

เอกสารอ้างอิง



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ภาคผนวก

ตารางที่ 4.1. ค่าข้อมูลการดำเนินงานของระบบบำบัดน้ำเสียของเทศบาลเมืองสุพรรณบุรี

Date	Influent					Effluent from Bio Disc										Effluent from Submerged Drum									
	pH	SS	COD	BOD	Tot-N NH ₃ -N	Flow ml/m	pH	SS	COD	BOD	DO	Tot-N NH ₃ -N	NO ₂ -N	NO ₃ -N	Flow	pH	SS	COD	BOD	DO	Tot-N NH ₃ -N	NO ₂ -N	NO ₃ -N		
Run No. 1 6/8/77	4.65	at 5 rpm	started on 1694		1977	15.0	8.20	intermittent feed	Continuous feed on 2	hd	August 1977	with flow rate 12	ml/minute	approximately	(the first day of operation)										
8/9/77	4.45	2191				10.0	8.10	28							9.9	8.15	24								
18/8/77	4.65	1628				16.0	8.40	42							10.7	8.50	29								
20/8/77	5.20	1631				16.0	8.65	42							16.4	8.70	54								
23/8/77	5.20	1445				15.9	8.50	42	5.15					14.5	8.60	1.0	32			5.70					
27/8/77	4.55	1937				11.5	8.40	32	6.20					18.4	8.55		63			5.75					
29/8/77	4.70	1764				13.5	8.50	45						11.5	8.70		35								
30/8/77	5.25	1674				14.0	8.55	53	5.80					11.6	8.70		49			6.30					
7/9/77	5.10	1976				14.0	8.75	51						13.1	8.70		47								
8/9/77						8.9	8.55		5.60					13.1	8.70					6.65					
19/9/77	63							3.0																	
20/9/77	5.70	104				11.3	8.40	5.5	4.70					11.3	8.75	4.0	3.3			5.70					
22/9/77	4.80	146	1987	1173		11.1	9.65	2.0	1.3	6.45				14.8	8.60	1.0	48			1.6	6.70				
27/9/77	106	2006				12.8		2.3	1.2					13.9		0.3	47			1.5					
29/9/77	4.45	82	2291	1434		13.0		0.7	1.4	6.95				13.3		0.7	47			1.5	6.95				
30/9/77	122	2276				13.0		1.3	44	7.05				12.1		1.0	37			7.05					
3/10/77	5.15	140	1879			8.2	8.95	1.3	31	6.70	3.1	0.4	0.01	2.7		1.3	36			7.05	3.4	0.7	.001	3.2	
4/10/77	4.80	88	1900			8.2	8.75	1.2	29	6.75				10.7	8.65	1.1	25			7.00					
5/10/77	4.70	109	1896	1160		8.5	8.65	1.4	1.0	7.05				12.1	8.65	1.0	38			1.0	7.20				
6/10/77	5.00	88	2066			11.4	8.75	2.1	44	6.85				12.0	8.65	1.4	37			1.0	7.15				
7/10/77	4.85	100	1917	1188		11.4	8.65	1.9	42	6.90	5.7	2.1	0.01	3.2		1.3	37			1.0	7.20	3.1	1.2	.001	3.5
8/10/77		1920				11.2		37						12.4			35								
17/10/77	4.95	88	2080	1248		10.4	8.75	2.0	30	6.95	2.9	0.7	0.01	3.8		0.8	41			1.1	7.15	4.0	0.9	.001	3.6

ตาราง 4.1 (ต่อ)

Date	Influent				Effluent from Bio Disc										Effluent from Submerged Drum												
	pH	SS	COD	BOD	Tot-N	NH ₃ -N	Flow	pH	SS	COD	BOD	DO	Tot-N	NH ₃ -N	NO ₂ -N	NO ₃ -N	Flow	pH	SS	COD	BOD	DO	Tot-N	NH ₃ -N	NO ₂ -N	NO ₃ -N	
Run no. 2 (at 5 rpm) started on 17th October 1977.																											
17/10/77																											
23/10/77	4.85		2277				22.9	8.45	97								23.6	8.40									
24/10/77	5.05		2370				24.0	8.15	116								24.9	8.25									
25/10/77	5.00		2289				24.7	8.20	118								26.2	8.40									
26/10/77	4.75		1615				23.7	8.20	87								25.9	8.15									
27/10/77	5.35		2257				25.2	8.10	127								26.2	8.05									
28/10/77	4.65		1816				25.1	8.20	130								25.8	8.00									
29/10/77	4.85		1764				23.5	8.25	126								26.8	8.30									
30/10/77	5.55		1431				23.3	8.10	101								26.3	8.10									
31/10/77	5.95	158	1431				24.2	8.20	13.3	121							25.8	8.40	5.3								
1/11/77	5.10	140	1879	977			25.2	8.40	17.9	142	19	2.40					26.8	8.30	5.0								
2/11/77	5.00	124	2370				25.0	8.25	21.0	169		1.95	23.3	19.4	7.5	2.4	25.8	8.30	6.5								
3/11/77	4.80	196	2283	1150			25.6	8.20	17.5	155	24	2.25	24.2	20.0	6.1	2.8	22.5	8.30	5.5								
4/11/77	4.65	102	1968				23.3	8.30	22.5	144		1.40	23.5	19.2	10.7	2.9	21.3	8.30	5.0								
5/11/77	4.60	124	1934				23.3	8.00	18.0	142		2.55					25.0	8.20	4.5								
6/11/77	4.85	118	2245	1145			24.7	8.20	23.0	148	21	2.45					26.3	8.45	5.0								
Run no. 3 (at 5 rpm) started on 6 th November 1977.																											
5/11/77																											
7/11/77	5.10		1553				42.7	8.20	161			0.50					45.4	8.20									
8/11/77	4.80		1553				45.7	8.35	162			2.15					47.6	8.40									
9/11/77	4.80	94	1594				43.2	8.30	39	173		2.10					43.2	8.30	40								
10/11/77	4.90	179	2041	1112			42.0	8.30	51	187	36	2.05					44.1	8.30	13								

ANNEX H.1 (cont)

Date	Influent				Effluent from Bio Disc							Effluent from Submerged Drum																	
	pH	SS	COD	BOD	Tot-N	NH ₃ -N	Flow ml/h	pH	SS	COD	BOD	LO	Tot-N	NH ₃ -N	NO ₂ -N	NO ₃ -N	Flow	pH	SS	COD	EOD	DO	Tot-N	EH ₃ F	NO ₂ -N	NO ₃ -N			
11/11/77	5.05	112	1790			42.5	8.20	40	184		2.00						41.7	8.25	5	122		4.15							
12/11/77	5.30	135	1657	928	74.2	24.1	43.0	39	164	34	2.60	34.7	28.5	2.4	0.1		43.2	8.10	15	104	14	5.40	11.2	6.7	4.8	8.3			
13/11/77	5.20	108	1511		70.1	20.4	44.5	41	183		2.10	42.0	29.0	1.9	0.2		42.4	8.10	8	93		5.15	10.5	4.5	4.4	7.8			
14/11/77	5.00	162	1633	914	69.7	19.7	42.3	36	190	40	2.55	44.5	32.8	2.1	0.3		43.1	7.90	9	158	21	4.30	13.6	8.1	4.6	10.1			
15/11/77	5.10	146	1455			44.9	8.28	29	163		2.60						42.8	8.10	15	91		5.10							
Run no. 4 (at 5 rpm) started on 15th November 1977.																													
15/11/77 Adjusted the flow rate approximately to 96 ml/minute																													
16/11/77	4.85		1614			81.5	7.80		382		0						88.9	7.60		421		0							
17/11/77	4.65		1886			89.2	7.40		682		0						81.3	7.55		672		0							
18/11/77	4.85					70.0	8.00				-						73.0	7.95		-		-							
19/11/77	5.00	184	2022			62.0	7.50	150	409		0						69.0	7.60	142	359		0							
20/11/77	5.15	146	1905		76.8	9.1	97.0	143	755		0	54.9	30.4	0	0		99.0	7.60	162	787		0	51.4	29.4	0	0			
21/11/77	4.90	126	1748			96.0	7.60	168	730		0						94.0	7.60	138	687		0							
22/11/77	5.30	190	2231			102.0	7.60	162	809		0						105.0	7.75	96	739		0							
23/11/77	4.75	122	1938			102.0	7.60	154	814		0						96.3	7.75	120	732		0							
24/11/77	4.75	130	1956	1190		89.5	7.80	168	768	370	0						98.0	7.75	96	718	287	0							
25/11/77	4.65	100	2041	1149	82.3	8.9	98.0	126	783	436	0	61.2	37.2	0	0		95.0	7.70	78	806	365	0	57.6	38.4	0	0			
26/11/77	4.70	134	1865	1280	77.4	7.5	94.0	102	808	388	0	58.2	37.4	0	0		97.0	7.70	126	821	258	0	88.2	43.5	0	0			
Run no. 5 (at 10 rpm) started on 26th November 1977.																													
26/11/77 Adjusted the flow rate approximately to 48 ml/minute																													
27/11/77	4.70	164	1858			47.0	8.10	26	126		5.75						44.0	7.90	42	160		6.30							
28/11/77	4.75	86	1767			46.5	8.35	4	119		5.50						40.0	8.05	2*	97		6.20							
29/11/77	4.70	98	1566			33.9	8.30	4	88		6.70						40.6	8.10	7	94		5.35							

* Using fresh waste from the soya-bean cake factory, the SS was low.
 † The flow was low because of clogging the pump.

TABLE 4.1.

Date	Influent					Effluent from Bio Disc										Effluent from Submerged Drum													
	pH	SS	COD	BOD	Tot-N	NH ₃ -N	Flow	PH	SS	COD	BOD	DO	Tot-N	NH ₃ -N	NO ₂ -N	NO ₃ -N	Flow	PH	SS	COD	BOD	DO	Tot-N	NH ₃ -N	NO ₂ -N	NO ₃ -N			
30/11/77	4.95	108	1723				61.2	8.00	46	328	0						53.6	8.10	3	327								5.50	
1/12/77	4.80	36	1687				51.0	8.05	52	185	0.50						44.5	8.05	2	98								5.55	
2/12/77	4.70	32	1720				45.8	8.15	38	161	3.3						45.8	8.10	6	89								5.55	
3/12/77	4.90	74	1667	990			44.0	8.30	64	171	41	3.75					44.0	8.10	17	99	29							5.45	
4/12/77	5.10	110	1791		85.4	10.6	43.1	8.50	56	186	4.85	4.85	40.7	29.2	-		46.3	8.10	24	135	135							5.35	
5/12/77	4.70	56	1778	1018	98	14.8	41.0	8.35	52	184	4.45	4.45	41.8	28.5	3.2	0.2	49.0	7.85	31	139	34							4.50	
6/12/77	4.80	48	1720		70.4	3.5	39.2	8.30	38	157	4.85	4.85	37.2	26.0	4.9	0.2	41.2	7.80	15	109								5.40	
7/12/77	4.90	76	1823	1122	71.4	3.6	41.8	8.40	60	179	4.00	4.00	37.9	23.0	6.2	0.3	43.2	7.95	45	149	38							3.50	
Run no.6 (at 15 rpm) started on 7 th December 1977.																													
7/12/77																													
Adjusted the flow rate approximately to 48 ml/minute																													
8/12/77	4.70	128	1962				39.0	8.20	27	135	4.75	4.75					38.5	8.15	18	117									5.30
9/12/77	4.60	134	1964		81.6	3.8	44.1	8.20	59	205	4.75	4.75					37.3	8.05	29	110									5.65
10/12/77	4.80	134	1937				44.0	8.30	79	197	4.50	4.50					40.0	7.90	28	123									5.05
11/12/77	4.75	128	1811				41.8	8.30	73	203	3.70	3.70					36.4	8.10	18	108									5.05
12/12/77	4.70	104	1805	1210	73.4	12.8	44.5	8.20	65	199	3.95	3.95	30.0	10.0	136	1.5	36.0	8.10	15	117	17								4.95
13/12/77	4.75	118	1640				45.0	8.25	54	188	4.35	4.35					40.0	8.15	12	103									5.00
14/12/77	4.60	128	1649	1076	81.8	12.4	43.0	8.20	61	177	4.55	4.55	28.4	15.4	160	0.5	38.8	8.00	6	88	8.8								4.95
15/12/77	5.10	120	1663	1064	82.5	4.0	45.0	8.30	59	185	4.60	4.60	30.5	16.1	150	0.5	35.3	8.10	8	99	13								5.3
16/12/77	5.00	156	1693				44.0	8.20	53	159	4.60	4.60					38.0	7.90	9	80									4.6

The flow was high because the pump was out off control.

17/12/77

Date	Influent					Effluent from Bio Disc										Effluent from Submerged Drum								
	PH	SS	CO ₂	BOD	Tot-N NH ₃ -N	Flow ml/hr	PH	SS	COD	BOD	LO	Tot-N NH ₃ -N	NO ₂ -N	NO ₃ -N	Flow	PH	SS	COD	BOD	DO	Tot-N NH ₃ -N	NO ₂ -N	NO ₃ -N	
Run no. 7 (at 5 rpm) started on 17 th December 1977. (Using new Rotating Biological contactors)																								
17/12/77 Started up with the wastewater from the soya-bean cake factory.																								
18/12/77	4.80					0.6	7.65								0.6	7.90								
19/12/77	5.30					16.2	7.90								11.8	8.10								
20/12/77	4.80					39.5	8.10								47.0	8.20								
21/12/77	4.90	86	1566			42.5	8.35	151	397	0				46.2	8.10	135	482	0						
22/12/77	4.95					44.5	7.90		0					46.2	8.40									
23/12/77	5.35					46.0	8.15							44.0	8.25									
24/12/77																								
25/12/77																								
26/12/77																								
27/12/77																								
28/12/77	4.75					45.5	8.5		0					42.5	8.40					0				
Run no. 7 (at 15 rpm) started on 28 th December 1977.																								
28/12/77 Adjusted the flow rate approximately to 48 ml/minute																								
29/12/77																								
30/12/77						47.0			2.50					36.0										
31/12/77	5.50					44.2	8.50							36.0	8.65					5.10				
1/1/78	5.55	87	1521			45.8	8.55	4	100	4.90				43.4	8.45	6	95	5.15						
2/1/78	6.40	123	1726			43.0	8.50	12	103	5.30				40.0	8.25	10	83	5.60						
3/1/78	5.10	82	1710			44.0	8.40	14	117	4.60				39.0	8.10	7	84	5.05						
4/1/78	4.90	60	1676			45.5	8.45	1	87	5.55				43.3	8.00	8	91	5.20						

01/01/78

Date	Influent				Effluent from Bio Disc							Effluent from Submerged Filter																
	pH	SS	COD	BOD	Tot-N	NH ₃ -N	Flow ml/h	pH	SS	COD	BOD	LO	Tot-N	NH ₃ -N	NO ₂ -N	NO ₃ -N	Flow	pH	SS	COD	BOD	DO	Tot-N	NH ₃ -N	NO ₂ -N	NO ₃ -N		
5/1/78	4.85	59	1680				42.5	8.35	2	73		5.75					42.3	8.10	16	118		6.30						
6/1/78	4.90	77	1667				42.6	8.40	2	81		5.15					44.0	8.35	8	85		4.40						
7/1/78	4.80	60	1885	1224	71.4	5.5	42.9	8.35	8	70	15	5.55	24.2	18.6	12.4	1.4	43.8	8.00	37	93	21	5.85	7.2	0.4	30.8	1.2		
8/1/78	4.95	171	2022	1355	77.1	2.2	40.8	8.40	10	94	21	4.75	23.0	16.5	13.7	0.9	46.0	8.10	12	104	24	5.65	2.3	0.7	24.4	0.9		
9/1/78	4.80	177	1723	1132	90.2	10.9	50.0	8.30	14	99	22	4.30	47.0	17.9	10.9	0.6	47.8	8.10	20	102	25	5.20	6.9	2.3	23.5	0.8		
Run no. 8 (at 5 rpm) started on 9 th January 1978.																												
9/1/78 Adjusted the flow rate approximately to 48 ml/minute																												
10/1/78	4.80	108	1890				41.8	8.20	8	166		2.55					55.8*	8.20	56	369		0						
11/1/78	4.90	118	1868				44.8	8.35	8	155		2.75					44.8	8.20	53	255		0						
12/1/78	4.70	97	1955				43.3	8.20	6	125		2.10					43.1	8.20	20	185		1.45						
13/1/78	4.70	64	1856				43.0	8.25	3	123		3.45					42.5	8.20	7	170		2.35						
14/1/78	4.62	88	1663	1098	67.8	3.4	44.2	8.25	8	107	25	4.10	40.0	40.9	1.2	0.1	43.5	8.20	17	140	42	4.50	52.1	42.6	1.2	0.2		
15/1/78	4.90	144	1730	1125	67.5	6.0	42.0	8.25	5	87	21	4.90	39.3	31.8	2.1	0.1	42.0	8.20	7	125	35	3.55	40.5	33.4	1.6	0.1		
16/1/78	5.07	164	1801	1190	80.2	1.3	41.0	8.30	9	73	17	4.10	37.4	32.1	3.6	0.3	43.5	8.35	16	131	37	4.55	48.0	35.9	2.0	0.1		
17/1/78	4.80	177	1732				42.8	8.30	9	84		4.15					43.8	8.35	14	135		4.45						

* The flow was high because the pump was out of control

ตารางที่ 0.2 (ต่อ)

Run	ประเภทการดำเนินงาน Activity	Influent Waste					Effluent Waste											
		pH	SS	COD	BOD	Tot-N	Flow ml/min.	pH	SS	COD	BOD	DO	Tot-N	NH-N	NO-N	NO ₂ -N	NO ₃ -N	
4	7 วัน	4.65-5.30	106-190	1748-2231	1149-1280	76.8-82.3	7.5-8.9	64.0-102.0	7.60-7.80	126-202	730-814	370-430	0-0	54.9-61.2	30.4-37.4	0-0	0-0	0-0
		4.88	135	1969	1206	78.7	8.5	96.9	7.67	160	781	398	0	58.4	35	0	0	0
		0.25	27.8	146.0	67	3.09	0.87	4.42	0.08	23.7	31.5	34.1	0	3.22	3.98	0	0	0
		4.70-5.10	32-110	1667-1828	990-1122	70.4-98	3.5-14.8	39.2-45.8	8.15-8.50	38-64	157-186	41-52	3.3-4.95	37.2-41.8	23.0-29.2	3.2-6.2	0.2-0.3	0.2-0.3
5	6 วัน	4.85	66	1751	1043	81.3	8.1	41.2	7.80	6-39	29	3	3.50-5.55	6.3-12.5	1.4-4.8	2.1-3.5	2.1-3.5	
		0.152	27.13	58.71	69.55	13.07	5.55	42.5	8.33	51	173	46	4.2	39.4	26.7	4.8	0.2	
		4.70-5.10	32-110	1667-1828	990-1122	70.4-98	3.5-14.8	39.2-45.8	8.15-8.50	38-64	157-186	41-52	3.3-4.95	37.2-41.8	23.0-29.2	3.2-6.2	0.2-0.3	0.2-0.3
		0.152	27.13	58.71	69.55	13.07	5.55	42.5	8.33	51	173	46	4.2	39.4	26.7	4.8	0.2	0.2
6	7 วัน	4.50-5.10	104-156	1640-1937	1054-1210	73.4-82.5	4.0-12.8	41.8-45.0	8.20-8.30	61-79	159-203	52-56	3.70-4.60	28.4-30.9	10.0-16.1	13.6-16.0	0.5-1.5	0.5-1.5
		4.81	127	1742	1117	79.2	9.70	35.3	7.90	6-8	80-117	17	5.66-5.5	4.2-5.5	1.0-1.4	2.9-4.4	1.1-1.4	
		0.175	16.08	11.40	81.05	5.06	4.97	43.9	8.25	63	187	53	4.32	29.8	13.8	14.9	10.8	
		4.70-5.10	32-110	1667-1828	990-1122	70.4-98	3.5-14.8	39.2-45.8	8.15-8.50	38-64	157-186	41-52	3.3-4.95	37.2-41.8	23.0-29.2	3.2-6.2	0.2-0.3	0.2-0.3
6	7 วัน	4.81	127	1742	1117	79.2	9.70	35.3	7.90	6-8	80-117	17	5.66-5.5	4.2-5.5	1.0-1.4	2.9-4.4	1.1-1.4	
		0.175	16.08	11.40	81.05	5.06	4.97	43.9	8.25	63	187	53	4.32	29.8	13.8	14.9	10.8	
		4.70-5.10	32-110	1667-1828	990-1122	70.4-98	3.5-14.8	39.2-45.8	8.15-8.50	38-64	157-186	41-52	3.3-4.95	37.2-41.8	23.0-29.2	3.2-6.2	0.2-0.3	0.2-0.3
		0.175	16.08	11.40	81.05	5.06	4.97	43.9	8.25	63	187	53	4.32	29.8	13.8	14.9	10.8	

ตารางที่ 4.2 (ต่อ)

Run	จำนวน เวลา หรือ รอบ	สภาพน้ำ	Influent Waste						Effluent Waste									
			pH	SS	COD	BOD	Tot-N	NH-N	Flow ml/min	pH	SS	COD	BOD	DO	Tot-N	NH-N	NO ₂ -N	NO ₃ -N
		Range	4.80-5.10	59-177	1567-2022	1132-1355	71.4-90.2	2.2-10.9	DISC 40.8-50.0	6.30-8.45	1-14	70-99	15-22	4.30-5.75	23.0-47.0	16.5-18.6	10.9-13.7	0.6-1.4
		Mean	4.90	98	1766	1237	79.6	6.2	DISC 44.1	8.38	7	89	19	5.09	31.4	17.7	12.3	1.0
		Standard Deviation	0.10	52.7	135.2	112.1	9.64	4.39	DRUM 43.7	8.11	15	97	23	5.38	5.5	1.1	26.2	3.0
		Range	4.62-5.07	88-177	1663-1801	1098-1190	67.5-80.2	1.3-6.0	DISC 41.0-44.2	8.25-8.30	5-9	73-107	17-25	4.10-4.90	37.4-40.0	31.8-40.9	1.2-3.6	0.1-0.3
		Mean	4.85	143	1732	1130	71.6	3.6	DRUM 42.0-43.8	8.20-8.35	7-17	125-140	35-42	3.55-4.55	40.5-52.1	33.4-42.6	1.2-2.0	0.1-0.2
		Standard Deviation	0.19	39.3	56.4	42.3	7.25	2.35	DISC 42.5	8.28	8	88	21	4.31	38.9	34.9	2.3	0.2
									DRUM 43.2	8.28	14	133	30	4.26	46.9	37.3	1.6	0.1
									DISC 1.35	0.03	1.89	4	0.39	1.35	5.17	1.21	0.12	
									DRUM 0.81	0.09	4.51	6.34	3.61	0.48	5.83	4.76	0.4	0.06

* ค่าเฉลี่ยของวันปฏิบัติการ

ตารางที่ ๓.3 แสดงความสัมพันธ์ระหว่าง BOD₅ และ COD ของน้ำทิ้งจากโรงบำบัดน้ำเสีย

run	influent		effluent from DISC		effluent from DRUM	
	BOD ₅	COD	BOD ₅	COD	BOD ₅	COD
1	1179	1987	1.3	39	1.6	48
	-	2006	1.2	38	1.5	47
	1434	2291	1.4	44	1.5	47
	1160	1896	1.0	36	1.0	38
	1188	1917	1.3	42	1.0	37
mean	1248	2080	0.6	30	1.1	41
			0.610			
2	977	1879	19	142	7	82
	1150	2283	24	155	5	64
	1145	2245	21	148	6	73
mean						
			0.511			
3	1112	2041	36	187	17	125
	928	1657	34	164	14	104
	914	1633	40	190	21	158
mean						
			0.545			
4	1190	1956	370	768	287	718
	1149	2041	436	783	365	806
	1280	1965	388	806	258	821
mean						
			0.608			
			0.555			
			0.203			
			0.482			
			0.557			
			0.481			
			0.507			
			0.135			
			0.400			
			0.453			
			0.314			
			0.389			

ตารางที่ น. 3 (ต่อ)

run	influent			effluent from DISC			effluent from DRUM		
	BOD	COD	$\frac{BOD}{COD}$	BOD	COD	$\frac{BOD}{COD}$	BOD	COD	$\frac{BOD}{COD}$
5	990	1667	0.594	41	171	0.240	29	99	0.293
	1018	1778	0.572	44	184	0.239	34	139	0.245
	1122	1828	0.614	52	179	0.290	38	149	0.255
mean			0.593			0.256			0.264
6	1210	1803	0.671	56	199	0.281	17	117	0.145
	1076	1649	0.652	52	177	0.294	8.8	88	0.1
	1064	1663	0.640	52	185	0.281	13	99	0.131
mean			0.654			0.285			0.125
7	1224	1885	0.649	15	70	0.214	21	99	0.212
	1355	2022	0.670	21	94	0.223	24	104	0.231
	1132	1723	0.657	22	99	0.222	25	102	0.245
mean			0.659			0.220			0.229
8	1098	1663	0.660	25	107	0.234	42	140	0.3
	1125	1730	0.650	21	87	0.241	35	125	0.28
	1190	1801	0.661	17	73	0.233	37	131	0.282
mean			0.657			0.236			0.287

* ลกพื้นที่ผิวของวัสดุยัดเกาะ

การวิจัย 4.4 ผลการดำเนินงานของระบบกรองชีวภาพ biological filters

Treatment Process	Conductor	Unit Named	Type of Wastewater	Speed of Rotation rpm	Volumetric Organic Load Kg/m ³ -day	Areal Organic Load g/m ² -day	% BOD Removal
Rotating Biological Disc Filters	SUWANNARAT(1968)	BDF	Milk	0.5	2.75	11	98 BOD
	WELCH (1969)	RBC	Synth. Sewage	20	-	4-8	65 BOD
	CHITENDEN & WELIS (1970)	RBC	Beef	3	-	9	83.2 BOD
	ANTONIE (1970)	Bio-Disc	Sewage	-	2.3	9.5	90 BOD
	NAIR (1971)	BDF	Pepsi Cola Sewage	10	4	20	95 COD
	BIERSK & HYNEK (1971)	Bio-Disc	Cheese	2	-	9.4	95 BOD
	WPRL (1971)	Bio-Disc	Sewage	1	1.65	6-10	98 30D
	SIMPSON (1972)	BDU	Sewage	-	1.3	-	96.5 30D
	HSIEH (1972)	BDF	Coca Cola	10	6	25	86.5 COD
	WENG (1972)	BFFRD	Synth. Sewage	-	1.8	6.15	89 COD
	CHEN (1973)	BDF	R.C. Cola	5	-	16-30	60-85 COD
	COCHRANE & DOSTAL (1972)	RBC	Simulated Potato	10	-	5.18	92 BOD
	ANTONIE & MIELKE (1974)	Full-Scale Treatment Plant	Sewage	2	-	11-18.7	85 BOD
						1.895-3.24	95 BOD

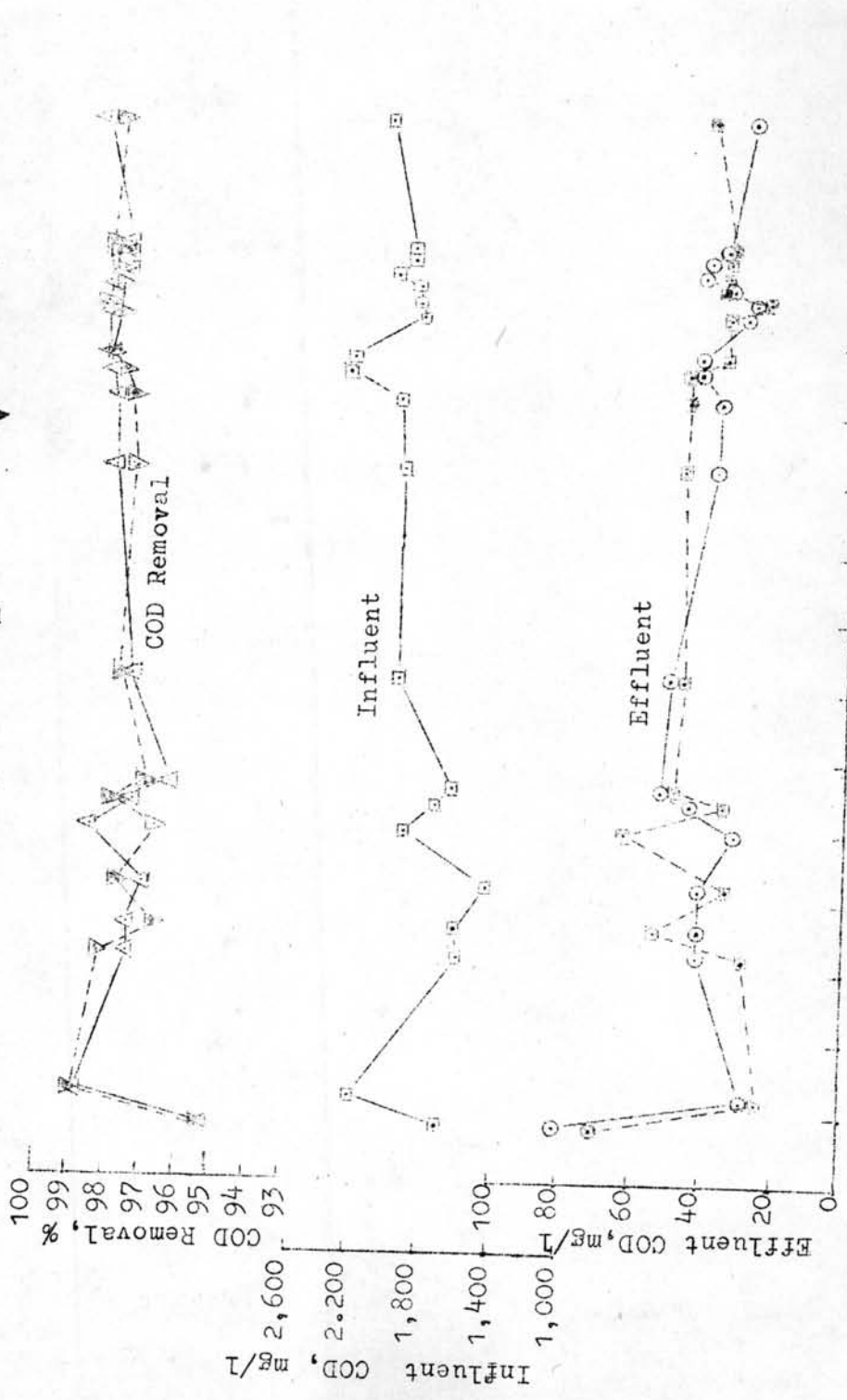
TABLE 4.4 (cont)

Treatment Process	Conductor	Unit Named	Type of Wastewater	Speed of Rotation rpm	Volumetric Organic Load $K_5/m^3 \cdot day$	Areal Organic Load $g/m^2 \cdot day$	% BOD Removal	
Rotating Biological Drum Filters	VITOMPANYAKIJ (1976)	RDC	Synth. Sewage	5	3	-	90 BOD	
	SORENSEN (1974)	Bio-Drum	Sewage	2.5	2.158	21.16	76.5 BOD	
	EURO-MATIC (1974)	Bio-Drum	Sewage	7.5	4.53	44.4	57.5 BOD	
	EURO-MATIC (1974)	Bio-Drum	Milk	10	2.93*	-	94.5 BOD	
	WPRL (1971)	5.08 cm Rings	Settled Sewage	6	1.16	11.2	90 BOD	
		2.54 cm Rings	Sewage	6	1.21	7.1	94.2 BOD	
		2.54 cm Rings	Sewage	6	1.62	7.5	87 BOD	
	Trickling & Heavy Loaded Filters	SORENSEN (1974)	Bio-Tower	Sewage	-	2.263	22.19	57 BOD
		ASKEW (1967)	Floccer Plastic Filter	Brewery	-	2	-	80.2 BOD
		ASKEW (1970)	Plastic Filter	Sewage	-	1.3	-	77 BOD
Tricklings Filters in General		Low Rate	-	-	0.16-0.32	-	90 BOD	
		High Rate	-	-	1.445	-	65-75 BOD	
Automatic Bio-Drum	McKINNEY (1962)	Plastic Media	-	-	1.6	-	97 BOD	
	EMAYATULLAH (1975)	60 cm dia. Bio-Drum	Soft Drink Bottling	11	4.66	29.5	98 BOD	
		60 cm dia. Bio-Drum	Taproot	11	2.92	-	98 BOD	
		60 cm dia. Bio-Drum	Starch	11	22.6	143	82 BOD	
					14.0	82 BOD		
					5.3*	98 BOD (Expected)		

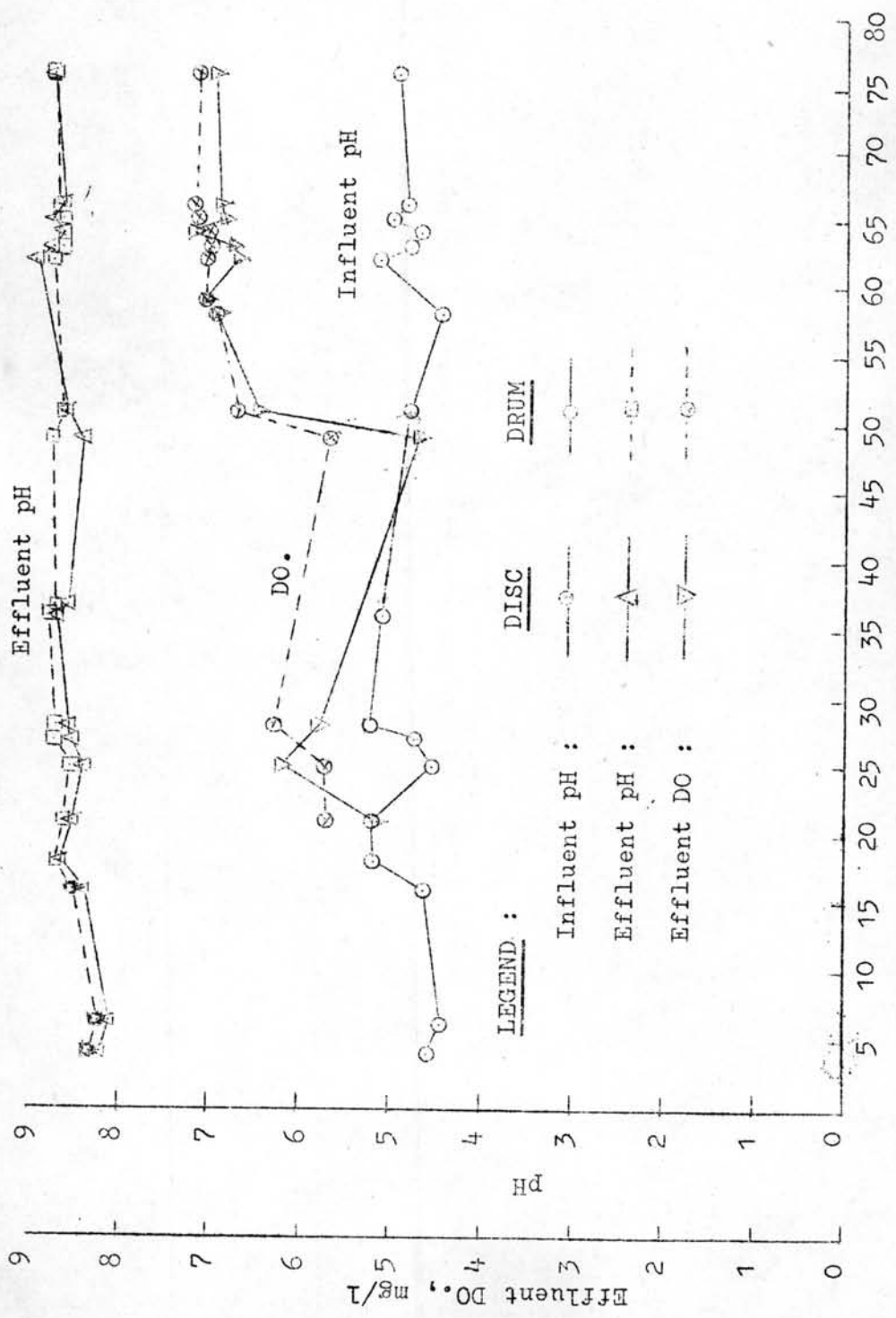
* Based on Volume of the Drum (after EMAYATULLAH, 1975)

LEGEND :

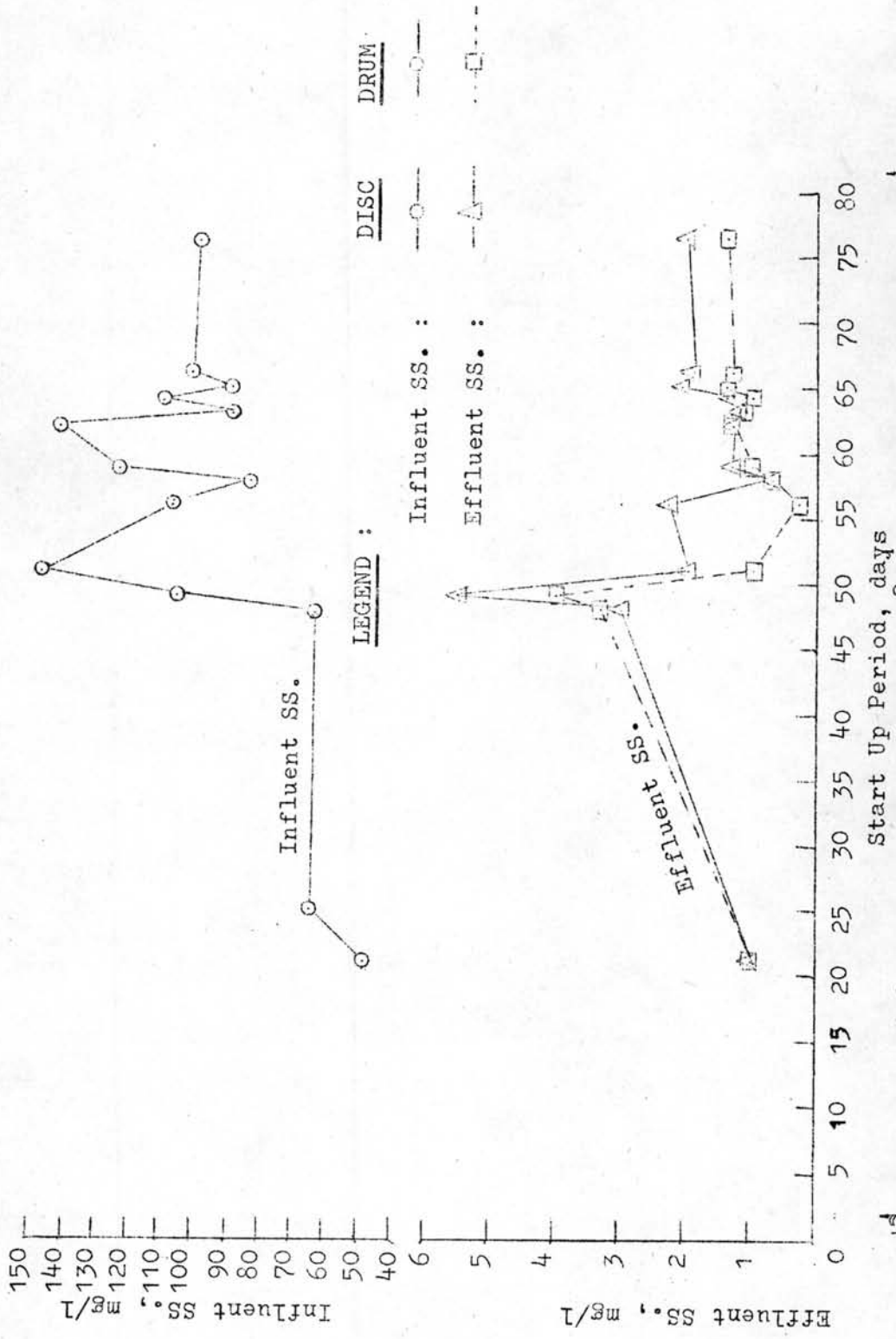
- DI\$C DRUM
- Influent COD : —□—
- Effluent COD : —○—
- COD Removal : —△— —▽— —▲— —▼—



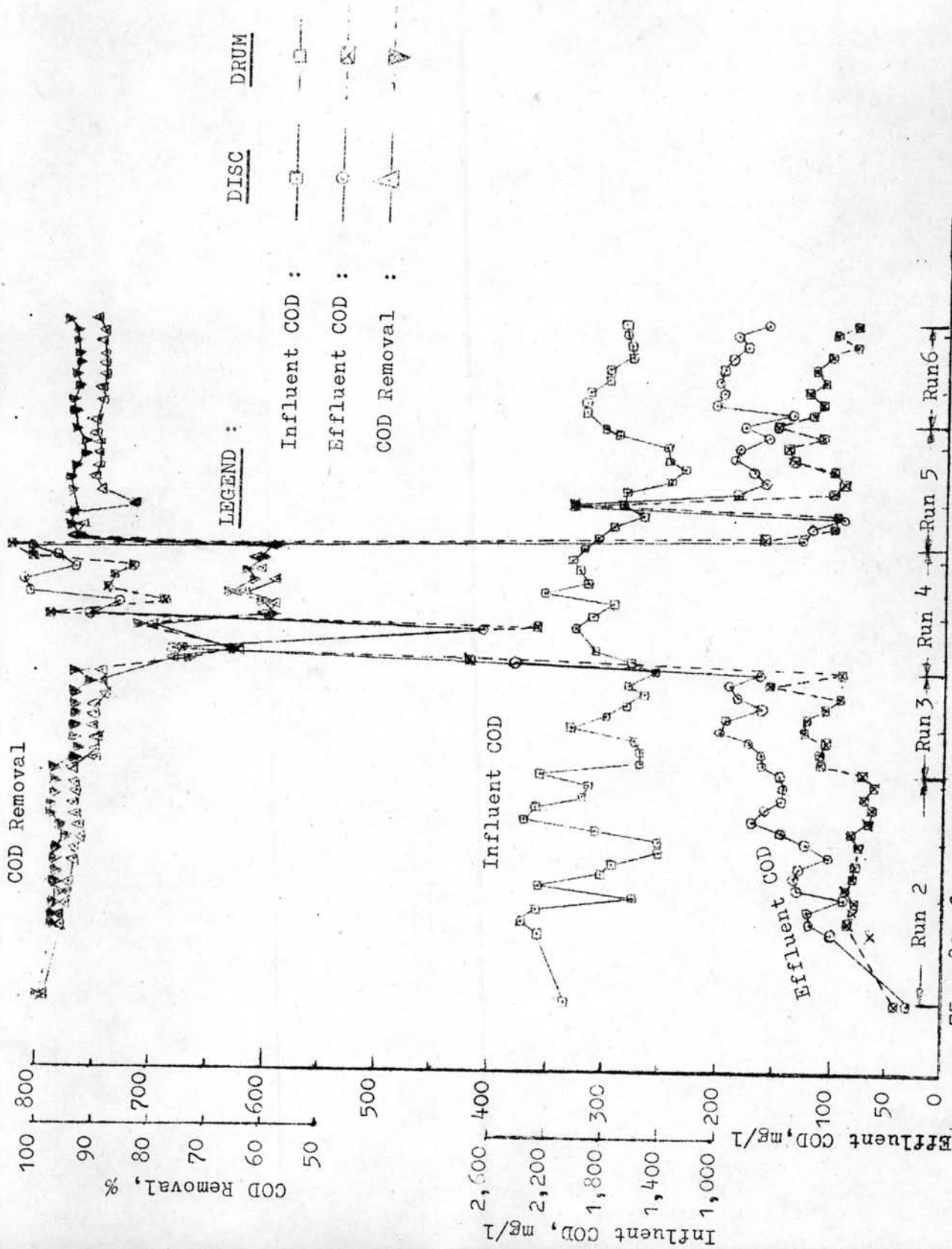
รูปที่ ๑.๑ บันทึกการทำงานของ Bio Disc และ Submerged Drum ในการกำจัดน้ำทิ้งจากโรงงาน
ผลิตเตา (ในช่วงระยะเวลาของการทดลอง ชุดที่ 1)



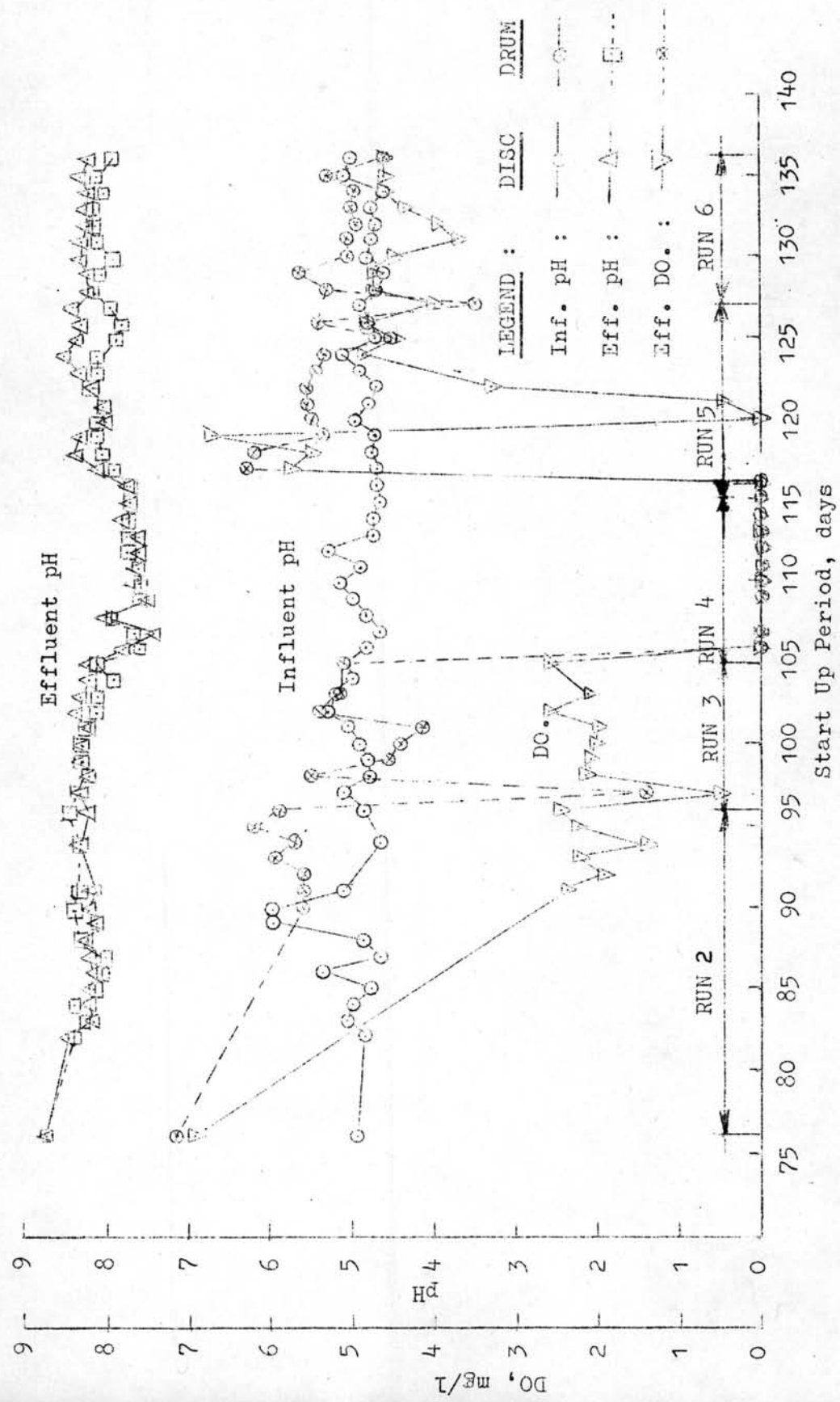
รูปที่ ๒.๒ ความแปรปรวนของ pH และ DO ในช่วงระยะเวลาของการทดลอง ชุดที่ 1



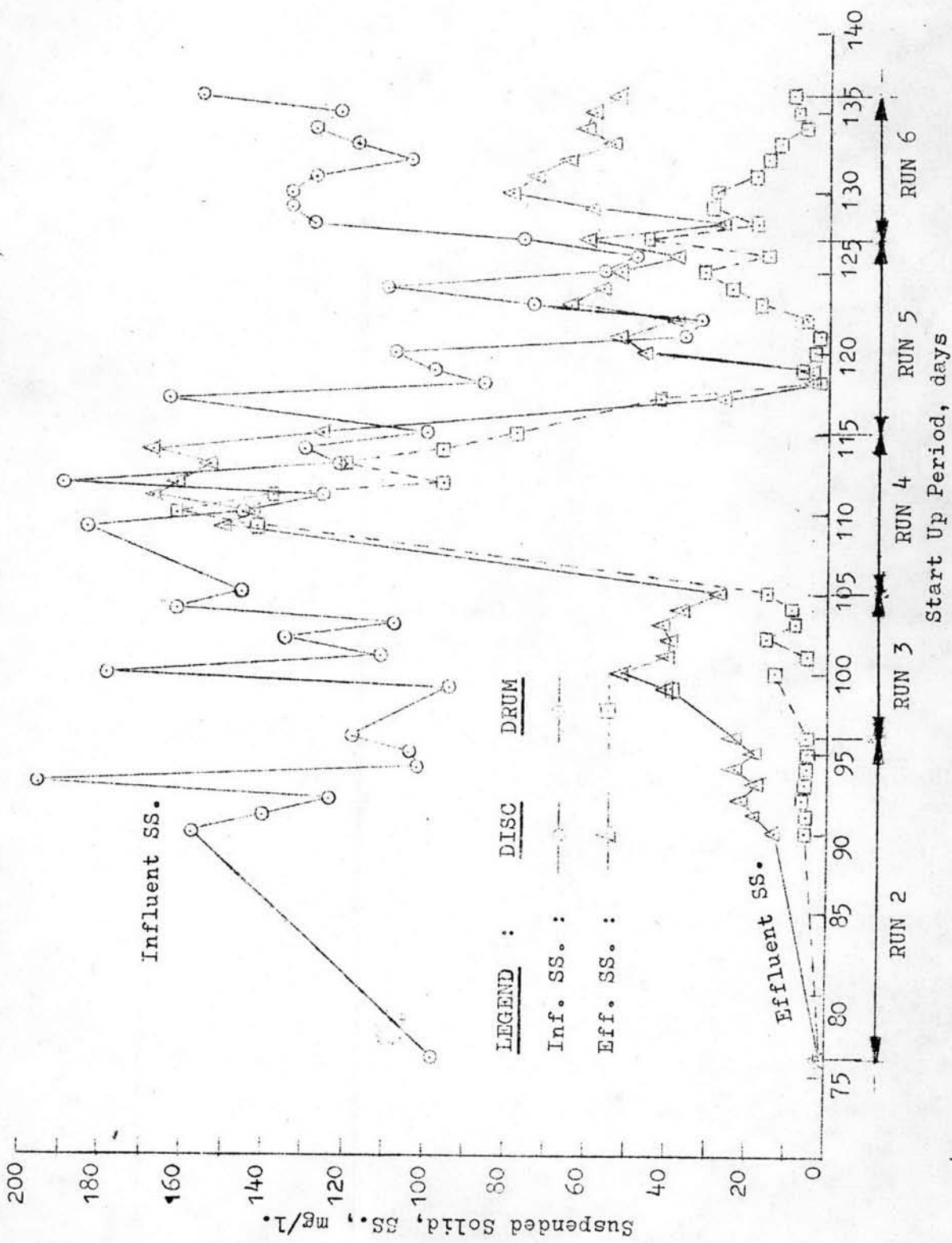
รูปที่ ๘.๓ ความแปรปรวนของตะกอนแขวนลอย (SS) ในทางระยะเวลาของการทดลอง ชุดที่ 1



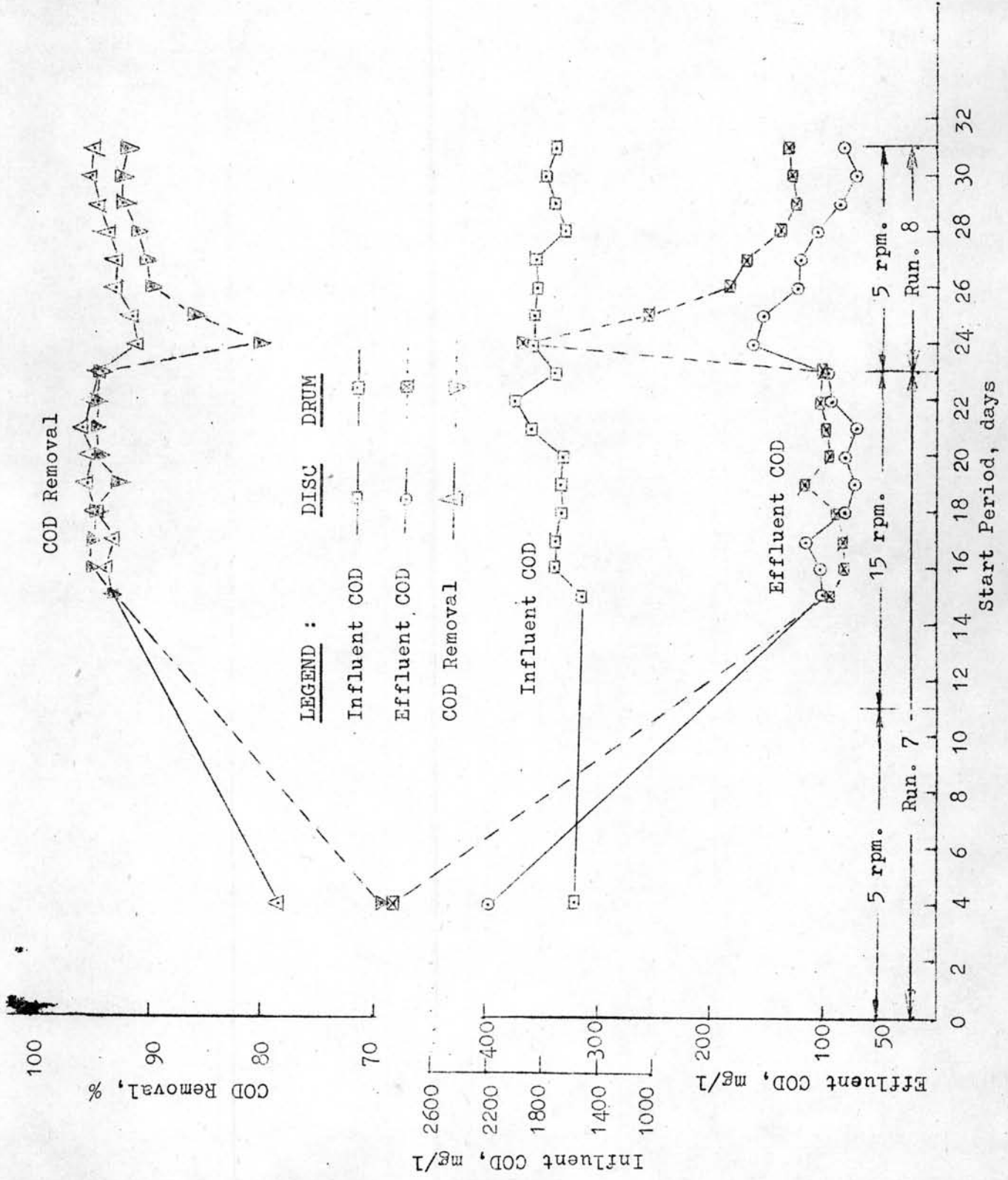
รูปที่ ๕. ๔
 บันทึกการทำงานของ Bio Disc และ Submerged Drum ในการกำจัดน้ำทิ้งจาก
 โรงผลิตเตา (ในช่วงระยะเวลาของการทดลอง ชุดที่ 2, 3, 4, 5, 6)



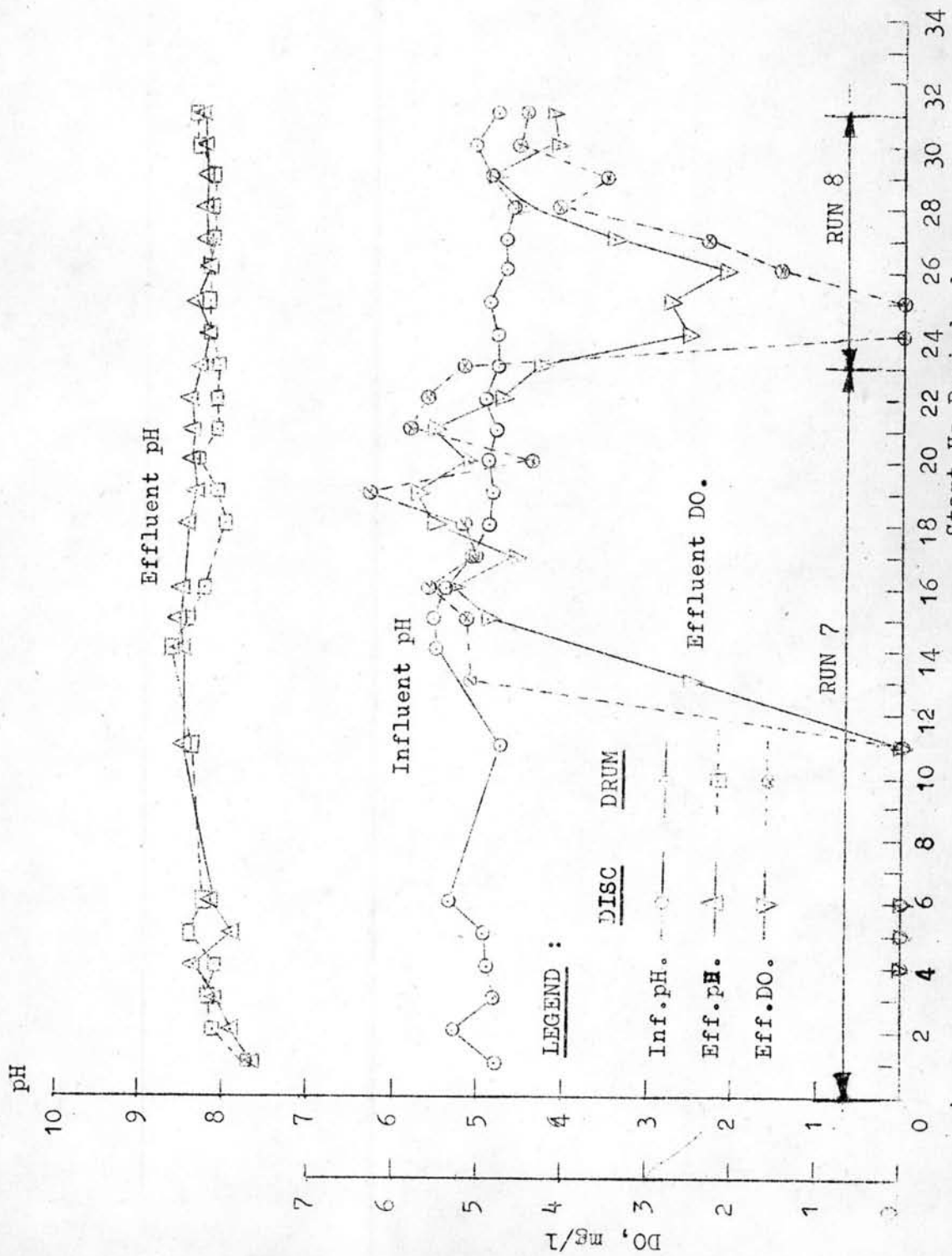
รูปที่ ๓.๕ ความแปรปรวนของ pH และ DO. ในช่วงระยะเวลาของการทดลอง ชุดที่ 2 ถึง 6



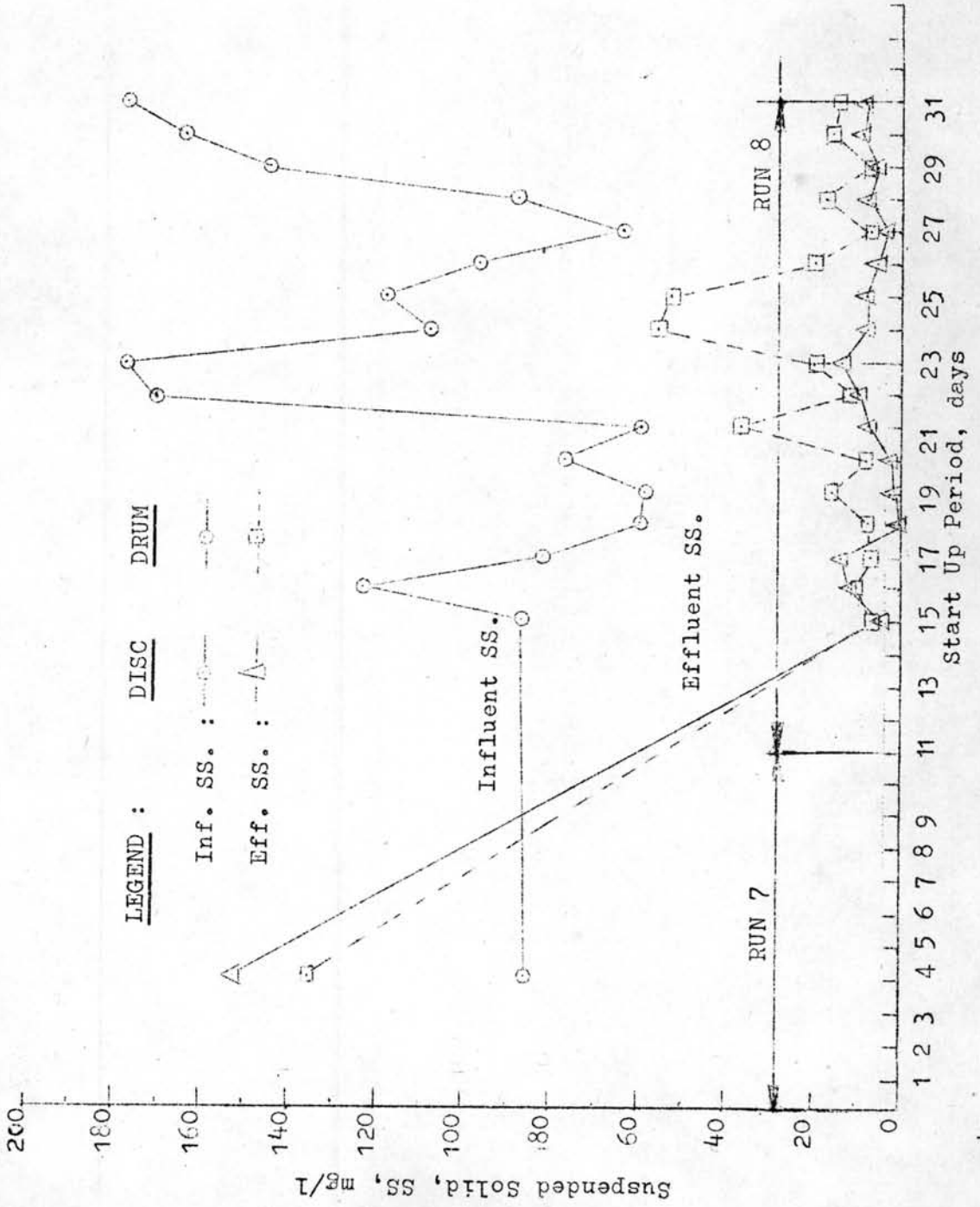
รูปที่ ๖.๖ ความแปรปรวนของตะกอนแขวนลอย (SS.) ในช่วงระยะเวลาของการทดลอง ชุดที่ 2 ถึง 6



รูปที่ ๗. 7 บัญชีการทำงานของ Bio Disc และ Submerged Drum ในการกำจัดน้ำทิ้งจากโรงงานผลิตเตาทุบ (ในช่วงระยะเวลาของการทดลอง ชุดที่ 7 และ 8)



รูปที่ ๘.๘ ความแปรปรวนของ pH และ DO ในช่วงระยะเวลาของการทดลอง ชุดที่ 7 และ 8



รูปที่ ๘.๑ ความแปรปรวนของตะกอนแขวนลอยในช่วงระยะเวลาของการทดลอง ชุดที่ 7 และ 8

ประวัติผู้เขียน



ชื่อผู้วิจัย

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