



Wellfield Automation Byron Center LoCI Trial

By Kyle Tucker

Landfill Gas Well Tuning (Concept)



Weather/Atmospheric Changes Barometric Pressure Moisture (Rain/Snow) Temperature





Byron Center LoCI Trial – Site Introduction



Perfect Site For A Trial

- EDL Operates Gas Field
- Non-NSPS Site
- Lone Operator Site
- Gas Short & Additional Capacity For Generation
- Small Quantity Of Wells (36 In Total)
- Support Of Landfill Partner



Why Automate The Gas Field?

- Frequent Tuning Intervals
- Realtime Adjustments To Changes
- Full Visibility Of Wellfield
- Less Time Spent In Wellfield
- Onsite & Technical Assistance By LoCI Staff
- Better Data Management





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LoCI Tuning Process

- Devices take a reading every hour (can be adjusted to less).
- Adjusts valve position based on reading.
- The unit takes an additional gas reading to confirm the change.
- An additional reading is taken, and the unit will make an adjustment if necessary.
- The cycle continues to tune based on the inputs the end user provides to LoCI.
 - At Byron Center CH4 was 51%, O2 < 0.5%.
- The unit has its own calibration gases. Units calibrate every week.
- LoCI control room monitors the data and sensor drift to determine if device is malfunctioning.





0 -10 PA System Pressures -20 , PB PA: -14.8 "H₂O PB: -44.8 "H₂O -30 -40 02/10 02/16 01/20 01/23 01/26 01/29 02/01 02/04 02/07 02/13 100 75 Valve 50 Position 71.8% 25 0 01/20 01/23 01/26 01/29 02/01 02/04 02/07 02/10 02/13 02/16 30.5 Barometric 30.0

02/01

02/04

02/07

02/10

02/13

02/16



Pressure

30.03 "Hg

29.5

29.0

01/20

01/23

01/26

01/29



Full Visibility

	Wells								
	Sort by:								
	Alphabetical								
	CH ₄ flow %								
South Kent Landfill	CO2 flow %								
Byron Center, MI	O2 flow %								
	Bal. Gas flow %								
	LFG Flow								
	Temperature								
	Pressure PB PA								
Dashboard	Plant Sentry 495								
Map View	GW25 87								
Table View	GW21 54								
Woll Details	GW16R 41								
Departo	GW14 40								
Repuits	GW36 35								
Settings	GW26 34								
	GW30 33								
Active Wells	GW36A 31								
34	GW31 30								
54	GW29 29								
	GW23 28								
Iotal CH ₄ Flow:	GW24 25								
571 SCFM	GW28 21								
	GVV35 21								
Total LFG Flow:	GW11 17								
1,012 SCFM	GW13 17								
	GW20 13								
Total CO ₂ :	GW19 12								
34.1%	GW17 11								
	GW32 10								
Total CIL 1	GW06 10								
Iotal CH ₄ :	GW05 9								
56.5%	GW15 9								
	GW22 6								
	GW34 6								
	GW12 5								
	HC02 4								
	GW07 3								
	GW04 3								
	GW01 2								
	GW08 2								
Sign Out	GW09 1								





Full Visibility (cont.)





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Full Visibility (cont.)





LoCI Technical Assistance & Reduced Labor Time



- LoCl monitors system remotely
- LoCI technicians service & supports all LoCI hardware & calibration gases.
- LoCI technician is on call for field support (Product Related Tasks).
- LoCI analyzes data and makes field recommendations based on that analysis to increase production & efficiency.
- EDL operator estimated 60% reduction in time spent in gas field.
- EDL operator was freed up to take on more plant tasks.
- EDL operator is exposed less to high risk work environment

Data Management



ئارى	Loci Automated Gas Collection - Table View														
South Kent Landfill Byron Center, MI	Well	CH4 (%)	CO2 (%)	O2 (%) \$	Bal. Gas (%) ∲	LFG Flow (SCFM)	Temperature (F)	PA (in. H2O)	PB (in. H2O) ♦	Valve Position (%)					
	GW02	41.7	33.3	0.5	24.4	8.7	43.1	-4.2	-46.5	15.					
	GW03	46.5	33.6	0.0	19.9	24.4	58.2	-19.4	-45.7	31.8					
Dashboard Map View	GW04	43.3	29.0	3.2	24.5	3.9	39.2	-10.2	-45.4	15.3					
Table View	GW05	48.7	33.9	0.0	17.4	19.7	52.5	-45.0	-45.1	100.0					
Well Details Reports	GW06	49.7	35.1	0.7	14.5	16.1	60.9	-6.7	-43.5	21.2					
Settings	GW07	40.8	32.7	0.6	25.9	8.5	45.2	-15.3	-45.7	15.0					
	GW08	42.2	30.9	5.4	21.5	3.9	41.2	-46.6	-46.6	15.0					
Active Wells: 33	GW09	45.6	34.4	0.0	20.0	11.0	47.2	-8.4	-47.5	17.3					
	GW11	53.0	39.1	1.3	6.7	32.1	91.1	-44.1	-44.4	99.6					
Iotal CH ₄ Flow: 411 SCFM	GW12	44.7	33.8	2.8	18.6	12.9	70.4	-7.0	-44.0	15.3					
Total LEG Flow:	GW13	44.9	34.3	0.7	20.0	31.6	62.6	-23.3	-45.4	34.5					
780 SCFM	GW14	48.4	33.9	1.3	16.4	75.0	72.7	-46.7	-46.3	98.4					
Total CO ₂ :	GW15	57.8	41.4	0.0	0.7	14.4	85.5	-9.6	-9.8	100.0					
37.5%	GW17	47.3	37.0	1.0	14.7	47.4	104.5	-22.5	-42.1	43.1					
Total CH ₄ :	GW18	49.5	32.2	0.3	18.0	0.0	55.5	-43.5	-43.4	98.8					
52.6%	GW19	50.1	33.6	0.2	16.2	25.7	56.1	-44.2	-44.1	98.8					
	GW20	61.4	38.1	0.5	0.0	20.7	89.6	-46.1	-46.1	100.0					
	GW22	57.1	34.0	1.5	7.4	3.9	37.7	-24.2	-24.1	100.0					
	GW23	58.2	40.6	1.3	0.0	48.4	98.7	-15.5	-15.2	100.0					
	GW24	61.0	38.2	0.8	0.0	38.9	80.4	-43.9	-43.7	100.0					
	GW25	48.6	41.5	0.9	9.0	66.8	97.8	-11.1	-47.6	43.9					
Sign Out	GW26	45.6	33.0	0.2	21.2	0.0	67.3	-1.9	-45.6	15.3					

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Loci Automated Gas Collection - Reports

Monthly Performance Reports									
Download Measurement History (all collectors)									
 2020 January February 2019 June July August September October November December 									

Results Of Byron Center Trial (Overview)



- Overall increase in average gas flow by 13.98% Or 115 SCFM
 - Best month (23.25%)
- Overall increase in average generation by 13% or 0.3MW
 - Best month (24.26%)
- Slight reduction in CH4 Quality -1.3%
- Slight increase in O2 +0.23%



Byron Center - LoCI Controls Monthly Performance Tracker																	
2018 Net Generation (KW)	2019 Net Generation (KW)	2019 Net Generation LOCI (KW)	Difference KW (±)	2018 Average Flow	2019 Average Flow	Difference (±)	2018 Average CH4%	2019 Average CH4%	2019 Average CH4% (LOCI)	Difference (±)	2018 Average O2%	2019 Average O2%	Difference (±)	2018 Average Vacuum (Inches H2O)	2019 Average Vacuum (Inches H2O)	Difference (±)	
2703.03	2493.13		-209.90	921.78	878.78	-43.00	51.97%	53.37%		0.01	0.32%	0.22%	-0.10%	-41.42	-44.81	-3.39	
2627.29	2520.30		-106.99	927.39	957.76	30.37	50.78%	51.38%		0.01	0.41%	0.93%	0.52%	-41.94	-45.90	-3.96	
2590.39	2278.73		-311.67	904.12	863.97	-40.16	51.38%	51.66%		0.00	0.39%	0.99%	0.60%	-43.33	-43.03	0.30	
2597.04	2373.22		-223.82	900.48	899.75	-0.73	51.56%	51.69%		0.00	0.21%	0.79%	0.58%	-44.79	-44.62	0.17	
2397.68	2503.18		105.50	840.30	924.47	84.17	52.98%	52.99%		0.00	0.12%	0.17%	0.05%	-43.58	-45.64	-2.06	
2411.33	2441.42		30.09	875.42	918.48	43.06	51.76%	52.04%		0.00	0.10%	0.15%	0.05%	-44.72	-44.86	-0.13	LoCI Controls Installed
2215.41	2251.57	2251.57	36.16	842.08	882.69	40.61	50.24%	50.40%	50.40%	0.0016	0.08%	0.31%	0.23%	-44.88	-48.10	-3.21	Late June 2019
2202.14		2540.81	338.67	843.87	956.07	112.20	50.38%		50.58%	0.0020	0.15%	0.38%	0.22%	-44.69	-49.55	-4.86	
2320.32		2686.06	365.73	845.55	1000.71	155.16	51.81%		50.18%	-0.0163	0.09%	0.26%	0.17%	-44.66	-49.44	-4.77	
2378.63		2706.36	327.72	834.76	986.15	151.39	53.25%		50.63%	-0.0262	0.13%	0.60%	0.47%	-44.70	-48.75	-4.05	
2223.88		2763.39	539.51	773.73	953.54	179.81	53.60%		51.85%	-0.0175	0.25%	0.32%	0.07%	-42.61	-49.72	-7.12	
2483.95		2625.16	141.21	862.58	914.70	52.13	54.15%		51.75%	-0.0240	0.12%	0.35%	0.24%	-46.02	-49.80	-3.78	
	2018 Net Generation (KW) 2703.03 2627.29 2590.39 2597.04 2397.68 2411.33 2215.41 2320.32 2378.63 2223.88 2483.95	2018 Net Generation (KW)2019 Net Generation (KW)2703.032493.132627.29250.302659.392278.732597.042373.222397.682503.182411.332441.422215.412251.572202.142251.572378.632441.422378.632441.422378.632441.42	2018 Net Generation (KW)2019 Net Generation Generation LOCI (KW)2703.032493.132703.032493.132627.292520.302590.392278.732597.042373.222597.042373.222397.682441.422215.412251.572202.142251.572320.322441.422378.632706.362223.882763.392483.9510	2018 Net Generation (KW)2019 Net Seleveration 	2018 Net Generation (KW)2019 Net Seneration (KW)2019 Net Seneration Seneration LOCI (KW)Difference KW (±)2018 Seneration Sen	Z018 Net Generation (KW)Z019 Net Seneration (KW)Z019 Net Seneration LOCI (KW)Difference KW (±)Z018 Seneration KW (±)Z018 Seneration Seneration LOCI (KW)Difference KW (±)Z018 Seneration Seneration Seneration Seneration Seneration Seneration LOCI (KW)Difference KW (±)Z018 Seneration 	2018 Net Generation (KW)2019 Net Seneration (KW)2019 Net Seneration LOCI (KW)Joifference KW (±)2018 Suber and Suber and 	Z018 Net Generation (KW) Z019 Net Generation (KW) Z019 Net Sufference Seneration (KW) Joinference Seneration (KW) Z018 Verage Flow Z019 Average Flow Difference Sufference Flow Z019 Average Sufference Flow Difference Sufference Flow Z019 Average Flow Z019 Average Flow	2018 Net Generation (KW) 2019 Net Seneration (KW) 2019 Net Seneration (CKW) 2018 Net Seneration (CHW) 2018	2018 Net Generation 2019 Net Generation 2019 Net CCI (KW) 2019 Net KW (±) 2019 Net Verege Flow 2019 Net Superation 2019 Net Superation <	constraint constraint <thconstraint< th=""> constraint constrai</thconstraint<>	Bestimization Bestimant inteacon interaction Bestimization	construction construction<	Action of the construct of the con	Barton Strategie Strate Strategie Strategie	Bartial State State	Series of the construction of the construct



1500.00 1450.00 2018 Average Flow @50% CH4 (SCFM) 1400.00 1350.00 1300.00 1250.00 2019 Average Flow @50% CH4 (SCFM) 2019 Average Flow @50% CH4 SCFM (LOCI) 1200.00 1150.00 1100.00 1050.00 1000.00 950.00 900.00 850.00 800.00 750.00 700.00 650.00 600.00 550.00 500.00 March April February May ylul August October June December Septembe Januar Novembe

Byron Center - Gas Flow Comparison (SCFM)

Results Trends





Byron Center - Net Generation Comparison (KW)

Return On Investment



- 2018 Average Net Generation (June-Dec) 2.3 MW
- 2019 Average Net Generation (June-Dec) 2.6 MW
 - Percentage Generation Increase = 13%
- Return On Investment = 130%
 - Calculated After LoCI Costs
- ROI does NOT include reduction in labor time
- Reduced exposure to safety risk can't be quantified.

Conclusions From Trial

- Automating increased flow and generation as advertised
 - Approx 14% flow increase
 - Approx 13% generation increase
- Automating helped increase vacuum without sacrificing gas quality.
- Automating reduced labor in gas field.
 - Estimated 60%
- Automating assists troubleshooting by having full visibility.
- Better data organization and viewing capabilities.
- Required good communication and interaction between EDL operations and LoCI to maximize success.



