71	7.63	0.89	1.45	7.58	0.92	1.20
14/1/2014	7.86	27.83	7.64	0.88	1.45	7.59	0.92	1.20
15/1/2014	7.87	29.54	7.64	0.89	1.47	7.59	0.92	1.21
16/1/2014	7.86	30.75	7.64	0.90	1.47	7.55	0.91	1.22
17/1/2014	7.86	29.79	7.64	0.90	1.47	7.54	0.92	1.20
18/1/2014	7.85	29.96	7.63	0.91	1.47	7.62	0.92	1.20
19/1/2014	7.85	30.83	7.45	0.89	1.46	7.60	0.95	1.21
20/1/2014	7.85	29.79	7.64	0.89	1.46	7.55	0.95	1.22
21/1/2014	7.86	51.88	7.64	0.90	1.46	7.55	0.95	1.22
22/1/2014	7.86	55.71	7.64	0.88	1.47	7.68	0.92	1.20
23/1/2014	7.86	34.75	7.64	0.90	1.23	7.70	0.89	1.20
24/1/2014	7.86	32.38	7.64	0.89	1.47	7.55	0.89	1.21
25/1/2014	7.86	29.29	7.64	0.89	1.48	7.50	0.89	1.21
26/1/2014	7.86	29.54	7.64	0.89	1.46	7.50	0.89	1.20
27/1/2014	7.86	29.04	7.64	0.89	1.48	7.55	0.89	1.22
28/1/2014	7.86	28.71	7.64	0.89	1.47	7.45	0.92	1.22
29/1/2014	7.85	28.54	7.64	0.90	1.46	7.45	0.92	1.20
30/1/2014	7.57	28.17	7.64	0.89	1.47	7.50	0.92	1.21
31/1/2014	7.86	27.96	7.64	0.89	1.46	7.50	0.95	1.22
Average	**7.83**	**31.27**	**7.61**	**0.89**	**1.46**	**7.55**	**0.92**	**1.21**

		FEBRUARY			2014			
	Bhagiathi WTP					SRP Based Pilot WTP		
Date		Raw Water Quality	Final Treated Water Qualiy			Final Treated Water Qualiy		
	pH	Turbidity (NTU)	pH	Turbidity (NTU)	RFC(mg/l)	pH	Turbidity (NTU)	RFC(mg/l)
1/2/2014	7.86	27.33	7.64	0.89	1.47	7.60	0.89	1.20
2/2/2014	7.86	27.75	7.64	0.88	1.47	7.65	0.91	1.20
3/2/2014	7.85	27.38	7.49	0.90	1.46	7.68	0.91	1.21
4/2/2014	7.85	27.88	7.55	0.88	1..48	7.65	0.92	1.22
5/2/2014	7.86	27.83	7.64	0.88	1.48	7.65	0.95	1.22
6/2/2014	7.86	27.46	7.64	0.89	1.47	7.68	0.92	1.20
7/2/2014	7.86	27.58	7.65	0.89	1.47	7.68	0.92	1.21
8/2/2014	7.86	28.33	7.64	0.89	1.47	7.70	0.91	1.22
9/2/2014	7.86	34.46	7.64	0.89	1.47	7.71	0.90	1.20
10/2/2014	7.86	34.25	7.64	0.89	1.47	7.71	0.93	1.21
11/2/2014	7.86	29.00	7.64	0.89	1.48	7.72	0.94	1.22
12/2/2014	7.85	27.92	7.64	0.90	1.47	7.75	0.94	1.21
13/2/2014	7.86	27.67	7.64	0.90	1.47	7.68	0.94	1.21
14/2/2014	7.86	28.33	7.64	0.90	1.47	7.68	0.94	1.22
15/2/2014	7.86	36.21	7.64	0.89	1.47	7.71	0.91	1.20
16/2/2014	7.87	33.04	7.64	0.88	1.46	7.71	0.91	1.20
17/2/2014	7.88	76.71	7.64	0.89	1.47	7.68	0.91	1.22
18/2/2014	7.89	57.46	7.66	0.88	1.47	7.65	0.91	1.22
19/2/2014	7.87	56.04	7.45	0.89	1.47	7.60	0.90	1.21
20/2/2014	7.87	31.96	7.64	0.90	1.48	7.62	0.90	1.20
21/2/2014	7.87	30.08	7.64	0.89	1.48	7.60	0.90	1.21
22/2/2014	7.86	30.54	7.64	0.88	1.48	7.58	0.91	1.22
23/2/2014	7.87	28.88	7.65	0.88	1.47	7.59	0.91	1.20
24/2/22014	7.86	28.71	7.65	0.88	1.47	7.55	0.91	1.21
25/2/2014	7.86	27.25	7.65	0.88	1.47	7.58	0.92	1.21
26/2/2014	7.88	27.83	7.65	0.89	1.47	7.58	0.92	1.20
27/2/2014	7.88	27.83	7.67	0.89	1.47	7.59	0.92	1.22
28/2/2014	7.89	30.88	7.68	0.89	1.47	7.58	0.90	1.20
Average	**7.87**	**33.09**	**7.63**	**0.89**	**1.47**	**7.65**	**0.92**	**1.21**

	MARCH				2014			
	Bhagiathi WTP					SRP Based Pilot WTP		
Date	Raw Water Quality		Final Treated Water Qualiy			Final Treated Water Qualiy		
	pH	Turbidity (NTU)	pH	Turbidity (NTU)	RFC(mg/l)	pH	Turbidity (NTU)	RFC(mg/l)
1/3/2014	7.88	39.21	7.61	0.87	1.47	7.58	0.91	1.21
2/3/2014	7.88	32.46	7.49	0.86	1.47	7.50	0.93	1.22
3/3/2014	7.88	29.13	7.65	0.90	1.46	7.50	0.90	1.20
4/3/2014	7.88	28.08	7.55	0.88	1.47	7.56	0.90	1.21
5/3/2014	7.88	28.08	7.62	0.87	1.46	7.56	0.89	1.21
6/3/2014	7.88	26.5	7.63	0.88	1.44	7.56	0.89	1.22
7/3/2014	7.89	27.29	7.63	0.88	1.47	7.50	0.90	1.21
8/3/2014	7.88	26.71	7.64	0.88	1.47	7.50	0.91	1.20
9/3/2014	7.89	26.75	7.63	0.87	1.47	7.50	0.92	1.20
10/3/2014	7.88	25.13	7.63	0.88	1.47	7.50	0.92	1.21
11/3/2014	7.88	25.17	7.63	0.87	1.47	7.53	0.90	1.22
12/3/2014	7.9	25.54	7.63	0.90	1.46	7.53	0.91	1.22
13/3/2014	7.87	25.33	7.63	0.89	1.45	7.55	0.91	1.20
14/3/2014	7.89	25.13	0.64	0.89	1.45	7.55	0.90	1.21
15/3/2014	7.89	24.96	7.64	0.89	1.47	7.53	0.90	1.22
16/3/2014	7.89	24.83	0.64	0.88	1.47	7.55	0.91	1.21
17/3/2014	7.88	23.08	7.64	0.88	1.47	7.53	0.92	1.21
18/3/2014	7.88	23.42	7.63	0.89	1.47	7.60	0.92	1.20
19/3/2014	7.88	25.17	7.45	0.90	1.46	7.60	0.92	1.20
20/3/2014	7.89	24.71	7.64	0.90	1.46	7.60	0.92	1.21
21/3/2014	7.89	26.88	7.64	0.90	1.46	7.55	0.92	1.22
22/3/2014	7.89	35.04	7.64	0.89	1.47	7.50	0.92	1.20
23/3/2014	7.88	32.71	7.64	0.87	1.23	7.50	0.92	1.21
24/3/2014	7.87	33.54	7.64	0.88	1.47	7.53	0.92	1.22
25/3/2014	7.88	34.71	7.64	0.89	1.48	7.55	0.90	1.22
26/3/2014	7.88	32.92	7.64	0.87	1.46	7.60	0.90	1.20
27/3/2014	7.88	32.29	7.64	0.88	1.48	7.60	0.90	1.20
28/3/2014	7.87	30.33	7.64	0.89	1.47	7.55	0.92	1.21
29/3/2014	7.88	30.08	7.64	0.88	1.46	7.65	0.92	1.21
30/3/2014	7.88	28.92	7.64	0.88	1.47	7.66	0.93	1.22
31/3/2014	7.88	28.5	7.64	0.89	1.46	7.65	0.91	1.20
Average	**7.88**	**28.11**	**7.16**	**0.88**	**1.46**	**7.55**	**0.91**	**1.21**

	APRIL			2014				
	Bhagiathi WTP					SRP Based Pilot WTP		
Date	Raw Water Quality		Final Treated Water Qualiy			Final Treated Water Qualiy		
	pH	Turbidity (NTU)	pH	Turbidity (NTU)	RFC(mg/l)	pH	Turbidity (NTU)	RFC(mg/l)
1/4/2014	7.89	30.13	7.66	0.88	1.48	7.56	0.91	1.20
2/4/2014	7.89	35.67	7.66	0.89	1.48	7.60	0.93	1.22
3/4/2014	7.87	34.83	7.65	0.90	1.47	7.60	0.94	1.22
4/4/2014	7.88	30.92	7.55	0.89	1.47	7.50	0.92	1.22
5/4/2014	7.87	29.79	7.65	0.90	1.47	7.60	0.91	1.21
6/4/2014	7.88	29.38	7.64	0.90	1.47	7.65	0.89	1.20
7/4/2014	7.89	28.75	7.65	0.89	1.47	7.65	0.89	1.21
8/4/2014	7.89	29.38	7.65	0.88	1.47	7.65	0.89	1.22
9/2/2014	7.88	31.08	7.63	0.90	1.47	7.45	0.89	1.20
10/4/2014	7.88	28.63	7.62	0.89	1.46	7.45	0.90	1.20
11/4/2014	7.88	29.71	7.62	0.89	1.47	7.45	0.91	1.20
12/4/2014	7.87	28.29	7.62	0.89	1.46	7.45	0.92	1.21
13/4/2014	7.87	28.50	7.61	0.90	1.46	7.55	0.92	1.21
14/4/2014	7.87	35.58	7.61	0.88	1.46	7.56	0.92	1.22
15/4/2014	7.88	35.96	7.63	0.89	1.48	7.66	0.92	1.20
16/4/2014	7.88	35.08	7.62	0.89	1.47	7.60	0.92	1.20
17/4/2014	7.87	31.00	7.63	0.89	1.47	7.60	0.91	1.20
18/4/2014	7.87	32.13	7.62	0.90	1.47	7.55	0.91	1.21
19/4/2014	7.86	35.00	7.45	0.89	1.46	7.62	0.91	1.21
20/4/2014	7.87	33.88	7.63	0.89	1.46	7.60	0.92	1.22
21/4/2014	7.87	29.58	7.64	0.88	1.46	7.60	0.92	1.20
22/4/2014	7.87	28.29	7.63	0.89	1.47	7.65	0.92	1.21
23/4/2014	7.87	28.46	7.63	0.89	1.47	7.65	0.91	1.22
24/4/2014	7.88	27.29	7.64	0.90	1.47	7.60	0.91	1.20
25/4/2014	7.87	28.88	7.63	0.89	1.47	7.60	0.91	1.21
26/4/2014	7.86	32.38	7.63	0.90	1.47	7.60	0.92	1.21
27/4/2014	7.87	32.75	7.61	0.88	1.47	7.60	0.93	1.22
28/4/2014	7.88	31.96	7.63	0.89	1.47	7.60	0.93	1.20
29/4/2014	7.87	31.42	7.64	0.89	1.47	7.65	0.91	1.20
30/4/2014	7.86	33.50	7.63	0.89	1.47	7.68	0.91	1.22
Average	**7.87**	**31.27**	**7.62**	**0.89**	**1.47**	**7.59**	**0.91**	**1.21**

	MAY				2014			
	Bhagiathi WTP					SRP Based Pilot WTP		
Date	Raw Water Quality		Final Treated Water Qualiy			Final Treated Water Qualiy		
	pH	Turbidity (NTU)	pH	Turbidity (NTU)	RFC(mg/l)	pH	Turbidity (NTU)	RFC(mg/l)
1/5/2014	7.86	44.25	7.63	0.89	1.47	7.58	0.90	1.20
2/5/2014	7.86	47.29	7.63	0.89	1.47	7.56	0.91	1.22
3/5/2014	7.87	45.13	7.63	0.90	1.46	7.58	0.91	1.21
4/5/2014	7.87	44.50	7.55	0.88	1.47	7.60	0.91	1.21
5/5/2014	7.88	45.08	7.63	0.89	1.47	7.60	0.92	1.20
6/5/2014	7.87	44.75	7.63	0.89	1.46	7.58	0.92	1.22
7/5/2014	7.86	45.79	7.63	0.89	1.47	7.58	0.92	1.22
8/5/2014	7.87	45.83	7.63	0.89	1.46	7.58	0.93	1.20
9/5/2014	7.88	56.46	7.63	0.90	1.47	7.60	0.92	1.20
10/5/2014	7.89	120.21	7.63	0.90	1.47	7.65	0.90	1.21
11/5/2014	7.89	102.79	7.62	0.89	1.47	7.60	0.89	1.21
12/5/2014	7.88	118.25	7.61	0.89	1.46	7.62	0.89	1.22
13/5/2014	7.89	78.42	7.62	0.90	1.47	7.62	0.88	1.21
14/5/2014	7.88	80.63	7.64	0.89	1.47	7.62	0.92	1.21
15/5/2014	7.88	65.46	7.63	0.90	1.47	7.62	0.92	1.21
16/5/2014	7.89	60.96	7.63	0.90	1.47	7.62	0.91	1.22
17/5/2014	7.88	73.17	7.63	0.90	1.47	7.62	0.90	1.20
18/5/2014	7.89	78.63	7.63	0.89	1.47	7.65	0.90	1.20
19/5/2014	7.88	81.83	7.45	0.89	1.46	7.62	0.91	1.21
20/5/2014	7.88	74.13	7.63	0.89	1.47	7.65	0.92	1.22
21/5/2014	7.88	64.88	7.63	0.89	1.47	7.65	0.92	1.20
22/5/2014	7.88	54.92	7.63	0.90	1.47	7.00	0.90	1.20
23/5/2014	7.89	57.42	7.63	0.90	1.23	7.63	0.88	1.22
24/5/2014	7.89	61.42	7.62	0.90	1.47	7.60	0.91	1.20
25/5/2014	7.9	61.54	7.62	0.89	1.47	7.55	0.90	1.22
26/5/2014	7.89	62.33	7.62	0.89	1.46	7.55	0.89	1.20
27/5/2014	7.89	60.71	7.63	0.90	1.48	7.56	0.89	1.21
28/5/2014	7.89	65.96	7.63	0.90	1.47	7.55	0.88	1.21
29/5/2014	7.89	57.38	7.63	0.90	1.46	7.50	0.89	1.21
30/5/2015	7.89	59.00	7.63	0.89	1.46	7.45	0.90	1.20
31/5/2014	7.89	56.42	7.63	0.89	1.47	7.55	0.90	1.20
Average	**7.88**	**65.71**	**7.62**	**0.89**	**1.46**	**7.57**	**0.90**	**1.21**

Please Note : The treated water quality based on SRP technology is at par (meeting drinking water standard) with water quality based on conventional treatment technology.