

403.253.7601 Tel 403.252.7532 Fax www.waterouspower.com

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

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Section 1

GE Jenbacher Commissioning Protocol



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

Software version B&R/SAM	RPS:	(computer-controlled control)	2.10a
	VISU:	(Dia.ne 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	Α	880	870				
Zero conductor current	Α	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				

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Datum: 3/24/2009 Seite: 1 von 4



					F	Engine No.					
		4721681		470	1601	Engi	ne ino.				
0.15.15.15.15.15.16	00				1691		1				
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	2	:0	2	20						
Hot water forward temperature	°C		3		77						
Hot water return temperature	°C	7	7	6	03						
Exhaust-gas heat exchanger - tube-plate temperature	°C	n	/a	n	/a						
Drive side (DS) generator bearing temperature	°C	4	7	Ę	51						
Non-drive side (NDS) generator bearing temperature	°C	4	3	3	37						
Generator winding temperature 1	°C	6	3	5	54						
Generator winding temperature 2	°C	5	9	5	58						
Generator winding temperature 3	°C	6	i4	5	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./%		.4	1	.0						
CO value (related to 5% O2)	mg/Nm ³		. 4 59		27			 			
NOx value (related to 5% O2)	mg/Nm³		53		<u>47</u>			 			
Engine cooling water - concentration test	Vol./%		.0		10						
Product applied / additive	. 51., 75			-	-						
Mixture cooling circuit (2nd stage) concentration test	Vol./%	4	.0		10						
Product applied / additive	1							•			
Intake temperature at engine air-filter intake	°C	9	.8	1;	3.4						
Generator cooling-air intake temperature	°C	1	1		8						
Crankcase pressure (at dipstick)	mm/WS		·5	4	-4						
Engine-room pressure	mbar		1								
Valve noise (KLS 98)	mV		-		/a						
Zero pressure controller setting	mm/U		2		2				· <u></u>		



	Engine No.										
Valve stem projection:		472	1681	472	1691	Liigii	10 140.				
		Cyl. 1	Cyl. 2	Cyl. 1	Cyl. 2	Cyl. 1	Cyl. 2	Cyl. 1	Cyl. 2	Cyl. 1	Cyl. 2
Left-hand intake valve	mm	28,6	28,4	28.6		Oyi. 1	Oyı. 2	Oyi. 1	Oyi. 2	Oyi. 1	Oyi. 2
Right-hand intake valve	mm			20.0	20.0						
Left-hand exhaust valve	mm	29,0	29,2	28.9	28.8						
Right-hand exhaust valve	mm			20.0	20.0						
		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	Oyi. 3	Оуі. 4	Oyi. 3	Cyl. 4	Oyi. 3	Oyl. 4
Right-hand intake valve	mm			20.0	20.0						
Left-hand exhaust valve	mm	29,0	29,0	28.8	28.8						
Right-hand exhaust valve	mm			20.0	20.0						
3		Cyl. 5	Cyl. 6	Cyl. 5	Cyl. 6	Cyl. 5	Cyl. 6	0.1.5	0.1.0	0.1.5	0.1.0
Left-hand intake valve	mm	28,6		28.7	28.6	Cyl. 5	Cyl. 6	Cyl. 5	Cyl. 6	Cyl. 5	Cyl. 6
	mm	20,0	28,0	20.7	20.0						
Right-hand intake valve Left-hand exhaust valve	mm mm	29,0	29,2	28.9	28.9	-		-	-	-	
Right-hand exhaust valve	mm	29,0	29,2	20.9	20.9						—
ragneriana oznadot valvo											
I aft based intoles color		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			00.0	00.0						
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
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
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
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
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
Left-hand intake valve	mm	Cyl. 17		Oyl. 17	Oyi. 10	Gyi. 17	Oyi. 10	Gyr. 17	Oy1. 10	Oyr. 17	Oyi. 10
Right-hand intake valve	mm										
Left-hand exhaust valve	mm										
Right-hand exhaust valve	mm				-	 		 	 	 	
gara omiadot rairo											
Loft hand intaka yalva		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					ļ		ļ		ļ	<u> </u>
Right-hand intake valve	mm					ļ		ļ		ļ	<u> </u>
Left-hand exhaust valve	mm					ļ		ļ		ļ	<u> </u>
Right-hand exhaust valve	mm										



Additional data for blogas ilistal	lations	with exha	aust-gas heat e	exchanger
Measure these data at different load points. Make the load points has been stable f				
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 ³	/	/	/
NOx value (related to 5% O2) upstream/downstream of catalytic converter (if available)	mg/Nm ³	/	/	,
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			
Remote data tra	oofor			
	isiei			
	Isiei	Modem	type	
connection)	isiei	Modem	type	
	Islei	Modem	type	
Internal modem			type er scope of supply	
Internal modem			er scope of supply one of supply	
Internal modem External modem	0 1	Jenbache	r scope of supply	
Internal modem External modem Power cubicle	0 1	Jenbache yes	er scope of supply ono	
Internal modem External modem Power cubicle Synchronisation	0 1	Jenbache yes	er scope of supply ono no	A 40
Internal modem External modem Power cubicle Synchronisation	0 1	Jenbache yes	er scope of supply ono	A 40
External modem Power cubicle	e down all	Jenbache yes yes I data to be erence data	on no Chevron LHS	a "reference list" and
Internal modem External modem Power cubicle Synchronisation Lubricating oil type: While commissioning the equipment, you must not compare the data with more recent data. Comparing	e down all	Jenbache yes yes I data to be erence data	on no Chevron LHS	a "reference list" and nables you to detect possi
Internal modem External modem Power cubicle Synchronisation Lubricating oil type: While commissioning the equipment, you must not compare the data with more recent data. Comparing	e down all	Jenbache yes yes I data to be erence data	er scope of supply no no Chevron LHS able to use this as with recent data e	a "reference list" and nables you to detect possi
Internal modem External modem Power cubicle Synchronisation Synchronisation Under the data with more recent data. Comparing the equipment of the compare the data with more recent data.	e down all	Jenbache yes yes I data to be erence data ards.	er scope of supply no no Chevron LHS able to use this as with recent data e	a "reference list" and nables you to detect possi

Erstellt: Service Index: L



Keyword: Cedar Road
Generator type: 1 x JGC 312 GS - N.L.
Type/vorsion:

MARCHERS.	Design No.: D390
Year of c	Dealgir No.: D390 onstruction: 2006
Country of	onstruction: 2006 Installation: Kanada

oftware version B&R/SAM	2.10a
VISU:1(Dlaine Visualisation)	<u>11.10a</u>
MMU! (Muld:function transducer)	15
ZÜND(((gnhion);	11.36
MONIC: (Ignition Visualisation)	
KUS98: (Knock control)	
[2] [1] [2] [2] [2] [2] [2] [2] [2] [2] [2] [2	
ALIE SAMILLE DE LA COMPANION DELA COMPANION DE LA COMPANION DE LA COMPANION DE LA COMPANION DE	
EMS3000: FIRST STATE OF THE PROPERTY OF THE PR	
Software version Siemens/B&R	0.4
Syn: (Synchronisation)	
Stäti (Station control)	

•	ī	' + + + + + + + + + + + + + + + + + + +	Control of the contro	Engine No.	Star program	
THE BURE OF STREET	14:14	4721681	14721691 ₂	digida.	[light design
Engine No.	1, 1, 2, 7, 2,	4721681	4721691			
Operation bours	Bh	13	4			
Number of starts		56	20			
Number of starts Power, electric Voltage - average value	kW	633	633	· · · · · · · · · · · · · · · · · · ·		
Voltage - average value	V	493	495			
Current - average value	Α	880	870			
Current - average value Zero conductor current :	À	0	0		<u> </u>	
Cos phi.	Ind/Kap	-0.82	-0.83	<u> </u>	<u> </u>	
Exciter voltage: 3. 4, 311	٧	n/a	n/a		1	
Mixture temperature	Ç	46.7	45.6			
Exciter voltage Mixture temperature Charge pressure Gas-mixer position / TEC Throttle:valve:position Flow-Tech:position	mbar	2590	2570		<u></u>	
Gas-mixer position //TEG	mm / %	23.7	22.1	<u> </u>		ļ
Throttle:valve:position	%	100	100		<u> </u>	
Flow-Tech:position	%	41.5	39.9		1	
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	Ş	49	42			
Engine cobling water temperature	တ	74.6	77	1		
Engine cooling-water pressure	bar	1.36	1.40			
Oil temparature Oil pressure	Ç	75	77	<i></i>	1	
Oll pressure	bar	4.05	4.12		<u> </u>	<u> </u>
Gas pressure after pre-pressure controller.	mbar	200	200			
Ges pressure after pre-pressure controller	mbar	46	48			
Pre-combustion chamber differential pressure	mbar	n/a	n/a			
Ges pressure before differential pressure controller	bar	n/a	n/a			
Methane content (CH4)	%	ca. 55	55			
Gas temperature before activated carbon filter	~	n/a	n/a			

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		470	1001	W70	1601	7 L 10	9191	94.1	waste is l'	: ii. : : : : :	
and the first term of the control of				200	004	15141				242175-201	
Gylinder temp. 1/2	r		597	608	_						
Cylinder temp. 1/2 Cylinder temp. 3/4					618						
Cylinder temp. 5/6			605-				<u> </u>				_
Cylinder temp. 7/8				_	597			ļ		_	
Cylinder terrin, 9/10 " 1		611	<u> 598 </u>		608						
Cylinder temp. 1.1/12:	~ C_	605	609	603	595		<u> </u>				
Collectoring 19/16	Ç		Ţ				<u> </u>				
Cylinder temp. 15/18 Cylinder temp. 17/18 Cylinder temp. 19/20.	Ç				T		l				
Cullnday tether 17/18	S.							l)		
Ordinder temp. 19/20. 110 110 110 110 110 110 110 110 110 1	°C		 				, T				
Ignition-voltage requirement min/max:	kV					1					
Ighillon-voltaga radulement introducer	"KWVQT	<u> </u>	20		20						
Ignition point	~~	_	63		77	-		1			
Hot water return temperature Hot water return temperature	- 2		77		50	_					
Hot water return temperature	, L		"	·	-			} 		_	••••
Exhaust-gas heat exchanger - tube-plate temperature	℃	,	√a	r	1/a						
Exhaust-gas heat exchanger - tube-plate remberature	ეზ		47		51						
Non-drive side (NDS) generator bearing temperature	°C		43		37						
Generator winding temperature 1	- C		63		54	+					
Generator winding temperature	∞		59		58	+		╁┷╌			
Generator winding temperature:2	√	_	_		<u>56</u> 54	 		-			
Generator Winding temperature 3			64	-	34	+		╁──		 	
Exhaust gas temperature before heat exchariger	~℃		n/a	<u> </u>	n/a _			ļ			
Exhaust gas temperature after neat exchanger.	∞		n/a		n/a						
Cooling water inlet temperature at exhaust-gas heat exchanger Cooling water outlet temperature at exhaust-gas heat	ç		п/а		n/a						
Cooling water outlet temperature at exhaust gas heat exchanger	°C	1	n/a		n/a						
Differential pressure - exhaust-des heatlexchanger.			******				•				
Differential pressure .catalytic converter	mbar	-	n/a		n/a	+-		+		ļ	
Differential pressure - cafalytic converter	mbar	<u> </u>	n/a	-	n/a	_				<u> </u>	
Exhaust gas backpressure after exhaust-gas											
turbocharger	mbar	<u> </u>	3	_	7.4	ļ		 		ļ	
O2/value minimization and a state of the control of	Vol./%		e.4		8.0					1	
C2 value (related to 5% O2) NOx value (related to 5% O2)	mg/Nm ²		759		727						
NOx value (related to 5% O2)	mg/Nm ³		253		247						
Engine cooling water - concentration test	Voi./%		40		40					·	
Product applied / additive	7 01.7 78	_	10	<u> </u>	**			-		,	
Mixture adding circuit (2nd stage) concentration test	Vol./%		40		40		_		_		_
Product applied / additive		\mathbb{L}_{-}									
Intake temperature at engine air-filter intake	· •c	Ĭ .	9.8		13.4		•				
Ganarator cooling all intake temperature	°C		11		8	\top					
Crankcase pressure (at diastick)		T		1		\dagger		1			
Engine room pressure		}	<u>+5</u> 1	-	+4	+-		-		-	
Valve noise (KLS 98)	mV	╅	- -	+-	n/2	+		+-		+	
	mm/U	╅┯	- 2	+	<u>n/a</u> 2	┪		┿		┽──	
Zero pressure controller setting	Tunino	L	۷.		~					1	



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· ·	11177	4704	604	4:7'91	201		1:1:59	. II II a	1 1 1 1	15 15 15 15	10 C a la
		*									-
A STATE OF THE PARTY OF THE PAR		CA, Y	CLI	. ομ. 1 ¹ !		5/1	Cyl. 2	.cyu f ;;	- Cyl.2:	loki:	Cyl: 2;
Left-hand intake valve	mm	28.6	28,4	28.6	28.6						
Right-hand Intake valve	mm_										
Left-hand exhaust velve	mm	29,0	29,2	28.9	28.8						
Right-hand exhaust valve	mm		77				·				
Francisco Association and Company of the Company	1, 12, 116 3, 10, 10, 116 3, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10	Cyl. 3	b, 4	Cyl: 3	CV 4	Cyr.o.	Cy. 4	. c.ks	Cy 42	0/63	th 3
Left-hand intake valve	mm	28,6	28,8	28.6	28.6						
Right-hand intake valve :		40									
Left/hand exhaust valve.	mm	29,0	29.0	28.8	28.8						
Right-hand exhaust valve	mm				Ī						
	111111	. diu.	. Oil ti.	CVE	6.8	oji s	çi.ii	Cy1.6	. d.ko	oy.	Cyl. 6
Profe formed involves weather	mm	28.6		26.7							
Left-hand Intake valve	mm										
Left-hand exhaust valve	mm	29.0	29.2	28.9	28.9						
Right-hand exhaust valve						1 .					
Discoult Control of the Control of t		Cyl. 7.	Cop.in	ا تاری	'.су.а	Cyl. 7	by .n	i ko	Cyl.D		cylin
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	28.6	28.8		28.5	Cyl			17. 331.07.		.,-74%
Left-hand intake valve	· mm	20,0	20,0	20.0	20.5			├			
Left-hand exhaust valve	. mm	29.0	29,0	20.0	28.9	\vdash					
Right-hand exhaust valve		23.0	20,0	20.0	20,0				1		
) mgs - 64,	. .		1	11115	11 to 1 de	5.500.0	441344	j:
				dy, a		Cy7.0.	CYC10		;6yu;10	by.	Cylitic
Left-hand intake valve	mm	28,6		28.5	28.5	<u> </u>				_	-
Right-hand Intake valve	mm			00.0	00.0	├ ─				<u> </u>	
Left-hand exhaust valve	mm	29,1	29,0	28,9	28.8	 		<u> </u>	-	┢	
Right hand exhaust valve	mm					╀╌			1162 113 1		<u> </u>
er, egic 46,40,500 og blev i brevis skriver giver	12431444	. 		Op. 11		OUT	OL 12:	byk if	Žyv. 12	CK (1)	(cy.)12
Left-hand intaké valve	mm	28,6	28,6	28.7	28.5	<u> </u>				<u> </u>	
Right-hand intake valve:	mm	<u> </u>		<u> </u>		<u> </u>		ļ	<u> </u>	<u> </u>	<u> </u>
Lefthand exhaust valve (1911) Lines (1911) All margin	mm	29,0		28.6	28.9	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	L
Right-hand exhaust valve	: mm				ļ.,,,,	↓		<u> </u>	Ļ	ļ	
er in 1905 film blever af the green film of the color of		Oy. O	GK.14	ON 19	cy. jv	ַבּוֹ וּלֶים '	14.16	cki, 13	Cv. 48	byllia.	CV 14
Left-hand intaké valve	mm										
Right-hand-intake valve	mm].						
Left-hand exhaust valve	mm	Ī <u></u>							1		
Right hand exhaust valve	mm				I	Í					
en de la companya de La companya de la co	3304 3	נוֹיו עם	i icui 14	Cyl. 18	CONTR	Cyl. 16.	Ċv. (e	icki id	CH. 18	byl. 18	C)1.16
Left-harid intake valve	mm				\ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	1			1	 	<u> </u>
Right-hand intake valve	mm			1		1				 	
Left-hand exhaust valve:		1 -				1					
Right-hand exhaust valve:		1			1	 		\vdash	1	1	
		Oy 17	الم د الله	1223		ay 12	rig giri	ing i bai	. 2251	: buuu	10y.31
	<u> </u>	: : : : : : : : : : : : : : : : : : : :	Cyt. 11	7 97.12	C.Y. in	35555	Chemi) y y	_ cyran	11 15/11/2	109.31
The state of the s		╁		\vdash	 	\vdash	-	1	+	┼	├
Right hand imake valve	: mm			+	+	+	1	\vdash	+	 	
Right-hand exhaust valve	mm mm			╁	1			 	 	1	₩
programme of the control of the cont		+		 		.	المراجعة المراجعة			i i i i i i i i	di sa co
1845-20-20-20-100-100-20-20-20-20-20-20-20-20-20-20-20-20-2		Cyl. 10	CM. 20	Cy.311	<u>∴64/26</u>	Cit. (e)	dica	Syl. (A	C) . 20	Sy (S	(Cy1, 20
Left-hand intake valve		~~		↓	↓	 	 	┞	 		
Right-hand intake valve				ऻ—	 	ļ	ļ	_	<u> </u>	 	<u> </u>
Left-hand exhaust valve		<u> </u>			↓	1		<u> </u>		 	<u> </u>
Right-hand exhaust valve	mm	<u> </u>		<u> </u>		<u> </u>		L		1	1

content to determine the calculic value (if colline asurement available)	∴ % <u></u>		The state of the s		
Siconcentration in fuel gas	ppm		E 12.11	<u>(1225) (3.141)</u> 75	100
put in % of Pn	%	50		/5	100
value upstream/downstream of catalytic converter vallable) value (related to 5% O2) upstream/downstream of	Vol./%	1		1	1
alytic converter (li available)	mg/Nm ³	1		1	1
x value (related to 5% O2) upstream/downstream o alytic converter (if avallable)	mg/Nm³	,		1	,
laust-gas temperature before heat exchanger	୍				
naust-gas temperature after heat exchanger	°C				
oling water outlet temperature at exhaust-gas heat hanger oling water inlet temperature at exhaust-gas heat	~				
oling water inlet temperature at exhaust-gas heat hanger	ျ			,	
naust-gas dack pressure upstream of exhaust-gas	::				
atiexchanger naust-gas back pressure downstream of exhaust-g	mbar mbar				•
ording to type plate.	ansfer				
select an outside line (if not main telephone			,		•
on the state of th		Modern	type·	:: ·	
Internal modem		***			
Militaria in a management de la companya del companya de la companya de la companya del companya de la companya	1 2 10 14 :	:: Jenbache	r scope of s	upply	
Power cubicle	0	yes	On		
Synchronisation	0	yes	® no		
•					
bricating oil type:			Chevro	LHSA 40	

Drafted on: 10 MAR 09

Fratelit: Service Index: L

Datum; 3/23/2009 Selto: 4 von 4

Dave Sibley

Name:

Section 2

Exhaust Gas Readings at Commissioning

```
*******
* E C O M - J 2 K N *
*********
Anlage: Cedar Road LF
Motor Nr:
Leistung(kW): 472/1691
Katalysator:
ZZP:
               D330
           PN = 100^{7}
Time
16:55:30
Date
09.03.09
Gas analysis
Fuel type
Natural gas
                      °C
                  12
T.Air
                        રુૅ
                  8.0
02
                 8.0
727 mg/ms
73 mg/m3
137 mg/m3
CO 5%02
NO 5%02
NO2 5802
                  \frac{247}{7.3}
NOx 5%02
                        mg/m3
C02
GE Jenbacher GmbH &
Co OHG
Achenseestr. 1-3
 A-6200 Jenbach
 Tel: 05244/6002437
```

```
****<del>*</del>********
 * E C O M - J 2 K N *
****************
Anlage: Cedar Road LT
 Motor Nr:
Leistung(kW): 472/1691
Katalysator: 330
                D//=
 Date
 09.03.09
                17:06:30
 _____
 Gas analysis
 Fuel type
 Natural gas
 ------
T.Air
                    11
                         °C
02
                   7.6
CO 5802
NO 5802
NO2 5802
                        용 -
                   632
                         mg/m3
                   84
                         mg/m3
                   119
                         mg/m3
NOx 5802
                  \frac{247}{7.5}
                         mg/m3
C02
GE Jenbacher GmbH &
Co OHG
Achenseestr. 1-3
A-6200 Jenbach
Tel: 05244/6002437
```

Date Time 05.03.09 14:38:44
Gas analysis
Fuel type Natural Gas
T.Air 14 °C 02 8.4 8 C0 5802 759 mg/m3 NO 5802 61 mg/m3 NO2 58C2 159 mg/m3 NOx 5802 253 mg/m3 CO2 7.1 8
GE Jenbacher GmbH & Co OHG Achenseestr. 1-3 A-6200 Jenbach Tel: 05244/6002437
Engine I

Lugine -

Date Time 05.03.09 14:48:26
Gas analysis Fuel type Natural gas
T.Air 17 °C 7.6 % 7.6 % 644 mg/m3 NO 5%02 76 mg/m3 NO 5%02 133 mg/m3 NOx 5%02 250 mg/m3 CO2 7.5 %
GE Jenbacher GmbH & Co OHG Achenseestr. 1-3 A-6200 Jenbach Tel: 05244/6002437

Engine

Section 3

GE Jenbacher Technician Report



PROJECT #:			CUSTOMER NAME: Waterous Power						
DATE:	3/4/2009			PERFORMED BY : D.Sibley					
GEJ KEYWORD:	Cedar Road		 M	ODULE TYPE	: JGS 312 GS-L	L			
J-NUMBER:	D390		<u> </u>						
	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7		
055141 410	serviced	serviced	serviced	serviced	serviced	serviced	serviced		
SERIAL NO. MODULE NO.									
UNIT HOURS:									
STARTS:									
	Comple	rted	□Return	n visit required	☐ Additional	parts required			
WORK REQUIRED):					para raquira			
		Co	mmission	ning Train	ing				
DESCRIPTION (C									
Arrive at site; utility									
locked out the brea									
having excitation vo Rob swapped 2 cal									
contacts with the b									
and left site; the roo									
wrong location / the									
		FΔ	II FD PAR'	TS REMO\	/FD				
QUANTITY			DESCRIPT			OPH OF PART	PART#		
						1			
		EOUID	MENT 9. N	1ATERIALS	RIIGED				
QUANTITY		EQUIP		CRIPTION	3 U3ED		PART #		
ζον									
S.T. L	ABOR (HOURS).8	0	G	EJ STARTUP WOR	10.0	1		
	ABOR (HOURS	· — — — — — — — — — — — — — — — — — — —	_		ISTRIBUTOR WORK		1		
Т	RAVEL (MILES)		FACTORY	DEFICIENCY WORK	<			
MISCELLANEOUS	EXPENSES (\$)	:			TOTAL WORK	(
CUSTOMERS SIGN	IATURE:					_ Date:			



PROJECT #:			CUST	OMER NAME	: Waterous Po	wer		
DATE:	3/5/2009		PERFORMED BY: D.Sibley					
GEJ KEYWORD:	Cedar Road	d	MODULE TYPE: JGS 312 GS-L.L					
J-NUMBER:	D390							
			_					
	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7	
	serviced	serviced	✓ serviced	serviced	serviced	serviced	serviced	
SERIAL NO								
MODULE NO								
UNIT HOURS								
STARTS	:							
WORK REQUIRE	D: Compl	eted	Retur	n visit required	Additiona	l parts required		
		Co	mmissio	ning Train	ing			
DESCRIPTION (C	CONDITIONS	/ WORK PE	REORMED):					
Got commissioning					out the checklist	and P&ID: star	ted engine	
and eventually got								
	1	FA		TS REMOV	/ED			
QUANTITY			DESCRIPT	ION		OPH OF PART	PART#	
		FOLUD	NACNIT O N	AATEDIALO	LICED			
	T	EQUIP		MATERIALS	9 02ED			
QUANTITY			DES	SCRIPTION			PART#	
	1							
S.T. L	ABOR (HOURS	8.0	0	Gi	EJ STARTUP WOF	10.0	1	
	ABOR (HOURS	· —	_		ISTRIBUTOR WOF		1	
	TRAVEL (MILES	<i>'</i>	7		DEFICIENCY WOF		1	
MISCELLANEOUS	•	· —	1		TOTAL WOF		1	
2 2 22	(4	· <u> </u>	_		· · ·		_	
CUSTOMERS SIGN	NATURE:					Date:		



PROJECT #:	CUSTOMER NAME: Waterous Power						
DATE:	3/6/2009		PERFORMED BY: D.Sibley				
GEJ KEYWORD:	Cedar Road		MO	DULE TYPE:	JGS 312 GS-L.	L	
J-NUMBER:	D390		<u>-</u>				
	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7
OFFINA NO	serviced	serviced	✓ serviced	serviced	serviced	serviced	serviced
SERIAL NO. MODULE NO.			-				
UNIT HOURS:							
STARTS:	-						
	☐ Comple	ted	Return	visit required	Additional	parts required	
WORK REQUIRED):						
		Co	mmission	ing Trainii	ng		
DESCRIPTION (C							
Upon arrival the fla							
get it ready; we che		-	•				
connected the coup finish Monday; Rob							
put engine 1 online							
shut down engine 1							
due to the electrom			_			-	
tomorrow; left site.							
		FΔI	LED PART	S REMOV	FD		
QUANTITY			DESCRIPTION			OPH OF PART	PART#
		FOLUDI	ACNT O NA	ATERIALO	HOED		
OLIANITITY	1	EQUIP	MENT & MA		USED		DADT #
QUANTITY			DESC	CRIPTION			PART #
			7			10.0	Ī
	ABOR (HOURS) ABOR (HOURS)		4		J STARTUP WORK STRIBUTOR WORK		
	RAVEL (MILES)	-	+		EFICIENCY WORK		
MISCELLANEOUS	,		1	IACIONID	TOTAL WORK		
	σ=σ (ψ)		1				1
						_	
CUSTOMERS SIGN	IATURE:					Date:	



PROJECT #:			CUSTO	MER NAME	: Waterous Pow	er	
DATE:	3/7/2009		PERFORMED BY : D.Sibley				
GEJ KEYWORD:	Cedar Road		_ MC	DULE TYPE	: JGS 312 GS-L	.L	
J-NUMBER:	D390		_				
			_				
	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7
	serviced	serviced	✓ serviced	serviced	serviced	serviced	serviced
SERIAL NO. MODULE NO.							
UNIT HOURS:							
STARTS:							
		ted	☐ Peturn	visit required	Additional	narts required	Į.
WORK REQUIRE	D: Comple	iteu	LI Retuin	visit required	Additional	parts required	
		Co	mmission	ing Train	ing		
DESCRIPTION (C	CONDITIONS	/ WORK PER	RFORMED):				
Arrived onsite; wor							
undervoltage circui							
the collective troub			control; electr	ician installed	I new transforme	rs in the break	er cabinets for
breaker control pov	ver, idied uriit	۷.					
		FAI	ILED PART		ED	T	
QUANTITY			DESCRIPTION			OPH OF PART	PART#
	•	EQUIP	MENT & M	ATERIALS	SUSED	•	
QUANTITY			DES	CRIPTION			PART#
S.T. L	ABOR (HOURS	8.0)	GI	EJ STARTUP WORK	10.0	1
O.T. L	ABOR (HOURS	2.0	D .	DI	STRIBUTOR WORK		
Т	RAVEL (MILES)		FACTORY I	DEFICIENCY WORK		
MISCELLANEOUS	EXPENSES (\$)	:			TOTAL WORK		J
CUSTOMERS SIGN	NATURE:					Date:	



PROJECT #:			CUST	OMER NAME	: Waterous Por	wer		
DATE:	3/8/2009		PERFORMED BY : D.Sibley					
GEJ KEYWORD:	Cedar Roa	d	MODULE TYPE: JGS 312 GS-L.L					
J-NUMBER:	D390		_					
			_					
	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7	
	serviced	serviced	✓ serviced	serviced	serviced	serviced	serviced	
SERIAL NO								
MODULE NO								
UNIT HOURS								
STARTS	:							
WORK REQUIRE	D: Comp	leted	Retur	n visit required	Additiona	al parts required		
		Co	ommissio	ning Train	ing			
DESCRIPTION (C	CONDITIONS	S / WORK PE	RFORMED):					
Finished the alignn					ssions.		-	
		FΔ	II FN PAR	TS REMO\	/FD			
QUANTITY		1 7	DESCRIPT			OPH OF PART	PART#	
QO/MITTI			DECOTIII 1	1014		01110117411	170017	
							1	
		EQUIF	PMENT & N	//ATERIALS	SUSED	-	•	
QUANTITY				SCRIPTION			PART#	
							7	
	ABOR (HOUR		_		EJ STARTUP WOF	-	<u>- </u>	
	ABOR (HOUR		.0		ISTRIBUTOR WOF			
	RAVEL (MILE	<i>'</i>		FACTORY	DEFICIENCY WOF	-		
MISCELLANEOUS	EXPENSES (\$):			TOTAL WOR	RK]	
CUSTOMERS SIGN	JATI IRF					Date		



PROJECT #:	CUSTOMER NAME: Waterous Power							
DATE:	3/9/2009		PERFORMED BY: D.Sibley					
GEJ KEYWORD:	Cedar Roa	ıd	MODULE TYPE: JGS 312 GS-L.L					
J-NUMBER:	D390							
			_					
	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7	
	serviced	serviced	✓ serviced	serviced	serviced	serviced	serviced	
SERIAL NO								
MODULE NO								
UNIT HOURS STARTS								
STAITIS			+ –	ļ	-		<u> </u>	
WORK REQUIRE	D: Comp	oleted	☐ Retur	n visit required	☐ Additiona	l parts required		
		0.4		nina Train	la a			
		C	onssimi	ning Train	iing			
DESCRIPTION (C								
Finished alignment	on #2; para	alled #2; took fu	ull load and s	et emissions.				
		FA	ILED PAR	TS REMO	VED			
QUANTITY			DESCRIPTION			OPH OF PART	PART#	
	1	EQUIP		//ATERIAL	SUSED			
QUANTITY			DES	SCRIPTION			PART #	
S.T. L	ABOR (HOUR	RS) 8.	0	G	EJ STARTUP WOR	10.0		
O.T. L	ABOR (HOUR	RS) 2.	0		ISTRIBUTOR WOR	RK		
1	RAVEL (MILE	:S)		FACTORY	DEFICIENCY WOR	K .		
MISCELLANEOUS	EXPENSES (\$):			TOTAL WOR	K]	
CUSTOMERS SIGN	JATUPE:					Date		



PROJECT #:			_ CUST	OMER NAME	: Waterous Po	wer		
DATE:	3/10/2009		PERFORMED BY: D.Sibley					
GEJ KEYWORD:	Cedar Road	d	 M	ODULE TYPE	: JGS 312 GS-	L.L		
J-NUMBER:	D390		_					
	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7	
	serviced	serviced	✓ serviced	serviced	serviced	serviced	serviced	
SERIAL NO	-							
MODULE NO								
UNIT HOURS								
STARTS	:							
WORK REQUIRE	D: Compl	eted	Retur	n visit required	Additiona	al parts required		
		Co	ommissio	ning Train	ing			
DESCRIPTION (C	CONDITIONS	/ WORK PF	RFORMED):					
Commissioning ch					and data export	: worked on sta	ting for both	
engines.		,	, ,			,	3	
	1	FA		TS REMOV	/ED	•	1	
QUANTITY			DESCRIPT	ION		OPH OF PART	PART#	
		FOLUD	BAENT O B	AATEDIALO	LICED			
	1	EQUIP		MATERIALS	9 02ED			
QUANTITY			DES	SCRIPTION			PART#	
S.T. L	ABOR (HOURS	8.0	0	Gi	EJ STARTUP WOF	RK 10.0	5]	
	ABOR (HOURS	,			ISTRIBUTOR WOF		_	
	RAVEL (MILES	•	7		DEFICIENCY WOF		1	
MISCELLANEOUS	,	· —	7		TOTAL WOF	-		
	(*		_				_	
CUSTOMERS SIGN	NATURE:					Date		



PROJECT #:			CUST	OMER NAME	: Waterous Pow	ver	
DATE:	3/11/2009		PERFORMED BY : D.Sibley				
GEJ KEYWORD:	Cedar Road	d	_ M				
J-NUMBER:	D390		_				
	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7
	serviced	serviced	✓ serviced	serviced	serviced	serviced	serviced
SERIAL NO							
MODULE NO. UNIT HOURS							
STARTS							
0.7							<u> </u>
WORK REQUIRE	D: Comp	eted	☐ Returi	n visit required	☐ Additional	parts required	
		Co	mmiccio	ning Train	ina		
		CC	111111111111111111111111111111111111111	illig ITalli	iiig		
DESCRIPTION (C							
Went to site to get	TOE signed	and for Kay to	pack up his	tools; travel t	o Vancouver		
OLIANITITY.	T	FA		TS REMO	/ED	Tanii an a a a a	· DADT "
QUANTITY			DESCRIPTION			OPH OF PART	PART#
	11	EQUIP	MENT & N	MATERIALS	S USED	1	1
QUANTITY				SCRIPTION			PART#
Q T I	ABOR (HOURS	S) 8.0	1	G	EJ STARTUP WORI	< 10.0	7
	ABOR (HOUR	·			ISTRIBUTOR WOR		1
	RAVEL (MILES	′ 	-		DEFICIENCY WORL		1
MISCELLANEOUS	•	·		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	TOTAL WOR		1
	- (,	, L			-		_
						_	
CUSTOMERS SIGN	CUSTOMERS SIGNATURE: Date:						



PROJECT #:			CUSTO	DMER NAME :	er		
DATE:	3/12/2009		PERFORMED BY : D.Sibley				_
GEJ KEYWORD:	Cedar Road		MODULE TYPE: JGS 312 GS-			.L	
J-NUMBER:	D390		_				
			_				
	site unit :1	site unit :2	site unit :3	site unit :4	site unit :5	site unit :6	site unit :7
	serviced	serviced	✓ serviced	serviced	serviced	serviced	serviced
SERIAL NO MODULE NO							
UNIT HOURS							
STARTS							
	ПСотр	eted	□Return	visit required	Additional	narts required	
WORK REQUIRE	D: Compr	eteu		i visit required	Additional	Daris required	
		Co	mmissior	ning Trainii	ng		
DESCRIPTION (C	CONDITIONS						
Travel Home	ONDITION	, WOIIICI EI	ili Olivied).				
		FΔ	II FD PAR	TS REMOV	FD		
QUANTITY			DESCRIPTI			OPH OF PART	PART#
		FOLUD	NACNIT O NA	IATEDIALO	HCED		
QUANTITY	1	EQUIP		IATERIALS SCRIPTION	USED		PART#
QUANTITI			DLC	OTTI HON			I AIII #
S T I	ABOR (HOURS	8.0	า	GE	J STARTUP WORK	10.0	
	ABOR (HOURS	·	_		STRIBUTOR WORK		
	RAVEL (MILES	′	-		EFICIENCY WORK		
MISCELLANEOUS	,	·			TOTAL WORK		
	(+	, i			-		1
CLICEO VED C C.S.	LATRIBE					5	
CUSTOMERS SIGNATURE:						Date:	

Section 4 Equipment Acceptance



403.253.7601 Tel 403.252.7532 Fax www.waterouspower.com

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 beer	found				
With completion of the test run	and the demonstration of fu	ull load capabilities the equipme	ent has been turned over			
on: March 12, 2009						
Instructions for operation and r	maintenance have been give	en to: Don Best and Tony Piñe	eiro Perez			
on March 12, 2009						
Warranty period: Twelve (12)	months from startup					
Warranty period begins on:	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:				
1		Signature:				



403.253.7601 Tel 403.252.7532 Fax www.waterouspower.com

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
the		s been found in full accordance upplied equipment have been t 09	•
Results: No a	apparent defects have been	found	
With completion of the test run	and the demonstration of fu	ull load capabilities the equipme	ent has been turned over
on: March 12, 2009			
Instructions for operation and r	naintenance have been give	en to: Don Best and Tony Piñe	eiro 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	I	Name:	
1		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



Page - No.: 1 / 4



Inspection task			
Inspection task	Number/	Interval	Note
	section		
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	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	Remark: If the C	rement according to official guidelines. O limiting values are exceeded, inspect clean the combustion chambers.

 \triangle

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.

 Keyword:
 Standard
 Unit no.:
 J xxxx
 Module no.: xxxxxx x
 Module no.: xxxxxx x

 Module type:
 J 312-320 GS
 Version:
 C21/121/221/81/281/82
 Engine no.: xxxxxxx x

 Issued:
 Doku/Bilek
 Checked:
 VMP_Klammer Gerhard/TEAM_Egger Christoph/CSA_Sonnerer Herbert
 Date: 2006-05

Index:







Interval reference number = Opera	ting hours/1000			Z	K =	0	n th	ne (occ	as	ion	of	су	line	der	he	ad	dis	sas	ser	nbl	у
Maintenance task/	Number	C)pei	at	ting	g h	ιοι	ırs														
Inspection task		< 100	1000	2000	3000	4000	2000	0009	2000	8000	0006	10000	11000	12000	13000	14000	15000	16000	17000	18000	19000	20000
- Maintenance after first start-up	W 1000 0																					
2 Valve clearance	W 0400 M0																					
2 Ignition system	W 0303 M0																					
2 Inspection	I 0103 0																					
2 Crankcase suction filter	W 0505 M0																				l	
Regulating rods/Throttle valve/ Actuator	W 0200 M0																				ŀ	
2/30/ 60 Gas train	W 8045 A0																					
10 Turbocharger	W 8023 M0																					
10 Engine coolant pump	W 0201 M0																					
10 Starter	W 8032 M0																					
10/20 Gas mixer	W 0704 M0																					
20 Mixture bypass valve	W 0802 M0																					
20 Torsion vibration damper	W 0601 M0																					
20 GE Jenbacher-switch cabinets	W 8031 A0																					
20 Piston/Piston cooling	W 8047 M0																					
20 Con rod/Con rod bearing	W 8048 M0																					
20 Cylinder liner/Scraper ring	W 8049 M0																					
ZK 20 Camshaft/Steering parts	W 8052 M0																				ŀ	
40 Crankshaft main bearing	W 8050 M0																					
60 Engine oil pump	W 8046 M0																					
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	re	qui	re	d								
- Generator (Stamford 5, 6, 7)	W 8030 A0																				[
- Elastomer parts	W 8033 0																		\square			



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

 Keyword:
 Standard
 Unit no.:
 J xxxx
 Module no.: xxxxxx x

 Module type:
 J 312-320 GS
 Version:
 C21/121/221/81/281/82
 Engine no.: xxxxxx x







	Interval reference number = Operating hours/1000				ZK =	= 0	n t	he	ОС	cas	sio	n o	f c	ylir	nde	rhe	ad	di	sas	se	mb	ly
nr	Maintenance task/	Number	0	ре	erat	in	g h	ou	ırs													
Interval ref. I	Inspection task		21000	22000	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	34000	35000	36000	37000	38000	39000	40000
2	Valve clearance	W 0400 M0																				
2	Ignition system	W 0303 M0																				
2	Inspection	I 0103 0																				
2	Crankcase suction filter	W 0505 M0																				
2/30	Regulating rods/Throttle valve/ Actuator	W 0200 M0			I																	
2/30/ 60	Gas train	W 8045 A0			I																	
10	Turbocharger	W 8023 M0																				
10	Engine coolant pump	W 0201 M0																				
10	Starter	W 8032 M0																				
10/20	Gas mixer	W 0704 M0																				
20	Mixture bypass valve	W 0802 M0																				
20	Torsion vibration damper	W 0601 M0																				
20	GE Jenbacher-switch cabinets	W 8031 A0																				
20	Piston/Piston cooling	W 8047 M0																				
20	Con rod/Con rod bearing	W 8048 M0																				
20	Cylinder liner/Scraper ring	W 8049 M0																				
ZK 20	Camshaft/Steering parts	W 8052 M0																				
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									f r		uir									
-	Generator (Stamford 5, 6, 7)	W 8030 A0																				
-	Elastomer parts	W 8033 0																				



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

Keyword: Standard Unit no.: Module no.: xxxxxx x Module type : J 312-320 GS C21/121/221/81/281/82 Engine no.: xxxxxx x Version:







Interval refe	Interval reference number = Operating hours/1000					ZK =	• 0	n ti	he	oc	cas	sior	n o	f cy	ylin	de	rhe	ad	di	sas	se	mb	ly
Maintenan	Maintenance task/ Number					rati	inç	g h	ou	rs													
Inspection	task			41000	42000	43000	44000	45000	46000	47000	48000	49000	20000	51000	52000	23000	54000	22000	26000	22000	28000	29000	00009
2 Valve clear	ance	W	0400 M0			_																	
2 Ignition sys	tem	W	0303 M0																				
2 Inspection		10	103 0																				
	suction filter	W	0505 M0																				
Actuator	rods/Throttle valve/	W	0200 M0			I																	
2/30/ 60 Gas train		W	8045 A0			ı																	
10 Turbocharg	er	W	8023 MO																				
10 Engine coo	lant pump	W	0201 M0																				
10 Starter		W	8032 M0																				
10/20 Gas mixer		W	0704 M0																				
20 Mixture byp	ass valve	W	0802 M0																				
20 Torsion vib	ration damper	W	0601 M0																				
20 GE Jenbac	her-switch cabinets	W	8031 A0																				
20 Piston/Pisto	on cooling	W	8047 MO																				
20 Con rod/Co	n rod bearing	W	8048 MO																				
20 Cylinder lin	er/Scraper ring	W	8049 MO																				
ZK 20 Camshaft/S	Steering parts	W	8052 M0																				
40 Crankshaft	main bearing	W	8050 M0																				
60 Engine oil p	oump	W	8046 M0																				
60 Turbocharg	er after-lubrication pump	W	8054 M0																				
60 Plate-type h	neat exchanger	W	8043 A0																				
60 Overhaul		W	2100 M0																				
ZK Exhaust ga	s manifold/Isolation	W	8051 M0																				
- Cylinder he	ad replacement	W	8053 M0								i	f r	eq	uir	ed								
- Generator (Stamford 5, 6, 7)	W	8030 A0																				
- Elastomer	parts	W	8033 0																				



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

Keyword: Standard Unit no.: J xxxx Module no.: xxxxxx x Module type : J 312-320 GS C21/121/221/81/281/82 Engine no.: xxxxxx x Version:



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

Parts required for 2000 Hour Maintenance:

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

Recommended Spare Parts to be kept on site:

Part	Description	Quantity
Number		
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

Section 7 Contact Information



403.253.7601 Tel 403.252.7532 Fax www.waterouspower.com

Waterous Power Systems Contact Information

Parts:

Allison Lebel

Phone: 403-253-7601 Fax: 403-259-0267

Email: <u>alebel@waterouspower.com</u>

Service:

Roger Benson

Phone: 403-212-4769 Fax: 403-259-0267

Email: 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

Mailing Address:

Head Office: 10025 – 51 Avenue Edmonton AB T6E 0A8

Calgary Branch: 4343 – 114 Avenue SE Calgary AB T2Z 3M5