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Contact: 91-231-2535706/07 Fax: 91-231-2535708

Website : www.siberindia.edu.in Email : sajmr@siberindia.edu.in, sibersajmr@gmail.com

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C O N T E N T

Editorial Note

"A Case Study : Utilization of Boiler Fly Ash To Reduce TheParameters of Effluent Generated In Shree Datta S.S.S.K. Ltd., Shirol "

Deepa Bhandare Env. Officer, SDSSSK
Varsha Kadam Field Officer, MPCB
Vishwajit Shinde Prod. Manager, SDSSSK

ABSTRACT : The large quantities of waste water generated at all stages of sugar production are highly contaminated. Waste water management in sugar industry must implement safe and effective methods to reduce impurities. A sequential combination of different physical unit operations and chemical and biological unit processes constitute major parts of our waste water treatment. The general criteria for measuring effluent treatment plant efficiency are the degree of COD / BOD/TSS reduction, which constitutes organic pollution.

Introduction

Sugar industry is the one of the most important and second largest agro based industry in India and highly responsible for creating significant impact on rural economy. Sugar industry is seasonal in nature and operates for about 140 days in a year. Significant amount of effluent is generated during the operation of Sugar Industry which contains large amount of pollution load particularly BOD, COD and TDS. This high colored effluent with unpleasant odour and having lesser dissolved oxygen content is highly toxic for aquatic living species. Its treatment is the most and foremost important task because this treated effluent is generally used for land irrigation. The Central Govt. as well as State Govt. have set up the certain parameters like COD, BOD, TSS, TDS, pH etc. for the treated effluent and both the bodies are supervising on these parameters through Online Monitoring System.

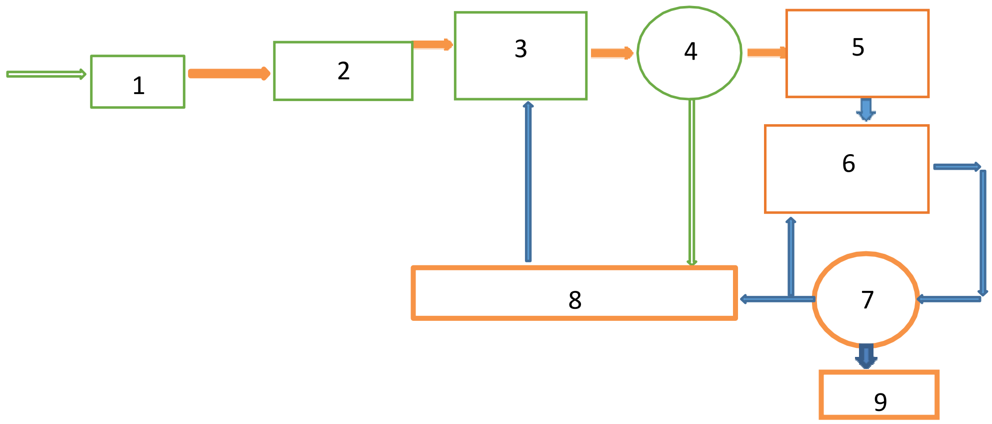
Even though the effluent of sugar industry is not reaching to the natural streams directly but treated effluent is given to farmers for irrigation purpose. Strict monitoring and good treatment practices for effluent plays vital role. If proper treatment practices are not followed then this bad/poor quality treated effluent makes impact on human / soil health, aquatic life, ground water and surface water etc.

The effluent generated through the sugar industry is of both types i.e., alkaline and acidic. The alkaline and acidic effluent treatment is the challenge at sugar industry effluent treatment plant. Water is an important natural resource and pollution of the same is to be strictly monitored and must be treated suitably before it enters into the environment. A number of treatments methods are available such as coagulation, membrane separations, adsorption, ion exchange, advanced oxidation process, biological treatment, cavitation, etc. to bring down the COD / BOD level to prescribed norms. Although some of these methods are well established, industry generates Secondary waste that again needs to be treated or disposed of suitably.

Shree Datta S. S. S. K. Ltd., Shirol is a Sugar Complex having capacity 9000 TCD along with 60 KLPD distillery and 30 KLPD ethanol plant. Steam and power is supplied fromco-generation plant, which is working under the separate management. The management of the Shree Datta S. S. S. K. Ltd., Shirol is very keen about protecting the environmental norms and committed to improve the environment in line with social responsibilities towards global initiatives. Shree Datta S. S. S. K. Ltd., Shirol have planted around 40000 trees as the Karkhanasite, which is full grown.

METHODOLOGY

DIGRAM OF ETP



1. Bar Screen	4. Primary Clarifier	7. Secondary Clarifier
2. Oil & Grease Trap	5.Anaerobic Filter	8. Sludge Drying Beds
3. Equalization Tank	6. Aeration Tank	9. Discharge tank

Above-described technology is used in Shree Datta S. S. S. K. Ltd., Shirol to minimize the COD/BOD levels in effluent generated. This particular project has been taken in hand to find alternate cost-effective way to minimize the COD, BOD, TSS, colour/ odour etc. For thisstudy we have used the fly ash which is the waste generated during boiler operation. Fly ashes the waste product generated in substantial quantity and needs to be disposed of with great precaution. We have utilized this fly ash for filtration purpose of effluent generated from sugar factory. Firstly, we have utilized the fly ash for filtration and filtered waste water is analyzed for COD, BOD, TSS, colour / odour etc. Then after the fly ash was washed with raw water and dried completely for reuse,

For filtration purpose we made one assembly of plastic can of 50 litres and converted thatplastic can into multi-bed filler. For this multibed filter we have used the different size of smallstones, sand and upper layer is covered with fly ash. We passed the effluent taken from the inlet of theequalization tank and filtered effluent is analyzed for the chemical properties i.e., BOD, COD,TSS, pH and physical properties like odour and colour.

Need Of The Study

Generally, the effluent treatment plant is designed as per the crushing capacity of the sugar factory, effluent generation and the organic load going to ETP. In Maharashtra generally every sugar factory is doing its capacity utilization more than 100% to crush maximum sugar cane in minimum time to achieve maximum recovery. This excess crushing leads to the generation of excess effluent and it becomes difficult to handle this excess effluent for ETP and it becomes very difficult to maintain the prescribed norms of treated effluent. This heavy organic load deteriorates the working of ETP as well as the treated water parameters.

Many times ETP has to treat more load of effluent than its basic designed capacity. This hampers the working of ETP and there may be large deviation in the prescribed parameters ofthe treated effluent. Frequent heavy organic loads on ETP keeps ETP working parameters disturbed, which ultimately leads towards the bad quality of treated effluent water.

This particular project study has taken in consideration to overcome problems arising from the higher organic loads going towards ETP, to establish alternate method to reduce excess COD/ BOD/ TSS/ colour/ odour etc., to consider problems arising from expansion of ETP for higher crushing rates of factory, to overcome major expenditure required to expand the ETP, and to take care of any kind of disturbance of routine working of ETP.

Observations

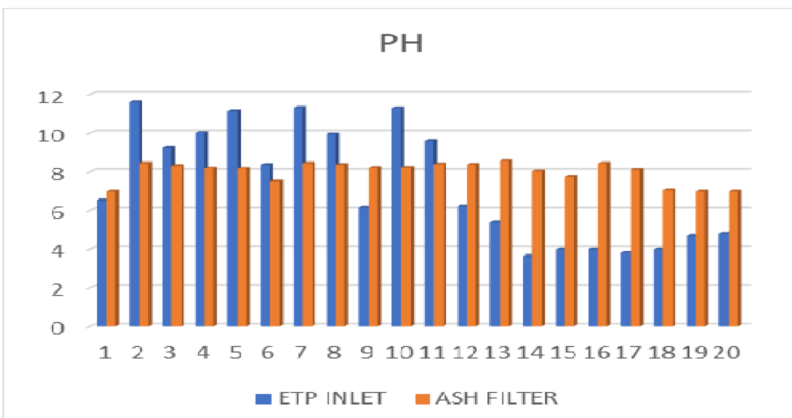
Different Studied Parameters –1

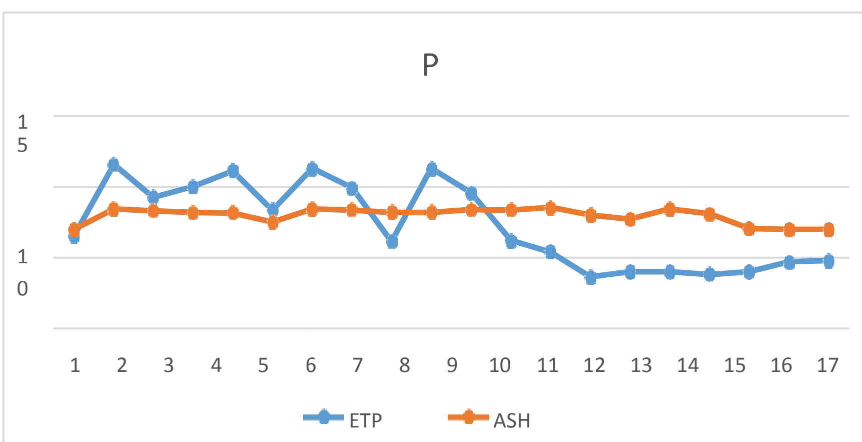
pH:

Study of pH of ETP waste water from DSSSK.

Sr. No.	pH Etp. Inlet	pH After Ash Filter	Sr. No.	pH Etp Inlet	pH After Ash Filter
1	6.53	7	11	9.58	8.4
2	11.59	8.44	12	6.21	8.38
3	9.26	8.32	13	5.41	8.55
4	10.02	8.19	14	3.65	8.02
5	11.14	8.18	15	3.99	7.73
6	8.37	7.51	16	3.99	8.44
7	11.32	8.44	17	3.82	8.1
8	9.93	8.37	18	3.99	7.06
9	6.15	8.22	19	4.68	7
10	11.3	8.23	20	4.78	7

(Observation Table no. 1)

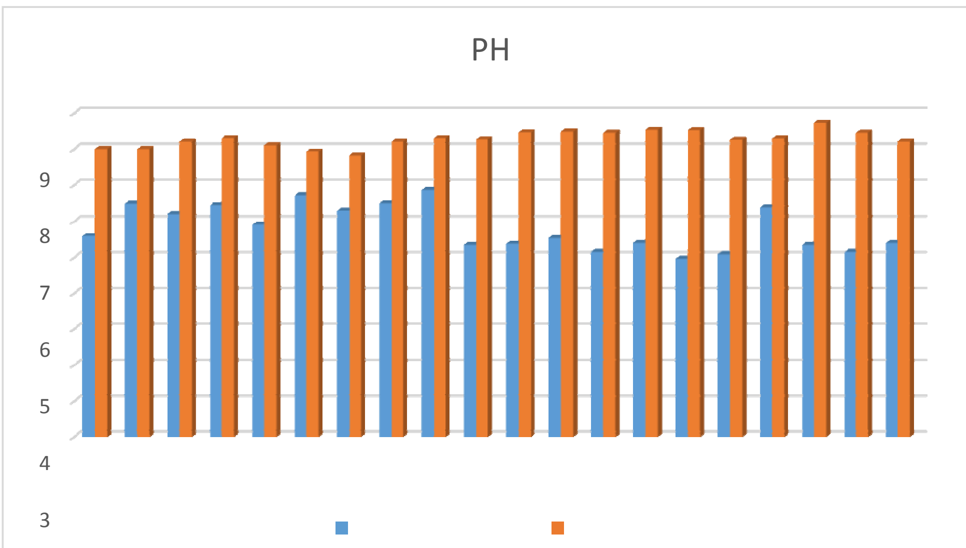


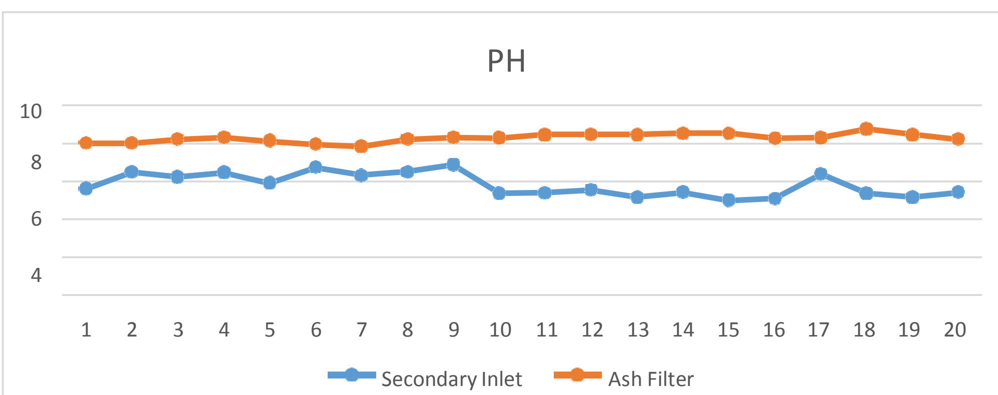


Study of pH of Secondary Inlet waste water from DSSSK.

Sr. No.	PH Secondary Inlet	PH AfterAsh Filter	Sr. No.	PH Secondary Inlet	PH After Ash Filter
1	5.59	8	11	5.38	8.45
2	6.49	8	12	5.53	8.47
3	6.2	8.2	13	5.15	8.44
4	6.45	8.3	14	5.4	8.52
5	5.9	8.1	15	4.97	8.51
6	6.72	7.93	16	5.09	8.25
7	6.3	7.82	17	6.39	8.29
8	6.5	8.2	18	5.35	8.74
9	6.86	8.3	19	5.15	8.44
10	5.35	8.26	20	5.4	8.2

(Observation Table no. 2)



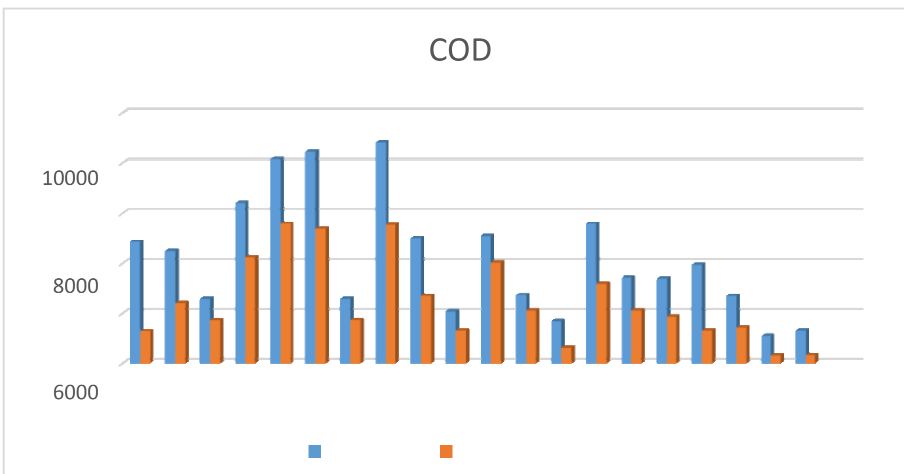


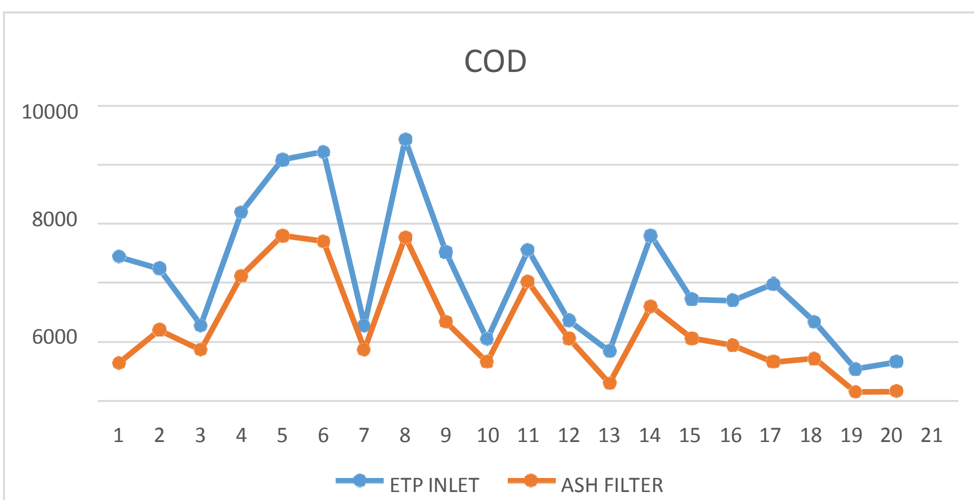
COD:

Study of COD of ETP waste water from DSSSK.

Sr. No.	Cod EtpInlet	Cod AfterAsh Filter	Sr. No.	Cod Etp Inlet	Cod AfterAsh Filter
1	4880	1280	11	5120	4040
2	4480	2400	12	2720	2120
3	2560	1720	13	1680	600
4	6400	4240	14	5600	3200
5	8160	5600	15	3440	2120
6	8440	5400	16	3400	1880
7	2560	1730	17	3960	1320
8	8850	5550	18	2680	1440
9	5040	2680	19	1080	304
10	2080	1320	20	1320	320

(Observation Table no. 3)

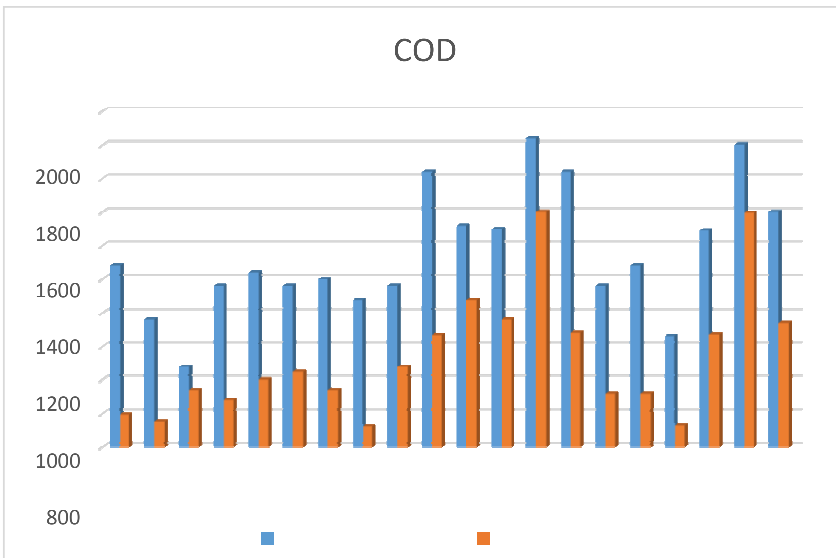


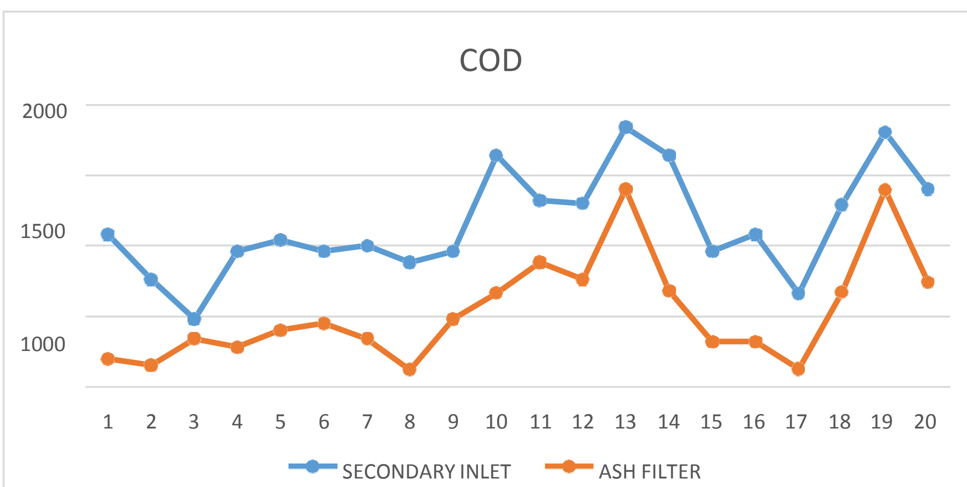


Study of COD of Secondary Inlet waste water from DSSSK.

Sr. No.	Cod Secondary Inlet	Cod AfterAsh Filter	Sr. No.	Cod Secondary Inlet	Cod AfterAsh Filter
1	1080	197	11	1320	880
2	760	152	12	1300	760
3	480	340	13	1840	1400
4	960	280	14	1640	680
5	1040	400	15	960	320
6	960	1088	16	1080	320
7	1000	340	17	660	125
8	880	120	18	1290	670
9	960	480	19	1804	1395
10	1640	666	20	1400	740

(Observation Table no. 4)



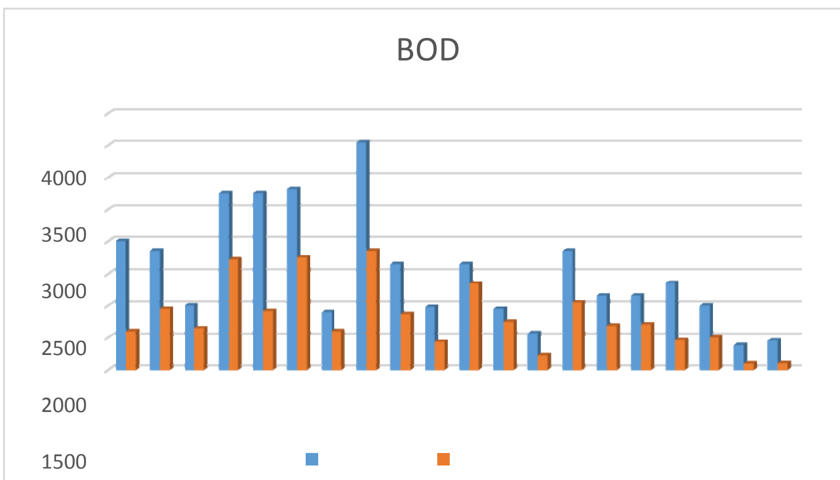


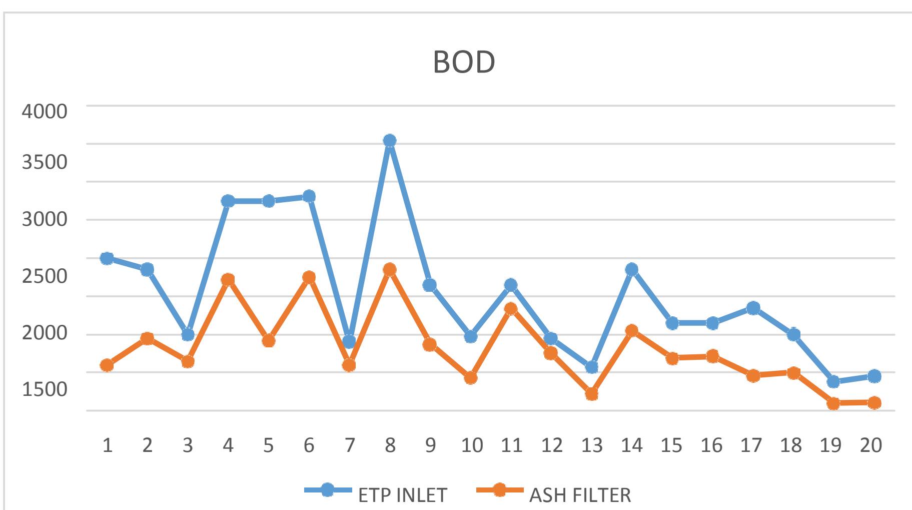
BOD:

Study of BOD of ETP waste water from DSSSK.

Sr. No.	Bod EtpInlet	Bod AfterAsh Filter	Sr. No.	Bod EtpInlet	Bod AfterAsh Filter
1	2000	600	11	1650	800
2	1850	950	12	950	750
3	1000	650	13	570	220
4	2750	1320	14	1850	1050
5	2750	916	15	1150	690
6	2810	1430	16	1150	710
7	900	600	17	1350	460
8	3540	1450	18	1000	500
9	1650	870	19	380	100
10	980	430	20	450	105

(Observation Table no. 5)

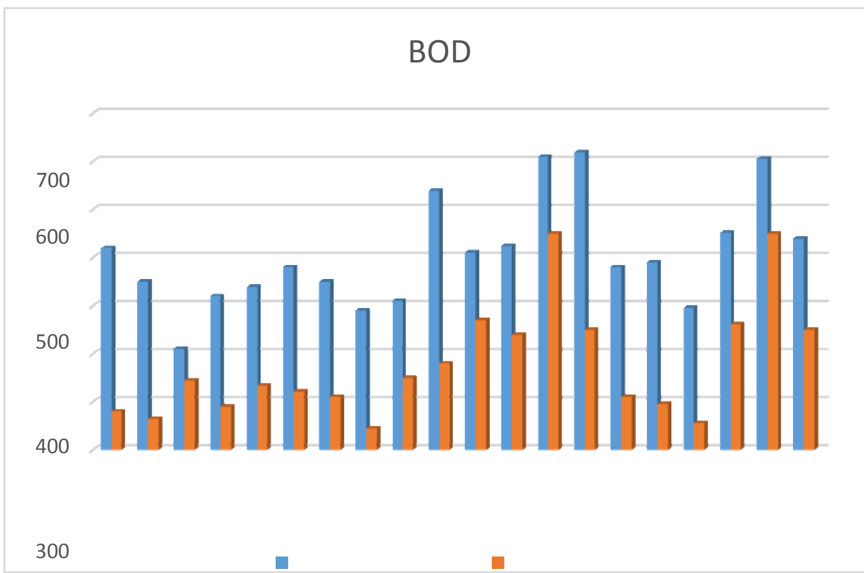


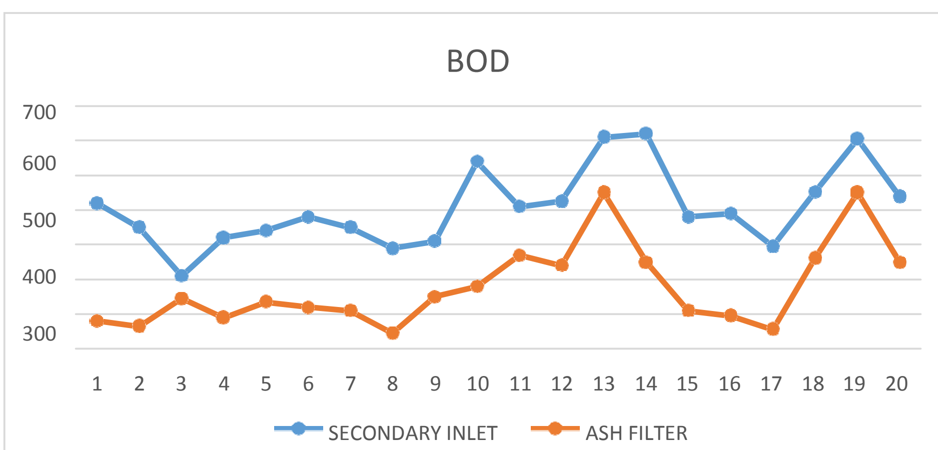


Study of BOD of Secondary Inlet waste water from DSSSK.

Sr. No.	Bod SecondaryInlet	Bod AfterAsh Filter	Sr. No.	Bod SecondaryInlet	Bod AfterAsh Filter
1	420	80	11	410	270
2	350	65	12	425	240
3	210	145	13	610	450
4	320	90	14	620	250
5	340	135	15	380	110
6	380	120	16	390	95
7	350	110	17	295	56
8	290	45	18	452	262
9	310	150	19	605	450
10	540	175	20	440	250

(Observation Table no. 6)



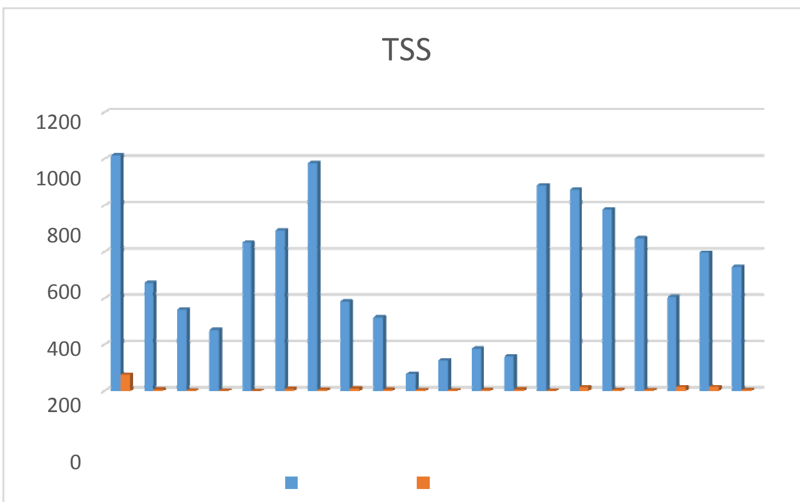


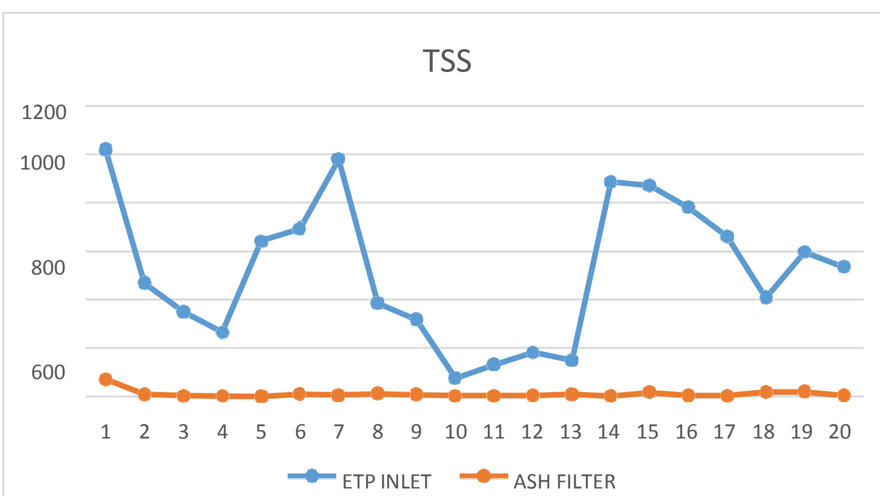
TSS:

Study of TSS of ETP waste water from DSSSK.

Sr. No.	Tss EtpInlet	Tss After Ash Filter	Sr. No.	Tss EtpInlet	Tss After Ash Filter
1	1018	71	11	132	3
2	467	8	12	182	5
3	350	3	13	149	8
4	264	2	14	886	2
5	642	1	15	869	18
6	693	10	16	781	5
7	980	6	17	660	4
8	385	12	18	408	19
9	317	7	19	597	20
10	75	4	20	535	5

(Observation Table no. 7)

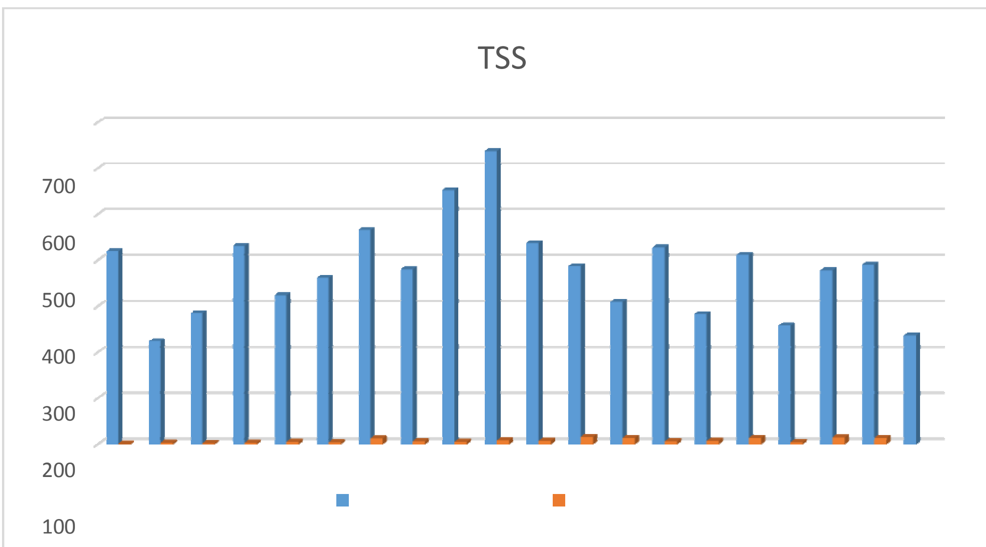


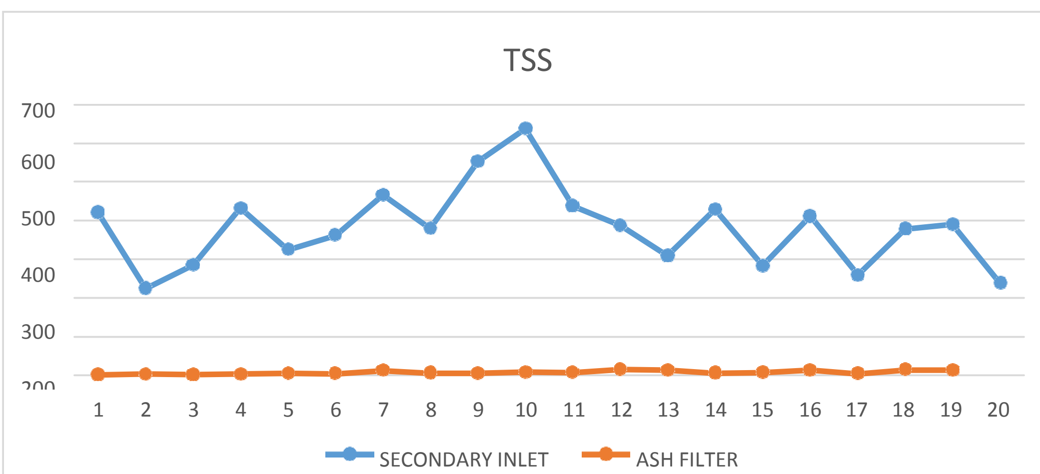


Study of TSS of Secondary Inlet waste water from DSSSK.

Sr. No.	Tss SecondaryInlet	Tss AfterAsh Filter	Sr. No.	Tss SecondaryInlet	Tss AfterAsh Filter
1	421	1	11	438	7
2	224	3	12	387	15
3	285	2	13	309	13
4	432	3	14	429	6
5	325	5	15	283	7
6	362	4	16	411	13
7	466	12	17	259	4
8	380	6	18	378	14
9	553	5	19	390	13
10	638	8	20	238	7

(Observation Table no. 8)



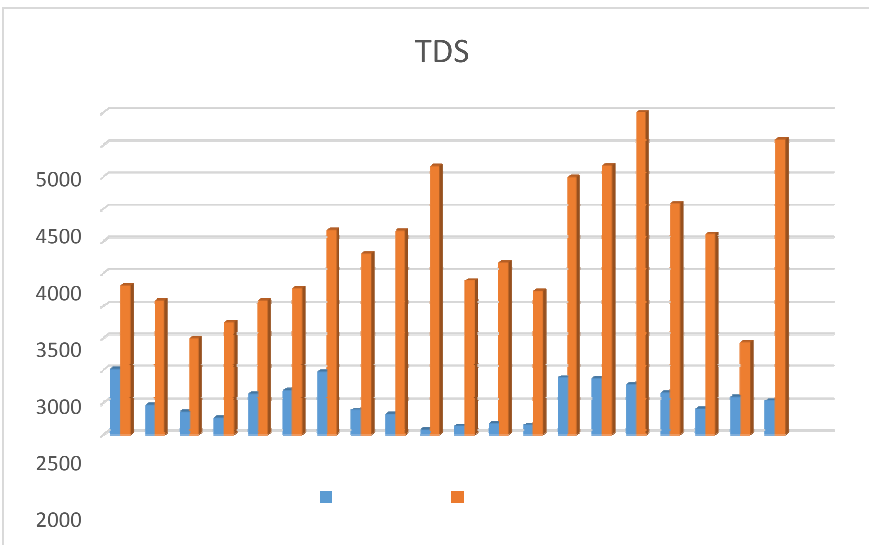


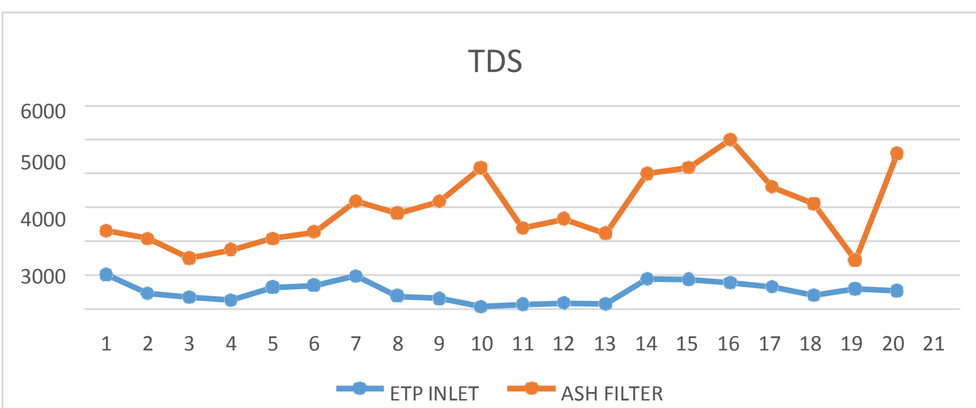
TDS:

Study of TDS of ETP waste water from DSSSK.

Sr. No.	Tds Etp Inlet	Tds AfterAsh Filter	Sr. No.	Tds EtpInlet	Tds After AshFilter
1	1758	2310	11	951	2390
2	2490	2090	12	854	2660
3	902	1497	13	702	2230
4	1153	1746	14	1931	4000
5	1749	2090	15	1689	4170
6	1300	2270	16	1771	5000
7	3250	3180	17	1778	3600
8	1260	2820	18	1489	3110
9	1299	3170	19	1845	1440
10	1588	4160	20	1685	4580

(Observation Table no. 9)

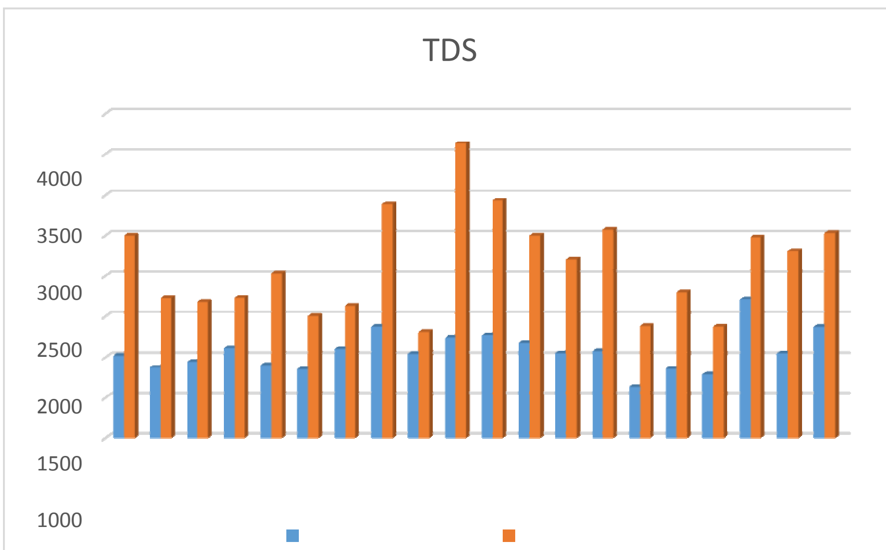


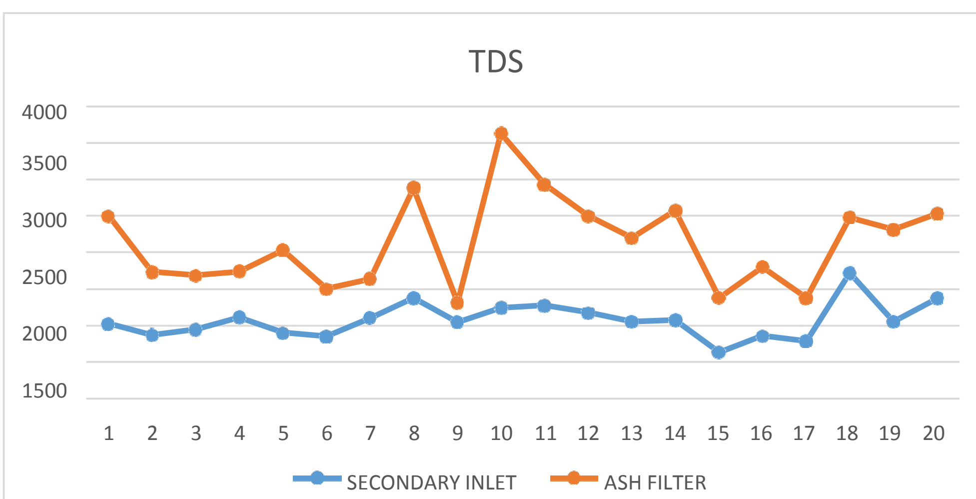


Study of TDS of Secondary Inlet waste water from DSSSK.

Sr. No.	Tds Secondary Inlet	Tds AfterAsh Filter	Sr. No.	Tds SecondaryInlet	Tds AfterAsh Filter
1	1020	2500	11	1270	2930
2	873	1733	12	1177	2500
3	944	1682	13	1050	2200
4	1113	1737	14	1075	2570
5	903	2030	15	630	1380
6	851	1503	16	856	1800
7	1102	1636	17	783	1373
8	1372	2881	18	1717	2480
9	1042	1310	19	1050	2310
10	1240	3630	20	1370	2530

(Observation Table no. 10)





COLOUR:

Study of COLOUR of ETP waste water from DSSSK.

Sr. No.	Colour Etp Inlet	Colour After AshFilter	Sr. No.	Colour Etp Inlet	Colour After AshFilter
1	PALE YELLOW	COLOURLESS	11	YELLOW	COLOURLESS
2	BROWN	COLOURLESS	12	YELLOW	COLOURLESS
3	BROWN	COLOURLESS	13	YELLOW	COLOURLESS
4	PALE YELLOW	COLOURLESS	14	BROWN	COLOURLESS
5	PALE YELLOW	COLOURLESS	15	YELLOW	COLOURLESS
6	BROWN	COLOURLESS	16	YELLOW	COLOURLESS
7	YELLOW	COLOURLESS	17	YELLOW	COLOURLESS
8	YELLOW	COLOURLESS	18	YELLOW	COLOURLESS
9	PALE YELLOW	COLOURLESS	19	YELLOW	COLOURLESS
10	PALE YELLOW	COLOURLESS	20	YELLOW	COLOURLESS

(Observation Table no. 11)

Study of COLOUR of Secondary Inlet waste water from DSSSK.

Sr. No.	Colour Secondary Inlet	Colour After Ash Filter	Sr. No.	Colour Secondary Inlet	Colour After Ash Filter
1	LIGHT BROWN	COLOURLESS	11	BLAKISH	COLOURLESS
2	BLAKISH	COLOURLESS	12	BLAKISH	COLOURLESS
3	BLAKISH	COLOURLESS	13	BLAKISH	COLOURLESS
4	BLAKISH	COLOURLESS	14	BLAKISH	COLOURLESS
5	BLAKISH	COLOURLESS	15	BLAKISH	COLOURLESS
6	BLAKISH	COLOURLESS	16	BLAKISH	COLOURLESS
7	BLAKISH	COLOURLESS	17	BLAKISH	COLOURLESS
8	BLAKISH	COLOURLESS	18	BLAKISH	COLOURLESS
9	BLAKISH	COLOURLESS	19	BLAKISH	COLOURLESS
10	BLAKISH	COLOURLESS	20	BLAKISH	COLOURLESS

(Observation Table no. 12)

ODOUR:

Study of ODOUR of ETP waste water from DSSSK.

Sr. No.	Odour Etp Inlet	Odour AfterAsh Filter	Sr. No.	Odour Etp Inlet	Odour AfterAsh Filter
1	Nuisance	ODOURLESS	11	Nuisance	ODOURLESS
2	Nuisance	ODOURLESS	12	Nuisance	ODOURLESS
3	Nuisance	ODOURLESS	13	Nuisance	ODOURLESS
4	Nuisance	ODOURLESS	14	Nuisance	ODOURLESS
5	Nuisance	ODOURLESS	15	Nuisance	ODOURLESS
6	Nuisance	ODOURLESS	16	Nuisance	ODOURLESS
7	Nuisance	ODOURLESS	17	Nuisance	ODOURLESS
8	Nuisance	ODOURLESS	18	Nuisance	ODOURLESS
9	Nuisance	ODOURLESS	19	Nuisance	ODOURLESS
10	Nuisance	ODOURLESS	20	Nuisance	ODOURLESS

(Observation Table no. 13)

Study of ODOUR of Secondary Inlet waste water from DSSSK.

Sr. No.	Odour Secondary Inlet	Odour AfterAsh Filter	Sr. No.	Odour Secondary Inlet	Odour AfterAsh Filter
1	UNPLEASANT	ODOURLESS	11	UNPLEASANT	ODOURLESS
2	UNPLEASANT	ODOURLESS	12	UNPLEASANT	ODOURLESS
3	UNPLEASANT	ODOURLESS	13	UNPLEASANT	ODOURLESS
4	UNPLEASANT	ODOURLESS	14	UNPLEASANT	ODOURLESS
5	UNPLEASANT	ODOURLESS	15	UNPLEASANT	ODOURLESS
6	UNPLEASANT	ODOURLESS	16	UNPLEASANT	ODOURLESS
7	UNPLEASANT	ODOURLESS	17	UNPLEASANT	ODOURLESS
8	UNPLEASANT	ODOURLESS	18	UNPLEASANT	ODOURLESS
9	UNPLEASANT	ODOURLESS	19	UNPLEASANT	ODOURLESS
10	UNPLEASANT	ODOURLESS	20	UNPLEASANT	ODOURLESS

(Observation Table no. 14)

Note: - On LHS of every photo is the beaker having untreated water and RHS includes thewater after ASH FILTER TREATMENT




500 ml
ASGI


500 ml
ASGI


500 ml
ASGI
mixing

CONCLUSION

This study has been carried out at Shree Datta S. S. S. K. Ltd., Shirol which is the sugarcomplex having crushing capacity 12000 TCD with 90 KLPD Distillery and 90 KLPD Ethanol Plant. All the samples are collected from the ETP inlet and inlet of the secondary clarifier of effluent treatment plant of capacity 2800 m^3 / day.

The analysis of waste water was done for the parameters like pH, COD, BOD, TSS, TDS, odour and colour during the period.

The samples collected were analyzed in the laboratory of Shree Datta S. S. S. K. Ltd.,Shirol and the following conclusions were drawn:

1. The pH of samples collected from the ETP inlet and inlet of secondary clarifier having wide range from 3.65 to 11.59 which is not within the norms prescribed by CPCB whereas the samples filtered through fly ash, found with pH variations of 7.82 to 8.74, which was within the norms of CPCB and MPCB.

2. The COD of samples collected from ETP inlet and secondary clarifier having range from 1080 to 8440 whereas the sample results which were filtered through fly ash, found with COD variations of 120 to 1840. It means that in the filtered samples Av. COD reduced by 53.79%.

3. The BOD of samples collected from ETP inlet and inlet of secondary having the range 210 to 3540 whereas the sample results which were filtered through fly ash, found with BOD variations of 45 to 1450, it shows that in the filtered samples Av. BOD reduced by48.25%.

4. The TSS of samples collected from ETP inlet and inlet of secondary clarifier having the range from 224 to 1018 whereas the sample results which were filtered through flyash, found with TSS variations of 1 to 71,which is within prescribed limits, it simply indicates that the Av. TSS removed was almost 98%.

5. The TDS of samples collected from ETP inlet having range from 702 to 3250 whereas treated samples TDS range from 1440 to 4580. The TDS of samples collected from secondary inlet range from 630 to 1717 whereas the treated samples range varies from 1310 to 2881. In the both cases Av. TDS increase is almost double but in case of secondary sample the increase in Av. TDS is definitely double but still within the prescribed norm i.e., 2100 mg/lit.

6. During the study it is found that after the filtration TDS goes on increasing so if any additional measure is taken to reduce the TDS within prescribed norms then the system will be up to the mark.

7. We have achieved considerable reduction in COD/BOD values (nearly 50 %), and we are planning to introduce novel ideas in the clarification and aeration units with the help of experts so that COD/ BOD values of economically treated effluent will be within the prescribed norms of pollution control boards.

8. The odour of samples collected from inlet of the ETP and secondary inlet was nuisance and unpleasant respectively whereas the treated samples turned into odorless.

9. The colour of samples collected from inlet of ETP and secondary inlet was yellow and blackish respectively whereas the treated samples were completely colorless.

Suggestion

Now a day's primary and secondary treatment has been followed for effluent treatment. Herewe suggest tertiary treatment for further improvement of treated effluent parameters by utilizing boiler fly ash.

Acknowledgement

The Authors express their sincere gratitude towards Hon'ble Chairman Ganpatrao Patil and Mr. M. V. Patil for allowing us to undertake the study and for permitting to present this paper. The authors are also thankful to technical staff of sugar factory for their co-operation.

References.

EMS Documentation of Shree Datta S. S. S. K. Ltd., Shirol.

ISO Documentation of Shree Datta S. S. S. K. Ltd., Shirol.

Jain and Sunil Rao:- Industrial safety, Health and Environmental Management.

Sankapasri S.S., Prithviraj H.K., Lalithamba C., Reshma T.V. :- Characteristics of sugar industry waste water and performance evaluation of effluent treatment plant. International Journal of Future Generation communication and Network vol.13(4),3156-3162 (2020)

Sapkal D.B., Gunjal B.B., Deshmukh I.K. and Kadam A.B.,: -Achieving zero water requirement for sugar factory- A case study, DSTA 52nd annual conference , B-7 to 13(2003)

Shinde V.V., and Sapkal D.B., Achieving zero water requirement and waste water minimization in sugar mill-Practical Experience, State level sugar conference at VSI, Pune pp 127-129(2015)\\

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Instructions to Authors

South Asian Journal of Management Research (SAJMR) is planned to be an archival journal of research pertaining to managerial aspects in various areas of human activities. This journal is a publication of Chhatrapathi Shahu Institute of Business Education and Research (CSIBER) Kolhapur, India. CSIBER is a unique institute of its kind in the entire Indian subcontinent imparting postgraduate professional education in the fields of business management, social work administration, environmental studies and computer application. Management thoughts and managerial research are the common factors that link these otherwise diverse fields. Having completed three decades, the institute now desires to cater to the international community by creating a platform for sharing the outputs of managerial research in these as well as other areas of human activities. We believe that the socio-economic and political environments in South Asian countries are more or less similar that we will be able to share the same media for this purpose. SAJMR is the realization of this vision.

Scope of the Journal

The Journal publishes original research papers pertaining to the managerial aspects of (but not limited to) Business, Industry, Information Technology. Environmental Studies, Public Administration and Social Work Administration. The journal will also consider publishing full-fledged review papers in some of these areas.

Content blend

The journal prefers to publish rigorous papers with sound methodology leading to advanced body of knowledge Conceptual and empirical research paper, review papers, theoretical studies, case studies, simulation studies and model building will be considered for publication.

Frequency

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Editorial Policy

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1. We expect the papers to have word length between 3000 and 7000.
2. First page of the manuscript should contain only the title of the paper, name(s) of author(s), name(s) and full address(es) of organization(s) (along with phone, fax and e-mail) where the work has been carried out. The corresponding author should be marked with an asterisk (*).
3. An abstract of 150 words should be included at the beginning of the paper.
4. Abstract should be following by relevant key words.
5. The paper must be typed on MS Word with Times New Roman font, 1.5 line spacing. A4 size paper. 1.5" margin on left side and 1" margin on all other sides. The main heading should be of 16 font size and it should appear in bold characters. The rest of the paper including the sub heading and sub-sub headings should be of 12 font size.
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8. All headings should appear in title case.
9. Ashort biography (one paragraph per author) of the author(s) should appear at the end of the paper.
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Journal reference

Starbuck, W.H. & Mezias, J.M. (1996) Opening Pandora's box: Studying the accuracy of managers' perceptions. *Journal of Organizational Behaviour, 17:99-117.*

Book reference

Cummins, Thomas G. & Huse, Edger E. (1998) Organizational Development and Change. West Publishing Company, St. Paul, New York.

Submission of Papers

1. The manuscript should be submitted through email as an attachment file in MS Word to the Editor Dr. T.V.G. Sarma (E-mail:sajmr@siberindia.co.in, sibersajmr@gmail.com).
2. The author(s) of the research paper should give an undertaking while submitting the paper that the manuscript submitted to the journal has not been published or submitted simultaneously elsewhere and the manuscript is their original work. The duly signed undertaking should be sent to the editor by post.
3. If asked to revise, the authors have to resubmit the articles within a period of 30 days.
4. Each author will get a soft copy of the paper and a free journal copy in which their paper is published.

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South Asian Journal of Management Research (SAJMR)
Chhatrapati Shahu Institute of Business Education and Research (CSIBER)

University Road, Kolhpaur - 416004, Maharashtra State. India.

Phone : 0231-2535706, 2535707. Fax : 0231-2535708

Website : www.siberindia.edu.in Email : sajmr@siberindia.edu.in, sibersajmr@gmail.com