

ENVIRONMENTAL TECHNOLOGY VERIFICATION (ETV)

VERIFICATION STATEMENT

TECHNOLOGY TYPE: **Tire Pyrolysis**

APPLICATION: **Scrap Tires Reclaimed**

TECHNOLOGY NAME: **Waste Rubber Extract Rubber Oil Plant
(ETV 12-023)**

COMPANY: **Jinlong Development Group Incorporated**

DATE: **July 2013**

Disclaimer

This ETV Statement is the result of an impartial, consensus-based approach to evaluating innovative environmental technology in accordance with the ETV Technical Protocol. The data presented are believed accurate and the analyses credible. The statements made and conclusions drawn regarding the product evaluated do not, however, amount to an endorsement or approval of the product in general, for any particular application or a warranty to the performance of the technology that it will always operate as verified.

This ETV Statement is based from an evaluation activity supported by the DOST-ITDI ETV Group, the Panel of Experts and Jinlong Development Group Incorporated.

Mention of commercial product name does not imply endorsement.



This ETV Statement is a summary of the ETV Report of the *Waste Rubber Extract Rubber Oil Plant (ETV 12-023)*.

ETV TEST DESCRIPTION

The ETV Panel of Experts and the Jinlong Development Group Incorporated agreed to validate the following claim:

1. The air emission and noise level of the system during its operation is within the applicable Philippine DENR standards.

TECHNOLOGY DESCRIPTION

The description given below is based on the technical information supplied by *Jinlong Development Group Incorporated* and does not represent verified information:

The Waste Rubber Extract Rubber Oil plant is a scrap tire recycling system using non-burn technology (pyrolysis) with a capacity of 300 tons of used tires per year. It can convert all scrap tires into new resources like vapor gas, carbon black and rubber oil as seen in the following figure.

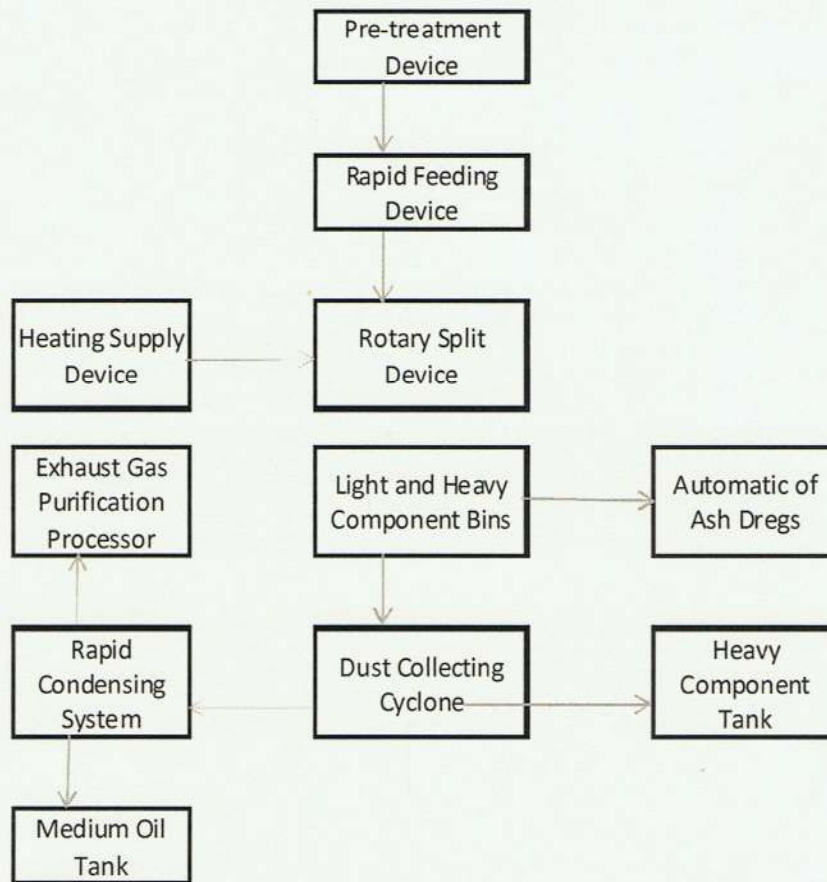


Figure 1. Waste Rubber Extract Rubber Oil Extraction Process Flow

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VERIFICATION OF PERFORMANCE

Claim that the air emissions are within the standards of the Philippine Clean Air Act

The ambient air quality and stack emission monitoring was conducted by Aeronics Incorporated during the test run of the system. Ambient Air Quality Parameters consisted of Total Suspended Particulates (TSP), Nitrogen Dioxide (NO₂) and Sulfur Dioxide (SO₂). One-hour ambient air noise levels were also monitored at four (4) identified sampling sites. Stack emission parameters consisted of Particulate Matter (PM), Oxides of Nitrogen (NO_x) and Sulfur (SO_x) and Carbon Monoxide (CO).

The ETV Panel of Experts then evaluated the results of ambient air quality monitoring based on National Ambient Air Guideline Values (NAAGV) which can be found in section 12 of RA 8749 as shown in Table 1. Moreover the result of noise level monitoring was evaluated based on the DENR Ambient Noise Quality Standards Section 78 Chapter IV, Article 1 of NPCC Rules and Regulations 1978 standards limits for Class "C" for Light Industrial Area Classification as shown in Table 2.

The stack emission parameters of the furnace consisting of Particulate Matter (PM), Oxides of Nitrogen (NO_x) and Sulfur (SO_x) and Carbon Monoxide (CO) was monitored. Firewood and non-condensable gas that comes from the residual by product of their tire recycling process were used as fuel. The monitoring results were compared with the National Emission Standards for Specific Air Pollutants (NESSAP) identified in the Implementing Rules and Regulations for RA 8749, Part VII Rule XXV as shown in Table 3.

Table 1. Measured Ambient Air Concentrations of TSP, SO₂ and NO₂ in Comparison with National Ambient Air Guideline Values (NAAGV)

Location	Date and Time of Sampling	TSP µg/Nm ³	SO ₂ µg/Nm ³	NO ₂ µg/Nm ³
Near entrance gate, approximately 100 meters away from pyrolysis machine (Downwind)	June 4, 2013 1155H-1255H	23	24	19
Near staff house (Downwind)	June 4, 2013 1312H-1412H	30	25	19
Near stock warehouse (Downwind)	June 4, 2013 1440H-1540H	281	34	34
Near fabrication area, approximately 50 meters away from pyrolysis machine (Upwind)	June 4, 2013 1600H-1700H	143	40	35
DENR Standard (NAAGV)	1 hr. sampling	300	340	260

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Table 2. Ambient Noise Level Measurement in Comparison with National Pollution Control Commission (NPCC)

Location	Noise Level (dBa)	DENR Standard Maximum Allowable Noise Level, dBa Class "C" (Light Industrial Area) Classification
Near entrance gate, approx. 100m away from pyrolysis machine	53	70
Near staff house	55	70
Near stock warehouse	63	70
Near fabrication area, approximately 50m away from the pyrolysis machine	63	70

Table 3. Stack Emission Test Results

Parameter	Run 1	Run 2	Run 3	Average	DENR Standard (NESSAP)
Moisture Content, %	10.0	9.3	10.1	9.8	--
Carbon Dioxide Concentration, %	3.8	4.0	3.8	4.0	--
Oxygen Concentration, %	16.7	16.5	16.5	17.0	--
Particulate Matter Emissions, mg/Nm ³	44.0	57.0	60.0	54.0	150
Sulfur Oxides (as SO ₂) Emissions Concentration, mg/Nm ³	4.0	2.0	1.0	3.0	700
Nitrogen Oxides (as NO ₂) Emission Concentration, mg/Nm ³	216.0	184.0	258.0	219.0	500
Carbon Monoxide as (CO) Emissions Concentration, mg/Nm ³	32.0	36.0	47.0	38.0	500

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Based on the average data obtained from test runs, the claims of *Jinlong Development Group Incorporated* on the merits of *Waste Rubber Extract Rubber Oil Plant* have been verified as follows:

- The measured ambient air quality for Total Suspended Particulates (TSP), Sulfur Dioxide (SO₂) and Nitrogen Dioxide (NO₂) were in the ranges from 23 µg/Nm³ to 143 µg/Nm³, 24 µg/Nm³ to 40 µg/Nm³ and 19 µg/Nm³ to 35 µg/Nm³, respectively. The National Ambient Air Quality Values (NAAQV) for TSP is 300 µg/Nm³ while for the SO₂ and NO₂ are 340 µg/Nm³ and 260 µg/Nm³, respectively.
- The measured noise levels recorded were in the range from 53 dBa to 63 dBa. The 1978 National Pollution Control Commission Rules and Regulations had set the standard at 70 dBa.
- The DENR National Emission Standards for Source Specific Air Pollutants (NESSAP) for Particulate Matter (PM), Sulfur Oxides (as SO₂), Nitrogen Oxides (as NO₂), and Carbon Monoxide (as CO) are 150, 700, 500 and 500, respectively and all expressed as mg/Nm³. The results of the emission sampling and analysis were 54 mg/Nm³ for particulate emissions, 3 mg/Nm³ for sulfur oxides, 219 mg/Nm³ for nitrogen oxides and 38 mg/Nm³ for carbon monoxide.

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