BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL

PRINCIPAL BENCH, NEW DELHI

OA NO. 429 OF 2019

IN THE MATTER OF:

RWA Society — Applicant

Versus

Govt. of NCT of Delhi — Respondent

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Place:: New Delhi

Filed By

Date::31**-05-2021**

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STATUS/COMPLAINCE AFFIDAVIT IN TERMS OF ORDER DATED 23-02-2021 ON BEHALF OF DELHI JAL BOARD

AFFIDAVIT

I, Satish Chander Vashishth S/o Late Shri S.N.Sharma aged 58 yrs, presently working as Chief Engineer (SDW)S/E with the Delhi Jal Board having its office CE(SDW) at Keshopur Sewage Treatment Plant do hereby solemnly affirm as hereunder::

1. That I am presently working as Chief Engineer (SDW)S/E with the Respondent, DJB, and as such I am fully conversant with the facts and circumstances of the present writ petition and hence competent to swear the present affidavit.

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2. That the present Status/ action taken/ compliance affidavit is being filed by the respondent in terms of order dated 23-02-2021 passed by this Hon'ble Tribunal in above captioned matter.

3. That the above captioned OA was instituted wherein the applicant being aggrieved by the bad odour emitting out of STP Kondli and spreading in the surrounding residential area.

4. That this Hon'ble Tribunal was pleased to direct DJB to take remedial steps to ensure that the bad odour is controlled at the STP situated at Kondli which as per averments of the applicant is situated near the residential area.

5. It is pertinent to mention here that in compliance of the orders passed by the Hon'ble Tribunal, DJB appointed a consultant, who surveyed and inspected 45 MGD STP Kondli site round the clock to assess the actual odour problem and accordingly submitted Detailed Project Report (DPR), wherein, it was recommended to install Two Stage Biological Odour Control Unit at 45 MGD STP Kondli.

6. That it is relevant to submit here that the recommendations of the consultant involved an expenditure of approx Rs. 17 Crores, for installation of equipment as recommended.

7. That It is further relevant to submit here that whenever such kind of recommendations are made by the consultant, such

recommendations are placed before the Board of Respondent so as to enable the respondent to take a considered decision as to implement the recommendations or to conduct further studies or find other viable resources to meet the problem for which a particular consultant is hired.

8. That it is relevant to submit that whenever such recommendation is place before the Board then while considering such recommendations the Board not only considers the technical viability but also considers the financial implications which might burden the government exchequer.

9. That it is not out of the place to bring to Your Lordship's notice that whenever anything comes to the notice of respondent with regard to effective measures to be undertaken by the respondent in discharge of its statutory duty then the respondent has to have approval from the Board to undertake any such project as recommended by a consultant for effective discharge of it function as mandated in Delhi Water Board Act-1998.

10. That it is pertinent to mention here that the proposal according to the DPR was prepared, and placed before the Board; however, during the meetings it was deliberated upon and proposed by the Board to find out a better viable technology and even find out technology used by government departments globally, which not

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only effectively controls bad odour emitting from STP Kondli, but also is financially viable.

11. That pursuant to this the DTQC of the respondent which comprises the experts in the field , conducted various studies about, "*Chemical dosing as recommended process for removal of various contaminants from waste water e.g. odour caused by sulphides, suspended solids, suspended BOD, phosphate etc.*"

12. That the sources of the study conducted are mentioned as under:-

a). Chapter 12 of "CPHEEO" (Central Public health & Environmental Engineering Organisation, Ministry of housing and Urban development, Government of India) manual (page no 220-221).

12.6 of CPHEEO manual suggest about chemical sedimentation. Coagulation of sewage/waste waters. 12.6.1 refers about chemicals to be used as coagulants for chemical dosing of waste waters.

b). Chapter 6 of "Waste Water Engineering (Treatment and reuse)" by Metcalf & Eddy, page no 476- 477 explain about role of chemical unit processes and its applications and page no 493-500 suggest Chemical precipitation for improved plant performance.

S/c

c). Below researches papers established that Ferric Chloride removes odour caused by sulphide and also BOD, TSS and phosphates:-

i)."IWA Publishing 2021", Water Practice & Technology Vol 16 No 1, doi: 10.2166 /wpt. 2020.111., Research paper on Ferric chloride for odour control: studies from wastewater treatment plants in India

ii)."Combating Wastewater Treatment Plant Issues", Article published in Water World magazine on Iron and Peroxide Chemistry

iii)."IWA Publishing 2021", Water Practice & Technology 2010;61(10):2635-44. doi: 10.2166/ wst.2010.211., Research paper on Treatment of unpleasant odours in municipal wastewater treatment plants.

13. That in view of above referred study/research, it was found that Dosing of Ferric Chloride may be an effective measure which can take care of bad odour emitting from the raw sewage that comes for treatment at STP Kondli.

14. That based on the research/study and getting confirmed theoretically, respondent DJB's Scientific-staff initiated study and research on the effect and possibilities of coagulation in the removal of odour and suspended impurities in May to September

6/L

2020 at DJB STPs at Okhla Sewage Laboratory under the guidance of Chief Water Analyst (W&S)-III. For this purpose, various coagulants like ferric chloride, PAC, Alum were used separately and in combination in various concentrations and it was established in laboratory through Jar tester method that Ferric Chloride is highly effective for removal of sulphides that is major cause of odour in waste waters. It also removes suspended BOD, TSS and ammonia. At the dose of 40 mg/ltr it removes 92.3% Sulphides, 57.4% BOD, 38% TSS , 15.6% Phosphates and 23% ammonia.

15. That the main highlights of the study conducted are as under:-

- Foul odours at WWTPs are due mainly to hydrogen sulphide emission.
- This study explores the application of the commonly-used coagulant ferric chloride to remove sulphides from wastewater.
- Dosage of 40 mg/L ferric chloride was effective in removing sulphides, phosphates, TSS and BOD.
- Ferric chloride can provide cost-effective treatment in WWTPs to reduce foul odour emissions.

7/C

A true Copy of the study conducted by DTQC is annexed herewith and marked as **ANNEXURE 1**.

16. That it is pertinent to mention here that it is the presence of hydro sulphide in the raw sewage which is principally responsible for bad odour/foul smell. The ferric chloride acts as a coagulant. Hence, being coagulant, it also helps in improving the chemical properties and thereby arresting the Sulphide contents present in the raw sewage, which is principally responsible for foul smell. A true copy of the scientific study as available is annexed herewith and marked as **ANNEXURE 2.**

17. That after completion of testing and its encouraging results, in-principle approval was obtained for the work of "Supply, Provisioning, Installation, Commissioning and O&M for 1 Year of Automatic Chemical Dosing System at 45 MGD Sewage Treatment Plant" by the respondent and the NIT for the same was floated. A true copy of the NIT is annexed herewith and marked as **ANNEXURE 3**.

18. That it is pertinent to mention here that Three (03) valid bids were received for the work. The work has been awarded to M/s Ideatec vide LOI No. DJB/CWA(W&S)-III/2020-21/271 dated

8/c

16.03.2021 issued by CWA (W&S)-III/Okhla. A true copy of the work order is annexed herewith and marked as **ANNEXURE 4**.

19. That it is pertinent to mention here that M/s Ideatec, the company which has been awarded the work order, has already commenced the Manual Ferric chloride dosing on 17.05.21.However, The automatic dosing system is delayed, because of Covid-19 situation, there is lockdown and whole Country is in Horrible condition, causing delay in procuring automatic aid instruments, panels, IOT devices etc. Since these items have to be transported from Pune (Maharashtra) and Coimbatore (Tamil Nadu), DJB already issued request letters to concern district administration to consider these items as essential and allow transportation of these items on urgent basis, the project is likely to be completed by 30th June 2021.

20. That the dosing of ferric chloride has reduced emission of Hydrogen Sulphide from 3.8mg/l at inlet to 0.8-1.5mg/l at outlet thereby reducing the bad odour considerably. A report of the lab showing reduction in hydrogen sulphide after ferric chloride dosing is annexed herewith and marked as **ANNEXURE 5**.

21. That it is pertinent to mention here that in addition to the dosing of Ferric Chloride; the respondent DJB has covered following units

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at STP Kondli, namely: Primary Thickener-A, Primary Thickener-B and Sludge Balancing Tank near residential area as an additional measure to curb spread of Hydrogen Sulphide in the Air whereby spreading of bad odor has been further minimize in the area. The photographs of the units covered in STP are annexed herewith and marked as **ANNEXURE 6**.

22. It is most humbly submitted that the respondent DJB has taken effective scientific steps for controlling bad odour by carrying out the above stated two activities. and the order Dated 23-02-2021 of this Hon'ble Tribunal has been complied with.

23. It will not be out of place to submit that process of dosing as adopted and implemented by the respondent has not only effectively minimised bad odour but this process is much more economical and financially viable.

24. It is further relevant to submit here that the dosing process which is being carried out by the contractor is being continuously monitored by respondent DJB.

25. That it is further pertinent to mention here that, in addition to the aforementioned activities being carried out at STP Kondli, the respondent has planted more than 1000 trees around the boundary

wall of STP, adjacent to residential area to create a natural barrier and also to offer natural filtration to further minimize bad odor and also to improve environment in and around STP Kondli.

26. That it is most humbly submitted that after implementation of the aforestated dosing process and coverage done at the plant, respondent has not received any complaint from anyone including the applicant regarding the bad odour.

27. That last but not the least the Respondent has always remained vigilant with regard to carrying out its statutory functions and will remain vigilant in future as well.

28. That in view of the above submissions, it is prayed that this Hon'bleTribunal may please dispose off the present OA No. 429/2019.

DEPONENT

S. C. VASHISHTH
Chief Engineer (SDW) N/W
DELHI JAL BOARD
WWTP Keshopur,
New Delhi-110018

VERIFICATION:-

Verified at New Delhi on this __th day of May 2021 that the contents of the above affidavit are true and correct to be best of my knowledge and belief are based on the available information in the department and that nothing contained therein are false and nothing material has been concealed therefrom.

DEPONENT

S. C. VASHISHTH
Chief Engineer (SDW) N/W
DELHI JAL BOARD
WWTP Keshopur,
New Delhi-110018

S. C. VASHISHTH
Chief Engineer (SDW) NW

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OFFICE OF THE CHIEF WATER ANALYST
(Water & Sewage)
GOVT. OF NCT OF DELHI
OKHLA SEWAGE TREATMENT PLANT
MATHURA ROAD, NEW DELHI-110020
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Raw sewage kondli STP Fecl$_3$ experiment conducted on 15.10.2020

DOSE		10 ml			20 ml			30ml			40ml			50ml		
TIME (MINUTES)	R.S	2	5	10	2	5	10	2	5	10	2	5	10	2	5	10
pH	7.71			6.92	6.9		6.91	6.89		6.9	6.92		6.91	6.93		6.92
Tub.	121	120		107	105		97.1	101		98.5	98		93	98		96.4
TDS	770	760		761	760		758	746		748	738		740	733		736
NH_3	42	38		37	35		35	35		34	32		32	30		30
PO_4	3.2	3.0		2.9	2.9		2.8	2.8		2.7	2.8		2.8	2.7		2.7
TSS	153	100		96	104		95	100		96	98		95	98		93
H_2S	5.2	5.2		3.6	3.6		2.8	0.8		0.8	0.4		0.4	0.4		0.4
BOD	263	213		133	163		123	160		120	163		112	162		100
COD	480	400		350	380		330	380		330	380		320	380		310

Executive Engineer (SDW)-IV
Delhi Jal Board, Govt. of NCT of Delhi
Kondli Sewage Treatment Plant
Kondli, Delhi-110 096

Annexure-1

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Ferric Chloride Experiment On Dated 22.09.2020

		10 Min.			
Particulars	**R.S**	**$Fecl_3$**	**Alum**	**Pac**	**$Fecl_3$+ Alum**
Dose		**15 ml**	**15 ml**	**15ml**	**10ml + 5 ml**
pH	6.7	6.98	6.55	6.75	6.8
Ammonia	32	30	28	28	28
Phosphate	0.8	0.8	0.3	0.9	0.8
T.S.S	172	64	10	15	37
T.D.S	604	582	601	590	590
B.O.D	148	38	34	35	36
C.O.D	290	100	80	80	90
H_2S	2.4	NIL	1.2	1.2	0.8
Clarity	Blackish	Yellowish	clear	clear	Hazy
Smell	Sewage	Very Mild	Mild	Mild	V.Mild
Total coliform count,MPN/100 ML	$24X10^{16}$	$24X10^{16}$	$24X10^{16}$	$24X10^{16}$	$24X10^{16}$

CWA (W&S) III ACWA Chemist Asstt. Chemist

Executive Engineer (SDW)-IV
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Ferric Chloride Experiment on Dated 21.09.2020

		10 Min.				15 Min.			
Particulars	**R.S**	**$Fecl_3$**	**Alum**	**Pac**	**$Fecl_3$+ Alum**	**$Fecl_3$**	**Alum**	**Pac**	**$Fecl_3$+ Alum**
Dose		**10 ml**	**10 ml**	**10 ml**	**10 ml**	**10 ml**	**10 ml**	**10 ml**	**10 ml**
pH	7.47	6.87	6.81	6.86	6.74	6.89	6.8	6.84	6.6
Ammonia	45	35	30	32	30	35	31	30	30
Phosphate	2.3	0.9	0.3	0.6	0.3	0.9	0.3	0.7	0.4
T.S.S	204	63	21	24	21	64	25	23	20
T.D.S	806	636	643	638	638	634	643	635	656
B.O.D	118	60	40	41	38	62	35	33	40
C.O.D	370	110	70	130	140	110	70	140	150
H_2S	4.0	0.8	0.8	1.6	1.6	0.8	0.8	1.2	1.6
Clarity	Blackish	Hazy	clear	clear	Turbid	Hazy	clear	clear	Turbid
Smell	Sewage	Mild	Mild	Mild	V.Mild	Mild	Mild	Mild	V.Mild
Total coliform count,MPN/100 ML	$24X10^{16}$	$24X10^{16}$	$24X10^{16}$	$24X10^{16}$	$24X10^{16}$	$24X10^{16}$	$24X10^{16}$	$24X10^{16}$	$24X10^{16}$

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Experiment Conducted on 16.09.2020 With $FeCl_3$ & Alum, With 1 L sample

Particulars	R.S	Sample + $FeCl_3$ +Alum (10+5 ml)	Sample + $FeCl_3$ +Alum (10+10ml)	Sample + $FeCl_3$ +Alum (10 ml+5ml)	Sample + $FeCl_3$ +Al .m (10+10 ml)
Contact Time		(10 minutes)	(10 minutes)	(15 minutes)	(15 minutes)
pH	6.93	6.65	6.58	6.75	6.62
NH_3	42	40	38	40	37
PO_4	2.8	1.2	0.6	1.5	0.8
TSS	318	31	32	34	32
H_2S	5.2	3.6	3.6	3.6	3.6
TDS	650	629	625	622	624
Conductivity	997	966	962	956	959
BOD@3days	130	20	17	18	17
COD@2hrs	400	100	120	70	70
Smell	Foul	Mild	Mild	Mild	Mild
Clarity	Blakish	Clear	Clear	Clear	Clear

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Experiment Conducted on 12.09.2020 With $FeCl_3$, Alum & PAC With 1 L sample

Particulars	R.S	Sample + Alum(20 ml)	Sample + PAC (15ml)	Sample + $FeCl_3$ (20ml)	Sample + PAC +Alum (6+10 ml)
Contact Time		(10 minutes)	(10 minutes)	(10 minutes)	(10 minutes)
pH	7.19	6.58	6.77	7.0	6.71
NH_3	38	32	35	28	28
PO_4	1.5	0.3	0.8	1.0	0.4
TSS	200	13	32	71	12
H_2S	3.6	2.4	2.4	1.0	2.4
TDS	645	648	627	609	622
Conductivity	994	997	963	937	956
Smell	Foul	Mild	Mild	Mild	Mild
Clarity	Blakish	Clear	Hazy	Turbid	Clear

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Ferric chloride Experiment on dt 4.08.2020

Raw Sewage		Time 2Hrs. @ 40 ppm		% Reduction
		10ml/500ml For 5min	10ml/500ml For 10 min	
Turbidity	142	95	90	
pH	7.47	7.38	7.34	
NH3	38	29	27	
PO4	2.8	2.2	2.0	
BOD	137	58	52	62%
TSS	163	70	65	60%
H2s	2.4	0.8	0.4	83%
Color	Black	Grey	Grey	
Odor	Foul sewage smell	Mild	Mild	

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Ferric Chloride Experiment on Dated 28.05.2020

Raw sewage STP KONDLI

FERRIC CHLORIDE 40 ppm

Particulars	R.S	10 ml			15 ml			20ml		
		5 min	10 min	15 min	5 min	10 min	15 min	5 min	10 min	15 min
Turbidity	231	181	180	180	182	180	180	180	178	178
Ammonia	35	30	30	28	30	28	28	27	25	25
Phosphate	3.5	2.8	2.8	2.8	2.5	2.6	2.6	2.6	2.6	2.6
B.O.D	170	-	-	72	-	-	68	-	-	64
H_2S	6.4	6.0	4.0	2.0	4.8	2.8	1.6	1.6	1.6	1.2
ODOUR	FOUL	Not so foul	Not so foul	Not so foul	Not so foul	Not so foul	Not so foul	Very mild	Very mild	Very mild
Reduction				58%			60%			62%

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Ferric chloride Experiment on dt 27.05.2020

Raw Sewage okhla		Time 2 hrs @ 40 ppm		% Reduction
		5ml/500ml	10ml/500ml	
Turbidity	266	98.5	95.6	
pH	7.0	7.84	7.59	
NH3	40	35	32	
PO4	2.6	2.4	2.2	
BOD	183	65	62	66%
TSS	316	91	82	74%
H2s	5.2	2.0	1.2	77%
TDS	719	699	688	
Color	Black	Grey	Grey	
Odor	Foul sewage smell	Not so foul	Mild	

CWA (W&S) III ACWA Chemist Asstt. Chemist

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Ferric chloride Experiment

26.05.2020

Raw Sewage (12 MGD) Okhla		$FeCl_3$ 40 ppm	
Particulars	Without Ferric Chloride	5ml/500ml	10ml/500ml
Turb.	167	187	166
pH	7.02	7.54	7.47
Po_4	2.3	2.8	2.7
NH_3	35	20	18
B.O.D	155	152	150
T.S.S	196	200	194
H_2S	2.8	2.0	1.6
COLOUR	Blackish	Grey	Grey
T.D.S	890/577	587	581
ODOUR	Foul	Not So foul	Very Mild

CWA (W&S) III ACWA Chemist Asstt. Chemist

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Kondli, Delhi-110 096

Annexure-2

2d/c

A SIMPLE GUIDE TO THE CHEMISTRY, SELECTION AND USE OF CHEMICALS FOR WATER AND WASTEWATER TREATMENT

Peter Leopold & Sue D Freese

Report to the
Water Research Commission

by

Water Science cc

WRC REPORT NO. TT 405/09

July 2009

2/1/C

4.1.6 Application of Ferric Chloride in Wastewater Treatment

The primary reason for removing phosphate from wastewater is because phosphate is a nutrient and if released into surface waters, it can result in nutrient enrichment of the water body (especially when released into a river flowing into a dam (reservoir). This in turn can lead to excessive growth of algae and aquatic plants, eventually causing oxygen depletion in the water, fish kills and poor water quality. This condition is known as 'eutrophication'. Excessive growth of algae is of course a major aesthetic and environmental problem in many of the dams in South Africa and in some sensitive catchment areas specific regulations exist regarding the discharge of phosphates with the intention of controlling algae growth. Of course if we could eliminate phosphates from our water courses it would be effective in controlling the growth of algae. Unfortunately however, phosphorus has a wide range of unique uses such as in laundry detergents and fertilisers. There have been regulations in some countries to limit or prevent the use of phosphates in laundry detergents but unfortunately the alternative products are expensive and not as effective. Furthermore, phosphates are essential to fertilisers and therefore agricultural run-off would still account for phosphate loadings. Natural sources of phosphate also occur in domestic wastewaters, so limiting phosphates in detergents and fertilisers would not necessarily solve the problem.

Fortunately for water treatment chemists, the phosphate salts of ferric (Fe^{3+}) iron are quite insoluble and this is the key to the most common chemical means of phosphate removal. The reaction is one of precipitation of insoluble ferric phosphate according to the reaction (Metcalf and Eddy, 1999):

$$Fe^{3+} + H_nPO_4^{3-N} \leftrightarrow FePO_4 + nH^+ \qquad [7]$$

We can ignore the parts of the reaction we are not interested in and note that 56 g (or kg or tons) of iron will react exactly with (31 + 16 + 16 + 16 + 16) = 75 g (or kg or tons) of phosphate. So 56 g of iron will, in theory remove 75 g of phosphate. It can now be seen that if you know how many g (or kg) of phosphate are flowing into a plant over a period of time, the quantity of iron required to remove the phosphate can be calculated, and therefore the quantity of ferric chloride required can be determined.

However it is not as simple as that. Although in theory the above is correct, these reactions do not account for all the competing reactions that also occur as well as the effects of alkalinity, pH, trace elements, etc. that are found in wastewater. The result is that in practice the theoretical calculated amount provides nothing more than a rough estimation, but hopefully this provides some understanding of how chemical reactions occur and how calculations can be used to at least provide an approximation of dosage rates, etc.

Theory would suggest that we need 75 ÷ 56 = 1.34 times as much iron as there is phosphate. This is the stoichiometric amount. In practice though, because of the competing reactions, it is usually found that 1.5-2.5 times the stoichiometric amount of Fe:P is required.

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There are many different designs of wastewater plant and as a result the best place to add the ferric chloride also varies. In some plants it is added near the beginning of the works, right before the primary settling tanks, while in others, it is added to the activated sludge plant. A third option is add it near the end of the process into the secondary setting tanks.

Finally, before leaving the subject of ferric chloride we should mention its use as part of a process called 'Chemically Enhanced Primary Treatment' or 'CEPT'. As its name implies this process involves adding ferric chloride (or other metal salts) to the first, or primary settling tanks in a wastewater works. Primary settling tanks rely on gravity and natural flocculation to remove some of the suspended solids from the raw sewage before the settled sewage overflows into the secondary stage. By adding an iron salt to the primary settling tanks, the flocculation process becomes much more efficient and a significant proportion of the phosphate can be removed in the sludge. This reduces the solids that normally flow into the second stage allowing the plant to cope with a higher flow rate. Of course the result is that the amount of solids produced in the primary stage is much greater and this is only acceptable on plants that have enough solids handling capacity, (e.g. digester capacity) to cope with this extra load. Under these circumstances however, CEPT can provide a cost effective means of increasing the effective capacity of a treatment works without having to spend capital expenditure on plant extensions.

4.2 Ferric Sulphate

Ferric sulphate is also extensively used for water treatment, particularly in the Cape area of South Africa. It has been used in wastewater treatment in this country where it has been prepared from waste chemicals. It is also corrosive and has a low pH although it is more comparable in this regard to aluminium sulphate solutions. Although it can be obtained in solid form (e.g. crystals, as a source of iron in animal feeds) it is usually supplied as a solution. The strength of solution supplied is not fixed by convention as much as for the other chemicals.

4.2.1 General description

Ferric sulphate is sold commercially for water treatment in solution form. It is also sold as crystals for example, as a source of iron in animal feeds. The cost is generally based on its iron content as Fe. Depending on solution strength the iron content may range from about 8% up to 14%.

The solution is very similar in appearance to ferric chloride, having a characteristic red-brown colour and like ferric chloride the solution is acidic and corrosive, but not specifically corrosive to stainless steel as it does not contain chloride. It is regarded as hazardous in terms of handling and transport.

4.2.2 Manufacture

There are two processes that are used commercially in South Africa for the manufacture of ferric sulphate. The first of these involves the reaction of iron oxide with concentrated sulphuric

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Ferric chloride for odour control: studies from wastewater treatment plants in India

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Abstract

This study was about the feasibility of using ferric chloride as an agent for odour control in wastewater treatment plants (WWTPs) due to hydrogen sulphide emission. Total inlet sulphide concentrations at 11 WWTPs in Delhi were measured and ranged between 1.1 and 14.8 mg/L. Wastewater samples from Najafgarh drain were used in jar tests to estimate the ferric chloride concentration required to obtain acceptable treatment. Ferric chloride was effective in removing sulphide, phosphate and total suspended solids (TSS), and gave significant biological oxygen demand (BOD) reduction. It was ineffective, however, in removing ammoniacal-nitrogen. A dose of 40 mg/L removed 76% of total sulphide, which corresponds to a significant reduction in hydrogen sulphide emission. The study demonstrated that ferric chloride can be used as a cost-effective pre-treatment step in WWTPs to reduce sulphur-related odours significantly, as well as TSS, BOD and phosphate from wastewater.

Key words: ferric chloride, hydrogen sulphide, pre-treatment, wastewater

Highlights

- Foul odours at WWTPs are due mainly to hydrogen sulphide emission.
- This study explores the application of the commonly-used coagulant ferric chloride to remove sulphides from wastewater.
- Dosage of 40 mg/L ferric chloride was effective in removing sulphides, phosphates, TSS and BOD.
- Ferric chloride can provide cost-effective treatment in WWTPs to reduce foul odour emissions.

INTRODUCTION

Wastewater treatment plants (WWTPs) are integral in wastewater management and maintaining urban sanitation. A major issue encountered in WWTPs is foul odour emissions (Al-Shammiri 2004). Anaerobic microbial reactions in WWTPs and odorous volatile organic compounds (VOCs) produce hydrogen sulphide (Carrera *et al.* 2014), the target of this study. Hydrogen sulphide has a distinct, rotten egg smell and concentrations as low as 0.00047 mg/L can be detected (Crites & Tchobanoglous 1998) and it is produced by sulphate-reducing bacteria.

Hydrogen sulphide emissions at WWTPs can: (i) emanate foul odour; (ii) corrode exposed metal surfaces; (iii) lead to health issues among workers (Esswein *et al.* 2016), and (iv) cause fires if the gas comes into contact with strong oxidising agents (Nielsen *et al.* 1992). Strategies must be devised, therefore, to mitigate hydrogen sulphide emissions at WWTPs for both public health and safety. Odour neutralizers or masking agents are often used to neutralize odours, and industrial grade

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covers are used, in some cases, to prevent odour diffusion into the atmosphere (Ando 1980). These methods only mask the problem and do not treat the odour's source. Other technologies are available but are not economically feasible for use in developing countries. In addition to higher maintenance costs, biological odour control methods such as biofilters and bio-trickling filters have a large footprint and high water consumption, respectively (Estrada *et al.* 2011).

Previous studies have analysed the efficacy of chemical oxidants such as hydrogen peroxide, sodium hypochlorite and potassium permanganate in wastewater samples from WWTPs. Studies with hydrogen peroxide showed that 20–30 minutes of reaction time was required for H_2S control at 50% (v/v) concentration. However, there are safety issues with handling hydrogen peroxide at the concentration used (Thomas 2007). The concentration of H_2S in WWTP influents is directly related to the sulphide concentration in the wastewater (Al-Shammiri 2004), so the use of strategies to reduce the influent sulphide concentration at WWTPs is expected to lower hydrogen sulphide emissions proportionally.

Iron salts are commonly used both for phosphorus removal and as coagulants for removing suspended solids (Metcalf & Eddy 2003). The potential of sludge containing ferric and alum salts for hydrogen sulphide removal has been explored by Wang & Pei (2012). The sludge that they used contained twice as much iron as aluminium (w/w) and demonstrated significant H_2S removal at neutral pH. Previous studies have shown the use of ferric salts in sewer systems for sulphide and phosphate removal from wastewater (Gutierrez *et al.* 2010). However, this model might not be feasible in all developing countries since not all areas have a centralized sewer system. For example, raw sewage in most unsewered areas in Delhi is currently trapped from open drains, via the Interceptor Sewer Project, and diverted to the nearest WWTP.

The effectiveness of ferric chloride dosing on sewage sludge in controlling malodourous sulphur gas emissions was also reported by Devai & Delaune (2002). As far as is known, however, there are no current studies on the application of ferric chloride as a pre-treatment step in WWTPs for potential odour control in relation to sulphurous gases.

The major objective of this study was to explore the potential of ferric chloride dosing in WWTP inlets to reduce sulphide concentrations substantially in the presence of TSS and phosphorus. Significant sulphide and TSS removal at WWTP inlets can potentially mitigate odour nuisance due to hydrogen sulphide emission and reduce oxygen demand during further treatment in the plant.

MATERIALS AND METHODS

Materials

1,000 mg of ACS reagent grade Iron (III) chloride hexahydrate (Sigma-Aldrich, Assay 97%, CAS No. 10025-77-1), molecular weight 270.30, was dissolved in 1,000 ml of deionized water (Milli-Q) to make the stock ferric chloride solution. Different concentrations of ferric chloride were prepared by further dilution of aliquots. Deionized water from Milli-Q was used throughout.

Methods

Sulphide concentration measurement at WWTP inlets

Samples of influent wastewater at WWTPs in Delhi were withdrawn and the sulphide concentrations determined by the iodometric method (APHA 1999). Influent wastewater samples were collected from the WWTPs at Kondli (phases II and IV), Chilla, Coronation Pillar (phases I, II and III),

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Yamuna Vihar (phases I, II and III), Okhla (phases I, II and III), Keshopur (phases I and II), Najafgarh, Nilothi (phases I and II), Pappankalan (phases I and II), Rithala (phase I and II) and Rohini.

Jar tests

Experiments were carried out in a jar test apparatus (Model 1924, Electronics India Pvt Ltd) with a speed range of 25–200 rpm. Raw sewage from Najafgarh drain was used – see Table 2 for its physico-chemical characteristics. The raw sewage samples were dosed with between 5 and 50 mg/L of ferric chloride, and stirred for 30 minutes at room temperature. The concentrations of sulphide, ammonia, phosphate, TSS (total suspended solids), BOD (biological oxygen demand) and COD (chemical oxygen demand) were measured following the APHA protocol (APHA 1999). The percentage removal of pollutants was calculated using Equation (1):

$$\%removal = \frac{C_i - C_f}{C_i} \times 100 \quad (1)$$

where C_i and C_f are the initial and final concentration of the pollutant respectively. All experiments were performed in triplicate to check reproducibility, and average values are used in the tables.

RESULTS AND DISCUSSION

Generation and emission of hydrogen sulphide in WWTPs

The generation and emission of hydrogen sulphide in WWTPs depend on the wastewater's physical, chemical and biological constituents (Park *et al.* 2014). In addition to the problem of corrosion, hydrogen sulphide is a serious health and environmental hazard with high concentrations being fatal (Hvitved-Jacobsen *et al.* 2002; Nielsen *et al.* 2008). H_2S emission is related to the wastewater's free sulphide concentration (Al-Shammiri 2004). Typically, total sulphide concentrations in wastewater are between 0.1 and 10 mg/L (Henze & Comeau 2008), while sulphate ranges between 20 and 50 mg/L (Metcalf & Eddy 2003). Anaerobic regions in WWTPs, etc, facilitate the generation and emission of H_2S with the help of sulphate-reducing bacteria (SRBs). Maintaining the pH above the neutral range (the optimum pH for SRB growth is between 6 and 8) (Lopes 2007; Ayangbenro *et al.* 2018) and dissolved oxygen levels above 1 mg/L, can inhibit SRB growth and reduce foul odours at WWTPs.

Odour emission from WWTPs in Delhi

A study undertaken at 11 WWTPs in Delhi, all of which used the activated sludge process, showed that most had odour nuisance problems due to H_2S emission. A few plants also reported equipment corrosion thought to be due to high sulphide levels. Influent sulphide levels were measured (June 2020) in the WWTP inlets, therefore, and the results are shown in Table 1. The sulphide levels varied between 1.1 and 14.8 mg/L. Total sulphide concentrations can vary through the year depending on both the influent wastewater's characteristics and external factors like temperature. Studies at the Ardiyah WWTP, Kuwait, which reported odour emissions, with measured annual median total sulphide levels in the raw influent of about 10 mg/L (Al-Shammiri 2004), consistent with the results obtained for this study.

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Table 1 | Influent sulphide in selected Delhi WWTPs

WWTP	Sulphide concentration (mg/L)
Kondli Phase II	5.81 ± 0.37
Kondli Phase IV	5.19 ± 0.09
Chilla	4.81 ± 0.21
Coronation Pillar Phase I	11.45 ± 0.23
Coronation Pillar Phase II	14.8 ± 0.33
Coronation Pillar Phase III	9.4 ± 0.09
Yamuna Vihar Phase I	1.99 ± 0.22
Yamuna Vihar Phase II	1.99 ± 0.14
Yamuna Vihar Phase III	3.25 ± 0.41
Okhla Phase I	1.6 ± 0.23
Okhla Phase II	1.33 ± 0.13
Okhla Phase III	1.33 ± 0.13
Keshopur Phase I	4.2 ± 0.18
Keshopur Phase II	4.8 ± 0.23
Najafgarh	4.4 ± 0.11
Nilothi Phase I	2.9 ± 0.18
Nilothi Phase II	3.2 ± 0.19
Pappankalan Phase I	6.0 ± 0.13
Pappankalan Phase II	7.2 ± 0.26
Rithala Phase I	1.1 ± 0.21
Rithala Phase II	1.1 ± 0.08
Rohini	1.5 ± 0.03

Use of Iron (III) chloride for odour control

If the influent wastewater sulphide can be precipitated at the WWTP inlet by pre-treatment, further wastewater treatment will be eased, H_2S emission during treatment reduced, and, potentially, treatment costs reduced if the installation of odour control equipment is not needed. Previous studies have shown the ability of soluble sulphides to react with Fe salts and precipitate as insoluble iron sulphide (Grady *et al.* 1999), and the use of Fe salts to minimize sulphide generation in gravity sewers was studied by Cao *et al.* (2019). The latter used Fe salt concentrations in the range 30–60 mg/L, with different dosing frequencies, in their study and found that the microbial diversity and SRB function in the sewer were altered.

Jar tests on wastewater

Jar tests were carried out using raw wastewater from the Najafgarh drain, one of the major drains discharging into the River Yamuna. The sulphide concentration of the wastewater was 3.61 mg/L, and its TSS and BOD concentrations were 105 and 74 mg/L respectively (Table 2). Initial studies were carried out with 5, 10 and 15 mg/L $FeCl_3$ doses. While 25% of the phosphate – from 2 mg/L – was removed at all dosing concentrations, however, there was no significant removal of TSS, sulphide or BOD. Because of this, the dosing concentration was increased and 20, 30, 40 and 50 mg/L concentrations were used and determined.

Table 2 shows that increasing the ferric chloride concentration produces an increase in the proportional removal of sulphide – e.g. from 64 to 76% as the dosing concentration was raised from

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Table 2 | Effect of $FeCl_3$ concentration on sulphide removal

			Concentration of Ferric chloride (mg/L)			
			20	30	40	50
Parameter	Reporting units	Raw sewage	% removal			
pH	–	7.65 ± 0.05	7.30 ± 0.15	7.17 ± 0.12	7.10 ± 0.11	7.11
Ammoniacal-nitrogen	mg-NH_3/L	30	0	0	0	25
Phosphate	mg-PO_4/L	3.25 ± 0.62	40	41.11	52.22	50
Sulphide	mg-S/L	3.61 ± 0.87	64	74	76	76
TSS	mg/L	105 ± 11.7	33	53	62	70
BOD	mg/L	74 ± 11.3	44	46	52	52

20 to 50 mg/L respectively. The elimination of hydrogen sulphide from sewer systems using iron salts depends on the precipitation of the sulphide present, thus lowering the soluble sulphide concentration (Park *et al.* 2014). The presence of $FeCl_3$ has also been shown to inhibit SRB activity significantly in anaerobic zones (Zhang *et al.* 2009) and so reduce hydrogen sulphide emissions.

$FeCl_3$ dosing had almost no effect on removing ammoniacal nitrogen removal until 40 mg-$FeCl_3$/L was achieved. A further increase to 50 mg-$FeCl_3$/L removed 25% of the raw wastewater's ammonia. Increases in the ferric chloride dose led to increased TSS removal, nearly 70% TSS removal being observed at 50 mg-$FeCl_3$/L and natural pH. Other studies have shown that ferric chloride is most effective as a coagulant between pH 4 and 12, with maximum TSS removal at pH 4.9 (Reynolds & Richards 1996; Amokrane *et al.* 1997; Selcuk 2005; Aziz *et al.* 2007). Sarparastzadeh *et al.* (2007) showed a 48% reduction in TSS levels when raw wastewater was treated with an optimum ferric chloride dose of 70 mg/L. COD concentrations were determined and ~35% removal was observed at 40 mg-$FeCl_3$/L dosing. Precipitation of soluble organic species with ferric chloride can be attributed as a factor in COD removal (Tebbutt 1998).

Increases in ferric chloride dosing also led to increased phosphorus removal from the wastewater. Proportional removal increased from 40 to 52% as dosing increased from 20 to 40 mg-$FeCl_3$/L. Park *et al.* (2014) reported precipitated phosphorus using iron salts. Iron salt addition to wastewater causes sulphide to precipitate as iron sulphide and the larger aggregates settle in the primary settling tank. Gutierrez *et al.* (2010) indicate the need for ferric chloride dosing at locations close to WWTPs to maximize phosphate precipitation in the aeration tanks. Similar trends were observed in BOD removal and are consistent with reports by Mostafa & Peters (2016) indicating a gradual improvement in BOD removal with increased ferric chloride dosing. The lowering of BOD concentrations may be due to the corresponding precipitation of phosphorus together with the coagulation-flocculation of suspended particles. The dosing concentration and frequency required depend on the wastewater's characteristics as the proteinaceous components of the organic matter affect iron species precipitation from wastewater (Kiilerich *et al.* 2017).

Cost-benefit considerations

The jar test results indicate that a dosing concentration of 40 mg-$FeCl_3$/L can remove 76% of sulphide in addition to significant reductions in BOD and TSS levels. The main objective of this study was to remove sulphide from wastewater to reduce WWTP odour emission arising from hydrogen sulphide. Lowering of BOD in TSS concentrations would potentially simplify downstream aeration requirements during treatment as well as being cost-effective for odour control. Use of 30 mg-$FeCl_3$/L removes around 74% of influent sulphide and a 25% increase in dosing rate from 30 to 40 mg/L yields a 25% operating cost (chemical purchases) increase but only 2–3% sulphide removal

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improvement. Assuming that 40 mg-$FeCl_3$/L were used at a 10 MLD WWTP, 0.4 tonne/day of ferric chloride would be required at a cost of 10,000 INR/day (about USD 140/day). Dosing at 30 mg/L would lead to a saving, against 40 mg/L, of around 2,500 INR/day and can be taken into consideration as it can reduce the number of haulage journeys, materials handling required and so on. The long-term environmental impact must also be included when considering cost and benefits. Ferric chloride addition as a pre-treatment step is highly efficient in reducing odour and has low environmental impact. It can also improve the health of workers and local residents significantly.

SUMMARY AND CONCLUSIONS

1. Foul odours from WWTPs arise mainly from hydrogen sulphide emissions. Many WWTPs use odour masking agents or covers to deal with the issue.
2. Since hydrogen sulphide emissions relate directly to the presence of sulphide in wastewater, the feasibility of using ferric chloride to lower the wastewater sulphide concentration was studied.
3. Influent sulphide concentrations at 11 WWTPs in Delhi were measured and jar test studies performed on raw wastewaters. The results indicated that dosing 40 mg-$FeCl_3$/L led to significant proportional removal of sulphide, in addition to removal of TSS, BOD, phosphate and COD.
4. Ferric chloride dosing as a pre-treatment step at WWTP inlets can lower sulphide and other contaminant concentrations substantially, reducing downstream aeration requirements in treatment while providing cost-effective odour control.

DATA AVAILABILITY STATEMENT

All relevant data are included in the paper or its Supplementary Information.

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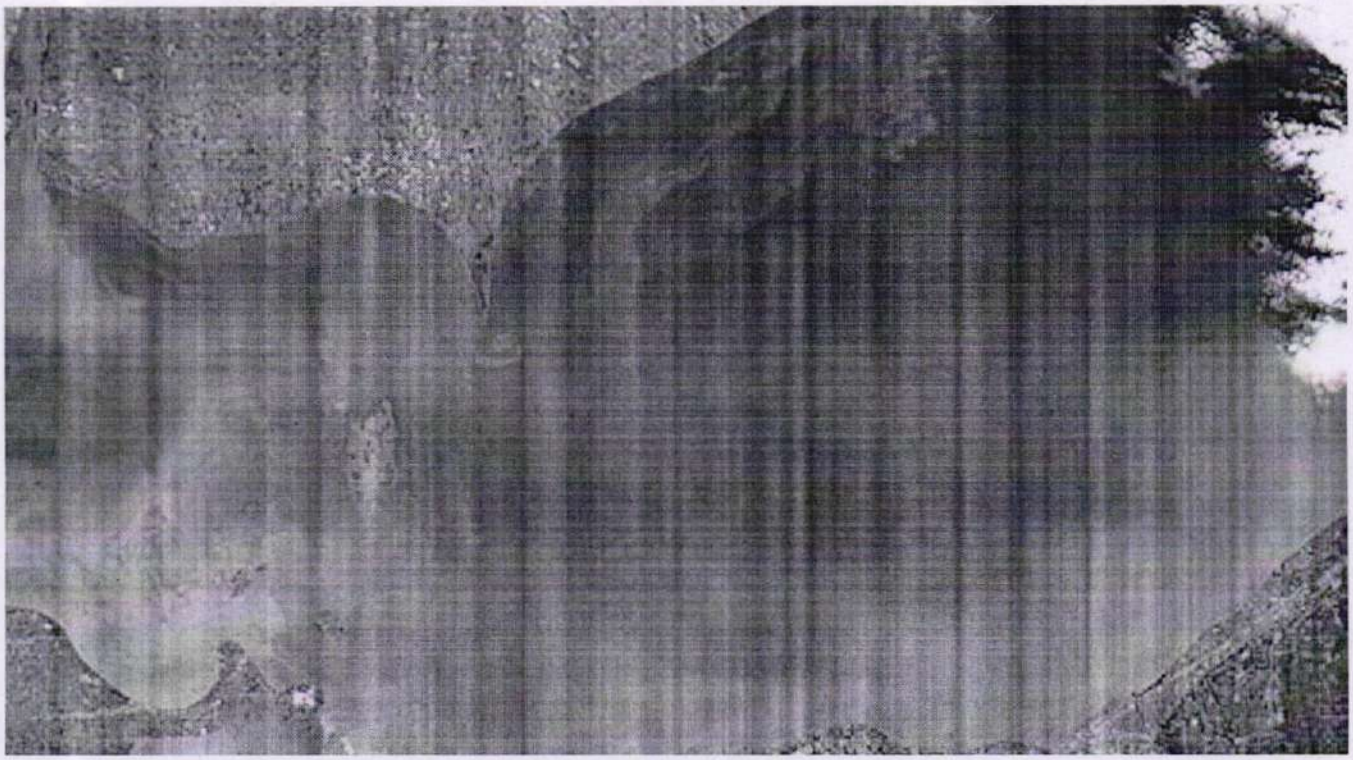

WASTEWATER | TREATMENT

Iron and Peroxide Chemistry

A straightforward treatment method based on iron and peroxide chemistry can potentially help wastewater treatment plant personnel better control phosphorus discharge, reduce hydrogen sulfide odors, and mitigate the potential for struvite deposition.

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Nov 18th, 2019

A common weapon for combating several wastewater treatment plant issues

By Brad Buecker, Jamie Belden and Inken Mello

Publicly owned treatment works (POTW) personnel must deal with a multitude of complex factors at their plants. Variable influent quality and quantity, process upsets, and plant

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discharge issues are of constant concern, coupled with the ever-present need to operate economically.

This article outlines a straightforward treatment method based on iron and peroxide chemistry that can potentially help plant personnel better control phosphorus discharge, reduce hydrogen sulfide odors, and mitigate the potential for struvite deposition, a common problem in wastewater plants that can clog pipes and other equipment.

Phosphorus: A Gorilla in the Room

Phosphorus is an essential element for life and as such, all forms of municipal waste contain it (typically as phosphate [PO4] compounds). Phosphate, however, can be problematic in wastewater treatment and industrial plants for several reasons.

In POTWs, phosphate will react with magnesium and ammonium ions to form the deposit struvite ($NH_4MgPO_4 \cdot 6H_2O$). Struvite deposition (see Fig. 1) may be particularly problematic in plants with anaerobic digesters, as will be discussed later.

On a much broader scale, phosphorus discharge from POTWs and other industrial facilities is increasingly being regulated and restricted due to serious problems from the formation of toxic algae blooms in receiving bodies of water.

Although algae blooms are commonly perceived to be most prominent in temperate climates such as Florida and the Gulf of Mexico, they can occur in colder environments as well (see Fig. 2). Thus, point source discharge restrictions for phosphorus are appearing in many areas of the country.

In yet another development, alternatives to fresh water are increasingly being selected for makeup to industrial plants. A leading alternative is secondary-treated effluent from POTWs. Unless removed upstream, phosphate, nitrogen compounds (ammonia and nitrite/nitrate), and organics provide substantial nutrients and food for microbiological growth within plant cooling and service water systems. The microorganisms can induce extreme fouling of heat exchangers, cooling tower fill, and other equipment (see Fig. 3).

It is critical to address these issues early in the design phase of any project and to institute measures to remove impurities upstream of the industrial facility. (As a side note, with regard to cleaning fouled cooling tower fill, peroxide chemistry similar to that highlighted in this article can be quite effective, provided the fill is not irreversibly fouled.1)

Phosphate Removal

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Techniques to remove phosphate prior to discharge of POTW effluent are of increasing necessity. A standard method is precipitation of phosphate with a metal salt, typically ferric chloride or ferric sulfate. The ferric compounds are also good at oxidizing and removing sulfide (H2S), thus contributing significantly to odor control. It is within these processes that supplemental use of hydrogen peroxide (H2O2) assists with iron recovery and reuse (an economic benefit), additional odor control, and permanent sequestration of phosphate, which in turn reduces the potential for struvite formation (see Fig. 4).

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Full-Scale Applications

At the Water Reclaim Facility (WRF) in Wichita, Kans., several primary treatment methods, including aerobic processes, are utilized to initially condition the incoming wastewater (see Fig. 5). Clear water discharge from the final clarifiers receives ultraviolet (UV) disinfection and reaeration prior to discharge.

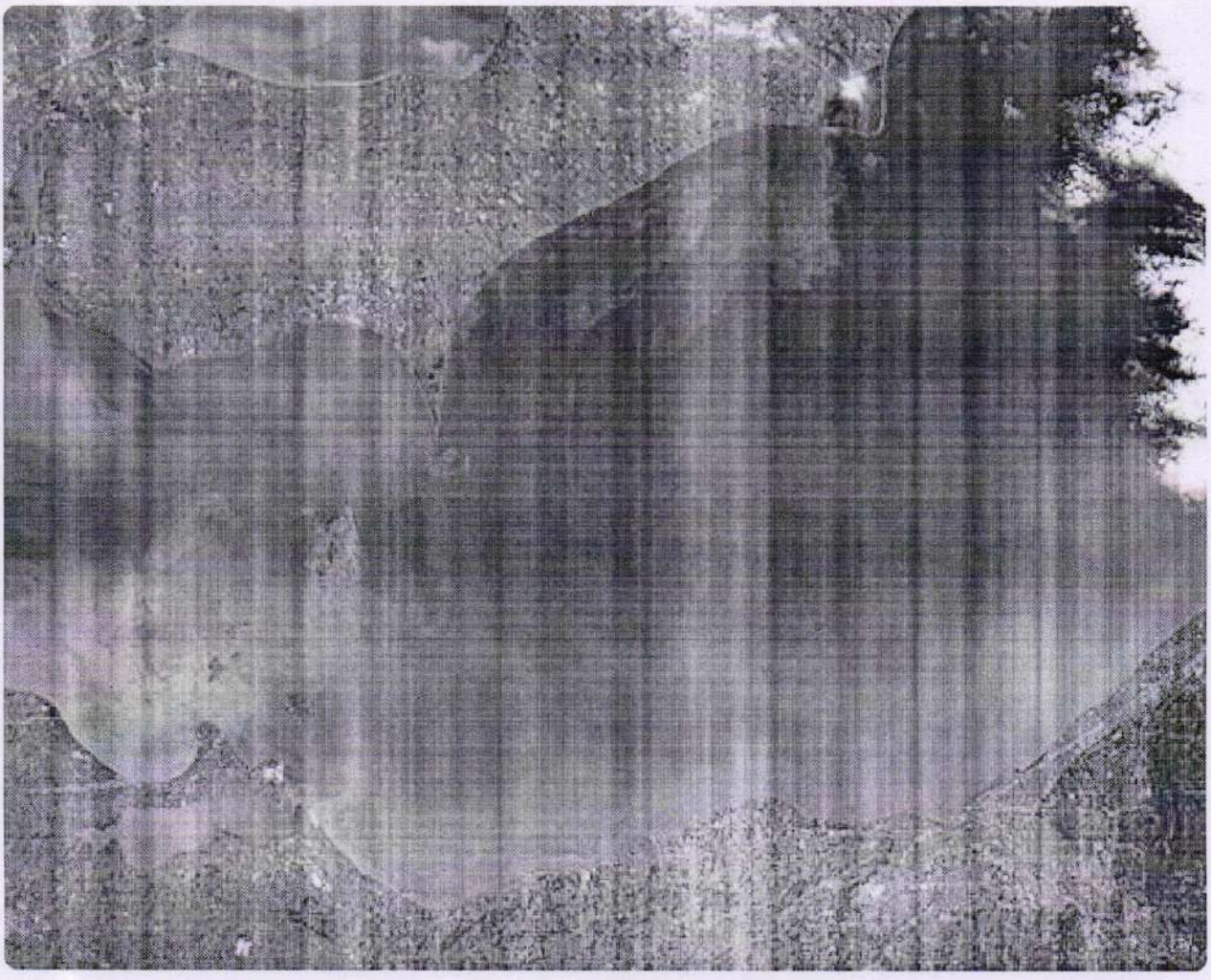

Figure 2. An aerial view of a toxic algae bloom in Lake Erie, 2011. Courtesy: NASA.

With respect to solids production, sludge from the primary and final clarifier is first treated by dissolved air flotation (DAF). The thickened sludge from these units is then treated in anaerobic digesters followed by belt filter presses (BFP).

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A key component of the overall process is feed of ferric iron at various points in the system, where usage often averages around 1,000 lbs/day. Ferric salts, typically chloride or sulfate, may serve several functions at a POTW:

- Coagulating agent for the clarifiers
- Odor control by binding sulfide from H2S
- Phosphate precipitation and transfer of phosphate from liquid to solid phase

It is in respect to the latter two items that the PRI-TECH® methodology has proven to be a valuable modification. The beneficial microorganisms in the anaerobic digesters induce the re-release of phosphorus, primarily as orthophosphate (PO4). Thus, digester effluent contains magnesium, ammonium, and phosphate ions, which can lead to the formation of struvite deposits in post-digester pumps, piping, tanks, and filter press dewatering piping.

Wichita WRF personnel conducted successful trials of ferric chloride injection to the digester effluent/filter press influent to reduce the dissolved phosphate concentration. The tests indicated a reduction in dissolved phosphate concentration of the BFP filtrate from an average of 85 mg/L to less than 20 mg/L. But it is here where peroxide injection shows an added advantage. The 1,000 lbs/day on average of ferric iron fed to the system equates to around a 150 to 200 mg/L residual of spent iron in the digester solids. Injection of peroxide reactivates the spent iron in the digester sludge by oxidizing the sulfide from the ferrous sulfide (FeS) complex, which correspondingly lowers the more expensive ferric chloride (FeCl3) feed needed at this location.

Initial data indicates that 100 mg/L H2O2 and 100 mg/L ferric chloride concentrations are a summertime requirement. It may be possible to reactivate even more iron with increased peroxide up to a 275 mg/L concentration. The treatment offers a 30 to 50 percent reduction in ferric chloride chemical feed costs.

Other advantages were also noted after start-up of this technology. The H2S vapor concentration was reduced from 16 ppm to essentially non-detectable in the biosolids feed pump room, and final cake solids increased in concentration by up to 6 percent. These solids are stored on-site, and then are applied to farmland as conditions permit. Long-term studies are underway to determine the effects on crop growth from the increase in bound phosphate due to the peroxide process enhancement.

A similar program has been established at another plant in the Southwest. Primary-treated wastewater is first conditioned for suspended solids removal in a set of upstream clarifiers with ferric sulfate [Fe2(SO4)3] as the coagulant. Besides serving as a coagulant, the ferric

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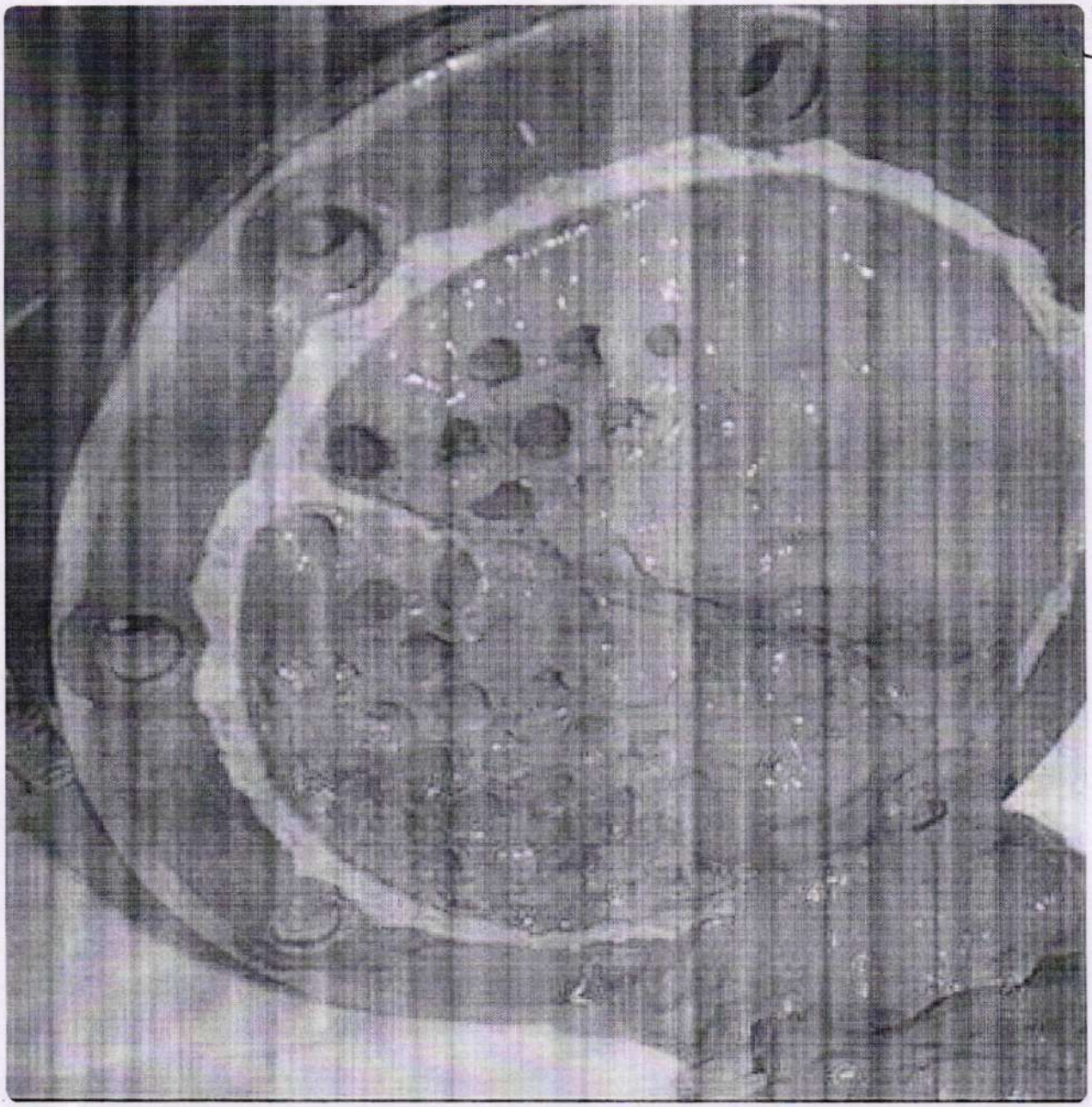

Figure 3: Microbiological fouling in a heat exchanger (left) and cooling tower fill (right).

salt also reacts with phosphate to transfer a substantial portion of the phosphate to the clarifier blowdown sludge. The clarifier effluent is routed to aeration basins for further aerobic treatment while the sludge is routed through gravity thickeners and then is transferred to three anaerobic digesters.

The thickener inlet stream is treated with both ferric sulfate and peroxide. This stage is an initial odor control step in the process. As with the previous example, ferric chloride is fed to the digester effluent/belt filter influent to precipitate phosphate and reduce odors. However, a PRI-TECH® system has been installed to treat the effluent from two of the digesters. These two digesters handle approximately 60 percent of the waste flow.

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The initial results of the peroxide feed indicate a 50 percent reduction in ferric chloride feed, with 60 percent reduction anticipated as the system is fine tuned. The projected annual chemical cost savings due to the initial peroxide feed modification will be greater than $100,000. Furthermore, based on the very positive results so far, plans are in progress

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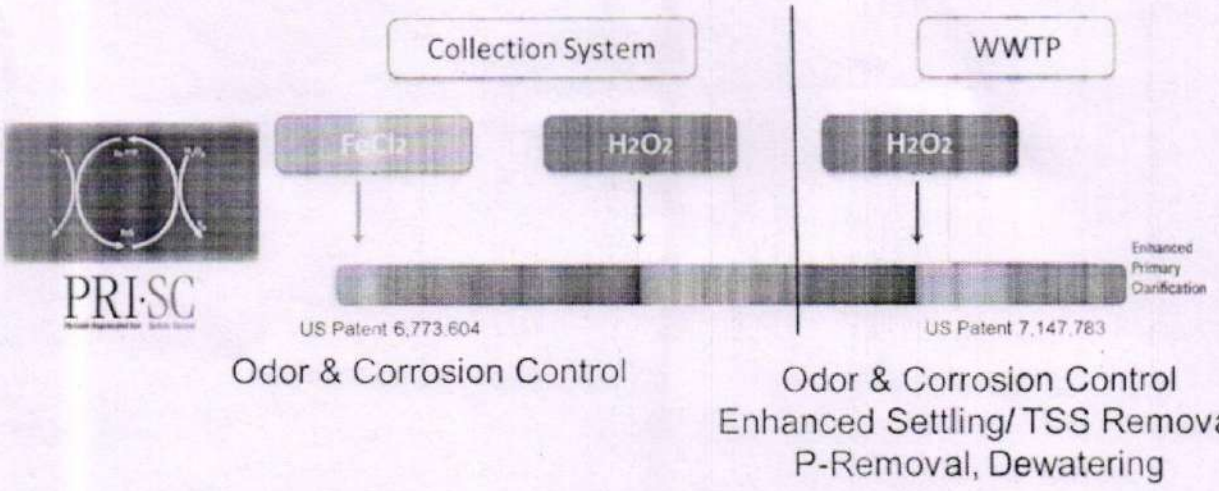
to convert the third digester effluent stream to this process. After fine tuning, annual chemical cost savings are projected to exceed $200,000.



The chemistry recovers iron for reuse in phosphate precipitation and odor control.

Conclusion

The real-world examples above are another illustration of the evolution of improved technologies for water treatment applications. They also represent examples of "green" chemistry, as hydrogen peroxide leaves no residual elements or compounds to handle, unlike chlorine or other halogen-based oxidizing chemicals. The breakdown products of H2O2 are oxygen and water, which is as benign as it gets. Note, however, that all systems are different and have their own peculiarities. Each application requires careful evaluation of process conditions and consultation with feed system experts to ensure correct installation and operation. **WW**

References

1. Buecker, B. "Cleaning Cooling Tower Fill," *Industrial WaterWorld*, May/June 2019.Circle No. 239 on Reader Service Card

About the Authors: Brad Buecker has 35 years of experience in or affiliated with the power industry, much of it in steam generation chemistry, water treatment, air quality control, and results engineering. He is currently senior technical publicist with ChemTreat.
Jamie Belden is the sewage treatment operations supervisor for the City of Wichita, Kans.
Inken Mello is the business development manager for USP Technologies specializing in chemical solutions for odor and corrosion control, as well as phosphorus removal, struvite control, and dewatering enhancements for wastewater treatment plants.

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Water Sci Technol. 2010;61(10):2635-44. doi: 10.2166/wst.2010.211.

Treatment of unpleasant odors in municipal wastewater treatment plants

Petros Karageorgos [1], Manolis Latos, Christina Kotsifaki, Mihalis Lazaridis, Nicolas Kalogerakis

Affiliations

PMID: 20453338 DOI: 10.2166/wst.2010.211

Abstract

The purpose of this paper to present a case study on how to address the odor problem from secondary sources within a municipal wastewater treatment plant (WWTP) by first identifying the locations of the problem and second by evaluating alternative treatment technologies. The WWTP of Chania is a typical 100,000 equivalent inhabitants-facility in a warm semi-arid environment which is located close to residential areas. The installation of a chemical scrubber to control major odor sources within the plant did not succeed in eliminating complaints by nearby residents, and additional measures were required. In this case study we identify all major secondary sources of odor within the plant and evaluate the effectiveness of the different technologies that were employed to address this problem (cover installation, gas and liquid phase oxidation, activated carbon/permanganate absorption, FeCl(3) addition). In particular, we found that installation of covers and reduction of turbulence at two key locations within the WWTP was the best strategy to combat unpleasant odors. Furthermore, when the central chemical scrubber was near capacity the installation of an auxiliary system of activated carbon absorption coupled to permanganate oxidation was deemed to be a safe approach. However, despite the very high removal efficiency (>99.5%) of the unit, the addition of FeCl(3) in the liquid phase was required in order to achieve complete deodorization (below the human odor threshold level).

Related information

PubChem Compound (MeSH Keyword)

LinkOut - more resources

Full Text Sources
Silverchair Information Systems

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Annexure-3

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Chief Water Analyst (W&S)-III
Delhi Jal Board, Okhla Sewage Laboratory,
Okhla Sewage Treatment Plant, Mathura Road, Delhi
PRESS NIT NO. 04
NOTICE INVITING TENDER IN TWO BID SYSTEM,NIT No. 4/2020

On behalf of DJB, Chief Water Analyst (W&S)-III invites online Item rate, tenders from the firms having experience in installation of automatic systems/ LIMS software/automatic system integrators of water/waste water treatment plants.

Prebid meeting: : Dt. 11/01/2021 at 13.00 Hrs

Last date & time for tender download : Dt. 18/01/2021 at 13:30 Hrs

Last date & time for online submission of tender : Dt. 18/01/2021 at 14:00 Hrs

Date/Time opening of Technical Bid : Dt. 18/01/2021 at 15:00Hrs

Date/Time opening of Financial Bid : on evaluation of the technical bid

Detail of the works: -

S. No	Name of work	Estimated Cost	E/ Money (EMD) in INR	Tender Fees in INR	Completion Period
1	Invitation of Bids for Supply, Provisioning, installation, commissioning and O n M for 1 year of Automatic Chemical dosing system at 45 MGD Kondli Sewage Treatment Plant	Job Rate	80,000/-	1000/-	As per clause-II, 'G' of Part I

T

1. The firm shall submit the one set of hard copy of the uploaded tender documents (documents required in technical bid) after of the closing of the bid (within 24 hrs).
2. The tender documents along with bill of quantity and all terms and conditions are available on the website http://govtprocurement.delhi.gov.in/, and may be downloaded from there.
3. 'Tender Processing Fee' will be NON-Refundable.
4. The tender should be valid at least for a period of 120 days from the date of opening of price bid.
5. **According the Delhi Govt. Minimum waged rule all participant/ bidders upload an affidavit along with tender documents that the salary of engaged employees shall have deposited in their respective bank A/c only up to 7th day of every months positively and also mandatory to deposited the ESI/ EPF of engaged employees every months (if applicable). None availability of this affidavit with tender document, tender shall not be considered.**
6. **The successful bidder will submit a certificate regarding depositing of salary of every contractual staff engage in their contract up to 10th day of every month.**

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Additional Information of NIT:

The intending bidders shall submit the online bid written in English language only, under two bid system i.e. **Part-A** (Technical Bid) &**Part-B** (Financial Bid).

A. Bid Part-A should contain the self attested scanned copies of the following documents in support of Eligibility Criteria:-

I. The tenders for this contract will be considered only from those bidders (proprietorship firms, partnerships firms, companies, corporations, consortia or joint ventures) who meet requisite eligibility .

II. VAT/ GST Registration Certificate and the latest applicable VAT/ GST Returns filed.

III. Permanent Account No.

IV. The bidder shall submit scanned copy of an undertaking on e-non-judicial stamp paper on a prescribed format that the applicant has not been Debarred /blacklisted as on date in any of the department. The date of said non judicial stamp paper and undertaking must be valid for at-least one month after the issue of NIT and it should be attested from the Notary Public.

V. An Undertaking, given in current date, by authorized signatory of the firm stating that;

a. The firm has not left any work abandoned during past 3 years.

b. The documents enclosed with the bid are true and correct and in case any document found fake/false, the department shall be at liberty to take action against the firm along with rejection of bid.

The undertaking should clearly carry the name and status/rank, of the signatory in the organization.

Other documents as per PART-I of the tender documents. In absence to any of the document required in the tender the bid may be rejected. Decision of purchase committee will be final in this respect.

In case any of the document(s) uploaded with Technical Bid is signed on behalf of firm(s) by any individual, as an Authorized signatory, he/she should clearly mention his/her, name and portfolio and should also put a seal with signature. A copy of Memorandum of Authorization/ Minutes of Meeting of Board of Directors of the Company, should invariable be enclosed with the document(s). Else the document(s) in question will not be considered, as valid.

B. Bid **Part-B** tender shall consist of tender form & the bill of quantity from Annexure B, and schedule of price.

Terms & Conditions:-

1. The DJB reserves the right to reject any or all tenders without assigning any reason.
2. If any of the above date happens to be holiday, the next working day will be considered for all purposes.
3. The bidders shall quote the rates, separately for the individual items.
4. The firm shall have to fill a mandate form for E.F.T system in case the work is awarded.
5. The firm shall execute the Contract Agreement on non-judicial stamp paper of Rs. 50/-, on prescribed format and will also sign the GCC.
6. Incomplete and conditional tenders shall be liable for rejection without any notice/ information.
7. The bidders must submit the credentials along with the tender. If the bidders deliberately give wrong information of credentials / documents in his/their tender and there by creates circumstances for acceptance of his/their tender. The department reserves the right to reject such tender at any stage besides suspending the business.

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8. The General conditions of contract (subject to change or modification from time to time.) are available on the DJB website which will be applicable for all the work/ supply & may be downloaded (for the information of the bidders) and the same need not to be attached with tender. However these shall form a part of contract documents and shall be attached at the time of entering into contract with the successful bidders. (wherever applicable)
9. The conditional discounts offered by the bidders for coverage within a shorter period, early inspection / payments/ early placement of order, etc. shall not be considered and such tenders shall be rejected.
10. In addition to above, conditions mention in the NIT, Contactor are advised to see the Terms & conditions mentioned in the B.Q of Respective work before participation in tender bid, as the same will also be a part of contract documents.
11. At no stage, the firm has the right to withdraw the offer after submission.
12. Department has the right of examination/verification of the documents submitted by the firms.
13. The firm has to submit the procurement vouchers of items / equipments supplied along with all other relevant documents of the material used for execution of work.
14. The firm, who did not complete any of the previous awarded work timely in this division, will not be considered.
15. "In terms of notification No. 25/2012-service tax dated 20 June 2012, issued by the Department of Revenue, Ministry of finance, Government of India, the services provided by a Contractor/ Operator to DJB in context of carrying out any activity in relation to any function ordinarily entrusted to DJB is exempt from the Service Tax, This is, however, subject to any further documents/ clarifications issued by the Government of India or nay decision/ ruling of the Court, in this regard. The contractor/ Operator may accordingly obtain an independent legal opinion on the applicability and quantum of service tax on the activities under this contract. Service tax, if applicable, shall be reimbursed by the DJB to the contractor/ Operator against a statement from the contractor's/ Operator's chartered Accountant as to the amount of service tax paid against the awarded work. DJB, however, reserves the right to get an independent legal opinion the applicability and valuation of service tax, at its own cost, so as to ascertain the correctness of the contractor's/ Operator's claim for service tax reimbursement. In the event where DJB is of the considered opinion that service tax is not applicable or paid in excess, DJB may reject the claim to that extent. Further, in case where DJB has already reimbursed service tax erroneously, DJB reserves the right to claim back the amount of service tax reimbursed beyond admissible limits.
    This NIT is divided in to four Parts as follows: -

    a. **Part - I.** Contains General Information and Instructions for the Bidders about the NIT such as Critical dates, Delivery location, EMD/ Call Deposit, time, place of submission and Opening of Tenders, Validity of offer, Period of supply of stores etc.
    b. **Part - II.** Contains Technical Specifications for Supply, Provisioning, Installation Commissioning and O&M of the dosing system.
    c. **Part - III.** Contains General Conditions to include Pre-Dispatch Inspection of stores, warranty, Payment details, Performance Bank Guarantee, Risk and Cost, Non-Disclosure clause, Penalty Clause, Repeat Supply Order etc.
    d. **Part - IV**. Contains Evaluation Criteria and Format of Price Bids.

The address and contact numbers for seeking clarifications regarding this tender are given below:-

Queries to be addressed to : Chief Water Analyst (W&S)-III
Postal address : Chief Water Analyst (W&S)-III
Delhi Jal Board
Okhla Sewage Laboratory, Okhla STP

Executive Engineer (SDW)-IV
Delhi Jal Board, Govt. of NCT of Delhi
Kondli Sewage Treatment Plant
Kondli, Delhi-110 096

Mathura Road, Delhi-110052

Designation of the contact personnel: Chief Water Analyst (W&S)-III

Telephone numbers: 9718761234/7703844064

E-mail Ids of contact personnel :cwaws3.djb@gmail.com

Note: The pre-bid meeting will be held in the office of SE(SDW)-I, Kondli STP, Kondli, Dallupura, New Delhi as per schedule.

Sd/- x-x-x-x-x
(Sanjay Sharma)
Chief Water Analyst (W&S)-III

Copy to:

1. P.S. to Vice Chairman, DJB
2. P.S. to CEO (DJB)
3. EO to Member (Dr.)
4. CE (SDW) SE
5. Director of Vigilance (DOV)
6. DTQC
7. SE (SDW) IV
8. Sr. A.O (DTQC)
9. AAO (CWA) Okhla
10. Tender Notice Board.
13. Allahabad Bank, Copernics Marg, New Delhi Branch.

Chief Water Analyst (W&S)-III
Okhla Sewage Laboratory

Executive Engineer (SDW)-IV
Delhi Jal Board, Govt. of NCT of Delhi
Kondli Sewage Treatment Plant
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PART I - GENERAL INFORMATION

1. **Critical Dates.** The critical dates with respect to the Tender ref NIT No.4 dt 26 December 2020.

Sr No	Event	Date	Time
a.	Tender Publish date	26 December 2020	0009 Hrs
b.	Bid Submission start date	26 December 2020	0009 Hrs
c.	Pre bid meeting	11 January 2021	13:30 Hrs
d.	Bid Submission End date	18 January 2021	1400 Hrs
e.	Bid Opening date	18 January 2021	1500 Hrs

2. **General Supply location**: Chief Water Analyst (W&S)-III,
   Okhla Sewage Laboratory,
   Mathura Road, Delhi
3. **Installation, Commissioning and O&M**: 45 MGD Kondli STP
4. **Manner of Depositing the Bids**. The bid will be submitted only on line on https://govtprocurement.delhi.gov.inwill be submitted in the following manner:-

I. Technical Bid: will be submitted online

A. **Earnest Money Deposit (EMD)**. Rs. **80,000 (Rupees Eighty thousands only)** shall be submitted as per following: -

i. The bidders shall deposit **EMD (Refundable) and tender processing fee (Nonrefundable)** electronically on or before the last date & time of bid submission in DJB EMD A/c No-50448339804 at Allahabad Bank, Copernicus Marg, New Delhi. (IFSSC/RTGS code No- ALLA0210619) through bidders' banker. The RTGS timings are 10.00 Hrs to 16.00 Hrs on all working days except Saturday, timing on Saturday are 10.00 Hrs to 13.00 Hrs. The bidder must mention NIT No., Name of Division, Closing date & time and bidder Name & Address, Mobile No. in the application details column in the RTGS as shown below.

Details of Applicant	
(A) Account No.	
(B) Name	<NIT No./item No.>,<Name of the Division>,<closing Date>&<Time of tender>,<Bidder Name>.
(C) Address	<Bidder Address & Mobile No.>

ii. Bidder must deposit the Tender Fee and EMD through Sub-paisa Gateway by URL

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http://delhijalboard.nic.in/content/tender-0

iii. The process for deposit EMD and Tender Fee is as under:
Instruction for making payment and E-Receipt:

- After reaching payment page please choose mode of payment carefully.
- Don't Cancel / Refresh payment page while processing.
- After making successful payment, page will redirect to E-Receipt.
- An E-Receipt is an electronic document with a unique confirmation number given to remitter in place of a paper receipt.
- Payers are advised to carry transaction e-receipt for future reference.

iv. The bidder must upload the scanned copy of RTGS customer payment confirmation along with the bid in Part 'A'. The dept. Is not liable to entertain for the submission of earnest money/other documents in the office through courier/postal service, manually and such tenders shall not be entertained and rejected.

Eligible Applicants:

The tenders for this contract will be considered only from those bidders (proprietorship firms, partnerships firms, companies, corporations, consortia or joint ventures) who meet requisite eligibility criteria prescribed as under:

JV (Joint venture) conditions and conflict of interest

1) In the case of a JV or Consortium, all members of the group shall be jointly and severally liable for the performance of whole contract.
2) A technically qualified non-Indian firm is permitted to bid only in a consortium arrangement or Joint Venture, with its wholly owned Indian subsidiary or any other Indian firm, registered in India under The Companies Act, 1956. However, in both the cases, Indian Firm/ Indian subsidiary shall be the lead member2 and shall solely meet the financial eligibility criteria
3) Bidders shall not have a conflict of interest that affects the Bidding Process. Any Bidder found to have a conflict of interest will be disqualified from the bid process. Bidders shall be considered to have conflict of interest that affects the Bidding Process, if:
   a) Such Bidder (or any constituent thereof) and any other Bidder (or any constituent thereof) have common controlling shareholders. Control is defined by The Institute of Chartered Accountants of India Accounting under Standard (AS)213, Consolidated Financial Statements as:
      i) The ownership, directly or indirectly through subsidiary(ies), of more than one-half of the voting power of an enterprise; or
      ii) Control of the composition of the board of directors in the case of a company or of the composition of the corresponding governing body in case of any other enterprise so as to obtain economic benefits from its activities.
   b) Bidder shall be liable for disqualification if any legal, financial or technical adviser, including but not limited to a consultant, of the Employer (DJB) in relation to the Project is engaged by the Bidder in any manner for matters related to or incidental to the Project and which will affect the bidding process thereof; Employer shall itself publish the list of its legal, financial or technical adviser engaged by it for the said projects; or

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c) such Bidder has worked as a consultant in the preparation of design or technical specifications or any other tender related activity for the works; or
d) such Bidder applies for bid both as an individual firm and as a part of JV or consortium; or
e) a constituent of one consortium is also a constituent of another consortium; or
f) such Bidder submits more than one application in this bidding process

4) In a tender, either the Indian agent on behalf of the Principal/ OEM or Principal/ OEM itself can bid but both cannot bid simultaneously.
5) If an Indian agent submits bid on behalf of Principal/ OEM, the same agent shall not submit a bid on behalf of another Principal/ OEM in the same tender.
6) A firm, who has purchased the tender document, if applicable, in its name, can submit the bid either as individual firm or in joint venture/ consortium. However in joint venture/ consortium:
   a) The members shall jointly fulfill the general and particular experience criteria as mentioned above. However, part qualification of any individual technical criteria related to project capacity shall not be permitted (example: If the criteria is EPC experience of 10 MGD of water treatment plant, two members having EPC experience of 5MGD of water treatment plant each shall not be qualified). Further, each member shall at least qualify one eligibility criteria (financial, general and particular.
   b) The lead member shall fulfill the financial eligibility criteria solely.
   c) Members having less than 26 % participation shall be termed as non substantial members and shall not be considered for evaluation which means their financial capability and work experience will not be considered for evaluation of JV/ consortium.
   d) Copy of the Joint Venture Agreement (JVA) entered into by the members shall be submitted along with the bid as per the format attached. The JVA shall include among other things, the joint venture's objectives, percentage participation of each member, the role of each member in the joint venture operation, the commitment of the members to joint and several liability for due performance, recourse/ sanctions with the joint venture in the event of default or withdrawal of any member(s).
   e) in any case, number of JV/ consortium members shall not exceed 3 (three)
   f) **For DBO/ PPP projects**: In case of JV/ consortium, change in constitution of percentage participation is allowed 2 years after commissioning/ commercial operation date. However, such a change shall be subject to written approval of Employer. Such approval shall be denied if (i) members withdraw from the joint venture and the remaining members do not meet the qualifying requirements; (ii) the new members to the joint venture are not qualified individually or as joint venture members. Change in constitution will be discouraged if it affects the continuity of Works.
   g) **For non-DBO/non-PPP projects**: In case of JV/ consortium, no change in constitution of percentage participation is allowed.
7) Bidder (individual or any member in case of JV/ consortium) shall not have suffered bankruptcy/ insolvency during the last 3 financial years from the date of submission of bid.
8) Any bidder which has been barred by the Central or State government, or any entity controlled by them (controlling stake) from participating in any project and the bar commence/ subsists as on the date of issue of NIT and/ or submission of bid and/ or any date before the of issue of work order, the bidder shall not be eligible to submit the bid, either individually or as a member of consortium and if the bids are already submitted the same shall be rendered invalid.

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9) If the firm claiming Technical Eligibility Criteria for the works has completed any of the works in joint venture with any other company then, along with the experience certificates, the firm shall submit the joint venture agreement for that particular work. Experience certificates not accompanied by joint venture agreement shall not be considered for evaluation. The credit for the firm which has completed a work in joint venture is allocated as follows:
   a) If the firm has completed the work as a Lead member in the project then the firm can claim credit for the entire scope of work
   b) If the firm has completed the work as a member in the project then the firm can claim credit for the entire scope of the work in proportion to the stake (e.g. if the capacity of the WWTP executed is 30 MGD and if the firm has executed the project as member with a 40% stake then the firm can claim credit for (40%x30MGD) 12 MGD works. A statutory auditor certificate specifying the payments received for the project should be submitted. In the event of percentage participation in the project calculated through the statutory auditor certificate differs from the percentage in the JVA, the percentage participation calculated through payments received shall be considered for evaluation purposes.

[1] Wholly owned subsidiary defined as a company whose common stock is 100% owned by another company (parent company)
[2] Lead member is a member of consortium nominated by the other members to lead the project in terms of responsibilities as well as to act as primary interface between the Employer and the consortium. It shall be noted that being a lead member does not signify a participation interest in the project of more than 50% and any member with a participation interest in the project of more than 26% can be a lead member.
[3] AS 21 can be accessed at http://220.227.161.86/265accounting_standards_as21new.pdf
[4] For Item rate, Percentage rate and lump sum (EPC/DBO) type of contracts, ECV shall only include the estimated capital cost. However, for exclusive O&M contracts, the EMD shall be deposited at total cost of O&M works for entire period.

Observations:

1) Bidders are required to furnish memorandum of understanding (MOU) with any supplier prior / technology vendor who had similar work experience to award of the contract., the same has to be submitted along with bid, in which case, no withdrawal of the MoU shall be permitted later on and the vendor withdrawing the MoU will be blacklisted by Employer for a period of 2 years.
2) Bidders are also required to submit along with the bids a list of all works in accordance with Annexures, executed or under execution, during last 10 years whether in Individual capacity or in JV/ Consortium with another contractor or as a sub-contractor, as per the annexure format attached.
3) Bidders should also submit an affidavit on non-judicial stamp paper of Rs. 100/- in original confirming that the details of all such works executed/under execution either being executed in their name or being executed as joint venture within India or abroad (bidder's share) have been provided in the Annexure B and is correct. In case of any concealment of information, the bidder's bid will be rejected. Please note that the affidavit as mentioned above should be duly notarized and submitted along with the bid. No relaxation in this criteria is permitted.
4) If any bidder fails to furnish prescribed performance guarantee with in prescribed period will be liable for forfeiture of the EMD paid.

B. The bid and relevant documents will be submitted online as per cover details:-
Scanned copy of the following documents will be uploaded on-line:-

Executive Engineer (SDW)-IV
Delhi Jal Board, Govt. of NCT of Delhi
Kondli Sewage Treatment Plant
Kondli, Delhi-110 096

AS/C

i. The firm shall submit the scanned copy of confirmation by the vendor that the vendor has seen all the conditions of the NIT and agrees with the conditions of DJB. The bidder shall certify for acceptance of all the tender conditions of the online NIT and furnish a certificate as per Appx 'A'. The certificate duly signed shall be scanned and uploaded. In case of any deviations, the bid shall be rejected. If the certificate is signed by legally authorized signatory, a copy of the authorization letter be enclosed/ uploaded.
ii. The firm shall submit the scanned copy of registration certificate for GST and PAN.
iii. The firm shall submit the scanned copy of the latest return file for GST.
iv. The firm shall submit scanned copy of affidavit on non-judicial stamp paper confirming that firm has not been debarred from any organization for doing such works and firm is not in the habit of going in to arbitration and number of arbitration cases if any.
v. The firm shall submit copy of ISO 9001:2015 QMS for software and IT industry or any other credentials.
vi. The firm shall submit its profile on its letter head along with number and bio-data of technical expert (Engineers, Scientific/laboratory personnel) working with them as per PART-IV.
vii. The firm shall submit work orders/ projects completed in past relevant to dosing/automation works/ software for LIMS etc, if any.

Note:

a) **If bidder does not submit the documents as above as applicable the technical bid will be rejected.**
b) **Before opening of the price bid the biding firm shall be asked to give presentation of the dosing system they proposed before the Purchase committee to access its technical ability and understanding towards DJB requirements. (it will be part of technical qualification and the decision of purchase committee to accept or reject any firm will be final)**

II. **Commercial bid BOQ (Bill of Quantities) will be submitted on line**

A. **Clarification regarding contents of the NIT**. A prospective bidder who requires clarification regarding the contents of the bidding documents or any issues shall submit in writing on or before pre-bid meeting. The quarries raised by prospective bidder will be uploaded ascorrigendum forallprospectivebidderswhohavereceivedthebiddingdocuments.

B. **Modification and Withdrawal ofBids.** No bid may be withdrawn or modified after submission and if it is withdrawn in the interval between the deadline for submission of bids and expiry of the period of the specified bid validity. Withdrawal of a bid during this period will result in forfeiture of Bidder's BidSecurity/EMD.

C. **Clarification regarding contents of the Bids. The detailed instructions for bidders are as Appx 'C'.** During evaluation and comparison of bids, the Buyer may, at its discretion, ask the bidder for clarification of his bid. The request for clarification will be given in writing and no change in prices or substance of the bid will be sought offered or permitted.

D. **Rejection of Bids**. Canvassing by the Bidder in any form, unsolicited letter and post-tender correction may invoke summary rejection with forfeiture of EMD. Conditional Bids will not beaccepted.

E. **Unwillingness to Quote**. Bidders unwilling to quote should ensure that intimation to this effect reaches before

Executive E[illegible](SDW)-IV
Delhi Jal Board, Govt. of NCT of Delhi
Kondli Sewage Treatment Plant
Kondli, Delhi-110 096

AE/C

the due date and time of opening of the Bid, failing which the defaultingBiddermaybedelistedforthegivenrangeofitemsasmentionedinthisNIT.

F. **ValidityofBids**.The Bids will remain valid **120 Days** from the date of opening Bids.

G. **Supply of Stores**. Complete stores shall be supplied, installed within **75 days** after placing of work order. The system must be commissioned in another 45 days. There will be 60 days for trial run of the system after commissioning.

H. **Liquidated Damages.** The timely supply of stores, installation and commissioning as per the work order by the vendor is of paramount importance for Operational reasons.

"If the contractor fails to maintain the required progress to complete the work and clear the site on or before the contract or extended date of completion, he shall, without prejudice, to any other right or remedy available under the law to the Government on account of such breach, pay as agreed compensation the amount calculated at the rates stipulated below as the Superintending Engineer (whose decision in writing shall be final and binding) may decide on the amount of tendered valve of the work for every completed day/month (as applicable)

This will also apply to items or group of items for which a separate period of completion has been specified.

Compensation for delay of work **@ 1.5% per month delay to be computed on per day basis**

Provided always that the total amount of compensation for delay to be paid under this condition shall not exceed 10% of the Tendered Value of work or to the Tendered Value of the item or group of items of work for which a separate period of completion is originally given.

The amount of compensation may be adjusted or set-off against any sum payable to the Contractor under this or any other contract with the Government. In case, the contractor does not achieve a particular milestone mentioned in schedule-F, or the rescheduled milestone(s) in terms of Clause 5.4, the amount shown against that milestone shall be withheld, to be adjusted against the compensation levied at the final grant of extension of time. Withholding of this amount on failure to achieve milestones shall be automatic without any notice to the contractor. However, if the contractor catches up with the progress of work on the subsequent milestone(s), the withheld amount shall be released. In case the contractor fails to make up for the delay in subsequent milestone(s), amount mentioned against each milestone missed subsequently also shall be withheld. However, no interest, whatsoever, shall be payable on such withheld amount.

I. **Litigation/ Arbitration**: All litigation or arbitration are subject to jurisdiction of Delhi.

Sd/- x-x-x-x-x
(Sanjay Sharma)
Chief Water Analyst (W&S)-III

Executive Engineer (SDW)-IV
Delhi Jal Board, Govt. of NCT of Delhi
Kondli Sewage Treatment Plant
Kondli, Delhi-110 096

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eTendering System Government of NCT of Delhi

Delhi Tenders

Tender Details

Date : 28-Dec-2020 11:07 AM

Print

Basic Details

Organisation Chain	Delhi Jal Board||Delhi Jal Board||CWA(W and S)- III		
Tender Reference Number	PRESS NIT NO. 04		
Tender ID	2020_DJB_197912_1		
Tender Type	Open Tender	**Form of contract**	Item Rate
Tender Category	Goods	**No. of Covers**	2
General Technical Evaluation Allowed	No	**ItemWise Technical Evaluation Allowed**	No
Payment Mode	Offline	**Is Multi Currency Allowed For BOQ**	No
Is Multi Currency Allowed For Fee	No	**Allow Two Stage Bidding**	No

Payment Instruments

Offline	S.No	Instrument Type
	1	R-T-G-S
	2	NEFT

Cover Details, No. Of Covers - 2

Cover No	Cover	Document Type	Description
1	Fee/PreQual/Technical	.pdf	Scanned copy of Tender fee and EMD.
		.pdf	Scanned copy of other related documents as per NIT condition.
2	Finance	.xls	Financial Bid

Tender Fee Details, [Total Fee in ₹ * - 1,000]

Tender Fee in ₹	1,000		
Fee Payable To	50448339804 at Allahabad Bank, Copernicus Marg, Ne	**Fee Payable At**	New Delhi
Tender Fee Exemption Allowed	No		

EMD Fee Details

EMD Amount in ₹	80,000	**EMD through BG/ST or EMD Exemption Allowed**	No
EMD Fee Type	fixed	**EMD Percentage**	NA
EMD Payable To	50448339804 at Allahabad Bank, Copernicus Marg, Ne	**EMD Payable At**	New Delhi

Work /Item(s)

Title	PRESS NIT NO. 04				
Work Description	Invitation of Bids for Supply, Provisioning, installation, commissioning and O n M for 1 year of Automatic Chemical dosing system at 45 MGD Kondli Sewage Treatment Plant				
Pre Qualification Details	Please refer Tender documents.				
Independent External Monitor/Remarks	NA				
Tender Value in ₹	NA	**Product Category**	Miscellaneous Goods	**Sub category**	NA
Contract Type	Tender	**Bid Validity(Days)**	120	**Period Of Work(Days)**	75
Location	Chief Water Analyst (W n S)-III	**Pincode**	110025	**Pre Bid Meeting Place**	SE(SDW)-I Kondli STP
Pre Bid Meeting Address	SE(SDW)-I, Kondli STP, Kondli,	**Pre Bid Meeting Date**	11-Jan-2021 01:00 PM	**Bid Opening Place**	Chief Water Analyst (WnS)-III
Should Allow NDA	No	**Allow Preferential**	No		

Executive Engineer (SDW)-IV
Delhi Jal Board, Govt. of NCT of Delhi
Kondli Sewage Treatment Plant
Kondli, Delhi-110 096

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Tender		Bidder	

Critical Dates

Publish Date	26-Dec-2020 09:00 AM	**Bid Opening Date**	18-Jan-2021 03:00 PM
Document Download / Sale Start Date	26-Dec-2020 09:00 AM	**Document Download / Sale End Date**	18-Jan-2021 02:00 PM
Clarification Start Date	NA	**Clarification End Date**	NA
Bid Submission Start Date	26-Dec-2020 09:00 AM	**Bid Submission End Date**	18-Jan-2021 02:00 PM

Tender Documents

NIT Document

S.No	Document Name	Description	Document Size (in KB)
1	Tendernotice_1.pdf	nit	137.63

Work Item Documents

S.No	Document Type	Document Name	Description	Document Size (in KB)
1	BOQ	BOQ_250180.xls	boq	313.50
2	Tender Documents	2.pdf	nit	2766.13

Tender Inviting Authority

Name	Chief Water Analyst (W n S)-III
Address	Chief Water Analyst (W n S)-III

Executive Engineer (SDW)-IV
Delhi Jal Board, Govt. of NCT of Delhi
Kondli Sewage Treatment Plant
Kondli, Delhi-110 096

Annexure-4

"STOP CORONA VIRUS-Wash Your Hand/Wear Mask/Maintain Social Distance"

OFFICE OF THE CHIEF WATER ANALYST
(Water & Sewage) III
DELHI JAL BOARD
GOVT. OF NCT OF DELHI
OKHLA SEWAGE TREATMENT PLANT
MATHURA ROAD, NEW DELHI-110020
Cwaws3.djb@gmail.com,011-26933433

स्वच्छ भारत
एक कदम स्वच्छता की ओर

No.DJB/CWA(W&S) III/2020-21/ 271 Date: 16/03/2020

Letter of Intent

M/S Ideatech Automation Pvt. Ltd.
5,OKS Buildings, College Road 2nd cross,
Tirupur, 641602, Tamilnadu
Email-ideatechautomation@gmail.com

Subject: - Supply provisioning, installation, commissioning and O&M for One year of Automatic Chemical Dosing System at 45 MGD STP Kondli

Competent Authority has approved the award of work for "Supply provisioning, installation, commissioning and O&M for One year of Automatic Chemical Dosing System at 45MGD STP Kondli at the bidded rates of 78,87,881.60 (Seventy eight Lacs Eighty Seven Thousand Eight Hundred Eighty One Rupees And Sixty Paisa only) to M/S Ideatech Automation Pvt. Ltd.

M/S Ideatech Automation Pvt. Ltd. is requested to accept the work and also to submit performance guarantee at 3% of the bidded cost and signed the contract agreement on the stamp paper of Rs 100/-with DJB within three days.

The terms and condition of the contract will be as per the tender.

sd/-
CWA (W&S) III

Copy to:

1. P.S. to Vice Chairman, DJB
2. P.S. to CEO (DJB)
3. EO to Member (Dr.)
4. CE (SDW) SE
5. Director of Vigilance (DOV)
6. SE (SDW) I
7. Sr. A.O (DTQC)
8. AAO (CWA) Okhla

Executive Engineer (SDW)-IV
Delhi Jal Board, Govt. of NCT of Delhi
Kondli Sewage Treatment Plant
Kondli, Delhi-110 096

CWA(W&S)III 16.03.

Delhi Jal Board

OFFICE OF THE CHIEF WATER ANALYST (W&S) III
DELHI JAL BOARD
OKHLA SEWAGE TREATMENT PLANT
MATHURA ROAD, NEW DELHI-110020

No. CWA(W&S)III/2020-20/F-1/Dosing/K_O/ 708

Dated:- 25.05.2021

To whomsoever it may concern

This is to request you to allow the movement of an urgent shipment meant for Delhi Jal Board (Essential Service Provider) amid the current coronavirus lockdown from our vendor Ideatec Automation Pvt Ltd office at Tripur, Tamil Nadu to Delhi. The shipment contains the Sewage Treatment Plant Dozing Control Panel (3 No.) and Chemical Dozing Pump (2 No.) meant for ISASMAC system at Kondli STP, Delhi Jal Board. The said system needs to be commissioned as per the Hon'ble National Green Tribunal (NGT) orders at the earliest.

With this letter, I request the concerned authorities to allow the movement of the said shipment.

Thank you.

25.05.2021

Sanjay Sharma
Chief Water Analyst (W&S)-III,
Okhla Sewage Treatment Plant,
Delhi Jal Board, New Delhi

Executive Engineer (SDW)-IV
Delhi Jal Board, Govt. of NCT of Delhi
Kondli Sewage Treatment Plant
Kondli, Delhi-110 096

Annexure-5

OFFICE OF THE ASSISTANT CHIEF WATER ANALYST
DELHI JAL BOARD
GOVT. OF N.C.T. OF DELHI
QUALITY CONTROL LABORATORY
STP KONDLI, DELHI-110096

D.No. 4914
DATE 31/5/21
STP KONDLI

Analysis report of sulphide(H2S) after dosing of ferric chloride at 45 MGD STP Kondli

FeCl3 Dose : 40 mg/l
FeCl3 dose rate: 6.8kg/hr @ sewage flow 8458 m3/hr

Date: 27.05.2021

S.No	Sample Collected From	Unit	Time of sample collection	
			10:00 AM	2:00 PM
1	Raw Sewage(Before Dosing)	mg/l	4.0	3.6
2	Inlet at 45 MGD	mg/l	1.6	1.2
3	Inlet PST	mg/l	2.0	1.6
4	Outlet PST	mg/l	1.2	1.2
5	Final Effluent	mg/l	0.8	1.0

on leave
ACWA(K)

31-5-2021
Chemist(K)

31/5/21
Asstt. Chemist

Executive Engineer (SDW)-IV
Delhi Jal Board, Govt. of NCT of Delhi
Kondli Sewage Treatment Plant
Kondli, Delhi-110 096

Annexure-6

5/C

5/C

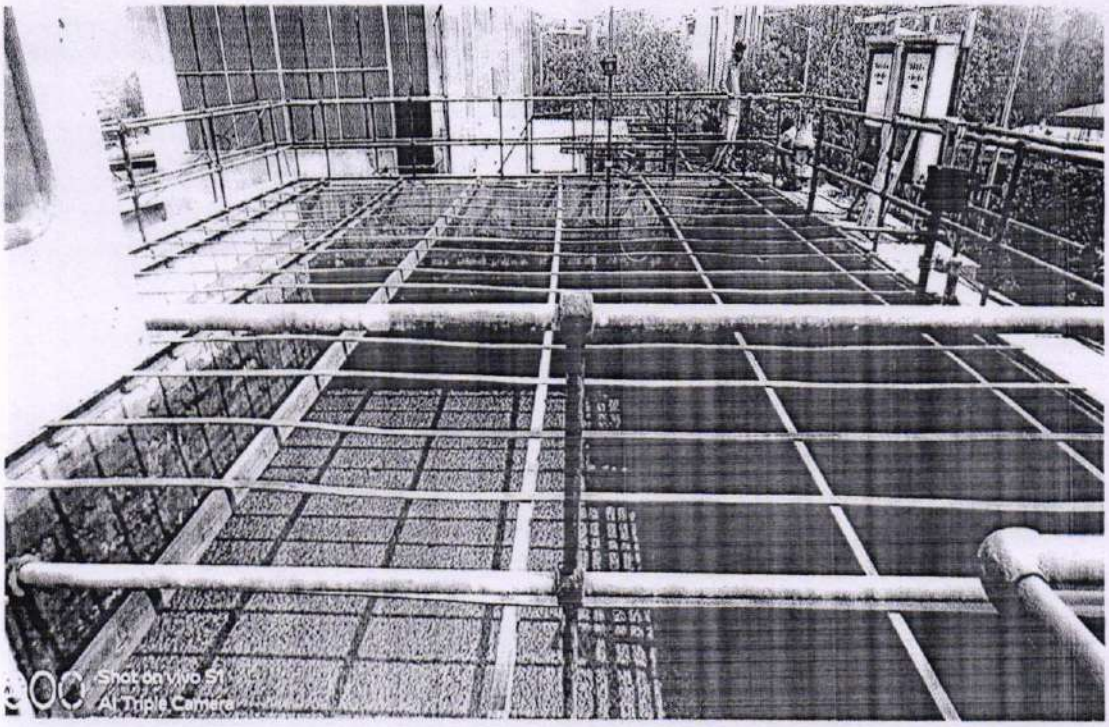
Executive Engineer (SDW)-IV
Delhi Jal Board, Govt. of NCT of Delhi
Kondli Sewage Treatment Plant
Kondli, Delhi-110 096

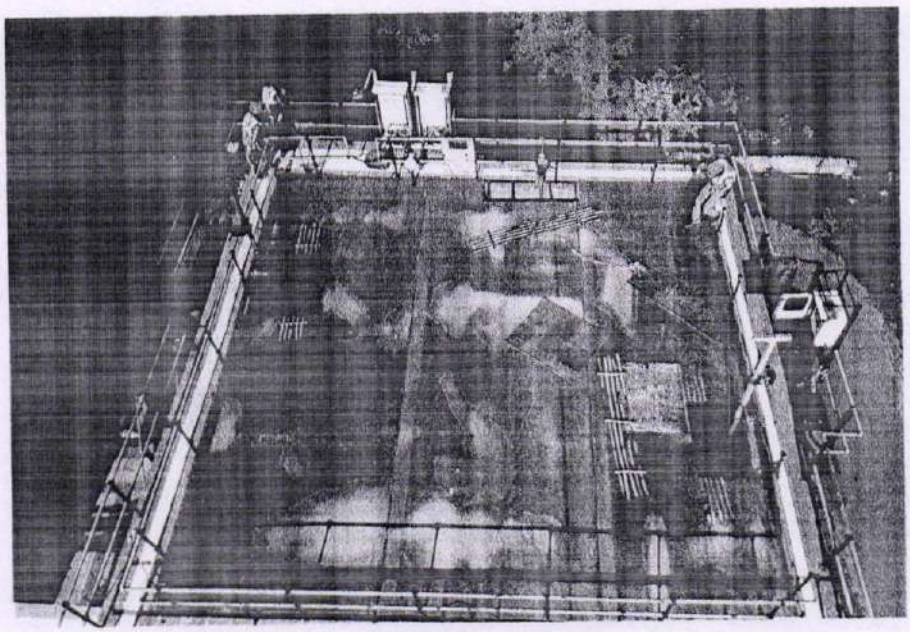
4/C
53/C

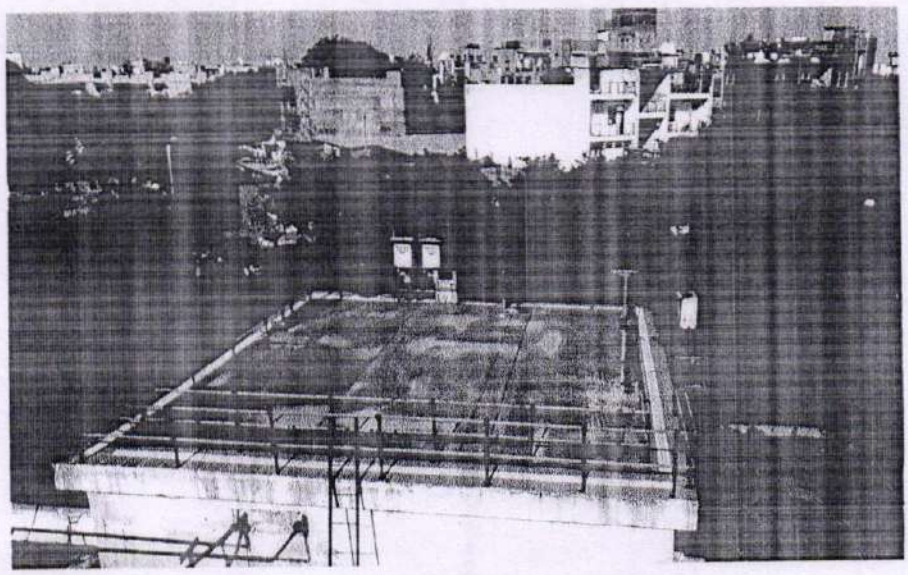
Executive Engineer (SDW)-IV
Delhi Jal Board, Govt. of NCT of Delhi
Kondli Sewage Treatment Plant
Kondli, Delhi-110 096

SA/c

(SDW)-IV
GCT of Delhi
Plant


Shot on vivo S1
AI Triple Camera





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