

## Commissioning Documents

Project: Cedar Road Landfill

Customer: Cedar Road LFG Inc.

Location: 1105 Cedar Road  
Nanaimo BC V9X 1K9

Equipment: 2 GE Jenbacher JGS 312  
Gas Engine Generator  
Sets

# Index

Section 1 .....	GE Jenbacher Commissioning Protocol
Section 2 .....	Exhaust Gas Readings at Commissioning
Section 3 .....	GE Jenbacher Technician Report
Section 4 .....	Equipment Acceptance
Section 5 .....	Revised Maintenance Schedule
Section 6 .....	Spar Parts List
Section 7 .....	Contact Information

# Section 1

## GE Jenbacher Commissioning Protocol



Keyword:	Cedar Road	Design No.:	D390
Generator type:	1 x JGC 312 GS - N.L	Year of construction:	2006
Type/version:		Country of installation:	Kanada

Software version B&R/SAM	RPS: (computer-controlled control)	2.10a
	VISU: (Diagnose visualisation)	11.10a
	MMU: (Multi-function transducer)	15
	ZÜND: (Ignition)	11.36
	MONIC: (Ignition visualisation)	
	KLS98: (Knock control)	
	TEC: (Tecjet)	
	SAM:	
	EMS3000:	
Software version Siemens/B&R	Sps: (PLC control)	0.4
	Syn: (Synchronisation)	
	Stat: (Station control)	

		Engine No.			
		4721681	4721691		
Engine No.		4721681	4721691		
Operating hours	Bh	13	4		
Number of starts		56	20		
Power, electric	kW	633	633		
Voltage - average value	V	493	495		
Current - average value	A	880	870		
Zero conductor current	A	0	0		
Cos phi	Ind/Kap	-0.82	-0.83		
Exciter voltage	V	n/a	n/a		
Mixture temperature	°C	46.7	45.6		
Charge pressure	mbar	2590	2570		
Gas-mixer position / TEC	mm / %	23.7	22.1		
Throttle valve position	%	100	100		
Flow-Tech position	%	41.5	39.9		
After cooler differential pressure, mixture side	mbar	25	25		
Mixture cooling water temperature, intake, stage 1	°C	71	68		
Mixture cooling water temperature, intake, stage 2	°C	49	42		
Engine cooling-water temperature	°C	74.6	77		
Engine cooling-water pressure	bar	1.36	1.40		
Oil temperature	°C	75	77		
Oil pressure	bar	4.05	4.12		
Gas pressure before pre-pressure controller	mbar	200	200		
Gas pressure after pre-pressure controller	mbar	46	48		
Pre-combustion chamber differential pressure	mbar	n/a	n/a		
Gas pressure before differential-pressure controller	bar	n/a	n/a		
Methane content (CH4)	%	ca. 55	55		
Gas temperature before activated carbon filter	°C	n/a	n/a		



		Engine No.							
		4721681		4721691					
Cylinder temp. 1/2	°C	608	597	608	604				
Cylinder temp. 3/4	°C	616	602	627	618				
Cylinder temp. 5/6	°C	611	605	610	605				
Cylinder temp. 7/8	°C	608	602	616	597				
Cylinder temp. 9/10	°C	611	598	608	608				
Cylinder temp. 11/12	°C	605	609	603	595				
Cylinder temp. 13/14	°C								
Cylinder temp. 15/16	°C								
Cylinder temp. 17/18	°C								
Cylinder temp. 19/20	°C								
Ignition-voltage requirement	min/max	kV							
Ignition point	°KWvOT	20	20						
Hot water forward temperature	°C	63	77						
Hot water return temperature	°C	77	60						
Exhaust-gas heat exchanger - tube-plate temperature	°C	n/a	n/a						
Drive side (DS) generator bearing temperature	°C	47	51						
Non-drive side (NDS) generator bearing temperature	°C	43	37						
Generator winding temperature 1	°C	63	54						
Generator winding temperature 2	°C	59	58						
Generator winding temperature 3	°C	64	54						
Exhaust-gas temperature before heat exchanger	°C	n/a	n/a						
Exhaust-gas temperature after heat exchanger	°C	n/a	n/a						
Cooling water inlet temperature at exhaust-gas heat exchanger	°C	n/a	n/a						
Cooling water outlet temperature at exhaust-gas heat exchanger	°C	n/a	n/a						
Differential pressure - exhaust-gas heat exchanger	mbar	n/a	n/a						
Differential pressure - catalytic converter	mbar	n/a	n/a						
Exhaust-gas backpressure after exhaust-gas turbocharger	mbar	3	7.4						
O2 value	Vol.-%	8.4	8.0						
CO value (related to 5% O2)	mg/Nm <sup>3</sup>	759	727						
NOx value (related to 5% O2)	mg/Nm <sup>3</sup>	253	247						
Engine cooling water - concentration test	Vol.-%	40	40						
Product applied / additive									
Mixture cooling circuit (2nd stage) concentration test	Vol.-%	40	40						
Product applied / additive									
Intake temperature at engine air-filter intake	°C	9.8	13.4						
Generator cooling-air intake temperature	°C	11	8						
Crankcase pressure (at dipstick)	mm/WS	+5	+4						
Engine-room pressure	mbar	1							
Valve noise (KLS 98)	mV	--	n/a						
Zero pressure controller setting	mm/U	2	2						



		Engine No.											
		4721681		4721691									
		Cyl. 1	Cyl. 2	Cyl. 1	Cyl. 2	Cyl. 1	Cyl. 2	Cyl. 1	Cyl. 2	Cyl. 1	Cyl. 2	Cyl. 1	Cyl. 2
Valve stem projection:													
Left-hand intake valve	mm	28,6	28,4	28,6	28,6								
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	29,0	29,2	28,9	28,8								
Right-hand exhaust valve	mm	--	--										
		Cyl. 3	Cyl. 4	Cyl. 3	Cyl. 4	Cyl. 3	Cyl. 4	Cyl. 3	Cyl. 4	Cyl. 3	Cyl. 4	Cyl. 3	Cyl. 4
Left-hand intake valve	mm	28,6	28,8	28,6	28,6								
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	29,0	29,0	28,8	28,8								
Right-hand exhaust valve	mm	--	--										
		Cyl. 5	Cyl. 6	Cyl. 5	Cyl. 6	Cyl. 5	Cyl. 6	Cyl. 5	Cyl. 6	Cyl. 5	Cyl. 6	Cyl. 5	Cyl. 6
Left-hand intake valve	mm	28,6	28,0	28,7	28,6								
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	29,0	29,2	28,9	28,9								
Right-hand exhaust valve	mm	--	--										
		Cyl. 7	Cyl. 8	Cyl. 7	Cyl. 8	Cyl. 7	Cyl. 8	Cyl. 7	Cyl. 8	Cyl. 7	Cyl. 8	Cyl. 7	Cyl. 8
Left-hand intake valve	mm	28,6	28,8	28,6	28,5								
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	29,0	29,0	28,8	28,9								
Right-hand exhaust valve	mm	--	--										
		Cyl. 9	Cyl. 10	Cyl. 9	Cyl. 10	Cyl. 9	Cyl. 10	Cyl. 9	Cyl. 10	Cyl. 9	Cyl. 10	Cyl. 9	Cyl. 10
Left-hand intake valve	mm	28,6	28,6	28,5	28,5								
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	29,1	29,0	28,9	28,8								
Right-hand exhaust valve	mm	--	--										
		Cyl. 11	Cyl. 12	Cyl. 11	Cyl. 12	Cyl. 11	Cyl. 12	Cyl. 11	Cyl. 12	Cyl. 11	Cyl. 12	Cyl. 11	Cyl. 12
Left-hand intake valve	mm	28,6	28,6	28,7	28,5								
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	29,0	29,0	28,8	28,9								
Right-hand exhaust valve	mm	--	--										
		Cyl. 13	Cyl. 14	Cyl. 13	Cyl. 14	Cyl. 13	Cyl. 14	Cyl. 13	Cyl. 14	Cyl. 13	Cyl. 14	Cyl. 13	Cyl. 14
Left-hand intake valve	mm	--	--										
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	--	--										
Right-hand exhaust valve	mm	--	--										
		Cyl. 15	Cyl. 16	Cyl. 15	Cyl. 16	Cyl. 15	Cyl. 16	Cyl. 15	Cyl. 16	Cyl. 15	Cyl. 16	Cyl. 15	Cyl. 16
Left-hand intake valve	mm	--	--										
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	--	--										
Right-hand exhaust valve	mm	--	--										
		Cyl. 17	Cyl. 18	Cyl. 17	Cyl. 18	Cyl. 17	Cyl. 18	Cyl. 17	Cyl. 18	Cyl. 17	Cyl. 18	Cyl. 17	Cyl. 18
Left-hand intake valve	mm	--	--										
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	--	--										
Right-hand exhaust valve	mm	--	--										
		Cyl. 19	Cyl. 20	Cyl. 19	Cyl. 20	Cyl. 19	Cyl. 20	Cyl. 19	Cyl. 20	Cyl. 19	Cyl. 20	Cyl. 19	Cyl. 20
Left-hand intake valve	mm	--	--										
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	--	--										
Right-hand exhaust valve	mm	--	--										



Additional data for biogas installations with exhaust-gas heat exchanger				
Measure these data at different load points. Make sure, however, to carry out measurements only after each of the load points has been stable for a certain period of time (approx. 15 min.)!!				
CH4 content to determine the calorific value (if online measurement available)	%			
H2S concentration in fuel gas	ppm			
Output in % of Pn	%	50	75	100
O2 value upstream/downstream of catalytic converter (if available)	Vol.-%	/	/	/
O2 value (related to 5% O2) upstream/downstream of catalytic converter (if available)	mg/Nm <sup>3</sup>	/	/	/
NOx value (related to 5% O2) upstream/downstream of catalytic converter (if available)	mg/Nm <sup>3</sup>	/	/	/
Exhaust-gas temperature before heat exchanger	°C			
Exhaust-gas temperature after heat exchanger	°C			
Cooling water outlet temperature at exhaust-gas heat exchanger	°C			
Cooling water inlet temperature at exhaust-gas heat exchanger	°C			
Exhaust-gas back pressure upstream of exhaust-gas heat exchanger	mbar			
Exhaust-gas back pressure downstream of exhaust-gas	mbar			
Manufacturer and type of exhaust-gas heat exchanger according to type plate				

Remote data transfer		
To select an outside line (if not main telephone connection)		
	Modem type	
Internal modem		
External modem		
Jenbacher scope of supply		
Power cubicle	<input type="radio"/> yes	<input checked="" type="radio"/> no
Synchronisation	<input type="radio"/> yes	<input checked="" type="radio"/> no

Lubricating oil type:

Chevron LHSA 40

While commissioning the equipment, you must note down all data to be able to use this as a "reference list" and compare the data with more recent data. Comparing the reference data with recent data enables you to detect possible problems at an early stage or to analyse the problem afterwards.

Name: Dave Sibley

Drafted on: \_\_\_\_\_  
(signature)

281-442-9994



Jenbacher  
Documentation

Commissioning protocol:

Keyword: Cedar Road Design No: D390  
 Generator type: JGC 312 GS - NL Year of construction: 2006  
 Type/version: Country of installation: Kanada

Software version: B&R/SAM	RPS: (computer-controlled control)	2.10a
	VISU: (Dlaine-visualisation)	11.10a
	MMU: (Multi-function transducer)	15
	ZUND: (Ignition)	11.36
	MONIC: (Ignition Visualisation)	
	KUS98: (Knock control)	
	TEC: (Tebjet)	
	SAM:	
	EMS3000:	
Software version: Siemens/B&R	Sps: (PLC control)	0.4
	Syn: (Synchronisation)	
	Stat: (Station control)	

		Engine No.	
		4721681	4721691
Engine No.		4721681	4721691
Operating hours	Bh	13	4
Number of starts		56	20
Power, electric	kW	633	633
Voltage - average value	V	493	495
Current - average value	A	880	870
Zero conductor current	A	0	0
Cos phi	Ind/Kap	-0.82	-0.83
Exciter voltage	V	n/a	n/a
Mixture temperature	°C	46.7	45.6
Charge pressure	mbar	2590	2570
Gas-mixer position / TEC	mm / %	23.7	22.1
Throttle valve position	%	100	100
Flow-Tech position	%	41.5	39.9
After cooler differential pressure, mixture side	mbar	25	25
Mixture cooling water temperature, intake, stage 1	°C	71	68
Mixture cooling water temperature, intake, stage 2	°C	49	42
Engine cooling water temperature	°C	74.6	77
Engine cooling water pressure	bar	1.36	1.40
Oil temperature	°C	75	77
Oil pressure	bar	4.05	4.12
Gas pressure before pre-pressure controller	mbar	200	200
Gas pressure after pre-pressure controller	mbar	46	48
Pre-combustion chamber differential pressure	mbar	n/a	n/a
Gas pressure before differential-pressure controller	bar	n/a	n/a
Methane content (CH4)	%	ca. 55	55
Gas temperature before activated carbon filter	°C	n/a	n/a





		Engine No.			
		4721681	597	4721691	604
Cylinder temp. 1/2	°C	608	597	608	604
Cylinder temp. 3/4	°C	610	602	627	618
Cylinder temp. 5/6	°C	611	605	610	605
Cylinder temp. 7/8	°C	608	602	616	597
Cylinder temp. 9/10	°C	611	598	608	608
Cylinder temp. 11/12	°C	605	609	603	595
Cylinder temp. 13/14	°C				
Cylinder temp. 15/16	°C				
Cylinder temp. 17/18	°C				
Cylinder temp. 19/20	°C				
Ignition-voltage requirement	min/max	kV			
Ignition point		KWvOT	20	20	
Hot water forward temperature	°C		63	77	
Hot water return temperature	°C		77	60	
Exhaust-gas heat exchanger - tube-plate temperature	°C		n/a	n/a	
Drive side (DS) generator bearing temperature	°C		47	51	
Non-drive side (NDS) generator bearing temperature	°C		43	37	
Generator winding temperature 1	°C		63	54	
Generator winding temperature 2	°C		59	56	
Generator winding temperature 3	°C		64	54	
Exhaust-gas temperature before heat exchanger	°C		n/a	n/a	
Exhaust-gas temperature after heat exchanger	°C		n/a	n/a	
Cooling water inlet temperature at exhaust-gas heat exchanger	°C		n/a	n/a	
Cooling water outlet temperature at exhaust-gas heat exchanger	°C		n/a	n/a	
Differential pressure - exhaust-gas heat exchanger	mbar		n/a	n/a	
Differential pressure - catalytic converter	mbar		n/a	n/a	
Exhaust-gas backpressure after exhaust-gas turbocharger	mbar		3	7.4	
O <sub>2</sub> value	Vol.-%		8.4	8.0	
CO value (related to 5% O <sub>2</sub> )	mg/Nm <sup>3</sup>		759	727	
NO <sub>x</sub> value (related to 5% O <sub>2</sub> )	mg/Nm <sup>3</sup>		253	247	
Engine cooling water - concentration test	Vol.-%		40	40	
Product applied / additive					
Mixture cooling circuit (2nd stage) concentration test	Vol.-%		40	40	
Product applied / additive					
Intake temperature at engine air-filter intake	°C		9.8	13.4	
Generator cooling air intake temperature	°C		11	8	
Crankcase pressure (at dipstick)	mm/WS		+5	+4	
Engine room pressure	mbar		1		
Valve noise (KLS 98)	mV		--	n/a	
Zero pressure controller setting	mm/U		2	2	



		Engine No.:											
		4721681				4721691							
		Cyl. 1	Cyl. 2	Cyl. 3	Cyl. 4	Cyl. 5	Cyl. 6	Cyl. 7	Cyl. 8	Cyl. 9	Cyl. 10	Cyl. 11	Cyl. 12
Valve stem projection:													
Left-hand intake valve	mm	28,6	28,4	28,6	28,6								
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	29,0	29,2	28,9	28,8								
Right-hand exhaust valve	mm	--	--										
Left-hand intake valve	mm	28,6	28,8	28,8	28,6								
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	29,0	29,0	28,8	28,8								
Right-hand exhaust valve	mm	--	--										
Left-hand intake valve	mm	28,6	28,0	28,7	28,8								
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	29,0	29,2	28,9	28,9								
Right-hand exhaust valve	mm	--	--										
Left-hand intake valve	mm	28,6	28,8	28,6	28,5								
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	29,0	29,0	28,8	28,9								
Right-hand exhaust valve	mm	--	--										
Left-hand intake valve	mm	28,6	28,6	28,5	28,5								
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	29,1	29,0	28,9	28,8								
Right-hand exhaust valve	mm	--	--										
Left-hand intake valve	mm	28,6	28,6	28,7	28,5								
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	29,0	29,0	28,8	28,9								
Right-hand exhaust valve	mm	--	--										
Left-hand intake valve	mm	--	--										
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	--	--										
Right-hand exhaust valve	mm	--	--										
Left-hand intake valve	mm	--	--										
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	--	--										
Right-hand exhaust valve	mm	--	--										
Left-hand intake valve	mm	--	--										
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	--	--										
Right-hand exhaust valve	mm	--	--										
Left-hand intake valve	mm	--	--										
Right-hand intake valve	mm	--	--										
Left-hand exhaust valve	mm	--	--										
Right-hand exhaust valve	mm	--	--										



Additional data for biogas installations with exhaust-gas heat exchanger			
Measure these data at different load points. Make sure, however, to carry out measurements only after each of the load points has been stable for a certain period of time (approx. 15 min.)!			
CH <sub>4</sub> content to determine the calorific value (if online measurement available)	%		
H <sub>2</sub> S concentration in fuel gas	ppm		
Output in % of Pn	%	50	75 100
O <sub>2</sub> value upstream/downstream of catalytic converter (if available)	Vol. %	/	/ /
O <sub>2</sub> value (related to 5% O <sub>2</sub> ) upstream/downstream of catalytic converter (if available)	mg/Nm <sup>3</sup>	/	/ /
NO <sub>x</sub> value (related to 5% O <sub>2</sub> ) upstream/downstream of catalytic converter (if available)	mg/Nm <sup>3</sup>	/	/ /
Exhaust-gas temperature before heat exchanger	°C		
Exhaust-gas temperature after heat exchanger	°C		
Cooling water outlet temperature at exhaust-gas heat exchanger	°C		
Cooling water inlet temperature at exhaust-gas heat exchanger	°C		
Exhaust-gas back pressure upstream of exhaust-gas heat exchanger	mbar		
Exhaust-gas back pressure downstream of exhaust-gas heat exchanger	mbar		
Manufacturer and type of exhaust-gas heat exchanger according to type plate			

Remote data transfer	
To select an outside line (if not main telephone connection)	
Modem type	
Internal modem	
External modem	
Jenbacher scope of supply	
Power cubicle	<input type="radio"/> yes <input checked="" type="radio"/> no
Synchronisation	<input type="radio"/> yes <input checked="" type="radio"/> no

Lubricating oil type:

Chevron LHSA 40

While commissioning the equipment, you must note down all data to be able to use this as a "reference list" and compare the data with more recent data. Comparing the reference data with recent data enables you to detect possible problems at an early stage or to analyse the problem afterwards.

Name: Dave Sibley

Drafted on: 10 MAR 09

D. Sibley  
(signature)

## Section 2

# Exhaust Gas Readings at Commissioning

\*\*\*\*\*  
 \* E C O M - J 2 K N \*  
 \*\*\*\*\*  
 Anlage: Cedar Road LF  
 Motor Nr:  
 Leistung(kW): 4721691  
 Katalysator:  
 ZZP: D330

Date Time  
 09.03.09 16:55:30

Gas analysis

Fuel type  
 Natural gas

T.Air	12	°C
O2	8.0	%
CO 5%O2	727	mg/m3
NO 5%O2	73	mg/m3
NO2 5%O2	137	mg/m3
NOx 5%O2	247	mg/m3
CO2	7.3	%

GE Jenbacher GmbH &  
 Co OHG  
 Achenseestr. 1-3  
 A-6200 Jenbach  
 Tel: 05244/6002437

Engine II

\*\*\*\*\*  
 \* E C O M - J 2 K N \*  
 \*\*\*\*\*  
 Anlage: Cedar Road LF  
 Motor Nr:  
 Leistung(kW): 4721691  
 Katalysator:  
 ZZP: D330

Date Time  
 09.03.09 17:06:39

Gas analysis

Fuel type  
 Natural gas

T.Air	11	°C
O2	7.6	%
CO 5%O2	632	mg/m3
NO 5%O2	84	mg/m3
NO2 5%O2	119	mg/m3
NOx 5%O2	247	mg/m3
CO2	7.5	%

GE Jenbacher GmbH &  
 Co OHG  
 Achenseestr. 1-3  
 A-6200 Jenbach  
 Tel: 05244/6002437

\*\*\*\*\*  
 \* E C O M - J 2 K N \*  
 \*\*\*\*\*  
 Anlage: Cedar Road  
 Motor Nr: 4721681  
 Leistung(kW):  
 Katalysator: D330  
 ZZP:

PN = 100%  
 Date Time  
 05.03.09 14:38:44

Gas analysis

Fuel type  
 Natural gas

T.Air	14	°C
O2	8.4	%
CO 5%O2	759	mg/m3
NO 5%O2	61	mg/m3
NO2 5%O2	159	mg/m3
NOx 5%O2	253	mg/m3
CO2	7.1	%

GE Jenbacher GmbH &  
 Co OHG  
 Achenseestr. 1-3  
 A-6200 Jenbach  
 Tel: 05244/6002437

Engine I

\*\*\*\*\*  
 \* E C O M - J 2 K N \*  
 \*\*\*\*\*  
 Anlage: Cedar Road  
 Motor Nr: 4721681  
 Leistung(kW):  
 Katalysator: D330  
 ZZP:

PN = 50%  
 Date Time  
 05.03.09 14:48:26

Gas analysis

Fuel type  
 Natural gas

T.Air	17	°C
O2	7.6	%
CO 5%O2	644	mg/m3
NO 5%O2	76	mg/m3
NO2 5%O2	133	mg/m3
NOx 5%O2	250	mg/m3
CO2	7.5	%

GE Jenbacher GmbH &  
 Co OHG  
 Achenseestr. 1-3  
 A-6200 Jenbach  
 Tel: 05244/6002437

Engine I

# Section 3

## GE Jenbacher Technician Report

**SERVICE ORDER**  
**GE JENBACHER USA**



PROJECT #: \_\_\_\_\_  
 DATE: 3/4/2009  
 GEJ KEYWORD: Cedar Road  
 J-NUMBER: D390

CUSTOMER NAME : Waterous Power  
 PERFORMED BY : D.Sibley  
 MODULE TYPE: JGS 312 GS-L.L

	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7
	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced
SERIAL NO.							
MODULE NO.							
UNIT HOURS:							
STARTS:							

**WORK REQUIRED:**     Completed                       Return visit required                       Additional parts required

**Commissioning Training**

**DESCRIPTION ( CONDITIONS / WORK PERFORMED):**

Arrive at site; utility arrived; ran engine and tried to close breaker; breaker chattered and protective relay tripped and locked out the breaker; suspected the gen rotation was backward; tried to figure out how to check rotation without having excitation voltage; backfed gen momentarily to see what direction gen turned; rotation was reversed; Kay and Rob swapped 2 cables at gen; contacts in the breaker were damaged during the closing attempt; we swapped contacts with the breaker in engine 2; ran engine, closed breaker and got load up to about 460kw; shut down engine and left site; **the room ventilation system is improperly designed / the gas alarm/fire alarm sensor is located in the wrong location / these are not Jenbacher issues as these containers were built by the customer**

**FAILED PARTS REMOVED**

QUANTITY	DESCRIPTION	OPH OF PART	PART #

**EQUIPMENT & MATERIALS USED**

QUANTITY	DESCRIPTION	PART #

S.T. LABOR (HOURS)	8.0
O.T. LABOR (HOURS)	2.0
TRAVEL (MILES)	
MISCELLANEOUS EXPENSES (\$):	

GEJ STARTUP WORK	10.0
DISTRIBUTOR WORK	
FACTORY DEFICIENCY WORK	
<b>TOTAL WORK</b>	

CUSTOMERS SIGNATURE: \_\_\_\_\_

Date: \_\_\_\_\_

**SERVICE ORDER**  
**GE JENBACHER USA**



PROJECT #: \_\_\_\_\_  
 DATE: 3/5/2009  
 GEJ KEYWORD: Cedar Road  
 J-NUMBER: D390

CUSTOMER NAME : Waterous Power  
 PERFORMED BY : D.Sibley  
 MODULE TYPE: JGS 312 GS-L.L

	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7
SERIAL NO.	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input checked="" type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced
MODULE NO.							
UNIT HOURS:							
STARTS:							

**WORK REQUIRED:**     Completed                       Return visit required                       Additional parts required

**Commissioning Training**

**DESCRIPTION ( CONDITIONS / WORK PERFORMED):**

Got commissioning info emailed from Alex, went to Staples and printed out the checklist and P&ID; started engine and eventually got to full load; set emissions; powered up unit 2 and loaded software and parameters;

**FAILED PARTS REMOVED**

QUANTITY	DESCRIPTION	OPH OF PART	PART #

**EQUIPMENT & MATERIALS USED**

QUANTITY	DESCRIPTION	PART #

S.T. LABOR (HOURS)	8.0
O.T. LABOR (HOURS)	2.0
TRAVEL (MILES)	
MISCELLANEOUS EXPENSES (\$):	

GEJ STARTUP WORK	10.0
DISTRIBUTOR WORK	
FACTORY DEFICIENCY WORK	
<b>TOTAL WORK</b>	

CUSTOMERS SIGNATURE: \_\_\_\_\_

Date: \_\_\_\_\_



**SERVICE ORDER**  
**GE JENBACHER USA**



PROJECT #: \_\_\_\_\_  
 DATE: 3/6/2009  
 GEJ KEYWORD: Cedar Road  
 J-NUMBER: D390

CUSTOMER NAME : Waterous Power  
 PERFORMED BY : D.Sibley  
 MODULE TYPE: JGS 312 GS-L.L

	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7
	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input checked="" type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced
SERIAL NO.							
MODULE NO.							
UNIT HOURS:							
STARTS:							

**WORK REQUIRED:**     Completed                       Return visit required                       Additional parts required

**Commissioning Training**

**DESCRIPTION ( CONDITIONS / WORK PERFORMED):**

Upon arrival the flare skid was down, which meant we could not run the engine; we continued working on engine 2 to get it ready; we checked rotation of the gen and found it good; me and Rob checked valve stem measurements; Rob connected the coupling and began checking alignment; needed some washers and was not able to finish, he will finish Monday; Rob and Rick went home for the weekend; alignment should be good enough to just idle; got gas and put engine 1 online at full load; kept working on engine 2; customer had to replace a transformer in both units so we shut down engine 1; they also found the steel threaded rings around the power cables were extremely hot, most likely due to the electromagnetic field (the rings we use on our equipment are always plastic); they will look into that tomorrow; left site.

**FAILED PARTS REMOVED**

QUANTITY	DESCRIPTION	OPH OF PART	PART #

**EQUIPMENT & MATERIALS USED**

QUANTITY	DESCRIPTION	PART #

S.T. LABOR (HOURS)	8.0
O.T. LABOR (HOURS)	2.0
TRAVEL (MILES)	
MISCELLANEOUS EXPENSES (\$):	

GEJ STARTUP WORK	10.0
DISTRIBUTOR WORK	
FACTORY DEFICIENCY WORK	
<b>TOTAL WORK</b>	

CUSTOMERS SIGNATURE: \_\_\_\_\_

Date: \_\_\_\_\_

**SERVICE ORDER**  
**GE JENBACHER USA**



PROJECT #: \_\_\_\_\_  
 DATE: 3/7/2009  
 GEJ KEYWORD: Cedar Road  
 J-NUMBER: D390

CUSTOMER NAME : Waterous Power  
 PERFORMED BY : D.Sibley  
 MODULE TYPE: JGS 312 GS-L.L

	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7
SERIAL NO.	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input checked="" type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced
MODULE NO.							
UNIT HOURS:							
STARTS:							

**WORK REQUIRED:**     Completed                       Return visit required                       Additional parts required

**Commissioning Training**

**DESCRIPTION ( CONDITIONS / WORK PERFORMED):**

Arrived onsite; worked on getting unit 2 to start; checked auxiliary items; worked on wiring for the e-stop circuit and undervoltage circuit with electrician; (undervoltage circuit is not using the undervoltage contact in our cabinet, is using the collective trouble relay); checked breaker control; electrician installed new transformers in the breaker cabinets for breaker control power; idled unit 2.

**FAILED PARTS REMOVED**

QUANTITY	DESCRIPTION	OPH OF PART	PART #

**EQUIPMENT & MATERIALS USED**

QUANTITY	DESCRIPTION	PART #

S.T. LABOR (HOURS)	8.0
O.T. LABOR (HOURS)	2.0
TRAVEL (MILES)	
MISCELLANEOUS EXPENSES (\$):	

GEJ STARTUP WORK	10.0
DISTRIBUTOR WORK	
FACTORY DEFICIENCY WORK	
<b>TOTAL WORK</b>	

CUSTOMERS SIGNATURE: \_\_\_\_\_

Date: \_\_\_\_\_

**SERVICE ORDER**  
**GE JENBACHER USA**



PROJECT #: \_\_\_\_\_  
 DATE: 3/8/2009  
 GEJ KEYWORD: Cedar Road  
 J-NUMBER: D390

CUSTOMER NAME : Waterous Power  
 PERFORMED BY : D.Sibley  
 MODULE TYPE: JGS 312 GS-L.L

	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7
	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input checked="" type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced
SERIAL NO.							
MODULE NO.							
UNIT HOURS:							
STARTS:							

**WORK REQUIRED:**     Completed                       Return visit required                       Additional parts required

**Commissioning Training**

**DESCRIPTION ( CONDITIONS / WORK PERFORMED):**  
 Finished the alignment on #2; paralleled #2, took to full load and set emissions.

**FAILED PARTS REMOVED**

QUANTITY	DESCRIPTION	OPH OF PART	PART #

**EQUIPMENT & MATERIALS USED**

QUANTITY	DESCRIPTION	PART #

S.T. LABOR (HOURS)	8.0
O.T. LABOR (HOURS)	2.0
TRAVEL (MILES)	
MISCELLANEOUS EXPENSES (\$):	

GEJ STARTUP WORK	10.0
DISTRIBUTOR WORK	
FACTORY DEFICIENCY WORK	
<b>TOTAL WORK</b>	

CUSTOMERS SIGNATURE: \_\_\_\_\_

Date: \_\_\_\_\_

**SERVICE ORDER**  
**GE JENBACHER USA**



PROJECT #: \_\_\_\_\_  
 DATE: 3/9/2009  
 GEJ KEYWORD: Cedar Road  
 J-NUMBER: D390

CUSTOMER NAME : Waterous Power  
 PERFORMED BY : D.Sibley  
 MODULE TYPE: JGS 312 GS-L.L

	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7
	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input checked="" type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced
SERIAL NO.							
MODULE NO.							
UNIT HOURS:							
STARTS:							

**WORK REQUIRED:**     Completed                       Return visit required                       Additional parts required

**Commissioning Training**

**DESCRIPTION ( CONDITIONS / WORK PERFORMED):**

Finished alignment on #2; paralled #2; took full load and set emissions.

**FAILED PARTS REMOVED**

QUANTITY	DESCRIPTION	OPH OF PART	PART #

**EQUIPMENT & MATERIALS USED**

QUANTITY	DESCRIPTION	PART #

S.T. LABOR (HOURS)	8.0
O.T. LABOR (HOURS)	2.0
TRAVEL (MILES)	
MISCELLANEOUS EXPENSES (\$):	

GEJ STARTUP WORK	10.0
DISTRIBUTOR WORK	
FACTORY DEFICIENCY WORK	
<b>TOTAL WORK</b>	

CUSTOMERS SIGNATURE: \_\_\_\_\_

Date: \_\_\_\_\_

**SERVICE ORDER**  
**GE JENBACHER USA**



PROJECT #: \_\_\_\_\_  
 DATE: 3/10/2009  
 GEJ KEYWORD: Cedar Road  
 J-NUMBER: D390

CUSTOMER NAME : Waterous Power  
 PERFORMED BY : D.Sibley  
 MODULE TYPE: JGS 312 GS-L.L

	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7
	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input checked="" type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced
SERIAL NO.							
MODULE NO.							
UNIT HOURS:							
STARTS:							

**WORK REQUIRED:**     Completed                       Return visit required                       Additional parts required

**Commissioning Training**

**DESCRIPTION ( CONDITIONS / WORK PERFORMED):**

Commissioning checklist on #2; data protocol on #2; saved parameters and data export; worked on starting for both engines.

**FAILED PARTS REMOVED**

QUANTITY	DESCRIPTION	OPH OF PART	PART #

**EQUIPMENT & MATERIALS USED**

QUANTITY	DESCRIPTION	PART #

S.T. LABOR (HOURS)	8.0
O.T. LABOR (HOURS)	2.0
TRAVEL (MILES)	
MISCELLANEOUS EXPENSES (\$):	

GEJ STARTUP WORK	10.0
DISTRIBUTOR WORK	
FACTORY DEFICIENCY WORK	
<b>TOTAL WORK</b>	

CUSTOMERS SIGNATURE: \_\_\_\_\_

Date: \_\_\_\_\_

**SERVICE ORDER**  
**GE JENBACHER USA**



PROJECT #: \_\_\_\_\_  
 DATE: 3/11/2009  
 GEJ KEYWORD: Cedar Road  
 J-NUMBER: D390

CUSTOMER NAME : Waterous Power  
 PERFORMED BY : D.Sibley  
 MODULE TYPE: JGS 312 GS-L.L

	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7
SERIAL NO.	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input checked="" type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced
MODULE NO.							
UNIT HOURS:							
STARTS:							

**WORK REQUIRED:**     Completed                       Return visit required                       Additional parts required

**Commissioning Training**

**DESCRIPTION ( CONDITIONS / WORK PERFORMED):**

Went to site to get TOE signed and for Kay to pack up his tools; travel to Vancouver

**FAILED PARTS REMOVED**

QUANTITY	DESCRIPTION	OPH OF PART	PART #

**EQUIPMENT & MATERIALS USED**

QUANTITY	DESCRIPTION	PART #

S.T. LABOR (HOURS)	8.0
O.T. LABOR (HOURS)	2.0
TRAVEL (MILES)	
MISCELLANEOUS EXPENSES (\$):	

GEJ STARTUP WORK	10.0
DISTRIBUTOR WORK	
FACTORY DEFICIENCY WORK	
<b>TOTAL WORK</b>	

CUSTOMERS SIGNATURE: \_\_\_\_\_

Date: \_\_\_\_\_

**SERVICE ORDER**  
**GE JENBACHER USA**



PROJECT #: \_\_\_\_\_  
 DATE: 3/12/2009  
 GEJ KEYWORD: Cedar Road  
 J-NUMBER: D390

CUSTOMER NAME : Waterous Power  
 PERFORMED BY : D.Sibley  
 MODULE TYPE: JGS 312 GS-L.L

	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7
	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input checked="" type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced	<input type="checkbox"/> serviced
SERIAL NO.							
MODULE NO.							
UNIT HOURS:							
STARTS:							

**WORK REQUIRED:**     Completed                       Return visit required                       Additional parts required

**Commissioning Training**

**DESCRIPTION ( CONDITIONS / WORK PERFORMED):**  
 Travel Home

**FAILED PARTS REMOVED**

QUANTITY	DESCRIPTION	OPH OF PART	PART #

**EQUIPMENT & MATERIALS USED**

QUANTITY	DESCRIPTION	PART #

S.T. LABOR (HOURS)	8.0
O.T. LABOR (HOURS)	2.0
TRAVEL (MILES)	
MISCELLANEOUS EXPENSES (\$):	

GEJ STARTUP WORK	10.0
DISTRIBUTOR WORK	
FACTORY DEFICIENCY WORK	
<b>TOTAL WORK</b>	

CUSTOMERS SIGNATURE: \_\_\_\_\_

Date: \_\_\_\_\_

# Section 4

## Equipment Acceptance



### Equipment Acceptance

Customer:	Cedar Road LFG Inc. 1105 Cedar Road Nanaimo BC V9X 1K9		
Customer Order Number:	2008 01 30-1		
Unit Name:	Cedar Road Landfill # 1		
Set Type:	JGS 312	Design Number:	J D390
Set Number:	4721701	Engine Number:	4721681
Generator Model:	5012L	Generator Number:	M03 20078037-100R-01

**Scope of Supply:** The above listed equipment has been found in full accordance with the specification of the order. All functions of the supplied equipment have been tested.

Completion Date: March 12, 2009

**Results:** No apparent defects have been found

With completion of the test run and the demonstration of full load capabilities the equipment has been turned over on: March 12, 2009

Instructions for operation and maintenance have been given to: Don Best and Tony Piñeiro Perez

on March 12, 2009

**Warranty period:** Twelve (12) months from startup

**Warranty period begins on:** March 13, 2009

**Ends:** March 12, 2010

On behalf of Waterous Power Systems

On behalf of Cedar Road LFG Inc. Date: \_\_\_\_\_

Rick Schmidt

Name: \_\_\_\_\_



Signature: \_\_\_\_\_

### Equipment Acceptance

Customer:	Cedar Road LFG Inc. 1105 Cedar Road Nanaimo BC V9X 1K9		
Customer Order Number:	2008 01 30-1		
Unit Name:	Cedar Road Landfill # 2		
Set Type:	JGS 312	Design Number:	J D390
Set Number:	4721702	Engine Number:	4721691
Generator Model:	5012L	Generator Number:	M03 20078037-100R-01

**Scope of Supply:** The above listed equipment has been found in full accordance with the specification of the order. All functions of the supplied equipment have been tested.

Completion Date: March 12, 2009

**Results:** No apparent defects have been found

With completion of the test run and the demonstration of full load capabilities the equipment has been turned over on: March 12, 2009

Instructions for operation and maintenance have been given to: Don Best and Tony Piñeiro Perez

on March 12, 2009

**Warranty period:** Twelve (12) months from startup

**Warranty period begins on:** March 13, 2009

**Ends:** March 12, 2010

On behalf of Waterous Power Systems

On behalf of Cedar Road LFG Inc. Date: \_\_\_\_\_

Rick Schmidt

Name: \_\_\_\_\_

Signature: \_\_\_\_\_



# Section 5

## Revised Maintenance Schedule

# **Revised Maintenance Schedule**

for GE Jenbacher Engines Version C81 Landfill Gas

Please replace pages 1 to 4 in section 3.1 of your Maintenance Manual with the following



<b>Inspection task</b>			
<b>Inspection task</b>	<b>Number/ section</b>	<b>Interval</b>	<b>Note</b>
Daily inspection round	I 9002 0	daily	Carry out daily visual inspection of the unit.
Operating data log	---	daily	Log the operating data daily.
Intake air filter-Engine	IW 8041 A0	daily	Checking the vacuum indicator
Check ignition voltage/ spark plug	IW 0309 M0	weekly < 250 oh	The result of the ignition voltage check to be carried out weekly, serves as the indicator for the actual service life of the spark plug.
Lubricating oil	IW 0101 M0 TA 1000-0099A TA 1000-0099B TA 1000-0099C	first time after 75 oh	The results from the engine lubricating oil analyses are decisive for the actual oil change periods.
Battery	TA 1000-0050	once in a month	Check the acid level. Check if the pole binders are properly secured.
Cooling water	TA 1000-0200 TA 1000-0201 TA 1000-0204	once in a year	Concentration inspection
	W 8080 A0	20000 oh after having completed the overhaul activities	Cooling water exchange
Battery in DIANE module	---	every two years	Replace
Storage battery at battery charger	---	every five years	Replace
Emission measurement	W 8056 M0	Emission measurement according to official guidelines. Remark: If the CO limiting values are exceeded, inspect and, if required, clean the combustion chambers.	



Proper maintenance according to the maintenance schedule is a condition for honouring any claims under warranty.



After the „Overhaul“ 60000 operating hours, the maintenance work to be carried out is repeated at the same interval periods.



Interval ref. nr.	Interval reference number = Operating hours/1000		ZK = on the occasion of cylinderhead disassembly																					
	Maintenance task/ Inspection task	Number	Operating hours																					
			< 100	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000	18000	19000	20000	
-	Maintenance after first start-up	W 1000 0	<input type="checkbox"/>																					
2	Valve clearance	W 0400 M0		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Ignition system	W 0303 M0		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Inspection	I 0103 0		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Crankcase suction filter	W 0505 M0		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2/30	Regulating rods/Throttle valve/ Actuator	W 0200 M0		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2/30/ 60	Gas train	W 8045 A0		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Turbocharger	W 8023 M0									<input type="checkbox"/>												<input type="checkbox"/>	
10	Engine coolant pump	W 0201 M0									<input type="checkbox"/>													<input type="checkbox"/>
10	Starter	W 8032 M0									<input type="checkbox"/>													<input type="checkbox"/>
10/20	Gas mixer	W 0704 M0									<input type="checkbox"/>													<input type="checkbox"/>
20	Mixture bypass valve	W 0802 M0																						<input type="checkbox"/>
20	Torsion vibration damper	W 0601 M0																						<input type="checkbox"/>
20	GE Jenbacher-switch cabinets	W 8031 A0																						<input type="checkbox"/>
20	Piston/Piston cooling	W 8047 M0																						<input type="checkbox"/>
20	Con rod/Con rod bearing	W 8048 M0																						<input type="checkbox"/>
20	Cylinder liner/Scrapper ring	W 8049 M0																						<input type="checkbox"/>
ZK 20	Camshaft/Steering parts	W 8052 M0																						<input type="checkbox"/>
40	Crankshaft main bearing	W 8050 M0																						
60	Engine oil pump	W 8046 M0																						
60	Turbocharger after-lubrication pump	W 8054 M0																						
60	Plate-type heat exchanger	W 8043 A0																						
60	Overhaul	W 2100 M0																						
ZK	Exhaust gas manifold/Isolation	W 8051 M0																						
-	Cylinder head replacement	W 8053 M0	<b>if required</b>																					
-	Generator (Stamford 5, 6, 7)	W 8030 A0				<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>						<input type="checkbox"/>	
-	Elastomer parts	W 8033 0									<input type="checkbox"/>													<input type="checkbox"/>



Please note that properly carried out maintenance work is to be acknowledged by filling in the maintenance protocol.



Interval ref. nr.	Interval reference number = Operating hours/1000		ZK = on the occasion of cylinderhead disassembly																		
	Maintenance task/ Inspection task	Number	Operating hours																		
			21000	22000	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	34000	35000	36000	37000	38000	39000
2	Valve clearance	W 0400 M0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Ignition system	W 0303 M0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Inspection	I 0103 0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Crankcase suction filter	W 0505 M0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2/30	Regulating rods/Throttle valve/ Actuator	W 0200 M0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2/30/ 60	Gas train	W 8045 A0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Turbocharger	W 8023 M0								<input type="checkbox"/>											<input type="checkbox"/>
10	Engine coolant pump	W 0201 M0								<input type="checkbox"/>											<input type="checkbox"/>
10	Starter	W 8032 M0								<input type="checkbox"/>											<input type="checkbox"/>
10/20	Gas mixer	W 0704 M0																			<input type="checkbox"/>
20	Mixture bypass valve	W 0802 M0																			<input type="checkbox"/>
20	Torsion vibration damper	W 0601 M0																			<input type="checkbox"/>
20	GE Jenbacher-switch cabinets	W 8031 A0																			<input type="checkbox"/>
20	Piston/Piston cooling	W 8047 M0																			<input type="checkbox"/>
20	Con rod/Con rod bearing	W 8048 M0																			<input type="checkbox"/>
20	Cylinder liner/Scraper ring	W 8049 M0																			<input type="checkbox"/>
ZK 20	Camshaft/Steering parts	W 8052 M0																			<input type="checkbox"/>
40	Crankshaft main bearing	W 8050 M0																			<input type="checkbox"/>
60	Engine oil pump	W 8046 M0																			
60	Turbocharger after-lubrication pump	W 8054 M0																			
60	Plate-type heat exchanger	W 8043 A0																			
60	Overhaul	W 2100 M0																			
ZK	Exhaust gas manifold/Isolation	W 8051 M0																			
-	Cylinder head replacement	W 8053 M0	if required																		
-	Generator (Stamford 5, 6, 7)	W 8030 A0			<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>					<input type="checkbox"/>
-	Elastomer parts	W 8033 0								<input type="checkbox"/>											<input type="checkbox"/>



Please note that properly carried out maintenance work is to be acknowledged by filling in the maintenance protocol.



Interval ref. nr.	Interval reference number = Operating hours/1000		ZK = on the occasion of cylinderhead disassembly																			
	Maintenance task/ Inspection task	Number	Operating hours																			
			41000	42000	43000	44000	45000	46000	47000	48000	49000	50000	51000	52000	53000	54000	55000	56000	57000	58000	59000	60000
2	Valve clearance	W 0400 M0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Ignition system	W 0303 M0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Inspection	I 0103 0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Crankcase suction filter	W 0505 M0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2/30	Regulating rods/Throttle valve/ Actuator	W 0200 M0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2/30/ 60	Gas train	W 8045 A0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10	Turbocharger	W 8023 M0								<input checked="" type="checkbox"/>												<input checked="" type="checkbox"/>
10	Engine coolant pump	W 0201 M0								<input checked="" type="checkbox"/>												<input checked="" type="checkbox"/>
10	Starter	W 8032 M0								<input checked="" type="checkbox"/>												<input checked="" type="checkbox"/>
10/20	Gas mixer	W 0704 M0								<input checked="" type="checkbox"/>												<input checked="" type="checkbox"/>
20	Mixture bypass valve	W 0802 M0																				<input checked="" type="checkbox"/>
20	Torsion vibration damper	W 0601 M0																				<input checked="" type="checkbox"/>
20	GE Jenbacher-switch cabinets	W 8031 A0																				<input checked="" type="checkbox"/>
20	Piston/Piston cooling	W 8047 M0																				<input checked="" type="checkbox"/>
20	Con rod/Con rod bearing	W 8048 M0																				<input checked="" type="checkbox"/>
20	Cylinder liner/Scraper ring	W 8049 M0																				<input checked="" type="checkbox"/>
ZK 20	Camshaft/Steering parts	W 8052 M0																				<input checked="" type="checkbox"/>
40	Crankshaft main bearing	W 8050 M0																				
60	Engine oil pump	W 8046 M0																				<input checked="" type="checkbox"/>
60	Turbocharger after-lubrication pump	W 8054 M0																				<input checked="" type="checkbox"/>
60	Plate-type heat exchanger	W 8043 A0																				<input checked="" type="checkbox"/>
60	Overhaul	W 2100 M0																				<input checked="" type="checkbox"/>
ZK	Exhaust gas manifold/Isolation	W 8051 M0																				
-	Cylinder head replacement	W 8053 M0	<b>if required</b>																			
-	Generator (Stamford 5, 6, 7)	W 8030 A0			<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>							<input checked="" type="checkbox"/>
-	Elastomer parts	W 8033 0								<input checked="" type="checkbox"/>												<input checked="" type="checkbox"/>



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# Section 6

## Spar Parts List

# Spare Parts

Customer:	Cedar Road LFG Inc. 1105 Cedar Road Nanaimo BC V9X 1K9		
Customer Order Number:	2008 01 30-1		
Unit Name:	Cedar Road Landfill # 1		
Set Type:	JGS 312	Design Number:	J D390
Set Number:	4721701 / 4721702	Engine Number:	4721681 / 4721691
Generator Model:	5012L		

## Parts required for oil change:

Oil change intervals are determined by the results of oil sampling		
Part Number	Description	Quantity per engine
225125	Oil Filter	2
235077	Filter Spin-on	1

## Parts required for 2000 Hour Maintenance:

Part Number	Description	Quantity per engine
102981	Seal Ring	12
100548	Gasket Valve Cover	12

## Recommended Spare Parts to be kept on site:

Part Number	Description	Quantity
347257	Spark Plug	12
464366	Spark Plug Socket	2
285903	Rubber Spring	4
257320	Filter Air	1
270160	Filter Mat Air	1
253583	Filter Air	1

270159	Filter Mat Air	1
118257	Coil	4
236490	Filter Insert Gas	2
241403	Gasket Kit, Gas Filter Canister	2

For current pricing and availability please contact Allison Lebel at 403-259-7601 or [alebel@waterouspower.com](mailto:alebel@waterouspower.com)

# Section 7

## Contact Information

## Waterous Power Systems Contact Information

### Parts:

Allison Lebel  
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Email: [alebel@waterouspower.com](mailto:alebel@waterouspower.com)

### Service:

Roger Benson  
Phone: 403-212-4769  
Fax: 403-259-0267  
Email: [rbenson@waterouspower.com](mailto:rbenson@waterouspower.com)

### After hours Parts or Service:

Phone: 403-253-7601 (follow voice prompt)

### Account Information:

Rolly Buchanan  
Phone: 780-437-8204  
Fax: 780-437-5864  
Email: [rbuchanan@waterouspower.com](mailto:rbuchanan@waterouspower.com)

### Mailing Address:

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