

# EM TREATMENT ON SADAT CITY SEWAGE WATER

December 17, 1997

EM Research Organization

# Progress Report, DEC ' 1997.

Material and Instruments required for the 6 months period  
(Oct'97 ~ Mar'98) :

1. EM = 2,160L (approximately)
2. EM = 1,800L (Special kind of EM essential for Water Treatment Purposes)
3. Molasses = 5,280L (approximately)
4. Sandy Soil = 50 t (approximately)
5. Clean Water = (for the preparation of EM secondary, etc.)
6. Waterhyacinth = 2 t (approximately)
7. Tanks = 3 x 3 t
8. Injectors = 3 x 15m (1cm )
9. Sheets = 5 x 5m (for EM sandy soil)
10. Nets = 4 (for pond 3 & 4)
11. Pump = 1500 t/day (Water Reverse System which shortens the time requires for water treatment and also saves the cost of water required for the preparation of EM secondary, etc.)
12. Miscellaneous

### Achievements :

87 tons of EM Secondary and 35 tons of EM Sand changed the 1,066,260 tons of Sewage Pond into a Fish Pond.

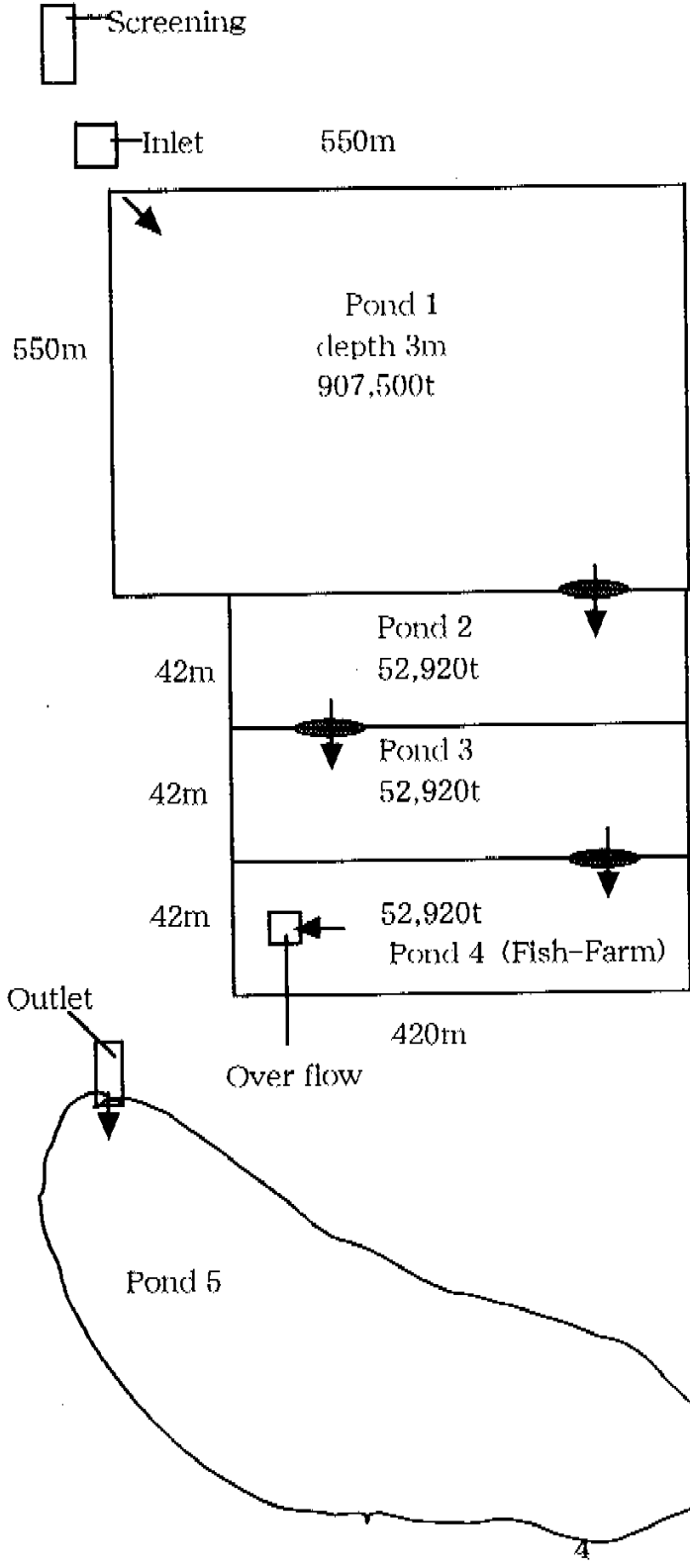
### Problems:

1. Please see page 13 ~ 16. (The analysis data of major problems)
2. Pungent smell all around the area.
3. Harmful for irrigation purposes.
4. Spoiling the desert area and the farms near the pond.

### Treatment Procedure:

1. EM Secondary 9 tons/week, injected into the sludge at the inlet of the pond. (Since Oct' 26 ~ Nov' 22) and (from Nov' 22 ~ Dec' 10 twice a week)
2. EM Sandy Soil 5 tons/week, poured into the water at 5 different points of the 1st pond.
3. Nile Plants were placed in the water at the 3rd pond on Nov' 2.
4. 3 Nets were fixed in pond 3 to stop the flow of seeds of the Nile Plants.
5. 1 Net was fixed in pond 4 to stop the flow of Fish(Boltl).
6. 115 Fish were transfered into pond 4 on Nov' 30.

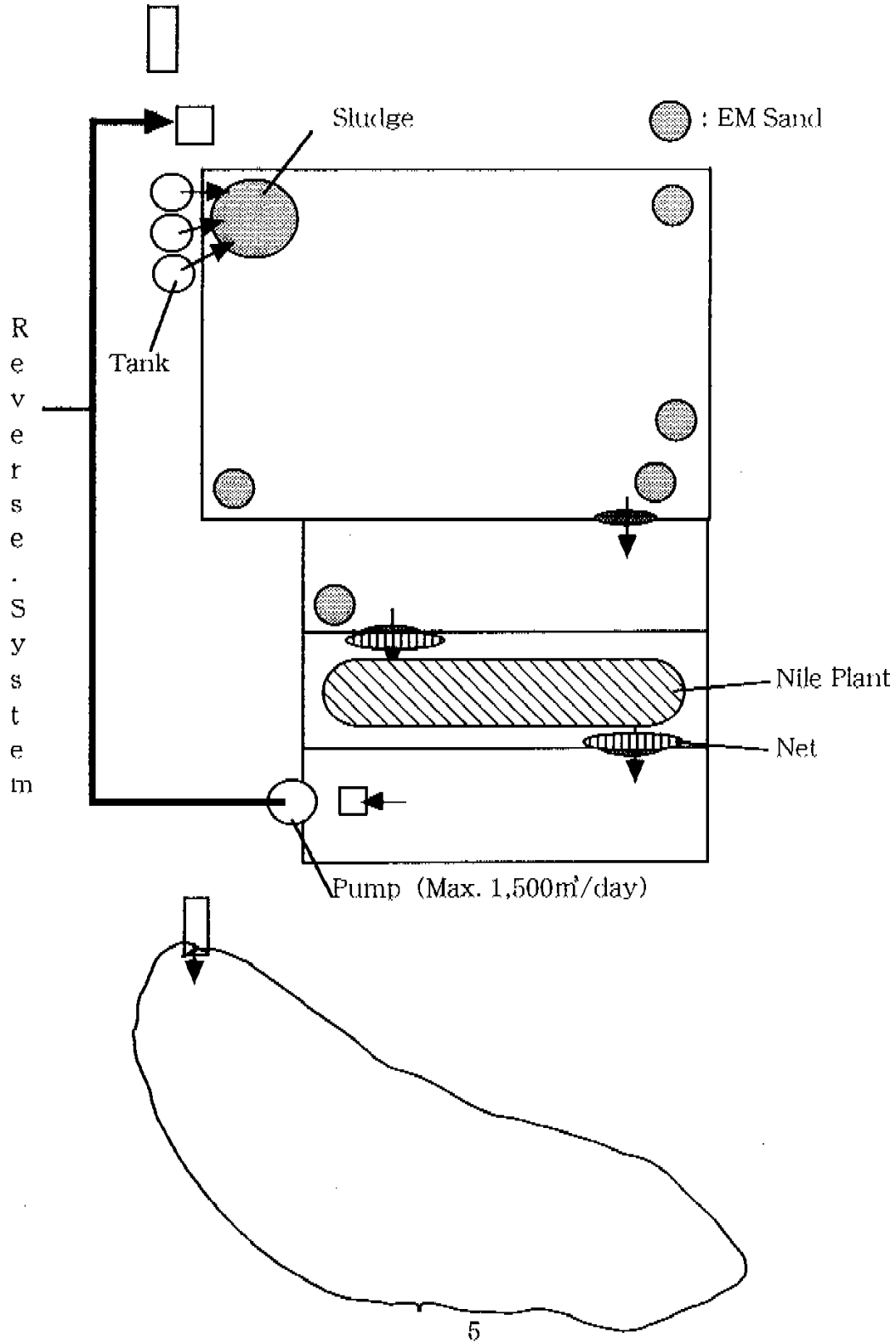
### Site Map of Water Treatment Station :



- 1) Amount of Water 30,000t/day
- 2) Water Contains Industrial waste, Sewage water, etc.
- 3) Water remains in the pond for 30~35days
- 4) Ponds are made by Cement and Tarcoal material.
- 5) Total : 1,066,260t

↓ Flow of water  
○ Over flow

Flow chart (Water Treatment Procedure):



## Analysis Data before EM Treatment:

(I) Sampling & Analysis : Oct ' 28, 1997.

Parameters	Unit	Sample1(inlet)	Sample2(outlet)	Max limit by law
BOD <sub>5</sub>	mgO <sub>2</sub> /L	257	72	
COD	mgO <sub>2</sub> /L	600	121	
Phosphate	mgP/L	6.8	4.8	
Nitrate(NO <sub>3</sub> )	mgN/L	0.01	0.25	
T.K.N(T-N)	mgN/L	14	10.1	

### "Heavy Metals"

Parameters	Unit	Sample1(inlet)	Sample2(outlet)	Max limit by law
Cd	mg/L	<0.05	<0.05	
Pb	mg/L	0.6	<0.2	
Cu	mg/L	<0.1	<0.1	
Zn	mg/L	2.2	<0.05	
Ni	mg/L	<0.15	<0.15	
Cr	mg/L	<0.2	<0.2	

\*Analysed by : National Research Centre Consulting Services, Cairo.

### Analysis Data After EM Treatment:

#### (II) Sampling & Analysis : Nov ' 22, 1997.

Parameters	Unit	Sample.1	Sample.2	Limit by Law
BOD <sub>5</sub>	mg O <sub>2</sub> /L	85	60	
COD	mg O <sub>2</sub> /L	160	126	
Phosphate	mg P/L	7.1	6.3	
Nitrate	mg N/L	0.09	0.01	
T.K.N.	mg N/L	10.4	9.3	

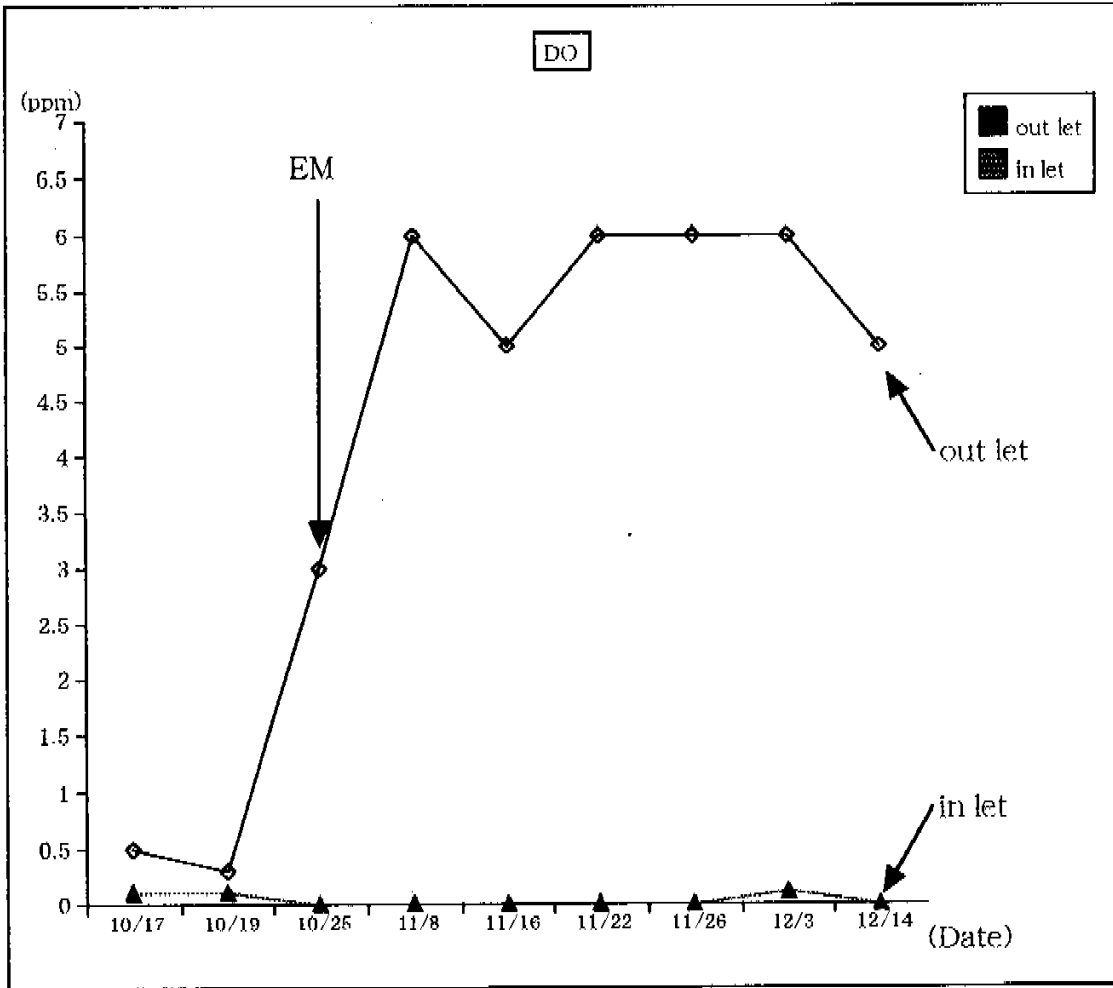
#### "Heavy Metals"

Parameters	Unit	Sample.1	Sample.2	Limit by Law
Pb	mg/L	0.03	0.07	
Cd	mg/L	0.02	0.02	
Cu	mg/L	0.21	0.08	
Zn	mg/L	0.25	0.01	
Ni	mg/L	0.027	0.025	
Cr	mg/L	0.01	0.01	

\* Analysed by : Ministry of Agriculture, Afforestation & Reclamation, Egypt.  
(Dr. Mohammad Al-fattah)

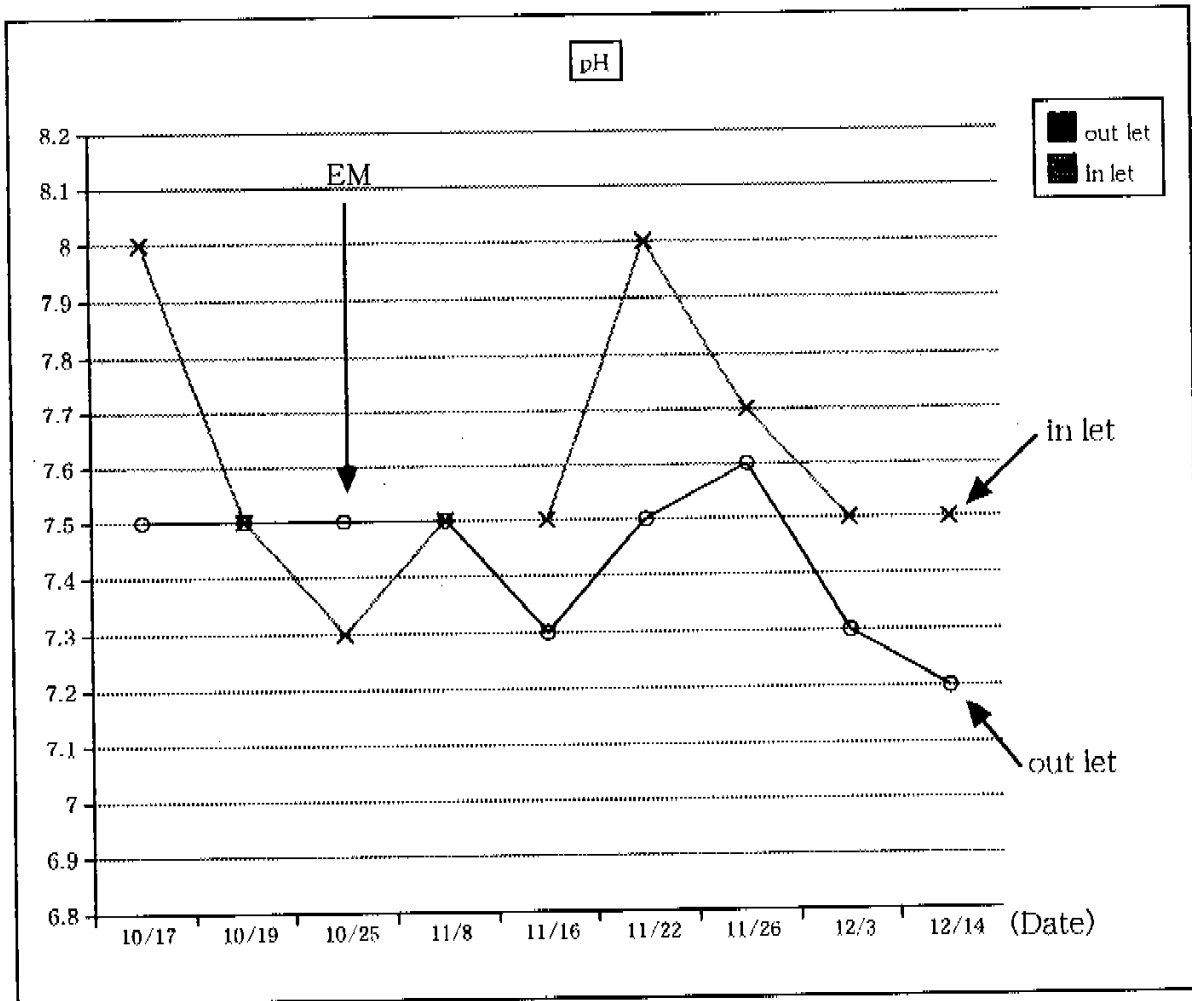
Following graphs show a clear picture of a remarkable progress of EM Treatment.

(I) DO

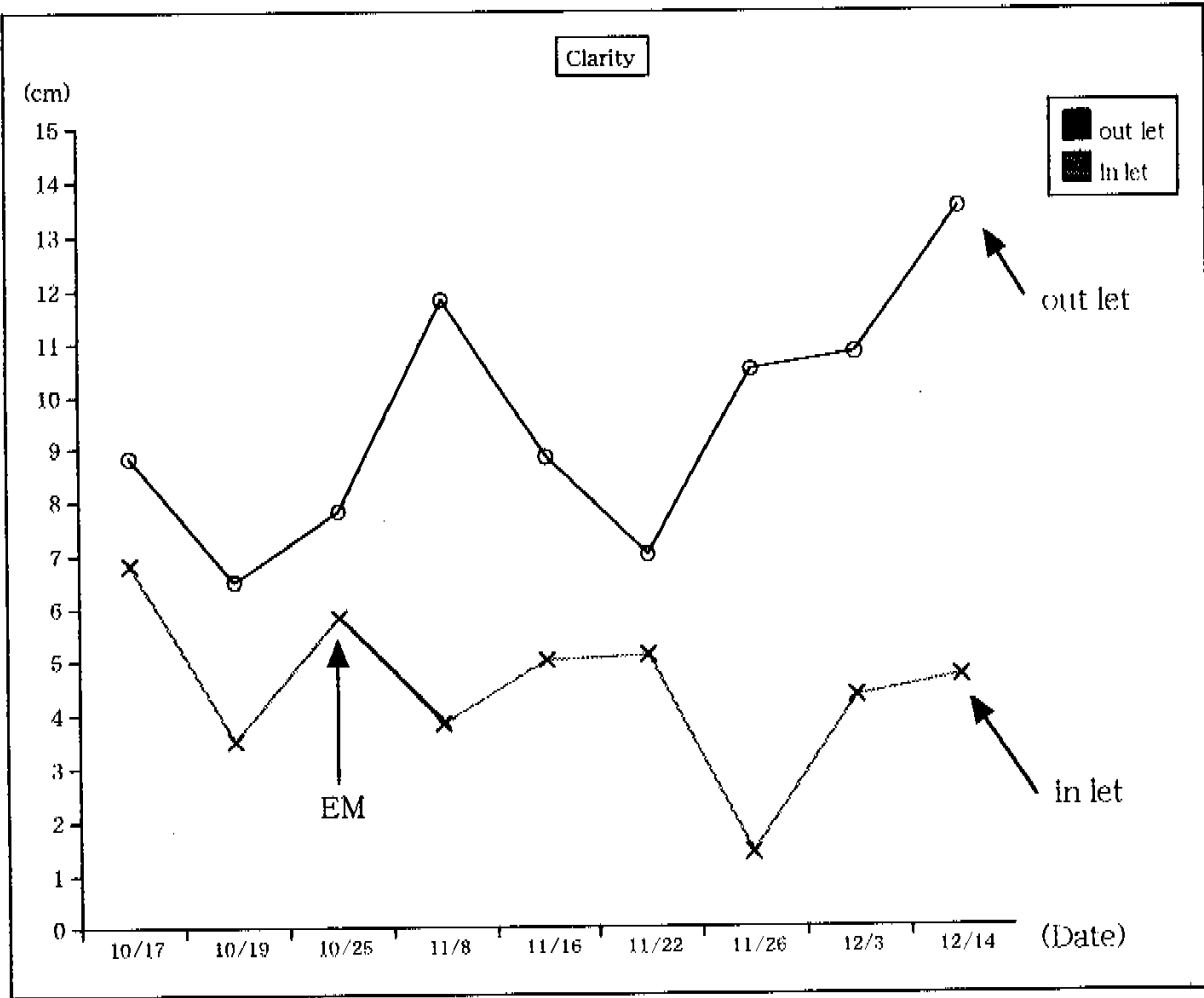




(II) PH



### (III) Clarity



**Observations:**

1. No more smell from the water or around the area.
2. After the decomposition of sludge, the water getting lighter and waves can be seen.
3. Birds can be seen all the day coming to the pond very often.

**Goal:**

1. To achieve the certain specific levels mentioned below.

Parameters	Unit	Result
BOD <sub>5</sub>	mg O <sub>2</sub> /L	less than 20 ppm
COD	mg O <sub>2</sub> /L	less than 50 ppm
N	mg N/L	less than 30 ppm
P	mg P/L	less than 20 ppm
Heavy Metals	mg/L	less than the max.

**Remarks:**

This project was launched on Oct' 20 by the co-operation of the Undersecretary of State for Afforestation and Reclamation the Ministry of Agriculture Egypt, and EMRO (EM Research Organization, Japan) & APNAN (Asia Pacific Natural Agriculture Network) & INFRC (International Nature Farming Research Centre, Japan).

Project was designed and organized by:

Syed Ali (Project Manager EMRO Team for Egypt)  
 Masakai Nakamine (Chief Engineer EMRO Team for Egypt)

Local Staff at the Site: Dr. Mohd. Al-fattah  
 Eng. Folly  
 Eng. Mohd. Ibrahim  
 6 Technicians

The pilot project underwent successfully during it's first 2 months period. The remaining 3 and half months period will be very enough to reach the goal, however if we setup the Reverse System Pump, it will make the quality of the water much better and will be time saving and also low cost.

It is recommended that the Egyptian side can think over to run the project by the help of the local team, which EMRO team has trained, applying the same treatment method for the remaining period, however, the necessary supervision can be done by the EMRO Team, time to time. So that, EMRO Team can take care of other new projects in Egypt and out of Egypt.

#### Note:

Sadat City Sewage Water Treatment data can't be published without the prior permission of EMRO HQ. Okinawa, Japan.

### Acknowledgement

Sadat City Sewage Water Treatment progress reports are prepared and presented by The Project Manager EMRO Team in Egypt.

Syed Ali

Project Manager  
EMRO Team in Egypt

Received by The Undersecretary of State for Afforestation and Reclamation, Egypt.

Dr. Mamdouh Riad

Undersecretary of State for  
Afforestation & Reclamation, Egypt.

\* There are 4 sets of this report.

(A = Egypt, B = Dr. Higa, C = EMRO HQ. D = EMRO Team)

## Major Problems of the Sewage Water :

(I) Sampling & Analysis : Jan ' 31, 1995.

NO	Parameters	Result	Max limit by law
1	Temperature (°C)	16.5	
2	pH	7.24	
3	Total Solids (mg/L)	1020	
4	Soluble Solids (mg/L)	700	
5	Suspended Solids (mg/L)	300	
6	Percipitated substances in 10 minutes (mg/L)	2.5	
7	Percipitated substances in 30 minutes (mg/L)	2.6	
8	BOD (mg/L)	266	
9	COD (mg/L)	339	
10	Sulphides	10.8	
11	Total Alkalining (mg/L)	240	
12	Chlorides (mg/L)	232	
13	Amonium (mg/L)	12	
14	Nitrates (mg/L)	4.3	
15	Oil	N.D	
16	Soluble Oxygen (mg/L)	0.1	
17	Phosphates (mg/L)	3.45	
18	The prabrable Number of Coton group in 100ml	$1.2 \times 10^7$	
19			

## "Heavy Metals"

NO	Parameters	Result	Max limit by law
1	Iron (mg/L)	1.03	1
2	Magnesium (mg/L)	0.1	0.5
3	Zinc (mg/L)	1.431	1
4	Copper (mg/L)	0.231	1
5	Cobalt (mg/L)	0.0	-----
6	Nickle (mg/L)	0.22	0.1
7	Aluminium (mg/L)	0.201	-----
8	Lead (mg/L)	0.0231	0.05
9	Cadmium (mg/L)	0.3127	0.01

\* Provided by the Ministry of Agriculture, Afforestation & Reclamation, Egypt.

## (II) Sampling &amp; Analysis : Jan ' 30, 1995.

NO	Parameters	Result	Max limit by law
1	Temperature (°C)	16.5	
2	pH	7.24	
3	Total Solids (mg/L)	1020	
4	Soluble Solids (mg/L)	700	
5	Suspended Solids (mg/L)	300	
6	Percipitated substances in 10 minutes (mg/L)	2.5	
7	Percipitated substances in 30 minutes (mg/L)	2.6	
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1	Iron (mg/L)	1.03	1
2	Magnesium (mg/L)	0.1	0.5
3	Zinc (mg/L)	1.431	1
4	Copper (mg/L)	0.231	1
5	Cobalt (mg/L)	0.0	-----
6	Nickle (mg/L)	0.22	0.1
7	Aluminium (mg/L)	0.201	-----
8	Lead (mg/L)	0.0231	0.05
9	Cadmium (mg/L)	0.3127	0.01

\* Provided by the Ministry of Agriculture, Afforestation & Reclamation, Egypt.

## Note:

Sadat City Sewage Water Treatment Project is still under work. For any informations on EM application procedure, please contact EMRO HQ Japan.



Table, Effect of EM Treatment for Sewage water.

Sewage Treatment Analysis of Wastewater  
 Samples Located at Sadat City Sewage Water Treatment Station

(Formal Data)

in let	'95, Jan/30	'97, Oct/28	97/Nov/22	97/Dec/21	'98, Jan/21
BOD	266	257	85	63	100
COD	339	600	160	350	163.3
Phosphate	3.45	6.8	7.1	3.89	5.1
Nitrate	4.3	0.01	0.09	0.12	0.15
T, K, N		14	10.4	25.2	10.85
Cd	0.3127	<0.05	0.02	0.01	0.01
Pb		0.6	0.03	0.28	0.68
Cu	0.231	<0.1	0.21	0.01	0.02
Zn	1.431	2.2	0.25	0.45	0.24
Ni	0.22	<0.15	0.027	0.13	0.25
Cr		<0.2	0.01	0.03	0.02

out let	'95, Jan/30	'97, Oct/28	97, Nov/22	97, Dec/21	'98, Jan/21
BOD	36	72	60	11	25
COD	138	121	126	241	40.8
Phosphate	3	4.8	6.3	2.9	3.36
Nitrate	8.2	0.25	0.01	0.08	0.12
T, K, N		10.1	9.3	11.2	9.45
Cd	0.225	<0.05	<0.02	0	0.01
Pb		<0.2	0.07	0.17	0.09
Cu	0.225	<0.1	0.08	0.01	0.01
Zn	2.025	<0.05	0.01	0.06	0.08
Ni	0.0625	<0.15	0.025	0.11	0.13
Cr		<0.2	0.01	0.01	0.02

Remark's: 1. Unit: (ppm).

2. Befor EM Treatment: '95, Jan/30 and '97, Oct/28.

3. After EM Treatment: '97, Nov/22 and '97, Dec/21 and '98, Jan/21

Table, Effect of EM Treatment for Sewage water.  
 Sewage Treatment Analysis of Wastewater  
 Samples Located at Sadat City Sewage Water Treatment Station

Table a. In let

	'97, Oct/17	Oct/19	Oct/25*	Nov/8	Nov/16	Nov/22	Nov/26	Dec/3	Dec/10	Dec/17	'98, Jan/18	Jan/21	Jan/25	Feb/1	Feb/4	Feb/8	Feb/11	Feb/15
W. Temp**	29.5	28	28.2	27	26.5	26.2*	26.8*	25.4*	25.3*	26	22.8	23	22.9	20	24.8	23.8	24	24.8
A. Temp***	30.5	28.5	34.5	24.8	24.1	33.5*	32	27	24.5	24.5	22	20.8	20	21.8	17.5	20	23.8	24.8
pH	8	7.5	7.3	7.5	7.5	8	7.7	7.5	7.5	7.5	7.5	7.7	7.5	7.5	7.1	7.8	7.8	8.3
Clarity(cm)	6.8	3.5	5.8	3.8	5	5.1	1.4	4.3	4.7*	2.9	1	1	6	12.8	4.3	2.5	5	2.2
DO(ppm)	0.1	0.1	0	0	0*	0	0	0.1	0*	0	0	0	0	0	0	0	0	0

Table b. Out let

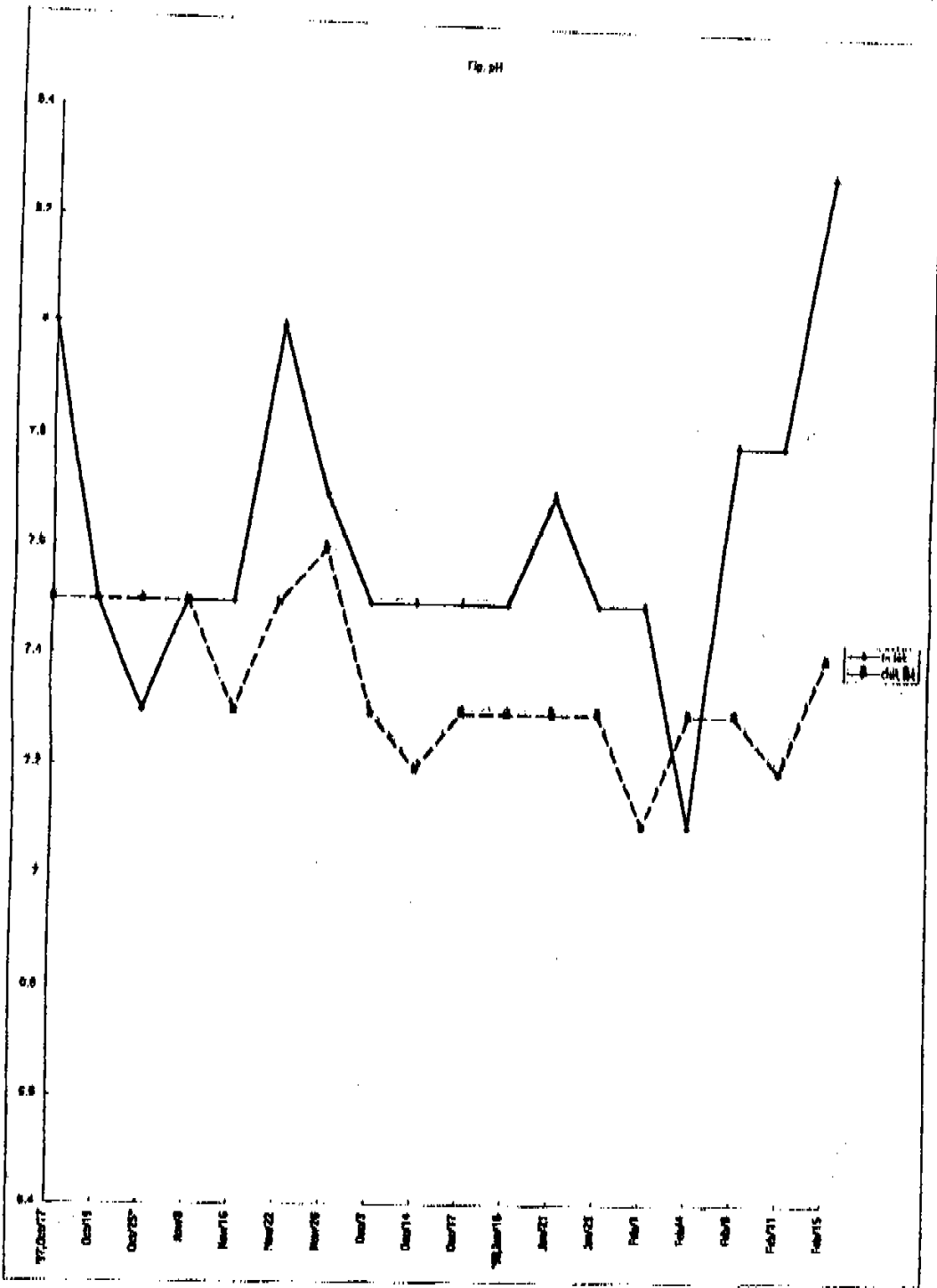
	'97, Oct/17	Oct/19	Oct/25*	Nov/8	Nov/16	Nov/22	Nov/26	Dec/3	Dec/14	Dec/27	'98, Jan/18	Jan/21	Jan/25	Feb/1	Feb/4	Feb/8	Feb/11	Feb/15
W. Temp**	25.5	24.5	23.5	20.8	20.2	21	22	18.8	17.5	16.8	14.8	15.8	15	14.8	17	16.8	16.8	16.8
A. Temp***	30.5	26.5	34.5	24.8	24.1	24.1	33.5*	32	27	24.5	24.5	22	20.8	20	17.5	20	24	24.8
pH	7.5	7.5	7.5	7.5	7.3	7.5	7.6	7.3	7.2*	7.3	7.3	7.3	7.3	7.1	7.3	7.3	7.2	7.4
Clarity(cm)	8.8	6.5	7.8	11.8*	8.8*	7	10.5*	10.8	13.5*	12.8*	13.5	15.3	11.5	10.2	15.5	11.2	7	7
DO(ppm)	0.5	0.3	3	6	5	6	6*	6	5	4*	0	3.5	0	0	0	0	0	0

\*\*Scott EM Treatment

\*\*\*Water Temperature (C)

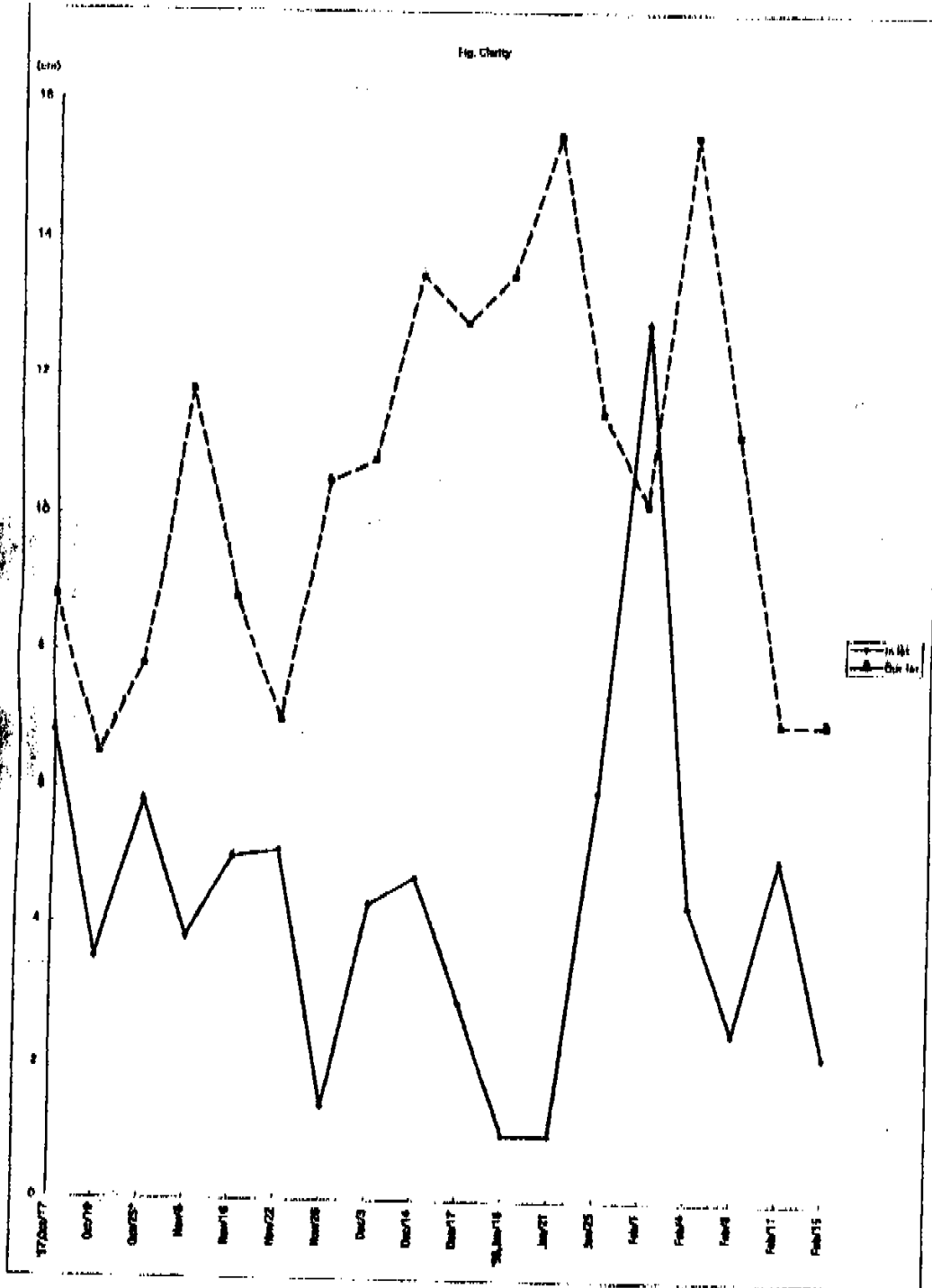
\*\*\*\*Atmospheric Temperature (C)

Date	07/02/17	08/17/18	09/20/19	Nov/8	Nov/16	Nov/22	Nov/28	Dec/5	Dec/14	Dec/17	Jan/10	Jan/16	Jan/23	Jan/30	Feb/7	Feb/14	Feb/21	Feb/28
pH	7.5	7.3	7.5	7.5	7.9	7.8	7.4	7.3	7.4	7.3	7.8	7.7	7.3	7.3	7.3	7.1	7.3	7.3
Conc	7.5	7.3	7.5	7.5	7.9	7.8	7.4	7.3	7.4	7.3	7.8	7.7	7.3	7.3	7.3	7.1	7.3	7.3



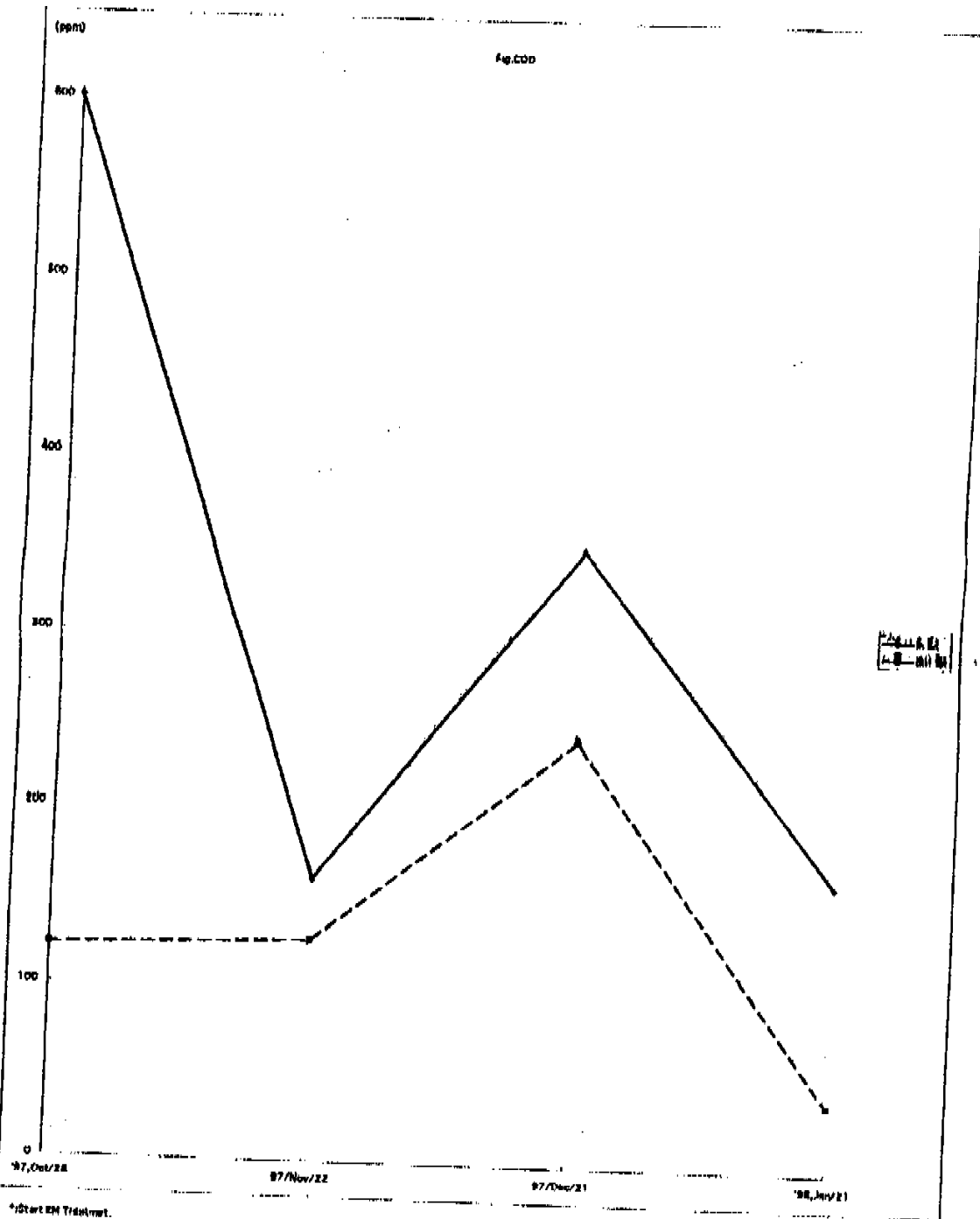
\*Start EM Treatment

Clarifylow	97/Oct/17	97/Oct/19	97/Oct/25	97/Nov/8	97/Nov/10	97/Nov/22	97/Nov/28	97/Dec/9	97/Dec/14	97/Dec/17	98/Jan/18	98/Jan/21	98/Jan/25	98/Feb/1	98/Feb/4	98/Feb/8	98/Feb/11	98/Feb/18
In let	6.9	6.5	9.0	9.8	8	8.3	1.4	8.8	4.7	8.9	1	9	17.6	13.3	2.8	7	2.2	
Out let	8.9	6.5	7.8	11.0	8.6	7	10.9	10.8	13.3	13.8	13.3	13.8	11.3	10.2	11.8	11.2	7	7

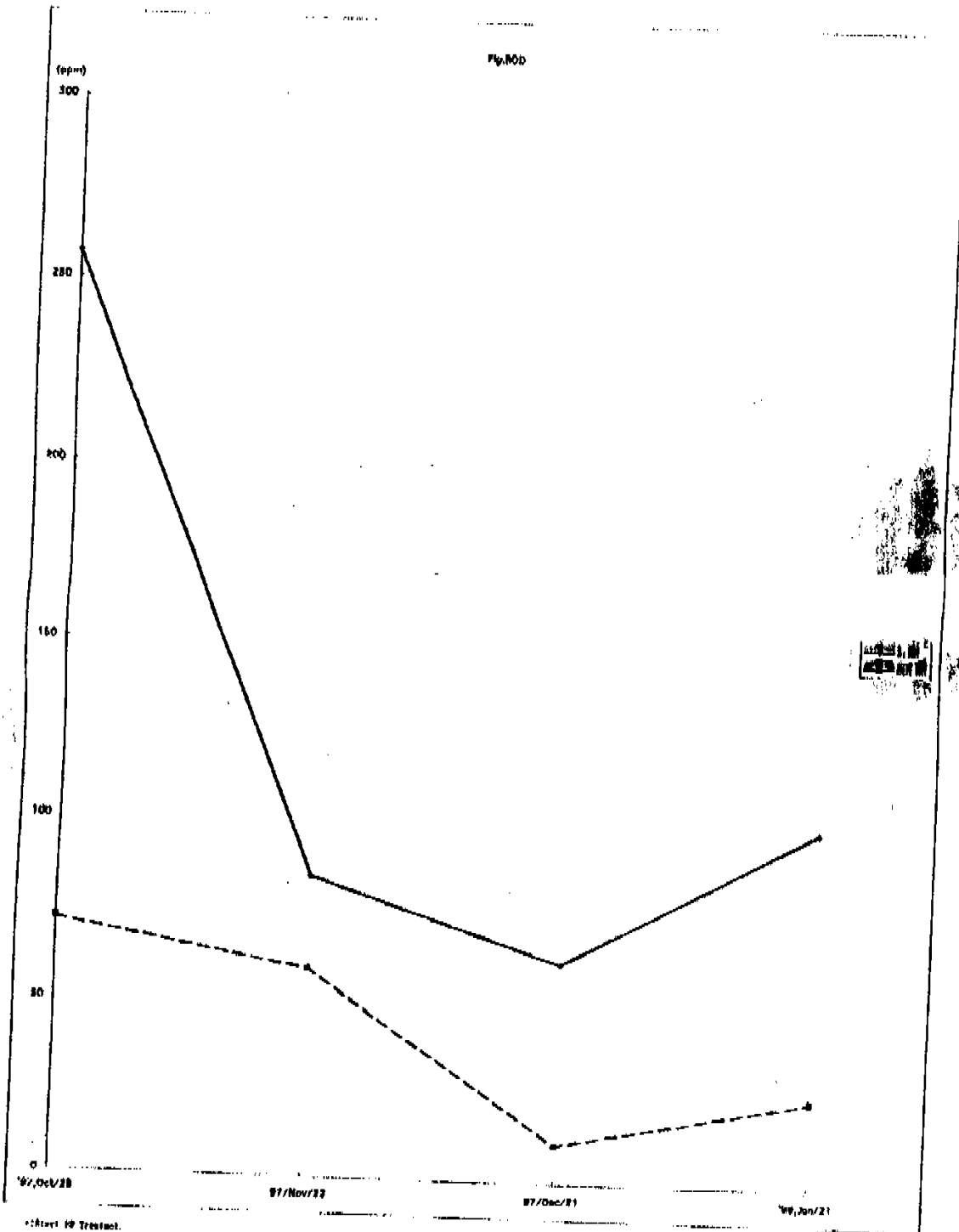


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	97/Oct/28	97/Nov/22	97/Dec/21	98/Jan/21
In Tot	800	160	360	163.3
Out Tot	181	120	241	40.0



	97, Oct/20	97, Nov/22	97, Dec/21	98, Jan/21
in let	287	85	63	100
out let	72	60	11	25



DO	9/10/17	Oct/19	Oct/25	Nov/8	Nov/16	Nov/22	Nov/28	Dec/5	Dec/14	Dec/17
Inlet	0.1	0.1	0	0	0	0	0	0.1	0	0
Outlet	0.5	0.3	1	5	5	5	5	5	3	4

