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April 28, 2010

F.No. B-31011(BMW) /30/93/HWMD/ Speed Post

936-39

To

The Secretary  
Technology Information, Forecasting & Assessment Council (TIFAC)  
Department of Science & Technology  
Technology Bhawan, New Mehrauli Road  
New Delhi - 110 016

Sub: Approval for adoption of plasma pyrolysis for treatment of bio-medical waste as per Bio-medical Waste (Management & Handling) Rules, 1998 as amended - reg.

Sir,

This has reference to your letter No. T-75(53)/HGT/TIFAC dated 14/12/2005 seeking approval of Central Pollution Control Board (CPCB) as required under Bio-medical Waste (Management & Handling) Rules, 1998 as amended on the proposed 'Plasma Pyrolysis Technology' as an additional option for treatment of Bio-medical waste developed by 'Facilitation Centre for Industrial Plasma Technology (FCIPT), Gandhinagar' under the 'Home Grown Technology (HGT) Programme of Technology Information, Forecasting & Assessment Council (TIFAC)'.

Based on the subsequent monitoring results of the trial runs of the afore-said system carried out during February 24-25, 2009 & October 14-15, 2009 at Ahmedabad and the clarifications received vide FCIPT letters dated June 16, 2006 & May 23, 2007 were considered and a provisional approval to adopt "Plasma Pyrolysis System" for treatment of bio-medical waste i.e. category (1) & (2) as per Schedule I of the Bio-medical Waste (Management & Handling) Rules, 1998 & as amended is hereby accorded at present subject to the conditions enclosed at Annexure-I along with this approval.

The compliance of the conditions stipulated in this approval shall be ensured.

This issues with the approval of the Competent Authority, Central Board.

Yours faithfully,

*J.S. Kamyotra*  
(J.S. Kamyotra)  
Member Secretary

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Encl.:As above

Contd..2/-

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Copy to:

- (1) Shri Rajiv Gauba, : for kind information please  
Joint Secretary, HSM Division  
Ministry of Environment & Forests,  
Paryavaran Bhawan, C.G.O. Complex, Lodhi Road,  
New Delhi - 110 003
- (2) To all the members of Expert Committee : for kind information please.  
on Bio-medical Waste Management  
(as per list enclosed)
- (3) Head, : for kind information & n.a please  
Facilitation Centre for Industrial Plasma Technologies  
A-10/B, GIDC, Electronic Estate  
Sector 25  
Gandhi Nagar - 382 044, Gujarat.

*J.S. Kamyotra*  
(J.S.Kamyotra)

CENTRAL POLLUTION CONTROL BOARD  
(Hazardous Waste Management Division)  
Parivesh Bhawan, East Arjun Nagar  
DELHI -110 032  
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I. Conditions for adoption of 'Plasma Pyrolysis' technological option for treatment of Bio-medical Waste:

Approval for use of 'Plasma Pyrolysis' technology for treatment of bio-medical waste by the Health Care Facility(HCF)/Common Bio-medical Waste Treatment Facility (CBWTF) is accorded subject to the following conditions:

- 1) The 'plasma pyrolysis' shall be used only for treatment of Bio-medical Waste categories 01 & 02 as notified under Schedule 1 of the Bio-medical Waste (Management & Handling) Rules, 1998 as amended.
- 2) Any proponent [Health Care Facility (HCF) /Common Bio-medical waste Treatment Facility (CBWTF) Operator] proposes to adopt plasma pyrolysis technology for treatment of above bio-medical waste, is required to obtain Consent to Establish/Operate under Water (Prevention & Control of Pollution) Act, 1974 /Air (Prevention and Control of Pollution) Act, 1981 followed by Authorization under Bio-medical Waste (Management & Handling) Rules, 1998 and amendments made thereof from the concerned State Pollution Control Board (SPCB)/ Pollution Control Committee (PCC) for assessment of compliance of the system.
  - (a). Any existing incinerator operator (i.e HCF/CBWTF) proposes to switch over to the 'plasma pyrolysis', in such case prior approval (s) from the concerned SPCB/PCC shall be obtained as per provisions stipulated under the Environment (Protection) Act, 1986, prior to the commencement of such operation.
- 3). All the operators of the Plasma Pyrolysis shall meet the following operating and emission standards:
  - A. Operating Standards:
    - i). Combustion efficiency (CE) shall be at least 99.00%.
    - ii). The Combustion efficiency is computed as follows:
 
$$C.E = \frac{\% CO_2}{\% CO_2 + \% CO} \times 100$$
    - iii). The temperature of the primary chamber (PC) shall be 800 ± 50 °C at all points of the primary chamber.
    - iv). The temperature of the secondary chamber (SC) shall be 1050 ± 50 °C with gas residence time shall be at least 1 (one) second, with minimum 3% Oxygen in the stack gas.

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v). The stack height should be minimum of 30 m above ground level and shall be attached with the necessary monitoring facilities as per requirement of monitoring of 'general parameters' as notified under the E (P) Act, 1986 in accordance with the CPCB guidelines of Emission Regulation Part -III as well as monitoring requirement of 'Dioxins and Furans'.

**B. Emission Standards**

Stack emission standards for bio-medical waste incinerators notified under Schedule V of the Bio-medical Waste (Management & Handling) Rules, 1998 and amendments made thereof shall also be applicable for the 'plasma pyrolysis' technology. However, standards if modified later shall come into force from the date of notification in future.

**C. Air Pollution Control Measures:**

- i). Suitably designed pollution control devices should be installed/retrofitted with the 'plasma pyrolysis' so as to achieve the stack emission limits.
- ii). Wastes to be treated using 'plasma pyrolysis' shall not be chemically treated with any chlorinated disinfectants.
- iii). Chlorinated plastics shall not be treated in the 'plasma pyrolysis' unit.
- iv). The ash/vitrified material generated from the plasma pyrolysis shall be disposed off in accordance with the Hazardous Waste (Management, Handling and Transboundary Movement) Rules 2008 and amendments made thereof in case the constituents in it exceeds the limits prescribed under Schedule 2 of the said Rules or else in accordance with the provisions of the Environment (Protection) Act, 1986, whichever is applicable.

**D. Liquid Effluent Discharge Standards:**

The liquid waste generated from the 'plasma pyrolysis unit' shall be treated appropriately to meet the effluent discharge norms as notified under the Environment (Protection) Act, 1986 and amendments made thereof.

**4). General Conditions:**

- a). The primary chamber of the 'Plasma Pyrolysis system' shall have 'oxygen starved condition' & free from any leakages where as the secondary chamber of the system shall have controlled combustion processing atmosphere for complete combustion of the gases emanated from the primary chamber.
- b). The system shall have suitable programmable logical control system (PLC) based Automatic Feeding system with a provision of automatic recording for the parameters like date, time, batch no., operating parameters such as temperatures in primary & secondary chambers, negative draft in the primary chamber, amount of excess air supplied in secondary chamber, air flow rate & resident time for sat. gases, scrubber water temperature, pressure drop in the scrubber etc.

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- c). Digital flow meter / suitable flow measuring devices for measurement of negative draft in the primary chamber shall be mounted on the primary and secondary air ducting.
- d). A minimum negative draft of 1.27 to 2.54 mm of WC (Water Column) shall be maintained in the primary chamber to avoid any leakage of gaseous emission from the chamber and for safety reasons.
- e). Nitrogen purging prior to the waste feeding into the primary chamber shall be carried out to remove the residual air present in the primary chamber. The waste shall be fed into the system uniformly in adequate quantities depending on the designed capacity of 'Plasma Pyrolysis system' in a fixed and uniform interval of time.
- f). The primary and secondary chambers shall preferably have rounded corner from inside to avoid possibility of formation of black pockets / dead zones.
- g). There shall be a separate graphite plasma torch for the primary chamber & electrically operated igniter arrangement in the secondary chamber to strike the flame. The torch shall have automatic switching "off/on" control to avoid the fluctuations of temperatures beyond the required temperature range. There shall be automatic provision for opening of primary chamber only when the desired temperature is attained in the primary and secondary chambers. Also following provisions to be made:
  - i). proper flame safeguard of the plasma torch shall be installed.
  - ii). view ports to observe flame of the torch.
  - iii). Torch of the primary chamber shall be pointing towards the centre of the feed and length of the torch shall be extended such that it touches the waste but does not impinge directly on the refractory floor or wall.
  - iv). The secondary torch shall be positioned in such a way that the flue gas passes through the flame for proper combustion of the gases.
  - v). Electrical power supply panel shall be fitted with necessary electrical safety alarm indication & interlock for protection of accidents due to short circuit etc. Also, necessary power supply panel protections such as secondary flame disappearance, induced draft fan failure, pressure limit in the secondary & primary chamber, scrubber water temperature, failure of water circulation to the scrubber, also be provided.
- h). The CO, CO<sub>2</sub>, and O<sub>2</sub> in source emission shall also be measured daily (at least ½ hour at one minute interval) and records in this regard shall be maintained. Additionally, parameters such as CO, Cl, CH<sub>4</sub> and H<sub>2</sub> shall also be measured in secondary chamber, prior to scrubbing and after scrubbing at least once in a month and records shall be maintained and submitted to CPCB and concerned SPCB/PCC.
- i). The possibility of providing heat recovery system/ heat exchanger with the system shall also be considered wherever possible, to minimize the cost of treatment and energy consumption.
- j). Structural design of the chimney / stack shall be as per IS: 6533-1989. The chimney/stack shall be lined from inside with minimum of 3mm thick natural hard

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rubber suitable for the duty conditions and shall also conform to IS:4682 Part- 1968 to avoid corrosion due to oxygen and acids in the flue gas.

- k) ✓ Only skilled person shall be designated to operate and maintain the system. The operator shall have adequate qualification in relevant subject and shall be trained & certified by the pyrolysis system supplier w.r.t the operation & maintenance of the system.
- l). There shall be at least one assistant designated at the plant to keep track of the wastes, records of system operation, cleanliness of the surrounding area and waste storage room. They shall also take care of waste charging and ash disposal.
- m). All the staff at the plant handling bio-medical waste should put on protective gears such as gumboots, gloves, eye glasses, etc. for reasons. The workers handling bio-medical waste and/or operating the system shall have to undergo health check up periodically and records need to be maintained for verification by the regulatory authorities.
- n). Any accident occurred shall immediately be reported to the concerned prescribed authority (SPCB/PCC) as stipulated under the BMW Rules by the facility operator. The facility operator shall have well defined strategies to deal with such accident/emergency. Periodic mock drill also be practiced and records need to be maintained in this regard.
- o). The provision of feeder cycle of the system shall start only when the pre-heating temperature in the primary chamber minimum of 600 ° C is attained. Provision of proper suction arrangement as well as tangential loading of the material shall be provided in feeder section to avoid fugitive emissions during loading. To avoid fire as a result of any escape of CO or Hydrogen gases from the primary chamber while feeding the wastes into the primary chamber, steam is required to be purged into the feeder system.
- p). Suitable and adequate insulation shall be provided for the system externally to avoid thermal radiation and its losses.
- q). The system shall be attached with the required stack monitoring provision as per requirement of the Dioxins/Furans monitoring and as per CPCB guidelines of Emission Regulation Part -III.
- r). ✓ The operator of a plasma pyrolysis shall comply with all the provisions of the Bio-medical waste (M & H) Rules, 1998 and amendments made thereof for collection, storage, transportation, and disposal of the treated bio-medical waste.
- s). The guidelines of CPCB applicable for CBWTFs and Bio-medical Waste Incinerators shall also be applicable to the Plasma Pyrolysis system and all the operators shall comply with the said guidelines.
- t). Any other conditions if necessary that may be imposed by CPCB in future as and when required.

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Speed Post

F.No. B-31011(BMW) /30/93/HWMD/

March 22, 2011

To

Dr. S.Mukherjee, Head,  
Facilitation Centre for Industrial Plasma Technology  
Institute of Plasma Research  
A 10 - B, G.I.D.C., Sector 25  
Gandhi Nagar - 382 044 (Gujarat)

Sub: Provisional Approval for adoption of 'plasma pyrolysis' for treatment of bio-medical waste as per Bio-medical Waste (Management & Handling) Rules, 1998 as amended - follow-up action as per minutes of the Expert Committee held on 12.02.2011 in CPCB, Delhi - reg.

Sir,

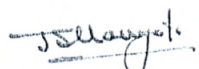
This has reference to grant of provisional approval granted by CPCB vide letter No. B-31011 (BMW)/30/93/HWMD/936-939 dated April 28, 2010 for adoption of 'Plasma Pyrolysis System' for treatment of bio-medical waste categories (1) & (2) as listed under Schedule - I of the Bio-medical Waste (Management & Handling) Rules, 1998 as amended.

Your representation for inclusion of bio-medical waste categories (6) & (7) as listed under schedule I of the BMW Rules in the afore-said provisional approval has been considered in 11<sup>th</sup> meeting of Expert Committee on Bio-medical Waste Management held on February 12, 2011 in CPCB, Delhi. This is to inform that the provisional approval earlier granted is hereby amended and accordingly it is permitted for treatment of bio-medical waste categories (01), (02), (05) and (06) using the "Plasma Pyrolysis". All other conditions stipulated in the afore-said approval remaining same.

The compliance of the conditions stipulated in this approval shall be ensured and appraised periodically to this office.

This issues with the approval of the Competent Authority, Central Board.

Yours faithfully,

  
(J.S.Kamyotra)  
Member Secretary

Copy to:

- (1) Shri Rajiv Gauba, : for kind information please  
Joint Secretary, HSM Division  
Ministry of Environment & Forests,  
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Shahid Jeet Singh Marg,  
New Delhi - 100 016.

  
(J.S.Kamyotra)

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