### CLASS "C"

### WATER AND/OR WASTEWATER UTILITIES

(Gross Revenue of Less Than \$200,000 Each)

### ANNUAL REPORT

WS975-17-AR

OF

Public Service Commission
Do Not Remove From This Office

**Coastal Income Properties-The Harbor** 

Exact Legal Name of Respondent

671-W and 573-5

Certificate Number(s)

Submitted To The

STATE OF FLORIDA



### PUBLIC SERVICE COMMISSION

FOR THE

YEAR ENDED DECEMBER 31, 2017

Form PSC/AFD 006-W (Rev. 12/99)

### FINANCIAL SECTION

### REPORT OF

(	coastal Income Properties	s-The Harbor	
		E OF UTILITY)	
38573 US Highw		38573 US Highway 19 N	
Palm Harbor, FL		Palm Harbor, FL 34684	Pinellas
Mailing Addre	SS	Street Address	County
Telephone Number 727-686-2700	)	Date Utility First Organized	
Fax Number		E-mail Address	
Sunshine State One-Call of Florida, Inc.	Member No.	Applied For	
Check the business entity of the utility as	filed with the Internal Re	venue Service:	
Individual Sub Chapter	S Corporation	1120 Corporation x	Partnership
Name, Address and phone where record	s are located:	38573 US Highway 19 N	
		Palm Harbor, FL 34684	
Name of subdivisions where services are	provided:	The Harbor Waterfront Resort	
The state and a state and a state and a state and	provided.	The Harbor Waterholit Nesolt	
Name	Title	Principal Business Address	Salary Charged Utility
Person to send correspondence:		2840 West Bay Drive #174	
Kim Whitt	Administrator	Bellair Bluffs, FL 33770	1
Person who prepared this report:		1404341 # =	
Timothy M. Hohl Company, PLLC	CPA's	14814 North Florida Ave	
Timothy W. Flori Company, F ELO	OLYA	Tampa, FL 33613	1
Officers and Managers:			
			\$
			\$
			\$
			\$
			J
			· <b>L</b>
Report every corporation or person ownin ecurities of the reporting utility:	g or holding directly or in-	directly 5 percent or more of the voting	
econics of the reporting utility:			
	Percent		Salary
	Ownership in		Charged
Name	Utility	Principal Business Address	Utility
Brown Florida Holdings, LLC	33.4	635 Court Street Ste 120	\$ N/A

33.3

33.3

Hello Tiger, LLC

K4 Investments, LLC

Clearwater, FL 33756

2840 West Bay Drive #174

Bellair Bluffs, FL 33770

\$

\$

\$ \$

37573 US Hwy 19 N Palm Harbor, FL 34684

YEAR OF REPORT 31-Dec-17

### INCOME STATEMENT

	Dof		1	T	Total
Account Name	Ref. Page	Water	Wastewater	Other	Company
Account Name	aye	A A Q T C I	AAGOGGAAGIGI	Outer -	Company
Gross Revenue: Residential Commercial Industrial Multiple Family Guaranteed Revenues		\$ 22,992	\$ 22,992	\$	\$45,984
Other (Specify)				***************************************	Φ 45.004
Total Gross Revenue		\$ 22,992	\$ 22,992	\$	\$ 45,984
Operation Expense (Must tie to pages W-3 and S-3)	W-3 S-3	\$11,662	\$ <u>11,662</u>	\$	\$ 23,324
Depreciation Expense	F-5	Names of an official or the condition to the desire of reference from the sufficient of	7,778		7,778
CIAC Amortization Expense_	F-8		A		
Taxes Other Than Income	F-7	<del></del>	N/A	An alternative description of the administration of the Annihilation of the Annihilati	s beech bedeen den deen den de verweren weren weren weren were
Income Taxes	F-7		Armonia de como como instrumina de las como de describir de la como de la com	**************************************	
Total Operating Expense		\$ 11,662	19,440	<del>Variation in the second and the sec</del>	\$ 31,102
Net Operating Income (Loss)		\$ 11,330	\$ 3,552	\$	\$ 14,882
Other Income: Nonutility Income		\$	\$	\$	\$
Other Deductions: Miscellaneous Nonutility Expenses Interest Expense		\$	\$	\$	\$
Net Income (Loss)		\$11,330	\$3,552	\$	\$ <u>14,882</u>

### COMPARATIVE BALANCE SHEET

	Reference	Current	Previous
ACCOUNT NAME	Page	Year	Year
Assets:			
Utility Plant in Service (101-105)  Accumulated Depreciation and	F-5,W-1,S-1	\$200,000	\$ <u>N/A</u>
Amortization (108)	F-5,W-2,S-2	(7,778)	***************************************
Net Utility Plant		\$ 192,222	\$
CashCustomer Accounts Receivable (141)Other Assets (Specify):			
Total Assets		\$192,222_	\$
Liabilities and Capital:			
Common Stock Issued (201)	F-6		Amount for the shift down for the last of the said for said the said the said the said the forest distribution of the said the sa
Preferred Stock Issued (204) Other Paid in Capital (211)	F-6		
Retained Earnings (215)	F-6		
Propietary Capital (Proprietary and		***************************************	
partnership only) (218)	F-6	46,903	
Total Capital		\$ 46,903	\$
Long Term Debt (224)	F-6	\$	\$
Accounts Payable (231)Notes Payable (232)		145,319	
Customer Deposits (235)			
Accrued Taxes (236)		************************************	
Other Liabilities (Specify)		Annaharkanharkanhari eta ekokolisian kalisia (dunkarinis ekokolisia kalisia kalisia	
		,	
		**********************************	
Advances for Construction Contributions in Aid of			
Construction - Net (271-272)	F-8		
Total Liabilities and Capital		\$192,222_	\$ 

YEAR OF REPORT December 31, 2017

GROSS UTILITY PLANT

	GRUSS	UTILITY PLANT		
Plant Accounts: (101 - 107) inclusive	Water	Wastewater	Plant other Than Reporting Systems	Total
Utility Plant in Service (101)  Construction Work in Progress	\$100,000	\$100,000	\$ <u>N/A</u>	\$200,000
Other (Specify)				
Total Utility Plant	\$	\$ 100,000	\$ <u>N/A</u>	\$200,000

### ACCUMULATED DEPRECIATION (A/D) AND AMORTIZATION OF UTILITY PLANT

Account 108	Water	Wastewater	Other Than Reporting Systems	Total
Balance First of Year	\$ <u>N/A</u>	\$ <u>N/A</u>	\$ <u>N/A</u>	\$ <u>N/A</u>
Add Credits During Year:  Accruals charged to  depreciation account Salvage Other Credits (specify)	\$3,889	\$3,889	\$	\$
	\$3,889	\$	\$	\$ 7,778
Deduct Debits During Year:  Book cost of plant retired Cost of removal Other debits (specify)	\$	\$	\$	\$
Total Debits	\$	\$	\$	\$
Balance End of Year	\$3,889	\$3,889	\$	\$7,778

CAPITAL STOCK ( 201 - 204 )		
	Common Stock	Preferred Stock
Par or stated value per share		NA
RETAINED EARNINGS ( 215 )		
	Appropriated	Un- Appropriated
Balance first of yearChanges during the year (Specify):	\$NA	\$
Balance end of year	\$	\$
PROPRIETARY CAPITAL ( 218 )		
	Proprietor Or Partner	Partner
Balance first of yearChanges during the year (Specify):	\$	\$
Balance end of year	. \$	\$
LONG TERM DEBT ( 224 )		-
Description of Obligation (Including Date of Issue and Date of Maturity):	Rate # of Pymts	Principal per Balance Sheet Date

### TAX EXPENSE

(a)	Water (b)	Wastewater (c)	Other (d)	Total (e)
Income Taxes: Federal income tax State income Tax Taxes Other Than Income: State ad valorem tax Local property tax Regulatory assessment fee Other (Specify)		\$ <u>N/A</u>	\$ N/A	\$ N/A
Total Tax Expense	\$	\$	\$	\$

### PAYMENTS FOR SERVICES RENDERED BY OTHER THAN EMPLOYEES

Report all information concerning outside rate, management, construction, advertising, labor relations, public relations, or other similar professional services rendered the respondent for which aggregate payments during the year to any corporation, partnership, individual, or organization of any kind whatever amounting to \$500 or more.

Name of Recipient	Water Amount	Wastewater Amount	Description of Service
	\$	\$	
	-   •	Ψ	
	_   \$	\$	
	\$	\$	
	\$	\$	
	-   -	ļ	
	_   \$	\$	
	\$	\$	
	\$	\$	
	-   e	6	
	-   °	Φ	
	_ \$	\$	
	\$	\$	
	9	6	
	-   <sup>Ψ</sup>	Ψ	
		1 1	

### CONTRIBUTIONS IN AID OF CONSTRUCTION ( 271 )

	(a)		Water (b)	Wastewater (c)	Total (d)
1) 2) 3) 4)	Balance first of yearAdd credits during year  Total  Deduct charges during the year		\$	\$ <u>N/A</u> \$	\$ \$ N/A
5) 6)	Balance end of year Less Accumulated Amortizatio				
7)	Net CIAC		\$	\$	\$
	ADDITIONS TO CONTRI	BUTIONS IN AID OF	CONSTRUCTION D	URING YEAR (CREI	DITS)
	Report below all developers or agreements from which cash o received during the year.		Indicate "Cash" or "Property"	Water	Wastewater
	Sub-total			\$ NONE	\$ NONE
		apacity charges, mair and customer conne during the year.			
	Description of Charge	Number of Connections	Charge per Connection		
			\$	\$	\$
Tota	al Credits During Year(Must agr	ee with line # 2 abov	re.)	\$	\$
		ACCUMULATED A	MORTIZATION OF C	AC (272)	ı
Ва	lance First of Year Add Debits During Year:		\$ N/A	Wastewater \$ N/A	*
	Deduct Credits During Year:				

Balance End of Year (Must agree with line #6 above.)	\$	\$ \$
	1	

### \*\* COMPLETION OF SCHEDULE REQUIRED ONLY IF AFUDC WAS CHARGED DURING YEAR \*\*

UTILITY NAME Coastal Income Properties-The Harbor

YEAR OF REPORT DECEMBER 31, 2017

### SCHEDULE "A" SCHEDULE OF COST OF CAPITAL USED FOR AFUDC CALCULATION (1)

Class of Capital (a)	Dollar Amount (b)	Percentage of Capital (c)	Actual Cost Rates (d)	Weighted Cost [ c x d ] (e)
Common Equity	\$ <u>N/A</u>	<u>N/A</u> %	%	%
Preferred Stock		%	%	%
Long Term Debt		%	%	%
Customer Deposits		%	%	%
Tax Credits - Zero Cost		%	0.00 %	%
Tax Credits - Weighted Cost		%	%	%
Deferred Income Taxes		%	%	%
Other (Explain)		%	%	%
Total	\$	100.00_ %		%

(1) Must be calculated using the same methodology used to calculate AFUDC rate approved by the Commission.

### APPROVED AFUDC RATE

Current Commission approved AFUDC rate:	 (140)	%
Commission Order Number approving AFUDC rate:	 	

### \*\* COMPLETION OF SCHEDULE REQUIRED ONLY IF AFUDC WAS CHARGED DURING YEAR \*\*

UTILITY NAME Coastal Income Properties-The Harbor

YEAR OF REPORT DECEMBER 31, 2017

### SCHEDULE "B"

### SCHEDULE OF CAPITAL STRUCTURE ADJUSTMENTS

Class of Capital (a)	Per Book Balance (b)	Non-utility Adjustments (c)	Non-juris. Adjustments (d)	Other (1) Adjustments (e)	Capital Structure Used for AFUDC Calculation (f)
Common Equity Preferred Stock Long Term Debt Customer Deposits Tax Credits-Zero Cost Tax Credits-Weighted Cost of Capital Deferred Income Taxes Other (Explain)	\$ <u>N/A</u>	\$ N/A	\$ N/A	\$ <u>N/A</u>	\$ N/A
Total	\$	\$	\$	\$	\$

(1) Explain below all adjustments made in Column (e):

### WATER OPERATING SECTION

### WATER UTILITY PLANT ACCOUNTS

Acct. No. (a)	Account Name (b)	Previous Year (c)	Additions (d)	Retirements (e)	Current Year (f)
301	Organization	\$ -	\$	\$	\$
302	Franchises		_		
303	Land and Land Rights	-	-		
304	Structures and Improvements	-		_	
305	Collecting and Impounding Reservoirs	-	-	-	-
306	Lake, River and Other Intakes		-	_	
307	Wells and Springs	<u>-</u>			
308	Wells and Springs Infiltration Galleries and				
	Tunnels		_	-	-
309	Supply Mains		<del></del>		
310	Power Generation Equipment				
311	Pumping Equipment				
320	Water Treatment Equipment		100,000		100,000
330	Water Treatment Equipment Distribution Reservoirs and		-100,000		
	Standpipes	-	-	_	
331	Standpipes Transmission and Distribution Lines		-	-	-
333	Services				-
334	Services Meters and Meter				
"	Installations		_	-	-
335	I Hydranis	122			
336	Backflow Prevention Devices				
339	Other Plant and			-	
340	Miscellaneous Equipment Office Furniture and Equipment			-	-
341	Equipment	<del></del>			-
341	Transportation Equipment Stores Equipment		-		
342	Stores Equipment		-		
343	Tools, Shop and Garage Equipment		-	-	-
344	Laboratory Equipment				
345	Laboratory Equipment Power Operated Equipment			-	-
346	Communication Equipment			-	
347	Miscellaneous Equipment				
348	Other Tangible Plant		-	-	
	Total Water Plant	\$	\$100,000	\$	\$100,000

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### ANALYSIS OF ACCUMULATED DEPRECIATION BY PRIMARY ACCOUNT - WATER

Accum. Depr. Balance End of Year (f-g+h=i)	\$	
Credits (h)	-   -   -   -   -   -   -   -   -   -	
Debits (g)	\$ 3889	
Accumulated Depreciation Balance Previous Year (f)	# ## ## ## ## ## ## ## ## ## ## ## ## #	
Depr. Rate Applied (e)	3.889	
Average Salvage in Percent (d)	%     % <td></td>	
Average Service Life in Years (c)	1 12 1 12 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
Account (b)	Structures and Improvements  305  Collecting and Impounding Reservoirs  Lake, River and Other Intakes  307  Wells and Springs  Infiltration Galleries &  Tunnels  Supply Mains  130  Supply Mains  Supply Mains  Supply Mains  130  Supply Mains  Supply Mains  Supply Mains  131  Pumping Equipment  Standpipes  Standpipes  Standpipes  Standpipes  Services  333  Meter & Meter Installations  Services  334  Hydrants  Equipment  Office Furniture and  Equipment  Office Furniture and  Equipment  Transportation Equipment  342  Stores Equipment  Transportation Equipment  Stores Equipment  Tools, Shop and Garage  Equipment  Abover Operated Equipment  Communication Equipment  345  Power Operated Equipment  Communication Equipment  Altaboratory Equipment  Communication Equipment  Altaboratory Equipment  Communication Equipment  Totals  Totals  This amount should tie to Sheet F-5	
Acct. No. (a)	304 305 305 306 307 308 308 311 320 331 333 334 334 334 345 345 346 347 348 348	

### WATER OPERATION AND MAINTENANCE EXPENSE

Acct.			
No.	Account Name	Amou	int
601	Salaries and Wages - Employees	s	
603	Salaries and Wages - Officers, Directors, and Majority Stockholders	1 "	_
604	Employee Pensions and Benefits		
610	Purchased Water	1	
615	Purchased Power		,255
616	Fuel for Power Production		,200
618	Chemicals		
620	Materials and Supplies	1	,472
630	Contractual Services:		,4/2
	Diff		
	V	- 2	001
	Professional		,002
	TestingOther		320
640	OtherRents	3,	,614
650	Rents	1 s <del>-money</del>	
655	Transportation Expense	l ———	
665	Insurance ExpenseRegulatory Commission Expenses (Amortized Rate Case Expense)	l	
670	Rad Debt Expenses (Amortized Rate Case Expense)		
675	Bad Debt Expense		
0,3	Miscellaneous Expenses		
	Total Water Operation And Maintenance Expense	\$ 11.6	363
	* This amount should tie to Sheet F-3.	Ψ11,0	103

### WATER CUSTOMERS

Description (a)	Type of Meter ** (b)	Equivalent Factor (c)	Number of Ac Start of Year (d)	tive Customers End of Year (e)	Total Number of Meter Equivalents (c x e) (f)
Residential Service  5/8" 3/4" 1" 1 1/2" General Service  5/8" 3/4" 1" 1 1/2" 2" 3" 3" 3" Unmetered Customers Other (Specify)	D D D,T D,C,T D C T	1.0 1.5 2.5 5.0 1.0 1.5 2.5 5.0 8.0 15.0 16.0 17.5	0	189	189
** D = Displacement C = Compound T = Turbine		Total	0	189	189

UTILITY NAME: Co	astal Income Proper	ties-The Harbor		YEAR OF R	The state of the s
SYSTEM NAME:	The Harbor Waterfro	ont Resort		DECEMBER 3	31, 2017
***see attached Monthl			D WATER STATIST	cs	
(a)	Water Purchased For Resale (Omit 000's)	Finished Water From Wells (Omit 000's) (c)	Recorded Accounted For Loss Through Line Flushing Etc. (Omit 000's) (d)	Total Water Pumped And Purchased (Omit 000's) [ (b)+(c)-(d) ] (e)	Water Sold To Customers (Omit 000's)
January February March April May June July August September October November December Total for Year	0 0 0 0 0	181,181 637,251 665,348 772,083 548,134 563,083 579,202	unknown	181,181 637,251 665,348 772,083 548,134 563,083 579,202	unknown
If water is purchased for VendorPoint of delivery  If water is sold to other anot applicable	not applicable			w:	not metered
***see attached diagram	***	MAINS (FE	ET)		
Kind of Pipe (PVC, Cast Iron, Coated Steel, etc.)	Diameter of Pipe	First of Year	Added	Removed or Abandoned	End of Year
unknown					

### MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER [PWS Identification Number: 353-073|Plant Name| THE HARBOR WATER FRONT RESORT

Average	Total	30	29	28	27	26	25	24	23	22	21	20	19	81	17	16	15	14	13	12	=	10	9	&	7	6	5	4	ÿ	2	-	Day of the			Type of Disinfectant Residual Maintained in Distribution System:	Means of Achieving Four-Log Virus Inactivation/Removal:*	THE DAILY DAILS FOR THE STORMAN GAL OF
		×		×		×			×		х		×																			Staffed or Visited by Operator (Place "X")	Dave Diant		fectant Res	nicving Fou	Am my mis
		24	24	24	. 24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	Hours Plant in			sidual Main	ır-Log Virus	N. Carlington
6039	181181	16700	16700	16350	16350	20200	20200	20200	13350	13350	13600	13600	581																			Net Quantity of Finished Water Produced, gal			tained in Di	Inactivation	April 100
																															$\rightarrow$	Peak Flow			stribution S	n/Removal:	SCHOOL SECTION OF THE PROPERTY.
																																Residual Disenfectant Concentration (C) Before or		CT Calcula	ystem:	*	
																															0	Contact Time (T) at C Measurement Point During	CT Calculations	tion, or UV			
																															$\neg$	Provided Before or at First Customer	itions	Dose, to Den			
																															ir anea, o	Temp. of		nonstrate Fo	Free Chlorine		
																															ii algoria	pH of Water,		ur-Log Viru	ne		
																									1						11111111	Rec		CT Calculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation,			
															100000000000000000000000000000000000000																360/011/2	Lowest Operating UV Dose, mW-		, if Applicable*			
																															HIAA-Sec/CHIT			)le*			
		1.4		1.6		2.0			2.2		2.0	4.5	0.3																		at Nemote	0 -					
			, .	Cleaned injection point								i not official viole to ayatem	First official visit to system																		Out of Operation	Emerger Conditions; R Involves Tak					

### MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER PWS Identification Number: 353-073 Plant Name THE HARBOR WATER FRONT RESORT

(customer request)	1.4 (c										637251			Total
I terrule; 10' pickup tubing	L										30650	24	×	31
											30650	24		30
	2.0										30650	24		29
											15850	24	×	28
	2.0										15850	24		27
											19200	24	×	26
											19200	24		25
	1.8										19200	24		24
											17050	24	×	23
	1.8										17050	24		22
	0										15750	24	×	21
	1.0										15750	24		20
											21000	24	×	19
Ke-attached discharge line	U.2										21000	24		18
											23467	24	×	17
2 cover screws											23467	24		16
Tube housing cover w/ bushing;	1.0										23467	24		15
											13300	24	×	14
	1.2										13300	24		13
											16700	24	×	12
	1.4										16700	24		11
											22500	24	×	10
											22500	24		9
	1.2										22500	24		8
											20950	24	×	7
Variable cam; flipped index plate	1.6										20950	24		6
											21720	24	×	5
											21720	24		4
											21720	24		3
											21720	24		2
Out of Operation	_	12		min/L	if Applicable	Water, C	Customer	Point During	(c) perote of	iaic, gira	21720	24		-
Emergency or Abnormal Operating Conditions, Repair or Maintenance Work that Involves Taking Water System Components	Lowest Residual Disinfectant Concentration	Minimum UV Dose Required,	Lowest   Doperating UV   Dose, mW-	Minimum CT Required, mg-	pH of Water,	Temp. of	-				Net Quantity of Finished Water	Hours Plant in	Staffed or Visited by Operator (Place "X")	Day of the Month
							tions	C1 Calculations	Lowest				Days Plant	
		e*	if Applicable*	C1 Calculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation,	ır-Log Virus	nonstrate Fou	Dose, to Der	ition, or UV	C1 Calcula					
					ne	Free Chlorine			System:	stribution !	lained in Dis	Type of Distribution System:	Anticciant Ke	Type of Dis
														57.
								//1/201/	* Julic-1 /	/Removal	Inactivation	Means of Achieving Four-Log Virus Inactivation/Removal*	chieving Fo	Means of A
									Trans.		THE PARTY OF THE P	The second second second		The state of the s

Average

Maximum

\* Refer to the instructions for this report to determine which plants must provide this information.

PWS Identification Number:

353-0736 Plant Name: THE HARBOR WATER FRONT RESORT

Maximum	Average	Total	31	30 x	29	28 x	27	26	25 x	24	23 x	22	21 x	20	19	18 ×	17	16 x	15	14 x	13	12	11 x	10	9 x	8	7 x	6	5	4 x	3	2 x	_		Day of the Staffed or	Plant	Days		Type of Disinfectant Residual Maintained in Distribution System:	The office of the state of the
			24	24	24	24	24	. 24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24		24	24	24	24	24	24	_	_		int Hours	ys		lant Kesidual N	
27850	21463	665348	27850	27850	27850	20267	20267	20267	25350	25350	18150	18150	20833	20833	20833	17950	17950	24100	24100	25733	25733	25733	24550	24550	23050	23050	17633	17633	17633	15300	15300	15750		Fii	of ,	Quantity	NG.		laintained in	
																																		<u>a</u>		Peak			Distribution	
																																		+	3		Jowesi	CT Calculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*	on System:	
																																		at C	Time (T)	nt Contact	CT Calculations	on, or UV I		
																																		Before or	Provided	CT	tions	Dose, to De		
																																		Water, C	Tamp of			monstrate F	Free Chlorine	
																																		applicati	Applicable	Water if		our-Log V	ine	
																																	c	mg-min/I	D. C.	CT		irus Inactiva		
																																	2000	Dose		Operation	UV Dose	tion, if App		
																																	****	mW-		Minimum I IV Dose		olicable*		
			1.2	13	1.0				13	1	3		13			- 5		14	-	14		1.1	13	0.0	8 0	3.2	2)		1.0	16	1.4	13	116	Disinfecta	Nesidual	Lowest Pacidnal				
								Cicalica injection politi	Cleaned injection point			v anabic can	Variable cam										icsolved, repolled IIIIIIOI SIEEVE IEAK	resolved: reported miner class led-	CL3 num to 3.75 from 3	3 75 in attempt to a from	Well icense: CI 2						System Components Out of		-	Emergency or Abnormal Operating				

<sup>\*</sup> Refer to the instructions for this report to determine which plants must provide this information.

27850

Maximum Average

PWS Identification Number:

353-0736 Plant Name: THE HARBOR WATER FRONT RESORT

III. Daily Data for the Month/Near of: Means of Achieving Four-Log Virus Inactivation/Removal:*	ving Fou	Month's ar-Log Vir	ear of: us Inactiva	ation/Rem	oval:*	Sep-17								
Type of Disinfectant Residual Maintained in Distribution System:	ctant Res	sidual Mai	ntained in	Distributi	on System:			Free Chlorine	ne					
					CT Calculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*	on, or UV I	Oose, to Der	nonstrate Fo	our-Log Vir	us Inactivat	ion, if App	licable*		
	Davs		NG.		Dawa	CT Calculations	tions		WE W		UV Dose			
PI		Hours	Quantity	Peak	Residual	nt Contact	CT		Water, if	CT	Operatin	UV Dose	Residual	Conditions: Repair or Maintenance
0			of	Flow	Disenfectan	Time (T)	Provided			ed,			Disinfecta	Work that Involves Taking Water
ISIA UNIOM	x x	Operation 24	Finished 13733	rate, gpd	-	at C	Before or	Water, C	е	mg-min/L	Dose,	mW-	nt	System Components Out of
2		24	19525										1.2	
ω		24	19525											
4		24	19525											
5	×	24	19525										1.2	Tightened injector
6		24	18950											c
	×	24	18950										1.4	
8		24	11780											
9		24	11780											
10		24	11780											
11		24	11780											
12	×	24	11780											
13		24	250											
14	×	24	250											
15		24	2200											
16	X	24	2200											
17		24	2200											
18	×	24	2200										1.6	
19		24	44000											
20	×	24	44000										1.6	
21		24	31900											
	×	24	31900										1.4	
23		24	49000											
24		24	49000											
25	×	24	49000										1.0	
26		24	47650											
	×	24	47650										1.2	
28		24	43350											
29	×	24	43350										1.5	Y.
30	_	24	43350											
Total			722083											
Average			23293											
Maximum			49000											

<sup>\*</sup> Refer to the instructions for this report to determine which plants must provide this information.

PWS Identification Number:

353-0736 Plant Name: THE HARBOR WATER FRONT RESORT

Disinfectant Residual Mair  Lays Plant Ne Staffed or Plant in Visited by Operation I  X  24  X  Z  Z  Z  Z  Z  Z  Z  Z  Z  Z  Z  Z									17682 21150			Average
Coloring   Four   Four   Free Chlorine   Fre									548134			Lotal
Sten:   Free Chlorine   Free Chlorine									20167	24		31
Sten:   Free Chlorine	3.0								20167	24	×	30
Stem:  Free Chlorine  Stem:  Free Chlorine  Adculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*  Advantage of Lowest District CT Calculations  To Calculations  To CT Operatin UV Dose  To Dose, mW- nt  1.2  1.2  1.3  1.4  1.5  1.6  1.7  1.8  1.9  1.9  1.9  1.0  1.0  1.0  1.0  1.0									20167	24		29
Sten:   Free Chlorine	011								20167	24		28
Stem: Free Chlorine  alculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*  CT Calculations  West Dismocual Lowest Dismocual Time (T) Provided Temp. of Applicable Reguired, g UV Required, Dismocual at C Before or Water, C e mg-min/L Dose, mW-  at C Before or Water, C e 1.2  L1.2  L2.3  L3.4  L3.4  L3.4  L3.4  L3.4  L3.5  L4.5  L5.5  L5	3.4								15650	24	×	27
Stem:   Free Chlorine	C - A								15650	24		26
Stem:   Free Chlorine   Free Chlorine	3.2								15500	24	×	25
Stem:   Free Chlorine   Free Chlorine									15500	24		24
stem:   Free Chlorine   Free Chlorine	3.2								16667	24	×	23
stem:    Free Chlorine									16667	24		22
stem:  Free Chlorine  alculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*  CT Calculations  CT Calculations  CT Districtat  CT Demonstrate Four-Log Virus Inactivation, if Applicable*  Water, if CT Operatin UV Dose  Residual  Time (T) Provided Temp. of Applicabl Required, g UV Required, Disinfecta  at C Before or Water, C e mg-min/L Dose, mW- nt  1.2  1.2  1.5  1.5  1.6  3.0  3.0									16667	24		21
stem:  Free Chlorine  CI Calculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*  CI Calculations  CI Calculations  CI Calculations  Water, if CI Calculations  Water, if CI Operatin UV Dose  at CI Before or Water, C e mg-min/L Dose, mW-  1.2  1.2  1.3  1.2  1.2  1.2  1.2  1.3  1.3	3.0								16000	24	×	20
stem:  Free Chlorine    Acculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*   UV Dose   UV Dose									16000	24		19
stem:  Free Chlorine    Acculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*   CT Calculations									20050	24	×	18
Stem:   Free Chlorine   Free Chlorine									20050	24		17
Stem: Free Chlorine    CT   Calculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*   UV Dose   UV Dose   UV Dose   UV Dose   IV UV D									18033	24	×	16
Stem:   Free Chlorine   Free Chlorine									18033	24		15
Stem:   Free Chlorine   Free Chlorine	departure								18033	24		14
Stem:   Free Chlorine   Free Chlorine	Stenner #7: residual 1.5								15700	24	Х	13
stem:  Free Chlorine  Alculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*  CT Calculations  Water, if CT Operatin UV Dose  Time (T) Provided Temp. of Applicabl Required, g UV Required, Disinfecta  t at C Before or Water, C e mg-min/L Dose, mW- nt  1.2 1  1.5			1						15700	24		12
Stem:  Free Chlorine  CT Calculations  West   Dismiectal   Lowest   Demonstrate Four-Log Virus Inactivation, if Applicable*  CT Calculations  Water, if   CT   Operatin   Lowest   IVInnimum   Lowest   IVINIMUM   IVIN									19750	24	×	11
Stem:  Free Chlorine  CT Calculations  West Dismiectal Lowest Infectan Time (T)  at C Before or Water, C e mg-min/L Dose, mw-  Total Before or Water, C at C mg-min/L Dose, mw-  Total Contact CT  Applicabl Required, g UV Bose Residual mg-min/L Dose, mw-  Total Contact CT  Applicabl Required, g UV Required, Disinfecta mg-min/L Dose, mw-  Total Contact CT  Total CONTACT CO									19750	24		10
stem:  Free Chlorine  Dy Dose  Free Chlorine  Lowest  Lowest  Lowest  Lowest  Lowest  Lowest  Mater, C  e mg-min/L  Dose, mW-  nt  1.2  1.5									18100	24	X	9
stem:  Free Chlorine  Free Chlorine  CT Calculations west Dismretta Lowest idual nt Contact t at C Before or Water, G e mg-min/L Dose, mt  Time (T) Provided Temp. of Applicabl Required, g UV Required, Disinfecta nt at C Before or Water, G e mg-min/L Dose, mw-  1.2 1  Time (T) Provided Temp. of Applicabl Required, g UV Required, Disinfecta nt at C Before or Water, G e mg-min/L Dose, mw-  1.2 1									18100	24		8
stem:  Free Chlorine  Free Chlorine  CT Calculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*  CT Calculations  West Dismectia Lowest  CT Calculations  Water, if CT Operatin UV Dose  Water, if CT Operatin UV Dose Residual  Infectan Time (T) Provided Temp. of Applicabl Required, g UV Required, Disinfecta  t at C Before or Water, C e mg-min/L Dose, mW- nt  1.2 1	1.0								18100	24		7
stem:  Free Chlorine  CT Calculations  West  Dismectal  CT  Contact  CT  Time (T)  Provided  t  at C  Before or  Water, C  Before or  W									12800	24	×	6
stem:  Free Chlorine  CT Calculations west Dismecta Lowest idual nt Contact t at C Before or Water, C e mg-min/L Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*  UV Dose Residual Nater, if CT Operatin UV Dose Residual Required, g UV Required, Disinfecta mg-min/L Dose, mW- nt  1.2				1					12800	24		5
stem:  Free Chlorine  CT Calculations  West   Disminectal   Lowest   Driving   Temp. of tall   Time (T)   Provided   t   at C   Before or   Water, C   e   mg-min/L   Dose, mw-min/L   Dose, mw-m									21150	24	×	4
stem:  Free Chlorine  CT Calculations  West   Dismirectal   Lowest   Dismirectal   Lowest   Infectan   Time (T)   Provided   t   at C   Before or   Water, C   e   mg-min/L   Dose, mw-  Tree Chlorine  Free Chlorine  Free Chlorine  Prour-Log Virus Inactivation, if Applicable*  UV Dose   UV Dose   Lowest   Ivinimum   Lowest   I									21150	24		3
Stem:  Free Chlorine  CT Calculations  West Dismirecta Lowest Foundact CT infectan Time (T) Provided t at C Before or Valer, CT  Total Dismirecta CT  Applicable Four-Log Virus Inactivation, if Applicable*  UV Dose  Valer, if CT  Applicable Foundact Valer, if CT  Applicable Required, g UV  Required, g UV  Required, g UV  Required, Disinfectan mg-min/L Dose, mW-  nt									17933	24	×	2
Stem:  Free Chlorine  Free Chlorine  Alculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*  CT Calculations  West Dismircua Lowest Priot Vinnimum Lowest Imminum Lowest Immi	2.10	0	1	-+					17933	24		-
stem:  Free Chlorine  Alculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*  CT Calculations  CT Calculations  West Dismirecta Lowest Printing UV Dose  Water, if CT Operatin UV Dose Residual	mW- nt				Before or	at C	t Discrimentari	rate, gpd	Finished	Operation		Month
stem:  Free Chlorine  Alculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*  CT Calculations  CT Calculations  Water if CT Operation IIV Dose Residual int Contact CT Water if CT Operation IIV Dose Residual	Daniel Diriginal			Tomp of	_	Time (T)	Disenfectan	Flow	of ,	Plant in		Day of the
stem:  Free Chlorine  Stem:  CT Calculations  CT Calculations  CT Calculations  ON THE OF THE PROPERTY OF THE	UV Dose Residual	CT	Water, if			nt Contact	Residual	Peak	Quantity	Hours	Plant	
Means of Achieving Four-Log Virus Inactivation/Removal:*  Type of Disinfectant Residual Maintained in Distribution System:  CT Calculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*	William III		DFTOI		ations	CT Calcul	Lowest		NG.		Days	
Means of Achieving Four-Log Virus Inactivation/Removal:*  Type of Disinfectant Residual Maintained in Distribution System:  Free Chlorine	tion, if Applicable*	irus Inactivat	Four-Log V	emonstrate	Dose, to Do	ion, or UV	CT Calculat					
			rine	Free Chlo			on System:	Distributi	intained ir	Residual Ma	isinfectant R	Type of D
							Oval.	attotiv Kerik	I do Hidella	our Tog v	Yourcame 1	Taround Of
						001-17	*	ation/Dam	rue Inactiv	our-I or V	A chieving E	Means of

<sup>|</sup> Maximum | 21100 | \*Refer to the instructions for this report to determine which plants must provide this information.

# MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER [PWS Identification Number: 353-0736] Plant Name: THE HARBOR WATER FRONT RESORT

353-0736 Plant Name: THE HARBOR WATER FRONT RESORT

* Refer to the inst	Average	Total	30	29 x	28	27 x	26	25	24 x	23	22 x	21	20 x	19	18	17 x	16	15 ×	14	13 x	12	=	10 x	9	8 ×	7	6 x	5	4	3 x	2	1 ×	Month Visited by	Day of the Stoffed	DI.	Tal		Type of Disinfectant Residual Maintained in Distribution System:	7	Means of Achievino Four-Loo Virus Inactivation/Removal-*	The many man of the would't can off
instructions for this			24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24		24		ed by Operation	_	_	-		lant Kesidua		ine Four-Le	TAY THE STATE OF T
41450	18164	563083	18150	18150	18150	17033	17033	17033	14950	14950	16050	16050		19667	19667	18700	18700	17150	17150	16967	16967	16967			41450				-		_	-	tion Finished	~		2		1 Maintainec		o Virus Inac	TO THE PARTY
		30										,										7		)			30	33	3			-	r row					in Distribut		tivation/Ren	
-																																	t	Kesidual	Lowest		CT Calcula	ion System:		word:*	
																																	at C	-	Disinfecta	CT Calculations	CT Calculation, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*				Z0V-1/
																																	Provided Before or		Lowest	tions	Dose, to Den				
•																																	Water C			let.	nonstrate Fo	Free Chlorine			
				$\downarrow$																													Applicabl F	Water, if			ur-Log Viru	16			
							1														1							-				9			Minimum	U	ıs Inactivatio				
									1								+		+								-		-		1	+	g UV Re	2	Lowest Mi	UV Dose	on, if Applic				
					-	+			-	+						+	+	1					1		1		1				1	+	Required, Disinfecta	UV Dose Re	Minimum L		able*				
		-	0.0	30	7.0	36		-	2.6		28		2.8	+	0.0	30	i i	3)	1	37	+		24	0.0	30	3.0	30		0.0	30	0.0	30		Residual   C	Lowest   E						
				,																												System Components Out of	Work that Involves Taking Water	Conditions; Repair or Maintenance	Emergency or Abnormal Operating	ŭ.			×		

<sup>|</sup> Maximum | 41450 | \*Refer to the instructions for this report to determine which plants must provide this information.

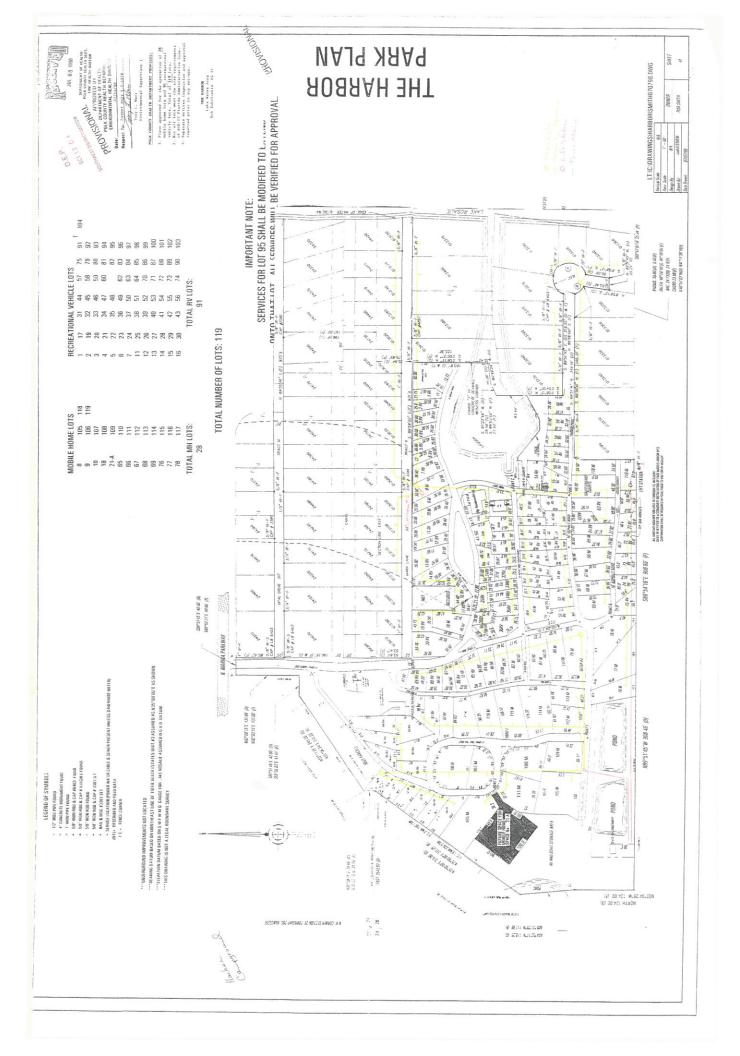
PWS Identification Number:

III. Daily Data for the Month/Year of:

Means of Achieving Four-Log Virus Inactivation/Removal:\* 353-0736 Plant Name: THE HARBOR WATER FRONT RESORT Dec-17

V Dose, to Deulations tal Lowest cet CT Provided Before or	V Dose, to Demonstrate Foundations tal Lowest cut CT Provided Temp. of Before or Water, C	Free Chlorine  V Dose, to Demonstrate Four-Log Virulations ta Lowest PH of CT  O Provided Temp. of Applicable Before or Water, C  Before or Water, C  O C C C C C C C C C C C C C C C C C	Free Chlorine  V Dose, to Demonstrate Four-Log Virus Inactivate ulations  Ital Lowest PH of Minimum Water, if CT  Provided Temp. of Applicabl Required, Before or Water, C e mg-min/L	ivation, if Ap  UV Dose  Im Lowest  Operatin  cd, g UV  /L Dose,	itvation, if Applicable*  UV Dose  Im Lowest Minimum  Operatin UV Dose  Ed, g UV Required,  IL Dose, mW-	iivation, if Applicable*  UV Dose  Im Lowest Minimum  Operatin UV Dose  Rd, g UV Required, Dis  /L Dose, mW-
						2.8
On, or UV Dose, to DesCT Calculations CT Calculations Disinfecta Lowest nt Contact Time (T) Provided at C Before or	V Dose, to Demonstrate Fe culations Sta Lowest   CT   Provided Temp. of Before or Water, C	V Dose, to Demonstrate Four-Log Virgulations Stal Lowest pH of act CT Water, if Before or Water, C e	Dose, to Demonstrate Four-Log Virus Inactations  Lowest CT Provided Temp. of Applicabl Requine Before or Water, C c mg-mir	ivation, if Ap UV Dose Im Lowest Operatin Od, g UV //L Dose,	ivation, if Applicable*  UV Dose  Im Lowest Minimum  Operatin UV Dose  Ed, g UV Required,  IL Dose, mW-	ivation, if Applicable*  UV Dose  Im Lowest Minimum  Operatin UV Dose  d, g UV Required,  L Dose, mW-

<sup>\*</sup> Refer to the instructions for this report to determine which plants must provide this information.



UTILITY NAME:	Coastal Income Properties-The Harbor
SYSTEM NAME:	

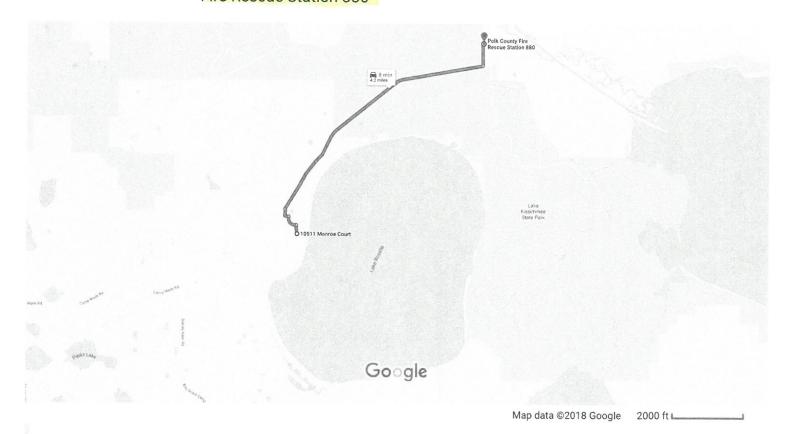
YEAR OF REPORT	nili
DECEMBER 31,	

### GENERAL WATER SYSTEM INFORMATION

		Furnish information below for each system. A separate page should be supplied where necessary.
	1.	Present ERC's * the system can efficiently serve unknown- no meters-currently serves 116 customers
iich	ca	n be served unknown
	3.	Present system connection capacity (in ERCs *) using existing lines unknown
	4.	Future connection capacity (in ERCs *) upon service area buildout not applicable
	5.	Estimated annual increase in ERCs * unknown
	6.	Is the utility required to have fire flow capacity? unknown If so, how much capacity is required? unknown
	7.	Attach a description of the fire fighting facilities. **see attached location of closest fire fighting facility**
	8.	Describe any plans and estimated completion dates for any enlargements or improvements of this system. not applicable
	9.	When did the company last file a capacity analysis report with the DEP? _ Last one found in records Year 2005 (attached)
	10.	If the present system does not meet the requirements of DEP rules, submit the following:  a. Attach a description of the plant upgrade necessary to meet the DEP rules.
		b. Have these plans been approved by DEP?
		c. When will construction begin?
		d. Attach plans for funding the required upgrading.
		e. Is this system under any Consent Order with DEP?
	11.	Department of Environmental Protection IE 3530736
		Water Management District Consumptive Use Permit # 53-00254-W
		a. Is the system in compliance with the requirements of the CUP? yes
		b. If not, what are the utility's plans to gain compliance?
		* An ERC is determined based on one of the following methods:
		<ul> <li>(a) If actual flow data are available from the proceding 12 months:         Divide the total annual single family residence (SFR) gallons sold by the average number of single family residents (SFR) gallons sold by the average number of single family residence customers for the same period and divide the result by 365 days.     </li> </ul>
		(b) If no historical flow data are available use:  ERC = (Total SER gallons sold (omit 000/365 days/350 gallons per day)

### Google Maps

### 10511 Monroe Court, Lake Wales, FL to Polk County Drive 4.2 miles, 8 min Fire Rescue Station 880



via Camp Mack Rd

Fastest route, the usual traffic

8 min

4.2 miles

UTILITY NAME:	Coastal Income Propert	ties-The Harbor	YEAR OF R						
SYSTEM NAME:	The Harbor Wate	erfront Resort	DECEMBER 3	31, 2017					
***see attached documents for	WELLS AN or additional information	D WELL PUMPS							
(a)	(b)	(c)	(d)	(e)					
Year Constructed Types of Well Construction and Casing	Aprox 1972 unknown	Aprox 1972 unknown							
Depth of Wells Diameters of Wells Pump - GPM Motor - HP Motor Type * Yields of Wells in GPD	4" 80 GPM	575 Feet 6' 80 GPM submersible							
Auxiliary Power	generator	generator							
* Submersible, centrifugal, etc	c.								
***see attached documents fo		RVOIRS							
(a)	(b)	(c)	(d)	(e)					
Description (steel, concrete) Capacity of Tank Ground or Elevated	unknown 								
HIGH SERVICE PUMPING									
(a)	(b)	(c)	(d)	(e)					
Motors  Manufacturer  Type Rated Horsepower									
Pumps  Manufacturer Type Capacity in GPM Average Number of Hours Operated Per Day Auxiliary Power									

Application Number:

090413-10

ROBERT SMITH July 21, 2009 Page 2

Date Of Issuance: July 21, 2009 Expiration Date: July 21, 2029

Water Use Classification: Public Water Supply
Water Use Permit Status: Existing/Unpermitted

Environmental Resource Permit Status: Not Applicable

Right Of Way Permit Status: Not Applicable.

Ground Water From: Floridan Aquifer System

Permitted Allocation(s):

**Annual Allocation:** 

11,937,300 Gallons

Maximum Monthly Allocation:

1,560,900 Gallons

Existing Withdrawal Facilities - Ground Water

Source: Floridan Aquifer System

1 - 4" X 80 GPM Well With Unknown Total And Cased Depth

1 - 6" X 575' X 80 GPM Well Cased To 365 Feet

**Rated Capacity** 

Source(s) Floridan Aquifer System	Status Code E	<b>GPM</b> 160	<b>MGD</b> 0.23	<b>MGM</b> 7.0	<b>MGY</b> 84
Totals:		160	0.23	7.0	84





### C & W Equipment Repair and Maintenance, Inc.

### Invoice

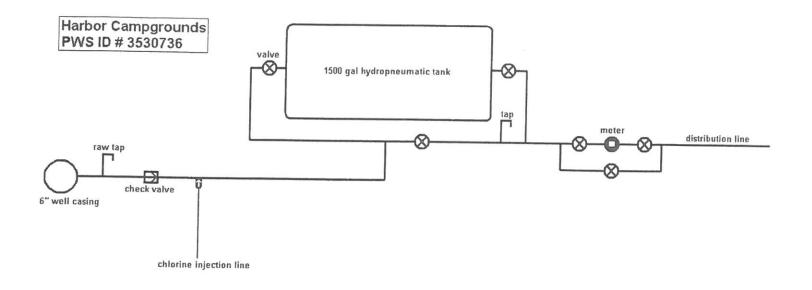
912 Roberts Rd. Unit #13 Haines City, Fl. 33844 863-585-7755-Phone 863-207-4563-Accounting

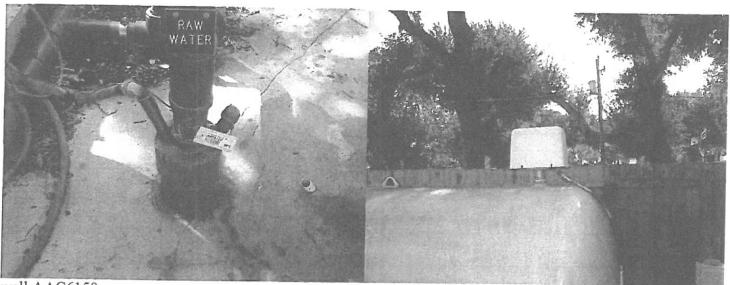
Date	Invoice #
12/20/2017	3280

RECEIVED DEC 27 2017

PRIME INCOME PROPERTIES, LLC	
2840 WEST BAY DRIVE	
SUITE 174	
BELLEAIR BLUFFS, FL. 33770	

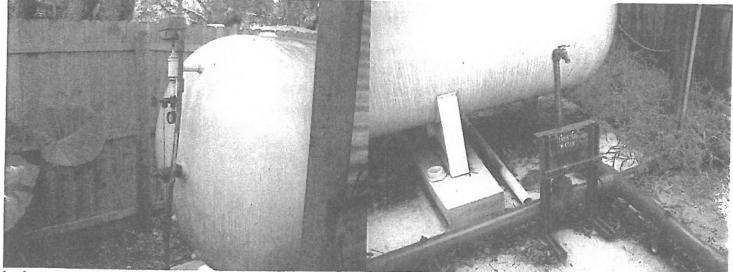
P.O. Number	Terms	Rep		Project	
	Due on receipt	DEC		THE HARBOR	
	Description		Quantity	Price Each	Amount
1- LIBERTY 1 HP PU	MP, 230V, 1 PHASE	2017 In	stalled	775.0	0 775.00
SERVICE LABOR TO UNSTOP 1/2 HP PUM Sales Tax	) INSTALL NEW PUM IP AT ANOTHER LIFT	P AND PULL AN STATION	1D	300.00 7.00%	
5% fee applies) Em	, M/C, Discover & A/ ail info@cwerm.com or go to www.cwerm	for		8	
hank you for your bus				T	
all invoices not paid with harges please pay your avoice, please call 863	ithin 30 days will be sub invoice within a timely -207-4563	ject to an 18% Al manner. For ques	PR, to avoid any late stions regarding this	Total	\$1,075.00





well AAC6150

air compressor on tank



hydropneumatic tank

point of entry tap

	UTILITY NAME: Co	astal Income Properties-T	he Harbor	YEAR OF REPORT DECEMBER 31,
		SOURCE OF S	SUPPLY	
	List for each source of supply	( Ground, Surface, Purcha	ased Water etc.)	
	Permitted Gals. per day			
	Type of Source	Florida Aquifer Systen		
		WATER TREATME	NT FACILITIES	
	List for each Water Treatment	Facility: P\	NS Identification No. 353-0736	3
	Type	115,200 GPD		
-	Chlorinator Ozone	Chlorine		
1	Other	Generator		

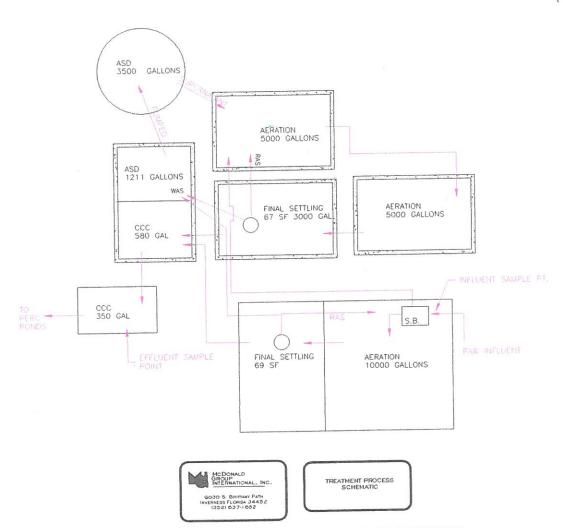
<sup>\*\*\*</sup>see attached for additional information\*\*\*

### **Unit Process Summary**

Influent Characteristics:			Current Flow	Design Flow
¥1	BOD	mg/L	212	250
	TSS	mg/L	108	250
	TKN	mg/L	40	40
	AADF	MGD	0.008	0.02
Effluent Targets				
	DOD		-20	-20
	BOD	mg/L	<20	<20
	TSS	mg/L	<20	<20
	Nitrate	mg/L	<12	<12
B	Disinfection		basic	basic
<b>Process Design:</b>			G: I T	D 155
	D		Single Train	Dual Train
	Process Mode		Ext Aer	Ext Aer
	Temp		20	20
	MLSS mg/L		3553	3526
	SRT days		33	20
	Yield Coefficient		0.64	0.71
	anoxic		0	0
	aeration		0.010	0.020
	Total Volume MGAL		0.010	0.020
	V/Q, hrs.		30.0	24.0
	BOD Loading, #/1000 cf		10.6	15.6
	Solids, Oxic, Lbs		296	588
	Solids, Anoxic, Lbs		0	0
	MLSS Recirculation, 9	ó	0	0
	RAS Recycle, %		100	100
	RAS mg/L	1.37	7106	7052
	WAS, lb/day		9	29.41
	WAS, gpd		152	500
	Tank Configuration		series	series
Aeration System:				
	Process O2, lb/day		41	110
	Diffuser Efficiency, %		6	6
	Air Rqd., SCFM		28	74
	lb O2/#BOD		2.9	2.6
	Air supply, CF/# BOD		2830	2549
	Type Aeration		Diffused	Diffused

		Current Flow	Design Flow
	Number of Eductors	1	2
	Return Rate/Eductor, GPM	5.6	6.9
	Air Eductors	7.6	20.0
	Skimmer Air	2.5	6.7
	Air Rgd. RAS:	10	27
	Air Rqd. Process:	28	74
	Air Rqd.Digester	19	19
	Volume Surge	0	0
	Air Rqd.Surge	0	0
	Total Air Rqd.:	57	119
	HP Required	2.3	4.8
	HP Provided:	(2) 5 Hp	(2) 5 Hp
Final Settling:		Anna Company	
<b>6</b>		single train	dual train
	No. of Clarifiers	1	2
	Surface Area	67	136
	Volume	3000	6000
	V/Q, hrs.	9.0	7.2
	Design Peak Factor	3.5	3.5
	Hydraulic Overflow:	and the second second of the second s	
	Avg., gpd/sf	119	147
	Peak, gpd/sf	418	515
	Solids Loading Rate:	410	313
	Avg., lb/d-sf	7	9
	Peak, lb/d-sf	16	19
Disinfection:	1 641, 10/4-51	10	19
	Method	Tablet Chlorination	Tablet Chlorination
	No. of CCCs	2	2
	Total CCC volume est	930	930
	Cl2 Residual, mg/L	0.5	0.5
	Cl2 Dose, mg/L	8	8
	Consumption, lb/day	0.53	1.33
	If Hypochlorination System In Use		
	Est. Sodium Hypochlorite strength, %	15	15
	Dose required, mg/L	8	8
	Available Chlorine, lb/gal	1.25	1.25
	dose, #/gal	6.68E-05	6.68E-05
	Avg dose, #/day	0.53	1.34
	Avg dose, gal/day	0.4	1.1
	Peak Hour Capacity, gal/day	1	4
	CCC Retention Time	700	
	@ ADF, minutes	167	67
	@ PHF, minutes	48	19
	Residual * Detention	24	10
	Disinfection Level	Basic	Basic
	- company and a second a second and a second a second and		- LAGIN

		Current Flow	Design Flow
Digestion:			
	WAS Flow, gpd	152	500
	Total Solids,#/day	8.98	29
	WAS, mg/L	7106	7052
	% Volatile	75	75
	WASv, mg/L	5329	5289
	Total VSS,#/d	7	22
	VSS, #/Digester cf/day	0.01	0.04
	Thick Solids,%	1	1
	Digester Vol, gal	4711	4711
	Initial Est.SRT, days	43	11
	Temp, Degrees C	20	20
	VSS Destroyed, %	40.27	21.18
	Avg. Solids, mg/L	7000	7000
	Supernatant Solids,mg/L	300	300
	WAS Fraction Not Destroyed	0.70	0.84
	WAS Fraction in Digester	0.50	0.59
	Supernatant, gpd	76	203
	TSS in Digester, #	275	275
	Total SS Removed, #/d	6	25
	Supernatant TSS,#/d	0.2	0.5
	Sludge Discharge,#/d	6	25
	Sludge Rem/year, DTR	1.1	4.5
	Sludge Discharge,gpd	75	297
	Digester SRT, days	42.6	10.9
	Sludge Stabiliz. Class	В	<b< td=""></b<>
	Digester HRT, days	31.1	9.4
	O2 Rqd, VSS, #/d	5	9
	Air, SCFM	4	8
	Diffuser Effic.,%	5	5
	Air Rqd. Mixing, SCFM	19	19
	Design SCFM	19	19
Land Application System			
	System	R001	R001
	Flow	0.008	0.020
	Land Application Area, sf	17000	17000
	Land Application Area, ac	0.3903	0.3903
	Type System	Perc Pond	Perc Pond
	# SubCells	2	2
	Load Rate, gpd/sf	0.47	1.18
	Load Rate, in/wk	5.28	13.21



NOTES: PROCESS VOLUMES/AREAS SHOWN BASED ON INFORMATION IN CURRENT PERMIT. ASD AND SECOND CCC VOLUME CALCULATED FROM INFORMATION IN PERMIT.

# WASTEWATER OPERATING SECTION

YEAR OF REPORT DECEMBER 31, 2017

### WASTEWATER UTILITY PLANT ACCOUNTS

Acct. No. (a)	Account Name (b)	Previous Year (c)	Additions (d)	Retirements (e)	Current Year (f)
351	Organization	\$ -	\$	\$	\$
352	Franchises	-	-	-	-
353	Land and Land Rights		-	-	-
354	Structures and Improvements	_	-	-	-
355	Power Generation Equipment	_	-	-	-
360	Collection Sewers - Force		-	-	-
361	Collection Sewers - Gravity	-	-	-	-
362	Special Collecting Structures			-	-
363	Services to Customers	-		-	-
364	Flow Measuring Devices	-		-	-
365	Flow Measuring Installations	-		-	-
370	Receiving Wells	-	-	-	-
371	Pumping Equipment		-	-	-
380	Treatment and Disposal				
	Equipment	- <u>-</u>	100,000_		100,000
381	Plant Sewers		-		
382	Outfall Sewer Lines		-		-
389	Other Plant and Miscellaneous				
200	Equipment			-	
390	Office Furniture and Equipment				
204	Equipment	-			
391 392	Transportation Equipment	-			-
392	Stores Equipment		-		
393	Tools, Shop and Garage				
394	Equipment				
395	Laboratory Equipment	-	-		-
396	Power Operated Equipment				
397	Communication Equipment			-	
398	Miscellaneous Equipment			-	
390	Other Tangible Plant			-	-
	Total Wastewater Plant	\$	\$100,000_	\$	\$100,000_*

<sup>\*</sup> This amount should tie to sheet F-5.

# ANALYSIS OF ACCUMULATED DEPRECIATION BY PRIMARY ACCOUNT - WASTEWATER

* This an		398	396 397	395	394		393	392	3	390	389	382	381		380	371	370	365	364	363	362	361	360	355	354	(a)	No.	A CC+	
This amount should tie to Sheet F-5.	Totals	Other Tangible Plant	Communication Equipment	Power Operated Equipment	Laboratory Equipment	Equipment	Tools, Shop and Garage	Stores Equipment	Equipment	Equipment Office Furniture and	Other Plant and Miscellaneous	! !	Plant Sewers	Fallinment	Treatment and Disposal	Pumping Equipment	Receiving Wells	Flow Measuring Installations	Flow Measuring Devices	Services to Customers	Special Collecting Structures		Collection Sewers - Force	Power Generation Equipment	Structures and Improvements	(b)	Account		
	V/4-1-1-1	1 1		1	1	1		1 1	1			1	ı   <del>-</del>	'n			.	.		,	-		1	1	ı	(c)	Years	Average Service	
		" %	- %	- %	-   % %	- %		·   · % %	- %	- %		- %	-   - %	2	- %	9 %	%	%	,	,	-	-	- %	- %	- %	(d)	Percent	Average Salvage	
		%	- %	- %	- %	- %	'0	%%	%	- %		- %	3.889 %		- %	2 %	0,0			-   %	,	-	-	- 1	- %	(e)	Applied	Depr.	
	<del>\$</del>			·				t	ı	1			1 1			1									A	(f)	Balance Previous Year	Accumulated Depreciation	
	\$ 3,889	1 1			1 1			1	1	ī		1	3,889		1									-	A	(g)			
	€ <del>9</del>						1		1						1	1								-	<del>9</del>	(h)			
	\$ 3,889	1 1	1	,			1		1				3,889								1	1			7	(i-g+n=i)	End of Year	Accum. Depr. Balance	

YEAR OF REPORT DECEMBER 31, 2017

### WASTEWATER OPERATION AND MAINTENANCE EXPENSE

Acct.		
No.	Account Name	Amount
701	Salaries and Wages - Employees	\$
703	Salaries and Wages - Officers, Directors, and Majority Stockholders	
704	Employee Pensions and Benefits	
710	Purchased Wastewater Treatment	
711	Sludge Removal Expense	
715	Purchased Power	2,225
716	Fuel for Power Production	
718	Chemicals_	
720	Materials and Supplies	2,472
730	Contractual Services:	
	Billing	
	Professional	3,002
	Testing	320
	Other	3,614
740	Rents	- 0,014
750	Transportation Expense	
755	Insurance Expense	
765	Regulatory Commission Expenses (Amortized Rate Case Expense)	
770	Bad Debt Expense	-
775	Miscellaneous Expenses	
	Total Wastewater Operation And Maintenance Expense	\$ 11.633
	* This amount should tie to Sheet F-3.	11,000

### **WASTEWATER CUSTOMERS**

			Number of Active CustomersTotal Number of				
1	Type of	Equivalent	Start	End ter	Equivalents		
Description	Meter **	Factor	of Year	of Year	(c x e)		
(a)	(b)	(c)	(d)	(e)	(f)		
Residential Service							
All meter sizes	D	1.0					
General Service							
5/8"	D	1.0					
3/4"	D	1.5					
1"	D	2.5		-			
1 1/2"	D,T	5.0					
2"	D,C,T	8.0					
3"	D	15.0					
3"	С	16.0					
3"	Т	17.5			-		
Unmetered Customers			0	189	189		
Other (Specify)					109		
( , , , , , , , , , , , , , , , , , , ,							
** D = Displacement							
C = Compound		Total	0	189	189		
T = Turbine							

UTILITY NAME:	Coastal Income Properties	-The Harbor				R OF REPORT
		UMPING EQU	IPMENT		DECI	EMBER 31, 201
***see attached invoice	for recently added pumps**			T		
Make or Type and name data on pump  Year installed Rated capacity Size Power: Electric						
	SE	RVICE CONNE	CTIONS			
Size (inches) u	nknown					
Type (PVC, VCP, etc.)_ Average length						-
Number of active service	1					
connections						:
Beginning of year Added during year						
Retired during year						
End of year						
Give full particulars conc inactive connections_	erning 					
	COL	LECTING AND	FORCE MAIN	S		
	Collecting	Mains			Force N	lains
Size (inches)	unknown					
Type of main						-
Length of main (nearest						
foot) Begining of year	1					
Added during year						
Retired during year_						
End of year						-
		MANHO	DLES			
	Size (inches) Type of Manhole Number of Manholes: Beginning of year Added during year Retired during year	22" Steel				
1	End of Year	6 total				

UTILITY NAME: Co	pastal Income Properties-The	Harbor			
SYSTEM NAME: Th	ne Harbor Waterfront Resort		0.111900000	R OF REPORT BER 31, 2017	
**Operations & Maintenenace Ma	nual Provided** TREATME	NT PLANT			
Manufacturer Type "Steel" or "Concrete" Total Permitted Capacity Average Daily Flow Method of Effluent Disposal_ Permitted Capacity of Disposa Total Gallons of Wastewater treated					
** Recent pump invoices provided	*** MASTER LIFT STAT	ION PUMPS			
Manufacturer Capacity (GPM's) Motor:     Manufacturer Horsepower Power (Electric or     Mechanical)	unknown				
	PUMPING WASTEWAT	ER STATISTICS			
Months	Gallons of Treated Wastewater	Effluent Reus Gallons to Customers	se	Effluent ( Dispose on si	ed of
January February March April May June July August September October November December Total for year	unable to find documenta	tion			
If Wastewater Treatment is pur	chased, indicate the vendor:				

### Kim Whitt

From:

The Harbor Waterfront Resort - Wendy <office@theharborwaterfrontresort.com>

Sent:

Wednesday, June 27, 2018 11:24 AM

To:

Kim Whitt

Subject:

Pump info from CW

Grinder pump for Lift Station behind #8

1HP, 115V

Model #: LPPRG101A-2

Sewer Pump for Lift Station behind #8

1/2 HP, 115V

Model #: LPLSG202A

Workshop Lift Station Sewer Pump

1HP, 230V

Model #: 102A2-2

Wendy Henderson, Park Manager
The Harbor Waterfront Resort
On Beautiful Lake Rosalie

10511 Monroe Ct. Lake Wales, FL 33898

Phone: (863) 696-1194

<u>Visit Our Website</u> <u>Join Us On Facebook</u>



C & W Equipment Repair and Maintenance, Inc.

RECEIVED MAY 15 2018

# Invoice

Date	Invoice #
5/10/2018	3525

P.O. Box 463 Haines City, Fl. 33845 863-585-7755-Phone 863-207-4563-Accounting

Bill To

THE HARBOR RV RESORT AND MARINA 10511 MONROE COURT LAKE WALES, FL. 33898-6914

Me have maved, Nease pote our new address aboveM

P.O. Number	Terms	Rep	·	Project	
	Dise on receipt	DEC		LIFT STATION	
	Description		Quantity	Price Each	Amount
I- I HP LIBERTY G	RINDER 115V PUMP	2018 In.	stalled	1,008.50	1,008.50
We now accept Visa (5% fee applies) Em	a, M/C, Discover & Alail info@cwerm.com	ISTALL GRINDE	177	340.00 7.00%	340.00
Thank you for your bus	siness.				
All invoices not paid w charges please pay you invoice, please call 863	rithin 30 days will be sur r invoice within a timely 3-207-4563	bject to an 18% A y manner. For que	PR, to avoid any late estions regarding this	Total	\$1,348.50





### C & W Equipment Repair and Maintenance, Inc.

Dan-Owner of Sn. Cow

# Invoice

Date	Invoice #	
11/16/2017	3227	State State State

912 Roberts Rd. Unit #13 Haines City, Fl. 33844 863-585-7755-Phone 863-207-4563-Accounting

Bill To

PRIME INCOME PROPERTIES, LLC 2840 WEST BAY DRIVE SUITE 174 BELLEAIR BLUFFS, FL. 33770 Dele Antitul 941-348-7820 11/20/17

P.O. Number	Terms	Rep		Project	
	Due on receipt	DEC		THE HARBOR	
	Description		Quantity	Price Each	Amount
1- DUPLEX CONTRO	OL BOX			725.00	725.00
2- BALL FLOATS				100.00	100.00
1- 1/2 HP 115 VOLT S	SEWAGE PUMP 20	old inet	alled	365.00	365.00
1- 1 HP 230 VOLT SE	EWAGE PUMP Z	017 Inst	alled	775.00	775.00
PUMPS FOR 2 LIFT S	OR INSTALLING PANE		)	900.00	900.00
ONLINE Sales Tax				7.00%	0.00
Res	e Jumps t	nure a	5 year warra	Ny.	
5% fee applies) Em authorization form	n, M/C, Discover & A/ ail info@cwerm.com or go to www.cwern	for			
Thank you for your bus	siness.				
All invoices not paid w harges please pay your nvoice, please call 863	rithin 30 days will be sub r invoice within a timely -207-4563	pject to an 18% A manner. For que	PR, to avoid any late stions regarding this	Total	\$2,865.00

### Kim Whitt

From: The Harbor Waterfront Resort - Wendy <office@theharborwaterfrontresort.com>

**Sent:** Wednesday, June 27, 2018 11:58 AM

To: Kim Whitt
Subject: Another Pump

Use info below for our 3rd Lift Station (same as workshop lift station):

#70 Lift Station Sewer Pump 1HP, 230V Model #: 102A2-2

Wendy Henderson, Park Manager The Harbor Waterfront Resort On Beautiful Lake Rosalie

10511 Monroe Ct. Lake Wales, FL 33898

Phone: (863) 696-1194

<u>Visit Our Website</u> <u>Join Us On Facebook</u>

for Ries

### **OPERATIONS & MAINTENANCE**

MANUAL

FOR

Harbor RV Resort & Marina

### WASTEWATER TREATMENT PLANT

Polk County, Florida

ID: FLA01141

### Prepared For:

THE HARBOR RV RESORT & MARINA 10511 MONROE CT LAKE WALES, FLORIDA, 33898-6914

### PREPARED BY:

McDonald Group International, Inc. 9030 S. Brittany Path Inverness, Florida 34452

FEBRUARY 3, 2005

### LIST OF OPERATIONS AND MAINTENANCE DOCUMENTS

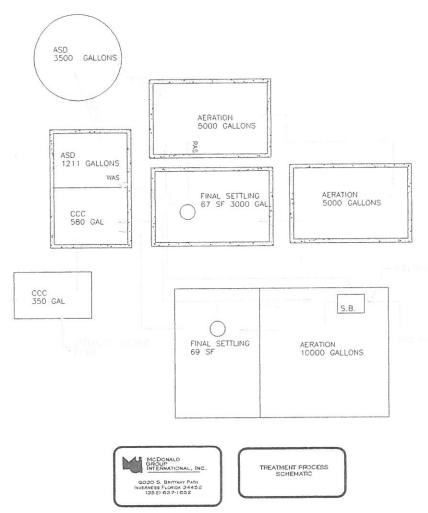
The O&M materials for this wastewater plant comprises the following documents:

- 1) CURRENT FDEP Wastewater Treatment Plant Permit
- 2) This O&M Manual Booklet
- 3) Owner's Record Drawings
- 4) Material Furnished by Equipment Suppliers
- 5) Material Maintained by the Owner in Support of the Current Permit including: Capacity Analysis Report and Operations and Maintenance Performance Report

### CONTENTS OF THIS BOOKLET:

- 1) Wastewater Plant Process Diagram
- 2) Wastewater Plant Unit Process Summary
- 3) Plant Operation General
- 4) Plant Startup
- 5) Normal Operation
- 6) Operational Testing
- 7) Problem Diagnosis
- 8) Nitrogen Removal In Activated Sludge, Domestic Wastewater Treatment Plants
- 9) EPA Rule 503, Rule 62-640: Stabilization in Aerobic Digestion and Lime Stabilization
- 10) Reuse Land Application Systems
- 11) Equipment Appendix

Blowers Submersible Pumps Hypochlorinator



NOTES: PROCESS VOLUMES/AREAS SHOWN BASED ON INFORMATION IN CURRENT PERMIT. ASD AND SECOND CCC VOLUME CALCULATED FROM INFORMATION IN PERMIT.

## **Unit Process Summary**

			Current Flow	Design Flow
Influent Characteristics:				
	BOD	mg/L	212	250
***	TSS	mg/L	108	250
	TKN	mg/L	40	40
	AADF	MGD	0.008	0.02
	AADI	MOD	0.008	0.02
Effluent Targets				
	BOD	mg/L	<20	<20
	TSS	mg/L	<20	<20
	Nitrate	mg/L	<12	<12
	Disinfection		basic	basic
Process Design:			Single Train	Dual Train
	Process Mode		Ext Aer	Ext Aer
	Temp		20	20
	MLSS mg/L		3553	3526
			333	20
	SRT days  Yield Coefficient		0.64	0.71
	anoxic		0.04	0.71
	aeration		0,010	0.020
	Total Volume MGAL		0.010	
	V/Q, hrs.		30.0	0.020 24.0
	BOD Loading, #/10	00 cf	10.6	15.6
	Solids, Oxic, Lbs	00 01	296	588
	Solids, Anoxic, Lbs	*	0	0
	MLSS Recirculation, %		0	0
	RAS Recycle, %		100	100
	RAS mg/L	,	7106	7052
	WAS, lb/day		9	29.41
	WAS, gpd		152	500
	Tank Configuration		series	series
Aeration System:				
	Process O2, lb/day		41	110
	Diffuser Efficiency, %		6	6
	Air Rqd., SCFM		28	74
	lb O2/#BOD		2.9	2.6
	Air supply, CF/# BOD		2830	2549
	Type Aeration		Diffused	Diffused

		Current Flow	Design Flow
	Number of Eductors	1	2
	Return Rate/Eductor, GPM	5.6	6.9
	Air Eductors	7.6	20.0
	Skimmer Air	2.5	6.7
	Air Rqd. RAS:	10	27
	Air Rqd. Process:	28	74
	Air Rqd. Piecess. Air Rqd.Digester	19	19
	Volume Surge	0	0
	Air Rqd.Surge	0	0
	Total Air Rqd.:	57	119
	HP Required	2.3	4.8
	HP Provided:	(2) 5 Hp	(2) 5 Hp
TOTAL OF COMMENTS	HP Flovided.	(2) 3 Hp	(2) J 11p
Final Settling:		single train	dual train
	No. of Clarifiers	1	2
	Surface Area	67	136
	Volume	3000	6000
	V/Q, hrs.	9.0	7.2
	Design Peak Factor	3.5	3.5
	Hydraulic Overflow:		
		119	147
	Avg., gpd/sf	418	515
	Peak, gpd/sf	410	515
	Solids Loading Rate:	7	9
	Avg., lb/d-sf	16	19
Disinfestions	Peak, lb/d-sf	10	19
Disinfection:			
	Method	Tablet Chlorination	Tablet Chlorination
	No. of CCCs	2	2
	Total CCC volume est	930	930
	C12 Residual, mg/L	0.5	0.5
	C12 Dose, mg/L	8	8
	Consumption, lb/day	0.53	1.33
	If Hypochlorination System In Use		
	Est. Sodium Hypochlorite strength, %	15	15 vi
	Dose required, mg/L	8	8
	Available Chlorine, lb/gal	1.25	1.25
	dose, #/gal	6.68E-05	6.68E-05
	Avg dose, #/day	0.53	1.34
	Avg dose, gal/day	0.4	1.1
	Peak Hour Capacity, gal/day	1	4
	CCC Retention Time		
	@ ADF, minutes	167	67
	@ PHF, minutes	48	19
	Residual * Detention	24	10
	Disinfection Level	Basic	Basic
			The second of th

		Current Flow	Design Flow
Digestion:			500
	WAS Flow, gpd	152	500
	Total Solids,#/day	8.98	29
	WAS, mg/L	7106	7052
	% Volatile	75	75
	WASv, mg/L	5329	5289
	Total VSS,#/d	7	22
	VSS, #/Digester cf/day	0.01	0.04
	Thick Solids,%	1	1
	Digester Vol, gal	4711	4711
	Initial Est.SRT, days	43	-11
	Temp, Degrees C	20	20
	VSS Destroyed, %	40.27	21.18
	Avg. Solids, mg/L	7000	7000
	Supernatant Solids,mg/L	300	300
	WAS Fraction Not Destroyed	0.70	0.84
	WAS Fraction in Digester	0.50	0.59
	Supernatant, gpd	76	203
	TSS in Digester, #	275	275
	Total SS Removed, #/d	6	25
	Supernatant TSS,#/d	0.2	0.5
	Sludge Discharge,#/d	6	25
	Sludge Rem/year, DTR	1.1	4.5
	Sludge Discharge,gpd	75	297
	Digester SRT, days	42.6	10.9
	Sludge Stabiliz. Class	В	<b< td=""></b<>
	Digester HRT, days	31.1	9.4
	O2 Rqd, VSS, #/d	5	9
	Air, SCFM	4	8
	Diffuser Effic.,%	5	5
	Air Rqd. Mixing, SCFM	19	19
	Design SCFM	19	19
Land Application System			
System	System	R001	R001
	Flow	0.008	0.020
	Land Application Area, sf	17000	17000
	Land Application Area, ac	0.3903	0.3903
	Type System	Perc Pond	Perc Pond
	# SubCells	2	2
	Load Rate, gpd/sf	0.47	1.18
	Load Rate, in/wk	5.28	13.21
	Loud Mito, 110 Wit	5.20	2 - Jul 2

### ACTIVATED SLUDGE, SUSPENDED GROWTH WASTEWATER PLANT OPERATION

### Plant Operation - General

A well managed plant will produce a safe, fine, clean, liquid at a reasonable cost and with a minimum of man-hours.

The objective of the operator is to attempt to get maximum efficiency from the treatment plant at all times. This will satisfy the Health Department, FDEP, owner and neighbors.

A "perfect" treatment plant that will operate under "all" con-ditions by itself has not been built. All must be adapted to their own particular flow patterns, strength fluctuations, and problems created by location or climate.

Needless to say a neat appearing plant and surrounding area creates an immediate impression of efficiency.

The appearance of the receiving stream, or water course, is generally the first thing checked by Health officials. They will keep you informed of any changes of stream classifications as well as any effect your plant is having on it.

For successful operation the operator should observe the following:

- Assemble all possible written information on the treatment process used.
- Understand exactly what the FDEP expects in the way of performance, test and reports.
- 3. Study the inlet sewer layout and pumping stations on the system. Your customers may have problems which aren't related to the "Plant", itself, but may be easily solved if you know the area which feeds your plant.
- 4. Have a good storage place for literature describing the plant equipment, and maintenance materials necessary to buy. Know where to obtain all items and keep a stock of repair parts and items recommended by the manufacturer, or owner, Request additional literature on equipment, if necessary, and be sure you know how each piece of equipment operates and if the manufacturer "allows" your repairs due to warranty, or has service available. List all material suppliers with tele- phone numbers and addresses. Some equipment such as brooms, rakes, lawn mowers, hoses, shovels, extension cords, flash lights, ladders, wheelbarrow, oil cans, gloves, soap, First Aid Kit, insect and rodent control supplies, pliers, screw-drivers, pipe wrenches, and the like are dependent upon the size of the plant and the degree of maintenance. Include general spare parts also for the lawn mower etc. as well as oil and light bulbs.
- 5. Have a good storage place for test equipment, tools, paint, clothes and similar items. This may be in conjunction with a wash up area and office area. A minimum size enclosure, building or area is not possible to describe since the requirements vary so

greatly. It can be as simple as a store room in an adjacent building or a small metal or concrete block building within the fenced enclosure measuring 41x6' with adequate headroom. It can be as elaborate as a 2 story building with vehicle storage.

- 6. Prepare a list of equipment and make a chart which says how often each needs maintenance. This will greatly speed up this operation and will be quite foolproof. Keep a separate sheet for comments or reports on each piece of equipment. This will allow noting any recurring problems and will be good information for the owner when replacement or expansion may be needed.
- 7. Whether anyone desires reports from you, or not, you should keep them for good overall operation. They should include test reports, visual inspection reports, equipment reports, and costs of operation,
- Consider the following at all times during the life of the plant.
  - 1. Location and therefore appearance.
  - 2. Future expansion.
  - 3. work shop and office area with rest rooms.
  - 4. Chlorination Equipment Area.
  - 5. Storage area.
  - 6. Additional drives and parking.
  - 7. Yard and plant lighting.

Standard Daily Practice

Plant care, operation and maintenance begins even before you arrive at the gate.

- Observe the area for neatness
- Listen for undesirable, or excessive noise.
- Check for an unpleasant odor.

The above sight, sound. and smell routine will keep you on friendly terms with the neighbors, which is a good basic policy.

### A. Suggested Sight Routine:

- 1. Generally, does everything look right? (Any storm damage, or vandalism?)
  - 2. Plant influent color good?'
  - 3. Any indication of high water?
- 4. Aeration tanks have good roll? Have a good color? Have white foam? Have scum layer?
  - 5. Final effluent clear? Cloudy?
  - 6. Return activated sludge (RAS) a good color? Flowing at a good rate?
  - 7. Chlorinator operating?

### B. Suggested Sound Routine:

- 1. Generally, does everything sound right? (Any equipment not running, or alarm activated?)

  2. Influent pumps sound OK?
  - 3. Air Blower sound OK? Belts OK? Bearings noisy? Motor hot?
  - 4. Air piping OK? Air leaks?
  - 5. Scraper drive motor OK?
  - 6. Effluent pumps sound OK?

### C. Suggested Smell Routine:

- Generally, does everything smell right? (The plant should not have any unpleasant odors.)
  Influent smell OK? Septic? Odors by bar screen or trash barrel? 1.
- 2.
- Aeration tanks have good odor? 3.
- RAS has a good odor? 4.
- Sludge digester has a good odor? 5.
- Sludge beds have a good odor? 6.

### Plant Startup

The most critical time for the operator is during the start-up of the treatment plant. Sometimes plants cannot be started merely by turning the equipment on and letting the wastes come in normally. It may be necessary to build up an initial biological sludge prior to starting normal operation. Generally, biological sludge can be built up quickly with a seed of activated sludge from another treatment plant. If activated sludge seed is not available, sludge from a trickling filter will be quite satisfactory. When no seed is available from any biological waste treat- ment system, it is possible to utilize cultivated garden soil or sacks of Milorganite(a fertilizer made from plant sludge) as seed.

If the initial plant loading is very low and the waste flow is small, the plant can be started without any special seed by operating as an aerated lagoon instead of and activated sludge system. The unit should be filled with water to permit the equipment to function properly. The raw wastes will enter the aeration tank where dilution will reduce the organic concentration and metabolism will permit very limited microbial synthesis so that little sludge will be formed. The sludge return systems should not be operated during the initial period since very little settleable solids will be formed and the high rate of recycling will result in loss of the few solids which have formed. As settleable solids build up, the sludge can be returned to the aeration tank once daily. The oxygen requirements for the aerated lagoon type of operation will be lower than with extended aeration so that the aeration equipment can be operated on an intermittent basis with a time clock in proportion to the oxygen demand. Needless to say, the treatment efficiency will be lower during the aerated lagoon type operation than during the normal operation.

To switch over to activated sludge, aeration should be increased. When a timer is included, it should be set to operate the air blower sufficiently to maintain the 2 ppm in the aeration and to control the brown scum layer on the aeration and also control the sludge settling properties in the final tank. A good initial setting is 45 minutes on and 15 off each hour during the startup phase The aeration tanks must have good agitation and mixing. The air valves should be full open to the diffusers. Some balancing of air to get a uniform roll may be required but keep these valves as much open as possible.

The color will develop from gray to rich brown as the solids in crease. (This can be 4 to 6 weeks depending upon the amount of sewage treated in relation to the design flows anticipated.) The odor will change from dishwater to musty, the PH will be between 6.8-7.4; the solids will indicate 20-40% in 30 minutes and the dissolved oxygen test (D.O.) will be 1 to 2 ppm as the plant continues to operate and treat efficiently.

Initially there will be white foam which will disappear as the solids build up.

### Physical Unit Processes

This section explains the function of the physical parts of the plant that will require regular checking and related accessory equipment.

### Diffusers

The diffuser units should contain a feature which prevents backflow and plugging when the air is shut off. When there is no longer air pressure in

the piping, the liquid tries to seek its own level up the pipe. As it does this it carries, or attempts to draw, particles of sludge and sewage up the pipe through the diffuser openings. When the air is turned on, these particles clog the diffuser openings and cause them to operate partially or not at all.

Replacement diffusers should protect the supply pipe from becoming clogged. Further, it should produce a curtain of air bubbles of relatively small size for more contact surface with the sewage.

### Final Settling Tank

The final settling tank should show no agitation or roll as in the aeration units.

To aid in this transition a baffle is located approximately two feet from the inlet. It extends above the liquid surface to retain any froth carried through. It also extends down the proper distance to force the solids (sludge) down into the hopper and permit the sludge return pumps to recirculate it back into the aeration units.

The hoppers are sloped (minimum 60 degrees) to decrease the sludge buildup on the sides. Any floating pieces are kept from entering the overflow weir box by the scum baffle. Movable weir plates are adjusted to assure a uniform flow over the lip. A skimmer is installed to collect floating material and see that it is skimmed off and returned to the aeration units for further treatment.

The air lift pump for sludge recirculation has no moving parts to wear out. The air introduced into the eductor pipe creates a lift which carries the sludge to the return pipe and to the discharge into the aeration tank. The sludge pumps may become clogged with rags, plastic or rubber goods which were not successfully retained in the trash basket. These are unclogged by closing the control on top and forcing the air to be ejected out the bottom of the eductor.

### Foam Control

Foam control has become increasingly important from the nuisance standpoint as well as the effect on the mechanical equipment and receiving stream. Studies are still being made to determine the hazard connected with foam caused by detergents. These even carry through municipal plants and are found in well water. The foam cannot be eliminated after passing through municipal water treatment plants.

Control of the foam in the plant can be accomplished by introducing a suppressant solution with a chemical feed pump into the first aeration tank. Another method uses heavy duty spray pump delivering clear effluent through brass nozzles. The spray is strong and with adjustable timed operation provides good control but poses housekeeping problems from windblown spray and frost damage to pumps.

### Controls

The equipment controls are mounted in a weather-tight singl door panel providing protection from dust and water. It is mounted on the equipment stand. The electrician must extend the service, mount a disconnect switch, and wire between them and any equipment not on the equipment stand.

Manual starting switches and magnetic full voltage starters provide overload

heater element to protect the equipment motors. Prewired panels are available and special panels are provided to include pump starters when required.

### Normal Operation

### Aeration System

Balance the flow of air to the aeration tanks so that each tank has a good roll and maintains 1 to 2 ppm dissolved oxygen content. Balancing is accomplished by adjusting the valves to each diffuser assembly.

### Sludge Return System

To assure good settling in the final tank the air lift sludge pump should be kept running dark and about 1/3 full without splashing.

### Final Settling (Sedimentation) Tanks

Activated sludge is separated from the liquid in the sedimentation tank and returned to the aeration tank. Most of the operation problems occur in the sedimentation section.

The light solids that are not decomposed in the aeration tank will float to the surface of the sedimentation tank and will have to be removed from the sedimentation tank surface by skimming. Some vegetables such as corn and peas will also pass through the system largely untouched and will float on the sedimentation tank surface. These materials should be skimmed off and removed from the system and not returned to the aeration tank as they will soon reappear in the sedimentation tank.

Excessive retention of the activated sludge in the sediment ation tank can cause denitrification and rising sludge. For this reason it is essential that the activated sludge be returned to the aeration tanks as quickly as possible. Denitrification results in the formation of a layer of biological solids over the sedimentation tank surface. It is necessary to agitate the scum layer to release the nitrogen gas and permit it to resettle. Generally, spraying the surface with water will break up the scum without excessive loss of the solids. The squeegee or any stick will also break up this layer. Regulation of the air to the aeration tanks will help control this sludge problem.

To squeegee the final settling tank, take the long handled squeegee and completely clean side walls, hopper and both sides of baffle. The solids dislodged will temporarily cloud the settling tank but gradually they will settle out and be returned to the aeration tanks by the air lift sludge return. This should be performed once or twice a week in slow firm strokes. The sludge return will turn quite dark, and this indicates that it is again operating properly.

Leaves should be removed very quickly since they will float initially and then sink after becoming throughly water-soaked. The leaves in the sedimentation tank have been one of the major causes of sludge return line clogging.

The skimmer should be used only as required since it causes a strong upward current which can cause the sludge to rise instead of settle at the bottom of the hopper to be returned to aeration by the eductor.

This process oxidizes most of the sludge so that disposal of excess amounts is only required after the plant has become fully loaded to the point of over loaded. Particles of sludge ash may float up and over the weir but are only pieces of sludge residue which will not create an odor.

### Aeration Tankage

A test was devised for operators which can tell them how well the treatment plant is operating and where trouble may be occurring. See Section on Testing. Upsets do occur periodically so that the operator should know enough about the system to make minor changes and to recognize major problems which require outside assistance.

Soft water can cause a lowering of the PH to the point where it will measure "acid" and not operate well. It will affect the nitrification process so steps must be taken to neutralize.

To summarize the operating characteristics,

- a. A daily check of the system is most desirable.
- b. The color of the aeration compartment should be copper or red color, or golden brown to dark brown.
- c. If tank color is beige, it is over-aerated.
- d. If black or dark gray it is under aerated.
- e. If light gray, it is a new plant, or has not received sufficient sewage and is primarily water or dishwater.
- f. The odor should be musty or earthy and not sharp or offensive. If stale dishpan odor, it is over-aerated.
- G. Foam residue should be rinsed back into the plant as soon as possible to prevent odor.
- H. The sludge return line should be running darker rather than light. If too light, the hopper should be squeegeed or flow reduced.

### Review of Daily Flow

### A. Average Daily Flow (ADF)

- 1. Municipal are considered on a 24 hour basis.
- 2. Other plants may consider other working hours
- 3. Assume I MGD Plant.
  - a. Hourly Flow = 41667 GPH
  - o. Flow per Min= 694 GPM
  - c. Design Peak =  $2.5 \times 694 = 1735 \text{ GPM}$
  - d. Typical Daily Flow (no infiltration)

8 A.M. = 1 MGD

9:30A.M. = 1.25 MGD

12:00P.M. = 1.35 MGD

I:OOP.M. = 1.4 MGD

6:00P.M. = 1.6 MGD

9:00P.M. = 1.4 MGD

10:00P.M. = 1.15 MGD

12:00Midnight=0.9 MGD

2:00 A.M. = 0.35 MGD

4:30 A.M. = 0.35 MGD

7:00 A.M. = 0.45 MGD

### B. "In-Plant" Flows

- 1. Sludge Return/ Recirculation.
  - a. Conventional Act. Sludge Process 15-75% of ADF
  - b. Contact Stabilization Process 50-150% of ADF
  - c. Extended Aeration Process 50-200% of ADF
- 2. Supernatant Return Sludge Draw-off.

This depends upon operator practice and could be a daily small amount or weekly large surge amount. An average daily amount is:

- a. 0.5% of ADF for Extended Aeration.
- b. 1.5% of ADF for Contact Stabilization.
- 3. Spray pumps for Foam Control.

This is directly related to the configuration of the aeration tanks and their length which needs foam control. A new plant particularly, utilizes foam control about 80 % of the time. An average nozzle will require a min. of GPM per lin.ft. of tank. 80% of a day = 1150 GAL. Per lin.ft. of tank which is a considerable amount of fresh water or lo-be pumped from the settling or chlorine contact chambers.

Consideration should be given to chemical foam suppressants because the volume of spray water is diluting the aeration tanks at a time when they are fighting to increase MLSS and become workable.

### 4. Skimmer Return.

Floating material is collected by skimming devices and often returned to a point in the plant. Wherever this is discharged it will cause a hydraulic load of varying degrees. Pumps of mechanical or air lift type

will produce an average flow of 50 GPM and may produce more if length of discharge is long and quantity of solids is great. There are normally several skimmers used throughout the plant and their accumulated flow can be considerable.

### 5. Tertiary Sand Filter Backwash (If filters installed on plant)

This is very objectionable because it is a large amount of clear, treated water not only causing a hydraulic load, but diluting the MLSS in aeration. When it is introduced directly into the plant inlet it produces a definite "shock" to the system. It should be returned to a mud tank to trap the foreign material removed by the filters. It can be pumped slowly back into the plant if necessary or to discharge since it is an already treated liquid. When returned to the plant it should flow thru the equalizing chamber either directly or from the mud tank. This anticipated flow should be added to the plant design daily flow' since it has such an obvious hydraulic impact on the plant operation. The flow rates are 15-20 gpm/sq.ft. of filter area times a 7-10 minute operation times the number of filters backwashed daily.

### 6. Other In-Plant Flows.

The other sources of hydraulic flows recycled thru the plant are generally intermittent and of low volume. They are of a clean up nature or drawing off sediment from the chlorine Contact Chamber, etc.

### Operational Testing

### Aeration Tank

The main tests needed in this compartment are:

- 1 . Dissolved oxygen (D.O.)
- 2. Setteability
- 3. Mixed Liquor Suspended Solids (MLSS)
- 4. Biochemical Oxygen Demand (BOD)

### 1. Dissolved Oxygen

A special kit is required to perform this test. It is a relatively easy test using special chemicals and takes approximately 5 minutes. Care must be taken to grab the sample carefully so as to get a true interpretation of the condition of the mixed liquor. The test kit will further explain this.

It may be of interest for you to obtain samples from the inlet, and at several points along the aeration tank, however, the most important location is immediately prior to entering the settling tank. At this point there is no other chance of the liquor receiving any more oxygen, so it should have gotten enough (approximately 2 Mg/1) before entering the final treatment stage.

### 2 . Settleability Test

Use the clear liquid from the top of the container used to collect the Setteablility  $\phantom{a}$  test .

Any container can be used to observe this test. A graduated cylinder already has markings on the sides, but a glass jar is usable if a tape is placed on the side, and marked in 10 equal spaces. Number from 10 at the top, to 0 at the bottom.

Collect the sample at the outlet end of the aeration tank and preferably down at the flow-thru port into the settling tank. (A coffee can, fastened to a broom handle, works well for obtaining samples). Care must be taken to take the sample slowly so that it will be true and representative of the conditions prevailing. Do not include surface scum in the sample. Keep the sampler below the surface (perhaps 2 feet) and remove it after the surface scum has been pushed away.

Pour the sample into the jar, along the inclined side, so that it does not splash and receive further aeration, at this point. Observe the time and allow it to set for 30 minutes. The color and odor can be checked at this time.

Other duties can be carried out while this settling is taking place. it should begin separating immediately and be well on the way in 10 minutes if everything is operating properly.

A good operating range is 20 to 40% of the sample having settled in the 30 minutes. This will vary as the solids content in the aeration tank (MLSS) varies.

### Final Settling-clarifier

Primarily the settling should have been predicted from tests tank in the aeration tank prior to entering this tank.

The tests normally performed in this tank are at the outlet weir. They are:

- I . D.O.
- 2. BOD & TSS
- 3. Solids or turbidity
- 1.. The dissolved oxygen (D.O.) test has been described previously and the sample can be taken from the top of the solids test sample.
- 2. The BOD and suspended solids (S.S.) tests are taken at the plant inlet and outlet to check plant efficiency.
- 3. The solids carry-over, or clarity of the final effluent, are observed by usually filling an imhoff cone and seeing the degree of "dusting" or solids in the bottom.

### Chlorine Contact Chamber

Since the objective of this chamber is to destroy germs and virus, it is necessary to continually test to see if enough chlorine is being used.

The dosing rate at the inlet end may vary from 2 to 10 Mg/l to achieve the results of 0.2 to I .0 M@ at the outlet end.

This test is performed with chemicals similar to those used on swimming pools and only takes a few minutes. Follow the instructions on the test kit.

### Problem Diagnosis

Before anyone can make a judgement (or recommendation) regarding a treatment plant which operates poorly, it is necessary to have the following information: (Using this as a check-list may uncover the problem. A laboratory is required to take the samples for 2 and 3, but are the same tests usually made monthly for reporting. Recent reports may be sufficient)..

- 1. Daily Flow How many gallons per day are flowing thru the plant? Flow recorders or elapsed time meters on lift pumps are the best method to determine this, or use water meter readings. If none of these are available, it may be necessary to install elapsed meters on the lift pumps or on the well pump. (check GPM or gallons per pump cycle by bucket or tub test. Record Daily Flow for a week.
- 2. Strength of Sewage What is the BOD (in Mg/1) of the raw sewage entering the plant? Take a test sample on 2 different days and at different times of day, each day. What is the BOD of the final effluent?
- 3. Solids in Sewage What is the suspended solids content of the raw sewage entering the plant? What is the suspended solids content of the aeration compartment nearest the final tank? Use the same test sample as for BOD on the "raw" and take additional samples from the aeration at the same time. What is the suspended solids content in the final effluent?
- 4. Oxygen Present What is the dissolved oxygen content in the sewage in the aeration compartment nearest the final tank? Use the same samples as above. What is the dissolved oxygen content in the final tank near the effluent trough?
- 5. pH What is the acidity or alkalinity in the raw sewage?
- 6. What are the hours of operation of the air blowers?
- 7. When was sludge drawn off? What is the draw off interval?
- 8. Does a probe of the aeration tanks reveal a build up of solids on the bottom while the diffusers are operating?
- 9. Are the sludge return air lift pumps operating properly? Flowing steadily and dark?
- 10. Any storms recently to cause infiltration in the sewer system?
- 11. Any power outages to cause equipment to be shut off for any long period?
- 12. Any cleani.ng or disinfecting materials used recently?
- 13. Water softener installed? Backwash flows to plant or ground?
- 14. Dishwashers Garbage disposals installed?

Routine Maintenance to Major Plant Equipment

### Air Blower

Turn on the blower with the switch or timer in the control panel. If no air bubbles appear immediately shut off the blower and check blower rotation and see if all valves are open. (Never close all air valves while blower is operating.)

After air is coming up in all compartments check to see if it is fairly uniform and adjust valves to even out mixing action. Close all accessory valves to trash or sludge compartments and skimmers. Cut down air to sludge returns toaeration to make flow about 1/3 of a pipe full. (No sludgeshould be flowing to any sludge compartments.)

Alternating blowers, when used, should be set for 12 hours onand 12 hours off for each. Timed blowers may be set to operatefull time or some portion of each hour. (See instructions at-tached to the wiring diagram.)

To check the oil in the blower, shut down motor blower systemand open petcock in housing opposite pulley end. The oil should barely drip from the petcock. Do not over lubricatebecause too much oil causes overheating. If no oil shows, unscrew plug at top of housing and add lubricant, using agood quality motor oil approximately SAE.NO. 40. Leave pet-cock open until it barely shows a drip. Close petcock, re-place plug, wipe exterior clean and start motor blower system. Check every month.

To change oil in blower, shut down motor blower system andremove plug at top and bottom of housing and allow all theoil to drain from housing. Replace plug at bottom and addoil until it shows at petcock. observe same procedure asadding oil. Change oil at six (6) months intervals.

To grease bearings at drive end (those at gear end arelubricated by splash from gears), shut..down motor and blowerand fill grease cup with the best grade, high temperature, ball bearing grease. Do not use ordinary cup grease. Re-place grease cup and turn gradually until fresh grease ap-pears at drain plug. If bearing is fitted for pressuregun, do not pack bearings too tightly. Replace drain plug, wipe exterior clean and start motor blower system. Greaseevery month.

To clean air filter, unscrew thumb nut and remove cover, lift filter screen from case and tap gently on a flathorizontal surface to remove accumulated dust and grit. Reassemble filter screen, cover and thumb nut. If filter isvery dirty, it may be washed in gasoline. Always allowfilter to dry before reassembling. Clean every month.

### The Blower Motor

To adjust belts, shut down motor blower system. Loosenfour (4) bolts in motor base. Use a small bar to shiftmotor away from blower or turn screw in slide base and hold while bolts are firmly tightened. Belts that are too tight will cause excessive bearing wear; loose belts will squeal. Tighten them only enough to correct this condition. Start motor blower system. Check every month.

To lubricate motor, shut down motor blower system. Remove plugs from the holes in the top and bottom of the bearing housing at each end of motor. With a gun, fill bearing with the best grade, high temperature, ball bearing grease until fresh grease appears at hole at the bottom. Replace all plugs and wipe exterior clean. Start motor blower system. This should be performed once every six (6) months or as recommended by motor manufacturer.

- If motor and blower labors:
- 11. Check for unusual heating.
- 2. observe belt condition and slippage.
- 3. Clean air filter.
- 4. Note and correct air pressure.
- 5. Check for clogged diffusers.

Unless you are a proficient electrician and mechanic, you should not attempt repairs of the motor blower system. If there is any doubt in your mind concerning the possibility of the continued operation of the motor blower unit causing further damange, shut it down and call a local qualified serviceman.

### Air Diffusion

The air for the sewage treatment depends upon the speed of the blower and the pressure. The rolling action of the liquid should not vary greatly from when it was observed when the plant was first placed in operation. If the rolling has decreased, it may indicate that rags, plastic or other material may have clogged the air tubes.

Shut off the valve to the diffuser line and disconnect the pipe and pull out to observe air tube. The pipe should be cleaned of obstruction, if necessary, and replaced.

Closing all the air valves except one or two will generally clean or blow out a line satisfactorily but should not be continued for more than two minutes for each application or the blower may begin to overheat. A diffusion tube, if damaged, may be slipped off and a new one put on easily by removing the cap on the end of the pipe. Be sure to install the new sleeve with the slit "up".

### Sludge Return

The sludge return is a simple air lift and nothing can happen to it unless it becomes clogged by a large foreign body in the hopper of the settling tank. To clean the system it is necessary to close the air supply valve and set the plug.valve to the lower position and tighten. open the air valve. This will force the air back through the eductor into the hopper and dislodge the obstruction. However, it may be necessary to restrict air flow to one or more aeration tanks, which will increase back pressure on air lift pump. After the system is cleared, close the air valve. Set the plug valve to the upper position. open the air valve. The settling tank will be clouded by this process, but it will clear itself in a short time. Where standard gate or valves are used instead of the plunger type plug valves, simply close them tightly until an upsurge is seen and then reopen so that the flow is again about 1/3 of a full pipe flowing smoothly in the aeration compartment.

### Problem Diagnosis Checklist

### OBSERVATION:

White, thick, billowing or sudsy foam on the aeration tank surface. (Too much food, not enough microorganisms.)

	Probable Cause:	Check:		Remedy:	
	1. Overloaded aeration tank. (Low MLSS)		heck B.O.D. loading. Check for cloudy	1.	Stop WAS or maintain minimum WAS.
DAG			effluent.	2.	Maintain sufficient
RAS.		3.	Check D.O.	3.	Maintain D.O. between 1.0 - 3.0 mg/l.
ft.	2. Excessive sludge wasting		Decrease in MLVSS. Decrease in MCRT.		Reduce WAS. Increase RAS (1 - 3
		3.	Increase in F/M.		sludge blanket.
		4.	D.O. levels.		
		5.	Increase in WAS.		
Waste	3. Toxic Waste	1.	Take MLSS sample. (Look for: metals,		Establish new culture. Enforce Industrial
			bacteriocide, temperature).		Ordinances.

### OBSERVATION:

White, thick, billowing or sudsy foam on the aeration tank surface.

Probable Cause:

Check:

Remedy:

I. Hydraulic washout.

1. Detention time in aeration tank.

1. Reduce RAS.

2. Surface over flow rate in F/S.

### OBSERVATION:

Shiney, dark tan foam on the aeration tank surface. (N-ot.enough food for the microorganisms.)

### Probable Cause:

### Check:

### Remedy:

- Aeration tank under loaded due to insuf-,
   Increase in MLVSS.
   Increase in MCRT. ficient sludge wasting.
- I. Increase WAS.

(High MLSS).

- 3. Decrease in F/M.
- 4. D.O. Levels.
- 5. Decrease in WAS.

### OBSERVATION:

Dark brown, almost blackish sudsy foam on the aeration tank surface.

Probable Cause:

### Check:

### Remedy:

- 1. Anaerobic conditions
- 1. Plugged diffusers.
- 1. Repair the diffuser

or

are occurring in the

2. Underaeration.

air pipe or blower,

etc.

aeration tank.

### OBSERVATION:

Localized clouds of homogenous sludge solids rising in certain areas of the clarifier.

Mixed liquor settles fairly well with a clear supernatant.

Pro	babl	e Ca	use:
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### Check:

### Remedy:

- Denitrification occurring.
- 1. Settleability test, (stir sludge to see if
- Increase WAS.
   Adjust RAS

(Maintain

3 '

bubbles are released).

and D.O. test in F/S.

sludge blanket l' -

in F/S.

- . . . . .
- 2. Temperature currents.
- 1. Perform temperature
- 1. Install additional

in F/S.

- baffles
- 3. Solids washout hydraulic overload.
- 1. Check aeration tank
- Reduce RAS.
   Use additional

hydraulic over aeration

- detention time.
- Surface overflow rate in F/S.
- if available.

### OBSERVATION:

Localized clouds of homogenous sludge solids rising in certain areas of the clarifier. Mixed liquor settles fairly well with a clear supernatant.

	Probable Cause:		Check:			Remedy:	
	1. Equipment is tioning.		lines.	RAS of WAS sludge collec-	1. R	epair or replace the faulty equipment.	
(main-	2. Equipment	is malfunc- 1.	. Sludge	removal rate.	1.	Adjust RAS rates	
(Main-	tioning.	2.	. Sludge	blanket depth		tain l' - 3' deep	

1. Decrease WAS.

### OBSERVATION:

Localized clouds of fluffy homogenous sludge rising in certain areas of the clarifier.

Mixed liquor settles slowly, leaving stragglers in supernatant.

Probable Cause:

Check:

Remedy:

- 1 Overloaded aeration tank. (Low MLSS).
- 1 .Decrease in MLVSS.
- 2. Decrease in MCRT.
- 3. Increase in F/M.
- 4. Lower air to maintain D.O. level.

### OBSERVATION:

Clouds of billowing homogenous sludge rising and extending throughout the clarifier. Mixed liquor settles slowly, but supernatant is fairly clear.

Probable Cause:

Check:

Remedy:

- Low D.O. in the aera-
- 1. Check D.O.

1. Maintain 1 - 3 mg/l

D.O. tion tank.

- 2. pH in aeration is less 1. Monitor influent pH.
- 1. Add alkaline agent to raise

pH.

- a. Caustic soda
- b. Lime

### OBSERVATION: (continued)

than 6.5

Clouds of billowing homogenous sludge rising and extending throughout the clarifier. Mixed liquor settles'slowly, but supernatant is fairly clear.

food.)

Probable Cause:

Check:

4.

Remedy:

- Improper organic
- 1. Decrease in MLVSS.
- 1. Decrease WAS.

loading.

- 2. Decrease in MCRT.
- 2. TEMPORARILY increase

3 mg/1.

RAS.

- 3. Increase in F/M.
- 3. Maintain D.O. 1 -

- - 2. Filamentous organ-
- 1. ML under microscope
- 1. Chlorinate

- influent.
- isms.

to determine type of organism.

Change in D.O. levels.

2. Chlorinate R.A.S.

- 3. Wastewater nutrient deficiencies.
- 1. Check nutrient levels of influent.
- 1. Add:
  - a. Nitrogen b. Phosporous
  - c. Iron

### OBSERVATION:

1	i	a	u	0	r

Sludge clumps rising to and dispersing on the clarifier surface.

Mixed

settles fairly well, but settled sludge rises to the surface within four hours after the test is started.

			-	
Dro	nah	10	C 21	190.

### Check:

### Remedy:

- 1. Denitrification
- 1. Check D.O.

1. Increase WAS.

- 2. Check R.A.S. rates.
- 2. Maintain D.O. 1 3

mg/1.

31

- 3. Check sludge blanket
- 3. Adjust R.A.S. 1' depth.

depth.

2. Septicity

- Check mechanical:
- 1. Repair equipment.
- a:. F/S equipment b. Diffusers, etc.

### OBSERVATION:

Secondary effluent from the clarifier is cloudy. Mixed liquor settles poorly, leaving a cloudy supernatant. (Not enough microorganisms for the food coming in.)

### Probable Cause:

### Check:

### Remedy:

- 1. MLSS in aeration is too low.
- 1. B.O.D. loading.
- 1. Don't waste sludge.

- 2. Increase in organic
- 1. Check organic loading.
- 1. Reduce WAS. 2. Increase R.A.S.

- loading.
- 1. Microscopic exam.
- 1. Reestablish a new
- (Look for inactive protozoa)

ture.

3. Toxic shock loading. cul-

### OBSERVATION:

Fine dispersed floc extending throughout the clarifier with little islands of sludge accumulated on the surface and discharging over the weirs. (Bug bones, low F/M; they are eating each other.)

### Probable Cause:

### Check:

### Remedy:

- 1. Aeration approaching underloaded conditions.
- 1. Increase in MLVSS. 2. Increase in MCRT.
- 1. Increase WAS.
- 2. Adjust R.A.S. 11 31
- 3. Decrease in F/M.

depth.

- 4. Decrease in WAS.
- 5. Decrease in organic loading.

### OBSERVATION:

Small particles of ash-like material floating on the clarifier surface.

### Probable Cause:

deep.

stop

### Check:

### RemeqX:

- Beginning of denitrification.
- Stir sample to see if 1. Increase WAS. the f 1 oc wi 1 1 settl e out 2. Adjust R.A.S. 1'- 3'

and release bubbles.

- 2. Grease in the mixed
- 1. Perform grease
- 1. Find the source and

liquor.

analysis.

it.

### OBSERVATION:

Particles of straggler floc extending throughout the clarifier and discharging over the weirs.

### Probable Cause:

### Check:

### Remedy:

- Aeration tank underloaded. (Low MLSS).
- Decrease MLVSS.
- 2. Decrease MCRT.
- Increase F/M.
   Increase or decrease in organic loading.
- 1. Decrease WAS.
- 2. Adjust R.A.S. 11 deep.
- 3. Decrease CFM.

#### Nitrogen Removal In Activated Sludge, Domestic Wastewater Treatment Plants

#### General

Nitrogen is present in raw wastewater in several forms; ammonia, organic nitrogen, nitrite, nitrate and nitrogen gas. Each form converts to another with the help of bacteria and plant life. This conversion is referred to as the nitrogen cycle and takes place in water and soil as well as wastewater treatment plant. TKN is ammonia plus organic nitrogen and it is this form of nitrogen that is found in raw sewage. The average amount is 30 mg/l. TKN will first be converted to Nitrite and then to Nitrate. The conversion is quick so Nitrite is generally not found in high quantities. Nitrate is then converted to Nitrogen Gas. Nitrogen re-enters the cycle when it is fixed by plant life.

#### TKN Removal

TKN is toxic to aquatic life.. If you are having trouble meeting your TKN limit, the first step is to modify the way the plant is being operated. The process of converting TKN to Nitrate is referred to as Nitrification. The bacteria that complete this conversion can be found in activated sludge if the environment is right. You will need to provide them with time to grow, oxygen and a pH above 7. In some cases, the plant will not be designed to meet the limit and a permit will be necessary to modify the plant. A microscope analyses is the best way to determine if nitrifiers are present in your activated sludge.

The pH is related to the amount of total alkalinity present in the influent. As TKN is converted to Nitrate, alkalinity drops. Eventually this will cause pH to drop below 7. If the total alkalinity is over 200 ing/l, maintaining a pH above 7 will most likely not be a problem. You can use the last drinking water analyses performed on your facility to get a general idea of what your total alkalinity is.

Oxygen is related to the size of the blowers, type of diffusers, number of diffusers, and the amount of time the blowers operate. A minimum DO of 2.0 mg/l should be maintained.

Time to grow is related to the sludge age, the mean cell residency time and the mixed liquor suspended solids. Start by modifying your wasting schedule to provide a MLSS around 3,000 mg/l to provide a longer mean cell residency time.

There are several formulas which can be used to help you determine if there is enough oxygen and alkalinity. You will need to give the following information:

- 1. influent TKN (have a lab run an analyses)
- 2. influent Total Alkalinity
- 3. influent pH
- 4. horsepower of the blowers motor
- 5. total amount of time the blower runs in a 24 hour period 6. type of diffusers
- 7. depth of the aeration basin

#### Nitrate Removal

Nitrate is a common source of contamination to ground water. The limit for Nitrate in drinking water is 10 mg/l. High nitrates in drinking water is a threat for infants because it will build up in their blood stream and cause death from lack of oxygen. For adults it may be a carcinogen and that is why limits on wastewater effluent discharges are placed

If you are having troublemeeting your Nitrate limit, the first step is to modify the waythe plant is being operated. The process of converting Nitrate to Nitrogen Gas is referred to as Denitrification. The bacteria that complete this conversion can be found in activated sludge if the environment is right. You will need to provide them with time

to grow, little oxygen and a carbon source. In some cases, the plant will not be designed to meet the limit and a permit will be necessary to modify the plant. A microscope analyses is the best way to determine if denitrifiers are present in your activated sludge.

Time to grow is related to the sludge age, the mean cell residency time and the mixed liquor suspended solids.

Low oxygen content can be induced by the amount of time the blowers operate during a 24 hour period. The blowers should be operated with a timer which is controllable down to 15 minute increments or less. Individual diffusor valves could also be controlledwith a timer and solenoid valves. The dissolved oxygen should be allowed to drop below 0.5 mg/l.

A carbon source is used by the bacteria as food. The 2 main sources of carbon found naturally in activated sludge are from raw sewage and biological cellular decay. At some facilities,, carbon is added in the form of methanol. Small facilities have experimented with using dog food as a form of carbon.

Available carbon is also related to the sludge age. When the sludge is old, higher forms of bacteria can be found. These forms of bacteria which are not denitrifiers will consume the carbon source first. Your wasting and hauling rates will effect the sludge age.

#### Total Nitrogen

Total Nitrogen is essentially TKN and Nitrate added together. Total Nitrogen can cause algae blooms in surface water and that is why it is given limits in a wastewater effluent discharge. if you are having trouble meeting your Total Nitrogen limit, the first step is to modify the way the plant is being operated. When modifying the operation, you want to ensure that the entire nitrification cycle is taking place in the plant. First you must convert TKN to Nitrate as explained above. Then you must reduce the Nitrate to Nitrogen Gas also explained above. In some cases, the plant will not be designed to meet the limit and a permit will be necessary to modify the plant.

#### Processes for Removing Nitrate - General Operational Guidelines

Cyclical Nitrogen Removal - There is a very simple approach to creating the anoxic times necessary for nitrate removal - The blowers are simply cycled off in a prescribed cycle.

Generally, at least 30 minutes blower off time per cycle is needed to denitrify. The exact pattern of on and off cycles is a trial and error excercise. Specialists with computer software can identify the best beginning strategy.

Post Denitrification N-Dn-R - This is the approach most often used in package plants. It usually doesn't work because the Nitrify-denitrify-reaerate process requires a carbon supplement to the anoxic tank, which is located just behind (process wise) of the aeration tank. The package plant manufacturers usually do not supply this.

Typical carbon source supplements include a step feed from the influent, methanol, and some work has been done with glucose, dog food, and even molasses.

Pre-Denitrification - Also called the Modified Ludzack Ettinger Process, the Anoxic tank is located in front of the aeration tank. The raw influent, return sludge flow plus recirculated mixed liquor from the aeration tank is directed to the anoxic tank. The process is very stable, reliable, when operated within normal parameters. Typically these are recirculation rates of 200-400% ADF, sludge recycle rates of 100%, and normal domestic sewage loads. The process is less effective with wastes of low BOD and high TKN values.

#### EPA Rule 503, Rule 62-640: Stabilization in Aerobic Digestion and Lime Stabilization

#### Aerobic Digestion

To meet class B stabilization standards using aerobic digestion, rule 62-640 F.A.C. requires that the aerobic digester provide a minimum of 40 days solids retention time in accordance with the standards of a Process to Significantly Reduce Pathogens (PSRP), presently contained in CFR 503.

Several methods to meet CFR 503 standards for Vector Attractor Reduction (VAR), defined as 38% VSS reduction, are available. Referring to the USEPA technical manual, Sludge Treatment and Disposal, a design graph is available for predicting VSS destruction in aerobic digesters based on the multiplier of temperature times solids retention time. Generally, 38% VSS destruction is expected at a temperature of 20 degrees C when the digester solids retention time is in excess of 40 days. It is suggested that facilility operators relying on aerobic digesters to meet CFR 503 strandards for VAR, confirm 38% VSS destruction by having the digested sludge periodically given a Specific Oxygen Uptake Rate (SOUR) test. (Standards for this test are contained in CFR 503).

Lime Stabilization in Small Aerobic Digesters

To meet class B Standards for sludge stabilization using lime stabilization the pH of the sludge being treated must be raised to pH 12 for 2 hours. To meet Federal Vector Attractor Reduction standards, the sludge must then be held at pH 11.5 for an additional 22 hours. (Note: Rules can change frequently)

To accomplish this in a small aerobic digester, the following needs to occur:

- Sufficient lime must be added. For manual addition of bagged lime, the use of hydrated lime is recommended. (NOT quicklime). Safety gloves, goggles and a respiratory mask are advisable. Lime should be added when the wind is not blowing.
- The approximate dosage required is 0.3# of hydrated lime per pound of solids.

#### Example:

Size of Digester 3375 gallons Solids Concentration 1%

Solids, Pounds

=8.34\*3375\*1\*10000/1,000,000

= 281 #

Dosage Rqd

=0.3 \* 281# = 84 # hydrated lime

There is a certain variability in this: the dosage actually required could vary significantly, and experience with the individual plant sludge is needed.

- 3. The limed sludge needs to be vigorously mixed. The aeration diffusers should be open and operating during the 24 hour stabilization period.
- Written records in the plant logbook of the process should be maintained. The pH should be monitored at least every half hour during the first two hours and at least three times during the next 22 hours. To ensure adequate mixing is occurring, samples from different parts of the tank should be checked.

#### **Reuse Land Application Systems**

#### Sprayfields

Sprayfields should be mowed regularly to keep grass from getting too high and to control the intrusion of unwanted species.

Normal maintenance is weekly inspection of sprinkler heads or application system, cleaning orifices as required.

Broken pipelines or inoperative sprayheads should be repaired as soon as possible.

Care should be taken with the duration of the application cycle so as not saturate the ground.

#### Rapid Infiltration Basins

Normal maintenance consists of weekly checks to see if the berms are eroding, pipelines are clear, no erosion occuring at point of discharge, and monitoring water level.

If multiple ponds are available, ponds should be not be wetted more than 7-14 days maximum, then should be rested. Normally, water level should be maintained at least 3 feet below top of berm and 2 feet below overflow device. Under no circumstances should less than 1 foot of freeboard be maintained.

Control of berm vegetation is essential, and frequent mowing is required.

Annually, the bottoms of the basins should be disced.

Large accumulations of sludge, muck or settled duckweed however should be hauled off to an FDEP approved site. This may need to be performed annually or less frequently depending on how much solid material is in the waste stream from the plant. Sludge, while mostly water itself, consists of fine particles that when settled, tend to block the pore soils in the soil below. For this reasons, deep accumulations of sludge should not be disced into the upper soils but should be hauled away. Hauling is also recommended when the soils normally flooded, i.e., there is difficulty in loading and resting the pond to allow it to dry out.

#### Drainfields

Normal maintenance consists of ensuring solids are kept out of the drainfield. Weekly the drainfield should be walked and checked for damp or soft spots. If mounded, check for erosion or weekness in the berms.

The top should be moved frequently and root intrusive vegetation controlled.

If the drainfield has more than one application zone it should be loaded and rested as per the cycle for the rapidinfiltration system.

Periodically open cleanouts and check for signs of clogging.

# **EQUIPMENT APPENDIX**

# INSTALLATION

blowers are internally and externally treated after factory assembly to protect against normal atmospheric corrosion before installation. Maximum period of internal protection is considered to be one year under average conditions, if closing plugs or seals are not removed. Protection against chemical or salt water atmosphere is not provided. Avoid opening the blower until ready to start installation, as protection will be lost quickly by evaporation.

NOTE — If there is to be an extended period between delivery (and/or installation) and startup, the following steps should be taken to insure corrosion protection:

- 1. Coat internals of cylinder and gearbox with Nox-Rust No. VCI10 or equivalent. Repeat once a year or as conditions may require. Motorstor is oil soluble and does not have to be removed before lubricating. If desired, No. VCI10 may be removed from within the cylinder shortly before startup by spraying a fine mist of petroleum solvent through the blower while it is running at a slow speed with open inlet and discharge, or it can remain in the blower if it is not harmful to the operation of the connected system.
- Fill drive end bearing cavities with grease as specified in Lubrication section.
- Paint shaft extension, inlet and discharge flanges, and all other exposed surfaces with Nox-Rust X-110 or equivalent.
- 4. Seal inlet, discharge, and all vent openings with tape. It is not recommended that the unit be set in place, piped to the system, and allowed to remain idle for extended periods. If any part is left open to the atmosphere, the Motorstor vapor will escape and lose its effectiveness.
- Units are not to be subjected to excessive vibration during storage.
- Rotate drive shaft three or four revolutions every two weeks.
- Prior to startup, remove flange covers on both inlet and discharge and inspect internals to insure absence of rust. Check all internal clearances. Also, at this time, remove gearbox and inspect gear teeth for rust.

Because of the completely enclosed blower design, location of the installation is generally not a critical matter. A clean, dry and protected indoor location is to be preferred. However, an outdoor or wet location will normally give satisfactory service. Important requirements are that the correct grade of lubricating oil be provided for expected temperatures, and that the blower be located so that routine checking and servicing can be handled conveniently after installation. Effect of the location on driver and accessory equipment must also be considered.

Supervision of the installation by a Factory Service Engineer is not usually required for these blowers. Workmen with experience in installing light-medium weight machinery should be able to produce satisfactory results. Handling of the equipment needs to be accomplished with care, and in compliance with safe practices. Blower mounting must be solid, without strain or twist, and air piping must be clean, accurately aligned and properly connected.

A bare blower without base should be lifted by a rope sling, with one loop passing under the gearhouse and the other loop under the cylinder.

When a blower is furnished mounted on a baseplate, with or without a driver, use of lifting slings passing under the base flanges is required. Arrange these slings so that no strains are placed on the blower casing or mounting feet, or on any mounted accessory equipment.

Before starting the installation, remove plugs, covers or seals from blower inlet and discharge connections and inspect the interior completely for dirt or foreign material. If cleaning is required, finish by washing the cylinder, headplates and impeller thoroughly with a petroleum solvent such as DuPont Triclene D. After this, turn the drive shaft by hand to make sure that the impellers turn freely at all points. Anti-rust compound on the drive shaft extension may also be removed at this time with the same solvent. Then plug the inlet and discharge connections to keep out dirt until ready to connect the air piping. Washing out is not required if the interior is found to be clean. The corrosion inhibitor used will vaporize and disappear during operation.

Care, plus consideration of all possible problems, will pay dividends when arranging the blower mounting. This is especially true when the blower is a "bare" unit furnished without a baseplate. The convenient procedure may be to mount such a unit directly on a floor or small concrete pad, but this generally produces least satisfactory results. It definitely causes the most problems in leveling and alignment.

Direct use of structural framing members is also not a recommended mounting. If unavoidable, the members must be rigidly reinforced when part of a building, and spring type mountings should not be used. Noise transmission can usually be reduced by use of a cork insulating pad 1 to 2 inches (25 to 50 mm) thickness. The pad should be supported by a full steel plate attached to the structure, with a rigid concrete slab laid on top of the cork to carry the blower and driver.

For a blower without base, it is recommended that a well anchored and carefully leveled steel or cast iron mounting plate be provided at the installation point. The plate should be ¾ to 1¼ inches (19 to 32 mm) thick, with its top surface machined flat, and needs to be large enough to provide leveling areas at one side and one end after the blower is mounted. It should have properly sized studs or tapped holes located to match the blower foot drilling. As an alternative, smaller plates at each end of the blower may be used. This is more complicated, usually makes leveling more difficult, and can produce twist or strains in the blower. Use of a high quality machinist's level is important. With the mounting plate in place and leveled, set the blower on it without bolting and check for rocking. If it is not solid, determine the total thickness of shims required under one foot to stop the rocking. Place half of this under each of the two short feet, and tighten the mounting studs or screws. Rotate the drive shaft to make sure the impellers still turn freely. If the blower is to

be direct coupled to a driving motor, consider the height of the motor shaft and the necessity for it to be aligned very accurately with the blower shaft. Best arrangement is for the blower to be bolted directly to the mounting plate while the driver is on shims of at least ¼ inch (3 mm) thickness. This allows adjustment of motor position in final shaft alignment by varying the shim thickness.

Satisfactory installation can be obtained by setting the baseplate on a concrete slab that is rigid and free of vibration, and leveling the top of the base carefully in two directions so that it is free of twist. The slab must be provided with suitable anchor bolts. The use of grouting under and inside the base, after it has been carefully leveled by shimming, is recommended.

When blower and driver have been factory mounted on a common baseplate, the assembly will have been properly aligned and is to be treated as a unit for leveling purposes. It is possible for a base mounted assembly to become twisted during shipment thus disturbing the become twisted during shipment thus disturbing the original alignment. For this reason, make the following checks after the base has been leveled and bolted down. Disconnect the drive and rotate the blower shaft by hand. It should turn freely at all points. Loosen the blower foot hold-down screws and determine whether all feet are evenly in contact with the base. If not, insert shims as required and again check for free impeller rotation. Finally, if blower is direct coupled to the driver, check shaft and coupling alignment carefully and make any necessary corrections prior to grouting.

In planning the installation, and before setting the blower, consider how piping arrangements are dictated by the blower design and assembly.

When a blower is DIRECT COUPLED to its driver, the driver RPM must be selected or governed so as not to exceed the maximum speed rating of the blower. Refer to LIMITATIONS for allowable speeds for various blower sizes. A flexible type coupling should always be used to connect the driver and blower shafts.

For engine drives, couplings with proper stiffness must be selected to avoid resonant torisonal vibrations. Also, safe operating speed must be limited to avoid critical speeds.

Coupling halves must be accurately aligned, and a sufficient gap between shaft ends provided, so that side strains and end thrust on either shaft are avoided or minimized. This will require considerable care in the mounting of the driver. The two shafts must be in as near perfect alignment in all directions as possible, and the gap must be established with the motor armature on its electrical center if end play exists. Coupling halves must be fitted to the two shafts such that they can be worked into place by hand. Maximum deviation in offset alignment of the shafts should not exceed .005" (.13 mm) total indicator reading, taken on the two coupling hubs. Maximum deviation from parallel of the inside coupling faces should not exceed .001" (.03 mm) when checked at six points around the coupling.

#### CAUTION

Couplings as well as sheave bushings must have a slight slide fit with the blower shaft such that they can be installed in place by hand. Any force used to install them will change blower end clearances resulting in blower damage. If an interference fit is desired for the coupling, the coupling hub should be heated and shrunk on the shaft. For engine drives, use "Locktite" between the coupling hubs and the blower/engine shafts and on the threads of the coupling set screws.

When a blower is BELT DRIVEN, a proper selection of sheave diameters can usually be made to adapt any standard driver speed to the required blower speed. This flexibility can sometimes lead to operating temperature problems caused by blower speed being too low. Make sure the drive speed selected is within the allowable range for the specific blower size, as specified under LIMITATIONS.

Belted drive arrangements usually employ two or more V-belts running in grooved sheaves, and a variety of positions are available for the driver. Installation of the driver is less critical than for direct coupling, but its shaft must be level and parallel with the blower shaft. The driver must also be mounted on an adjustable base to permit installing, adjusting and removing the V-belts. To position the driver correctly, both sheaves need to be mounted on their shafts and the nominal shaft center distance known for the belt lengths to be used.

Install the blower sheave (usually the larger one) so that its inner hub face is not more than ¼ inch (7 mm) from the bearing end cover. The shaft fit should be such that the sheave can be worked into place by hand. A tight or driving fit can damage a bearing, and may cause internal blower damage by forcing the impeller out of its normal operating position. A loose fit or wobbly sheave will cause vibration, and may result in shaft breakage.

The driver sheave should also be mounted as close to its bearing as possible, and again should fit the shaft correctly. Position the driver on its adjustable base so that % of the total movement is available in the direction away from the blower, and mount the assembly so that the face of the sheave is accurately in line with the blower sheave. This position minimizes belt wear, and allows sufficient adjustment for both installing and tightening the belts. After belts are installed, adjust their tension in accordance with the manufacturer's instructions. However, only enough tension should be applied to prevent slippage when the blower is operating under load. Excessive tightening can lead to early bearing failures.

Failure to properly align the blower and drive sheaves will result in the impeller being forced against one of the headplates during operation causing serious damage to the blower.

In the absence of belt manufacturer's instructions for tensioning, the following procedures may be used.

- With the belts loose, pull the slack on all of them to the bottom side of the drive.
- Adjust motor position to tighten belt until they appear to be seating in the sheave grooves.
- Thump the belts with your fist. If they feel dead, tighten them more until they vibrate and feel springy when struck.
- Run-in the drive for a short period, after preparing the blower as instructed in a following paragraph. While running, adjust until only a very slight bow appears in the slack side of the belts.
- Stop the motor and compare the tensions of the individual belts by pressing down firmly with one hand on the top surface. It should be possible to deflect each

belt only to the point where its top surface is even with the bottoms of the other undeflected belts.

6. A new set of belts should be first tensioned about 1/2 greater than normal to allow for stretch and wear-in. Before putting the drive into normal operation, increase the tension as obtained above by a small amount. Recheck after each 8 hour operating period during the first 50 hours, and adjust as necessary.

Before operating the drive under power to check initial belt tension, first remove covers from the blower connections. Make sure the interior is still clean, then rotate the shaft by hand. Place a screen over the inlet connection to prevent anything being sucked into the blower while it is operating, and avoid standing in line with the discharge opening. Put oil in the gearhouse per instructions under LUBRICATION.

Before connecting piping, remove any remaining antirust compound from blower connections. Piping must be clean and should be sized so that the air velocity will not exceed 75 feet per second (23 m per second). Pipe used should be no smaller than blower connections. In addition, make sure it is free of dirt, scale, cuttings, weld beads, or foreign materials of any kind.

To further guard against damage to the blower, especially when an inlet filter is not used, install a substantial screen of 16 mesh backed with hardware cloth at or near the inlet connections. Make provisions to clean this screen of collected debris after a few hours operation. It should be removed when its usefulness has ended, as the wire will eventually deteriorate and small pieces going into the blower may cause serious damage.

Pipe threads or flanges must meet the blower connections accurately and squarely. Do not attempt to correct misalignment by springing or cramping the pipe. In most cases this will distort the blower casing and cause impeller rubbing. In severe cases it can prevent operation or result in a broken drive shaft. For similar reasons, piping should be supported near the blower to eliminate dead weight strains. Also, installation of flexible connectors or expansion joints is recommended.

Figure 4 represents in diagram form a blower installation with all accessory items that might be required under various operating conditions. Inlet piping should be completely free of valves or restrictions. When a shut-off valve (not shown) cannot be avoided, make sure a full size vacuum relief is installed near the blower inlet. This will protect against blower overload caused by accidental closing.

Need for an inlet silencer will depend on blower speed and pressure, as well as sound-level requirements in the general surroundings. An inlet filter is normally recommended, especially in dusty or sandy locations, for blower protection. A discharge silencer is also normally suggested. Specific recommendations on silencing can be obtained from the nearest Sales Office. Silencers should be mounted as close to blower as possible.

Discharge piping requires a pressure relief valve, and should include a manual unloading valve to permit starting the blower under no-load conditions. Reliable pressure/vacuum gauges and good thermometers at both inlet and discharge are recommended to allow making the important checks on blower operating conditions. If the demand is constant, but somewhat lower than the blower

output, excess may be blown off through the manual unloading valve.

In multiple blower installations when two or more units discharge into a common header, use of check valves is recommended. These should be of a direct acting or free swinging type, with one valve located in each blower

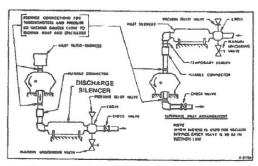


Figure 4 — Installation with Accessories

discharge line. Properly installed, they will protect against damage from reverse rotation caused by air backflow through an idle blower.

After piping is completed, and before applying power, rotate the drive shaft by hand again. If it does not move with uniform freedom, hook for uneven mounting, piping strain, excessive belt tension or coupling misalignment. Do not operate the blower more than briefly at this time because of possible inadequate oil supply in the gearhouse, Read LUBRICATION section.

# LUBRICATION

A simple but very effective lubrication system is employed on UNIVERSAL RAI® blowers. At the drive shaft end the bearings are grease lubricated using hydraulic pressure relief fittings. These relief fittings vent any excess grease, preventing pressure build-up on the seals. A restriction plug and metering orifice prevent loss of lubricant from initial surges in lubricant pressure but permit venting excess lubricant under steadily rising pressures.

The blind end bearings and timing gears are enclosed by a gearhouse located opposite the drive end of the blower. In a side outlet blower, the lower timing gear functions as an oil slinger, carrying lubricant to the upper timing gear and providing splash lubrication for the bearings. Pressure within the gearbox is vented through the breather vent plug (25).

The above description also applies in general to the top or bottom outlet style blower, the principal difference being that both gears dip into the oil sump.

Before starting blower, be sure oil has been put in gearhouse, as ALL OIL WAS DRAINED FOLLOWING SHOP TESTS. For recommended lubrication oil see Table 2. Use a good grade industrial type rust, oxidation, and foam inhibited, non-detergent oil such as Mobil DTE BB, Texaco R&O 220, Amoco 220 or equal. Also, Roots synthetic oil has proven to be an excellent lubricant.

Table 2 - Recommended Oil Grades

Ambient Temperature * F.	Viscosity Range SSU at 100° F.	ISO No		
(°C)	(38°C)			
Above 90° (32°)	1000 - 1200	320		
32° to 90° (0° to 32°)	700 - 1000	220		
0° to 32° (-18° to 0°)	500 - 700	150		
Below 0° (-18°)	300 - 500	100		

To fill the gearbox, remove the breather plug and the il overflow plug (Fig. 3). Fill the reservoir up to the verflow hole. Place the breather and the overflow plug ack into their respective holes.

Table 3 — Oil Sump Capacities

Frame	Capacity, F	Capacity, Fl. Oz. (Liters)					
Size	Vertical	Horizontal					
22	3.4 ( .1)	6.1 ( .18)					
24	8.4 ( .1)	6.1 ( .18)					
32	8.5 (.25)	16.0 ( .47)					
33	8.5 (.25)	16.0 ( .47)					
36	8.5 (.25)	16.0 ( .47)					
42	12.7 (.37)	22.8 ( .67)					
45	12.7 (.37)	22.8 ( .67)					
47	12.7 (.37)	22.8 ( .67)					
53	16.0 (.47)	27.6 ( .82)					
56	16.0 (.47)	27.6 ( .82)					
59	16.0 (.47)	27.6 ( .82)					
65	28.3 (.84)	52.1 (1.54)					
68	28.3 (.84)	52.1 (1.54)					
615	28.3 (.84)	52.1 (1.54)					
76	32.3 (.96)	59.5 (1.76)					
711	32.3 (.96)	59.5 (1.76)					
718	32.3 (.96)	59.5 (1.76)					

Proper lubrication is usually the most important single onsideration in obtaining maximum service life and the nost satisfactory operation from the unit. Unless operating onditions are quite severe, a weekly check of gearhouse il level and necessary addition of lubricant should be sufficient. However, oil should be changed after initial 100 tours of operation. Thereafter, a complete oil change normally is made after 1000 operating hours, or less, depending on the type of oil and oil operating temperature.

Shaft bearings at the drive end of the blower are grease ubricated and each bearing housing is equipped with sressure type grease fittings and pressure type relief fitings. When servicing drive end bearings, use a NLGI #2 remium grade, petroleum base grease with high emperature (300° service temperature) and moisture esistance and good mechanical stability. Using a pressure jun, force new lubricant into each drive end bearing housing until traces of clean grease comes out of the relief fitting.

After a long shutdown, it is recommended that the grease elief fittings be removed, the old grease flushed out with zerosene or \$10 lubricating oil, drained thoroughly, and searings refilled with new grease. Be sure grease relief fitings are reinstalled. Grease should be added using hand sperated grease gun to the drive end bearings at varying ime intervals depending on duty cycle and RPM. Table 4 has been prepared as a general greasing schedule guide sased on average operating conditions. More frequent inservals may be necessary depending on the grease operating emperature and under unusual circumstances.

Table 4 — Suggested Bearing Lubrication Intervals

Speed	Operating Hours Per Day						
in	8	16	24				
RPM	Greasing Intervals in Weeks						
750 - 1000	7	4	2				
1000 - 1500	5	2	1 1				
1500 - 2000	4	2	l î				
2000 - 2500	3	1	l î				
2500 - 3000	2	1	i				
3000 and up	iil	ī	1 ;				

# **OPERATION**

Before operating a blower under power for the first time, check the unit and the installation thoroughly to reduce the likelihood of avoidable troubles. Use the following procedure list as a guide, but consider any other special conditions in the installation.

- Be certain that no bolts, tools, rags or dirt have been left in the blower air chamber.
- Be certain that inlet piping is free of debris. If an out-door intake without filter is used, be sure the opening is located so it cannot pick up dirt and is protected by a strong screen or grille. Use of the temporary protective screen at the blower as described under INSTALLATION is strongly recommended.
- Recheck blower leveling, drive alignment and tightness of all mounting bolts if installation is not recent. If belt drive is used, adjust belt tension correctly.
- Turn drive shaft by hand to make sure impellers still rotate without bumping or rubbing at any point.
- Make sure oil level in blower gearbox is correct.
- Check lubrication of driver. If it is an electric motor, be sure that power is available and that electrical overload devices are installed and workable.
- Open the manual unloading valve in the discharge air line. If a valve is in the inlet piping, be sure it is open.
- Bump blower a few revolutions with driver to check that direction of rotation is correct, and that both units coast freely to a stop.

After the preceding points are cleared, blower is ready for trial operation under "no-load" conditions as set up under Item 7. The following procedure is suggested to cover this initial operating test period.

- a. Start blower, let it accelerate to full speed, then shut off. Listen for knocking sounds, both with power on and as speed slows down.
- Repeat above, but let blower run 2 or 3 minutes. Check for noises, and vibrations of 5 mils or greater.
- c. Operate blower for about 10 minutes unloaded. Check oil levels. Feel cylinder and headplate surfaces for development of spots too hot to touch, indicating impeller rubs. Be aware of any noticeable increase in vibration.

Assuming that all trials have been satisfactory, or that necessary corrections have been made, the blower should now have a final check run of at least one hour under normal operating conditions. After blower is re-

started, gradually close the discharge unloading valve to apply working pressure. At this point it is recommended that a good pressure gauge or manometer be connected into the discharge line if not already provided, and that thermometers be in both inlet and discharge lines. Readings from these instruments will show whether pressure or temperature ratings of the blower are being exceeded.

During the final run, check operating conditions frequently and observe the oil levels at reasonable intervals. If excessive noise or local heating develops, shut down immediately and determine the cause. If either pressure rise or temperature rise across the blower exceeds the limit specified in this manual shut down and investigate conditions in the piping system or in the process to which air is being supplied. Refer to the TROUBLE SHOOTING CHECKLIST for suggestions on various problems that may appear.

The blower should now be ready for continuous duty operation at full speed. During the first few days make periodic checks to determine whether all conditions remain steady, or at least acceptable. This may be particularly important if the blower is supplying air to a process system where conditions can vary. At the first opportunity, stop the blower and clean the temporary inlet protective screen. If no appreciable amount of debris has collected, the screen may be removed. See comments under INSTALLATION. At this same time, verify leveling, coupling alignment or belt tension, and mounting bolt tightness.

Should operating experience prove that blower capacity is a little too high for the actual air requirements, a small excess may be blown off continuously through the manual unloading vent valve. Never rely on the pressure relief valve as an automatic vent. Such use may cause the discharge pressure to become excessive and can also

TROUBLE	ITEM	TROUBLE SHOOTIN	GCHECKLIST
No Air Flow		POSSIBLE CAUSE	REMEDY
140 Air Piow	1 2	Speed too low Wrong rotation	Check by tachometer and compare with speed shown on Roots Order Acknowledgment.
	3	Obstruction in piping	Compare actual rotation with Figure 3.  Change driver if wrong.  Check piping, screen, valves, silencer, to assure
I am same the			an open flow path.
Low capacity	4	Speed too low	See item 1. If belt drive, check for slippage and readjust tension.
	5	Excessive pressure	Check inlet vacuum and discharge pressure, and compare these figures with specified
	6	Obstruction in piping	operating conditions on Order.
	7	Excessive slip	
			Check inside of casing for worn or eroded sur- faces causing excessive clearances.
Excessive Power	8	Speed too high	Check speed and compare with Roots Order
	9	Pressure too high	Acknowledgement. See item 5.
	10	Impellers rubbing	
			Inspect outside of cylinder and headplates for high temperatures areas, then check for im- peller contacts at these points. Correct blower
Overheating of	11	Inadequate lubrication	mounting, drive alignment.
Bearings, or Gears		madequate inorication	Restore correct oil levels in gearbox and
- 1,000 - 10	12	Excessive lubrication	lubricate. Check gear oil level. If incorrect, drain and refill
	13		with clean oil of recommended grade.
	13	Excessive pressure rise	See item 5.
	15	Coupling misalignment Excessive belt tension	Check carefully. Realign if questionable.
1	16	Speed too low	Readjust for correct tension.
		Specia 300 10W	Speeds lower than the minimum recommended will overheat the entire blower.
/ibration	17	Misalignment	See item 14.
	18	Impellers rubbing	See item 10.
	19	Worn bearings/gears	
1	20	Unbalanced or rubbing	Check gear backlash and condition of bearings. Scale or process material may build up on cas-
1		impellers	ing and impellers, or inside impellers. Remove
			Duild-up to restore original clearances and
	21	Driver or blower loose	impeller balance.
I	22	Piping resonances	Tighten mounting bolts securely.
	1		Determine whether standing wave pressure
			pulsations are present in the piping. Refer to Sales Office.

a minure of the valve itself. If blower capacity appears to be too low, refer to the TROUBLE SHOOTING CHECKLIST first. If no help is found there it may be possible to increase the blower speed. Before attempting this change, contact the nearest Distributor for recommendations. Be prepared to furnish data on actual air requirements and operating pressure/temperature conditions. VIBRATION ASSESSMENT CRITERIA

With measurements taken at the bearing locations on

the housings, an unfiltered vibration of 1.0 in/sec peak is considered an appropriate assessment guide line for rotary lobe blowers rigidly mounted on stiff foundations.

If the blower is operating above this level then the installation must be fully evaluated to determine the source or cause of the vibration. And, the cause corrected.

In general, blower vibration levels should be monitored on a regular basis and the vibration trend observed for progressive or sudden change in level. If such a change occurs, the cause should be determined through spectral analysis.

# SAFETY PRECAUTIONS

For equipment covered specifically or indirectly in this instruction book, it is important that all personnel observe safety precautions to minimize the chances of injury. Among many considerations, the following should particularly be noted:

- Blower casing and associated piping or accessories may become hot enough to cause major skin burns on contact.
- Internal and external rotating parts of the blower and driving equipment can produce serious physical injuries. Do not reach into any opening in the blower while it is operating, or while subject to accidental starting. Cover external moving parts with adequate guards.
- Disconnect power before doing any work, and avoid by-passing or rendering inoperative any safety or protective devices.
- If blower is operated with piping disconnected, place a strong coarse screen over the inlet and avoid standing in the discharge air stream.
- Stay clear of open inlet piping (suction area) of pressure blowers, and the open discharge blast from vacuum blowers.
- Stay clear of the blast from pressure relief valves and the suction area of vacuum relief valves.
- Avoid extended exposure in close proximity to machinery which exceeds safe noise levels.
- Use proper care and good procedures in handling, lifting, installing, operating and maintaining the equipment.
- Casing pressure must not exceed 25 PSI (172 kPa) gauge. Do not pressurize vented cavitles from an external source, nor restrict the vents.
- Do not use air blowers on explosive or hazard-
- Other putential hazards to safety may also be associated with operation of this equipment. All personnel working in or passing through the area should be warned by signs and trained to exercise adequate general safety precautions.

# **MAINTENANCE & REPLACEMENTS**

A good program of inspection and maintenance servicing, followed consistently, is the most reliable method of minimizing repairs to a blower. A simple record of services and dates will help keep this work on a regular schedule. Basic service needs are lubrication, checking for hot spots or increase in vibration and noise and the recording of operating pressures and temperatures. Above all, a blower must be operated within its specified rating limits, to obtain satisfactory service life.

A newly installed blower should be checked frequently during the first month of full-time operation. Attention thereafter may be less frequent, depending on what the early checks have shown. Lubrication is normally the most important consideration. Unless operating conditions are unusually severe, a weekly check of oil levels in the gearbox, with addition of oil as required, should be sufficient. Complete oil changes should be made at intervals of 1000 operating hours, or more frequently if oil condition becomes poor.

Driver lubrication practices should be in accordance with the manufacturer's instructions. If direct connected to the blower through a lubricated type coupling, the coupling should be checked and greased each time blower oil is changed. This will help reduce wear and prevent it from causing vibration. In a belted drive system, check belt tension periodically and inspect for frayed or cracked belts. Refer to tensioning instructions under INSTALLA-

In a new and properly installed blower there are no moving contacts between the two impellers, or between the impeller and cylinder or headplates. Wear is then confined to the bearing which support and locate the shafts, the shaft seals, and the timing gears. All are lubricated, and wear should be nominal if clean oil of the correct grade is always supplied. Seals are subject to deterioration as well as wear, and may require replacement at varying periods.

Shaft bearings have been selected to have optimum life under average conditions with proper lubrication. They are critical in the service life of the blower. Gradual bearing wear may allow a shaft position to change slightly, until rubbing develops between impeller and cylinder headplate. This will cause spot heating, which can be detected by feeling these surfaces. Sudden bearing failure is usually more serious. Since the shaft and impeller are no longer supported and properly located, extensive general damage to the blower casing and gears is likely to occur.

Shaft seals should be considered expendible items, to be replaced whenever drainage from the headplate vent cavity becomes excessive or when the blower is disassembled for any reason. Sealing effectiveness can vary considerably from seal to seal and is also affected by shaft smoothness under the seal lip. Because of these normal variables, minor seal leakage should not be considered an indicator for seal replacement.

Timing gear wear, when correct lubrication is maintained should be negligible over a period of years. Gear teeth are cut to provide the correct amount of backlash. and gears correctly mounted on the shafts will accom-

modate a normal amount of tooth wear without permitting contact between lobes of the two impellers.

However, a high oil level will cause churning and excessive heating, indicated by an unusually high temperature at the bottom of the gear housing. Consequent heating of the gears will result in loss of tooth-clearance or backlash, and rapid wear of the gear teeth usually will develop. Continuation of this tooth wear will eventually produce impeller contacts (knocking), and from this point serious damage will be unavoidable if blower operation is continued. A similar situation can be produced suddenly by gear tooth fracture, which is usually brought on by sustained overloading or momentary shock loads.

Operating problems may also develop from causes other than internal parts failure. Operating clearances within a blower are only a few thousandths of an inch (hundredths of a mm). This makes it possible for impeller interferences or casing rubs to result from shifts in the blower mounting or from changes in piping support. Foreign materials sucked into the blower will also cause trouble, which can only be cured by disconnecting the piping and thoroughly cleaning the blower interior.

If this type of trouble is experienced, and the blower is found to be clean, try removing mounting strains. Loosen blower mounting bolts and reset the leveling and drive alignment. Then tighten mounting again, and make sure that all piping meets blower connections accurately and squarely before reconnecting it.

A wide range of causes for operating troubles are covered in the **TROUBLE SHOOTING CHECKLIST**. The remedies suggested threr in some cases need to be performed by qualified mechanics with a good background of general experience, using procedures detailed in this manual. Major repairs generally are to be considered beyond the scope of maintenance, and should be referred to the nearest Sales Office listed on the last page.

Warranty failures should not be repaired at all, unless specific approval has been ovtained through a Sales Office or the factory before starting work. Unauthorized disassembly within the warranty period may void the warranty.

When a blower is taken out of service it may require internal protection against rusting or corrosion. The need for such protection must be a matter of judgment based on existing conditions as well as length of downtime. Under favorable conditions, protection will probably not be needed if shut-down is not longer than a month. Under atmospheric conditions producing rapid corrosion, the blower should be protected immediately. If blower is to be shut down for an extended period of time, see suggestions for corrosion protection under installation.

It is recommended that major repairs, if needed, be performed at a Dresser authorized service facility. However, it is recognized that this may not always be practical, especially when a spare blower is not available. If a blower is out of the warranty period, mechanical adjustments and parts replacement may be undertaken locally at the owner's option and risk. It is recommended that Factory Parts be used to insure fit and suitability. The maintenance of a small stock of on-hand spare parts can eliminate possible delays. When ordering parts give

Item Numbers and their word descriptions from Figures 5 & 6. Also specify quantities wanted and the blower size and serial number from the nameplate.

Repairs or adjustments are best performed by personnel with good mechanical experience and the ability to follow the instructions in this manual. Some operations involve extra care and patience, and a degree of precision work. This is especially true in timing impellers and in handling bearings. Experience indicates that a high percentage of bearing failure is caused by dirt contamination before or during assembly. Therefore, the work area should be cleaned before starting disassembly, and new or re-usable parts protected during progress of the work.

In the following outlines of repair procedures, numbers shown in brackets () correspond to the Item Numbers used in assembly drawing. Figures 11 & 13. It is recommended that the procedure be studied carefully and completely, with frequent reference to the drawings, before starting work. This will produce better efficiency through an understanding of what work is to be done, and the order of doing it. Before disassembly, mark all parts so that they may be returned to original locations or relative positions.

# A - Replacing Timing Gears

- Drain all oil from the gearhouse by removing drain plug (21) in the bottom. Remove gearhouse by taking out all cap screws (23) in its flange. It may be necessary to bump the sides with a wood block or mallet to break the flange joint.
- Reach through one of the blower pipe connections and place a chalk mark on the strip of one impeller and the mating waist of the other, so that they may easily be returned to their original relative positions.

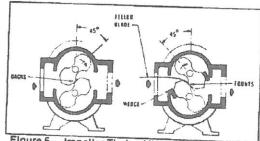


Figure 5 — Impeller Timing Viewed From Gear End

3. GEAR REMOVAL: For this operation, the impellers should be wedged as shown in Figure 5. Back off gear clamping nuts (17) about 14". Use a puller of the type shown in Figure 10. Position it around the gear per Figure 9. As the puller set screw is torqued, the puller will have a tendency to turn and contact teeth of the other gear. To prevent this contact, hold the puller corner nut with a wrench while torquing the set screw. Once the gear is unseated, remove the puller. Remove gear nuts (17) and the gear. Repeat same procedure for the other gear. NOTE: Do not remove gear nuts (17) completely before the gears are unseated from the taper fits or damage/injury may result.

rect position as previously marked. Be sure shafts and gear bores are clean and free of scratches. Clean the shaft tapered fits. Place hardwood wedges as shown in Figure 5. Install drive gear (4) and gear nut (17) so match mark at tooth is at the line of engagement. Tighten the drive gear nut to the torque given in Table 5. Blower assembly must be fastened down for torquing operation.

TABLE 5 - GEAR NUT TORQUE

Gear Size	То	rque
(in.)	lbft.	(kg-m)
2.5	60	
3.5	110	( 8.3)
4.0	190	(15.2)
5.0	N 1755 777 75	(26.3)
6.0	250	(34.6)
7.0	400	(55.3)
7.0	550	(76.1)

- 5. Installing driven gear (4) Insert a long, metal feeler gauge between the impellers' lobes at the fronts or backs as shown in Figure 5. Feeler gauge thickness to be a middle value from Table 6 for fronts and backs. Align the gear so the tooth match marks agree with the drive gear, then install nut (17). Tighten lightly with a small wrench, then check front and back clearances against Table 6 for each 45° position. Both fronts and backs should be about the same and within the specified range in Table 6. Adjust gear position, if necessary, then insert the corrected feeler gauge and wedges and use a torque wrench to tighten the gear nut to the torque specified in Table 5. Remove wedges and rotate the drive shaft by hand to make sure there are no gear tight spots or impeller contacts.
- Caution! Keep fingers away from impellers and gears.
- Check the end clearances between impellers and headplates. Adjust clearances per B-15 below.
- 7. When clearances are correct, clean and re-install the gearhouse. Check condition of flange gasket (7) and replace if questionable. Fill gearhouse to correct level with proper grade of oil.

# B — Replacing Shaft Bearings, and Impellers

Remove coupling or sheave from the drive shaft. Drain and remove gearhouse, and pull the timing gears. If gears are to be re-used, mark them so they may be returned to the same shafts.

 Break corners and deburr the keyway. Remove bearing end cover at the drive end. Remove bearing clamp plates (34).

- Make single and double identifying punch marks on the mating edges of headplate and cylinder flanges at the two ends of the blower.
- 3. At the drive end, drive out the two dowel pins and remove all capscrews holding headplate to cylinder. By inserting jacking screws into the two threaded flange holes, and turning them in evenly, the headplate will be separated from the cylinder. As the headplate comes off the shafts it will bring bearings with it. 2½" and 3½" gear diameter units do not have tapped holes for jack screws in the drive end headplates. Remove dowel pins and all capscrews holding headplate to cylinder and foot on the drive end. Support unit under gear end cylinder flange with the shafts vertical. Using soft metal block against gear end shafts, push them out of gear end headplate.
- For 2½" and 3½" gear diameter units, support the drive end headplate on the underside, and using soft metal block against drive end, shafts, push them out of drive end headplate.
  - For 4", 6" & 7" gear diameter units, from the gear end, using a wood or soft metal block against the ends of the shafts, drive them out of the headplate. If they are to be reused, protect them from damage in this operation.
- If blower interior surfaces need cleaning, it may be advisable to separate the gear end headplate from the cylinder. Use the same general procedure as employed at the drive end.
- 6. Working from the back (flat) face of each headplate, push or tap out the bearings and seals. Use a round har or tube that will pass through the shaft clearance holes in the headplates. All lip seals will be damaged during removal and must be replaced.
- 7. Clean bearing and seal pockets in headplates and remove burrs or rough edges. (Apply a thin coating of sealant on seal O.D.) Press new seals (27) into gear end headplate using a round tube or bar with recessed end that will bear on the outer metal edge of seal enclosure. Seal lip should point toward the driving tool. Seals to be flush with outboard bore face. Apply a light coat of oil or grease to the seal lips. In a similar fashion, install lip seals into the drive end headplate.
- 8. Place cylinder on a flat surface. Assemble gear end headplate to cylinder after checking flange punch marks. Drive in the two locating dowel pins before tightening flange screws. Also install gear end faot using the same longer cap screws (32) and washers (41). (on 6" & 7" UNIVERSAL RAI® install both gear and feet.)
- 9. Piace the assembly horizontally on steel blocks with gear end headplate on bottom. The height of the blocks should be sufficient to clear gear end shaft extensions. Assemble impellers into the cylinder with the drive shaft (longer shaft) in same

location as in original assembly. Before starting the shafts through the headplate holes, make sure shaft ends have no sharp or rough edges to damage seal lips. Position impellers at 90° to each other in the cylinder, using lobe-and-waist match marks if original impellers are being re-installed. Install drive end headplate and feet in same manner as gear end.

- 10. It is recommended that new bearings be used for rebuild. Apply thin film of machine oil on the shaft bearing fit, bearing I.D., and headplate bearing bore. Install drive end bearings into headplate. Use a tube with flanged end that will contact both bearing faces simultaneously. Refer to Fig. 11 for proper bearing depths.
  - NOTE: Cylindrical drive bearing should be installed with inner race large shoulder facing outboard.
- Place blower on its feet on a flat surface. Loosen feet capscrews (32) and square up unit. Re-tighten capscrews (32). Clamp unit down to a solid base for further assembly
- 12. Oil the gear end bearing fits as described previously. Install 2½-5" UNIVERSAL RAI® gear end bearings flush with the headplate bearing shoulders using proper drivers. On 6" & 7" UNIVERSAL RAI®, install thrust washer (29) in bearing bores then install gear end bearings so that they protrude ½" (1.6mm) above headplate surface.
- 13. Install bearing clamp plates (34). On 6" & 7" UNIVERSAL RAI®, impeller end clearances are also to be set during this step. Install clamp plates (34) with capscrews (31) making sure that the gap between the clamp plates and the headplate is even all around, at the same time, set end clearances per Table 5.
- Install gears and time impellers as in (A).
- 15. For setting end clearances on 2½-5" gear diameter units, special tools, thrust adjuster fork Fig. 7 and thrust adjuster saddle Figure 8 are required. Refer to Fig. 6 for installation of tools. The flat side of the saddle rests against the bearing inner race and the flat side of the fork rests against the back side of the gear. Install a shim, with thickness equal to gear end clearance (Table 6), between the impeller and the gear end headplates. Tap on top of the fork until the shim becomes snug. Remove the shim and check end clearances. To increase gear end clearance, tap on the end of the gear end shaft with

- a soft metal mallst. On units, UNIVERSAL RAI\*, set end clearances for 6" & 7" by turning capscrews (31) evenly in or out.
- 16. Install drive end cover (5) after packing bearing cavities with suitable grease. Replace drive shaft seal. Lip must point toward (33) the bearing. Exercise care not to damage the lip as it passes over shaft keyway.
- 17. Install gasket item (7). Install the gear house after cleaning out the inside. Tighten gear box cap screws (23) evenly. Fill with correct grade of oil until oil flows out through oil level hole. Grease drive and bearings. (See Lubrication.)
- Reinstall coupling or belt sheave making sure that they have a slight slide fit with the shaft and could be installed by hand.

Where repairs involve parts replacement, it is recommended that Factory Parts be used to insure fit and suitability. Delay in making such repairs can be reduced by having spare parts on hand.

When ordering parts, please furnish all information from the blower nameolate.

Repairs or adjustments to blowers should be performed by personnel with a good back ground of general mechanical experience and the ability to follow the detailed instructions in this manual. No special tools are required. Some operations involve extra care and a degree of precision work. This is especially true in timing impellers, and in handling bearings. Experience indicates that a high percentage of bearing failures is caused by dirt contamination before or during assembly. Therefore, clean the work area before starting disassembly, and protect new or reuseable parts during progress of the work. (See page 23 for Repair Kit Information.)

#### INTERNAL CLEARANCES

References to operating clearances in this manual include only one mention of the specific amount of clearance to be used or expected. For units in good condition this information is not essential in field service work. Situations may arise, however, when it is desirable to compare existing clearances with the correct Engineering values or to reestablish clearances.

Listed in Table 6 are the ranges of impeller clearances used in factory assembly of normal UNIVERSAL RAI\* blowers. It should be kept in mind that clearances may change slightly in service, but should never be less than the minimum values listed. Only well qualified personnel should attempt to measure clearances for direct comparison with this data.

#### Air Intake Filter and Filter Silencer

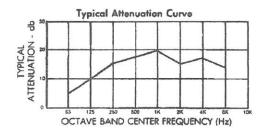
The Series F64 Air Intake Filter and Filter Silencer is designed to mount directly on the inlet of an engine, blower or compressor, It will provide 16dB to 20dB noise reduction and the paper filter media has an efficiency of 99% on 1 micron particles.

SERVICE LIFE & CLEANING: The service life of the element is dependent upon the surrounding environment and cannot be predicted.

To prevent COLLAPSING of the fifter element, STOD-DARD SILENCERS recommends the differential pressure

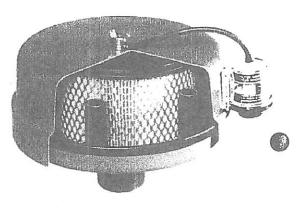
#### ALTERNATE FILTRATION MEDIA AVAILABLE FOR F64

Cleanable Polyester Felt - 99% on 3 micron particles Galvanized Wire Mesh - 90% on 10 micron particles (when oil wetted)

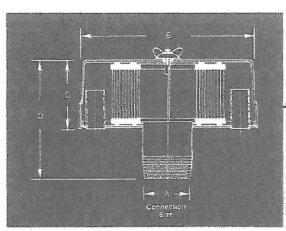


across the filter element NOT exceed 15 inches of water column. Positive indication that the element requires cleaning or replacement can be provided with STODDARD SILENCERS model A40-108 Pressure Drop Indicator, at an extra charge.

To extend service life, rap element gently to dislodge accumulated dirt. An alternate method is to direct compressed air (75 PSIG max) through the element opposite to the direction of air flow. THE FILTER ELEMENT MUST EVENTUALLY BE REPLACED.



F64 shown with optional A40-108 Pressure Drop Indicator.



Model	A Connection Size	ģ	С	D	Rated CFIS	WL.	Replacement Element Number
F64-1	1" NPT	10	4	7	35	9	F8-108
F84-11/2	1%" NPT	10	4	7	80	9	F8-108
F64-2	2" NPT	10	4	7	135	10	F8-108
F64-21/2	21/2" NPT	10	4	7	180	10	F8-108
F64-3	3" NPT	16	5	8	285	20	F8-109
F64-4	4" NPT	16	5	8	520	20	F8-109
F64-5	5" NPT/FLG	16	5	8	750	23	F8-109
F64-6	6" Flange	20	5	8	1075	40	F8-110
F64-8	8" Flange	20	10	13	1800	50	F8-111
F64-10	10" Flange	26	151/2	20	3335	95	F8-137
F64-12	12" Flange	26	151/2	20	4675	100	F8-137
F64-14	14" Flange	26	151/2	20	5655	115	F8-137

Sizes 10", 12" and 14" are FILTERS only

# **Submersible Pump Troubleshooting**

# CHECK LIST IF PUMP DOES NOT OPERATE PROPERLY

#### **CHECKING FOR MOISTURE IN MOTOR**

Use ohmmeter and set on highest scale. Readings on the large power cord between any of the conductors red, black, white to green conductor or motor housing should be more than 500,000 ohms. Motor probably will run with a lower reading, but if pump is out of service and reading is below 500,000 ohms the motor housing and stator should be removed and baked in a drying oven at 220°F. To be serviced only at authorized service station.

Readings should be taken with line leads disconnected from terminal strip.

#### **RESISTANCE OF WINDINGS**

Every motor winding has a fixed resistance. Winding must check close to the values given in tables to operate properly. This winding resistance also shows if motor is connected for voltage being used.

Use ohmmeter for this test and set on scale to read directly in ohms.

#### TROUBLE CHECK LIST

Troubles listed are generally caused by the pump. Other trouble can occur from faulty control box operation.

#### CONDITION

Pump runs but does not pump liquid from basin.

These will be listed with the control box instructions.

#### PROBABLE CAUSE

- Pump impeller may be air locked, this occasionally occurs on a new installation, see page 3. Start and stop pump several times to purge air. Be sure air vent hole in volute case is clean. See dwg. fig. 5.
- Run additional water into basin so that pump will be submerged deeper to clear air.
- If pump is three phase, rotation may be wrong. See instructions for checking proper rotation. See page 7.
- If pump has been installed for some time and does not pump, it may be clogged at inlet.
- 5. Discharge gate valve may be closed.
- Discharge check valve may be clogged or have a broken clapper or spring.
- Discharge head may be too high. Check elevation. Maximum pump head at zero flow is shown on pump curve sheet.
- If above checks do not locate trouble, motor rotor may be loose on shaft which allows motor to run but will not turn impeller or only at low RPM.

#### CONDITION

Pump is noisy and pump rate is low.

#### PROBABLE CAUSE

- Impeller may be partially clogged with some foreign objects causing noise and overload on the motor.
- Impeller may be rubbing on wear ring due to bent shaft or misalignment.
- Pump may be operating too close to shutoff. Check head.

Grease and solids have accumulated around pump and will not pump out of basin.

- 1. Lower control switch may be set too high.
- Run pump on hand operation for several minutes with small amount of water running into basin to clean out solids and grease. This allows pump to break suction and surge which will break up the solids. If level switch is set properly this condition generally will not occur.
- Trash and grease may have accumulated around floats causing pump to operate erratically.

# SYSTEM NAME The Harbor Waterfront Resort

## GENERAL WASTEWATER SYSTEM INFORMATION

	Furnish information below for each system. A separate page should be supplied where necessary.
	Present number of ERCs* now being served Aprox 116 residents served
	2. Maximum number of ERCs* which can be servedunknown
	Present system connection capacity (in ERCs*) using existing lines unknown
	4. Future connection capacity (in ERCs*) upon service area buildout. unknown
	5. Estimated annual increase in ERCs* unknown
6	5. Describe any plans and estimated completion dates for any enlargements or improvements of this system not applicable
	7. If the utility uses reuse as a means of effluent disposal, provide a list of the reuse end users and the amount of reuse provided to each, if known.
	8. If the utility does not engage in reuse, has a reuse feasibility study been completed? unknown
	If so, when?
	9. Has the utility been required by the DEP or water management district to implement reuse? unknown
	If so, what are the utility's plans to comply with this requirement?
	10. When did the company last file a capacity analysis report with the DEP? February 3, 2005 (already provi
	11. If the present system does not meet the requirements of DEP rules, submit the following:
	a. Attach a description of the plant upgrade necessary to meet the DEP rules. b. Have these plans been approved by DEP?
	c. When will construction begin?
	d. Attach plans for funding the required upgrading. e. Is this system under any Consent Order with DEP?
	12. Department of Environmental Protection ID# FLA0011041-009-DWF/MT
	<ul> <li>An ERC is determined based on one of the following methods:         <ul> <li>(a) If actual flow data are available from the proceding 12 months:</li> <li>Divide the total annual single family residence (SFR) gallons sold by the average number of single family residents (SFR) gallons sold by the average number of single family residence customers for the same period and divide the result by 365 days.</li> </ul> </li> </ul>
	<ul><li>(b) If no historical flow data are available use:</li><li>ERC = (Total SFR gallons sold (omit 000/365 days/280 gallons per day).</li></ul>

Jan Fres

# UPDATED CAPACITY ANALYSIS REPORT

FOR

HARBOR RV RESORT & MARINA

WASTEWATER TREATMENT PLANT

POLK COUNTY, FLORIDA

Facility ID: FLA011041 Permit No.: FLA011041 Expires: 11/28/2005

Prepared For:

THE HARBOR RV RESORT & MARINA 10511 MONROE CT LAKE WALES, FLORIDA, 33898-6914

FEBRUARY 3, 2005

Prepared By:
McDonald Group International, Inc.

9030 S. BRITTANY PATH INVERNESS, FLORIDA 34452 0.A.-7580



#### **UPDATED CAPACITY ANALYSIS**

#### REPORT

#### FOR

#### HARBOR RV RESORT & MARINA

#### WASTEWATER TREATMENT PLANT

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## **CAPACITY ANALYSIS**

# REPORT

FOR

Harbor RV Resort & Marina

Wastewater Treatment Plant

Polk County, Florida

The information contained in this report was prepared in accordance with sound engineering principals, and the recommendations contained within have been discussed with the permittee

Date:

George J. McDonald, P.E., FL PROFESSIONAL ENGINEER NO. 44740 McDonald Group International, Inc. CA-0007580 9030 S. Brittany Path, Inverness, Florida 34452 (352)-637-1652

I am fully aware and intend to comply with the recommendations and schedules included in this report

Date:

Robert Smith The Harbor RV Resort & Marina 10511 Monroe Ct Lake Wales, Florida,33898-6914 863-696-1194

# CAPACITY ANALYSIS REPORT FOR Harbor RV Resort & Marina WASTEWATER TREATMENT PLANT

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#### **CAPACITY ANALYSIS REPORT**

#### 1.0. General

Florida Department of Environmental Protection (FDEP) Rule 62-600.405(4) F.A.C. requires that a capacity analysis report be submitted to the Department with a permit application to renew a Wastewater facility permit.

This capacity analysis is submitted to the FDEP by McDonald Group International, George J. McDonald, P.E., consultant engineer for The Harbor RV Resort & Marina, the owner and operator of the Harbor RV Resort & Marina Wastewater Treatment Plant located in Polk County, Florida in order to comply with Rule 62-600.405, F.A.C. The last capacity analysis report is believed to have been performed during the last permit renewal.

The facility is located at 10511 Monroe Ct, Lake Wales, Florida. A location map and USGS quad map are provided in Figures 1.1 and 1.2, respectively.

#### 1.1 Authorization and Purpose

The Harbor RV Resort & Marina has retained George J. McDonald, P.E. to study their plant's historical flows, service area characteristics, and issues which effect changes in future capacity requrements of their wastewater treatment plant in order to provide a capacity analysis report (CAR) in support of the wastewater plant permit application.

#### 1.2 Related Reports and Documents

Accompanying this report is an Operations and Maintenance Performance Report, as well as FDEP Forms 1 and 2A for a domestic wastewater treatment plant. Additional information is contained in the accompanying reports and documents.

#### 1.3 General Service Area Description

The treatment facility serves The Harbor RV Resort. This area consists of approximately 137 RV spaces and mobile homes at present.

#### 1.4 Facility Information

This Wastewater Treatment Plant is presently permitted for the flow capacity and discharge limitation standards in the following table:

### Table 1.4 WWTF Effluent Limitation Standards Harbor RV Resort & Marina

- 1. Maximum flow capacity 0.020 MGD
- 2. BOD and TSS maximum concentrations -

20 mg/L annual average

30 mg/L monthly average

45 mg/L weekly average

60 mg/L any one sample

- 3. pH range 6.00 to 8.50
- Fecal Coliform -

200 #/100 annual average 800 #/100 maximum

- 5. Minimum Cl<sub>2</sub> conc. 0.5 mg/L
- 6. Nitrate

12 mg/L max

The Harbor RV Resort & Marina Wastewater Treatment Plant has been active since 1972.

#### Process

It is an activated sludge waste treatment facility operating in the extended aeration mode. The treatment process comprises the following: aeration, final settling; sludge digestion, disinfection.

A process plan follows the USGS map in the following pages as figure 1.3.

#### Modifications

The facility hast been reported to have been modified in the last 5 years. A new sludge digester and chlorine contact tank were added to the plant.

#### Notices of violation

According to the Owner and the operator, no recent notices of violation were recieved nor consent orders have been entered into.

#### 1.5 Scope of Report

Although containing many elements of a regular capacity analysis report, the depth and scope of this report is meant to equal or exceed the requirements for an "abbreviated" capacity analysis report.

#### 1.6 Information Sources

This report is prepared based on information supplied by the permittee, information that may be found in FDEP public databases, the current permit, and information supplied by the operator. The report relies on the accuracy of this information for all analysis and opinions.

Figure 1.1 Street Location Map

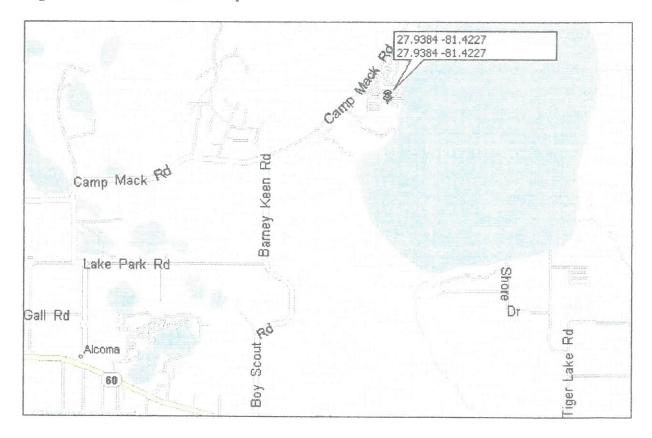


Figure 1.2 USGS Map

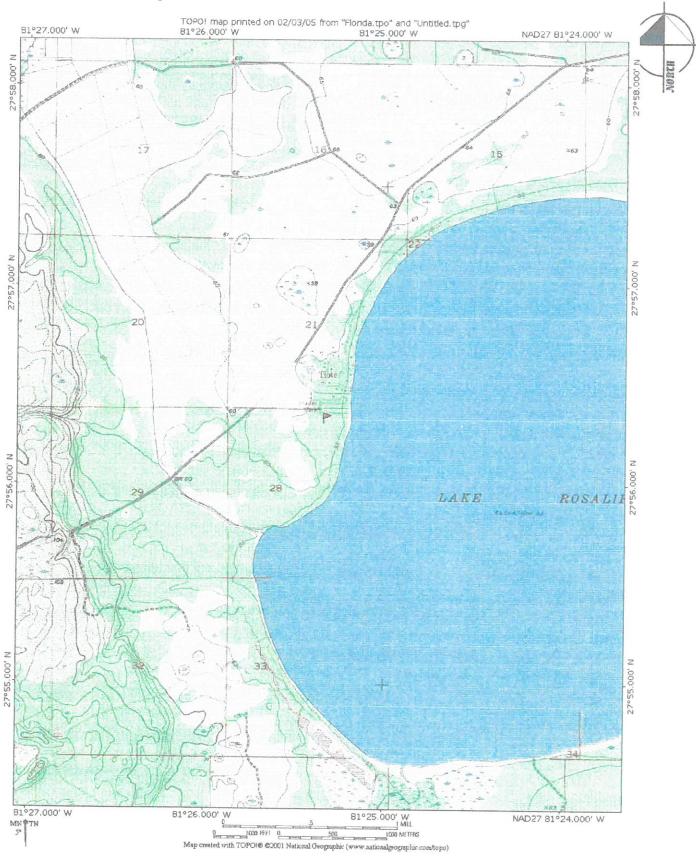
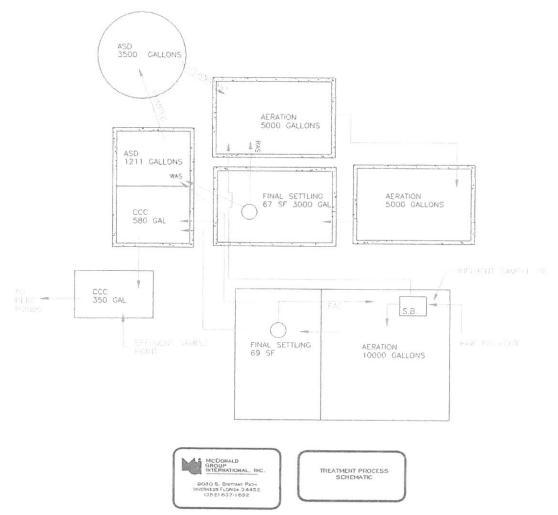
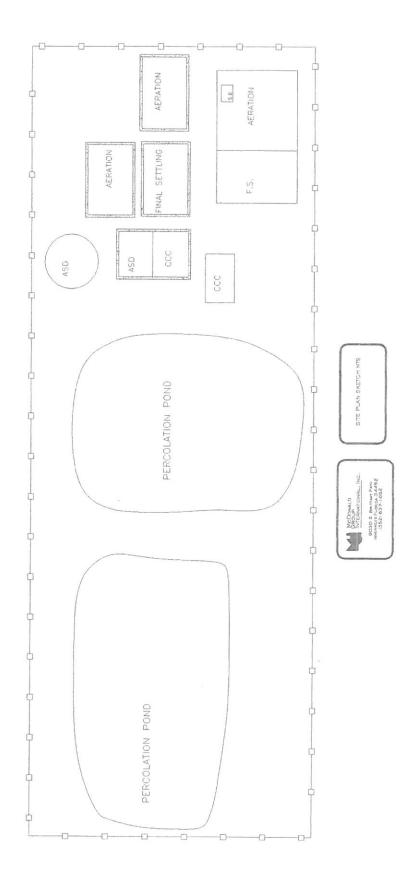


Figure 1.3 Process Plan



NOTES. PROCESS VOLUMES/AREAS SHOWN BASED ON INFORMATION IN CURRENT PERMIT. ASD AND SECOND CCC VOLUME CALCULATED FROM INFORMATION IN PERMIT.

Figure 1.4 Site Plan



## 2.0 Existing Conditions and Permitted Capacities

The Harbor RV Resort & Marina Wastewater Treatment Plant has been active since 1972. It is an activated sludge waste treatment facility operating in the extended aeration mode. The current operating permit, FLA011041 is due to expire 11/28/2005.

The Wastewater Treatment Plant is presently permitted to discharge effluent meeting the Secondary Treatment Technology Based Effluent Standards listed in the table in section 1.4.

#### 2.1 Influent Strength

The major parameters used to evaluate influent strength are influent BOD, TSS, TKN. Of these only BOD and TSS are often required to be tested by permit.

Based on available test data, the influent strength is estimated to be as follows:

Table 2.1 Influent Strength

Parameter	Characterization				
CBOD <sub>5</sub>	212 mg/L				
TSS	108 mg/L				

This is considered to be a normal strength wastewater

#### 2.2 Updated Flow Information

In this section, data and analysis is presented regarded current plant flows

#### 2.2.1 Flow Calibration

Flows to this wastewater plant are determined by elapsed time meters on the influent lift station.

The accuracy of this method appear to have been last checked by the Florida Rural Water Association on 6/16/2003.

#### 2.2.2 Plant Flow Characteristics

Data from Discharge Monitoring Reports (DMRs) were studied to determine the present plant flow characteristics. Table 2.2 summarizes the data taken from the DMRs for the period reviewed.

Figure 2.2 graphically illustrates the month average and rolling three month average flow for the period reviewed:

Figure 2.2 Flow Chart

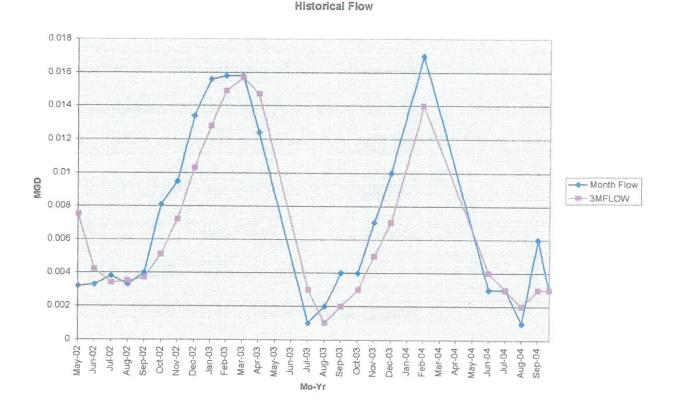


Table 2.2 Flow and Performance History

	TSS In																			108					
	BOD In																			212					
Flow	Month	0.0032	0.0033	0.0038	0.0033	0.004	0.0081	0.0095	0.0134	0.0156	0.0158	0.0158	0.0124	0.001	0.002	0.004	0.004	0.007	0.01	0.017	0.003	0.003	0.001	900.0	0.003
Flow 3	Mos Avg	0.0075	0.0042	0.0034	0.0035	0.0037	0.0051	0.0072	0.0103	0.0128	0.0149	0.0157	0.0147	0.003	0.001	0.002	0.003	0.005	0.007	0.014	0.004	0.003	0.002	0.003	0.003
Flow An	Avg													0.009	600.0	600.0	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008
	Nitrate	6.4	9.6	8.7	7.1	9.1	8.6	5.9	~	7.2	9.4	8.8	11.78	7.27	2.67	0.3	0.11	<u></u>	5.47	3.14	5.2	17.9	4.89	1.33	0.56
	TRC	2	1.4	9.0	-	0.5	0.5	9.0	_	90.0	<b>—</b>	_	-	-	0.8	0.2	9.0	1.5	9.0	9.0	0.4	4.0	4.0	0.4	0.5
	pH Max	Ø	Ø	7.6	7.8	7.8	7.6	7.8	7.4	7.8	7.2	7.8	7.8	7.6	7.6	7.8	7.8	7.6	7.3	7.1	7.8	7.4	7.7	7.6	7.4
	pH Min	7.8	7.6	7.4	7.1	7.2	7.4	7.1	6.9	6.5	6.9	8.9	6.9	7.2	6.9	7.3	7.1	7	7	8.9	8.9	6.8	7.2	7.1	7
FC Mo	Avg	4	Ψ-	2	S	e	4	~	~	~	က	4	-	~	<del></del>	τ-	<del>-</del>	~	_	28.3	<del></del>	<u>~</u>	<u>_</u>	<b>—</b>	-
Fecal An	Avg	4.33	4.12	3.92	4.08	3.83	3.83	3.83	3.42	3.33	3.17	2.92	2.58	6.0	1.4	~	<del>-</del>	Υ	<del></del>	2.7	7	2	7	2	2.3
	TSS Mo Avg	12.6	8.8	6.8	7.2	60	4.4	2.6	3.2	3.6	60.	3.8	3.6	60	8,5	2.5	6.5	7	0	2.5	0	4.5	60	1,5	7
TSS An	Avg	6.28	6.42	6.52	9.9	9.9	6.53	6.62	9.9	6.38	5.95	5.92	5.17	4.3	4.4	4.4	4.6	2.5	4.7	വ	8.	4.2	3.7	3.6	3.7
BOD MO	Avg	80	6.2	8.4	9.6	4	5.8	2.9	1.2	0.4	2.9	3.3	4.27	0	Ŋ	0	0	2.6	0	5.1	2.5	0	2.6		4.7
BOD An	Avg	5.06	5.16	5.24	5.69	5.8	5.97	6.13	5.94	5.81	5.37	5.43	5.12	3.7	3.3	2.9	2.5	2.5	2.4	2.1	0.	1.9	1.7	1.6	2.2
		5/31/2002	6/30/2002	7/31/2002	8/30/2002	9/30/2002	10/30/2002	11/30/2002	12/31/2002	1/31/2003	2/28/2003	3/31/2003	4/30/2003	7/31/2003	8/31/2003	9/30/2003	10/31/2003	11/30/2003	12/31/2003	2/29/2004	6/30/2004	7/31/2004	8/31/2004	9/30/2004	10/21/2004

#### 2.2.3 Peak Hour Flows

Peak hour flows were determined consideration of the characteristics fo the service area and plant performance.

Based on this, the peak hour factor is estimated to be 3.5 times the average daily flow.

## 2.3 Effluent Quality

The treated wastewater leaving the plant must meet specific limitations established by the FDEP in the current permit. Table 2.3 shows the current plant performance for the period studied versus the permitted requirements for effluent quality.

Table 2.3 Effluent Quality Analysis Harbor RV Resort & Marina

			Permit
Parameter	Statistic	Performance	Limit
BOD	Annual Avg	6.13	20
BOD	Max	9.6	60
TSS	Annual Avg	6.62	20
TSS	Max	12.6	60
Fecal	Max	28.3	800
рН	Min .	6.5	6
рН	Max	8	8.5
TRC	Min	0.06	0.5
Nitrate	Max	17.9	12
Flow	M3MADF	0.0157	0.02
Flow	Max Mo	0.017	0.750700=0

## 2.4 Design and Current Loadings

The Harbor RV Resort & Marina Wastewater Treatment Plant is an activated sludge wastewater treatment plant operating in the extended aeration mode.

Figure 1.3 at the beginning of this report provides a graphical illustration of the unit process flow scheme.

Table 2.4 lists each unit process along with the associated loading rate with pertinent dimensional or volumetric data. (Volumetric, areas and dimensional data is estimated from information in the previous permit).

Process design data is also incorporated into table 2.4.

Trall-	2 1	D	m.
Lable	4.4	- Process	Data

1.0			Current Flow	Design Flow
Influent Characteristics:				
	BOD	mg/L	212	250
	TSS	mg/L	108	250
	TKN	mg/L	40	40
	AADF	MGD	0.008	0.02
Effluent Targets				
	BOD	mg/L	<20	<20
	TSS	mg/L	<20	<20
	Nitrate	mg/L	<12	<12
	Disinfection		basic	basic
<b>Process Design:</b>				basic
			Single Train	Dual Train
	Process Mode		Ext Aer	Ext Acr
	Temp		20	20
	MLSS mg/L		3553	3526
	SRT days		33	20
	Yield Coefficient		0.64	0.71
	anoxic		0	0
	aeration		0.010	0.020
	Total Volume MGAL		0.010	0.020
	V/Q, hrs.		30.0	24.0
	BOD Loading, #/	1000 cf	10.6	15.6
	Solids, Oxic, Lbs		296	588
	Solids, Anoxic, Lbs		0	0
	MLSS Recirculation, %	0	0	0
	RAS Recycle, %		100	100
	RAS mg/L		7106	7052
	WAS, lb/day		9	29.41
	WAS, gpd		152	500
	Tank Configuration		series	series
Acration System:				
	Process O2, lb/day		41	110
	Diffuser Efficiency, %		6	6
	Air Rqd., SCFM		28	74
	lb O2/#BOD		2.0	
	Air supply, CF/# BOD		2.9	2.6

	Current Flow	Design Flow
Type Aeration	Diffused	Diffused
Number of Eductors	1	2
Return Rate/Eductor, GPM	5.6	6.9
Air Eductors	7.6	20.0
Skimmer Air	2.5	6.7
Air Rqd. RAS:	10	27
Air Rqd. Process:	28	74
Air Rqd.Digester	19	19
Volume Surge	0	0
Air Rqd.Surge	0	0
Total Air Rqd.:	57	119
HP Required	2.3	4.8
HP Provided:		
Final Settling:	(2) 5 Hp	(2) 5 Hp
	single train	dual train
No. of Clarifiers	1	2
Surface Area	67	136
Volume	3000	
V/Q, hrs.	9.0	6000
Design Peak Factor	3.5	7.2
Hydraulic Overflow:	3,3	3.5
Avg., gpd/sf	110	1.47
Peak, gpd/sf	119	147
Solids Loading Rate:	418	515
Avg., lb/d-sf	7	0
Peak, lb/d-sf	16	9
Disinfection:	10	19
Method	Tablet Chlorination	Tablet Chlorination
No. of CCCs	2	2
Total CCC volume est	930	930
C12 Residual, mg/L	0.5	0.5
C12 Dose, mg/L	8	8
Consumption, lb/day	0.53	1.33
If Hypochlorination System In Use	0.00	1.55
Est. Sodium Hypochlorite strength,	15	15
%	**	1.7
Dose required, mg/L	8	8
Available Chlorine, lb/gal	1.25	1.25
dose, #/gal	6.68E-05	6.68E-05
Avg dose, #/day	0.53	1.34
Avg dose, gal/day	0.4	1.1
Peak Hour Capacity, gal/day	1	4
CCC Retention Time	*	7
@ ADF, minutes	167	67
@ PHF, minutes	48	19
Residual * Detention	24	
FIRMANA	47	10

		Current Flow	Design Flow
	Disinfection Level	Basic	Basic
Aerobic Sludge			
Digestion:			
	WAS Flow, gpd	152	500
	Total Solids,#/day	8.98	29
	WAS, mg/L	7106	7052
	% Volatile	75	75
	WASv, mg/L	5329	5289
	Total VSS,#/d	7	22
	VSS, #/Digester cf/day	0.01	0.04
	Thick Solids,%	1	1
	Digester Vol, gal	4711	4711
	Initial Est.SRT, days	43	11
	Temp, Degrees C	20	20
	VSS Destroyed, %	40.27	21.18
	Avg. Solids, mg/L	7000	7000
	Supernatant Solids,mg/L	300	300
	WAS Fraction Not Destroyed	0.70	0.84
	WAS Fraction in Digester	0.50	0.59
	Supernatant, gpd	76	203
	TSS in Digester, #	275	275
	Total SS Removed, #/d	6	25
	Supernatant TSS,#/d	0.2	0.5
	Sludge Discharge,#/d	6	25
	Sludge Rem/year, DTR	1.1	4.5
	Sludge Discharge, gpd	75	297
	Digester SRT, days	42.6	10.9
	Sludge Stabiliz. Class	В	<b< td=""></b<>
	Digester HRT, days	31.1	9.4
	O2 Rqd, VSS, #/d	5	9
	Air, SCFM	4	8
	Diffuser Effic.,%	5	5
	Air Rqd. Mixing. SCFM	19	19
	Design SCFM	19	19
Land Application System			
	System	R001	R001
	Flow	0.008	0.020
	Land Application Area, sf	17000	17000
	Land Application Area, ac	0.3903	0.3903
	Type System	Perc Pond	Perc Pond
	# SubCells	2	2
	Load Rate, gpd/sf	0.47	1.18
	Load Rate, in/wk	5.28	13.21

#### 2.5 Effluent Disposal / Reuse

Effluent from the treatment plant is disposed or reused by dual percolation-evaporation ponds.

The relationship of the effluent disposal system to the treatment facility is shown in the site plan in figure 1.4

The associated loading rates of this system at current and design flows is as follows:

Table 2.5 Effluent Disposal\Reuse System

System Type	Application Area (acres)	Flow (MGD)	Loading Rate (in/wk)
dual percolation/	0.3903	0.020	13.21
evaporation ponds		0.008	5.28

Note: 1.9 gpd/sf equals 21.3 in/wk; 5.6 gpd/sf equals 62.9 in/wk.

It is recommended that the operator and Owner continue to monitor the performance of the system regularly, particularly if flow patterns should increase.

#### 2.6 Waste Sludge Disposal or Reuse System

#### 2.6.1 General Information About Rule 62-640, EPA Rule 503

The disposal of waste sludge from domestic wastewater plants in Florida is regulated by the FDEP under their rule 62-640, by the Federal Government under EPA rule 503, and often by local regulation which varies.

The relationship of the rules to each other is complex, but generally, WWTP owners have two ways to comply with rule 62-640 and rule 503. First, if the Owner elects to use a sludge hauler solely to haul his waste sludge to a land application site, the Owner will usually have to have on file with FDEP an Agricultural Use Plan (AUP). In many cases, the Owner will also need to obtain approval from the USEPA for the same site. In the second case, the Owner can enter into a contract with a sludge hauler who holds a permit from the FDEP to haul, treat and dispose of sludge himself. The hauler will have a type of permit known as a Regional Residuals Treatment Facility or Regional residuals Management Facility permit.

The primary difference between the first and second case is that in the first case, the sludge hauler is not permitted by FDEP to treat sludge, and so the Owner will hold the State FDEP AUP and the Federal permit, whereas in the second case, the hauler will usually hold those responsibilities.

Both rule 62-640 and Rule 503 have extensive record keeping and permitting requirements, particularly for facilities that have their sludge removed to an agricultural use site. Basically records include keeping a running total of when sludge is hauled, where, and keeping a running tally on the accumulation of the amount of heavy metals disposed of at the land application site. For plants hauling their sludge to another treatment, matters are significantly simplified, but hauling records are still required.

#### 2.6.2 Disposal and Reuse of Waste Sludge From Harbor RV Resort & Marina WWTP.

Estimated sludge removal quantities (dry annual tonnage) is shown below. Sludge from this facility is removed by A-1 Quality Services. Please refer to the process calculations in table 2.4 for information on the SRT and predicted VSS destruction from this facility from the aerobic process alone. Sludge from this facility is hauled to another treatment plant for further stabilization and disposal. The disposition of the sludge is as follows:

Table 2.6 Sludge (Residuals) Disposal

	Direct Land Application	Regional Residual Treatment Facility
Quantity Site/Facility	0 dry-tons/yr	1.1dry-tons/yr
Name		A-1 Quality Services RMF
Location	*	Aurburndale
County		Polk

# 3.0 Future Conditions - Wastewater Flow Projection

#### 3.1 Unit Waste Generation Rates

The current ADF unit waste generation rate(s) applicable to this facility is gpd per RV and mobile home site.

From section 3.1, the maximum three month average daily flow is 0.0157 MGD.

There are 119 RV Sites, and 28 rental mobile homes, for a total 137 connections served. The owner reports that during peak season, these are 100% occupied.

From this, it is concluded that the unit waste generation rate is 115 gpd per RV and mobile home site.

#### 3.2 Future Possible Average Flow

The future possible average flow to this facility is calculated in table 3.2 under the premise that the maximum future or build out flow is equal to the maximum number of units that contribute wastewater times their unit waste generation rate.

# Table 3.2 Future Possible Average Flow

Type of Unit	#of Units	Unit Waste Generation Rate	Future Flow
RV/MH Site	137	115 gpd per RV and mobile home site	o.016MGD

#### 3.3 Growth Rate

Future growth rates can be predicted from several methods. In general, the major methods are: linear regression of historical flow, local municipal comprehensive plan projections, and site specific knowledge.

In this case, site specific knowledge was used to predict flows using information supplied by the owners. The owner reports that the service area is out, the population demographics appear stable, and no further growth is expected.

# 4.0 Summary and Recommendations

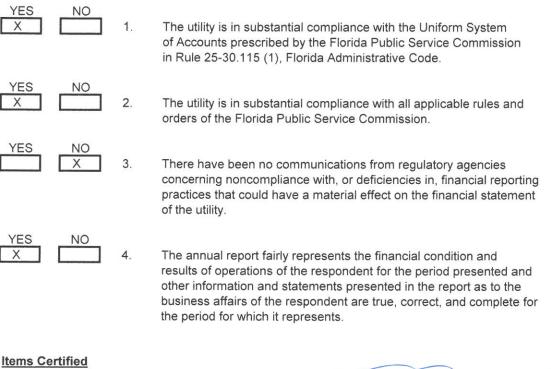
Based on the analysis of the wastewater treatment plant, effluent disposal or reuse system and sludge handling stream, the maximum ratable capacity of the system as a whole is 0.020 MGD, as noted in the foregoing sections.

Future maximum capacity anticipated needed over the foreseeable planning period is 0.016 MGD.

In accordance with 62-600.405 F.A.C. and based on future flow projections and present capacity, the owner of this facility needs to continue to monitor the proper operation of the plant.

# **CERTIFICATION OF ANNUAL REPORT**

I HEREBY CERTIFY, to the best of my knowledge and belief:



Items C	ertified				
1. X	2. X	3. X	4. X	(signature of chief executive officer of the utility)	*
			Date:	27-Jun-18	
1.	2.	3.	4.	(signature of chief financial officer of the utility)	*
			Date:		

\* Each of the four items must be certified YES or NO. Each item need not be certified by both officers. The items being certified by the officer should be indicated in the appropriate area to the left of the signature.

Notice:

Section 837.06, Florida Statutes, provides that any person who knowingly makes a false statement in writing with the intent to mislead a public servant in the performance of his duty shall be guilty of a misdemeanor of the second degree.