F. No.23-61/2015-HSMD
Government of India
Ministry of Environment & Forest & Climate Change
HSM Division

2nd Floor, Jal Block
Indira ParyavaranBhawan
Jor Bagh Road, Aliganj
New Delhi - 110003

Dy.No. 7384
Date 4.12.2015

Date: 24th November, 2015

OFFICE MEMORANDUM

Subject:-Standard Operating Procedures (SOPs) with regard to recycling from Waste Pneumatic Tyres, used PET Bottle Scrap, lead scrap/used lead batteries and recovery of TPO from tyre scrap -reg.

The matter herein pertains to Standard Operating Procedures (SOPs) with respect to recycling of:

(i) Waste Pneumatic Tyres/ tyre Scrap
(ii) Used PET Bottle Scrap
(iii) Lead scrap/used lead batteries
(iv) Recovery of Tyre Pyrolysis Oil (TPO) from tyre scrap.

The aforesaid SOPs have been finalized on the basis of recommendations of the Technical Review Committee constituted under Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules, 2008. The SOPs indicate the technical requirement with respect to environmentally sound operation of such units and import of such waste for the purpose of recycling and recovery.

2. In this reference undersigned is directed to convey that State Pollution Control Board (SPCB)/ Pollution Control Committee (PCC) shall ensure compliance with these SOPs before issuing any authorization under Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules, 2008 or Consent to Operate (CTO) under Air (Prevention & Control of Pollution) Act, 1981 and the Water (Prevention and Control of Pollution) Act, 1974. Compliance with these SOPs shall be certified by SPCB/PCC on the basis of inspection. The certificate shall accompany the CTO and Authorization as inspection report for all purposes.

3. Existing authorization and CTO for such units shall also be reviewed and such inspection certificate of compliance to SOP shall be provided to these units, if requested for.

4. As far as import of tyre scrap for pyrolysis purpose is concerned, no such application for import will be considered in the Ministry, until accompanied by inspection certificate indicating compliance of the unit with the prescribed SOP. These SOPs are available on Ministry's website (http://www.moef.nic.in/division/importexport). CPCB is requested to upload SOPs on their website.

This issues with the approval of the Competent Authority.

(Dr.Shruti Rai Bhardwaj)
Joint Director/ Scientist D

To:

1. Member Secretary, State Pollution Control Boards/ Pollution Control Committee (as per the list enclosed)

Copy to:

2. Shri S.M. Bhatnagar, Joint Secretary (Customs), Central Board of Excise and Customs, North Block, New Delhi-ll0001
3. Joint Director General of Foreign Trade, DGFT, Udyog Bhawan, H Wing Gate No. 2, Maulana Azad Road, New Delhi-110011
4. The Under Secretary, Ministry of Petroleum and Natural Gas, Supply Section, ShastriBhawan, New Delhi-11 0001
5. Member Secretary, Central Pollution Control Board (CPCB), PariveshBhawan, East Arjun Nagar, Delhi-l 10032

STANDARD OPERATING PROCEDURE
Import and recycling OF Waste Tyre Scrap for the production of Tyre Pyrolysis Oil

1. Background

1.1 Pyrolysis is a thermal degradation process carried out in the absence of oxygen/air so that combustion of material does not take place. Pyrolysis of tyres and rubber products produce low-grade oils, pyrolysis gas (pyro-gas), carbon-black-char and steel. Technologies are available to produce high quality oils comparable viscosity and calorific values comparable with diesel and gasoline type fuels. However, it was reported that tyre pyrolysis has not been economically viable in United States as full-scale operations could not be achieved due to costly clean-up operations.

1.2 Environmental and safety concerns in these plants arise due to fire hazards, emission of fine carbon particles and odor nuisance and need for flaring of excess pyro gas.

1.3 Most of the tyre pyrolysis units in the country are batch processes producing primarily oils for use as fuel oil in industrial furnaces. The pyro-gas generated form pyrolysis process is used as fuel in the pyrolysis process. In these plants the full tyres are fed to the pyrolyser manually and at the end of the process the steel wire and carbon are taken out manually. This leads to lot of carbon spillage, exposure of workers to fine carbon particles and working in the unconducive environment in the pyrolyser. In some of the plants some explosions also have been reported due to frequent opening of the reactors in the hot conditions. The flare system is also not properly designed. Since the system is not completely closed, the odor problem is prevalent throughout the plant. These are some of the major shortcomings of such plants.

2. Requisite facilities and standard operating procedures for the production of Tyre Pyrolysis Oil:

The applicant desires to import waste pneumatic tyres to produce pyrolysis oil and carbon-black-char may be considered only the units have requisite facilities as given below:

2.1 Batch process:

2.1.1 The feed to the pyrolysis reactor should be devoid of steel. After removal of steel wire the tyre can be put either in the

c. Lead in effluents (mg/l) :0.10 (notified general standard)

d. Lead in factory premises near boundary wall 24-hr avg ($\mu g/m^3$) : 1.0
(* Nm^3 – normal cubic meter)

e. Workers Blood lead levels: As a practice, all lead related units should periodically examine their workers at least once in year for lead level in blood as well as urine. Persons with higher lead levels (greater than 42 micrograms /dl) should be shifted immediately to non-lead activity areas and given special medical treatment till the lead levels come back to acceptable level (10- micrograms /dl).

4. Steps to minimize fugitive emissions of Lead

i. The design of hood/fume collection system from the smelting/refining operations (from metal tapping point, charging doors, furnace joints etc.) should be capable of collecting lead emissions and transfer to the air pollution control system.

ii. The storage and handling of all the raw materials, intermediates and products should be in covered area/shed having concrete floors and mechanized equipment should be used to handle these materials as far as possible.

iii. The floors in the loading area should be kept wet through sprinklers to reduce the chances of lead particles/dust getting airborne.

iv. Any water used for washing, rain water etc, should be collected through separate pits (to delink this from the regular drain) for removing metallic lead etc and the pit should have fine screens for passage of clear water.

v. The movement of vehicles to the administrative/working/production areas should ensure that only the trucks/vehicles involved in the material handling/transportation reach the work areas, and their tyres are washed before they leave these areas.

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form of crumbs or chips (which can be made simply by cutting without going for the shredding process).Further the feeding arrangement of the rubber crumb to the reactor should be mechanised.

2.1.2 The initial heating of the reactor should be done by liquid fuel or gas. The flue gas should be released to the environment through a chimney of at least 30 metres height.

2.1.3 After initial heating, during the pyrolysis process, the pyro gas generated within the plant should be used as a fuel.

2.1.4 Excess pyro gas if any should be flared through properly designed flaring system of adequate capacity considering the emergency situation in which the entire gas may have to be flared. The flaring should be done at a minimum height of 30 metre.

2.1.5 Adequate instrumentation for measurement and control of temperature and pressure along with safety interlocks in case of increase of temperature or pressure to cut off heating of the reactor should be provided. Automatic control systems such as Programmed Logic Control (PLC) shall be adopted. It should be ensured that the reactor is under positive pressure all the time.

2.1.6 In order to control fugitive emissions from the reactor during operation, proper sealing should be ensured.

2.1.7 The collection of the oil from the condensers should be in closed vessel and storage also should be in closed tanks with suitable vents. There should be no manual handling of oil. Transfer of oil should be through pumps.

2.1.8 At the end of the pyrolysis process the reactor has to be cooled before the removal of carbon. During this process, the reactor should be purged with nitrogen.

2.1.9 The removal of carbon should be started after the reactor's temperature has come down to below 50°C.

2.1.10 The removal of carbon should be through a mechanised system and it should be ensured that no spillage takes place during the collection of the carbon in the bags.

2.1.11 Adequate number of sensors along with alarm system should be provided at suitable locations throughout the plant to detect any leakage of flammable vapors from the system.

2.1.12 Adequate firefighting system like sprinklers and fire hydrant with necessary pumping system and water storage should be provided.

2.1.13 The plot size should be adequate for storage of crumb or cut tyres, oil and carbon black in addition to the pyrolysis plant and accessories as well as enough space for movement of fire tender in case of any emergency. A minimum indicative size of small plant is about 3000 square metres.

2.1.14 The plant shall possess clearance certificates issued by concerned departments.

2.1.15 The carbon black and the oil obtained from the process should be supplied only to actual users/processors.

2.1.16 The waste water generated in the process from condensers or any scrubbers should be properly treated in an effluent treatment plant and the sludge generated should be sent to TSDF.

2.1.17 Oil containing water condensate should be treated in suitable ETP. Oily sludge/residues should be disposed through TSDF.

2.2 Continuous Process:

The continuous plants operating in the country do not suffer from most of the environmental and safety problems encountered in the existing batch plants. However, even for the continuous pyrolysis plants the following facilities have to be ensured:

2.2.1 The feed to the reactor is in the form of crumbs, it should be ensured that during handling/ transfer of the crumbs there should be suitable system for suction and collection of fugitive fibres.

2.2.2 The feeding system should be provided with a air-lock arrangements so that no air enters the reactor during feeding.

2.2.3 The initial heating of the reactor should be done by liquid fuel or gas. The flue gas should be released to the environment through a chimney of at least 30 metres height.

2.2.4 After initial heating, during the pyrolysis process, the pyro gas generated within the plant should be used as a fuel.

2.2.5 Excess pyro gas if any should be flared through properly designed flaring system of adequate capacity considering the emergency

situation in which the entire gas may have to be flared. The flaring should be done at a minimum height of 30 metre.

2.2.6 Adequate instrumentation for measurement and control of temperature and pressure along with safety interlocks in case of increase of temperature or pressure to cut off heating of the reactor should be provided. Automatic control systems such as Programmed Logic Control (PLC) shall be adopted. It should be ensured that the reactor is under positive pressure all the time.

2.2.7 In order to control fugitive emissions from the reactor during operation, proper sealing should be ensured.

2.2.8 The collection of the oil from the condensers should be in closed vessel and storage also should be in closed tanks with suitable vents. There should be no manual handling of oil. Transfer of oil should be through pumps.

2.2.9 The removal of carbon should be through a mechanised system and it should be ensured that no spillage takes place during the collection of the carbon in the bags. Moreover an air-lock should be provided to ensure no entry of air into the reactor.

2.2.10 Adequate number of sensors along with alarm system should be provided at suitable locations throughout the plant to detect any leakage of flammable vapors from the system.

2.2.11 Adequate fire-fighting system like sprinklers and fire hydrant with necessary pumping system and water storage should be provided.

2.2.12 The plot size should be adequate for storage of crumb or cut tyres, oil and carbon black in addition to the pyrolysis plant and accessories as well as enough space for movement of fire tender in case of any emergency. A minimum indicative size of small plant is about 3000 square metres.

2.2.13 The plant shall possess clearance certificates issued by concerned departments.

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2.2.15 The waste water generated in the process from condensers or any scrubbers should be properly treated in an effluent treatement plant and the sludge generated should be sent to TSDF.

2.2.16 Oil containing water condensate should be treated in suitable ETP. Oily sludge/residues should be disposed through TSDF.

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