

ERRATA

ENGINEERING FEASIBILITY & COST ANALYSES OF NITROGEN REDUCTION FROM SELECTED POTWS IN MASSACHUSETTS

PROJECT NUMBER 2007-01/106

Page

- 4-6&7 Table 4.2-1: replace by attached table. The errant TKN value for February 2006 has been deleted and consequently the TKN summary data have changed. All values in the TN column have been corrected.
- 4-16 Second line under D. Plant and Cost Summary: should read less than 5 mg/L instead of almost 5 mg/L.
- 4-17 Table 4.2-9: value 5.4 should be 5.0 and value 5.3 should be 4.8.
- 5-16 Table 5.2-9: switch the 21.6 and 25.6 values. The seasonal value should be 25.6 and the annual value should be 21.6.
- 5-21 Table 5.3-1: replace by attached table. All NO₂ values for 2006 have been deleted since no data is available. All NO₃ data from 2005 and 2006 have been corrected. All summary data for NO₂ and NO₃ have changed accordingly.
- 5-30 Table 5.3-9: value 14.1 should be 14.3 and value 15.8 should be 15.1.
- 8-5 Table 8.2-1: replace by attached table. The errant TKN value from September 2004 has been deleted and consequently the TKN summary data have changed. The data in the column entitled TN is the Ammonia Nitrogen data, so the column titles have been switched. All data in the new TN column have been corrected.
- 8-15 Table 8.2-9: value 7.4 should be 17.4 and value 9.2 should be 22.6.
- 8-15 Second line under D. Plant and Cost Summary: sentence should read As shown, the plant seems to be achieving a minimal amount of nitrogen removal both seasonally and year-round with their current Ludzack-Ettinger process.

Table 4.2-1
SPRINGFIELD WWTF
Springfield, Massachusetts
Monthly Averages 2003-2006

GENERAL		INFLUENT				PRIMARY EFFLUENT		FINAL EFFLUENT						
DATE		INF	BOD	TSS	TEMP	BOD	TSS	pH	BOD	TSS	NO2 + NO3	TKN	NH3	TN
MONTH	YEAR	MGD	MG/L	MG/L	DEG F	MG/L	MG/L		MG/L	MG/L	MG/L	MG/L	MG/L	MG/L
January	2004				56.1	145.3	107.0							
February	2004	46.6	196.0	202.0	57.2	177.1	104.9	6.8	5.0	8.0	2.1	1.1	0.3	3.2
March	2004	45.9	190.0	157.0	58.3	178.3	89.5	6.8	6.0	9.0	2.2	1.4	0.4	3.6
April	2004	46.3	147.0	139.0	58.8	141.4	97.1	6.6	7.0	11.0	2.5		0.6	
May	2004	46.5	163.0	162.0	64.7	168.6	100.1	6.9	5.0	5.0	3.1		0.3	
June	2004	45.6	190.0	158.0	68.0	169.1	79.0	6.9	5.0	4.0	2.9	1.2	0.4	4.1
July	2004	45.4	176.0	169.0	72.1	154.4	80.4	7.0	4.0	3.0	3.2	1.8	0.3	5.0
August	2004	45.3	197.0	181.0	72.4	173.5	88.1	6.9	4.0	3.0	4.1		0.3	
September	2004	45.2	207.0	199.0	71.3	156.8	78.8	6.9	4.0	3.0	4.4	1.1	0.5	5.5
October	2004	44.5	192.0	166.0	66.7	150.9	76.0	6.8	3.0	3.0	4.0		0.3	
November	2004	43.7	209.0	180.0	64.4	158.1	85.3	6.9	4.0	4.0	4.9	2.0	0.4	6.8
December	2004	43.4	189.0	162.0	59.7	160.6	95.4	6.8	5.0	5.0	3.1		0.4	
January	2005	43.2	170.0	176.0	56.6	142.9	85.8	7.0	11.0	12.0	3.1	1.5	0.4	4.5
February	2005	43.8	167.0	165.0	56.6	141.1	87.5	6.8	9.0	11.0	2.7	1.8	1.6	4.5
March	2005	44.2	179.0	167.0	56.6	150.3	90.5	6.7	7.0	6.0	3.6		0.5	
April	2005	44.2	131.0	127.0	59.3	142.6	92.0	6.6	14.0	21.0	2.8		0.6	
May	2005	44.0	173.0	142.0	63.4	145.3	77.1	6.8	6.0	7.0	2.2	1.2	0.3	3.4
June	2005	43.9	184.0	157.0	69.8	167.6	86.6	6.9	6.0	5.0	2.0	2.4	0.4	4.4
July	2005	43.8	183.0	158.0	71.8	154.9	81.3	6.8	6.0	6.0	3.8	1.6	0.7	5.4
August	2005	43.6	198.0	176.0	73.9	169.3	88.9	6.9	7.0	6.0	4.1	3.2	1.2	7.3
September	2005	43.2	210.0	189.0	72.6	188.8	94.7	6.9	5.0	4.0	2.1	1.6	0.7	3.7
October	2005	45.6	129.0	139.0	66.2	121.7	80.9	6.4	8.0	14.0	2.8		0.2	
November	2005	47.0	147.0	139.0	62.9	127.2	80.5	6.7	7.0	11.0	4.2	1.6	0.9	5.8
December	2005	47.5	156.0	149.0	58.5	133.3	89.9	6.7	7.0	8.0	4.1	1.4	0.5	5.5
January	2006	48.9	123.0	122.0	56.7	112.6	80.4	6.6	9.0	13.0	1.8		0.2	
February	2006	49.9	122.0	108.0	56.5	111.6	71.8	6.8	10.0	12.0	1.0		1.3	

GENERAL		INFLUENT				PRIMARY EFFLUENT		FINAL EFFLUENT						
DATE		INF	BOD	TSS	TEMP	BOD	TSS	PH	BOD	TSS	NO2 + NO3	TKN	NH3	TN
MONTH	YEAR	MGD	MG/L	MG/L	DEG F	MG/L	MG/L		MG/L	MG/L	MG/L	MG/L	MG/L	MG/L
(continued)														
March	2006	49.7	147.0	131.0	58.4	151.6	84.3	6.9	6.0	6.0	2.0	1.8	0.5	3.7
April	2006	48.4	142.0	135.0	61.5	137.2	94.0	6.8	7.0	7.0	2.8	1.4	1.0	4.2
May	2006		130.0	124.0	64.1	132.2	86.9	6.8	7.0	5.0				
June	2006	49.8	132.0	129.0	67.8	125.1	83.2	6.8	6.0	5.0	1.6	2.9	1.5	4.6
July	2006	50.6	135.0	139.0	71.6	119.7	81.5	6.9	7.0	8.0	1.2	2.7	1.7	3.8
August	2006	51.1	165.0	156.0	72.8	145.1	89.7	6.9	4.0	3.0	3.1	2.5	1.5	5.6
September	2006	51.3	180.0	166.0	70.4	149.6	85.1	7.0	4.0	4.0	2.2	5.5	3.3	7.8
October	2006	49.2	160.0	157.0	66.4	138.0	92.0	6.7	5.0	6.0	2.8		0.7	
November	2006	48.4	158.0	142.0	64.5	140.6	80.2	6.9	4.0	6.0	0.1	3.1	1.8	3.2
December	2006	47.5	199.0	161.0	61.8	181.3	86.8	7.0	10.0	13.0	1.8		0.3	
Min. Month		43.2	122.0	108.0	56.1	111.6	71.8	6.4	3.0	3.0	0.1	1.1	0.2	3.2
Seasonal Average		46.4	172.4	159.3	69.2	151.7	85.0	6.8	5.3	5.2	2.9	2.3	0.8	5.0
Average Annual		46.4	167.9	155.1	64.2	149.0	87.0	6.8	6.4	7.3	2.8	2.0	0.8	4.8
Max. Month		51.3	210.0	202.0	73.9	188.8	107.0	7.0	14.0	21.0	4.9	5.5	3.3	7.8

Table 5.3-1
WARE WWTF
Ware, Massachusetts
Monthly Averages 2003-2006

GENERAL		INFLUENT						EFFLUENT								
DATE		INF	pH	BOD	TSS	TVSS	TEMP	DO	DO	pH	BOD	TSS	NO2	NO3	TKN	AMMONIA NITROGEN
MONTH	YEAR	MGD		MG/L	MG/L	MG/L	DEG F	MG/L	MG/L		MG/L	MG/L	MG/L	MG/L	MG/L	MG/L
January	2004	0.7	7.2	157.9	136.9	100.0	52.9	4.8	4.8	7.1	14.4	11.0			7.4	5.4
February	2004	0.6	7.3	173.4	256.0	180.0	52.4	4.0	4.4	7.2	14.9	15.0			17.4	
March	2004	0.7	7.3	207.0	135.4	74.9	54.2	4.9	4.2	7.2	13.4	11.2		2.3	12.9	
April	2004	1.0	7.1	162.5	129.4	105.6	55.9	5.2	4.0	6.9	10.7	10.8	3.2			1.5
May	2004	0.8	7.1	155.0	209.8	127.5	60.3	4.4	3.5	6.8	12.1	13.3		0.2		0.6
June	2004	0.6	7.2	184.7	216.5	185.8	64.8	3.0	3.4	6.7	17.2	10.8		5.8	4.2	0.6
July	2004	0.5	7.3				67.5	2.4	3.5	6.8			3.4	3.4	3.1	0.5
August	2004	0.6	7.3	208.8	250.4	205.3	69.1	3.1	4.1	6.6	15.4	10.3		2.0	1.7	0.4
September	2004	0.6	7.3	199.7	271.2	208.8	68.8	4.5	4.8	6.8	10.8	13.8		9.8	0.2	0.4
October	2004	0.6	7.4	189.2	246.0	161.0	64.7	4.5	4.6	6.9	11.1	13.8		12.0	2.2	0.8
November	2004	0.6	7.5	217.1	234.8	174.0	62.0	5.3	5.4	7.0	15.9	12.5		6.0	3.6	1.0
December	2004	0.7	7.5	207.3	171.2	134.0	57.9	6.0	6.2	7.0	15.7	13.6		8.4	3.6	3.6
January	2005	0.8	7.3	187.9	189.0	157.0	55.5	6.7	6.7	7.1	19.3	15.5		6.8	6.3	1.1
February	2005	0.8	7.3	195.9	178.0	138.0	53.8	7.2		7.3	17.4	12.0		3.2	22.0	12.0
March	2005	0.8	7.4	150.7	170.4	146.0	55.6	7.0	6.7	7.4	16.7	13.8		1.3	12.0	8.0
April	2005	1.2	7.1	150.4	135.0	88.0	57.4	7.2	6.4	7.1	12.5	12.3		1.0	5.0	3.4
May	2005	0.8	7.3	169.2	159.0	100.0	60.1	6.3	6.2	7.2	18.3	13.3		2.4	11.0	
June	2005	0.6	7.4	233.7	220.0	156.0	67.3	4.6	5.1	6.8	15.6	11.8		2.1	1.9	0.5
July	2005	0.6	7.4	255.8	257.5	207.5	70.1	4.5	5.2	6.9	19.8	15.5		3.2	1.1	0.3
August	2005	0.5	7.4	237.7	217.6	155.7	72.1	4.0	5.2	6.8	20.2	12.8		4.0	2.2	0.8
September	2005	0.5	7.5	242.5	257.8	200.3	70.8	4.2	5.3	6.8	14.1	9.0		12.0	2.0	0.7
October	2005	1.1	7.1	188.4	190.0	161.7	64.9	6.1	6.4	6.8	17.6	9.0		12.0	1.2	0.6
November	2005	1.0	7.0	183.3	172.0	143.2	61.8	6.4	6.8	6.9	15.0	9.6		4.0	4.4	1.2
December	2005	0.9	7.0	171.2	144.0	134.0	57.1	6.9	7.1	6.9	15.2	16.8		5.2	4.0	1.4
January	2006	1.2	6.9	187.9	203.0	95.0	53.5	7.4	7.4	6.9	15.9	15.3		4.5	10.0	2.0
February	2006	1.1	7.0	143.4	194.0	148.0	53.3	7.2	7.3	6.9	14.4	13.3		3.3	5.0	2.8
March	2006	0.7	7.1	248.3	242.0	157.0	54.0	6.9	6.8	7.0	22.2	19.2		1.4	14.0	

GENERAL		INFLUENT							EFFLUENT							
DATE		INF	pH	BOD	TSS	TVSS	TEMP	DO	DO	pH	BOD	TSS	NO2	NO3	TKN	AMMONIA NITROGEN
MONTH	YEAR	MGD		MG/L	MG/L	MG/L	DEG F	MG/L	MG/L		MG/L	MG/L	MG/L	MG/L	MG/L	MG/L
April	2006	0.6	7.1	242.9	231.4	190.6	57.2	6.8	5.9	6.7	19.2	16.0		0.4	14.0	
May	2006	0.7	7.1	238.3	188.2	166.2	60.4	6.1	5.6	6.8	17.6	11.4		2.4	15.0	
June	2006	0.8	7.0	198.3	231.0	142.0	65.8	5.4	4.8	6.7	14.2	12.5		1.3	12.0	1.3
July	2006	0.6	6.9	178.8	238.3	153.3	69.0	4.8	4.6	6.7	15.0	18.5		0.7	8.8	0.8
August	2006	0.5	7.1	237.7	288.7	199.7	70.0	4.8	5.1	6.9	22.2	12.0		1.5	18.0	1.4
September	2006	0.5	7.1	258.0	312.9	235.8	67.3	4.9	5.1	6.9	24.7	11.5		2.2	14.0	0.8
October	2006	0.5	7.1	273.8	245.8	150.9	63.8	5.3	5.1	6.9	24.7	10.3		0.1	14.0	0.7
November	2006	0.6	7.0	268.7	288.0	213.0	61.7	5.7	5.4	6.8	22.9	9.4		0.6	1.5	1.5
December	2006	0.6	7.0	273.3	251.0	200.0	58.5	6.3	5.7	6.9	15.0	15.6			12.0	1.3
Min. Month		0.5	6.9	143.4	129.4	74.9	52.4	2.4	3.4	6.6	10.7	9.0	3.2	0.1	0.2	0.3
Seasonal Average		0.7	7.0	229.1	235.3	171.6	66.5	4.6	4.9	6.8	17.1	12.3	3.4	4.3	6.6	0.7
Average Annual		0.7	7.2	205.1	213.2	157.0	61.4	5.4	5.4	6.9	16.6	12.9	3.3	3.9	7.9	1.9
Max. Month		1.2	7.5	273.8	312.9	235.8	72.1	7.4	7.4	7.4	24.7	19.2	3.4	12.0	22.0	12.0

Table 8.2-1
WESTFIELD WWTF
Westfield, Massachusetts
Monthly Averages 2003-2006

GENERAL		INFLUENT											PRIMARY EFFLUENT			FINAL EFFLUENT									
DATE		INF	pH	BOD	TSS	TVSS	TKN	TEMP	DO	AMMONIA NITROGEN	NO2	NO3	pH	BOD	TSS	DO	pH	BOD	TSS	F. COLI	NO2	NO3	NO2 + NO3	TKN	AMMONIA NITROGEN
MONTH	YEAR	MGD		MG/L	MG/L	MG/L	MG/L	DEG F	MG/L	MG/L	MG/L	MG/L		MG/L	MG/L	MG/L		MG/L	MG/L	# / 100ML	MG/L	MG/L	MG/L	MG/L	MG/L
January	2004	4.7	6.9	172.0	184.0	168.0		9.6	5.6				6.8	135.4	89.0	8.7	7.0	17.4	11.8				1.6	16.6	14.1
February	2004	3.6	6.9	212.0	192.0	177.0		22.8	5.6				6.8	170.7	96.6	8.7	7.2	29.6	19.4				2.3	37.1	18.5
March	2004	3.7	6.8	173.0	188.0	170.0		46.8	6.2				6.8	134.1	89.9	9.4	7.0	15.8	15.5				0.8	29.0	10.0
April	2004	6.2	6.7	131.0	147.0	132.0		60.0	5.7				6.7	93.7	77.7	9.1	6.9	13.9	4.5				1.8	13.0	9.4
May	2004	3.8	6.8	220.0	229.0	202.0		72.8	5.0				6.8	132.7	79.8	8.9	7.0	21.2	9.8				2.2	7.8	13.0
June	2004	2.9	6.7	220.0	240.0	205.0		77.9	4.6				6.7	139.1	79.4	8.7	6.8	14.9	9.3				1.1	19.0	18.0
July	2004	2.6	6.7	245.0	294.0	252.0		65.8	4.2				6.6	147.7	98.7	7.9	6.7	12.1	8.4				0.4	19.0	10.0
August	2004							32.0																	
September	2004	3.6	6.7	248.0	282.0	232.0		74.9	4.6				6.6	117.8	109.4	8.2	7.0	9.8	7.8				0.8		20.0
October	2004	3.6	6.8	228.0	268.0	224.0		60.4	4.7				6.8	122.6	100.0	8.1	6.8	8.8	7.9				5.5	1.9	0.6
November	2004																								
December	2004	4.4	7.1	235.8	259.0	226.0	35.0		4.0	14.0			7.1	137.3	65.9	8.5	6.9	16.1	10.7		8.4	1.4	4.9	11.0	8.6
January	2005	4.7	7.2	184.5	193.0	165.8	28.0		5.0	19.0	0.4	0.6	7.2	31.8	76.3	8.0	6.9	13.3	8.5		8.6		4.6	10.0	8.3
February	2005	4.5	7.1	157.6	497.1	231.0			5.7	24.0			7.1	106.8	81.6	7.5	7.0	14.1	11.5						13.0
March	2005	4.2	7.1	173.3	275.0	252.0	44.0		5.0	24.0	0.1		7.0	94.8	71.4	6.3	7.0	10.3	7.1		1.9	0.3	1.1	26.0	18.0
April	2005	5.6	7.0	115.5	289.0	247.0			5.0	24.0			7.0	86.1	93.1	8.2	6.9	2.5	4.3	40.5					7.5
May	2005		7.2	231.0	202.0	155.0			4.1	22.0			6.9	198.0	99.2	8.2	6.9	9.8	6.2	56.8					
June	2005									9.5															
July	2005	3.1	7.1	150.3	275.0	208.8			4.1	20.0			7.0	80.5	69.2	7.2	6.9	3.7	5.9	25.9					1.9
August	2005	2.6	6.7	129.7	225.1	172.5			2.8	31.0			6.9	102.1	53.6	7.0	7.0	4.5	9.8	74.2					1.2
September	2005	2.6	7.1	246.9	284.0	212.0			2.5	29.0			7.0	140.7	83.0	6.7	7.0	3.8	7.1	5.2					1.0
October	2005	5.6	7.0	156.1	327.0	245.0			3.0	16.0			6.8	87.5	75.6	7.7	6.9	3.6	6.1	48.8					1.2
November	2005	4.6	7.0	123.2	254.5	201.5			3.8	18.0			7.0	82.2	72.4	7.9	6.8	7.3	6.3						
December	2005	4.2	7.2	144.9	292.6	245.8			3.9	25.0			7.0	78.4	80.1	8.4	6.8	8.0	80.1						1.0
January	2006	5.7	7.0	118.5	201.1	165.9			4.6				7.0	61.9	68.4	8.6	6.9	9.8	6.4						
February	2006	4.9	7.1	121.6	174.8	149.8			4.7	12.0			7.0	105.9	56.0	8.3	6.9	7.5	5.3						
March	2006	3.4	7.2	178.7	314.2	256.8			4.5				7.1	95.8	83.8	7.6	7.0	12.1	8.3				7.7		
April	2006	3.5	7.3	200.8	333.5	288.6			4.4	24.0			7.1	106.9	109.1	7.2	7.0	10.1	8.5	34.6			16.8		
May	2006	4.3	7.1	159.9	398.8	278.3			3.9	14.0			7.0	103.7	122.5	8.3	7.0	10.5	9.7	35.4			13.1		
June	2006	4.0	7.1	129.3	251.6	196.7			3.9	15.0			7.0	92.8	90.5	8.6	7.0	5.9	5.1	3.4			9.0		
July	2006	3.3	7.1	187.2	370.5	302.9			3.5	24.0			6.9	70.4	65.5	7.3	7.0	4.3	4.5	8.7			5.5		
August	2006	2.8	7.2	229.2	319.6	258.2			3.2	18.0			7.0	79.9	69.1	6.1	7.1	6.4	5.6	12.1			9.1		
September	2006	2.9	7.1	204.5	312.4	251.7			2.4	18.0			6.9	113.0	68.6	7.5	7.0	8.2	5.6	4.8			8.4		
October	2006	3.5	7.1	232.2	294.5	233.9			1.9	35.0			6.8	116.4	72.1	8.4	6.9	10.4	5.0	44.8					
November	2006	4.5	6.9	162.9	233.7	191.3			4.1	19.0			6.7	75.0	57.4	9.4	6.8	13.3	9.3						
December	2006	3.6	7.0	192.7	322.3	264.6			13.9	18.0			6.8	111.4	72.2	8.0	6.9	17.6	10.4				10.3		
Min. Month		2.6	6.7	115.5	147.0	132.0	28.0	9.6	1.9	9.5	0.1	0.6	6.6	31.8	53.6	6.1	6.7	2.5	4.3	3.4	1.9	0.3	0.4	1.9	0.6
Seasonal Average		3.4	7.0	201.1	285.8	226.9		64.0	3.7	21.0			6.9	115.3	83.5	7.8	6.9	8.6	7.1	29.1			5.5	11.9	7.4
Average Annual		4.0	7.0	182.3	270.4	217.1	35.7	52.3	4.5	20.5	0.2	0.6	6.9	107.7	81.1	8.0	6.9	10.8	10.4	30.4	6.3	0.9	5.3	17.3	9.2
Max. Month		6.2	7.3	248.0	497.1	302.9	44.0	77.9	13.9	35.0	0.4	0.6	7.2	198.0	122.5	9.4	7.2	29.6	80.1	74.2	8.6	1.4	16.8	37.1	20.0