Appendix A

WRDP Process Calculations

APPENDIX A

WRDP Process Calculations

Water Quality Analysis From Effluent

MIAMI-DADE WATER AND SEWER DEPARTMENT
SOUTH DISTRICT WASTEWATER TREATMENT PLANT
WATER QUALITY ANALYSIS FROM EFFLUENT

Date	TDS,		Sulfate,		Chlorides,			TKN,	NH3,	Fecal Coliform, #	Conductivity,		Temp,		Temp,	pH			Alkalinity	TP,	TOC,	TSS		N03	N02	N03+ N02	Total N	CBOD
	mg/L	Daily Summary sheet 3 mg/L	mg/L	Daily Summary Sheet 3 mg/L	mg/L	Daily Summary sheet 2 mg/L	Daily Summary Sheet 3 mg/L	mg/L	mg/L	Col/100ml	Micomho/cm	Daily Summary Sheet Micomho/cm	C	C	F		Daily Summary Sheet 2	Daily Summary Sheet 3	mg CaCO3/L	mg/L	mg/L	mg/L	Daily Summary Sheet 2 mg/L	mg/L	mg/L	mg/L	Daily Summart Sheet 2 mg/L
Jan-01	252		20		72			24.41	21.24	7,200,000	755		25		78	6.8				1.46	11.2	19.2		0.08				5.16
Feb-01	360		31		86			19.70	21.06	360,000	785		27		81	6.9				0.52	11.1	8.4		0.39				3.39
Mar-01	392		34		101			21.75	18.96	360,000	804		28		82	6.5				1.22	13.3	11.6		0.09				6.57
Apr-01	752		51		290			19.30	15.84	11,100,000	1 ,436		29		83	6.6				2.14	20.7	42.4		0.00				8.08
May-01	904		100		369			21.38	17.79	8,400,000	1,695		28		82	6.4				1.48	13.6	17.6		0.00				7.41
Jun-01	344		29		77			28.94	25.86	1,122,130	754		30		85	6.8				1.99	10.3	4.8		0.00				3.17
Jul-01	344		37		77			17.55	15.43	8,667	694		28		83	6.7				1.11	11.7	7.2		0.18				3.68
Aug-01	284		14		53			16.07	13.41	4,150	620		28		83	6.9				1.5	10.7	19.2		0.12				4.45
Sep-01	360		18		63			14.98	12.83	24,000	657		30		86	6.7				2.29	11.5	5.2		1.38				4.14
Oct-01	308		20		53			7.73	5.26	45,000	579		27		81	6.5				0.85	9.13	17.2		0.28				4.85
Nov-01	352		23		54			20.25	16.41	40,000	730		26		79	6.7				1.09	12.2	10		0.11				4.53
Dec-01	324		21		66			15.19	12.53	40,000	661		26		79	6.9				0.53	11.4	9.2		0.07				4.24
Jan-02	360		22		64			21.30	19.18	47,000	697		23		73	6.7				2.24	11.9	11.2		0.79				5.32
Feb-02	340		26		63			20.76	20.11	6,300	719		25		78	6.7				1.84	10.3	8.4		0.27				4.50
Mar-02	360		26		76			27.03	24.49	32,000	791		27		80	6.6				1.94	10.4	6.8		0.12				5.15
Apr-02	360		31		77			20.92	15.67	24,000	715		26		79	6.5				0.99	11.6	6.4		0.15				4.55
May-02	392		29		86			20.53	18.97	6,800	714		28		83	7				1.1	12.2	8.8		0.3				5.77
Jun-02	252		22		53			12.53	10.87	49,000	600		28		82	6.8				0.45	9.92	11.6		1.5				5.02
Jul-02	376		20		85			12.12	10.38	76,000	805		28		82	6.5				1.9	9.68	9.6		0.01				4.84
Aug-02	324		22		86			18.25	13.42	7,800	713		29		85	7				0.91	10	7.2		0.17				5.24
Sep-02	392		25		73			16.49	14.49		686		28		83	6.7				0.62	8.67	9.2		0.1				4.79
Oct-02	356		26		72			18.16	13.53	30,500	727		28		83	6.6				0.97	9.22	9.6		0.14				3.76
Nov-02	328		27		85			17.48	15.93	25,000	721		27		80	7.6				0.96	10.2	6.5		0.23				5.76
Dec-02	320		20		68			14.61	12.30	24,000	649		26		80	6.6				0.75	10.9	9		0.14				5.81
Jan-03	356		25		73			19.63	20.12	28,000	713		22		71	6.7				0.96	11.6	14.4		0.08				5.38
Feb-03	364		25		80			20.73	19.99	69,000	741		25		77	6.9				1.04	10.3	17.7		0				5.36
Mar-03	360		30		86			20.11	18.30	51 ,000	742		28		82	6.9				1.09	8.76	4		0.1				4.38
Apr-03	328		27		77			28.30	27.99	26,000	798		27		80	6.7				1.22	9.71	7.2		0.13				5.95
May-03	352		21		69			19.02	17.91	60,000	695		28		82	6.7				2.15	9.46	7.6		0.3				3.80
Jun-03	316		21		68			12.49	11.63	61,000	644		30		85	6.6				0.71	10.1	4		0.14				3.64
Jul-03	300		21		59			10.54	8.80	38,000	597		28		82	6.8				0.56	8.76	5.6		0.41				3.30
Aug-03	336		21		64			11.90	10.63	22,000	630		30		86	7.3				0.52	9.14	2.5		0.68				4.04
Sep-03	292		23		63			10.38	8.83	8,000	634		31		87	6.5				0.61	9.58	1		0.44				6.01
Oct-03	368		23		72			18.84	17.21	5,400	705		29		84	6.6				2.33	10.8	10.8		0.7				3.94
Nov-03	356		12		75			17.71	17.90	4,900	710		29		83	6.8				2.21	10	9		0.7				5.01
Dec-03	300		22		77			4.50	20.54	26,500	720		26		78	6.9				0.47	10.9	6		0.47				4.98
Jan-04	296		22		72			17.30	16.31	35,500	660		27		80	6.5			206	0.09	12.2	5.6		0.23				3.77
Feb-04	392		22		79			25.43	26.09	58,000	737		28		82	6.7			220	2.43	1,1.50	7.20		0.12				5.11
Mar-04	412		30		73			21.07	21.46	3,600,000	757		25		78	6.6			204	2.00	12.10	13.60		0.20				4.86
Apr-04	312		25		67			24.41	20.38	5,700,000	696		26		78	6.9				1.64	11.50	10.80		0.12				5.09
May-04	340		22		71			17.40	16.80	590,000	669		28		82	6.7			192	1.08	11.9	6.4		0.3				4.75
Jun-04	356		26		78			19.00	15.60	250,000	704		30		86	6.1			192.5	1.26	11.9	6.4		0.47				5.81
Jul-04	356	420	29	27.29	76		70	20.40	18.40	4,000,000	819		31	30.79	87	6.5		6.48	188	2.04	12.9	6			2.25	3.11	23.5	5.00
Aug-04	420	392	24	26.6	49		65.5	16.00	13.10	6,000,000	631		29	29.5	84	6.5		6.56	204	1.42	12.7	18		0.53	0.2	0.73	16.7	4.78
Sep-04	332	334	27	25.36	69		62.2	16.10	17.10		727		31	29.37	87	6.5		6.51	194	1.72	10.7	9.6		0.29	2.27	2.56	18.7	4.06
Oct-04	368	361	26	27.65	66		64.75	19.60	17.10	4,700,000	752		30	27.37	86	6.6		6.59	202.6	1.54	10.4	5		0.38	1.1	1.48	21.1	3.95
Nov-04	364	372	27	27.95	73		71	22.70	21.50	53,000	760		27	27.5	81	6.6		6.51	211.6	1.33	10.8	6.4		0.1	0.43	0.53	23.2	4.03
Dec-04	362	362	30	29.97	76.8		76.8	24.85	23.28	75,431	791.6		26.6	26.34	79.4	6.48		6.49	226.3	1.61	12.25	7.88		0.1	0.27			5.04

Date	TDS,		Sulfate,		Chlorides,			TKN,	NH3,	Fecal Coliform, #	Conductivity,		Temp,		Temp,	pH			Alkalinity	TP,	TOC,	TSS		N03	N02	N03+ N02	Total N	CBOD
	mg/L	Daily Summary sheet 3 mg/L	mg/L	Daily Summary Sheet 3 mg/L	mg/L	Daily Summary sheet 2 mg/L	Daily Summary Sheet 3 mg/L	mg/L	mg/L	Col/100ml	Micomho/cm	Daily Summary Sheet Micomho/cm	C	Daily Summary Sheet 3 C	F		Daily Summary Sheet 2	Daily Summary Sheet 3	Daily Summary Sheet 3 mg CaCO3/L	mg/L	mg/L	mg/L	Daily Summary Sheet 2 mg/L	mg/L	mg/L	N02 mg/L	mg/L	Daily Summart Sheet 2 mg/L
Jan-05	364	372	27	29.69	73	75.6	77	22.70	21.50	53,000	760	771	27	25.79	81	6.6	7.1	6.49	226.5	1.33	10.8	6.4	10.8	0.1	0.43	0.53	23.2	4.64
Feb-05	364	394	26	30.33	73	70.8	75.25	20.00	25.10	200,000	2,000	769	26	25.4	78	6.5	7.2	6.49	227	2.22	11.5	6.4	10.9	0.17	0.47	0.64	20.6	5.15
Mar-05	364	380.8	30	32.05	73	73	74.4	26.70	29.10	200,000	760	759	23	25.71	74	6.4	7.3	6.5	222	2.38	13.2	6.4	10.5	0.41	0.35	0.76	27.5	6.00
Apr-05	364	391	27	30.13	73	73	71.25	25.20	25.20	250,000	760	760	29	27.35	84	6.5	7.2	6.51	226	2.3	11.9	6.4	12.7	0.14	0.35	0.5	25.66	5.76
May-05	364	383	27	31.25	73	72	74.5	29.10	29.40	210,000	760	755	28	28.1	83	6.7	7.3	6.57	228	1.87	11	6.4	10.9	0.19	0.41	0.6	29.68	5.85
Jun-05	364	362.4	24	26.23	73	58	59.4	17.00	17.90	98,182	760	639	29	28.5	83	6.6	7.4	6.68	214.4	1.28	8.9	6.4	12	0.2	0.31	0.51	17.5	5.32
Jul-05	364	344	24	27.07	73	60.25	63.25	23.10	20.90	94,545	760	680	30	29.36	86	6.6	7.3	6.56	214.5	1.44	10.6	6.4	6.5	0.32	0.44	0.76	23.9	4.28
Aug-05	364	358.4		27.39	73	44	59.6	14.70	15.20	57,000	760	481	30	29.8	87	6.4	5.4	6.64	208	0.97	8.3	6.4	4.1	0.45	0.51	0.96	15.6	2.17
Sep-05	364	374	24	27.77	67	64	66.75	18.12	16.86	40,000	711	679	30	29.5	85	6.4	7.0	6.6	208.5	1.46	11	5.6	7.7	0.3	0.63			4.29
Oct-05	364	332	26	27.3	73	60.29	74	17.60	15.80	48,000	760	680	30	29.3	86	6.3	6.8	6.3	208.5	1.35	11	6.4	8.6	0.21	0.94	1.15	18.7	5.38
Nov-05	364	394.4	33	26.4	73	73	74.8	28.70	24.70	9,819	760	743	29	28.1	85	6.2	7.2	6.26	228	1.71	14.4	6.4	8.3	0.34	1.12	1.46	30.2	4.82
Dec-05	364	388	24	28.25	73	66	65.3	22.70	20.40	4,800	760	705	27	26.4	80	6.5	7.2	6.42	213	1.93	10.5	6.4	8.2	0.21	0.85	1.06	23.8	4.86
Jan-06	396	417	27.2	27.2	72		69	22.50	22.00	80,000	786		27	26	81	6.6		6.5	233.5	1.8	11.3	18.7		0.25	0.31	0.56	23.1	
Feb-06	352	368	24	27.25	68		72.75	23.70	15.90	436,363	746		25	25.73	77	6.8		6.6	216.0	1.7	11.5	17.6		0.13	0.11	0.24	23.9	
Mar-06	424	436.8	29	33.05	89		101.2	28.80	23.10	14,414	862		26	26.3	79	6.9		6.68	224.0	2.66	12.1	8.8		0.2	0.17	0.37	29.2	
Apr-06	448	441	34	36.16	115		114.25	26.00	24.40	60,630	1,007		27	27	81	6.7		6.69	221	2.17	11.4	10.4		0.73	0.19	0.92	26.9	
May-06	496	478.4	35	40.37	126		132.4	32.70	27.40	380,000	890		28	27.86	83	6.5		6.58	233.2	2.63	15	14		0.26	0.16	0.42	33.1	
Jun-06		414		36			107							29				6.77	211.50									
Jul-06		381		31.6			81.25							29				7.08	207									
Aug-06		368		32.32			78.8							31				6.6	203.8									
Sep-06		405.3					86.7							29				6.63	198									

Date	TDS,		Sulfate,		Chlorides,			TKN,	NH3,	Fecal Coliform, #	Conductivity,		Temp,		Temp,	pH			Alkalinity	TP,	TOC,	TSS		N03	N02	N03+ N02	N	CBOD
	mg/L	mg/L	mg/L	mg/L	mg/L		mg/L	mg/L	mg/L	Col/100ml	Micomho/cm		C	C	F				mg CaCO3/L	mg/L	mg/L	mg/L		mg/L	mg/L	N02 mg/L	mg/L	mg/L
2001	415		33		113			19.28	16.39	2,391,996	794		28		82	6.70				1.35	12.24	14.33		0.00				4.97
2002	347		25		74			18.35	15.78	29,855	711		27		81	6.78				1.22	10.42	8.69		0.33				5.04
2003	336		23		72			15.77	16.65	31,709	694		28		81	6.78				1.16	9.93	7.48		0.35				4.65
2004	359	373	26	27	71		68	20.35	18.93	2,278,357	725		28	28	83	6.56		6.52	203.73	1.51	11.76	8.57		0.26	1.09	1.68	20.64	4.69
2005	364	373	27	29	73	66	70	23.09	21.84	105,446	859	702	28	28	83	6.48	7.03	6.50	218.70	1.69	11.09	6.33	9.27	0.25	0.57	0.81	23.30	4.88
2006	423	412	30	33	94		94	26.74	22.56	194,281	858		27	28	80	6.70		6.68	216.44	2.19	12.26	13.90		0.31	0.19	0.50	27.24	
Average	374	386	27.11	29.70	82.78	65.83	77.24	20.60	18.69	838607.24	773.71	701.75	27.55	28.04	81.55	6.67	7.03	6.57	212.96	1.52	11.28	9.89	9.27	0.25	0.61	1.00	23.73	4.85

Notes: 1. Samples from effluent wells taken one day per week, Composite Samples
2. Samples taken daily (From daily summary plant data - SDWWTP DataCDM.AB.xls).
3. Sample data summary taken from - Effluent data060929.XLS

Meeting Minutes

Memorandum

To: *File*

From: *Carmen Yee-Batista*

Date: *August 21, 2006*

Subject: *Coastal Wetland Reuse Rehydration Demonstration Pilot Project - Coordination meeting with Hazen and Sawyer*

A meeting was conducted on Thursday, July 27, 2006 with MDWASD, H&S, and CDM staff to discuss the High Level Disinfection (HLD) project and the Wastewater Reuse Pilot Plant (WRPP) as part of the Coastal Wetland Reuse Rehydration Demonstration Pilot Project.

Attendees:

- MDWASD: Bertha Goldenberg, Joe Mazzerese, Jim Ferguson, and Steve Kronheim
- Hazen and Sawyer: Rick Cisterna
- CDM: Victor Pujals, Carmen Yee-Batista, and Andrew Lynn (phone)

The agenda for this meeting included the following discussion points:

1. Presentation
2. Understanding HLD project and other expansion projects
3. Proposed pilot plant process
4. Tentative/conceptual size of pilot plant
5. Potential locations
6. Coordination to connect to existing facility
7. Long term implications to design full scale plant

This memorandum provides a summary of the major points discussed at this meeting:

- Rick Cisterna provided a summary of the improvements that are currently being design to provide HLD facilities at the South District WWTP. The improvements include one oxygenation train, four secondary clarifiers, deep bed filters, UV system, and chlorination and feed facility. The facilities are design to treat a peak flow of 285 MGD and annual average flow of 112.5 MGD. Facilities required for the 131 MGD AAD were also discussed, however, these facilities are not being designed.

- Joe Mazzarese mentioned that the current reuse facility has a capacity of 1 MGD and can be available for the pilot plant. He mentioned that we might be able to tab in to the reuse effluent instead of the secondary effluent. Steve Kronheim mentioned the plant is chlorinated every month for a period of four hours. The group did not think that was a problem because the pilot plant can be shut down during that time. Joe also mentioned that the pipeline (8-inch) that feeds secondary effluent to the existing reuse plant can be used to feed the WRPP.

- Other options for the pilot plant location were discussed. Some of the locations are illustrated on Figure 1. Potential locations outside the plant and close to the Lennar Flow Way were discussed; however, land acquisition, security, power supply, and location being to far for operators are some of the disadvantage of locating the plant outside the fence. The west area of the plant has space constraints due to future contractor trailers. Joe Mazzarese mentioned that he would like to stay east of the plant.

- Hazen & Sawyer mentioned that a copy of the staging plant for construction of the HLD project will be provided to CDM.

- The property appraisal website of Miami-Dade County might have land description of the land in proximity to the Lennar Flow Way.

- The group discussed potential modification of HLD plant to provide nutrient removal to comply with stringent regulations. Nitrification with Biological Aerated Filters is a potential option that the CERP report supported. The deep filters might be appropriate for denitrification if denitrification is required only during the dry season. Filters are design to a HLR of 6 gpm/sf at peak flow. The loading during annual average flow is about 2 gpm/sf which is typical hydraulic rate for denitrification. It is not clear by the group if the water rehydration project would operate only during dry season.

- UV disinfection or a combination of UV with chlorine disinfection is being evaluated as part of the HLD project. UV can be modified to provide also treatment for

contaminants of concerns with the addition of hydrogen peroxide if required in the future by regulators.

- Total phosphorus level in the effluent at SDWWT is approximately 1 mg/L. Data is from water quality analysis from effluent. Bertha Goldenberg provided five year of monthly data.

- The group discussed the addition of actiflow for phosphorus removal in the 1-MGD WRPP instead of using one secondary clarifier to remove bulk P.

- MDWASD mentioned to look at other plant process schematic, such as Tampa Bay. He also mentioned that it is important that the pilot plant represent a realistic scenario of potential modifications at SDWWTP.

CYB/pd

File:

Attachment

- SDWWTP Plant site layout

- Schematic

- WRPP site layout

- Water quality analysis from effluent

Memorandum

To: *Steve Kronheim (MDWASD)*

From: *Carmen Yee-Batista*

Date: *September 10, 2006*

Subject: *Coastal Wetland Rehydration Reuse Demonstration Project – Site Visit*

A site visit and meeting was held on September 7, 2006 at the South District Wastewater Treatment (SDWWTP) to discuss potential locations for the wastewater reuse demonstration plant (WRDP), the constructed wetland, and discharge point for the constructed wetland effluent. The meeting was attended by Steve Kronheim (MDWASD), Manuel Moncholi (MDWASD), Fernando Craveiro (CH2MHill), Randy Bushey (CH2MHill), Juan Jurado (MSA), Carmen Yee-Batista (CDM), and Ken Caban (CDM). The following is a summary of the major points discussed at the meeting.

- CDM indicated that a foot print of 300 ft x 100 ft might be required for the 1-MGD WRDP based on preliminary calculations conducted during the proposal phase.

- A site between final clarifiers no. 6 and no. 3 was presented as a potential option for the WRDP. However, because of space constraint and existing yard piping, the group did not think this will be a good option.

- The existing location of the existing wastewater reuse plant was also discussed as a possible site for the WRDP. To use this site, the existing wastewater reuse plant will need to be eliminated. MDWASD did not think that will be possible with FDEP. In addition, a chlorine storage and feed facility will be constructed close to the area limiting the space available for the WRDP.

- Another site next to oxygenation tank No. 7 was presented as a potential option for the WRDP. The group agreed that this site could be a potential location for the WRDP. Secondary effluent to feed the WRDP can come from injection well I-7. Steve Kronheim mentioned that the injection well is chlorinated once every month for a period of three hours. The group did not think this will be a problem for the operation of the demonstration plant. The injection well concrete pad can not be used for the WRDP.

- A site located next to the FPL substation and the injection well I-7 was presented as a potential location for the WRDP. This site is close to both the source water (injection well I-7) and the site where the constructed wetland will be constructed. The site is located in a flooding area, therefore, filling the site should be considered. FPL will soon begin upgrades to the substation. MDWASD recommended leaving approximately 40 to 50 feet between the substation and the demonstration plant. The area available at this site is approximately 220 ft x 140 ft.

- The group decided that the best two sites to locate the WRDP are: Option 1 - next to the FPL substation and injection well I-7 and Option 2 - next to the oxygenation tank No. 1. The attached drawing indicates the location of these two sites.

- The group also discussed where to discharge the effluent of the constructed wetland. Two options were presented. One option is to take the constructed wetland effluent to the head of the plant through a sanitary sewer and the other option was to discharge to a holding pond. Holding ponds at the plant are used for emergency overflow. The holding ponds considered were pond no. 7 and pond no. 12 indicated as Option A and Option B, respectively in the attached drawings. There is a culvert discharging to Pond 12 coming from SW 87 Ave. This culvert could be used to connect the constructed wetland effluent to Pond No. 12.

- MDWASD indicated the entire plant was recently surveyed for the High Level Disinfection (HLD) project. CDM should contact Jim Ferguson (MDWAS) to obtain the survey information. Drawings of the potential sites were shown to the group. The drawings come from Contract No. S133 A. CDM will be requesting these drawings to MDWASD.

- MDWASD indicated that laboratory analysis for the WRDP will need to be contracted out. During the design phase, a refrigerated area to store samples should be considered by the design engineer.

- MDWASD recommended installing a Ted's shed with an air conditioning window unit designed for hurricane protection to locate the control panels for the demonstration plant. A similar construction was used for the HLD pilot plant.

- A visit to the sites indicated above was conducted after the meeting.

Attachment

File: 6430-53684 –058.DN Series 200 (Correspondence)

cc: Attendees

Potential Location – Looking North East

Potential Location – Looking North East

Looking South – Injection Well I-7

Looking West – FPL Substation

OPTION 1

OPTION A

OPTION B

OPTION 2

POND No. 3

POND No. 4

POND No. 5

POND No. 6

POND No.8

POND No. 7

POND No. 12

POND No. 14

POND No. 16

POND No. 18

POND No. 19

POND No. 20

POND No. 21

EXISTING POND No. 11

INJECTION WELL I-15

FA-7

INJECTION WELL I-16

FA-8

INJECTION WELL I-17

FA-8

INJECTION WELL I-7

INJECTION WELL I-6

INJECTION WELL I-9

INJECTION WELL I-1

INJECTION WELL I-2

INJECTION WELL I-3

WELL HOUSE

INFLMETER VAULT #3

INFLMETER VAULT #2

INFLMETER VAULT #1

SAMPLING PUMP

FLORIDA AQUIFER MONITORING WELL FA-1

EFFLUENT INJECTION WELL I-8

F.P.&L. SUBSTATION

DRAIN SOAKAGE PIT

OXYGEN PLANT#2

OXYGEN PLANT#1

FOG

BAR SCREEN RM#3

BAR SCREEN RM#2

BAR SCREEN RM#1

GRIT CHAMBER #3

GRIT CHAMBER #2

GRIT CHAMBER #1

FUEL STORAGE TANKS

ODOR CONTROL BUILDING#2

ODOR CONTROL BUILDING#1

SLUDGE DRYING BEDS

AREA RESERVED FOR FUTURE SOLIDS HANDLING FACILITIES

EMERGENCY GENERATOR LINE-UP

MAIN ELECTRICAL DISTRIBUTION BLDG. NO. 2

SUB STATION

OXYGENATION TANKS NO. 5 TO 8

OXYGENATION TANKS NO. 1 TO NO. 4

GENERATOR

MAIN ELECTRICAL DIST. BUILDING NO. 1

ELECTRICAL DUCT BANK (TYP)

GATE (TYP)

EXISTING GATE

SLIDE GATE

ADMINISTRATION, LABORATORY & MAIN CONTROL BLDG.

SUBST.#11&#12

BOULDER ZONE MONITOR WELL

FUEL STORAGE TANK (UNDERGROUND)

METER VAULT (TYP)

FINAL CLARIFIER No. 16

FINAL CLARIFIER No. 13

FINAL CLARIFIER No. 15

FINAL CLARIFIER No. 14

FINAL CLARIFIER No. 12

FINAL CLARIFIER No. 9

FINAL CLARIFIER No. 11

FINAL CLARIFIER No. 10

FINAL CLARIFIER No. 8

FINAL CLARIFIER No. 7

FINAL CLARIFIER No. 5

FINAL CLARIFIER No. 4

FINAL CLARIFIER No. 1

FINAL CLARIFIER No. 6

FINAL CLARIFIER No. 3

FINAL CLARIFIER No. 2

SCUM WELL # 2

PUMP STATION NO.2

PUMP STATION NO.3

PUMP STATION #3

TO BE RELOCATED IN THE FUTURE

DEWATER FACILITY

TRANSFER

TRAILER

42" BACKWASH WASTE

96" 45° BEND

108"x96" RED

108"x72" TEE

MAINTENANCE BUILDING (PLANT PROCESS CONTROL SERVICE)

FLUSHING WATER CONTACT TANK

CHLORINATION BLDG.

CHLORINATION STORAGE AND FEED FACILITY

PROPOSED CHLORINE CONTACT AND STORAGE

EQUIPMENT ROOM

FUTURE FILTERS

DEEP BED FILTERS

BACKWASH WASTE EQUALI-ZATION TANKS (TYP)

BACKWASH SUPPLY STORAGE TANKS (TYP)

HIGH RATE CLARIFIERS

TRANSFER PUMP STATION

HUB ELECTRICAL DISTRIBUTION BUILDING

DIGESTER No. 15

DIGESTER No. 13

DIGESTER No. 16

DIGESTER No. 14

DIGESTER No. 11

DIGESTER No. 9

DIGESTER No. 12

DIGESTER No. 10

PROPOSED ELECTRICAL DUCT BANK (TYPICAL)

ELECT

SLUDGE CONCENTRA.#3

SLUDGE CONCENTRA.#4

POLYMER BLDG

SCUM WELL

SLUDGE CONCENTRA.

ODOR CONTROL BUILDING#3

DIGESTER BUILDING

VALVE PIT No. 2

VALVE PIT No. 1

DIGESTER No. 7

DIGESTER No. 5

DIGESTER No. 8

DIGESTER No. 6

DIGESTER No. 3

DIGESTER No. 1

DIGESTER No. 4

DIGESTER No. 2

SLUDGE GATES (TYP)

SUBST.#9&#7

SLUDGE PROCESSING FACILITY

CHLORINE CONTACT TANK (OR UV)

CO-GENERATION BUILDING

EFFLUENT PUMPING BUILDING

SURGE ARRESTORS

CHLORINE CONTACT TANKS (OR UV)

EFFLUENT PUMPING BUILDING

MONITORING WELL

WELL HOUSE

INJECTION WELL I-9

WELL HOUSE

INJECTION WELL I-1

WELL HOUSE

INJECTION WELL I-2

WELL HOUSE

INJECTION WELL I-3

WELL HOUSE

PIPING AND STRUCTURAL LEGEND

PROPOSED 2009 IMPROVEMENTS

PROPOSED 2020 IMPROVEMENTS

EXISTING PIPING

EXISTING

Note:

1) OPTIONS 1 AND 2 ARE POTENTIAL LOCATIONS FOR THE WASTEWATER REUSE DEMONSTRATION PLANT
   OPTION 1– 220ft X 140ft
   OPTION 2– 100ft X 300ft

2) OPTIONS A AND B ARE POTENTIAL DISCHARGE POINTS FOR THE CONSTRUCTED WETLAND EFFLUENT

HAZEN AND SAWYER
Environmental Engineers & Scientists

SOUTH DISTRICT WASTEWATER TREATMENT PLANT
HIGH LEVEL DISINFECTION UPGRADE

2020 SITE PLAN

FIGURE M

1"=80'-0"

80 40 0 80'

PLOT DATE: 01/13/06 9:56am FILE= O:\40588-014\Drawings\Conceptual Design\FIG-M by RANDERSEN XREF's=SP-PP-XB, SP-FD-X, SP-PP, EF-SBM, Site-PSite-Civil

Preliminary Motor List

MIAMI DADE WATER AND SEWER DEPARTMENT
1 MGD DEMONSTRATION COASTAL WETLAND REUSE PROJECT AT SDWWTP
PRELIMINARY MOTOR LIST (12/13/06)

Process Component / Item	Service	Number Units		Estimated Unit Power		Estimated Total Connected Power		Motor size /unit	Other
		Duty	Standby	HP	KW	HP	KW	HP	
Strainers	Eaton filtration	1	0					1/3	
SAF	Severn Trent Services	2	0						
Process Air Blowers		2	1	14	10	40.8	30	25	
Sump Pumps		1	1					0.5	
Denitrification Filters	Severn Trent Services	3	0						
Backwash Blowers		1	1	19.03	7.23	38.1	28	50	
Backwash Pumps		1	1	7.55	5.63	15.1	11	10	
Methanol Feed Pumps		1	1	0.01		0.0		0.01	
Analyzer Sample Pumps		1	1	0.75		1.5	1	0.75	
Ballasted Flocculation	Kruiger								
Coagulatin Tank		2	0	1.00		2.0	1	1	
Injection Tank		2	0	1.00		2.0	1	1	
Maturation Tank		2	0	1.50		3.0	2	1.5	
Settling Tank		2	0	0.50		1.0	1	0.5	
Manual Microsand Recycle Circuits		2	2	3		12.0	9	3	
Polymer Transfer Power									
Polymer Metering Pumps		2	2	5		20.0	15	5	
Ferric Chloride Transfer Pumps		1	1	1.5		3.0	2	1.5	
Ferric Chloride Metering Pumps		1	1	1/3		0.7		1/3	
Ultrafiltration	Zenon					0.0			
Membrane Aeration Blower		2	1	15		45.0	34	15	
Permeate/Backpulse pump		3	1	30		120.0	90	30	
Air Compressor c/w Motor & receiver		2	2	7.5		30.0	22	7.5	
Air Drier		2	0						0.02 KWh/day
Air Ejector		3	1						0.21 KWh/day
Zenon Control Power		1	0						60.27 KWh/day
UV process	Aquionics	2	0	72.00		144.0	107		54KW
RO Membrane Trailer (Pilot)				15.00		15.0	11		480 V, 60 A
O3 + H2O2(HiPOX) (Pilot)	Applied Process Technology	1	0	3.00		3.0	2	3	
Building Area (1152 sq.ft) (2 Watt/sf)						2.30	1.72		
Total						498.46	371.47		

Total power, kw	371
Power coeficient	0.8
Total power requirements, KVA	464

Operation and Maintenance Costs

PLANT: 1-MGD DEMONSTRATION PLANT

PROCESS: **STRAINER, SAF, DN FILTERS, BALLASTED FLOCCULATION, LOW-PRESSURE MEMBRANES AND UV SYSTEM**

O&M cost includes power, chemicals, and spare parts

ASSUMPTIONS		VALUE	UNITS
Power			
	Power cost, $/kw-hour	0.10	$/kw-hr
Chemicals			
	Methanol	1.15	$/gallon
	Ferric Chloride	275	$/ton
	Polymer Cost, $/lb	2	$/lb
	Sodium Hypochlorite (10.8 %) 55 gal drums	4.70	$/gallon
	Microsand	1.43	$/lb
	Citric Acid	0.71	$/lb
Spare Part Replacement			
	Not included - assume 5 years operation and warranty		

Assume 5 years operation

POWER COSTS

- o POWER FOR STRAINER
- o POWER FOR SAF
- o POWER FOR DENITE FILTERS
- o POWER FOR BALLASTED FLOCCULATION
- o POWER FOR UV SYSTEM

STAINER		
Motor power	hp	0.33
Daily operating time	hours	24
Total	hp-hrs/day	8
ANNUAL POWER	kwh/year	2,178
ANNUAL POWER COST		**$218**

SAF PROCESS BLOWERS		
Motor power	hp	27
Daily operating time	hours	24
Total	hp-hrs/day	649
ANNUAL POWER	kwh/year	176,676
ANNUAL POWER COST		**$17,668**

DENITRIFICATION FILTERS BACKWASH BLOWERS		
Motor power	hp	40.0
Daily operating time	hours/day	0.67
Total	hp-hrs/day	27
ANNUAL POWER	kwh/year	7,293
ANNUAL POWER COST		**$729**

DENITRIFICATION FILTERS BACKWASH PUMPS

Motor power	hp	9
Daily operating time	hours/day	2.41
Total	hp-hrs/day	22
ANNUAL POWER	kwh/year	5,899
ANNUAL POWER COST		**$590**

BALLASTED FLOCCULATION

Motor power	hp	10
Daily operating time	hours	24
Total	hp-hrs/day	252
ANNUAL POWER	kwh/year	68,535
ANNUAL POWER COST		**$6,854**

MEMBRANE

Total power consumption per system	kwh/day	587
Total	kwh/day	1174
ANNUAL POWER =	kwh/year	428,438
ANNUAL POWER COST =		**$42,844**

UV DISINFECTION

POWER USAGE	kw	86
Daily operating time	hrs/day	24.00
Total	kwh/day	2,064
ANNUAL POWER =	kwh/year	753,360
ANNUAL POWER COST =		**$75,336**
SSPP		
RO		**$25,000**
Other sidestream	kw	20.00
Daily operating time	hrs/day	24.00
Total	kwh/day	480
ANNUAL POWER =	kwh/year	175,200
ANNUAL POWER COST =		**$17,520**
TOTAL ANNUAL POWER COSTS =		**$186,758**

CHEMICAL COSTS

Methanol
Ferric Chloride
Polymer
Sodium Hypochlorite
Citric Acid Cost

METHANOL SYSTEM

Average consumption	gpd	116
Methanol consumption	gal/year	42,423

METHANOL COST PER YEAR	**$**	**48,787**
FERRIC CHLORIDE		
Average consumption	ppd	143
Ferric Chloride consumption	lb/year	52,304
FERRIC CHLORIDE COST PER YEAR	**$**	**7,192**
MICROSAND		
Average Consumption	ppd	10
Microsand Annual Average Consumption	lb/year	3,670
MICROSAND COST PER YEAR	**$**	**5,249**
POLYMER		
Average Consumption	ppd	10
Polymer Annual Average Consumption	lb/year	3,487
POLYMER COST PER YEAR	**$**	**6,974**
MEMBRANE CLEANING CHEMICALS CONSUMPTION (per Zenon)		
SODIUM HYPOCHLORITE		
Maintenance/recovery Cleaning		
Strength	%	10.8%
Chemical required	gal/year	3,900
Cost	**$/yr**	**$18,000**
CITRIC ACID		
Maintenance/recovery Cleaning		
Strength		**50%**
Specific gravity		1.3
Chemical required	gal/year	115
Chemical required	lb/year	1,247
Cost	**$/yr**	**$885**
TOTAL CHEMICAL COST		**$87,087**

REPLACEMENT PARTS

EQUIPMENT COST		3,500,000
Annual Replacement Parts (1% of equipment cost)	$	**$35,000**
MEMBRANE REPLACEMENT		
Total number of modules		108
Module Replacement Price	$/module	811
Membrane Life	years	10
Based on 5-year analysis, assume 20% of membranes will need to be replaced		22
Membrane Replacement (5 years)	$	$17,518
ANNUAL MEMBRANE REPLACEMENT COST	$/year	**3,504**

UV SYSTEM		
Lamps (based on ADF)	$/year	9,750
Wiper rings (based on ADF)	$/year	360
Quartz Sleeves (based on ADF)	$/year	600
Quartz Sleeve Seals (based on ADF)	$/year	80
TOTAL ANNUAL COST	$/year	**$10,790**

WATER QUALITY MONITORING		
Laboratory Analysis	$	$70,000

ANNUAL O&M COST SUMMARY

Power cost	186,758
Chemicals	$87,087
Replacement	$63,308
Water Quality Monitoring	$70,000

Treatment Plant Classification and Staffing

Treatment Plant Classification and Staffing

Source: DEP 200, Section 62-699.310 Classification and Staffing of Plants

For Demonstration Plant assume the following:

Unit Processes	Category	Plant Classification	Operator	Hours/day	days/week	Total Hours
SAF + Denite Filters	(3) (a) Category I	Class B	C	16	7	112
Ballasted Flocculation + Membrane + UV	(4) (b) Category II	Class B	C	16	7	112
Total hours						**224**

Assume: 2 additional operators * Other staff needs by existing plant personnel

40 hours/week

160 64

Position Description	Hourly Rate		1 MGD plant				
		Annual	Number of Positions	hours/day*	days/week	Total Budget	Total no of Positions
Engineers		60,000	0			0	0
Instrumentation/Electrical	30	62,790	0	8	5	0	0
Operator -Class C	**26**	**54,600**	**2**	**8**	**5**	**109,200**	**2**
Mechanic	26	54,600	0	8	5	0	0

* Salary rates based on FWPCOA Job Bank Web Site

$20.92/hr for a Class C Operator.

Additional 25 percent included for benefits

Engineer salary based on 2005 NACWA financial survey

Appendix

Side Stream Pilot Plant

Equipment Manufacturer's Cut Sheets
And Descriptive Literature

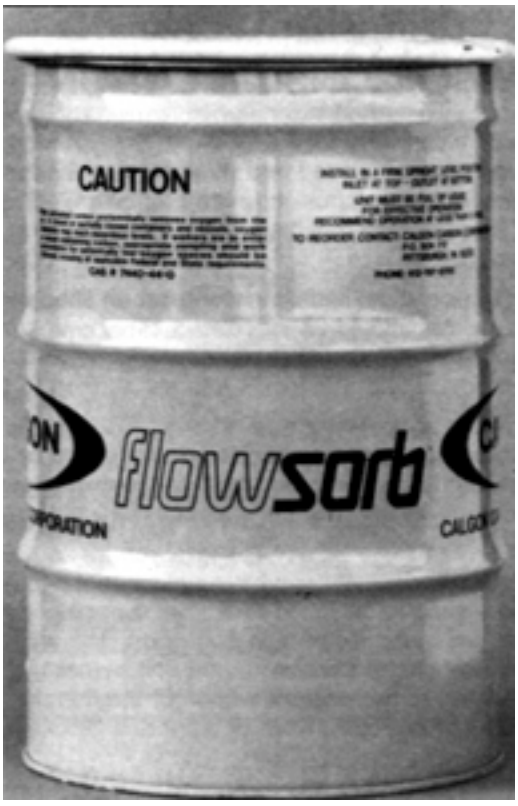
GRANULAR ACTIVATED CARBON

Equipment Bulletin

FLOWSORB®

General Description

Designed for low-flow water treatment applications, prefabricated 55-gallon Flowsorb® canisters contain all the operating elements found in a full-scale adsorption system. These small, economical treatment systems hold 165 pounds of granular activated carbon for applications including:



- Small wastewater streams
- Groundwater remediation
- Underground storage tank leaks
- Well pump tests
- Product purification or de-colorization
- Tank cleaning water treatment
- Batch water or product treatment
- Carbon adsorption pilot testing
- Emergency spill treatment
- Monitoring well water treatment

Features

Flowsorb offers several features and benefits to industrial, commercial and municipal users including:

- Sturdy 16 gauge steel construction
- Low cost per unit makes carbontreatment economical
- Simple installation and operation
- Space above carbon bed facilitates flow distribution or back-flushing
- Flexibility to be used in series or parallel operation
- Supplied with virgin or reactivated carbon
- Practical disposal option, as pre-approved spent carbon canisters may be returned to Calgon Carbon Corporation for safe carbon reactivation
- Continuous treatment at varying flow rates and concentrations

Flowsorb Specifications

Vessel	Open head 16 gauge steel canister
Max Operating Pressure	5 psig
Cover	Removable steel cover, 12 gauge bolt ring with butyl rubber sponge gasket
Internal Coating	Heat cured phenolic epoxy
External Coating	Baked enamel (gray)
Temperature Limit	150^{O}F (65.6^{O}C) continuous350^{O}F (176.7^{O}C) intermittent
Inlet	2" FNPT Nylon fitting
Outlet	2" FNPT Galvanized steel coupling; 304 stainless steel collector in nylon drum fitting
Carbon	165 pounds granular activated carbon: Specify Filtrasorb 300 or reactivated grade
Ship Weight	232 pounds (105 kg)
Identification	Sequentially numbered for traceability

Typical Flowsorb Operating Parameters

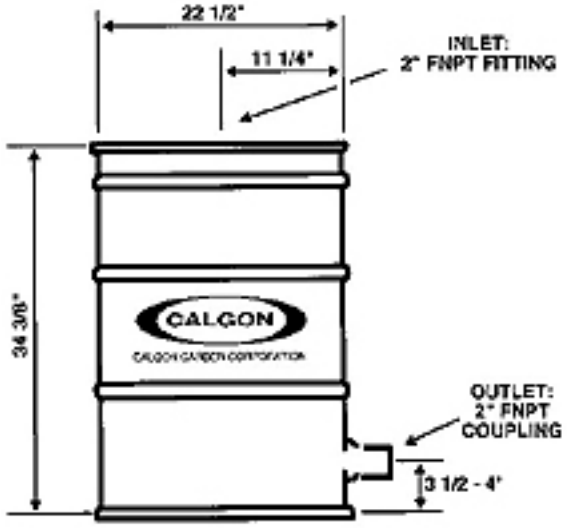
Flow Rate	10 gpm (37.8 l/m)
Contact Time	4.5 minutes
Pressure Drop	< 1 psi (clean water and carbon)
Operating Pressures	Recommend operation at less than5 psig, but higher pressures, up to12 psig, possible with tight cover closure

Flowsorb Installation

Flowsorb canisters are shipped with dry activated carbon; the carbon must be wetted and de-aerated prior to use. This procedure displaces air from the internal structure of the carbon granule, thus assuring that the liquid to be treated is in contact with the carbon surface.

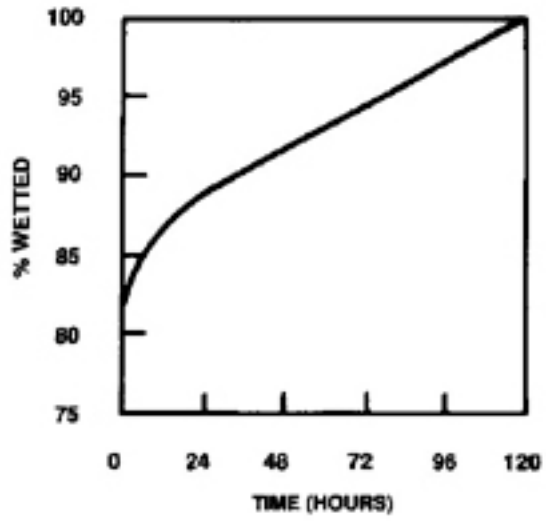
Prior to operation, each canister must be filled with clean water; the water should be introduced into the bottom outlet connection. The unit should set for approximately 48 hours - this allows most of the carbon's internal surface to become wetted, as shown on the wetting curve below.

After wetting, the carbon bed can be de-aerated by draining the canister and again filling the canister up-flow with clean water. This procedure will eliminate any air pockets which may have formed between the carbon granules. The Flowsorb is now ready for operation.



Flowsorb Dimensions

Canisters should be set on a flat, level surface and piped as recommended in the installation illustration. The influent pipe connection should be attached to the unit by using a flexible connection, as some minor deflection of the lid may occur if pressure builds due to filtration or other flow blockage downstream.



Flowsorb discharge piping should include an elevated piping loop to assure that the canister remains flooded with water at all times. In addition to the piping loop, a drain connection is recommended on the discharge piping; this allows drainage of the unit prior to disconnection or temporary shutdown.

A filter should be installed if the liquid to be treated contains substantial amounts of suspended solids. A simple cartridge or screen filter helps prevent pressure buildup in the carbon bed.

Safety Message

Wet activated carbon preferentially removes oxygen from air. In closed or partially closed containers and vessels, oxygen depletion may reach hazardous levels. If workers are to enter a vessel containing carbon, appropriate sampling and work procedures for potentially low oxygen spaces should be followed, including all applicable federal and state requirements.

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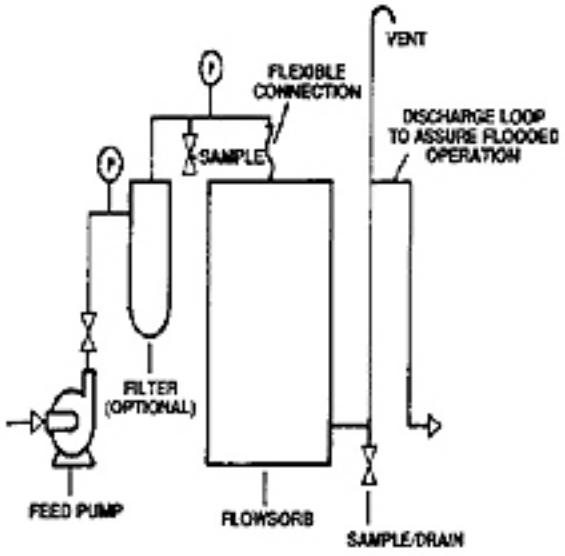
Chemviron Carbon

Flowsorb Operation

Flowsorb canisters should be full of clean water before treatment begins. Flow rate to the canister should be determined based on required contact time between the liquid and the carbon media. In ground-water treatment applications, the recommended contact time is typically 8-10 minutes with a resultant flow of approximately 5 gpm. Consult you Calgon Carbon Corporation Technical Sales Representative for advice about proper contact time for your application.

Flowsorbs can be manifolded in parallel operation for higher flow rates. For series operation, two Flowsorbs can be piped together sequentially, as normal pressure drop will not exceed the recommended operating pressure.

These canisters have space for bed expansion and can be back flushed by introducing clean water or liquid at approximately 20-25 gpm to the outlet and taking back-flush water from the inlet.



Typical Flowsorb Installation

If the operating pressure is expected to exceed 5 psig, an application of adhesive caulk at the lid gasket is recommended to prevent leakage. With all surfaces dry, apply the adhesive caulk to the lid recess and lip of the drum per the manufacturer's procedure and set the Flowsorb gasket into the lid recess. After allowing the caulk to set, install the drum lid and tighten the bolt ring.

Theoretical Flowsorb Treatment Capacity for Typical Cases

	Case 1		*Case 2*		*Case 3*	
	Conc.	**Gallons**	**Conc**	**Gallons**	**Conc**	**Gallons**
Benzene	20 ppb		200 ppb		2ppm	
Toluene	40ppb	1,600,000	400 ppb	400,000	4ppm	85,000
Xylene	40ppb		400 ppb		4ppm	

	Case 4		*Case 5*		*Case 6*	
	Conc	**Gallons**	**Conc**	**Gallons**	**Conc**	**Gallons**
TCE	50 ppb		500 ppb		5 ppm	
PCE	50 ppb	1,900,000	500 ppb	550,000	4 ppm	125,000

	Case 7		*Case 8*		*Case 9*	
	Conc	**Gallons**	**Conc**	**Gallons**	**Conc**	**Gallons**
Phenol	1ppm		10 ppm		100 ppm	
Total SOC	10ppm	230,000	100 ppm	50,000	1,000 ppm	10,000

Each case represents a groundwater or wastewater stream that contains the combination of contaminants listed. The treatment capacity indicates the total gallons of that particular water that may be treated before any of the specific contaminants are present in the treated water as noted. Theoretical capacity based on 5 gpm, water at 70ºF or less and 165 pounds of Filtrasorb 300. Background TOC is less than 1 ppm except phenol cases as noted. Contaminants reduced to < 5 ppb, except phenol case which is for 95% phenol reduction.

How to Estimate Flowsorb Life

The treatment table on this page lists the volume of water that can be purified by the Flowsorb for typical contamination situations. However, most applications involve a unique mixture of organic chemical contaminants including some chemicals that adsorb at different capacities or strengths. Please consult with you Calgon Carbon Technical Sales Representative for more information about carbon usage rates.

Return of Flowsorbs

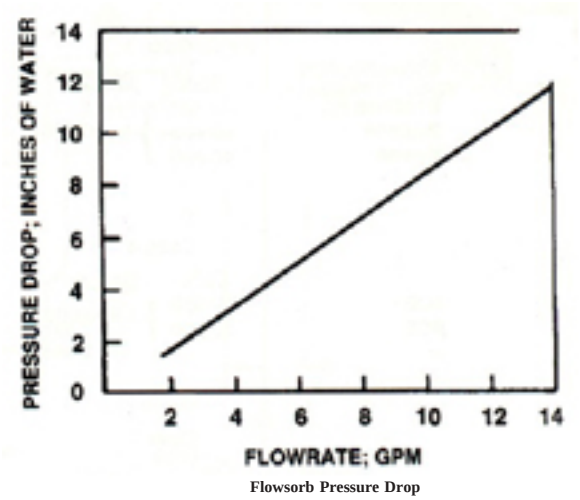
Arrangements should be made at the time of purchase regarding the future return of canisters containing spent carbon. Calgon Carbon will provide instructions on how to sample the spent carbon and arrange for carbon acceptance testing. The spent carbon is reactivated by Calgon Carbon and all of the contaminants are thermally destroyed. The company will not accept Flowsorbs for landfill, incineration or other means of disposal.lowsorbs cannot be returned to Calgon Carbon unless the carbon acceptance procedure has been completed, an acceptance number provided, and the return labels (included with the units at the time of purchase) are attached.Flowsorbs must be drained - and inlet/outlet connections must be plugged - prior to return to Calgon Carbon.

Safety Considerations

It is unlikely that a worker would be able to physically enter a Flowsorb canister. However, the following information and precautions apply to a partially closed canister or situations where carbon is to be removed from the canister and stored elsewhere. Wet or dry activated carbon preferentially removes oxygen from air. In closed or partially closed containers, oxygen depletion may reach hazardous levels. If workers must enter a vessel containing carbon, appropriate sampling and work procedures should be followed for potentially low-oxygen spaces - including all applicable federal and state requirements.

Calgon Carbon Liquid Purification System

Flowsorb is a unit specifically designed for a variety of small flow applications. Calgon Carbon Corporation offers a wide range of carbon adsorption systems and services for a greater range of flow rates and carbon usages to meet specific applications.



Flowsorb Pressure Drop

Warranty

There are no expressed or implied warranties - or any warranty of merchantability or fitness - for a particular purpose associated with the sale of this product.

Limitation of Liability

The Purchaser's exclusive remedy for any cause of action arising out of purchase and use of the Flowsorb, including but not limited to breach of warranty, negligence and/or indemnifications, is expressly limited to a maximum of the purchase price of the Flowsorb unit as sold. All claims of whatsoever nature shall be deemed waived unless made in writing within forty-five (45) days of the occurrence giving rise to the claim. In no event shall Calgon Carbon Corporation for any reason be liable for incidental or consequential damages, in excess of the purchase price of the Flowsorb unit, loss of profits or fines imposed by governmental agencies.

For information regarding incidents involving human and environmental exposure, please call (412) 787-6700 and ask for the Regulatory and Trade Affairs Department. **Application information provided in this bulletin is based upon theoretical data. Calgon Carbon Corporation assumes no responsibility for the use of the information in this product bulletin.** If at any time our products or services do not meet your requirements or expectations, or if you would like to suggest any ideas for improvement, please call us at 1-800-548-1999. From outside the U.S. please call +1-412-787-6700.

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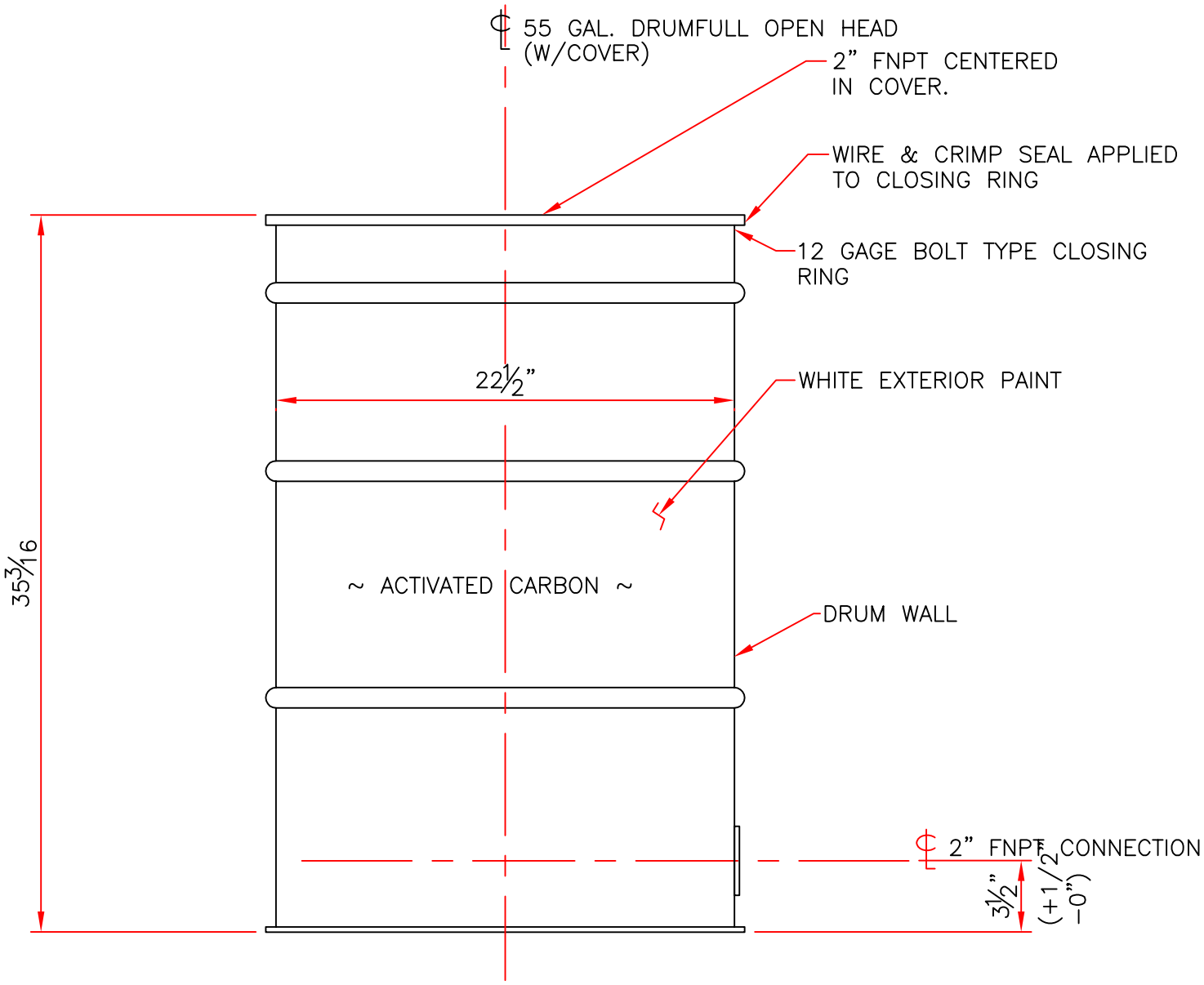
B-7181 Feluy, Belgium

Chemviron Carbon



NOTES:

1. MEETS UN1A2/X200/S
2. RECOMMENDED OPERATING PRESSURE 4 PSIG.
3. TEMPERATURE LIMIT 250°F INTERMITTENT
4. SHIPPING WEIGHT 219 LB.

SAP PART# 1043492

REV	DESCRIPTION	APP	DATE
C			
B			
A	Issued for Purchase	MHS	08/25/2005

REVISIONS

	NAME	DATE
DRAFTER	MHS	08/25/2005
DESIGNER		
CHECKER	JM	08/25/2005
APPROVAL	MHS	08/25/2005
PROJECT No.		

CALGON

CALGON CARBON CORPORATION

CLIENT: SALES DRAWING

TITLE: 55 GALLON DRUM ADSORBER

DWG. Size	SHEET No.	SCALE
A	1 OF 1	1 1/2"=1"-0"

DWG. No. 90-30-6000 REV. A

ION EXCHANGE

TONKA
WATER
TREATMENT
SYSTEMS

TONKA EQUIPMENT COMPANY
P.O. BOX 41126, PLYMOUTH, MN 55441-0126
13305 WATER TOWER CIRCLE, PLYMOUTH, MN 55441

PH: 763-55WATER
PH: 763-559-2837
FAX: 763-559-1925

November 14, 2006

Harikiran Sirivooru,
CDM
800 Brickell Avenue, Suite 710
Miami, FL 33131

Re: 10 gpm pilot unit for water reuse demonstration plant

Dear Mr. Sirivooru:

In accordance with our understanding of the above project, Tonka Equipment is pleased to provide budgetary pricing for pilot ion exchange equipment. We propose a dual-stage system described below.

Each ion exchange unit is designed for a flow of 10 gpm, running in series. The first unit would be designed for organic scavenging and the second unit would be designed for nitrate removal. This system does not include a bypass/blend system, as it is our understanding that the intent is to treat the entire 10 gpm flow. We have quoted a custom-designed pilot unit and the below price represents a "sale" price.

Included with this system are the following:

Two (2) 1'-6" diameter ion exchange vessels including:

Ion exchange resin (organic scavenging and nitrate selective)
Tonka underdrain nozzles
PVC header/lateral overdrain and underdrain systems
Hydraulic diaphragm valves
PVC facepiping
Sample taps
Brine dilution system
Gauges and meters
Automatic control system, allowing for complete, stand-alone automatic regeneration of ion exchange columns

- Services include freight.
- Factory training and start up services are <u>not</u> included.

The budgetary price for this system is $ 40,000

Tonka requires 6 weeks notice for manufacture after receipt of acceptable order. Start-up and technical services are available for $750/day plus travel and living expenses.

Note: the ion exchange resin may produce trace amounts of NDMA in the presence of chlorine. For this reason Tonka strongly recommends maintaining UV treatment downstream of this system to reduce the concentration of NDMA in the effluent, and to destroy other trace organics that may be endemic to this effluent.

We look forward to working with you on this water treatment project. If you have any questions, please feel free to call me at (763) 559-2837.

Sincerely,

Thomas D. Davis, P.E

Thomas D. Davis, PE

cc: Chuck Hlavach, Envirosales

FL_SD WWTP_IEX pilot budget_11-14-06.doc

REVERSE OSMOSIS (RO)

TECHNICAL DATA SHEET
RO PILOT

RO SKID

ITEM	UNITS	REQUIREMENT
NO OF SKIDS (TRAINS)		1
PRODUCTION	GPM	30
NO VESSELS		6
MEMBRANES PER VESSEL		7
ARRAY		4:2
AVERAGE FLUX	GFD	12
NOMINAL PRODUCTION PER ELEMENT	GPD	1020
RECOVERY STAGES 1 & 2	%	75%
PRODUCT QUALITY	PPM TDS	
FRAME MATERIAL		CS PAINTED
FRAME HEIGHT - MAX	FT	5

PRESSURE VESSELS

MANUFACTURER		PENTAIR OR PROTEC
DIAMETER	IN	4
LENGTH	IN	287
PORTS - FEED/CONCENTRATE	IN	1" IPS
PORTS - PERMEATE	IN	3/4" FPT
MAXIMUM WORKING PRESSURE RATING	PSIG	300
SHELL MATERIAL		FRP ASME SECT X
COLOR		WHITE
END PLATE MATERIAL		PVC COATED ALUMINUM

MEMBRANES

MANUFACTURER		HYDRANAUTICS, FILMTEC, KOCH OR APPROVED EQUAL
NUMBER		42
TYPE		LOW FOULING
NOMINAL DIAMETER	IN	4
NOMINAL LENGTH	IN	40
AREA PER ELEMENT	FT2	85
MATERIAL		POYAMIDE (THIN FILM COMPOSITE)
TYPE		SPIRAL WOUND
DESIGN MEMBRANE FLUX AVG.	GFD	12
AREA PER ELEMENT	FT2	85
MAXIMUM FEED PRESSURE	PSI	250

TECHNICAL DATA SHEET
RO PILOT

HIGH PRESSURE FEED PUMP

ITEM	UNITS	REQUIREMENT
MANUFACTURER		GRUNDFOS
MODEL		
TYPE		CENTRIFUGAL
NUMBER		1
CAPACITY	GPM	40
SPEED	RPM	3450
MINIMUM SUCTION HEAD	FT	23
TDH	FT	554
EFFICIENCY	%	65%
HYDRAULIC HP		8.6
RECOMMENDED MOTOR	HP	10.0
NUMBER OF STAGES		
DRIVE TYPE		VFD
MATERIAL- BOWLS		316 SS
MATERIAL- IMPELLERS		316 SS
MATERIAL-SHAFT		329 SS

PUMP DRIVER

MOTOR TYPE		TEFC
MOTOR HP	HP	10
VOLTS	VOLTS	480
PHASE		3
RPM		3600
SERVICE FACTOR		1.15
APPLICATION RATING		NEMA MG1 - 1993 Rev 1 Part 31
INSULATION		B

VARIABLE SPEED DRIVE

MANUFACTURER		ALLEN BRADLEY, ABB, SQUARE D, MITSUBISHI
MODEL NUMBER		
POWER RATING	HP	10
ENCLOSURE		IN POWER PANEL
PLC INTERFACE		WIRED OR DEVICE NET

TECHNICAL DATA SHEET
RO PILOT

ACID DOSING

ITEM	UNITS	REQUIREMENT
NUMBER OF PUMPS		1 PLUS 1 UNINSTALLED SPARE
MANUFACTURER		PROMINENT OR LMI
MODEL NUMBER		GAMMA/4B
CAPACITY	GPH	0.45
DISCHARGE PRESSURE	PSI	174.0
PUMP HEAD		PTFE
SUCTION/DISCHARGE VALVES		PTFE
VALVE BALLS		PTFE
VALVE SPRINGS		HAST C
INJECTION CHECK VALVE		PTFE
FOOT VALVE & STRAINER		PTFE
CONTROL SIGNAL		4-20MA
ELECTRICAL		120 V
TANK CAPACITY	GAL	15
TANK MATERIAL		STD
PIPING MATERIALS		PTFE TUBING

ANTISCALANT DOSING

NUMBER OF PUMPS		1 PLUS 1 UNINSTALLED SPARE
MANUFACTURER		PROMINENT OR LMI
MODEL NUMBER		GAMMA/4B
CAPACITY	GPH	0.45
DISCHARGE PRESSURE	PSI	174.0
PUMP HEAD		ACRYLIC
SUCTION/DISCHARGE VALVES		PVC
VALVE BALLS		PVC
VALVE SPRINGS		316 SS
INJECTION CHECK VALVE		PVC
FOOT VALVE & STRAINER		PVC
CONTROL SIGNAL		4-20MA
ELECTRICAL		120 V
DAY TANK CAPACITY	GAL	30
PIPING MATERIALS		POLYPROPYLENE

TECHNICAL DATA SHEET
RO PILOT

CLEANING PUMP

ITEM	UNITS	REQUIREMENT
MANUFACTURER		GRUNDFOS
MODEL		CRN 8-30
TYPE		CENTRIFUGAL
NUMBER		1
CAPACITY	GPM	40
SPEED	RPM	3450
TDH	FT	116
EFFICIENCY	%	66%
NUMBER OF STAGES		3
MATERIAL- BOWLS		316 SS
MATERIAL- IMPELLERS		316 SS
MATERIAL-SHAFT		329 SS
MOTOR TYPE		TEFC
MOTOR HP		3
VOLTS		480
PHASE		3
RPM		3600
SERVICE FACTOR		1.15
MOTOR INSULATION		B

CARTRIDGE FILTERS

NUMBER OF FILTER VESSELS		1
FLOW	GPM	44
MANUFACTURER		PARKER
MODEL		FH55530-L
CARTRIDGE MANUFACTURERS		PARKER,CUNO
CARTRIDGE TYPE		HFT 5M 30A/TX/N
MATERIAL		POLYPROPYLENE
RATING	MICRON	5
CARTRIDGE NOMINAL LENGTH	IN	30
NO. OF CARTRIDGES/VESSEL		6
SHELL MATERIAL		RTR
FILTER MATERIAL		POLYPROPYLENE
MAX. LOADING PER CARTRIDGE	GPM	3.5
VESSEL DESIGN PRESSURE	PSIG	100

TECHNICAL DATA SHEET
RO PILOT

PIPING

ITEM	UNITS	REQUIREMENT
FEED(LOW PRESSURE)		SCHED 80 PVC
FEED(HIGH PRESSURE)		SCHED 80 PVC
CONCENTRATE: (HP)		SCHED 80 PVC
CONCENTRATE: (LP)		SCHED 80 PVC
PERMEATE:		SCHED 80 PVC
CLEANING:		NYLON HOSE
CHEMICAL	ANTISCALANT	POLYPRO TUBING
	ACID	PTFE TUBING

CLEANING TANK

NUMBER		1
CAPACITY	GAL	100
HORIZONTAL/VERTICAL		VERTICAL
MATERIAL		HDPE
COVER & ACCESS HATCH		INCLUDED
TWO BULKHEAD FITTINGS		INCLUDED

POWER PANEL

NOMINAL SYSTEM VOLTAGE	VOLTS	480
FREQUENCY (Hz)		60
MAIN DISCONNECT		60 AMP MAIN CIRCUIT BREAKER
MAIN BUS CONTINUOUS RATING	AMPS	60
MAXIMUM SHORT CIRCUIT CURRENT		25K AIC (MIN)
PANEL SECONDAY VOLTAGE	VOLTS	120-240
120 V BRANCH CIRCUITS		10 @ 20 AMP MIN
CPT SIZE		5 KVA (MIN)
ENCLOSURE TYPE		NEMA 4X
MANUFACTURER		HOFFMANN
ALARM CONTACT		PHASE MONITOR
TRANSIENT VOLTAGE SURGE SUPRESSION		120 KA PER PHASE ON INCOMING 480V FEED

TECHNICAL DATA SHEET
RO PILOT

CONTROL PANEL

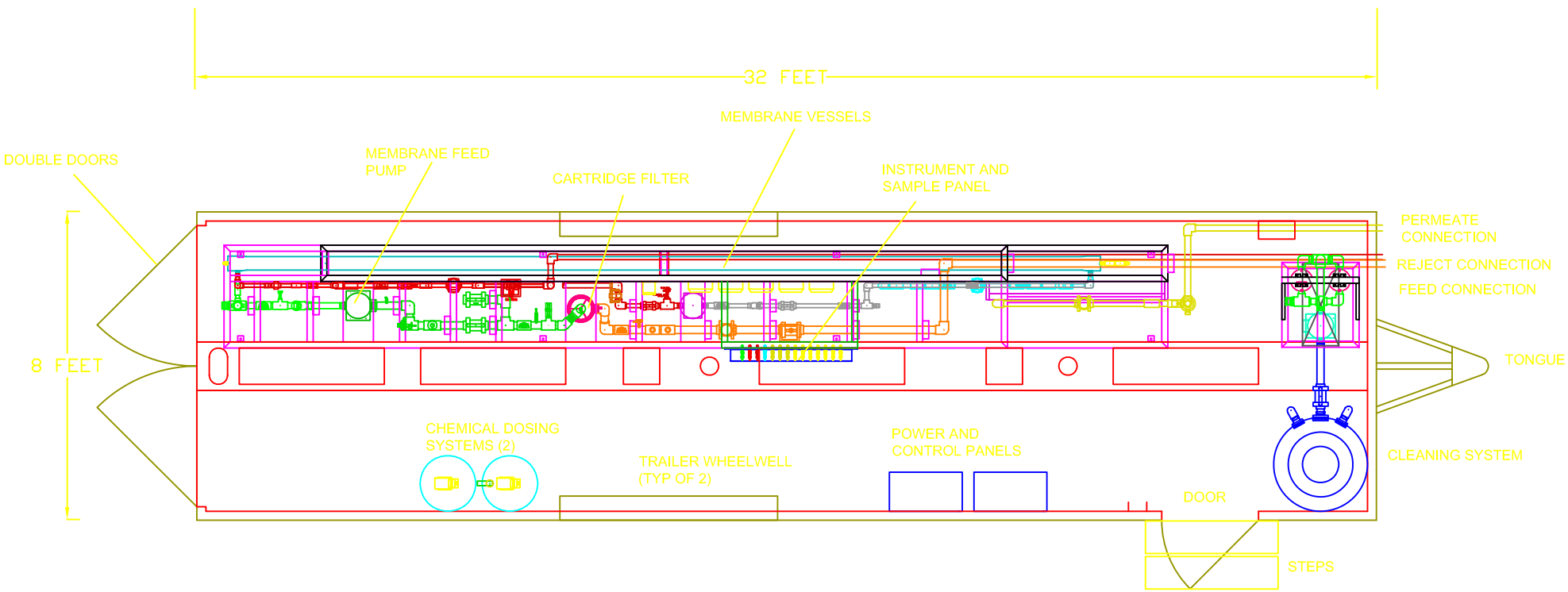
ITEM	UNITS	REQUIREMENT
MANUFACTURER		HOFFMAN
NEMA RATING		NEMA 4X
PLC MANUFACTURER		ALLEN BRADLEY
NUMBER		1
PLC MODEL		SLC 5/03
DIGITAL AC INPUT MODULES	MODS/POINTS	18 (MIN)
DIGITAL AC OUTPUT MODULES	MODS/POINTS	11 (MIN)
4-20 MA ANALOG INPUTS	NO. OF INPUTS	26 (MIN)
4-20 MA ANALOG OUTPUTS	NO. OF OUTPUTS	5 (MIN)
ALARM CONTACT		COMMON TROUBLE ALARM
POWER SUPPLY		120 VAC
PC COMPUTER/HMI		DELL LATITUDE OR EQUAL
PC COMPUTER/HMI FUNCTIONS		INDICATION ALL ANALOG AND ALARMS, ETC
REMOTE MONITORING & CONTROL		ALL HMI INPUTS, SYSTEM LOSS OF POWER, MOTOR OVERLOADS
INTERFACE PROGRAM		RSVIEW, LATEST REV, 150 TAGS , WINDOWS NT COMPATIBLE
PLC PROGRAM		REV

TRAILER

MANUFACTURER		WELLS CARGO, CONTINENTAL or Equal
NOMINAL DIMENSIONS	LxWxH FT	32x8x8
SIDE WALLS		3/8" PLYWOOD
FRAME		8" I-BEAM
FRAMING		12" OC (FLOOR), 16" OC (WALLS)
ROOF		GALVANIZED STEEL
EXTERIOR		0.030" ALUMINUM
FLOOR		3/4" EXTERIOR PLYWOOD
CEILING		INSULATED LUAN
AXELS		TANDEM
AXEL TYPE		7000# AXLES
TIRE SIZE/LOAD RANGE		"E" Rated ST225 75R15 - 8 LUG WHEEL
SUSPENSION (SHOCKS)		TORFLEX

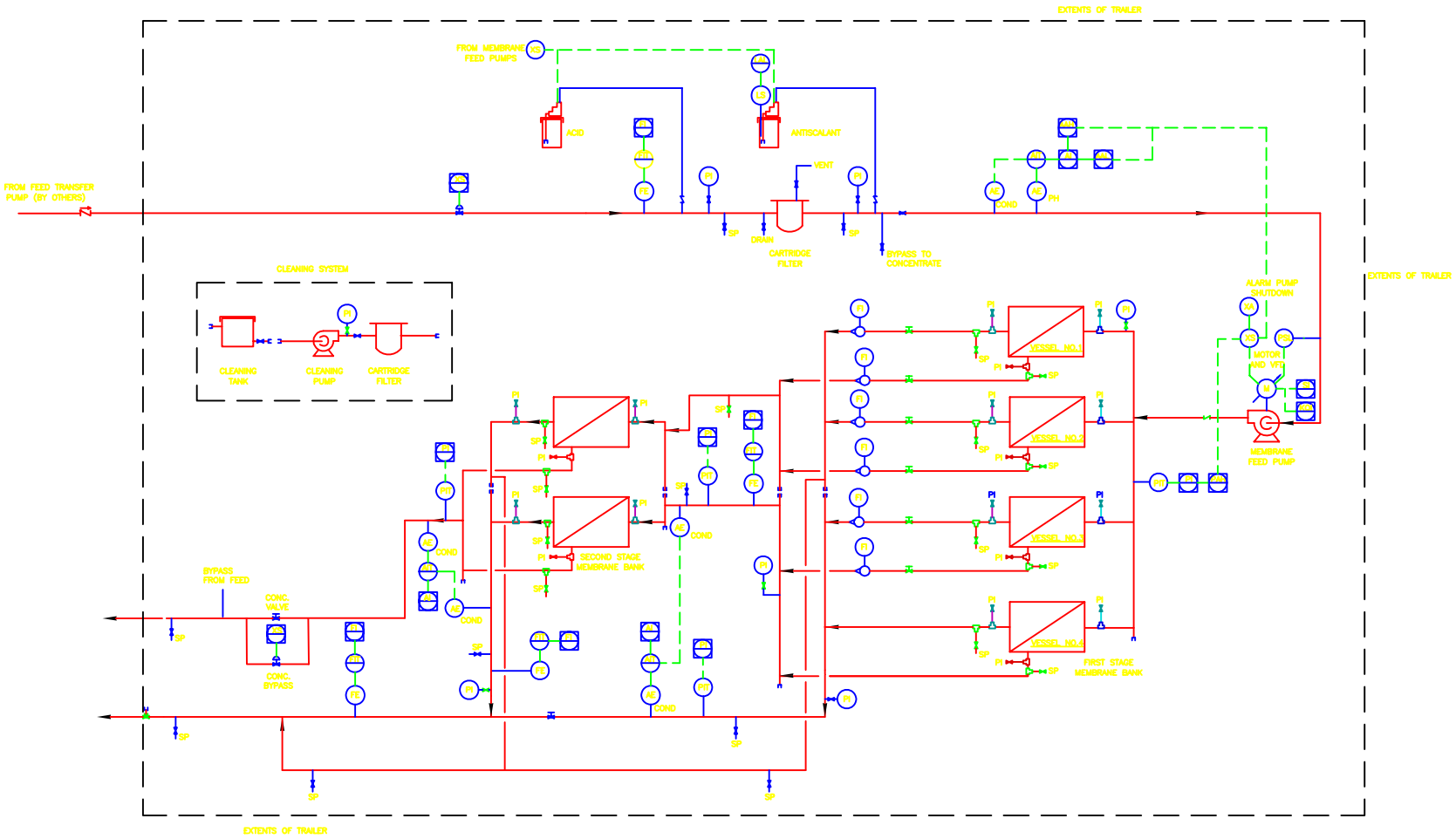
TECHNICAL DATA SHEET
RO PILOT

ITEM	UNITS	REQUIREMENT
BRAKES		ELECTRIC
INSULATION		BEAD FOAM STYROFOAM
SIDE DOORS		32"
REAR DOORS		DOUBLE
REAR DOOR OPENING WIDTHxHEIGHT	IN	7'x5'10"
AIR CONDITIONING UNIT		2 TON
ELECTRICAL		30 AMP PANEL
LIGHTING		4-8' DOUBLE FLUORESCENT
LIGHTING		2-12 V INSIDE LIGHTS
TOW CONNECTION		1 5/16" BALL
ELECTRICAL OUTLETS		2 @ 110 V



RO PILOT PLANT TRAILER EQUIPMENT LAYOUT

PROCESS FLOW DIAGRAM



PIPING AND INSTRUMENTATION DIAGRAM

ADVANCED OXIDATION PROCESS

- UV/O3 – Applied process technology
- UV/H2O2 - WEDECO
- UV - Aquionics

Applied Process Technology, Inc.

Clean Water. No Waste.

HiPOx HCU

Advanced Oxidation System

HCU

The HiPOx HCU is an advanced oxidation system that combines ozone and hydrogen peroxide to destroy groundwater contaminants in a continuous flow reactor. The system utilizes multiple reagent injection points and mixers to maximize contaminant destruction in a waste-free process.

The HCU is a compact skid-mounted unit with a footprint ideal for very small spaces. Low-to-medium ozone capacities make the HCU appropriate for low-flow sites with low-to-moderate contaminant concentrations.

- ✓ PLC control system provides for unattended and automated operation
- ✓ Fail-safe operation
- ✓ Automatic paging in event of shutdown
- ✓ Operating set points adjusted via local Operator Interface Terminal (OIT) or remotely via modem with optional SCADA package

STANDARD SPECIFICATIONS

Flow Rate	3 – 160 GPM
Ozone Capacity	Up to 20 lbs/day
Dimensions	8'L x 4'6"Wx 7'6"H
Weight	Approx. 4,500 lbs
Electrical Requirements	208VAC, 3Ø or 240VAC, 1Ø, 60 Hz, 55A maximum
Power Consumption	7-13 kW

SYSTEM CONFIGURATION AND FEATURES

Enclosure/Skid	Galvanized-skid platform; weather-resistant enclosure; corrosion-resistant piping; NFPA signage; power and process connections conveniently located to facilitate quick installation
Safety	Shop tested; ozone detector and destruct unit; fail-safe shutdown features; all ozone-containing piping is joint-free or (double-)contained within monitored enclosures

✓ *Waste-Free Contaminant Destruction*
✓ *Scalable Process for Predictable Results*
✓ *Highly-Effective, Low-Cost Solution*

OZONE GENERATION / DISTRIBUTION SYSTEM*

Generator Capacity	Up to 20 lbs/day**
Concentration	8% – 10% by weight
Injection Capacity	5 – 150 mg/L ozone dose
Injection Piping	PFA Teflon™

**includes rack-mounted, solid-state ozone generator(s), ozone manifold with metering and check valves, automatic pressure control and shutoff valve*
***uses oxygen from liquid oxygen dewars or produced by oxygen generation system*

REACTOR SYSTEM*

Flow Rate	3 – 160 GPM
Reactor Construction	PVC piping with internal static mixers
Reagent Control	Reagent addition precisely controlled and adjusted as needed at each injector

**includes gas/liquid separator and inlet flow meter; optional feed tank, pump and recycle valve also available*

HYDROGEN PEROXIDE SYSTEM*

Storage	25-gallon, non-metallic tank
Concentration	5% – 35% technical grade
Injection Piping	Polyethylene

**injection system included*

COOLING SYSTEM

Method	Refrigerated package chiller with outdoor condenser

OXYGEN SYSTEM*

Standard Supply	Liquid-oxygen Dewar cylinders
Size	160 – 265 liters
Concentration	99.9+%vol (Grade 6)

Optional Supply	PSA**-enriched gas
Concentration	90+%vol (-70ºF dew point)

**oxygen flow controller included; optional gas manifold available*
***Pressure-Swing Adsorption*

- ✓ Multiple ozone injection points maximize process efficiency and contaminant destruction
- ✓ Precision instrumentation for accurate reagent control
- ✓ One-button startup and shutdown; touchscreen control display for ease of operation

™Teflon is a registered trademark of the DuPont Co.

Applied Process Technology, Inc.
3333 Vincent Road, Suite 222, Pleasant Hill, CA 94523
tel: 925-977-1811 · fax: 925-977-1818 · toll free: 1-888-307-2749
www.aptwater.com · info@aptwater.com

BUDGETARY PROPOSAL #1960
PREPARED FOR CDM
BY APPLIED PROCESS TECHNOLOGY, INC.
PDH NOVEMBER 8, 2006

TREATMENT REQUIREMENTS

Site:	Miami Dade Water and Sewer Department - South District Wastewater Treatment Plant
Overview:	HiPOx Ozone / Hydrogen Peroxide Process Demonstration
Influent Stream Containing:	Nutrients and Emerging Contaminants
Treatment Specification:	NA
Discharge:	Recycle To WWTP Influent

HIPOX TECHNOLOGY

Applied Process Technology, Inc.'s innovative HiPOx technology is a continuous, in-line, at-pressure Advanced Oxidation Process (AOP) for the destruction of waterborne volatile organic compounds (VOCs). The process uses industry recognized ozone and hydrogen peroxide chemistry in a uniquely designed oxidation reactor. The reactants are injected directly into the water stream in precisely controlled ratios and locations, generating hydroxyl radicals, one of nature's most powerful oxidizers. These hydroxyl radicals attack the bonds in the organic contaminant molecules, progressively oxidizing these compounds and any resulting intermediate by-products until the basic atoms ultimately recombine into benign end-products of CO2, H2O, and salts.

HIPOX SOLUTION

To demonstrate the HiPOx ozone / hydrogen peroxide process' ability to treat wastewater, Applied proposes to provide a standard industrial system for short term lease.

The HiPOx Cabinet Unit (HCU) will be designed to treat a 6-10 gallons / minute of wastewater with up to 40 ppm of ozone and 20 ppm of hydrogen peroxide. At 10 gallons/minute flow rate, this will require approximately 4.9 lb/day ozone.

The HCU is fully pre-piped, wired and tested at Applied's Pleasant Hill, CA site.

The HiPOx HCU includes:

- One (1) each 100 gallon polyethylene equalization tank,

- One (1) each 9 gpm proprietary HiPOx™ reactor skid including plug-flow reactors, ozone and hydrogen peroxide injectors, and gas/liquid separation system,
- One (1) hydrogen peroxide storage (25 gallon) and delivery system,
- One (1) oxygen cylinder switching manifold and flow control system,
- One (1) 4.5 lb/day ozone generation with refrigerated cooling system,
- Integrated PLC based control system with modem for remote access.

The HCU system as described must be operated in an area with a non-hazardous electrical classification. The HCU should be operated and stored above freezing temperatures, and should be housed in a building or shed out of the direct sun / weather.

The HCU measures 4.5 ft wide x 8 ft long x 8 ft high and has an operating weight of approximately 4000 lb.

CUSTOMER RESPONSIBILITIES

CDM is responsible for:

- All HiPOx shipping and handling costs,
- Providing a secure, weather-protected site for the HCU System,
- All valves, regulators, booster pump(s), piping, etc. to tie the HCU System to the supply and discharge piping
- All site preparation and installation costs (including phone line),
- All building and operating permits and regulator interface,
- Suitable 208 volt / 3ph power supply,
- Ongoing oxygen (Dewars) supply,
- Hydrogen peroxide supply,
- All applicable taxes, and
- All analytical costs.

ESTIMATED UTILITY REQUIREMENTS & MONTHLY OPERATIONAL COSTS

The estimated consumables for the HiPOx HCU (at full flow and oxidant dose) are:

Power	2.1 kW
Oxygen	0.4 scfm
Hydrogen Peroxide	0.7 gal / day (35% solution)

The estimated operating cost for the HiPOx system as described is $395 / month.

Assumptions: 95% utilization and power at $0.10/kw-h, oxygen at $1.00 /CCF, and hydrogen peroxide at $3.00/gal (35% solution).

COMMERCIAL OFFERING

The HCU complete with one 5.0 lb/day ozone generator, can be leased for:

$3200.00 per month, FOB Pleasant Hill, California, minimum six month lease period.

Payment terms are first and last month's lease required prior to shipment of HCU, subsequent payments invoiced at the beginning of the month, payable net 30 days. Lease term begins upon HCU arrival at site.

Shipping costs (to and from site) are client's responsibility. If Applied administers the shipping, all related expense will be billed at cost plus 10%, payable net 30 days.

Applied will provide installation oversight, commissioning, and training services on a Time and Material basis, budget 3-5 days at $800/day plus travel and living expenses at cost + 10%.

Applied is eager to participate in the Miami-Dade Water and Sewer Department's wastewater treatment demonstration. If you have any questions or require additional information, please do not hesitate to contact me at 513 476 5600.

Sincerely,

Peter Herlihy
Applied Process Technology, Inc.
Cc: Doug Liddie, Keel Robinson, Customer File

	Demo Plant			Side Stream
	Unit 1	**Unit 2**	**Unit 3**	
Model	LBX400	LBX750	LBX750	LBX90
Number of lamps	16	32	32	4
Peak Flow	1 MGD			20 gpm
Dose (at peak flow)	80 mJ/cm2	160 mJ/cm2	160 mJ/cm2	600 mJ/cm2
Disinfection Limit	<10 FC / 100 ml (30-day geometric mean)	N/A	N/A	N/A
Budgetary Price	Total = **US$289,000**			**US$36,000**

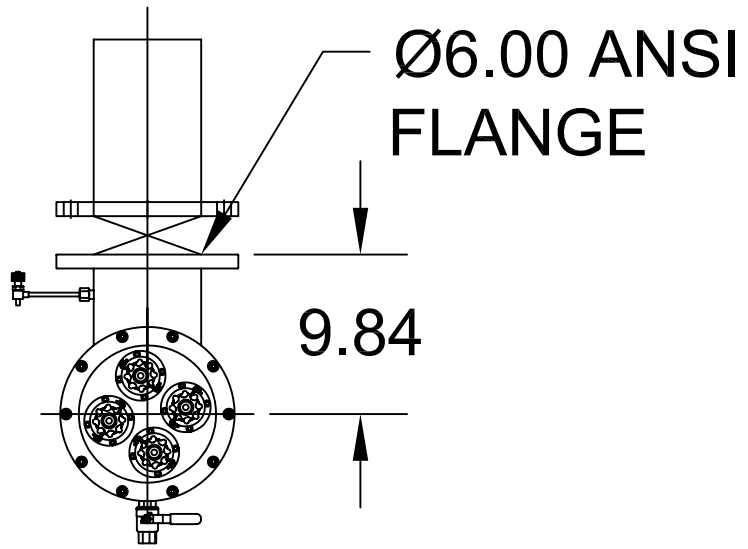
NOTES:

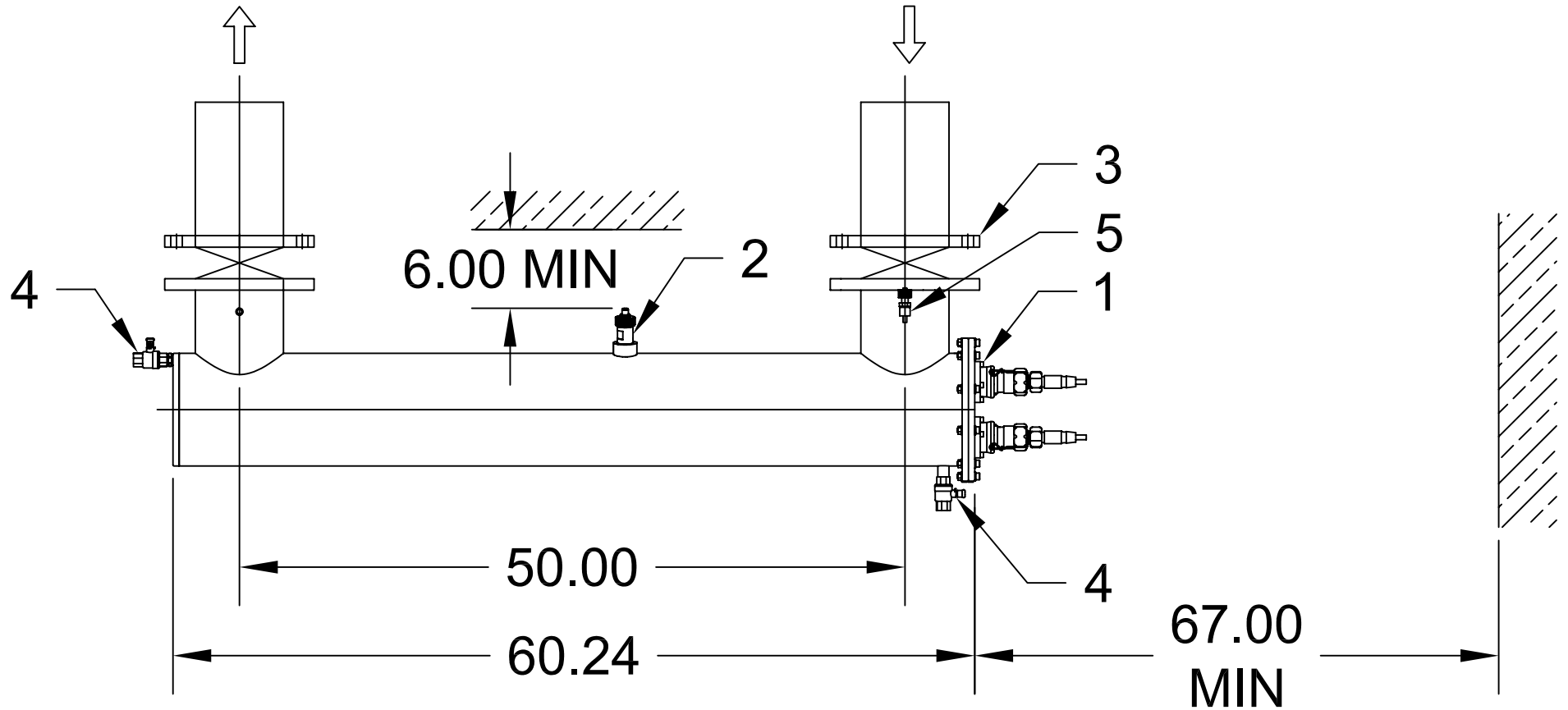
1.) The budgetary prices indicated do not include manufacturer's services which will be on a per diem rate.

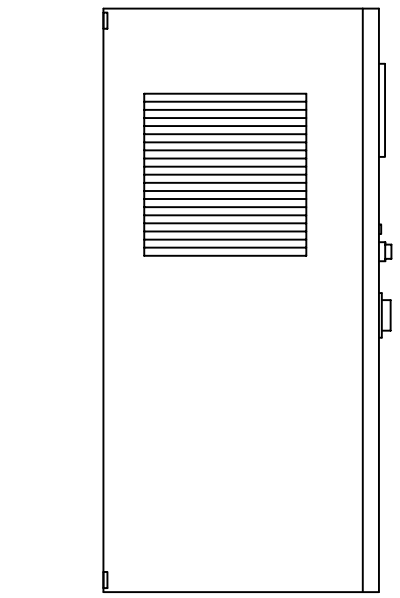
2.) WEDECO has made the following assumptions for advanced oxidation based upon our experience involving NDMA destruction:

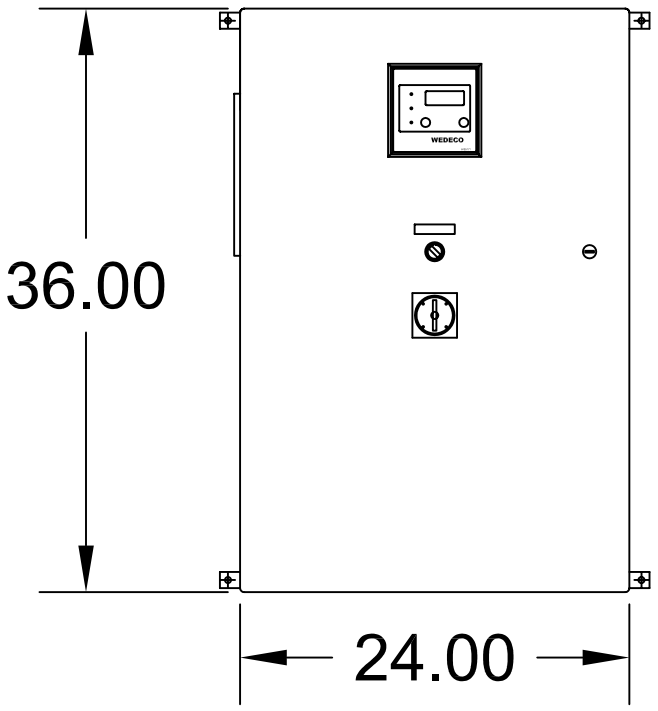
- EEO (beginning of lamp life) of 0.35 kWh/1000 gal
- Upstream addition of 5 mg/l H2O2

Please note that the EEO, however, is site-specific and depends upon the target organism of choice.









1. LAMP CONNECTOR
2. UV-SENSOR
3. SHUT-OFF VALVE (BY CUSTOMER)
4. CLEANING VALVE
5. SAMPLE VALVE (OPTION)

REV	DESCRIPTION	DATE	APPROVAL
	REVISIONS		

PROJECT

CUSTOMER

ENGINEER

NAVISION NUMBER | PO NUMBER

SPECIFICATION | JOB NUMBER

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE
.X = +/- .05 .XX = +/- .02 .XXX = +/- .005 ANG = 1° 0

FOR DISCUSSION ONLY

DESIGNER		8/12/05
CHECKER		
APPROVAL		
PROJ MGR		

WEDECO
ITT Industries
Engineered for life

14125 South Bridge Circle
Charlotte NC 28273 USA
(704) 716-7600
FAX (704) 295-9080

TITLE: UV DISINFECTION SYSTEM GENERAL ARRANGEMENT

MODEL NO.: LBX90

SIZE	DRAWING NO.	REV
B	GA-LBX90	-

SCALE: | WT. | MAT. | SHEET 1 OF 1

SPECS

TREATMENT CHAMBER

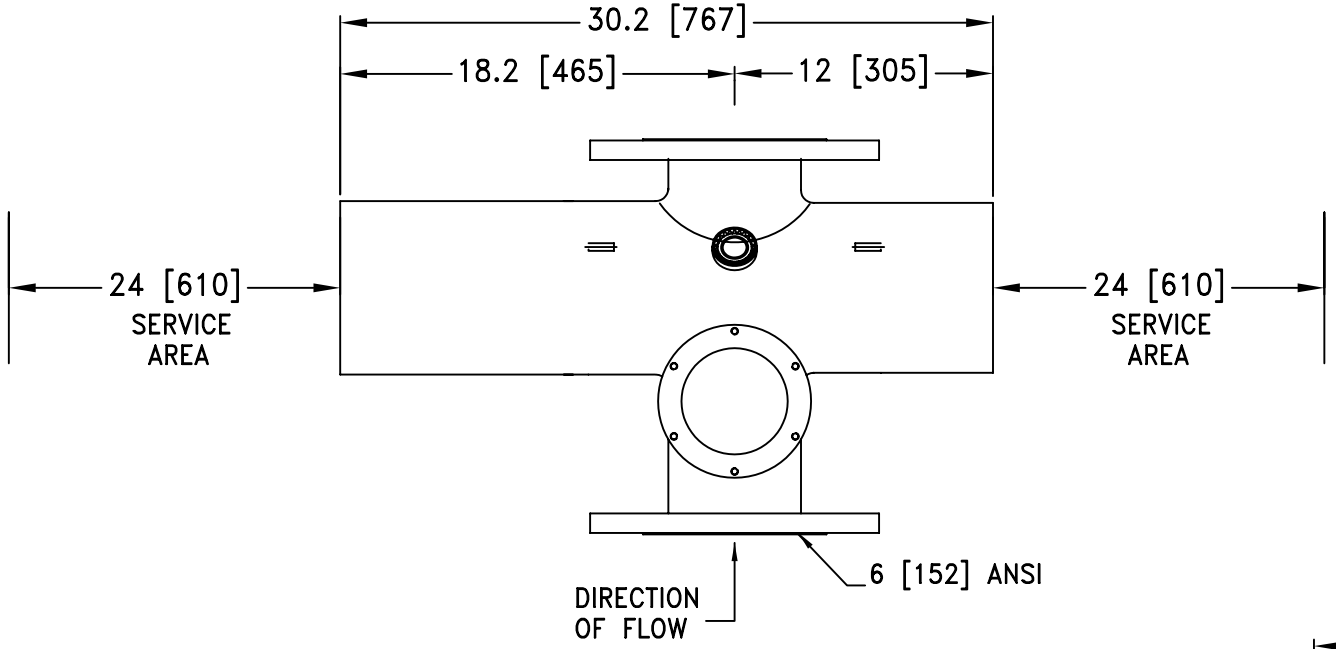
Model	: Inline 400+
Drawing	: INLN+06HA
Number per system	: 1
Material	: 316L stainless steel
Dimensions	
- length	: 18.3 in (465 mm)
- width	: 30.2 in (768 mm)
Weight	
- dry	: 115 lbs (52 kg)
- wet	: 143 lbs (65 kg)
Degree of protection	: NEMA12 (IP54)
Pressure rating	
- test	: 225 psi (15 bar)
- operational	: 150 psi (10 bar)
Operational water temperature	: 32–113 °F (0–45 °C)
Storage temperature	: 32–158 °F (0–70 °C)
UV lamp type	: B2020
Lamp life	: 8000 hrs (PL1, 2, and 3) : 6000 hrs (PL2 and 3) : 4000 hrs (PL3)
Number lamps per chamber	: 4
Inlet/Outlet connections	: 6 in ANSI
Features included	
- Access hatch	- UV sensor
- Temperature detector	- Cleaning mechanism (automatic)
- Manual air release valve	- Drain port

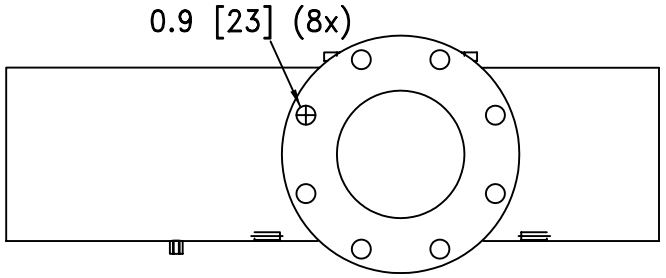
Options available

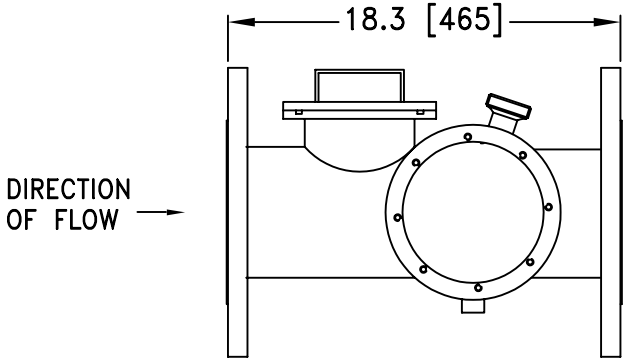
- Cleaning mechanism (manual or chemical assisted)
- Skid mounting
- Drain valve

POWER/CONTROL MODULE

Model	: 2020HSC4
Drawing	: CLIN400+
Number per system	: 1
Material	: Wall mounted epoxy coated steel
Dimensions	
- height	: 47.2 in (1200 mm)
- width	: 31.5 in (800 mm)
- depth	: 15.7 in (400 mm)
Weight	: 385 lbs (175 kg)
Degree of protection	: NEMA12 (IP54)
Operational temperature	: 32–113 °F (0–45 °C)
Storage temperature	: 32–158 °F (0–70 °C)
Lamp power	
- level 1	: 1500 W
- level 2	: 1880 W
- level 3	: 2240 W
Power level control	: Manual
Controls	: Ectronic+
Displays	
LEDs	
- UV on	- Warning
- Power on	- Alarm
Alphanumeric Scrolling Screen Menu (two line, 16 characters)	
- Power	- Flow (m^3/hr)
- Mode	- Total (hours)
- Language	- Lamps (hours)
- UV Int. (%)	- Wipes
- Water temp (deg C)	
Inputs	
- Remote ON/OFF	- Lamp power level
- Clear message	- Wipe
Outputs	
- Ready (PFC)	- Warning (PFC)
- UV intensity (mA)	- Alarm (PFC)
- UV failure (low intensity or lamp failure) (PFC)	
Electrical supply	
- voltage	: 480 V
- phase	: 3
- frequency	: 60 Hz
Power consumption (max.)	: 10 kW
Options available	
- NEMA 4X	
- UVtronic control system (microprocessor based)	



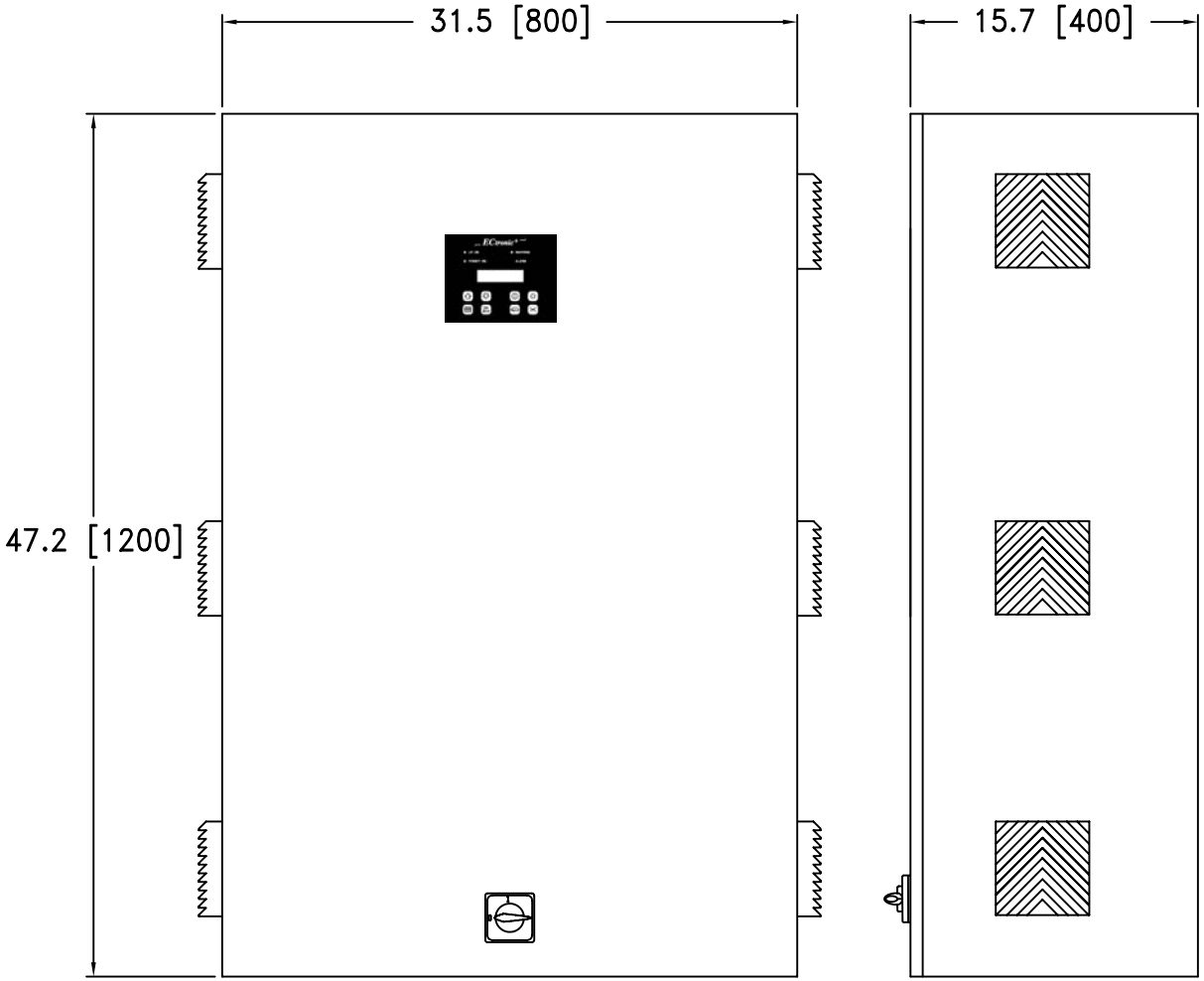


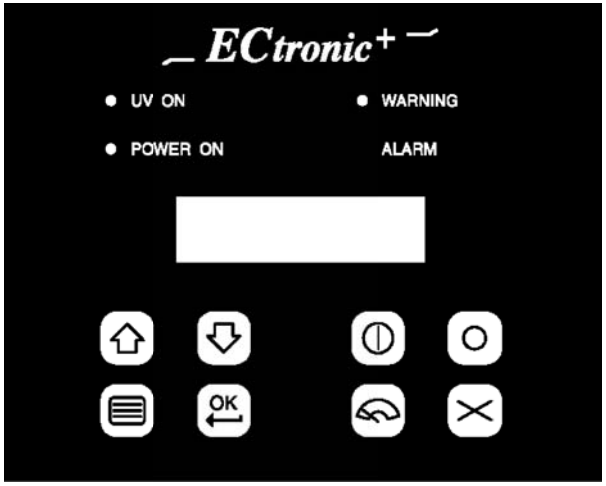


NOTES:
1. DIMENSIONS IN INCHES [MILLIMETERS].
2. DO NOT SCALE DRAWING.
3. CLEARANCE REQUIRED FOR SERVICE AND MAINTENANCE OF SYSTEM.
4. DIMENSIONS SUBJECT TO CHANGE.
5. ACCESS HATCH SHOULD BE PLACED UPSTREAM.

Title: INLINE 400+		Scale: NTS
WITH HATCH & AUTOMATIC WIPER		Page 1 of 1
6" ANSI FLANGES	Drawn: GCK	Date: 3/11/04
AQUIONICS A HALMA GROUP COMPANY	Appd: MJG	Date: 8/03/04
	Mat. 316L SS	Rev. B
	Part No.: INLN+06HA	

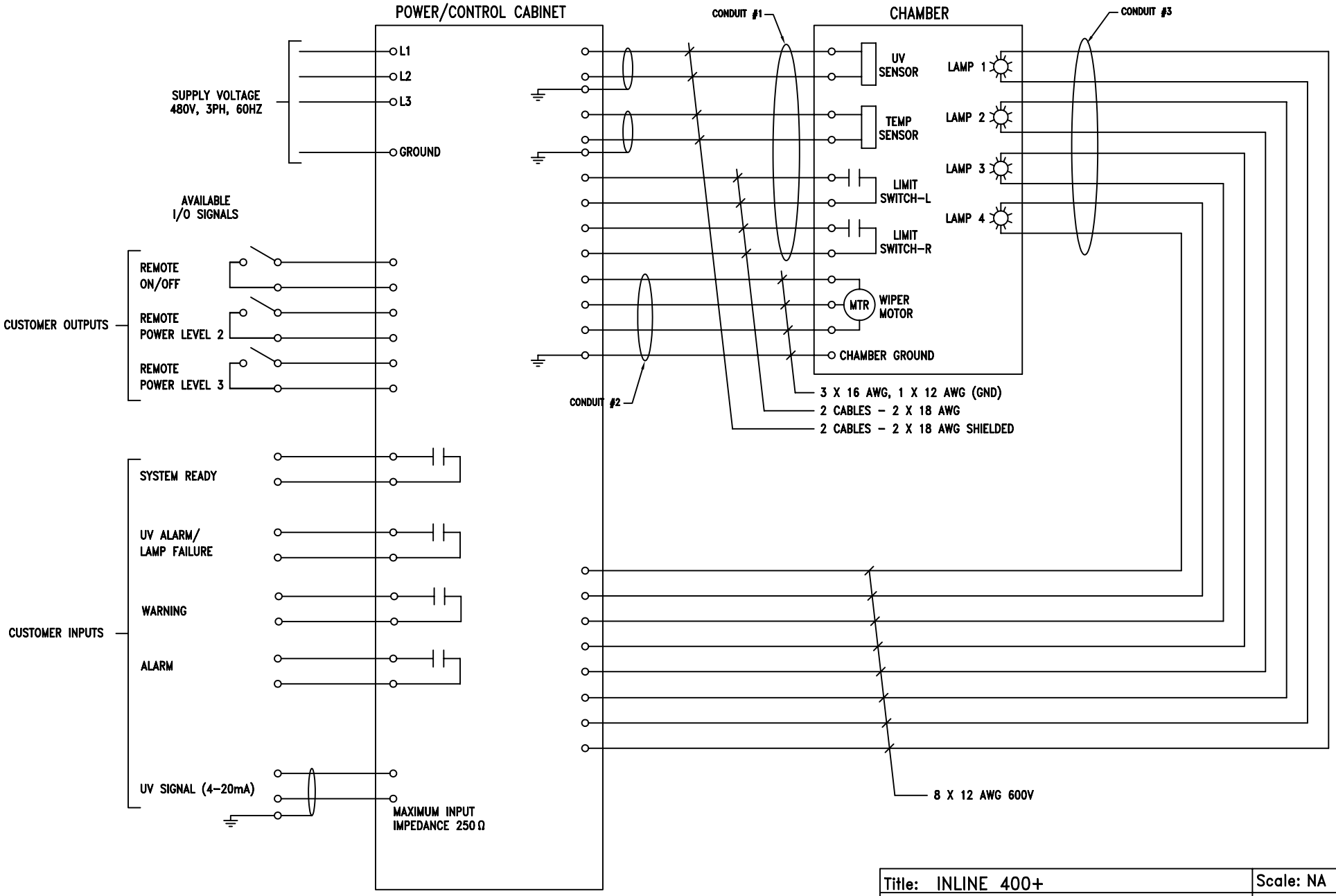
Standard Controls





NOTES:
1) DIMENSIONS IN INCHES [MILLIMETERS].
2) 30" FRONT CLEARANCE REQUIRED FOR SERVICE.
3) 12" SIDE CLEARANCE RECOMMENDED FOR AIR FLOW.

Title: INLINE 400+		Scale: NA
POWER AND CONTROL CABINET LAYOUT		Page 1 of 1
	Drawn: BG	Date: 2/21/06
AQUIONICS A HALMA GROUP COMPANY	Appd: PJB	Date:
	Mat.	Rev. A
	Dwg. No: CLIN400+	



Title: INLINE 400+		Scale: NA
FIELD WIRING DIAGRAM		Page 1 of 1
	Drawn: BG	Date: 6/28/06
AQUIONICS A HALMA GROUP COMPANY	Appd:	Date:
	Mat.	Rev. B
	Dwg. No: FWIN400+	

InLine 400+
UV System Headloss