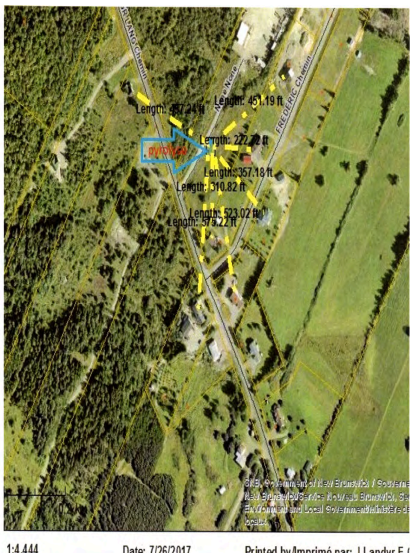
OTR Tyre pyrolysis project

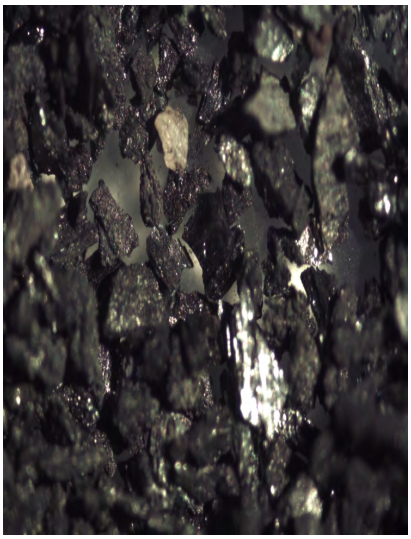
Annexes to

the application form

Gestion Claude Plourde Ltée



Report 1b



No. Plourde-1b-2017

November 10th, 2017

GECA ENVIRONNEMENT

EXPERT-CONSEIL ENVIRONNEMENT-RÉSIDUS-BIOCHARS

OTR Tyre pyrolysis project
Annexes to the application form

Report 1b

Presented to

Gestion Claude Plourde Ltd

For the intent of submitting to the New Brunswick government for the exploitation permit of a pyrolysis system at St-Basile, NB

Production team

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for GECA Environnement

Quebec, Qc
November 10th, 2017

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Disclaimer

«In the making of this report, it is expressly acknowledged that GECA Environnement did not conduct any data collection, have not specifically tested the pyrolyser components and did not directly measure any parameter of the pyrolyser system whatsoever (air emissions, sounds, odours, chemical concentration, etc.).

All of the empirical data and technical plans (the « Facts ») on which GECA Environnement bases its conclusions have been provided by the manufacturer or have been obtained through the most recent literature devoted to the subject of pyrolysis of OTR tyres.

Considering that GECA Environnement has taken every reasonable effort to ensure the accuracy of the Facts contained in this report, and considering its prospective nature, in the event that the Facts later prove to be inaccurate or false, GECA Environnement shall in no way be held responsible for any mistaken assumptions or conclusions arising from the Facts.»

Table of content

List of tables

List of figures

Annexe A

Facility Layout

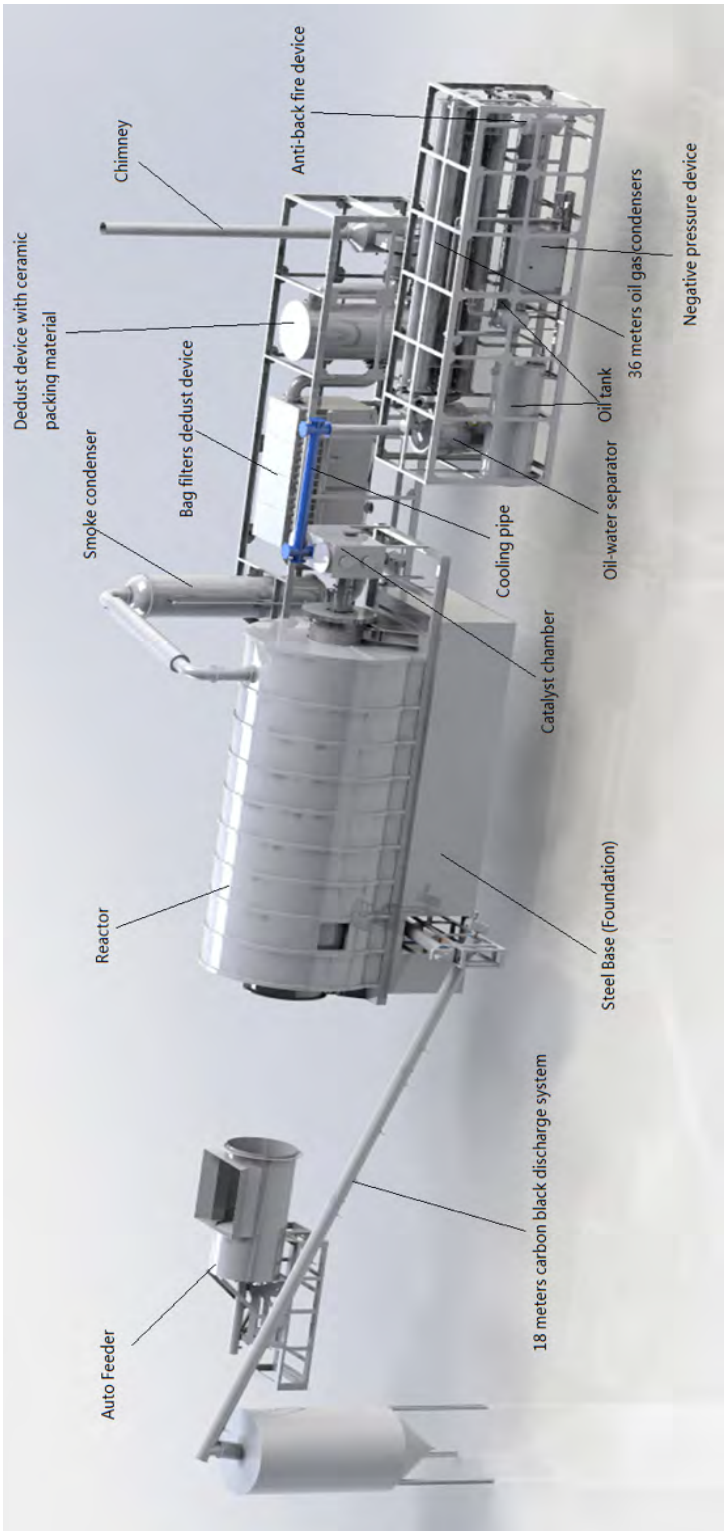

Figure 1. Pyrolyser systems

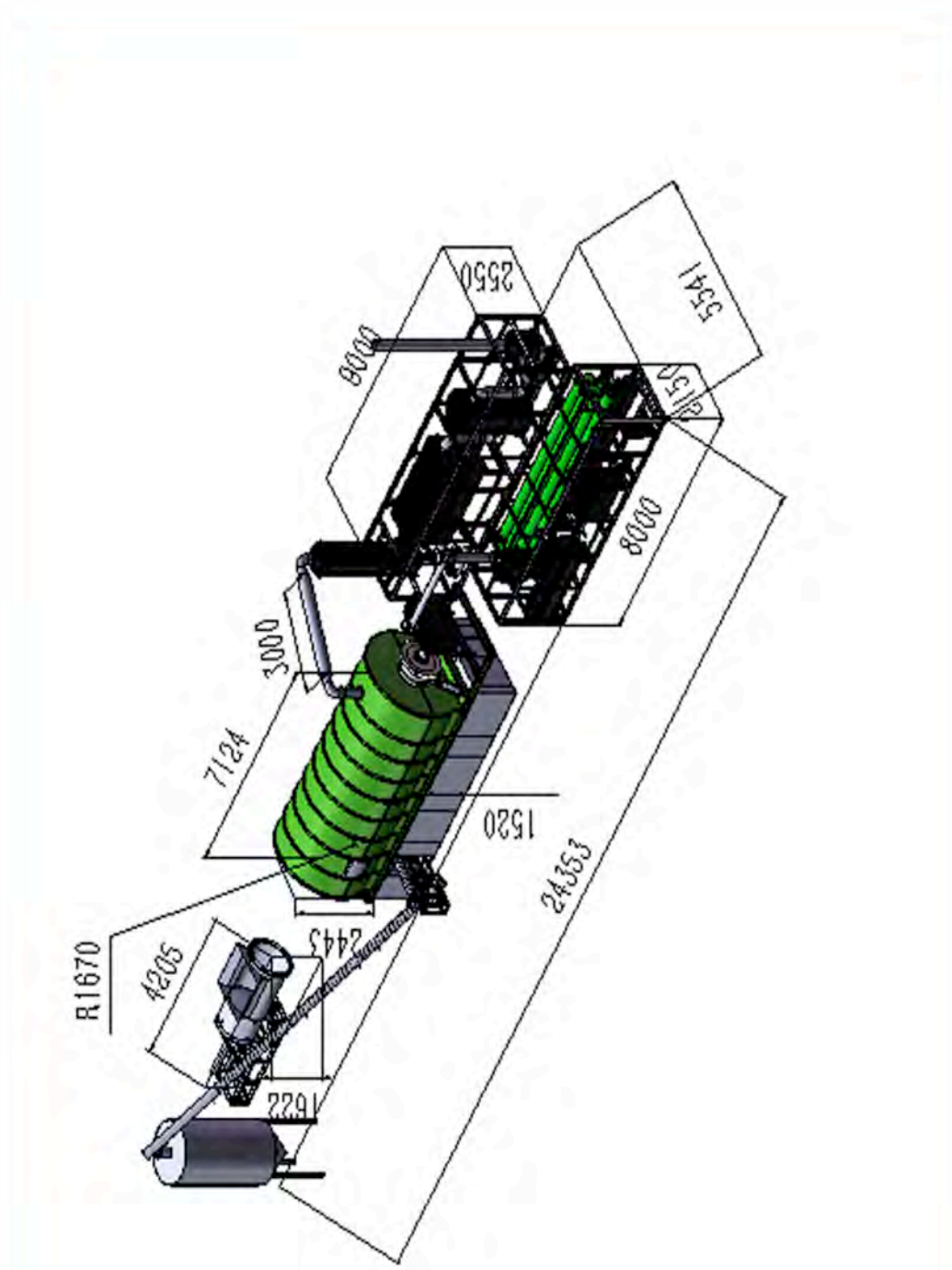

Figure 2.Pyrolyser plan with dimensions (cm); required distance will be respected around pyrolyser

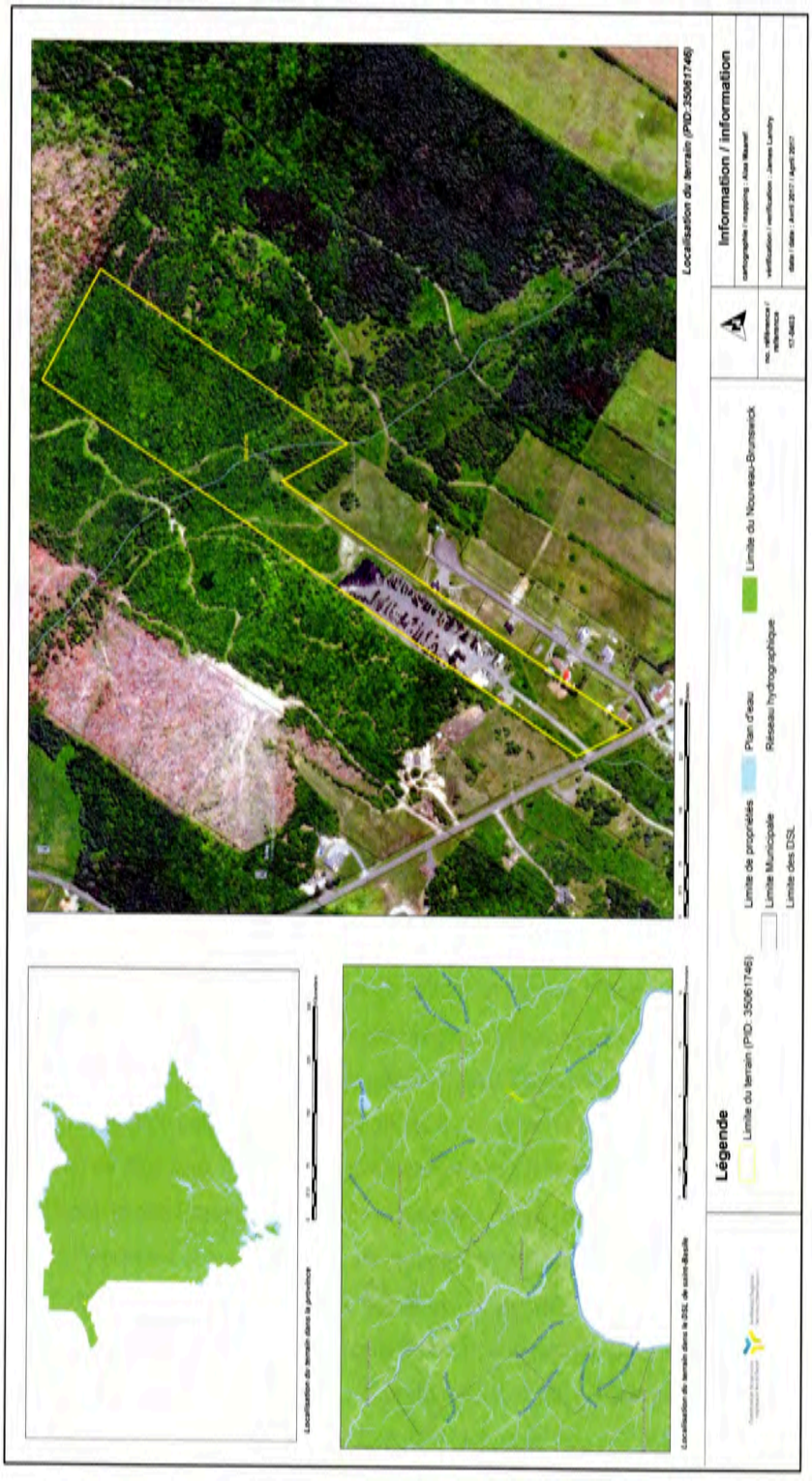

Figure 3. Site localisation, hydrological system

Figure 4. Site localisation, hydrological system, distance to the adjacent habitations is indicated by yellow arrows

Table 1. Equipment components not included in the pyrolysis technology, which should be separately purchased by Gestion Claude Plourde Ltd

System	Equipment
Protection building	Large plastic dome (Length: 100', width: 50', height: 30') will be installed following engineer's plans
Concrete floor slab	A concrete floor slab with safety systems in case of oil spill will be constructed following engineer's plans
Feedstock pre-conditioning et material handling	Shredder, loader and other potential equipment for handling feedstock and products will be purchased from standard equipment suppliers
Supports	Stainless steel plates and other supports for the tanks will be made and installed
Oil tanks	Large oil storage tank (25-50 t) will be purchased and installed by a specialize firm
Water reservoir	A water reservoir for the cooling system will be purchased and installed following engineer's plans
Water cooling tower	Could be purchased on shelve

Table 2. Duration/capacity of each step in the pyrolysis process

Step	Duration
Batch capacity	10 m. tons/batch
Number of batches	1/day, about 20-25/month
Duration of the entire process	24 hrs for 10 tons
Loading of 10 t of OTR tyres	2-3 hrs
Reactor preheating	3-4 hrs
Pyrolysis in the reactor	12-14 hrs
Cooling and discharging the reactor	4-5 hrs
Steel removing	1-2 hrs

Additional information

Control system

The pyrolyser is equipped with an automatic control system, pressure gauges, alarm system and safety valves. There are 2 sealing devices: oil/water separator and an anti-back fire device are installed in order to impede the inflammable gas to go back toward the reactor.

For more information on the technology, see the technical report 1c.

Table 3. Description of the pyrolysis system components

Component	Dimensions	Characteristics and comments
	5-meter distance should be reserved around the pyrolyser to allow staff security for handling and maintenance.	
Auto feeder	Length 4 205 cm, radius 1 622cm; 60-ton hydraulic pressure with foundation and ladder.	Takes 2-3 hours to prepare and load 10 tons of tyres into the reactor. Maximal size of particles = 1.4 m. Could be adjusted on demand (up to 1.8 m).
Pyrolyser itself		
Reactor	R: 1 670 cm, length: 7 124 cm; 16 mm thickness Q345R pressure vessel and boiler steel plates; base, rollers, gear, reducer and insulation layer. Burner installed on the fire furnace door or beside the fire furnace door.	Prior to pyrolysis process the reactor should be preheated by burning fuel in the combustion system. Preheating process consumes 450 kg of pyrolytic oil. Required 3-4 hours to preheat the reactor prior to pyrolysis process. Temperature inside the reactor during pyrolysis reachs 550 °C. The reactor works under very small constant negative pressure. Although the reactor has the ability to bear the pressure, if the pressure in the reactor reaches 0,02 Mpa, the alarm will ring. The worker should open the safety valve and release the pressure. If the pressure reaches 0,3 Mpa, the safety valve will release the pressure automatically.
Steel foundation	Width: 5 541 cm, height: 1 520 cm	Supports reactor
Catalytic chamber		The chamber has two layers and two double rooms. It contains molecular ring, which sorbs the dust and paraffin from the syngas to improve oil quality. It decreases the pressure, when the syngas changes pipe size. It slows down the oil movement speed in order to guarantee the oil can be completely cool down.
Condenser system (total length: 8 000 cm, total width: 2 150 cm)		
Cooling (condenser) pipe		First step of gas cooling (gas temperature can reach 300 °C) by heat-exchange method which use water piping surrounding the syngas. The non-condensed gas will be recycled into a burner (furnace) for reactor heating.
Syngas condensers	Length: 8 000 cm, width: 2 150 cm; 36-meter split into 6 x 6 m condensers; placed in three layers. German technology	The design guarantees the oil yield rate. Easy to clean. Glycol could be added to the water to prevent it from freezing, but the piping should be replaced by stainless steel pipes. If glycol is to be used, an authorisation will be completed.
Gas safety system		Gas safety device that can stop the syngas to go back to the reactor will be installed.
Oil tanks (2 tanks)	Big oil storage tank: Volume: 25 t -50 t to be determined Small tank fabricated of Q235B; Volume: 2.2·2.3 m^3.	Small tank oil storage is provided by the pyrolysis manufacturer. Small tank will be used only during processing, not for long time storage. The large tanks will be bought by Claude Plourde Ltd and installed by the proper company for this type of equipment.
Anti-back fire device (Gas recycling system)		Some gas (CH_4, C_2H_6, C_3H_8, C_4H_{10}, H_2) cannot be cooled down under normal pressure; these gases will be recycled in the anti-back fire device and will be send to furnace to burn and heat the reactor.

Tableau 3

Pressure release device		Should be opened before discharging the char allowing small resilient gas to escape to avoid potential instant combustion.
Water cooling reservoir	Volume: 70-80 m^3, depth: 2 m, width: 4 m, length: 10 m	The water should be kept at the liquid state. The optimal water temperature for condensate the syngas is ≤ 25 °C.
Water cooling tower	To be determined	Not included in the quotation list. The water should be allowed to cool after being passed in the condenser through a simple system such as a cooling tower.
		Dedusting system
Syngas condenser	Connected to the reactor by 3-m long pipe	The dust and sulfur gas are removed by a new German technology dust removing system using a composite ceramic material. The syngas passes through condenser, which cools it down.
Dedusting system:	Length: 80 m, width: 25 m	The non-condensed syngas goes through the ceramic packing material filter, which sorbs the dust from the syngas and sulphur components.
Chimney	Height: 10 m, diameter: 0.26 m	Ultra-low gas emissions (Table 2) are released to the atmosphere through the chimney.
		Carbon black discharging system
Carbon black discharging device	Tank height: 1.6 m; pipe: 18 m	Once the cooling down of the char completed, it can be packed in super bags. Requires 4-5 hours for cooling the reactor and discharging the char.
The hook		After 1-2 hours since the char discharge, steel wires can be discharged.
		Electric panel
Electric and electronic panels	380V/220V, 50 Hz.	The exact need in electrical power will be determined when all the additional components from what is provided by the pyrolysis manufacturer will be added. The automation system for controlling the pyrolyser (electronic) is provided by the manufacturer.

Annexe B

Air emission characteristics

Table 4. Exhaust gas properties

Compounds	Measured pyrolyser in the gas concentrations $\mu g/m^3$/ rate kg/h	Method	Ambient air norms at ground level in New Brunswick and Canada [1], $\mu g/m^3$
O	0.01	SEPA, 2003	
H_2S	0.01/1.39*10^{-4}*/ 0,01	Analytical method, SEPA 2003	1 hr: 15; 24 hrs: 5
SO_2	15/0.730	Stationary source, HJ/T57-2000	1 hr: 450 to 900; 24 hrs: 150-300; annual: 30 to 60; 20 [2]
NO_2	618/0.639	Stationary source, Fixed potential electrolysis methodHJ693-2014	1 hr: 400; 24 hrs: 200; annual: 100; 45 [1]
VOC	No information		
Particulate matter	04/3.7x10^{-4}	GB/T 16157-1996	24 hrs: 120; 1 an: 70 (geometries average)
CO	25/16/0.0258	SEPA 2003	1 hr: 35 000; 8 hrs: 15 000; annual: 6 000 [1]
Benzene C_6H_6	0.06	SEPA, 2003	30 [3]
Toluene C_7H_8	0.05	SEPA, 2003	1.880 [3]
Etylbenzen C_8H_{10}	<0.01	SEPA, 2003	

Table 4

Xylene C_8H_{10}	<0.02	SEPA, 2003	2.300[3]
Nonmethane hydrocarbon	1.3	Stationary source, Gas chromatography, HJ/JT 38-1999	
Sn	$1.00x10^{-4}$	Stationary source emission. Determination of tin-Graphite furnace abs method HJ/T 65-2001	
Pb	$2.43x10^{-4}$	Stationary source emission. Determination of lead-Flame atomic absorption spectrophotometric method HJ685-2014	
Cd	$<5.00x10^{-4}$	Stationary source emission. Flame atomic absorption spectrophotometric HJ/T 641-2001	
Be	$<5.00x10^{-5}$	Stationary source emission. Determination of beryllium-graphite furnace ABS, method: HJ 684-2014	
Ni	$9.67x10^{-3}$	Stationary source emission. Determination of nickel-flame ABS, method: HJ/T 63,1-2001	
Hg	<0.025	Stationary source emission. Determination of mercury. Cold atomic absorption spe Method HJ 543-2009	
Sb	$<5.00x10^{-5}$	Determination of metals in ambient particulate matter: HJ 657-2013	
Co	$1.99x10^{-4}$	The same as above	
Se	$<2.69x10^{-4}$	The same as above	
As	$1.35x10^{-4}$	Analytical method of monitoring of ambient air and exhausted air SEPA 2003	
Cu	$9.78x10^{-4}$	The same as above	
Mn	$1.54x10^{-3}$	The same as above	
Ft	<0.7	Stationary source emission. Determination of fluoride, ion selective method. HJ/T 67-2001	
Cl	<0.2	Determination of fluoride, ion chromatography. HJ 549-2009	
As+Ni	$9.81x10^{-2}$	SEPA 2003	
Cr+Sn+Sb+Cu+Mn	0.0178	SEPA 2003	
CH_2O (formaldehyde)	0.7	Determination of formaldehyde-acetylacetone spectrophotometric method GB/T 15516-1995	65[1]

Gas emission analyses

Information received from the manufacturer

SGS

CMA 2014090938Z

CNAS Testing CNAS L0599

TEST REPORT

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Yanli YANG	Manager	SGS-CSTC
Client	Xinxiang Huayin Renewable Energy Equipment Co.,Ltd	Laboratory	Shanghai Environmental Services
Address	Kangcun Industrial Zone,Xinxiang City 453800,Henan Province 453000, CHINA	Address	2/F, 3RD BUILDING NO. 889, YISHAN ROAD, XUHUI DISTRICT, SHANGHAI, CHINA
Telephone	+86- 0371-55917087	Telephone	+86 (21) 6140 2666-2002
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Email	info@huayinenergy.com	Email	REPORT.ENV @SGS.COM
Order Number	-	Report Number	SHE14-03790 R0
Samples	Exhaust Gas(1)	SGS Reference	0000021829
Project	**Default Project**	Date Reported	2014/12/29

COMMENTS

1.This test document cannot be reproduced in any way, except in full content, without prior approval in writing by the laboratory.
2.The results shown in this test report refer only to the sampling and the sample(s) tested unless otherwise stated.

SIGNATORIES

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SENIOR CHEMIST

JUNE CAI
Authorized Signatory

SHENV 143033

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Member of the SGS Group (SGS SA)

Item	Units	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13

Sampling site information

Sampling Address:Kangcun Industrial Zone,Xinxiang City,Henan

Sampling Date	-	2014-12-13
Sampling location	-	waste tire/ plastic pyrolysis machine
Sampling Time(Others)	-	10:15~11:00
Sampling Time(HF HCl)	-	10:15~10:35
Sampling Time(HCHO)	-	10:40~10:55
Sampling Time(HM)	-	11:25~12:10
Sampling Time(BTEX)	-	13:40~14:00
Sampling Time(Cl_2)	-	13:35~14:35
Sampling Time(Hg H_2S)	-	11:30~11:50
Sampling Time(NMHC)	-	13:40~13:45
Gas Temp	℃	39~44
Stack gas velocity	m/s	5.9~6.2
Sec.ar.	m^2	0.0572
Oxygen	%	7.43~7.49
Humidity	%	3.4~3.5
Dry Stardard Flowrate	m^3/h	1034~1078
Exhaust Height	m	10

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Item	Units	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13

Sampling site information

Sampling Address:Kangcun Industrial Zone,Xinxiang City,Henan

Sampling Date	-	2014-12-13
Sampling location	-	waste tire/ plastic pyrolysis machine
Sampling Time(Others)	-	10:15~11:00
Sampling Time(HF HCl)	-	10:15~10:35
Sampling Time(HCHO)	-	10:40~10:55
Sampling Time(HM)	-	11:25~12:10
Sampling Time(BTEX)	-	13:40~14:00
Sampling Time(Cl_2)	-	13:35~14:35
Sampling Time(Hg H_2S)	-	11:30~11:50
Sampling Time(NMHC)	-	13:40~13:45
Gas Temp	℃	39~44
Stack gas velocity	m/s	5.9~6.2
Sec.ar.	m^2	0.0572
Oxygen	%	7.43~7.49
Humidity	%	3.4~3.5
Dry Stardard Flowrate	m^3/h	1034~1078
Exhaust Height	m	10

SGS

TEST REPORT SHE14-03790 R0

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Analytical Method for Monitoring of Ambient Air and Exhausted Air(4th ed.,SEPA,China,2003) Method: SEPA 2003			
Carbon monoxide (Emission conc.)	mg/m³	1	**25**
Carbon monoxide (Conversion conc.)	mg/m³	-	18
Carbon monoxide (Emission rate)	kg/h	-	0.0258

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Stationary source emission. Determination of fluoride. Ion selective electrode method Method: HJ/T 67-2001			
Total fluoride (Emission conc.)	mg/m³	0.7	<0.7
Total fluoride (Conversion conc.)	mg/m³	-	<0. 5
Total fluoride (Emission rate)	kg/h	-	$<7.24\times10^{-4}$

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Ambient air and waste gas. Determination of hydrogen chloride. Ion chromatography Method: HJ 549-2009			
Chlorine hydride (Emission conc.)	mg/m³	0.3	<0.3
Chlorine hydride (Conversion conc.)	mg/m³	-	<0. 1
Chlorine hydride (Emission rate)	kg/h	-	$<3.10\times10^{-4}$

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Air quality-Determination of formaldehyde-Acetylacetone spectrophotometric method Method: GB/T 15516-1995			
Formaldehyde (Emission conc.)	mg/m³	0.5	**0.7**
Formaldehyde (Emission rate)	kg/h	-	7.18×10^{-4}

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Analytical Method for Monitoring of Ambient Air and Exhausted Air(4th ed.,SEPA,China,2003) Method: SEPA 2003			
Carbon monoxide (Emission conc.)	mg/m³	1	**25**
Carbon monoxide (Conversion conc.)	mg/m³	-	18
Carbon monoxide (Emission rate)	kg/h	-	0.0258

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Stationary source emission. Determination of fluoride. Ion selective electrode method Method: HJ/T 67-2001			
Total fluoride (Emission conc.)	mg/m³	0.7	<0.7
Total fluoride (Conversion conc.)	mg/m³	-	<0. 5
Total fluoride (Emission rate)	kg/h	-	$<7.24\times10^{-4}$

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Ambient air and waste gas. Determination of hydrogen chloride. Ion chromatography Method: HJ 549-2009			
Chlorine hydride (Emission conc.)	mg/m³	0.3	<0.3
Chlorine hydride (Conversion conc.)	mg/m³	-	<0. 1
Chlorine hydride (Emission rate)	kg/h	-	$<3.10\times10^{-4}$

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Air quality-Determination of formaldehyde-Acetylacetone spectrophotometric method Method: GB/T 15516-1995			
Formaldehyde (Emission conc.)	mg/m³	0.5	**0.7**
Formaldehyde (Emission rate)	kg/h	-	7.18×10^{-4}

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TEST REPORT SHE14-03790 R0

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Analytical Method for Monitoring of Ambient Air and Exhausted Air(4th ed.,SEPA,China,2003)5.4.10(3)			**Method: SEPA 2003**
Hydrogen Sulfide (Emission conc.)	mg/m³	0.01	**0.01**
Hydrogen Sulfide (Emission rate)	kg/h	-	1.39×10^{-5}
Hydrogen Sulfide (Conversion conc.)	mg/m³	-	0.01

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Stationary source emission. Determination of chlorine. Methyl orange spectrophotometric method			**Method: HJ/T 30-1999**
Chlorine (Emission conc.)	mg/m³	0.20	<0.20
Chlorine (conversion conc.)	mg/m³	-	<0. 15
Chlorine (Emission rate)	kg/h	0.330	$<2.14\times10^{-4}$

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Analytical Method for Monitoring of Ambient Air and Exhausted Air(4th ed.,SEPA,China,2003)			**Method: SEPA 2003**
Benzene (Emission conc.)	mg/m³	0.01	**0.06**
Benzene (Conversion conc.)	mg/m³	-	0.04
Benzene (Emission rate)	kg/h	-	6.36×10^{-5}
Toluene (Emission conc.)	mg/m³	0.01	**0.05**
Toluene (Conversion conc.)	mg/m³	-	0.04
Toluene (Emission rate)	kg/h	-	5.24×10^{-5}
Ethylbenzene (Emission conc.)	mg/m³	0.01	<0.01
Ethylbenzene (Conversion conc.)	mg/m³	-	<0. 007
Ethylbenzene (Emission rate)	kg/h	-	$<1.07\times10^{-5}$
Xylene (Emission conc.)	mg/m³	0.02	<0.02
Xylene (Conversion conc.)	mg/m³	-	<0. 014
Xylene (Emission rate)	kg/h	-	$<2.14\times10^{-5}$

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Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Stationary source emission. Determination of nonmethane hydrocarbons. Gas chromatography Method: HJ/T 38-1999			
Nonmethane hydrocarbons (Emission conc.)	mg/m³	1.0	1.3
Nonmethane hydrocarbons (Conversion conc.)	mg/m³	-	0.93
Nonmethane hydrocarbons (Emission rate)	kg/h	-	1.35×10^{-3}

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Stationary source emission-Determination of tin-Graphite furnace abs method Method: HJ/T 65-2001			
Stannum (Emission conc.)	mg/m³	5.00×10^{-5}	1.00×10^{-4}
Stannum (Conversion conc.)	mg/m³	-	1.08×10^{-7}
Stannum (Emission rate)*	kg/h	-	7.42×10^{-5}

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Stationary source emission-Determination of lead-Flame atomic absorption spectrophotometric method Method: HJ 685-2014			
Lead (Emission conc.)	mg/m³	5.00×10^{-5}	2.43×10^{-4}
Lead (Conversion conc.)	mg/m³	-	1.80×10^{-4}
Lead (Emission rate)	kg/h	-	2.62×10^{-7}

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Stationary source emission. Determination of cadmium. Flame atomic absorption spectrophotometric Method: HJ/T 64.1-2001			
Cd (Emission conc.)	mg/m³	5.00×10^{-6}	$<5.00\times10^{-4}$
Cd (Conversion conc.)	mg/m³	-	$<5.39\times10^{-9}$
Cd (Emission rate)	kg/h	-	$<3.70^{-6}$

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Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Stationary source emission-Determination of beryllium-Graphite furnace ABS method Method: HJ 684-2014			
Beryllium (Emission conc.)	mg/m³	5.00 X 10^{-5}	<5.00×10^{-5}
Beryllium (Conversion conc.)	mg/m³	-	<3.70×10^{-5}
Beryllium (Emission rate)	kg/h	-	<5.39×10^{-8}

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Stationary source emission-Determination of nickel-Flame abs method Method: HJ/T 63.1-2001			
Nickel (Emission conc.)	mg/m³	5.00 X 10^{-5}	9.67×10^{-3}
Nickel (Conversion conc.)	mg/m³	-	7.16×10^{-3}
Nickel (Emission rate)	kg/h	-	1.04×10^{-5}

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Stationary source emission. Determination of mercury. Cold atomic absorption spe Method: HJ 543-2009			
Mercury(Emission conc.)	mg/m³	0.025	<0.025
Mercury(Conversion conc.)	mg/m³	-	<0. 018
Mercury(Emission rate)	kg/h	-	< 2.70×10^{-6}

Parameter	Units	LOR	Lab ID: 14-03790.001 Sampling ID: Remark 3) Sample Matrix: Exhaust Gas Sample Description: - Sample Date: 2014/12/13
Ambient air and stationary source emission-Determination of metals in ambient particulate matter Method: HJ 657-2013			
Antimony (Emission conc.)*	mg/m³	5.00 X 10^{-5}	<5.00×10^{-5}
Antimony (Conversion conc.)*	mg/m³	-	<3.70×10^{-5}
Antimony (Emission rate)*	kg/h	-	<5.39×10^{-8}
Cobalt (Emission conc.)*	mg/m³	5.00 X 10^{-5}	1.99×10^{-4}
Cobalt (Conversion conc.)*	mg/m³	-	1.48×10^{-4}
Cobalt (Emission rate)*	kg/h	-	2.15×10^{-7}
Selenium (Emission conc.)*	mg/m³	0.000250	<2.50×10^{-4}
Selenium (Conversion conc.)*	mg/m³	-	<1.85×10^{-4}
Selenium (Emission rate)*	kg/h	-	<2.69×10^{-7}

SHENV 143039

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Annexe C

Waste storage and handling

Storage and handling are described directly in the application form. The following tables add information on the quantities and the properties of the pyrolytic oil and black carbon.

Table 5. Yield of char, oil, steel, and black carbon

Product	Yield (%) range and average	Mass yielded for 10 tons of tyres, 1 batch	Mass yielded from 3000 t/yr*
Steel	15-20%, 12.5%	1.25 t	375 t
Carbon Black	25-30%, 27.5%	2.75 t	825 t
Oil	40-45%, 42.5%	4.25 t	1275 t
Non-condensable gases	Syngases: 10-15%, 12.5%	Recycled in the furnace for heating the reactor	Burned in the reactor
Gases at the chimney	Ultra low emissions		Ultra low mass

*10 tons during 300 days/yr=3000 t

Table 6. Pyrolytic oil properties

Property	Concentration, units	Methods
Ash content	0.030 % (m/m)	ASTM D482-12
pH	5	
Gross catalytic value	44.30 MJ/kg	ASTM D 4868-00 (2010)
Net catalytic value	41.72 MJ/kg	ASTM D 4868-00 (2010)
Solidification Point	<-50 °C	GB/T510-83 (2004)
Water content	0.10 % (V/V)	ASTM D95-05 (2010)
Total sulphur content	6380 mg/kg	ASTM D4294-10
Carbon Residue-Micro Method	0.15 % (m/m)	ASTM D4530-11
Density at 15 °C	0.9133 g/cm^3	ASTM D1298-12b
Kinematic Viscosity at 50 °C	2.962 mm^2/s	ASTM F445-12
Flash point by PMCC	<40.0°C	ASTM D93-12 (Procedure A)

Pyrolytic oil analyses

Information received from the manufacturer

SGS

ORIGINAL

REPORT DATE: 02/12/2013

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CHINA
453000

Analysis Report: QD13-01487.002

WARNING: The sample to which the findings recorded herein relate was drawn and / or provided by the Client or by a third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativeness of any goods and strictly relate to the sample. The Company accepts no liability with regard to the origin or source from which the sample is said to be extracted.

JOB ORDER NO. :	OGCQD1302075-01	BOSS ORDER NO.:	--
CLIENT ID :	N/A	PRODUCT DESCRIPTION :	Liquid Sample - Tire Pyrolysis Oil
LOCATION :	N/A	VESSEL :	N/A
SAMPLE SOURCE :	Supplied by Client	SOURCE ID :	--
SAMPLE TYPE :	N/A	SAMPLE BY :	Client
SAMPLED :	--	RECEIVED :	26/11/2013
ANALYSED :	29/11/2013	COMPLETED :	29/11/2013
CONTAINER:	1×4L Plastic Bottle	SAMPLE STATE:	Liquid in Plastic Bottle

PROPERTY	METHOD	RESULT	UNITS	MIN	MAX
Ash Content	ASTM D482-12	0.030	% (m/m)	--	--
Gross Calorific Value	ASTM D4868-00(2010)	44.30	MJ/kg	--	--
Net Calorific Value	ASTM D4868-00(2010)	41.72	MJ/kg	--	--
Solidification Point	GB/T 510-83(2004)	<-50	°C	--	--
Water Content	ASTM D95-05(2010)	0.10	% (V/V)	--	--
Total Sulfur Content	ASTM D4294-10	6380	mg/kg	--	--
Carbon Residue - Micro Method	ASTM D4530-11	0.16	% (m/m)	--	--
Density at 15°C	ASTM D1298-12b	0.9133	g/cm³	--	--
Kinematic Viscosity at 50°C	ASTM D445-12	2.962	mm²/s	--	--
Flash Point by PMCC	ASTM D93-12(Procedure A)	<40.0	°C	--	--

** End of Analytical Results **

REPORTED BY

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AUTHORISED SIGNATORY

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Supervisor

SGS-CSTC OIL, GAS & CHEMICALS SERVICES

Page 2 of 2

OGC-EN_REPORT-2013-05-30-V58

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Black carbon properties

Information received from manufacturer

Table 7. Carbon black properties

Property	Values	Methods
Iodine absorption value	112 g/kg	GB/T3780.1-2006
DBP absorption value (B)	10^{-5} m^3/kg	GB/T3780.2-2007
CTABA Adsorption of specific surface area	103 m^2/kg	GB/T37780.5-2008
Nitrogen adsorption surface area	103 m^2/kg	GB/T10722-2003
STSA	103 m^2/kg	GB/T10722-2003
Heating loss (125 °C)	1.3	GB/T3780.8-2008
Ash content (125°C)	19.6	GB/T3780.10-2009
500 µm	2.2220	GB/T3780.21-2008
45 µm	49.656	GB/T3780.21-2008
pH	9.6	GB/T3780.7-2006
Impurity		GB/T3780.12-2007
Tensile strength MPa	-23.7	GB/T3780.18-2007
Elongation at break %	-174	GB/T3780.18-2007

Report No ： NICC B1102-12 Total 2 pages Page 1

Name Of Sample	Carbon Black	Sample No	S1131-12
Name And Address Of Company	Xinxiang Huayin Renewable Energy Equipment Co.,Ltd	Sample Feature	Black powder
Address	Kangcun Train Station Industry Zone, Huojia County	Brand	---
Sample Model	---	Product Grade	---
Lot Number	---	Sample Locations	Send sample
Sampling Basic Number	---	Sample Quantity	1000g
Sent Sample	Zhang yan	Offering Date	2012.06.11
Test Criterion	On the page of 2	Report Date	2012.06.16
Test Conclusion	Test Results As Shown In Page 2 （seal for inspection report） Date of Issue: On June 16, 2012		
REMARKS	As for elongation at break is not arriveed at 300%,no 300% Stretching stress data The determination of tensile strength, tensile elongation value is difference with SRB3 # standard carbon black, SRB3 # standard set for 300% of the carbon black stretch stress, tensile strength, tensile elongation, absolute value is 17.6 MPa, 27.3 MPa and 456%, respectively.		

Xinxiang Huayin Renewable Energy Equipment Co.,ltd

Report No ： NICC B1102-12 Total 2 pages Page 2

Inspection Item		Estimated Value	Inspection Standard
Iodine Absorption Value	g/kg	112	GB/T3780.1-2006
DBP Absorption Value (B)	10-5m3/kg	68	GB/T3780.2-2007
CTABA Dsorption Of Specific Surface Area	103m2/kg	42	GB/T3780.5-2008
Nitrogen Adsorption Surface Area	103m2/kg	55	GB/T10722-2003
STSA	103m2/kg	42	
Heating Loss(125℃)	%	1.3	GB/T3780.8-2008
Ash Content (825℃)	%	19.6	GB/T3780.10-2009
500μm Screenings	%	2.2220	GB/T3780.21-2006
45μm	%	49.656	
pH		9.6	GB/T3780.7-2006
Impurity			GB/T3780.12-2007
Tensile Strength	MPa	-23.7	GB/T3780.18-2007
Elongation At Break	%	-174	

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