Additional Information to
Environment Impact Assessment Report

Proposed Project for the Proposed Setting Up of a Pyrolysis Plant for the Recycling of Scrap Tyre/Rubber at Beemanique

by

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August 2014
The Permanent Secretary  
Department of Environment  
Ministry of Environment and Sustainable Development  
2nd Floor, Ken Lee Tower  
Cnr Line Barracks and St George Street  
Port Louis

25th August 2014

Attention: Mrs R. Aukhojee

Dear Sir/Madam,

Re: EIA Application for Proposed Setting up of a Pyrolysis Plant for the Recycling of Scrap Tyre/Rubber at Beemanique

I refer to the above project and to your letter dated 23rd May 2014. Please find herewith required information for you to process our application. You may take note that the promoter, Sujoy Vishnu Enterprise (Mius) Ltd, has decided to drop the pyrolysis plant for recycling waste plastics. The proposed project would therefore consist of the setting up of a pyrolysis plant for the recycling of scrap tyre/rubber at Beemanique.

a. Concerns raised by the Ministry of Health and Quality of Life

(i) State the source of potable water supply

The facility will draw water from the CWA mains at around 1.6 m³ per day and the wet scrubber will have a makeup water requirement of 0.50 m³/day (17% of water consumed). 1.0 m³/day of makeup water will also be required by the condenser to compensate for the water lost through evaporation during cooling process in the cooling tower.
(ii) A context plan signed by a sworn land surveyor showing the distance of the site boundaries from the nearest residence, the settlement boundaries, sensitive areas such as religious places and nearby industrial activities such as the scrap metal yard.

Refer to Annex A1. A copy of the Land Lease Agreement has been attached in Annex A2.

(iii) Identify all sources of odour for the proposed pyrolysis plant and associated amenities such as the storage of scrap tyre/rubber and plastic and to state the proposed mitigation measures.

- All equipment to be used will be air tight; hence there will be no odour emission from the equipment.
- Storage area of scrap tyre/rubber will have a capacity of 20 to 30 MT of tyre/rubber and the smell will be like that of a tyre selling shop and will not be spread outside site boundaries.
- The non condensable gases will be reused for heating purposes in the process and a burnout chamber will be installed. The emissions from burning will comply with the emission standards of the Republic of Mauritius.
- Odour of petroleum product like might arise in the storage area. This will be minimised by having clean conditions without spillages and maintenance of closed arrangement. Any minor odour will be restricted to the site premises.

(iv) To list the major equipment that are likely to cause noise, to predict their noise levels both on site and at the site boundaries and to elaborate on the mitigating measures such as soundproofing (if any) being proposed.

The plant will operate between 07:00 – 21:00 hrs

- The major equipment expected to have noise emissions are the pyrolysis reactor, suction blowers and the cooling tower. Noise emissions at source will be due to operation of the motors and will not exceed 60 dB (A) $L_{eq}$ during operation.
- The Diesel generator to be used for internal power generation will be equipped with a sound-proof system and will also not exceed the limit of 60 dB(A) $L_{eq}$ during
operation as indicated in the industrial noise exposure limit of the Environmental Protection (Environmental Standards for Noise) Regulations 1997.

Table 1: Industrial Noise Exposure Limits

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Noise Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:00 – 21:00 hrs</td>
<td>60* dB(A) L_{eq}</td>
</tr>
<tr>
<td>21:00 – 07:00 hrs</td>
<td>50* dB(A) L_{eq}</td>
</tr>
</tbody>
</table>

*Apply a tonal character adjustment of +5 dB(A) to the measured value where the noise has a definite continuous note such as a whine or hiss.

(v) A layout plan showing the plot coverage together with the storage area for the scrap tyre/rubber and plastic

Refer to Annex B.

(vi) Where and how the particulate solids obtained from the filtration of the effluent from the reaction tank will be dried and to state as to whether same will generate odour and if so, to state the mitigation measures to abate same.

The quantity of particulate solids obtained from filtration will be relatively low and odourless. The particulate solids will be collected by filtration and will be allowed to dry in the open air. After drying, the dry solids will be collected and sent to the landfill by a licenced waste carrier after approval from the relevant authority. The disposal of the solids, calcium sulphate and sodium sulphate is not expected to have any significant impact to the landfill.

b) Concerns raised by the Ministry of Environment and Sustainable Development

i) Arrangements made for collection of waste tyres and plastics.

The waste tyres will be collected in a closed truck of a maximum capacity of 8 MT. Collection of the materials will be done in collaboration with relevant authorities such as District Council of Grand Port under the aegis of the Ministry of Local Government and Outer Islands.
ii) Details on the type of plastics to be pyrolysed.

Please note that pyrolysis of waste plastics have been deferred.

iii) Describe the various processes involved at each stage mentioned in the flow diagram at pg 25 of the EIA report.

The processes involved in the pyrolysis of scrap tyre/rubber are shown in the amended flow diagram as per Figure 1.

- The first step involved in the preparation of the scrap tyres into 1 inch x 1 inch pieces to be fed to the pyrolysis reactor
  
The preparation is done by four units: Side Wall Cutter, Strip Cutter, Block Cutter and Bead Wire Remover.

- Feeding to reactor
  
The materials (1 inch x 1 inch rubber pieces) will be fed into the pyrolysis reactor by a belt conveyor and a rotary screw feeder to avoid entrance of air into the equipment. The rotary screw feeder is designed so as to prevent air to enter.

- Heating of the pyrolysis reactor and pyrolysis
  
The pyrolysis reactor will be heated by hot air generated by the burner operating with tire derived fuel. The process will begin when the temperature reaches 250°C whereby the rubber pieces will melt and the pressure will increase.

- Treatment of vapours from Pyrolysis
  
The vapours will pass through the gas separator whereby the heavy particles of carbon present in the gas will settle. The vapours will then pass through a unit where the gases will go into water and will condense in the water. Oil will be collected from a side valve.

Vapours will then pass through two sets of condensers and will be cooled by water. Condensable gases will be converted into fuel oil and non condensable will return back to the reactor for heat generation.

- Flue gas treatment
  
The flue gas produced from the burner will first be treated by a wet scrubber and the effluent generated will then pass through a bag filter. Water used as the scrubbing liquid will be recycled
back into the emission control equipment. The filtrate obtained will be allowed to dry in the open air prior to disposal into the landfill.

- Solid waste disposal

At a temperature of 400°C, the pyrolysis process, production of gases, and generation of hot air will be stopped. The pyrolysis reactor will be allowed to naturally cool up to a temperature of 100°C. At a temperature of less than 100°C, carbon black and steel pieces only will be left inside the reactor. The product will then be unloaded into a screw conveyor with the help of a rotary airlock valve and will be conveyed to a magnetic separator for the separation of carbon and steel. The carbon will fall out from a chute into a closed room and will be packed in lined bags for export. Steel will be stored for sale as scrap metal to the local market.

- Cooling Tower

Hot water from the condensers will pass through a cooling tower for cooling. After cooling process, the water is recycled back to the condenser. 1.0 m$^3$/day of makeup water will be required by the condenser.
Figure 1: Scrap Tyre Pyrolysis Plant
(iv) **Details on the means of storage of carbon black.**

The carbon black will be packed in a closed circuit equipped room in High Density Polyethylene (HDPE) lined bags. The packed carbon black will be sold afterwards.

(v) **Impacts associated with the storage of diesel and mitigating measures envisaged to prevent any accidental spillage and risk of fire.**

The possible environmental impacts associated with the storage of fuel oil would be:

- contamination of water from accidental spillage into ground water,
- potential risk of fire and spills.

The mitigating measures identified will be the use of concrete flooring at the storage area to prevent any potential contamination of groundwater. The risk of fire will be reduced with the use of signboards indicating presence of naked flame is to be avoided and prohibition to smoking on site. Foam fire extinguishers will be available on site as safety measure to fight fire, if safe. The site is to be evacuated immediately if fire breaks in the office or plant or storage area. All workers will need to assemble at the fire assembly point while the fire services will be made aware of the fire by calling 115. Risk of spills will be avoided during filling of the storage tank.

(vi) **Details on the stack height, the expected air emissions and compliance with air emission standards.**

The stack will have a height of 70 ft (i.e. 21 m). The emissions shall be in line with the Emission Standards (see Table 2) as per the Environment Protection (Standards for Air) Regulations 1998. Table 2 compares the standard emissions with exhaust gas emission. The emission test report is as per Annex C.
Table 2: Compliance with Air Emission Standard

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Standard</th>
<th>Exhaust Gas</th>
<th>Complied with Standard?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Particles</td>
<td>200 mg/m³</td>
<td>8.7 mg/m³ (Particulate Matter)</td>
<td>Yes</td>
</tr>
<tr>
<td>Sulphuric acid mist or sulphur trioxide</td>
<td>120 mg/m³</td>
<td>&lt; 2.33 mg/m³</td>
<td>Yes</td>
</tr>
<tr>
<td>Fluorine compounds</td>
<td>100 mg/m³</td>
<td>&lt; 1.46 mg/m³</td>
<td>Yes</td>
</tr>
<tr>
<td>Hydrogen Chloride</td>
<td>200 mg/m³</td>
<td>&lt; 0.54 mg/m³</td>
<td>Yes</td>
</tr>
<tr>
<td>Nitric acid or oxides of nitrogen</td>
<td>1,000 mg/m³</td>
<td>63 mg/m³</td>
<td>Yes</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>1,000 mg/m³</td>
<td>&lt; 0.8 mg/m³</td>
<td>Yes</td>
</tr>
</tbody>
</table>

(vii) Details on the composition of the gas channeled to the wet scrubber.

Refer to Annex C.

(viii) With reference to figure 2.13, to submit the composition of ‘clean emissions’ from the wet scrubber and compliance to air emission standards.

Please refer to part b(vi).

(ix) According to section 2.2.2 of the EIA report, the vapour/gas passes through a gas separator. To describe the processes taking place in the gas separator.

The vapour/gas passes through a gas separator whereby it is purified and separated from the solids and enters the water cooled condensers. The fine carbon particles (solids) carried along with the hot vapours are expanded in a separator. The fine carbon will be allowed to settle down and vapours will proceed further to the condensers. The carbon will be recycled back into the pyrolysis reactor in the next batch.
(x) With reference to section 2.2.2 of the EIA report, to submit details on the composition of the non-condensable gases sent to the gas burner to provide heat to the reactor.

Refer to Annex D.

(xi) Confirm as to whether any catalyst is required for the process.

The present proposed method of processing for the recycling of scrap tyre/rubber will not require any catalyst.

(xii) Mitigating measures envisaged to contain Volatile Organic Compounds.

Volatile Organic Compounds (VOC) will be present in the non condensable gases. The burner will make use of the VOC as source of energy for heat generation in the pyrolysis plant and any excess will be fired in a burnout chamber.

Good quality leak-proof pumps, valves and maintaining clean conditions will prevent escape of VOCs.

(xiii) Details on the mode of disposal of storm water including drainage network and point of final evacuation. Any provision of perimeter drainage system envisaged.

Storm water will be disposed through a soakaway pit. It will consist of a pit of not less than 2 m above the groundwater table and will be between 1.5 m and 4 m deep. The pit will have a bottom later of sand and fine gravels to help disperse the flow by gravitation.

(xiv) Details on depth of water table at the proposed site.

In Mauritius, there are 1202 boreholes/small wells/dug wells, out of which 376 are used for domestic, irrigation and industrial water supply. None of the boreholes are found on the site according to Figure 2.6. According to the piezometric contours in Figure 2.6, the groundwater level at the proposed site is at a depth of approximately 400 - 410 m.
(xv) Details on the volume and characteristics of the acidic wastewater generated during the wet scrubbing process with details on means of treatment and disposal.

The flue gas from the pyrolysis reactor will be sent to the emission control equipment, the wet scrubber, before releasing into the atmosphere. Around 3 m³ of water will be required for treating the flue gas. Due to the presence of Sulphur Dioxide in the gas, the wastewater generated will have an acidic pH of 5. Sodium Hydroxide/ Calcium Hydroxide will be added to neutralise the wastewater. As a result of neutralisation, Sodium Sulphate will be formed. Sodium Sulphate crystals will be obtained by evaporation of the water followed by filtration. The filtrate water is to be reused in the scrubber as makeup water required will be around 0.9 m³ amounting for 30% of total water input. The solid Sodium Sulphate crystals obtained, formed will be sent to landfill.
(xvi) To confirm as to whether the carbon black will be marketed locally or exported. Should the carbon black be sold locally to submit details on the market survey carried out for the acceptability of carbon black on the local market.

The carbon black obtained from the process will be exported if required.

Sujoy Vishnu Enterprise (Mtius) Ltd has made arrangements locally to sell the carbon black produced to Avantime ltd, who will use it in Coal Water Slurry manufacturing process. It is a proven application for pyrolytic carbon black with GCV of 6200Kcal and a preferred option due to cost saving. A letter from the company Avantime ltd is enclosed in Annex E.

(xvii) Copy of clearance from the Department of Civil Aviation.

A letter requesting the issue of a No Objection Certificate has already been sent to the Civil Aviation (See Annex F). We would like to request that this requirement be made part of the conditions of the EIA license so as not to delay the project.

c. Concerns raised by the Public

3.1 The EIA report recognizes that the pyrolysis process as a waste management technology will be a first in Mauritius.

3.2 The Solid Waste Management Strategy (2011-2015) for Mauritius adopted in 2011 does not specifically identify pyrolysis as a waste management option for used tyres and mixed plastic wastes. As a consequence, to date there is no feasibility study for thermal treatment options (including pyrolysis) of local waste tyres and mixed plastic wastes.

3.3 Hence the onus is on the Proponent to demonstrate the feasibility of the Pyrolysis process for the local used tyres and mixed plastic wastes. This feasibility study should include trial tests on the local feed stocks (tyres and mixed plastic wastes) and conduct performance trials at the technology manufacturers’ pilot or demonstration unit.

The promoter, represented by Mr Balaram Koneru is a graduate in Technology and has been involved in the manufacture of chemicals since the last 22 years. He was a director of Vishnu Chemicals Ltd, Hyderabad, India, which is a listed company on Bombay Stock Exchange, since 1994. Presently he is the Managing Director of Vishnu Chromates Pvt Ltd, Hyderabad, India. He
is well experienced with manufacturing of chemicals and allied products. At present his company is operating and maintaining the Common Chrome Recovery Unit at Asia’s biggest Leather complex located at Kolkata, West Bengal, India. Vishnu Chromates Pvt Ltd is fully involved with recovery and reuse of chromium in the leather tanning Industry. Mr Balaram Koneru is also associated with a company doing pyrolysis of waste tyres and waste rubber in Hyderabad since the past 3 years. Hence, the promoter is well versed with the proposed pyrolysis plant at Beemanique, Mauritius. It is to be noted that pyrolysis is not a new process worldwide and a number of pyrolysis plants are currently in operation.

3.4 The EIA Report has several shortcomings that include inter alia:

- **Incomplete description of the proposed Pyrolysis Plant, the processes and the types, operating conditions, types, design performance and efficiencies of antipollution devices.**

  Please refer to part b(iii) for process description and b(iv) for stack emissions. It has been noted that the emission complies with emission standards in force in Mauritius (see Table 2).

- **The waste streams (liquid, gaseous and solids) produced by the proposed Pyrolysis Plants, their characteristics, quantities, methods of storage, method of disposal.**

  Please refer to part (b) (iii) for process description.

  - With regards to the gaseous pollutants, an emission report is provided in Annex C and it has been noted that the stack emissions comply with emission standards in force in Mauritius (see Table 2).
  - Solid discharge will be comprised only of carbon black which will be packed in HDPE lined bags. The packing area will be kept clean such as dust emanation and any possible contamination are avoided.
  - Solid wastes of sodium sulphate or calcium sulphate will be disposed to landfill (with due permission from required authority)
- The liquid discharge will consist of effluent from the scrubbing process which will be treated using sodium sulphate/calcium sulphate followed by filtration. The filtrate water will be reused within the wet scrubber.

- **The EIA does not provide a proper evaluation of the performance of the proposed Pyrolysis Plants as it is not based on the quality (characteristics) of the local feed stocks (waste tyres and mixed plastic wastes) although references are made to the general characteristics of rubber tyres (Table 4.3 of EIA report) and mixed plastic wastes¹ (Table 4.4)**

  It should be noted that waste scrap tyres are standardised and the requested evaluation of performance is not necessary.

- **It is alarming that a Pyrolysis Project that generates highly toxic and hazardous substances whether as intermediate by-products or final products, does not provide sufficient information on pollution prevention, monitoring, and management for its intended activity as required under section 18 of the EPA 2002.**

  It is to be pointed out that none of the intermediate by products and final products obtained from the pyrolysis plant is highly toxic and hazardous.

  Carbon black obtained will be packed in a closed room which will avoid any possible emanation on site. The material safety datasheet (see Annex G1) of carbon black states that is neither classified as toxic nor as hazardous substance.

  On the other side, fuel oil being a flammable product may be a fire hazard when heated to high temperatures. However, safety measures will be taken on site such as signboards placed on site and at storage tank indicating absence of naked flames, and prohibition to smoking and presence of fire extinguishers at calculated positions. Fuel oil has also been identified not to be acutely toxic as per MSDS in Annex G2.
• **Environmental parameters:** The lists of pollutants in the gaseous, solid and liquid discharge, which are determinant for impact assessment and identification and suitability of proposed mitigation measures and of the environmental monitoring programme, are incomplete or not disclosed. Without these information, the impact matrix as defined in Table 4.1 cannot be validated.

With regards to the gaseous pollutants, an emission report is provided in Annex C. It was shown that the stack emission complies with emission standards in force in Mauritius (see Table 1).

Solid discharge will comprised of carbon black which will be packed in HDPE lined bags. The packing area will be kept clean such as dust emanation and any possible contamination are avoided.

The liquid discharge will consist of effluent from the scrubbing process which will be treated using sodium sulphate/calcium sulphate followed by filtration. The filtrate water will be reused within the wet scrubber while the solids obtained, from filtration of effluent, will be dried and sent to landfill.

• **Solid Waste Management:** Solid wastes streams have not been identified and characterized in both pyrolysis units of the plant. Furthermore their method of disposal needs to be assessed after leaching tests are carried out on these wastes. The pyrolytic char with its toxic constituents can eventually leach into the ground and pose significant risks to the quality of ground and surface water. Hence leaching tests on the pyrolytic char must be controlled tests disclosed in the EIA report. No solid waste management plan is given in the report for these wastes.

Carbon black will be handled in a closed circuit equipped room having concrete flooring. The probability of leaching is thus negligible and no mitigation measure is required.

• **Environmental monitoring:** There is no comprehensive monitoring plan that characterized the levels of pollutants at different phases of the pyrolysis process. Other potential release points of pyrolysis gases need to be monitored: afterburner or flare; re-suspended powder during transfer of char to sacks; transfer of product to tanker; and fugitive emissions from the thermal processor. The list of parameters to be measured is
not adequate for such activity. Particular compounds in the Benzene, toluene and xylene group of compounds (BTX) although not part of the Mauritian Air Quality regulations, should have been identified as controlled pollutant parameters given that the national standard is deficient with respect to these pollutants. It is the responsibility of the EIA Consultant to identify all type of pollutants produce during the pyrolysis process not only from what is being disclosed by the Proponent but also from a review of the literature assess their concentrations, propose Environmental Assessment level for each pollutant and recommend their level of monitoring in the event that local standards are deficient. Demonstrations of the pollutants level under different operating scenario of the pyrolysis Plants lend more credibility to the impact assessment and identification/propose of mitigation measures that mere statements that the Project will conform to the maximum permissible limits as per local regulations and standards.

Carbon black will be packed in HDPE lined bags in a close room to avoid any possible emanation of carbon black on site and to the surrounding.

**Annex C** provides the emission test results of the exhaust gas of an existing pyrolysis plant similar to that proposed by the Proponent. Referring to part *(b)*vi*, where**by** standard emissions were compared with that of the exhaust gas presented in Table 2, it was shown that gaseous emission from the plant will conform to the maximum permissible limits as per the Environment Protection (Standards for Air) Regulations 1998.

Estimated fugitive emissions from a ‘generic’ pyrolysis plant have been reported as 51.27 kg/day of VOC and using the dispersion formula this quantity would result in approximately 1.2µg/m³ in the air.

- **Emergency response plan:** There is a serious omission of emergency arising from fire in the facility. Fumes from burnt tyres and plastics can pose dangers to the workers, firefighters, and the surrounding communities. The burning tyres emit dangerous substances, among which are known carcinogens and toxics that target vital organs. These pose significant acute and chronic health hazards to those exposed to the plume. Reported health effects include skin, eye, and mucous membrane irritation, respiratory symptoms, central nervous system depression, and cancer.
An emergency preparedness plan is available as per Annex 9 of the EIA report. It should be noted that the tires are to be vaporized by indirect heat and not burnt. Moreover, equipments to monitor pressure and other control panels will be installed.

- **Occupational Health and Safety:** Protection against toxic and hazardous substances has not been identified since adequate evaluation of the pyrolysis processes including all waste streams have not been carried out. Examples are fugitive fumes in the workplace and pyrolysis char. Pyrolysis char is a lung irritant and contains known carcinogens.

Estimated fugitive emissions from a ‘generic’ pyrolysis plant have been reported as 51.27 kg/day of VOC and using the dispersion formula this quantity would result in approximately 1.2µg/m³ in the air.

<table>
<thead>
<tr>
<th>Emission Source</th>
<th>Kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe flanges</td>
<td>2.7</td>
</tr>
<tr>
<td>Compressors</td>
<td>5.0</td>
</tr>
<tr>
<td>Open Drains</td>
<td>4.54</td>
</tr>
<tr>
<td>Pump Seals</td>
<td>5.9</td>
</tr>
<tr>
<td>PRVs</td>
<td>2.27</td>
</tr>
<tr>
<td>Valves</td>
<td>30.84</td>
</tr>
</tbody>
</table>

- **Storage capacities and transfer of products:** The EIA report does not provide details on the storage methods and capacities of products and wastes (solid and liquid) have also not been addressed in sufficient detail as well as their pollution prevention devices. The method, means and frequency of transfer of the pyrolytic products and wastes have not been described and assessed in the report.

Addressed above b( iii) and 3.4
(v) Specific Issues

1. Feed stock to the pyrolysis plants

The EIA report reports on the amount of waste tyres and mixed plastics wastes generated every year in Mauritius and the potential amount available for their Proposed Pyrolysis Plant. No mention is made in the EIA report on how and where these wastes will be collected and the methods of collection and transport to the proposed Site. Furthermore the characteristics of the local used tyres and mixed plastics wastes are unknown.

• Unknown composition

Plastic wastes are currently disposed of to landfill as stated by the Proponent. As it is a waste material with no perceived value, its composition has not been fully evaluated. Moreover the Proponent has not provided any typical composition of local mixed plastic wastes upon which their proposed pyrolysis plant is designed to operate.¹

It is well known that in the absence of any compositional data for the target feedstock the technology manufacturers are reluctant to offer estimates of performance. They have performance data based on a ‘clean’ feedstock (e.g. post-industrial waste), but the impact if unknown contaminants means that extrapolation introduces technical risks among others.

The proponent should have carried out an analysis of local plastic wastes from a range of sources, and establish the average and range of compositions thereafter. This would need to be done at different times of the year, to account for seasonality in composition and contamination.

The use of plastic in the pyrolysis plant has been deferred. The collection of waste tyres has been stated in b(i).

• Unproven technology – Performance Guarantee from Technology Manufacturers

Although pyrolysis technologies such as that proposed by the Proponent have been around for some time, none has a demonstrated track record of handling a heterogeneous mixture of plastics waste with significant variations in composition.
As a consequence the Proponent should provide a written performance guarantee from his Technology Manufacturer for the proposed pyrolysis plants.¹

Please note that pyrolysis of mixed plastic wastes has been dropped.

- Contaminants in the Feed stock to the pyrolysis plants

Plastic wastes contain contaminants which may interfere with the pyrolysis process. The most important of these are PVC and oxygenated materials such as PET and paper.

The assumptions of the EIA report is that a feedstock of mixed plastic wastes of all types with the levels of contamination unknown will produce oil products in the yield and quality claimed in the EIA report; this need to be supported and guaranteed by the technology manufacturers.

It is reported that the pyrolysis process is sensitive to contamination, and this may reduce the quality and quantity of the oil products produced. If this is the case, and less-contaminated feedstock is required, then it will be necessary to remove the contamination prior to the pyrolysis the Proponent has failed to address this in this EIA.

Please note that pyrolysis of mixed plastic waste has been dropped.

2. Pyrolysis Processes for Waste Plastics and Tyres

The Pyrolysis description and the function of the process equipment for both the tyres and the waste plastic pyrolysis plants are incomplete and confusing.
Generally:

- **For each process, the operating conditions must be stated (pressure, temperature, residence time etc.)**

The operating conditions in the scrap tyre/rubber pyrolysis reactor are as follows:

- Pressure: 1.0 MPa-1.5MPa
- Temperature: 250 - 400°C
- Residence time: 5-6 hrs
- Capacity: 10 MT of scrap tyre per day

- **The function, characteristics, efficiency of the process equipment must be state; for example, the function, technical characteristics and efficiency of the filtration and purification of figures 2.15 & 2.16 of the EIA report are not given in the EIA report.**

Refer to part (b) iii.

- **An energy balance for each unit of the pyrolysis plant must be given.**

More specifically

The characteristics (key compounds, pollutants, concentrations, etc.) of each stream leaving the process unit must be stated, in particular the waste by-products (liquid, gas or solid):

For example, referring to figure 2.16 of the EIA report

- Around the wet scrubber
- Emissions from waste plastic recycling plant (0.75 MT)
- Clean emissions (0.075 MT)
- Effluent (1.375 MT)

Please refer to **Annex C** for emissions from Stack. It is to be noted that the emissions comply with local emission standards.
• **Around the Bag Filter**
  - Recycled water (0.5 MT)
  - Particulates (0.875 MT)
  - Recycled water (0.5 MT)

Effluent will be filtered and the treatment of the particulate solids have been described in \( a(iv) \). The recycled water will be sent back to the wet scrubber.

• **Around the filtration and purification system**
  - Residues (0.25 MT)
  - Pyrolysis Oil (Industrial Oil) (1.75 MT)

The residues will be sent to landfill by a licenced carrier. The disposal of solids is not expected to have significant impact to the landfill.

• **Around Distillation**
  - Diesel
  - Other Distillate

The distillation process has been removed from the process. Please refer to \( b(iii) \).

*The same as per above should be done for figure 2.15 (pertaining to mixed plastic wastes).*  

Please note that pyrolysis of mixed plastic waste has been dropped.

3. **Cumulative effects: Given the presence of Industrial activities in the near vicinity of site (as shown in figure 2.7 of the EIA report), the EIA report fails to provide an assessment on the air quality as well as on the water pollution risks to the surrounding environment.*
The emissions from the stack will be in accordance to relevant Mauritian standards concerning emissions.

Carbon Black will be handled in a closed circuit room with concrete flooring, thus leaching to the ground will be prevented.

Effluent from the wet scrubber will be treated so as to minimize environmental impacts.

Other by products obtained such as fuel oil will be collected and securely stored within the factory’s premises.

There will be minimal impact on the air quality and risk of water pollution will also be negligible.

Groundwater in the region is found at around 400 – 410 m deep. The pyrolysis plant will have concrete flooring at its scrap tyre storage area, factory area and storage of diesel. Therefore, contamination of groundwater by infiltration will be avoided.

4. Fugitive emissions

The Pyrolysis plants have processes that inherently can generate fugitive emissions whether on the plant workers and in the vicinity of the Site need to be evaluated and mitigation measures proposed.

For example, transfer, storage and loading of carbon black/pyrolysis char pose significant risks of fugitive emissions of particulate matter.

Please refer to 3.4.

5. Waste Carbon produced from the Pyrolysis Plants

The Proponent has not produced evidence on the characteristics of the pyrolytic char that will be generated from pyrolysis of the local feed stocks (local waste tyres and mixed plastic wastes¹).

Whether these pyrolytic chars have the same characteristics as per statement at page 31 of the EIA report and properties of the Carbon Black as per Material Safety Data Sheet given in Annex-6A of the EIA report remain to be demonstrated by the Proponent.
Furthermore, given that the pyrolytic chars originate from waste tyres and waste plastics of mixed composition and origin, the Proponent would carry out leaching tests on the pyrolytic chars and these test results are paramount to determine the impacts and mitigation measures associated with the production, storage and use of these chars. The Toxicity Characteristic Leaching Procedure (TCLP) and polycyclic aromatic hydrocarbons (PAH) tests are prerequisites tests.

The Proponent should also submit the Proximate and ultimate analyses results as well as the Gross Calorific Value of the pyrolytic chars (from tyres and waste plastics) as these analyses are more relevant in the evaluation of their ultimate fate.

The Proponent has not demonstrated that there is a local demand for the utilization of the pyrolytic chars and the tyre(s) of industrial processes that can use these chars. Moreover the Proponent should provide evidence that these local industrial processes can use these chars without any health and environmental impacts at their place of use and its vicinity.

The gross calorific value of the char is 6,000 kcal (25 MJ) which can be packed and exported. Carbon black obtained from the process will be exported. Local market potential exists for the use of carbon black as fuel with GCV not less than 6000kcal.

However Sujoy Vishnu Enterprise (Mtius) Ltd has made arrangements locally to sell the carbon black produced to Avantime ltd, who will use it in Coal water slurry manufacturing. It is a proven application for pyrolytic carbon black with GCV of 6200Kcal and a preferred option due to cost saving. A letter from the company Avantime ltd is enclosed in Annex E.

6. Odour Management

The EIA report does not recognize that pyrolysis plants will generate odorous compounds whether as intermediate or final products. These can be released directly or indirectly to the surrounding and these odorous compounds with very low odour threshold values can significantly impair the air quality for the site workers as well as the employees of the nearby industries.

Hence the Proponent should provide the sources and list of potential odorous compounds together with estimated concentrations from the pyrolysis plants. Moreover
an odour dispersion model should be used to predict the odour concentrations at selected locations around the proposed plants.

Impacts and mitigation measures are required together with an odour management plan.

Refer to part a (iii) for the sources of odour.

It is expected that the odour would be contained within the plant premises as the equipments used will be air-tight and emissions of odourous compounds would be negligible.

7. Inconsistencies in the EIA report

The EIA report contains many inconsistencies, improper conclusions, incomplete statements, inappropriate comparisons; and these challenge the credibility of the EIA report.

An example of an inconsistency is figure 2.12 which is purportedly to show the Process Diagram for the Plastic/tyre Waste Pyrolysis Plant. However the process description and technical specifications (Table 2.7), figure 2.15 and 2.16 as well as the limited description of section 2 do not tally.

An example of improper conclusion is the statement made in the EIA report that Fuel Oil will be distilled to produce Diesel for internal use in company vehicles only. Please refer to last para. (p 23):

“Fuel oil (35-40% of weight of recycled scrap tyres, will be distilled to produce Diesel for internal use, (company vehicles) only. Distilled oil (diesel) obtained from the distillation of pyrolysis oil at 250°C will have fuel properties comparable to that of commercial diesel. Table 6 below shows the properties of distilled oil obtained in the process and that of diesel fuel. It is revealed that the diesel obtained at 250°C has properties near to that of diesel fuel as per South Africa National Standards (SANS-342).”

First the paragraph gives the impression to the reader that the pyrolysis plant proposed by the Proponent will produce the characteristics of the distilled oil (diesel) obtained from the distillation of pyrolysis oil at 250°C although the characteristics of the distilled oil was obtained from a laboratory unit and not a pyrolysis plant process per se. Furthermore Pilusa J and Musenda E (2013) made the following conclusion:
“The findings of this study revealed that the fuel properties of distilled oil obtained at 250°C are comparable to commercial diesel with high heating value as well as low water content and total contamination. It was also discovered that the oil cannot be used directly into compression ignition engines in its pure form due to its higher sulphur content, low viscosity and low flash point …”

The above conclusion (shown in bold and underline) clearly shows that such Distilled Oil at 250°C if ever produced by the proposed Pyrolysis Plant will not be suitable for used by the Proponent in their company vehicles contrary to the statement made in the EIA report.

Please refer to b(iii) for process description.

It is to be noted that the characteristics of the hydrocarbon obtained from pyrolysis are closer to fuel oil than diesel. The hydrocarbon will thus be treated as fuel oil.

8. Socio-Economic Impact Assessment

The EIA report does not provide a proper socio-economic impact assessment in conformity with section 18 of EPA 2002, yet this is an important component of the Pyrolysis Project.

The main products from the proposed Pyrolysis Plants are: Pyrolysed Char, Pyrolysed Oil, Distillate Oil at 250°C and other Distillate Oil and scrap metal (wires).

Although the characteristics of the above products are uncertain as those reported in the EIA report are not based on the local feedstocks, yet there is general consensus in the literature that the presence of contaminants in these products reduces their suitability and value if they do not undergo further treatment. For example, the high level of sulphur in the pyrolysed oil renders it unsuitable for use as fuel as SO\textsubscript{x} is a controlled parameter under local regulation. Moreover the Distillate Oil at 250°C which the Proponent stated will be used as fuel for internal use in the company vehicles is not suitable for direct use into compression ignition engines due to its higher sulphur content, low viscosity and low flash point.
The pyrolytic char has uncertain characteristics but is likely to contain contaminants that will render it unsuitable for use without adequate treatment; the fate of the pyrolitic char is not stated in the EIA report and may well end up as a solid waste.

The EIA report fails to address the issues of end users for the above pyrolytic products. Without end users that can make use of the products in an environmentally safe manner with no detrimental health impacts to the workers and the nearby communities, the feasibility of the Pyrolysis Project remains to be demonstrated.

Market Demand for Products from the Proposed Pyrolysis Plants

Hence the EIA report should provide the following clarifications:

- What is the local market demand for the pyrolytic products?
- The pyrolytic Oils generated needs to be verified for its fuel & utility. Has the Proponent obtained clearances from the competent authority for their reuse?
- Who are the local end users of the pyrolysis products in Mauritius? Are they allowed to use these pyrolytic products in their processes? Have there been any contractual agreements between end users and the Proponent?
- Will the Pyrolysis Project benefit directly or indirectly from public funds through the MID fund for example?

To support his application for an EIA licence, we urge the Proponent disclose his feasibility study or research study that will provide the requested information as per section 18 of the EPA 2002.

None of the intermediate by products and final products obtained from the pyrolysis plant is highly toxic and hazardous. It is to be noted that the characteristics of the hydrocarbon obtained from pyrolysis are closer to fuel oil than diesel. The hydrocarbon will thus be treated as fuel oil.

The pyrolysis project will not benefit from public funds.

The carbon black obtained from the process will be exported mainly. Local market potential exists for use as fuel with GCV of not less than 6000 kCal. Sujoy Vishnu Enterprise (Mius) Ltd has made arrangements locally to sell the carbon black produced to Avantime ltd, who will use it in Coal water slurry manufacturing. It is a proven application for pyrolytic carbon black with
GCV of 6200Kcal and a preferred option due to cost saving. A letter from the company Avantime ltd is enclosed in Annex E.

\[1\] Please note that pyrolysis of waste plastics have been dropped.
Hoping the above clarifications will be helpful, I await the approval of our application.

Thanking you in advance, I remain at your disposal for any additional information that you may require.

Yours truly,

Mr Balaram Koneru  
Project Director

Dr Revin Panray Beeharry  
Environmental Consultant

Sujoy Vishnu Enterprise (Mtius) Ltd  
Sustainable Resource Management Ltd
Annex A2
INDEX

LEASE AGREEMENT

ANNEX A  -  General conditions of Lease

Clause

1  Definitions
2  Purpose of Lease
3  Developments on the Premises
4  Lease Period
5  Renewal of Lease
6  Rental
7  Infrastructure cost
8  Deposit
9  Lessor’s reasonableness relative to consent
10 Compliance with laws and title deeds
11 Maintenance
12 Lessor’s right of entry
13 Exclusion of Lessor’s liability for damage etc
14 Exclusion of claims and right to withhold rental
15 Boundaries
16 Resumption of premises for a public purpose
17 Cancellation of Lease
18 Breach by Lessee
19 Failure to vacate premises
20 Removal of building and installation on expiry of Lease or resumption of possession
21 No assignment, subletting, mortgage, etc
22 Lessee’s general obligations
23 Legal costs and outstanding payments
24 Monthly payments if cancellation disputed
25 Appropriation of payments
26 Notices
27 Whole agreement
28 Lease costs
29 Insurance
30 Winding up of Lessee
31 Access Roads
32 Amendments to Lease agreement
33 Entire Understanding

SUMMARY SCHEDULE

ANNEX B  -  Location plan
LEASE AGREEMENT

BETWEEN ROSE BELLE SUGAR ESTATE BOARD represented by its Chairman MR. NUNDALL BASANT ROI bearing ID No.B2202424000636 , and residing at La Rosa, New Grove and the General Manager MR. RAJEN RAMDEWOR, ID No.R21035360082G and residing at School Lane, Morcellement St André.
(hereinafter referred to as "the Lessor")

AND

SUJOY VISHNU ENTERPRISE (MTS) LTD incorporated under the provision of the Companies Act and registered in Mauritius.
The said Company is represented by its DIRECTOR, MR. PREMDEO PURGASS bearing ID No.P260557060166B residing at Tagore Lane, Fond du Sac.
(hereinafter referred to as "the Lessee")

WHEREAS:

A. The Lessor is the owner of the premises (hereinafter referred to as "the premises") as described in the Summary Schedule (hereinafter referred to as "the Schedule").
B. The Lessee has offered to lease the premises.
C. The Lessor has accepted to lease the premises to the Lessee upon the terms and conditions set out in this agreement.

THESE FACTS STATED IT IS AGREED AS FOLLOWS:

1. The Lessor hereby lets to the Lessee, who accepts the premises upon all the terms, conditions and stipulations contained in this agreement.

2. The Schedule and Annexes to this agreement shall be read together with this agreement and shall, to all intents and purposes, form part of this agreement.

MADE IN TWO ORIGINALS AND SIGNED on the date/s at the place/s and in the presence of the witnesses indicated below, the parties warranting that they are the contracting parties and the signatories warranting that they are duly authorised, if not personally the contracting parties, to represent the contracting parties in executing this agreement.

LESSOR: (1) Mr. NUNDLALL BASANT ROI

(2) Mr RAJEN RAMDEWOR

LESSEE: (1) Mr. PREMDEO PURGASS

WITNESS: Mr

Swaran Sharma Deygakant

WITNESS: Mr

DATE: 01/08/14

PLACE: Rose Belle.
GENERAL CONDITIONS OF LEASE

1. DEFINITIONS

In the interpretation of this agreement, unless the context clearly otherwise indicates:

1.1 "the premises" means the premises let in terms of this lease and as described in Section 6 of the Schedule.

1.2 "the commencement date" means the date upon which this lease commences; the commencement date is stipulated in section 7.1 of the Schedule and

1.3 "the termination date" means the date stipulated in section 7.3 of the Schedule.

1.4 "the Schedule" means the Summary Schedule attached to this agreement.

1.5 "financial year" means the financial year used by the Lessor for its accounting purposes.

1.6 "in writing" shall mean a written communication and shall include a telegram, telex or telefax transmission.

1.7 "the Lessor" includes its directors, agents, contractors, employees, licensees, invitees and similar categories of persons and in relation to the exercise of any powers afforded to the Lessor in terms hereof, shall include any manager or other person appointed by the Lessor to administer the building or any other agent appointed by the Lessor from time to time.

1.8 "the Lessee" includes its principals, directors, agents, representatives, employees, contractors, licensees, visitors and invitees and similar categories of persons.

1.9 Words importing any one gender shall include the other and words importing the singular shall include the plural and vice versa.

1.10 The headings are used for reference only and are in no way to be deemed to modify, amplify or aid in the interpretation of this agreement.

1.11 All terms referred to in the Schedule shall have the meanings assigned to them therein.

1.12 Any substantive right conferred or obligation cast upon any party in this clause 1 shall be given its full effect, notwithstanding that it appears among or as one of the definitions.

2. PURPOSE OF LEASE

2.1 Subject to Clause 2.2, the premises are leased to set up a WASTE TYRE RECYCLING PLANT AND OTHER INDUSTRIAL ACTIVITIES as set out in section 4 of the Schedule.

2.2 The Lessee may, with the approval in writing of the Lessor, use the premises for a purpose other than the one stipulated in section 4 of the Schedule provided that the Lessor shall not unreasonably withhold its approval.

2.3 In case the Lessor gives his approval under clause 2.2, the Lessor may request an increase in rental, which shall in no circumstances, be higher than the prevailing market rate for such premises. Should the parties fail to agree upon the amount of the increased rental, same shall then be determined by a single independent arbitrator who shall be a land valuer of at least ten years standing. The said arbitrator shall be appointed by the parties to this agreement or by a judge of the Supreme Court sitting in Chambers should the parties fail to agree upon the choice of the arbitrator.
The decision of the arbitrator shall be final and conclusive and binding upon the parties. The fees of the said arbitrator shall be borne equally by both parties.

3. DEVELOPMENTS ON THE PREMISES

3.1 The Lessee shall, unless prevented by circumstances beyond its control, implement its project as set out in Section 4 of the schedule. However, the attention of the Lessee is drawn to the fact that the project should be set up within a time frame of three (3) months starting from as from the date of signature.

3.2 In case the Lessee wishes to construct any building on the plot, it shall obtain all necessary permits and clearances from all relevant authorities before starting the construction of the building on the premises leased. Such building shall be constructed within a period of twelve months as from the date of signature of the lease.

3.3 Any delay in the obtention of permits and clearances specified in paragraph 3.2 of this Article shall not confer on the Lessee any right for any extension of the delay in the construction of the building. The Lessor may however grant an extension if the circumstances of the delay are beyond the control of the Lessee.

3.4 If the building is for any reason destroyed, the Lessee shall start over his project or the construction of a new building whichever applies within a period of six (6) months from the date of damage and shall complete same within twelve (12) months.

3.5 Before the construction of any building or structure the Lessee shall consult the Lessor in respect of the layout plan for the premises leased. Thereafter, the Lessee shall submit three comprehensive sets of plans comprising of (i) a site plan, (ii) a layout plan and (iii) elevation plans of the building and/or structure to the Lessor after approval by the relevant authorities.

3.6 The Lessee shall not construct any building and/or structure of any kind prior to the building plans having been approved by the Lessor.

3.7 The Lessee shall not construct any addition/extension of any kind to any building or structure prior to the building plans having been approved by the Lessor.

3.8 The Lessee shall not cultivate on the premises, plants liable to catch fire, especially sugar cane and plants harmful to health.

4. LEASE PERIOD

4.1 Unless postponed by the Lessor in writing, the lease commencement date shall be the date stipulated in section 7.1 of the Schedule.

4.2 This agreement shall be for the period stated in section 7 of the Schedule.

5. RENEWAL OF LEASE

5.1 This lease may be renewed at the option of the Lessee in accordance with section 7.4 of the Schedule on such terms and conditions as may be agreed upon. The Lessor reserves the right to revise the annual rent at the first and at each subsequent renewal to reflect the market rental value.

5.2 The Lessee shall exercise the option provided under this Clause 5 by registered letter to the Lessor at least three (3) months before the expiry of the lease.
5.3 Should the parties fail to agree upon the amount of the increased rental, same shall then be
determined by a single independent arbitrator who shall be a land valuer of at least ten years
standing. The said arbitrator shall be appointed by the parties to this agreement or by a judge of the
Supreme Court sitting in Chambers should the parties fail to agree upon the choice of the arbitrator.
The decision of the arbitrator shall be final and conclusive and binding upon the parties. The fees of
the said arbitrator shall be borne equally by both parties.

5.4 Notwithstanding clause 5.3, the Lessee shall pay the rent determined by the Lessor until the award
of the Arbitrator. However the Lessee shall be entitled to a refund of any amount paid in excess of
the rent determined by the arbitrator under clause 5.3.

5.5 The validity and effectiveness of any renewal under the option shall be subject to the drawing up of
a formal deed witnessing such renewal, and signed by both parties and will be duly registered with
the Registrar General.

6. RENTAL

6.1 The rental payable by the Lessee to the Lessor during the lease period is set out in section 8 of the
Schedule.

6.2 The rent represents payment for the occupation of the premises.

6.3 The Lessee shall pay the rental in advance on the first day of each year of the lease period set out in
section 7 of the Schedule as specified in section 8 of the Schedule, at the address set out in section 1 of
the Schedule or at such other address as the Lessor may from time to time notify to the Lessee.

6.4 If the rent is not paid within one month after falling due, it shall automatically bear interest at the legal
rate as from the date when due.

6.5 If the commencement date is not the first day of a calendar month a pro rata amount of the rental due
for the first year shall be paid.

6.6 All rental and other payments payable by the Lessee in terms of this agreement shall be made without
demand and without any deduction or set off whatsoever.

6.7 Should any cheque drawn by the Lessee be dishonoured the Lessor shall thereafter be entitled at any
time and from time to time to refuse to accept any payments from the Lessee hereunder, made in any
mode otherwise than in cash by legal tender.

6.8 Any failure by the Lessor to render any statement or the late receipt or non-receipt thereof by the
Lessee shall not in any way detract from the obligations of the Lessee to effect payment of all amounts
due in terms of this agreement on the due date for payment thereof.

6.9 The Lessee shall on request by the Lessor complete and execute all documents and supply all
information necessary to provide automatic transfer by electronic or other means from the bank
account of the Lessee to the bank account of the Lessor or such other bank account as the Lessor may
designate of such of the amounts payable in terms of this agreement as the Lessor may require,
without prejudice to the rights of the Lessor to require payment in terms of the other provisions of this
agreement of any other amounts payable thereunder.

7. INFRASTRUCTURE COST

Where the Lessor incurs any expenses with respect to construction or maintenance of any
infrastructure off the premises (including road, sewage system and water drainage installations)
which is to the benefit of the Lessee (either solely or in common with other Lessees) the Lessee shall
pay to the Lessor such proportion of the expenses to be determined by the Lessor.
8. DEPOSIT

8.1 The Lessee shall upon acceptance of the lease effect a deposit of **Rs24,625.00** plus VAT (equivalent to three (3) months of the annual rental value) to the Lessor.

8.2 The Lessor shall have the right to apply the whole or any portion thereof towards payment of rental or any liability of whatsoever nature for which the Lessee is responsible. If the whole or any portion of the deposit is so applied, the Lessor shall notify the Lessee in writing and the Lessee shall immediately reinstate the deposit to its original amount.

8.3 Failure by the Lessee to meet its obligation to reinstate the deposit to its original amount shall entitle the Lessor at his discretion to terminate the present lease agreement.

8.4 The deposit shall be retained by the Lessor or its agents until the expiry of this agreement or any renewal thereof, the vacating of the premises by the Lessee and the complete discharge of all the obligations of the Lessee to the Lessor arising from this agreement.

8.5 The Lessee shall not be entitled to set off against the deposit any rental or other amount payable by the Lessee.

8.6 Where the rental is increased in accordance with this agreement, the deposit shall be increased accordingly. If the Lessee fails to increase the deposit under this paragraph the Lessor may terminate the lease agreement.

9. LESSOR'S REASONABLENESS RELATIVE TO CONSENT

Except in respect of Clause 21 (No Assignment, Sub-letting) wherever in this agreement the Lessor is required to give its consent or approval, such consent and/or approval shall not unreasonably be withheld provided that in any dispute as to whether the Lessor has withheld its consent and/or approval unreasonably, the onus shall be on the Lessee to prove that the consent and/or approval was withheld unreasonably.

10. COMPLIANCE WITH LAWS AND TITLE DEEDS

The Lessee shall not contravene or permit the contravention of any of the conditions of title under which the property is held by the Lessor and shall not do or cause or permit to be done in or about the premises anything which may be or cause a nuisance or disturbance to other occupiers of the building or occupiers of adjoining premises.

11. MAINTENANCE

11.1 The Lessee shall be obliged to maintain the premises in neat and tidy condition.

11.2 The Lessee shall not dump any refuse on the premises but shall dispose of such refuse as directed by the sanitary authorities.

11.3 The Lessee shall dispose of all solid and liquid wastes in such a manner as not to pollute the air and water and not to cause any nuisance.

11.4 The Lessee shall not carry out open storage of materials on the site unless specifically approved by the Lessor.

11.5 The Lessee shall not without the written authorization of the Lessor erect, cause or allow to erect advertising posters on the premises leased.
11.6 The Lessee shall maintain the premises leased free from any obnoxious growth.

11.7 The Lessee shall not undertake any such activities which shall cause physical damage directly or indirectly to the environment.

12. LESSOR’S RIGHT OF ENTRY

12.1 The Lessor shall be entitled to enter the premises at all reasonable times for the purpose of inspecting the premises or for carrying out other work in respect of the premises if it should desire to do so.

12.2 The Lessor shall not in exercising its rights as aforesaid, unduly or unreasonably interfere with the conduct of any business lawfully carried on in the premises by the Lessee and shall carry out any repairs or other work as expeditiously as possible.

12.3 The Lessee shall not have any claim for remission of rental, compensation or damages in connection with the exercise by the Lessor of any of its aforesaid rights. This clause shall be without prejudice to the right of the Lessee in respect of any “faute”, negligence or imprudence committed by the Lessor.

13. EXCLUSION OF LESSOR’S LIABILITY FOR LOSS OR DAMAGE

The Lessor shall not be liable for any loss or damage which may be caused to any of the assets of the Lessee and otherwise in the premises or to the Lessee for any injury or loss of life by reason of the elements of the weather including cyclones (acts of God) or failure on the part of the Lessor to carry out any work required of it in terms of this Lease or otherwise in a proper manner. This clause shall be without prejudice to the right of the Lessee in respect of any “faute”, negligence or imprudence committed by the Lessor.

14. EXCLUSION OF CLAIMS AND RIGHT TO WITHHOLD RENTAL

The Lessee shall not under any circumstances be entitled to cancel this agreement or have any claim or right of action whatsoever against the Lessor for any damage or loss, nor be entitled to withhold or defer payment of rental for any reason whatsoever.

15. BOUNDARIES

15.1 The Lessee shall keep open and maintain on the premises a clear track of not less than one (1) metre wide running along the boundaries of the premises.

15.2 If the Lessee fails to keep the track clear as provided under Clause 15.1, the Lessor shall cause the boundaries to be cleared and the cost of the clearing shall be recovered from the Lessee.

16. RESUMPTION OF PREMISES FOR A PUBLIC PURPOSE

16.1 The Lessor may resume possession of the whole or any part of the premises at any time if it is necessary or expedient in the interest of the public or the development or utilisation of the premises are required in a manner as to promote the public benefit or the social and economic well-being of the people of Mauritius upon payment of such compensation in terms of clause 16.2.

16.2 The amount of compensation shall be determined by an arbitrator appointed by both parties or by a judge of the Supreme Court sitting in Chambers should the parties fail to agree upon the choice of the arbitrator. The decision of the arbitrator shall be final and conclusive and binding upon the parties. The fees of the said arbitrator shall be borne equally by both parties.
17. CANCELLATION OF LEASE

17.1 Without prejudice to Clause 18, the lease may be cancelled "de plein droit" and without payment of any compensation if:

(a) The Lessee fails to implement its project as set out in Section 4 of schedule within nine (9) months from the date of signature of the lease;

(b) The rent has remain unpaid for more than three (3) months after its falling due and a forty eight hour notice served upon the Lessee by registered post, requesting him to pay the rent that has remained uncomplied with; or

(c) The Lessee fails to comply with a material obligation or condition of the lease.

17.2 In the event of the lease being cancelled under Clauses 17.1(a), (b) or (c), the Lessee shall not be entitled to a refund of any portion of rent paid in advance.

18. BREACH BY LESSEE

18.1 Should the Lessee fail to pay any rental or any other amount due by the Lessee in terms of this agreement on due date, and fail so to pay within a period of seven (7) days or to remedy that other breach within a period of fourteen (14) days or if the breach is not capable of being remedied in 14 days such longer period as the Lessor may then reasonably stipulate, after receipt of notice to that effect from the Lessor, or repeatedly commits a breach any of the terms of this agreement in such manner as to justify the Lessor in holding that the conduct of the Lessee is inconsistent with the intention or ability of the Lessee to carry out the terms of this agreement or if the Lessee is placed under receivership, then and in any of such events the Lessor shall have the right, but shall not be obliged either:

(a) forthwith to cancel this agreement and to resume possession of the premises, without prejudice to its claim for arrears of rental and other amounts owing hereunder or for damages which it may have suffered by reason of the breach of contract of the Lessee or of the premature cancellation; or

(b) to vary this agreement by making it thereafter terminable by one (1) month's written notice given by the Lessor.

18.2 Notwithstanding anything to the contrary contained in Clause 18.1 above, the Lessor shall not be obliged to give, in respect of any period of twelve (12) consecutive months during the currency of this agreement more than two notices arising from a breach in terms of Clause 18.1, and shall thereafter be entitled to the remedies set out therein without notice in the event of any further breach.

18.3 The Lessor shall have the right to claim from the Lessee in the case of any breach, other than non-payment of a sum, the sum equivalent to two per cent (2 %) of the then current basic rental for each day or part of a day during which the breach remains unremedied, which the Lessee accepts as being fair and reasonable.

19. FAILURE TO VACATE PREMISES

Should, at the termination or cancellation of the lease, the Lessee fail to vacate the premises, the Lessor shall be entitled to apply for a writ habere facias possessionem to resume possession thereof.

20. REMOVAL OF BUILDING AND INSTALLATION ON EXPIRY OF LEASE OR RESUMPTION OF POSSESSION
20.1 Subject to clause 20.3, at the expiry of the term of this lease or upon its cancellation under the provisions of Clauses 17 and 18 of the present lease, the Lessee shall yield up the premises leased nowise deteriorated in value as it stands at the date of this lease without any claim whatever for any indemnity.

20.2 Upon resumption of the premises or part of the premises leased under Clause 16, the Lessee shall yield up the premises leased nowise deteriorated in value as it stands at the date of this lease.

20.3 At the expiry of the lease or upon its cancellation under clause 17 or 18, the Lessee shall at its own costs remove the buildings and installations standing on the land. Such buildings/structures and installations shall be removed within a period of not more than three months failing which the buildings/structures and installations shall become the property of the Lessor without any claim for indemnity.

21. NO ASSIGNMENT, SUBLETTING, MORTGAGE ETC

21.1 The Lessee shall not-

(a) sublet or assign the whole or any part of its interest under this lease;
(b) transfer or sells its shares
(c) take any mortgage on the premises or cause any lien or charge to be taken on the premises,
without the express written permission of the Lessor.

21.2 In case the Lessor gives his permission under clause 21.1, the Lessor may request an increase in rental which shall in no circumstances be higher than the prevailing market rate for such premises. Should the parties fail to agree upon the amount of the increased rental, same shall then be determined by a single independent arbitrator who shall be a land valuer of at least ten years standing. The said arbitrator shall be appointed by the parties to this agreement or by a judge of the Supreme Court sitting in Chambers should the parties fail to agree upon the choice of the arbitrator. The decision of the arbitrator shall be final and conclusive and binding upon the parties. The fees of the said arbitrator shall be borne equally by both parties.

21.3 Where the Lessor grants permission under clause 21.1 above for an assignment or subletting of the whole or part of the premises, the assignee or sub lessee and/or the Lessee, as the case may be, shall each be responsible for compliance with the other terms and conditions of the lease in relation to the part of the premises for which it is responsible.

22. LESSEE'S GENERAL OBLIGATIONS

The Lessee shall:

22.1 regularly clean the premises and keep the premises in a clean, orderly and sanitary condition;

22.2 keep clear any drains found on the premises and if there is no drainage system, cause to construct adequate drains to prevent any flooding on the premises and shall maintain such drains in good working conditions;

22.3 during the entire term hereof, keep in full force and effect a policy of public liability insurance in terms of Clause 29;

22.4 indemnify the Lessor and hold it harmless from and against any and all claims, actions, damages, liability and expense in connection with loss of life, personal injury or damage to property arising from or out of any occurrence in, upon or at the premises, or from the occupancy or use by the Lessee of the premises or any part thereof, or occasioned wholly or in part by any act or omission of the Lessee;

22.5 (in case the Lessor shall, without fault on its part, be made a party to any litigation commenced by or against the Lessee or against or by a third party) protect and hold the Lessor harmless against, and
shall pay, all costs, expenses and reasonable legal costs incurred or paid by the Lessor in connection with such litigation;

22.6 not do or permit to be done in or upon the premises anything which, in the opinion of the Lessor, may be a nuisance or which may in any way interfere with the occupiers of other premises or with their enjoyment, occupation or use thereof;

22.7 at all times ensure that the premises are free from infestation by vermin and should it be discovered that the premises are infested with vermin, the Lessee shall be responsible for the payment of the cost of the fumigation or other treatment necessary to eradicate such vermin; and

22.8 on the Lessee giving up occupation of the premises, the Lessee shall be obliged to ensure that the premises are free from infestation by vermin and should it be determined that the premises are infested with vermin the Lessee will likewise be responsible for the cost of treatment for the extermination and eradication of the vermin and such costs will be a charge against the Lessee's deposit. A certificate from a recognised registered fumigator or vermin exterminator as to the presence of vermin shall be conclusive and binding on the Lessee.

23. LEGAL COSTS AND OUTSTANDING PAYMENTS

23.1 Should the Lessor institute action against the Lessee pursuant to a breach by the Lessee of this agreement, then, without prejudice to any other rights which the Lessor may have, the Lessor shall be entitled to recover from the Lessee all legal costs incurred by it including such commission as the Lessor is obliged to pay to its attorneys.

23.2 Without prejudice to any of the other rights or remedies of the Lessee, the Lessee shall pay interest at a rate of two per cent (2%) above the prime bank overdraft rate from time to time charged by the bankers of the Lessor during the period while the payment is outstanding on all amounts (rental or otherwise) due by it to the Lessor in terms of or arising out of this agreement, including any monies disbursed by the Lessor on behalf of the Lessee.

23.3 The "prime bank overdraft rate" as aforesaid shall be the rate customarily charged by the said bankers, in respect of unsecured overdraft, as evidenced, in the event of a dispute, by a certificate under the hand of any branch manager of the said bankers, whose authority and appointment it shall not be necessary to prove.

24. MONTHLY PAYMENTS IF CANCELLATION DISPUTED

24.1 If the Lessor cancels this agreement and the Lessee disputes the right to cancel and remains in occupation of the premises the Lessee shall, pending settlement of any dispute either by negotiation, arbitration or litigation, continue to pay (without prejudice to its rights) an amount equivalent to the sum of the basic rental stipulated in section 8 of the Schedule and any other amounts payable as provided for in this agreement monthly in advance on the first day of each month and the Lessor shall be entitled to accept and recover such payments.

24.2 Any payments and the acceptance thereof shall be without prejudice to, and shall not in any way whatsoever affect the claim of, cancellation then in dispute. If the dispute is resolved in favour of the Lessor, the payments made and received in terms of this clause shall be deemed to be amounts paid by the Lessee on account of damages suffered by the Lessor by reason of the cancellation of this agreement or the unlawful holding-over of the premises by the Lessee.

25. APPROPRIATION OF PAYMENTS

The Lessor shall be entitled in its discretion to appropriate any amounts received from the Lessee towards the payment of any cause of debt or of any amount whatsoever owing by the Lessee to the Lessor.
26. NOTICES

26.1 All notices which are given by the Lessor to the Lessee shall be given to it at the address set out in section 2 of the Schedule, which address the Lessee chose as legal domicile for all purposes hereunder.

26.2 All notices which are given by the Lessee to the Lessor shall be given to it at the address set out in section 1 of the Schedule, which address the Lessor chose as legal domicile for all purposes hereunder.

26.3 All notices sent by either party to the other shall be delivered by hand or by telegram, transmitted by telex or telefax or sent by prepaid registered post.

26.4 All notices delivered, transmitted or sent as aforesaid to the respective addresses provided for in this Clause shall be deemed to have been received by the addressee on the date of delivery or transmission, or on the seventh business day after posting, as the case may be.

27. WHOLE AGREEMENT

27.1 This agreement constitutes the whole agreement between the parties and no warranties or representations, whether express or implied, not stated herein shall be binding on the parties.

27.2 No agreement at variance with the terms and conditions of this agreement nor any consensual cancellation thereof or of this Clause 27 or of any part of it shall be binding on the parties unless reduced to a written agreement signed by or on behalf of the parties.

27.3 No relaxation or indulgence which the Lessor may show to the Lessee shall in any way prejudice the rights of the Lessor hereunder and in particular no acceptance by the Lessor of rental after due date (whether on one or more occasions) shall entitle it from exercising any rights enjoyed by it hereunder by reason of any subsequent payment not being made strictly on due date or create any novation of any obligation of the Lessee.

27.4 Unless otherwise stated by the Lessor in writing, the receipt by the Lessor of any rental or other payment shall in no way whatsoever prejudice or operate as a waiver, rescission or abandonment of any cancellation effected or acquired prior to such receipt.

28. LEASE COSTS

28.1 The Lessee shall be liable-

(a) for the payment to the Lessor on demand of such registration duties as may be payable in respect of this agreement as set out in section 10 of the Schedule;

(b) for the cost of the "mise en règle" which shall also include:

(i) processing fees of Rs 5,000.00 plus VAT

(ii) valuation fees of Rs 8,000.00 plus VAT and

(iii) survey fees Rs 12,000.00 plus VAT

28.2 Should the Lessee, having already committed itself as a Lessee by virtue of a written offer to lease, accepted by the Lessor thereon or otherwise in writing, request any variation to the Lessor's standard conditions of lease, whether before or after signature of this agreement, and should the Lessor, in its discretion, deem it necessary to engage its attorneys to negotiate and/or settle the terms of any such variations, the Lessee shall refund to the Lessor all charges levied by the attorneys of the Lessor in relation to any such negotiation or settlement.
shall pay, all costs, expenses and reasonable legal costs incurred or paid by the Lessor in connection with such litigation;

22.6 not do or permit to be done in or upon the premises anything which, in the opinion of the Lessor, may be a nuisance or which may in any way interfere with the occupiers of other premises or with their enjoyment, occupation or use thereof;

22.7 at all times ensure that the premises are free from infestation by vermin and should it be discovered that the premises are infested with vermin, the Lessee shall be responsible for the payment of the cost of the fumigation or other treatment necessary to eradicate such vermin; and

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24.1 If the Lessor cancels this agreement and the Lessee disputes the right to cancel and remains in occupation of the premises the Lessee shall, pending settlement of any dispute either by negotiation, arbitration or litigation, continue to pay (without prejudice to its rights) an amount equivalent to the sum of the basic rental stipulated in section 8 of the Schedule and any other amounts payable as provided for in this agreement monthly in advance on the first day of each month and the Lessor shall be entitled to accept and recover such payments.

24.2 Any payments and the acceptance thereof shall be without prejudice to, and shall not in any way whatsoever affect the claim of, cancellation then in dispute. If the dispute is resolved in favour of the Lessor, the payments made and received in terms of this clause shall be deemed to be amounts paid by the Lessee on account of damages suffered by the Lessor by reason of the cancellation of this agreement or the unlawful holding-over of the premises by the Lessee.

25. APPROPRIATION OF PAYMENTS

The Lessor shall be entitled in its discretion to appropriate any amounts received from the Lessee towards the payment of any cause of debt or of any amount whatsoever owing by the Lessee to the Lessor.
29. INSURANCE

29.1 The Lessee shall during the entire term hereof, keep in full force and effect a policy of public liability insurance covering general and the Lessee's liability with respect to the premises.

29.2 The Lessee shall insure and keep insured during the period of the lease all buildings and/or installations erected on the premises against the risk of fire, full explosion, riots, strikes and malicious damage, cyclone, flood and water damage, earthquake, bursting of pipes, overflowing of water tanks and aircraft.

29.3 It is further declared and agreed that the Lessee shall at all times maintain in force such insurances and should the Lessee decide not to renew his insurances, immediate notice in writing must be given to the Lessor.

29.4 The Lessor may request sight of the policies contracted by the Lessee.

30. WINDING UP OF LESSEE

The lease shall be terminated in the event:

(a) Any order (provisional or final) is made or resolution is passed for the suspension of payments or dissolution, termination of existence, liquidation, winding-up, bankruptcy, judicial management or curatorship of the Lessee;

(b) A liquidator, trustee, administrator, receiver, arranger, judicial manager, curator or similar officer is appointed in respect of the Lessee or in respect of all or a substantial part of its assets;

(c) The Lessee is declared insolvent or is unable, or admits its inability to, pay its debts as they fall due or becomes insolvent within the terms of any applicable law; or

(d) Anything analogous to or having a substantially similar effect to any of the events abovementioned shall occur under the laws of any applicable jurisdiction.

31. ACCESS ROADS

The Lessee shall, at its own costs, construct on the premises such roads as may be required to service the buildings and the premises leased.

32. AMENDMENTS TO LEASE AGREEMENT

No variation or amendment of this agreement or oral promise or other commitment relating to it shall be valid unless committed to writing and signed by or on behalf of both parties. The failure by any of the Lessor or the Lessee to enforce, at any time, any provision of this Agreement shall not be construed as a waiver of its right to enforce the breach of that provision or any other provision of this Agreement or as a waiver of any continuing, succeeding or subsequent breach of that provision or any other provision of this Agreement.

33. ENTIRE UNDERSTANDING

This agreement embodies the entire understanding of the parties in respect of the matters contained or referred to in it and there are no promises, terms, conditions or obligations, oral or written, express or implied other than those contained in this agreement. Furthermore, this agreement supersedes any written or oral representation made prior to its signature.
SUMMARY SCHEDULE

1. LESSOR: ROSE BELLE SUGAR ESTATE BOARD
   Royal Road
   Rose Belle

2. LESSEE: SUJOY VISHNU ENTERPRISE (MTS) LTD

3. LESSEE'S TRADING NAME: Same as above

4. DESTINATION OF PREMISES: The premises shall be used only to set up a WASTE TYRE RECYCLING PLANT and OTHER INDUSTRIAL ACTIVITIES.

5. ESTIMATED AREA OF 1 Arpent 97 PERCHES

6. PREMISES: Lot as more fully shown on the Location Plan attached.

7. LEASE PERIOD: 15 years

7.1 Lease commencement date: 01/08/2014

7.2 Rental commencement date: 01/08/2014

7.3 Termination date: 31/07/2029

7.4 Renewal: On renewal rent will be revised to reflect the market rate.

8. RENTAL: The total annual rent shall be payable in advance as follows: Rs 98,500.00, (Ninety eight thousand and five hundred rupees) plus VAT. The rent will be revised every three years to reflect the prevalent market price.

9. DEPOSIT: Rs 24,625.00 plus VAT (equivalent to three (3) months of the annual rental value) (twenty four thousand six hundred and twenty five rupees plus VAT). The rent will be revised every three years to reflect the prevalent market price.

10. SURVEY, VALUATION AND PROCESSING FEES: Rs 25,000.00 plus VAT

11. ESTIMATED REGISTRATION DUTY: as per prevailing Legal rate.
MINISTRY OF HOUSING AND LANDS

PARCEL IDENTIFICATION NUMBER (PIN)

(PIN issued under Section 7(3) of the Cadastral Survey Act 2011)

Parcel Identification Number (PIN)

PCR 17222/2014

<table>
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<tr>
<th>SN</th>
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<th>PIN</th>
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</thead>
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<tr>
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<td>1502040035</td>
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</tbody>
</table>

NOTE:

1. This PIN Certificate is not a Certificate of Land Ownership.
2. Current Land Ownership has to be ascertained by the Land Surveyor /Notary prior to any transaction.
3. This PIN certificate is based on the annexed plan bearing the seal of the Ministry and the PIN Certificate Number.

N. Luchoo
For Chief Surveyor
14.05.2014

Disclaimer: The statements about land ownership do not constitute a proof of the land title and the Government of Mauritius or its employees do not accept any liability of whatever nature arising from the use of information other than for its intended purpose.
# Site Plan

## Application for PIN

<table>
<thead>
<tr>
<th>Site Location</th>
<th>BEEMANIQUE</th>
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</thead>
<tbody>
<tr>
<td>District</td>
<td>GRAND PORT</td>
</tr>
<tr>
<td>Owner</td>
<td>ROSE BELLE SUGAR ESTATE BOARD</td>
</tr>
<tr>
<td>Title Deed</td>
<td>TV 1221 No. 103</td>
</tr>
<tr>
<td>Extent</td>
<td>8323m² excised from 13A56 to be leased</td>
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### Site Plan

- **Scale:** 1/2000

### Approximate Boundary Coordinates (UTM 40S)

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<tr>
<th>PT No.</th>
<th>Eastings (m)</th>
<th>Northings (m)</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>560890.41</td>
<td>7748008.82</td>
</tr>
<tr>
<td>B</td>
<td>561036.87</td>
<td>7748064.56</td>
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</tbody>
</table>

### Centroid Coordinates (UTM 40S)

- X = 560948 mE
- Y = 7748059 mN

---

### Location Plan

- **Scale:** 1/40000

---

**D. Nathoo**

Land Surveyor

*22.04.2014*
Annex B
Annex C
TEST REPORT

CLIENT DETAILS

Contact: Bao Zhang
Client: QINGDAO XINGFU BOILER THERMOELECTRIC DEVICES CO., LTD.
Address: NO.5 GAOPING ROAD, PINGDU LIAOLAN INDUSTRIAL PARK, QINGDAO, CHINA
Telephone: 06 532 82301399
Fax: -
Email: -
Order Number: -
Samples: Exhaust Gas(2)
Project: Default Project

LABORATORY DETAILS

Manager: SGS-CSTC
Laboratory: Shanghai Environmental Services
Address: 2F, 3RD BUILDING NO. 889, YISHAN ROAD, XUHUI DISTRICT, SHANGHAI, CHINA
Telephone: +86 (21) 6140 2966-2002
Fax: +86 (21) 6115 2164
Email: REPORT.ENV@SGS.COM
Report Number: SHE14-01045 R0
SGS Reference: 0000018024
Date Reported: 2014/05/06

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

HONGLOU WANG
AIR TEAM SUPERVISOR

JUNE CAI
TECHNICAL MANAGER

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SHENV 128901
### Sampling Site Information

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<td>2014-4-23</td>
<td>2014-4-23</td>
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<tr>
<td>Sampling location</td>
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<td>Pyrolysis fume gas</td>
<td>Black carbon dust collector</td>
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<td>9:30-10:15</td>
<td>11:30-12:35</td>
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<tr>
<td>Sampling Time (CO NOx SOx)</td>
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<td>10:00-10:45</td>
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<tr>
<td>Sampling Time (Metals)</td>
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<td>10:30-11:15</td>
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<tr>
<td>Sampling Time (Hg HCl)</td>
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<td>9:30-9:50</td>
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<tr>
<td>Sampling Time (HF)</td>
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<td>10:00-10:15</td>
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<tr>
<td>Gas Temp</td>
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## Test Report

### Examination of Particulate Matter and Air Pollution Sampling Method

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<tr>
<td>Particulate matter (Emission conc.)</td>
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<td>Particulate matter (Conversion conc.)</td>
<td>mg/m³</td>
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<td>Particulate matter (Emission rate)</td>
<td>kg/h</td>
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### Ambient Air and Waste Gas Determination of Hydrogen Chloride Ion Chromatography Method

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<th>Parameter</th>
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<tbody>
<tr>
<td>Chlorine hydrate (Emission conc.)</td>
<td>mg/m³</td>
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<tr>
<td>Chlorine hydrate (Conversion conc.)</td>
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<td>0.54</td>
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<tr>
<td>Chlorine hydrate (Emission rate)</td>
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### Stationary Source Emission Determination of Fluoride Ion Selective Electrode Method

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<thead>
<tr>
<th>Parameter</th>
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<tbody>
<tr>
<td>Total fluoride (Emission conc.)</td>
<td>mg/m³</td>
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<tr>
<td>Total fluoride (Conversion conc.)</td>
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<td>Total fluoride (Emission rate)</td>
<td>kg/h</td>
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### Analytical Method for Monitoring of Ambient Air and Exhausted Air

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<th>Parameter</th>
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</tr>
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<tbody>
<tr>
<td>Sulphur dioxide (Emission conc.)</td>
<td>mg/m³</td>
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<tr>
<td>Sulphur dioxide (Conversion conc.)</td>
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<tr>
<td>Sulphur dioxide (Emission rate)</td>
<td>kg/h</td>
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## TEST REPORT

**SHE14-01045 R0**


**Method:** SEPA 2003

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<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Nitrogen Oxide (Emission conc.)</td>
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<td>Nitrogen Oxide (Emission rate)</td>
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<tr>
<td>Carbon monoxide (Emission rate)</td>
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**Method:** SEPA 2003

<table>
<thead>
<tr>
<th>Parameter</th>
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<tbody>
<tr>
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<tr>
<td>Cd (Emission conc.)</td>
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<td>6.25 X 10⁻⁴</td>
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<tr>
<td>Cd (Conversion conc.)</td>
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</tr>
<tr>
<td>Cd (Emission rate)</td>
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</tr>
<tr>
<td>Co (Emission conc.)</td>
<td>mg/m³</td>
<td>6.25 X 10⁻⁴</td>
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<tr>
<td>Co (Emission rate)</td>
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<td>Mn (Conversion conc.)</td>
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</table>

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**SHENV 128904**

SGS Shenzhen Technical Center Co., Ltd.
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cs.china@sgs.com

Member of the SGS Group (SGS SA)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>LGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mn (Emission rate)</td>
<td>kg/h</td>
<td>4.03 x 10^{-4}</td>
</tr>
<tr>
<td>Ni (Emission conc.)</td>
<td>mg/m³</td>
<td>6.25 x 10^{-4}</td>
</tr>
<tr>
<td>Ni (Conversion conc.)</td>
<td>mg/m³</td>
<td>-</td>
</tr>
<tr>
<td>Ni (Emission rate)</td>
<td>kg/h</td>
<td>1.35 x 10^{-4}</td>
</tr>
<tr>
<td>Pb (Emission conc.)</td>
<td>mg/m³</td>
<td>6.25 x 10^{-4}</td>
</tr>
<tr>
<td>Pb (Conversion conc.)</td>
<td>mg/m³</td>
<td>-</td>
</tr>
<tr>
<td>Pb (Emission rate)</td>
<td>kg/h</td>
<td>2.54 x 10^{-3}</td>
</tr>
<tr>
<td>Sb (Emission conc.)</td>
<td>mg/m³</td>
<td>6.25 x 10^{-4}</td>
</tr>
<tr>
<td>Sb (Conversion conc.)</td>
<td>mg/m³</td>
<td>-</td>
</tr>
<tr>
<td>Sb (Emission rate)</td>
<td>kg/h</td>
<td>1.47 x 10^{-4}</td>
</tr>
<tr>
<td>Ti (Emission conc.)</td>
<td>mg/m³</td>
<td>6.25 x 10^{-4}</td>
</tr>
<tr>
<td>Ti (Conversion conc.)</td>
<td>mg/m³</td>
<td>-</td>
</tr>
<tr>
<td>Ti (Emission rate)</td>
<td>kg/h</td>
<td>2.41 x 10^{-3}</td>
</tr>
<tr>
<td>V (Emission conc.)</td>
<td>mg/m³</td>
<td>6.25 x 10^{-4}</td>
</tr>
<tr>
<td>V (Conversion conc.)</td>
<td>mg/m³</td>
<td>-</td>
</tr>
<tr>
<td>V (Emission rate)</td>
<td>kg/h</td>
<td>5.30 x 10^{-3}</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>LGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hg (Emission conc.)</td>
<td>mg/m³</td>
<td>0.023</td>
</tr>
<tr>
<td>Hg (Conversion conc.)</td>
<td>mg/m³</td>
<td>0.018</td>
</tr>
<tr>
<td>Hg (Emission rate)</td>
<td>kg/h</td>
<td>&lt;1.0 x 10^{-4}</td>
</tr>
</tbody>
</table>

Remark:
1) Emission concentration: a temperature of 273.15 K, a pressure of 101.3 kPa, after correction of the content of water vapor from the waste gases.
2) Corrected concentration: a temperature of 273.15 K, a pressure of 101.3 kPa, correcting the emission concentration after the correction of the oxygen concentration from the waste gas (17.0%) with conversion of oxygen concentration (11%).

*** End of Report ***
Annex D
## Analytical Report

**Report No.:** JQ-LAB1306140QD-01

**Applicant:** Globen Energy Services SL.

**Product:** Vapor

**Job No.:** LAB1306140QD

**Sample No.:** LAB1306140QD-01

**Location:** ----

**Supplier:** ----

**Date Nomination:** ----

**Date Sampled:** ----

**Sample No.:** LAB1306140QD-01

**Date Received:** Jun. 15, 2013

**Vessel:** ----

**Date Sampled:** ----

**Name of Barge:** ----

**Date Analyzed:** Jun. 15-24, 2013

**Source:** ----

**Date  Analyzed:** Jun. 15-24, 2013

**Type of Sample:** ----

**Date  Reported:** Jun. 24, 2013

**Other Info:** 加塑料之后

**Container:** 500ml × 8 (Plastic Bag)

---

The above sample was tested in accordance with the test methods stipulated and the following results were obtained:

<table>
<thead>
<tr>
<th>No.</th>
<th>TEST</th>
<th>UNIT</th>
<th>METHOD</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SO₂*</td>
<td>mg/L</td>
<td>GC</td>
<td>16.8</td>
</tr>
<tr>
<td>2</td>
<td>NO*</td>
<td>mg/L</td>
<td>GC</td>
<td>2.3</td>
</tr>
<tr>
<td>3</td>
<td>NO₂*</td>
<td>mg/L</td>
<td>GC</td>
<td>0.13</td>
</tr>
<tr>
<td>4</td>
<td>N₂O*</td>
<td>mg/L</td>
<td>GC</td>
<td>Not detected</td>
</tr>
<tr>
<td>5</td>
<td>CO*</td>
<td>% (v/v)</td>
<td>GC</td>
<td>3.29</td>
</tr>
<tr>
<td>6</td>
<td>NMHC</td>
<td>% (v/v)</td>
<td>Calculation</td>
<td>55.82</td>
</tr>
<tr>
<td>7</td>
<td>O₂</td>
<td>% (v/v)</td>
<td>GC</td>
<td>1.73</td>
</tr>
<tr>
<td>8</td>
<td>C₁</td>
<td>% (v/v)</td>
<td>GC</td>
<td>28.92</td>
</tr>
<tr>
<td>9</td>
<td>C₂</td>
<td>% (v/v)</td>
<td>GC</td>
<td>16.04</td>
</tr>
<tr>
<td>10</td>
<td>C₃</td>
<td>% (v/v)</td>
<td>GC</td>
<td>13.77</td>
</tr>
<tr>
<td>11</td>
<td>C₄</td>
<td>% (v/v)</td>
<td>GC</td>
<td>18.15</td>
</tr>
<tr>
<td>12</td>
<td>C₅ &amp; C₆+</td>
<td>% (v/v)</td>
<td>GC</td>
<td>7.86</td>
</tr>
</tbody>
</table>

**Note:**

1. Tests marked by "*" are tested at our nominated laboratory, marked by "#" are tested at our Intertek internal laboratory.
2. For purpose of reporting and determining conformance with specifications, an observed value or a calculated value shall be rounded to "the nearest unit" in the last right-hand significant digit in accordance with the rounding method of ASTM E29 standard practice for using significant digit in test data to determining conformance with specifications.
3. The above report reflects our findings at time and place of above mentioned only and does not refer to any other matters.
4. This report shall not be reproduced except in full, without the written approval of the laboratory.
5. If you have any question about this report, please contact with us within 15 days from receipt of it.
6. The sample will not be retained for more than three months.

---

Reported By: Laboratory Approval Review

---

Date: ___________________________ Date: ___________________________
Annex E
To Mr Balaram Koneru
Sujoy Vishnu Enterprise (Mtius) Ltd
Tagore Road
Fond du Sac

Date: 02/07/2014

Dear Mr Balaram,

We have assessed the sample of Carbon Black and Pyrolysis Oil that you have made available to us on 18/06/2014. Both samples were found suitable. Carbon Black can be used to boost calonic value of our CWS and the Pyrolysis Oil can be traded as we have used it as used in our associated firms.

We look forward to purchase both products from Sujoy Vishnu Enterprise (Mtius) Ltd subject to successful price negotiations.

Yours truly,

Mr Didier Philogene
Director
Mr S. Kinnoo  
Ag. Director of Civil Aviation  
Department of Civil Aviation  
SSR International Airport  
Plaine Magnien  
Mauritius

13th August 2014

Dear Sir,

RE: Proposed Project for the Setting up of a Pyrolysis Plant for Recycling Scrap Tyre/Rubber and Plastic at Beemanique

This is to inform you that we are proposing to set up a pyrolysis plant for recycling scrap tyre of capacity of 10 tonnes per day at Beemanique on a site of an extent of 8,323 m² (Portion No. 1) as per Annex A. According to the Outline Planning Scheme for the Grand Port District Council area, the proposed site is found within the approach area of the airport which requires a No Objection Certificate at your end. You will find herein the information you require to process our application:

a) The location plan of the plant in relation to the Airport is provided in Annex B;
b) The height of the building above ground level will be 30 ft and the height of the stack will be 40 ft;
c) The average height of the terrain above mean sea level (see Annex B);
d) The distance of the site from the threshold of Runaway 14 measured along the extended center line (X distance) and the perpendicular distance of the site from the extended runaway centerline (Y distance) (see Annex B).

The above information has been certified by an approved land surveyor.
Thanking you for your kind cooperation.

Yours truly,

Mr Koneru Balaram
Director

C.c: Sustainable Resource Management Ltd,
CF2 Garden Village Centre, Curepipe
Tel: 6742587 Fax:6742346
ANNEX A
ANNEX B
PLAN SHOWING THE LOCATION OF A PLOT OF LAND FOR THE PROPOSED SUJOY VISHNU ENTERPRISE PLANT SITUATED AT BEE MANIQUE IN RELATION TO THE EXTENDED CENTRE LINE OF THE RUNWAY (Threshold 14)

D. Nathoo
Land Surveyor
11.08.2014

---

Extended Centre Line of Runway

Threshold 14

(Not to Scale)
**MATERIAL SAFETY DATA SHEET**

### SECTION I. Product Name and Company Identification

| Trade Name: Carbon Black | CHEMICAL NAME: Carbon (Amorphous) |

### SECTION II. Composition/Information on Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Carbon Black (Amorphous Carbon)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS Number:</td>
<td>1333-86-4</td>
</tr>
<tr>
<td>Weight, %</td>
<td>100</td>
</tr>
</tbody>
</table>

### SECTION III. Hazards for Man and Environment

#### POSSIBLE EFFECT ON HEALTH

- **EYE:** Carbon black may produce eye irritation.
- **SKIN CONTACT:** The product is not skin irritant.
- **INFECTION THROUGH SKIN:** Infiltration is not probable, carbon black being a dry solid material.
- **INGESTION:** Specific effect is not known.
- **INHALATION:** At high concentrations of carbon black dust (above TLV) inhalation may produce irritation of lungs.

### SECTION IV. First Aid

- **EYE:** Flush with water.
- **SKIN:** Wash with soap and water.
- **INGESTION:** Usually no hazardous effect is produced.
- **INHALATION:** Go out into open air.

### SECTION V. Fire Fighting Procedures

#### COMBUSTIBILITY

- **FLASH POINT:** N/A
- **INFLAMMABILITY IN AIR:** May inflame at temperatures above 250 C.
- **LOWER EXPLOSIBILITY LIMIT (LEL):** 60 mg/cu.m *
- **UPPER EXPLOSIBILITY LIMIT (UEL):** N/A
- **EXTINGUISHING MEDIA:** Atomized jet of water.

**UNUSUAL FIRE HAZARDS:**

Carbon monoxide and carbon dioxide are generated during combustion of carbon black. The product burns (smolders) without flame, therefore in some cases combustion of carbon black cannot be detected, cases combustion of carbon black cannot be detected, unless the product is stirred and sparks are produced.
HAZARDS OF DUST EXPLOSION

Carbon black does not explode easily, so it is not considered hazardous in practical applications. However, in certain test conditions mixture of carbon black dust and air may explode.

* Reported data on LEL differ. We take the value from The Handbook of Powder Technology, ed. by P.Field, v.4, as being the lowest in literature.

SECTION VI. Procedures in Case Material is Released or Spilled

Collect with vacuum cleaner, sweep up or sprinkle with water and collect in refuse container.

SECTION VII. Handling and Storage

Store in containers and indoors. Not to expose to open fire or strong oxidizers. Check for carbon monoxide and oxygen content in air before entering container or workroom.

If carbon monoxide is present or oxygen is low use adequate gas masks. Produce less dust in air. Collect all spilled material immediately.

SECTION VIII. Limiting Exposure and Personal Protective Measures

<table>
<thead>
<tr>
<th>INHALATION STANDARDS</th>
<th>Maximum carbon black dust content in air by U.S. standards is 3.5 mg/cu.m, by German standards 6 mg/cu.m, by Ukrainian standards 4 mg/cu.m, by U.K. standards 3,5 mg/cu.m.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BREATH PROTECTION</td>
<td>Not required in normal conditions. If dust content in air is above recommended limit use protective mask that conforms to European, national, and local regulations.</td>
</tr>
<tr>
<td>SKIN PROTECTION</td>
<td>Not required. Use of protective gloves is not necessary.</td>
</tr>
<tr>
<td>EYE PROTECTION</td>
<td>Use protective glasses or goggles.</td>
</tr>
<tr>
<td>PROTECTIVE CLOTHING</td>
<td>Not required.</td>
</tr>
<tr>
<td>TECHNICAL CONTROL</td>
<td>Adequate ventilation is recommended that should keep dust content in air under the standard limit</td>
</tr>
</tbody>
</table>

SECTION IX. Physical Data

<table>
<thead>
<tr>
<th>APPEARANCE</th>
<th>Amorphous solid material in the form of 0.1 to 3.0 mm black-colored pellets.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ODOR</td>
<td>Odorless</td>
</tr>
<tr>
<td>BOILING POINT</td>
<td>N/A</td>
</tr>
<tr>
<td>VAPOR PRESSURE</td>
<td>N/A</td>
</tr>
<tr>
<td>VAPOR DENSITY</td>
<td>N/A</td>
</tr>
<tr>
<td>SOLUBILITY IN WATER</td>
<td>Insoluble</td>
</tr>
<tr>
<td>RATE OF VAPORISATION</td>
<td>N/A</td>
</tr>
<tr>
<td>SPECIFIC WEIGHT</td>
<td>1.7 to 1.9</td>
</tr>
<tr>
<td>POUR DENSITY</td>
<td>150 to 650 (ASTM D1518)</td>
</tr>
<tr>
<td>VISCOSITY</td>
<td>N/A</td>
</tr>
</tbody>
</table>

SECTION X. Stability and Reactivity

| STABILITY             | Product is stable                                                          |
| INCOMPATIBILITY       | Strong oxidizers such as liquid oxygen, chlorates, bromates, nitrates.     |
**CONDITIONS TO AVOID**
Excessive heating, exposure to open fire.

**HAZARDOUS DECOMPOSITION PRODUCTS**
Carbon monoxide and dioxide are produced in combustion.

**HAZARDOUS POLYMERIZATION**
No polymerization occurs.

### SECTION XI. Toxicological Data

#### EYE
- **ACUTE**
  - Slight irritation
- **CHRONIC**
  - Slight irritation

#### SKIN
- **ACUTE**
  - Not expected
- **CHRONIC**
  - Not expected

#### INGESTION
- **ACUTE**
  - Not expected
- **CHRONIC**
  - Not expected

#### INHALATION
- **ACUTE**
  - Dust in concentrations above TLV may cause transient irritation of upper respiratory tract.
- **CHRONIC**
  - Research in USSR showed high incidence of respiratory tract diseases, including pneumoconiosis, emphysema, rhinitis. It is to be noticed that dust concentrations were above TLV in that research. On the other hand, ACGIH Committee on TLV classified carbon black as dust that causes inconvenience with no proved pathological or harmful changes of structure or function of lungs. No carcinogenic effect of carbon black on animals or man was established. Research on humans in USA gave no evidence of carbon black dust concentrations equal to or below TLV in workrooms causing respiratory tract diseases.

#### OTHER
- **CARCINOGENIC EFFECT**
  - Oral LD50 > 10000 mg/kg (rat).
  - The International Agency for Research on Cancer (IARC), the U.S. National Toxicology Program (NTP), the U.S. Occupational Safety and Health Administration (OSHA) do not classify carbon black as carcinogenic material.

### SECTION XII. Ecological Data

No negative effect on environment has been established.

### SECTION XIII. Waste Disposal

Neither in Ukraine nor in Europe (Directive 78/319/EEC) carbon black is classified as toxic or hazardous waste. Waste may be incinerated or buried, observing all European, national, and local regulations.
SECTION XIV. Transportation

According to the rules of transportation established by Ukrainian Ministry of Railroad, carbon black is classified as self-igniting hazardous material, Class 4, Subclass 4.2, and is supplied with Emergency Card 47. It may be transported in bulk in special hopper cars or packed in containers. In most European countries and in the USA carbon black is not considered hazardous material and may be shipped by land, sea, or air transport without limitations.

SECTION XV. Legal Information

Labeling Requirements

Carbon black, CAS No. 1333-86-4, is included in following inventories:
- All-Union Classifier of Industrial and Agricultural Products (Ukraine);
- U.S. Toxic Substances Control Act (TSCA);
- European Inventory of Existing Chemical Substances (EINESC - No. 215-609-9);
- Canadian Domestic Substances List (DSL);
- Australian Inventory of Chemical Substances (AICS);
- List of Existing Chemical Substances of Japanese Ministry of international Trade and Industry (MITI);
- Korean Toxic Chemicals Control Law (TCCL).

Classification according to Ukrainian Standards:
- Hazard symbol and labeling-according GOST 19433-88
- Classification code 4213
- UNO Classification No 1361

Classification according to European Standards:
- Symbol and Labeling for Hazard: None
- Components of Labeling for Risks: None
- R - Clauses: None
- S - Clauses: None

SECTION XVI. Other Information

TEXT ON LABEL: Carbon Black

The preceding data are based on test results that we consider reliable. However, we cannot guarantee them or take responsibility for the consequences of their use. Users are to conduct their own research in order to determine whether the data or products are suitable for their specific applications. None of the data reported here are to be understood as permission, suggestion, or recommendation for infringement of any laws or application of any inventions protected by patents in force.
Annex G2
SECTION 1: IDENTIFICATION OF THE SUBSTANCE

<table>
<thead>
<tr>
<th>Product name</th>
<th>Pyrolysis Fuel Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Family</td>
<td>Petroleum hydrocarbons</td>
</tr>
<tr>
<td>CAS Number</td>
<td>64742-90-1 (69013-21-4)</td>
</tr>
<tr>
<td>Chemical Name</td>
<td>Pyrolysis Fuel Oil</td>
</tr>
<tr>
<td>Synonyms</td>
<td>Petroleum Oil, Pyrolysis residuum, Residues (petroleum) – steam cracked</td>
</tr>
<tr>
<td>Type of use</td>
<td>Fuel, for production of carbon black</td>
</tr>
<tr>
<td>Company</td>
<td>„HIP-Petrohemija“ Pancevo Spoljnostarevacka 82 26000 Pancevo Republic of Serbia</td>
</tr>
</tbody>
</table>

Company Customer Service
Tel: +381(0)13 307 000
Fax: +381(0) 13 310 207
Email (competent person): prodaja@hip-petrohemija.rs
Webpage: www.hip-petrohemija.com

Emergency Contact (24h)
See Section 16. for the list of telephone numbers of poison centers in the European Economic Area

SECTION 2: HAZARD IDENTIFICATION

CLP: T – Toxic
GHS: DANGER! Carcinogenicity, category 1B; H350.

Adverse environmental effects
Oil substances are harmful to aquatic organisms, may cause long-term adverse environmental effects.

Adverse physical-chemical effects
Flammable liquid. Vapours are heavier than air. Ignition possible when exposed to hot surfaces, naked flames and sparks.

Signs and Symptoms of Acute Exposure

Skin Contact with the skin causes irritation.

Inhalation This product may be harmful by inhalation. Excessive inhalation of this material may result in heartbeat irregularities and central nervous system effect including headache, sleepiness, dizziness, nausea, loss of coordination, and in extreme conditions coma and possibly death; may cause damage to blood system, optical neuritis, and over time kidney and liver damage. Small amounts of this product, if aspirated into the lungs, may cause mild to severe pulmonary injury.

Eyes Contact with the eyes causes irritation.

Ingestion This product is harmful if swallowed. Ingestion of this product may result vomiting, nausea and abdominal pain and central nervous system effects including headache, sleepiness, dizziness, loss of coordination, and in extreme conditions coma and possibly death. Ingestion may cause kidney and liver damage and blood disorders.

Chronic Health Effects Kidney, gastrointestinal, blood, and skin disorders. Prolonged and/or repeated skin contact with this product may cause irritation/dermatitis and possible chemical blistering. Product contains component(s) that may be absorbed through the skin. Prolonged contact with this material may cause allergic skin sensitization reactions and possibly skin cancer.

Conditions Aggravated by Exposure The substance may have effects on the central nervous system and liver. Repeated inhalation of this material at elevated concentrations may cause damage to the following organs: blood, auditory system. Risk depends on duration and level of exposure.
SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

**EU Inventory** All components listed on European Inventory of Existing Chemical Substances (EINECS)

<table>
<thead>
<tr>
<th>Component Name</th>
<th>CAS #</th>
<th>EU Inventory EC #</th>
<th>Index No.</th>
<th>Concentration Wt.%:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyrolysis Fuel Oil*</td>
<td>64742-90-1 (69013-21-4)</td>
<td>265-193-8 (273-782-6)</td>
<td>649-018-00-6 (/)</td>
<td>100</td>
</tr>
<tr>
<td>Sulfur</td>
<td>7704-34-9</td>
<td>231-722-6</td>
<td></td>
<td>&lt;0,05</td>
</tr>
</tbody>
</table>

* Fuel oil is a complex mixture of hydrocarbons. Its exact composition depends on the source of the crude oil from which it was produced. Fuel oil contains hundreds of individual organic chemicals.

**Classification and Labeling**

<table>
<thead>
<tr>
<th>Classification (Hazard Class and Category Code– GHS)</th>
<th>CLP</th>
<th>GHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Phrases (Hazard statement – GHS)</td>
<td>T: Toxic</td>
<td>DANGER! Carc. 1B</td>
</tr>
</tbody>
</table>

R45 May cause cancer. H350 – May cause cancer

SECTION 4: FIRST AID MEASURES

**General**

In case of health troubles or doubts, seek medical advice immediately and show this Safety Data Sheet. Ensure activity of vitally important functions until the arrival of the doctor (artificial respiration, inhalation of oxygen, heart massage). If patient is unconscious, or in case of danger of blackout (apsychia), transport patient in a stabilised position. In case of first degree burns (painful redness), and second degree burns (painful blisters), cool the affected area with cold running water for a long time. In case of third degree burns (redness, cracking pale skin, usually without pain), do not cool affected skin, dress the area with sterile dry gauze only.

**Inhalation**

Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops. Thermal burns require immediate medical attention depending on the severity and the area of the body burned.

**Skin**

Remove person to fresh air. If person is not breathing provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

**Eyes**

In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

**Ingestion**

DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

**Note to Physician**

Treat unconsciousness, nausea, hypotension, seizures and cardiac arrhythmias in the conventional manner. Aspiration of this product during induced emesis can result in lung injury. If evacuation of stomach contents is considered necessary, use the method least likely to cause aspiration, such as gastric lavage after protecting the airway. Observe hospitalized patients for delayed chemical pneumonia, acute tubular necrosis, encephalopathy and dysrhythmias. Monitor for urinary phenol within 72 hours of acute exposure.
SECTION 5: FIRE FIGHTING MEASURES

<table>
<thead>
<tr>
<th>Flammable Properties</th>
<th>Combustible when heated. Danger of violent reaction or explosion. Vapours may travel considerable far distances and cause subsequent ignition. Do not empty into drains. When burning, it emits toxic and irritant fumes. Containers with the substance exposed to excessive heat may explode.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extinguishing Media</td>
<td>SMALL FIRE: Use dry chemical, CO₂, water spray or regular foam LARGE FIRE: Use water spray, water fog or foam.</td>
</tr>
<tr>
<td>Extinguishing Media (which shall not be used for safety reasons)</td>
<td>Do not use water jet</td>
</tr>
<tr>
<td>Hazardous Combustion Products</td>
<td>Upon combustion, this product emits carbon monoxide, carbon dioxide, low molecular weight hydrocarbons, acidic gases, nitrogen oxides, and sulfur oxides.</td>
</tr>
<tr>
<td>Protective Equipment/Clothing</td>
<td>Wear full protective clothing and a self-contained breathing apparatus</td>
</tr>
<tr>
<td>Fire Fighting Guidance</td>
<td>Fight from a maximum distance. Containers can build up pressure if exposed to heat; cool with flooding quantities of water until well after the fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of vessel. Always stay away from the ends of tanks. Always stay away from tanks engulfed in fire.</td>
</tr>
</tbody>
</table>

SECTION 6: ACCIDENTAL RELEASE MEASURES

<table>
<thead>
<tr>
<th>Extra personal protection</th>
<th>Wear recommended full protective personal equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental precautions</td>
<td>Prevent from further leaks of substance. Enclose and dike area. Do not allow substance to enter soil, water and sewage systems. In case of substance discharge to water courses or water containers, inform water consumers immediately, stop service and exploitation of water.</td>
</tr>
<tr>
<td>Recommended methods for cleaning and disposal</td>
<td>Isolate area. Keep unnecessary personnel away. Eliminate all sources of ignition. Stop traffic and switch off the motors of the engines. Do not smoke and do not handle with naked flame. Use explosion-proof lamps and non-sparking tools. Avoid contact with the substance. Stop leak if without risk. Use water spray or foam to reduce vapors. Prevent entry into sewers, basements or confined areas. Pump off substance safely, soak up residues with compatible porous material and forward for disposal in closed containers. Dispose of under valid legal waste regulations.</td>
</tr>
</tbody>
</table>

SECTION 7: HANDLING AND STORAGE

| Handling | Do not handle near heat, sparks, or flame. Avoid contact with incompatible agents. Use only with adequate ventilation/personal protection. Avoid contact with eyes, skin and clothing. |
| Storage  | Keep containers tightly closed when not in use and store in a well-ventilated area. Isolate incompatible materials such as oxidizers. Containers should be clearly labeled. Do not enter storage area unless adequately ventilated. Metal containers involved in the transfer of this material should be grounded and bonded. |
| Specific use(s) | Fuel, for production of carbon black. Handling with material according to Section 7 part Handling. |
### SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

ACGIH exposure limit lists have been checked for major components listed with CAS registry numbers. Other exposure limits may apply, check with proper authorities.

<table>
<thead>
<tr>
<th>Chemical Safety Report</th>
<th>Derived No Effect Levels (DNEL)</th>
<th>Predicted No Effect Concentration (PNEC)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not available</td>
<td>Not available</td>
</tr>
</tbody>
</table>

Personal protective equipment should not be considered a long-term solution to exposure control. Persons in ill health where such illness would be aggravated by exposure to product should not be allowed to work with or handle this product.

#### Inhalation
If engineering controls and ventilation is not sufficient to prevent buildup of aerosols or vapors, appropriate approved air-purifying respirators or self-contained breathing apparatus appropriate for exposure potential should be used. Air supplied breathing apparatus must be used when oxygen concentrations are low or if airborne concentrations exceed the limits of the air-purifying respirators.

#### Hand
Use chemically resistant gloves when handling product.

#### Eyes
Wear safety glasses; chemical goggles are recommended if splashing is possible, or to prevent eye irritation from heated vapors or mists.

#### Skin
Wear chemical-resistant safety footwear with good traction to prevent slipping. Work clothing that sufficiently prevents skin contact should be worn, such as coveralls and/or long sleeves and pants. If splashing or contact with liquid material is possible, consider the need for an impervious overcoat. Fire resistant or natural fiber clothing (i.e., cotton or wool) is recommended. Synthetic clothing can generate static electricity and is not recommended where flammable vapor releases may occur.

#### Environmental exposure controls
If engineering controls and ventilation is not sufficient to prevent buildup of aerosols or vapors, appropriate approved air-purifying respirators or self-contained breathing apparatus appropriate for exposure potential should be used. Air supplied breathing apparatus must be used when oxygen concentrations are low or if airborne concentrations exceed the limits of the air-purifying respirators.

### SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Physical state and Appearance</th>
<th>Liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Dark brown – black</td>
</tr>
<tr>
<td>Odour</td>
<td>Characteristic (oil-like)</td>
</tr>
<tr>
<td>Odour Threshold</td>
<td>Not Available</td>
</tr>
<tr>
<td>pH</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Boiling Point/Boiling Range</td>
<td>180-290°C</td>
</tr>
<tr>
<td>Melting Point</td>
<td>Not available</td>
</tr>
<tr>
<td>Flash Point</td>
<td>≤ 75°C</td>
</tr>
<tr>
<td>Auto-ignition</td>
<td>Not available</td>
</tr>
<tr>
<td>Flammability classification</td>
<td>Combustible when heated</td>
</tr>
<tr>
<td>Lower Flammable (explosion) Limit</td>
<td>Not available</td>
</tr>
<tr>
<td>Upper Flammable (explosion) Limit</td>
<td>Not available</td>
</tr>
<tr>
<td>Explosive Properties</td>
<td>Mixtures of vapour and air are explosive</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oxidizing Properties</th>
<th>May react with oxidizing agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vapour Pressure</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Relative Density at 15°C (water=1)</td>
<td>1,05</td>
</tr>
<tr>
<td>Solubility (Water)</td>
<td>Negligible</td>
</tr>
<tr>
<td>Partition Coefficient Octanol/Water (Log Pow)</td>
<td>Not available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Not available</td>
</tr>
<tr>
<td>Relative Vapour Density (air=1)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Evaporation</td>
<td>III</td>
</tr>
<tr>
<td>Additional Physical and Chemical Properties</td>
<td>/</td>
</tr>
</tbody>
</table>
SECTION 10: STABILITY AND REACTIVITY

<table>
<thead>
<tr>
<th>Chemical Stability</th>
<th>This product is stable under ambient pressure and temperature.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions to Avoid</td>
<td>Sources of ignition, static electricity, high temperature, sun radiation.</td>
</tr>
<tr>
<td>Substances to Avoid</td>
<td>Oxidizing agents, strong acids.</td>
</tr>
<tr>
<td>Decomposition Products</td>
<td>Thermal decomposition: CO, CO₂.</td>
</tr>
<tr>
<td>Hazardous Polymerization</td>
<td>Not likely to occur.</td>
</tr>
<tr>
<td>Reactions with Air and Water</td>
<td>Heated vapors may from explosive mixtures in air.</td>
</tr>
<tr>
<td>Advice to prevent explosion</td>
<td>Not considered to be corrosive</td>
</tr>
</tbody>
</table>

SECTION 11: TOXICOLOGICAL INFORMATION

**Acute Toxicity**
Substance is irritating to skin. Vapours are irritating to eyes, skin and respiratory system, may cause nausea, emesis, drowsiness and dizziness. Possible narcotic effects.

- Dermal rat LD₅₀ > 2300 mg/kg

**Repeated Dose Toxicity**
After long-term or repeated exposure skin diseases, skin cancer, eye damage, liver and erythrocytes damage may develop.

**Chronic Toxicity**
- ACGIH - A3 - Confirmed animal carcinogen with unknown relevance to humans
- OSHA - /
- IARC - Group 2B - The mixture is possibly carcinogenic to humans.
- NTP - Reasonably suspected to be Human Carcinogens

- Mutagenic effects: Not a known mutagen
- Teratogenic effects: Not a known teratogen.

**Special Remarks on Other Toxic Effects on Humans**
Substance is irritating to skin. Vapours are irritating to eyes, skin and respiratory system, may cause nausea, emesis, drowsiness and dizziness.

SECTION 12: ECOLOGICAL INFORMATION

**Ecotoxicity – Acute toxicity**
48 h / EC₅₀ / Daphnia magna /1.2 – 2.7 mg/l

**Mobility**
Persist under anaerobic conditions.

**Persistence and Degradability**

<table>
<thead>
<tr>
<th>Air</th>
<th>Contains volatile components. The volatile components oxidise rapidly by photochemical reactions in air.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>If it enters soil, it will adsorb to soil particles and will not be mobile. Large volumes may penetrate soil and could contaminate groundwater.</td>
</tr>
<tr>
<td>Water</td>
<td>Partly evaporates from water or soil surfaces, but a significant proportion will remain after one day.</td>
</tr>
<tr>
<td>Bioaccumulation</td>
<td>Contains components which may have the potential to bioaccumulate. May cause tainting of fish and shellfish</td>
</tr>
<tr>
<td>Biodegradation</td>
<td>Major components are inherently biodegradable.</td>
</tr>
<tr>
<td>Environmental adverse effects</td>
<td>Product is largely insoluble in water, and has low to moderate volatility based on its components. Product will exhibit a moderate order of toxicity. Product is sticky and will adhere to soil, sediment and plants, birds and water mammals.</td>
</tr>
</tbody>
</table>
SECTION 13: DISPOSAL CONSIDERATIONS

Waste disposal
Use material for its intended purpose or recycle if possible. Product reuse or disposal in accordance with valid waste legislative regulations. Recommended method: Energetic utilization (combustion). DO NOT ATTEMPT TO DISPOSE OF BY UNCONTROLLED IGNITION. Since emptied containers retain product/material residue, follow safe handling/label warnings even after container is emptied.

SECTION 14: TRANSPORT INFORMATION

Table:

<table>
<thead>
<tr>
<th>Field</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN Number</td>
<td>3256</td>
</tr>
<tr>
<td>H.I.N. (Kemler Number)</td>
<td>30</td>
</tr>
<tr>
<td>Road (ADR) / Rail (RID)/ Water (ADNR)</td>
<td></td>
</tr>
<tr>
<td>Proper Shipping Name</td>
<td>ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S.</td>
</tr>
<tr>
<td>UN Number</td>
<td>3256</td>
</tr>
<tr>
<td>Hazard class</td>
<td>3 (flammable liquids)</td>
</tr>
<tr>
<td>Transport category</td>
<td>F2</td>
</tr>
<tr>
<td>Packaging group</td>
<td>III</td>
</tr>
<tr>
<td>Required label(s)</td>
<td>![flammable liquid symbol]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine (IMO)</td>
<td></td>
</tr>
<tr>
<td>Proper Shipping Name</td>
<td>ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S.</td>
</tr>
<tr>
<td>UN Number</td>
<td>3256</td>
</tr>
<tr>
<td>IMDG class</td>
<td>3 (flammable liquids)</td>
</tr>
<tr>
<td>EmS category</td>
<td>F-E, S-D</td>
</tr>
<tr>
<td>Packaging group</td>
<td>III</td>
</tr>
<tr>
<td>Required label(s)</td>
<td>![flammable liquid symbol]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Transport (IATA/ICAO)</td>
<td></td>
</tr>
<tr>
<td>Proper Shipping Name</td>
<td>ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S.</td>
</tr>
<tr>
<td>UN Number</td>
<td>3256</td>
</tr>
<tr>
<td>ICAO/IATA class</td>
<td>3 (flammable liquids)</td>
</tr>
<tr>
<td>Packaging group</td>
<td>III</td>
</tr>
<tr>
<td>Required label(s)</td>
<td>![flammable liquid symbol]</td>
</tr>
</tbody>
</table>
## SECTION 15: REGULATORY INFORMATION

<table>
<thead>
<tr>
<th>Regulatory information</th>
<th>The SDS has been prepared according to EC REGULATION No. 1907/2006 REACH. The product has been classified as dangerous according to EC REGULATIONS, No. 1272/2008/EC, No. 1999/45/EC and No. 67/548/EEC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyrolysis fuel oil</td>
<td></td>
</tr>
<tr>
<td>CAS #</td>
<td>64742-90-1 (69013-21-4)</td>
</tr>
<tr>
<td>EU Inventory EC #</td>
<td>265-193-8 (273-782-6)</td>
</tr>
<tr>
<td>Index No.</td>
<td>649-018-00-6 (/)</td>
</tr>
<tr>
<td>Classification and Labeling Clasification and Labeling</td>
<td><strong>CLP</strong></td>
</tr>
<tr>
<td>Pictogram</td>
<td><img src="image" alt="Pictogram" /></td>
</tr>
<tr>
<td>Classification (Hazard Class and Category Code– GHS)</td>
<td>T; Toxic</td>
</tr>
<tr>
<td>Risk Phrases (Hazard Statement –GHS)</td>
<td>R45 May cause cancer.</td>
</tr>
<tr>
<td>Safety Phrases (Precautionary Statements – GHS)</td>
<td>S53 Avoid exposure – obtain special instructions before use S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible)</td>
</tr>
</tbody>
</table>
### SECTION 16: OTHER INFORMATION

| Training advice | Personnel handling the product need to be demonstrably with its hazardous properties, with health and environmental protection principles related to the product and first aid principles. |
| Recommended uses | THE PRODUCT IS RESTRICTED TO PROFESSIONAL USAGE. Use in industry only. |

#### List of telephone numbers of poison centres in the European Economic Area

<table>
<thead>
<tr>
<th>Country</th>
<th>Telephone Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUSTRIA (Vienna Wien)</td>
<td>+43 1 40 400 2222</td>
</tr>
<tr>
<td>BELGIUM (Brussels Bruxelles)</td>
<td>+32 70 245 245</td>
</tr>
<tr>
<td>BULGARIA (Sofia)</td>
<td>+359 2 9154 409 / +359 887 435 325</td>
</tr>
<tr>
<td>CZECH REPUBLIC (Prague Praha)</td>
<td>+42 2 2491 9293 or +42 2 2491 5402</td>
</tr>
<tr>
<td>DENMARK (Copenhagen)</td>
<td>+45 35 31 54 04</td>
</tr>
<tr>
<td>FINLAND (Helsinki )</td>
<td>+358 9 471 977</td>
</tr>
<tr>
<td>FRANCE (Paris)</td>
<td>+33 1 40 05 48 48</td>
</tr>
<tr>
<td>GERMANY (Berlin)</td>
<td>+49 30 450 653565</td>
</tr>
<tr>
<td>GREECE (Athens Athinai)</td>
<td>+30 10 779 3777</td>
</tr>
<tr>
<td>HUNGARY (Budapest)</td>
<td>+36 80 20 11 99</td>
</tr>
<tr>
<td>ICELAND (Reykjavik)</td>
<td>+354 525 111, +354 543 2222</td>
</tr>
<tr>
<td>IRELAND (Dublin)</td>
<td>+353 1 8379964</td>
</tr>
<tr>
<td>ITALY (Rome)</td>
<td>+39 06 305 4343</td>
</tr>
<tr>
<td>LATVIA (Riga)</td>
<td>+371 704 2468</td>
</tr>
<tr>
<td>LITHUANIA (Vilnius)</td>
<td>+370 2 36 20 52, +370 2 36 20 92</td>
</tr>
<tr>
<td>NETHERLANDS (Bilthoven)</td>
<td>+31 30 274 88 88</td>
</tr>
<tr>
<td>NORWAY (Oslo)</td>
<td>+47 22 591300</td>
</tr>
<tr>
<td>POLAND (Gdansk)</td>
<td>+48 58 301 65 16 or +48 58 349 2831</td>
</tr>
<tr>
<td>PORTUGAL (Lisbon Lisboa )</td>
<td>808 250 143 (for use only in Portugal), +351 21 330 3284</td>
</tr>
<tr>
<td>ROMANIA (Bucharest)</td>
<td>+40 21 230 8000;</td>
</tr>
<tr>
<td>SLOVAKIA (Bratislava)</td>
<td>+421 2 54 77 4 166</td>
</tr>
<tr>
<td>SLOVENIA (Ljubljana)</td>
<td>+386 41 650 500</td>
</tr>
<tr>
<td>SPAIN (Barcelona)</td>
<td>+34 93 227 98 33 or +34 93 227 54 00 bleep 190</td>
</tr>
<tr>
<td>SWEDEN (Stockholm)</td>
<td>+46 8 33 12 31 (International) 112 (National)</td>
</tr>
<tr>
<td>UNITED KINGDOM (London)</td>
<td>0870 243 2241</td>
</tr>
</tbody>
</table>
This information applies to the PRODUCT AS SUCH and conforming to specifications of „HIP- PETROHEMILA“ Pancevo.

In case of formulations or mixtures, it is necessary to ascertain that a new danger will not appear.

The information contained is based on our knowledge of the product, at the date of publishing and it is given quite sincerely. However the revision of some data is in progress. Users are advised of possible additional hazards when the product is used in applications for which it was not intended.

This sheet shall only be used and reproduced for prevention and security purposes.

The references to legislative, regulatory and codes of practice documents cannot be considered as exhaustive.

It is the responsibility of the person receiving the product to refer to the totality of the official documents concerning the use, the possession and the handling of the product.

It is also the responsibility of the handlers of the product to pass on to any subsequent persons who will come into contact with the product. (usage, storage, cleaning of containers, other processes) the totality of the information contained within this safety data sheet and necessary for safety at work, the protection of health and the protection of environment.