

HAZARDOUS WASTE MANAGEMENT PRE-REQUISITE FOR ISSUING AUTHORIZATION BY SPCB / PCC TO WASTE GENERATOR

1 PREAMBLE

Hazardous Waste (Management & Handling Rules), 1989, as amended in 2000 and 2003, are notified by the Central Government under the provisions of the Environment (Protection) Act, 1986. According to the provisions **under** Rule 5, the hazardous waste generator is required to obtain authorization to ensure the management and handling of the **hazardous** wastes in an environmentally sound manner. Again under Rule 12, the permission of the State Pollution Control Board (SPCB) / **Pollution Control Committee (PCC) of Union Territories (UTs)** and the Ministry of Environment & Forests (MoEF) is required for import **and export** of hazardous waste for recycling and reuse as raw material / re-processing / recovery operation **using environmentally sound management facilities.** The State Pollution Control Board, **Pollution Control Committees in UTs** and the State Government are responsible for enforcement of the said Rules.

Before issuance of the authorization / permission under Rule 5 / Rule 12 **respectively**, the following pre-requisites are suggested **for observance taking into account various environmental implications.**

2 REGULATORY REGIME FOR IMPORT OF HAZARDOUS WASTE AS RAW MATERIAL

2.1 Background

In a traditional manufacturing process, raw material and energy are the inputs, and the product and the wastes are the outputs. These wastes can be a real waste (with no economic value) or can be reclaimed/reused to some extent to obtain useful **resource** material. The wastes may be reclaimed and reused in the same industry or may be **elsewhere**. This "**elsewhere**" can be another country, which may

be in need of such raw material. This **is the pathway** how the hazardous waste makes a trans-boundary movement.

The intention behind such trans-boundary movement may be noble as to utilize the wastes and get some economical benefits **out of it**, or may **not be noble as to get** rid of the waste by dumping. The dividing line may be very thin and hence needs to be guarded against. **This differentiation can be done by two means viz.**

- (i) Regulating the mechanism of import of hazardous waste, so that it does not find an entry freely, except through a well-laid gate.
- (ii) Short listing of such wastes, in a scientific manner, which can be imported **or prohibited**.

The SPCBs / PCCs **are at times shy** in entertaining applications due to lack **of** adequate infrastructure and skilled personnel. Port and Customs authorities are also required to be **enlightened and strengthened** to control the entry of wastes without proper documentation as per the procedure for regulating the wastes enlisted under the law.

2.2 Rule 12 - Spirit of

The present wording of Rule 12, is not **loud** and clear enough as to announce what is in the interest of the country and **only** reflects India's commitment to the multilateral environmental agreement(s). **It will be worthwhile to introduce the spirit framing of the rule:**

- (i) While considering import of hazardous waste (**HW**), the intention must be that of using it as raw material, and not for dumping **under any circumstances**.
- (ii) The import may be **favourably** considered, only if the importer is direct user and not a trader.

- (iii) The import shall commensurate the technical capacity of the importer to process the wastes in an environmentally sound manner.
- (iv) The trans-boundary movement shall be within the framework of the Basel Convention.
- (v) The importer and exporter shall have legal responsibility to ensure environmentally sound management of **the** wastes.
- (vi) The exporter/importer **shall have** to provide information to the **Customs Department (at the port of entry, exit and transit)** on waste handling and insurance, if required. **Customs** will also have to devise mechanism to take back the waste, **if illegal traffic is detected.**
- (vii) **There shall be a commitment of the importer and exporter that at every step of 25, 50, 75 and 100 percent consumption / utilization of the imported hazardous waste as raw material shall be informing to SPCBs / PCCs in writing, so that the authorized person of the SPCBs / PCCs shall arrange an inspection / visit to verify the compliance.**

3 AUTHORIZATION

Prior to obtaining the authorization, the generator of the hazardous waste shall ensure that the hazardous wastes are collected, treated, stored, recycled/reused and the residues disposed **off** only in such facilities as may be authorized for this purpose **in accordance with the provisions laid down in the HW(M&H) Rules, 1989 as amended.** Every occupier generating hazardous wastes and having a facility for collection, reception, treatment, transport, storage and disposal of such wastes shall make an application in Form 1 to the SPCBs / PCCs for the grant of authorization for any of the above activities. Any person who intends to be an operator of a facility for the collection, reception, treatment, transport, storage and disposal of hazardous wastes, shall make an application in Form 1 to the SPCBs / PCCs for **obtaining the** authorization for any of the above activities.

The SPCBs / PCCs shall not issue an authorization unless it is satisfied that the operator of a facility or an occupier, as the case may be, possesses **adequate** and appropriate facilities, technical capabilities and equipment to handle hazardous wastes safely.

The authorization to operate a facility shall be issued in Form 2 and shall be subject to conditions laid down therein.

- An authorization granted under **Rule 5** shall unless suspended or cancelled, be in force for a period ofyears (**as specified by the SPCBs / PCCs**) from the date of issue or from the date of renewal.
- An application for the renewal of an authorization shall be made in Form 1, before its expiry.
- The authorization shall continue to be in force until it is renewed or revoked.

The SPCBs / PCCs may, after giving the applicant reasonable opportunity of being heard, refuse to grant authorization.

4 IMPORT OF HAZARDOUS WASTE FOR RE-USE / PROCESSING

Import of hazardous wastes from any country to India shall not be permitted for dumping. However, import of such wastes may be allowed for processing or re-use as raw material, after examining each case on merit by the SPCBs / PCCs or by an officer authorized **on its** behalf.

The exporting country or the exporter, as the case may be, of hazardous wastes shall communicate in Form 6 to the Central Government (the MoEF) of the proposed trans-boundary movement of hazardous wastes.

The Central Government shall, after examining the communication received and on being satisfied that the import of such hazardous wastes is to be used for processing or reuse as raw material, grant permission for the import of such wastes subject to such conditions as the Central Government may specify in this **regard** and if, however, the Central Government is not

satisfied with the communication received as per rule, may refuse permission to import such hazardous wastes.

Any importer importing hazardous wastes shall provide necessary information as to the type of hazardous wastes **proposes** to import, in Form 6, to the concerned SPCBs / PCCs.

The SPCBs / PCCs shall examine the information received under the rule and issue such instructions to the importers, as it considers necessary.

The Central Government or the SPCBs / PCCs, as the case may be, shall inform the concerned Port Authority to take appropriate steps regarding the safe handling of the hazardous wastes at the time of off-loading the same.

Any person importing hazardous wastes shall maintain the records of the hazardous wastes imported as specified in Form 6A, and the records so maintained shall be open for inspection by the MoEF / **CPCB/ concerned** SPCBs / PCCs, **or an officer designated by the MoEF/CPCB/SPCB/PCC** in this regard.

5 SUGGESTED TERMS AND CONDITIONS

Suggested terms and conditions for the grant of authorization are presented at Appendix-I for the consideration by the SPCBs / PCCs.

5.1 General Conditions

1. The authorization shall comply with the provisions of the Environment (Protection) Act, 1986 and the rules made thereunder.
2. The authorization or its renewal shall be produced for inspection at the request of an officer authorized by the SPCBs / **PCCs** as the case may be.
3. The person authorized **for hazardous waste management** shall not rent, lend, sell, transfer or otherwise transport the hazardous

wastes without obtaining prior permission of the SPCBs / PCCs.

4. Any unauthorized change in personnel, equipment and working conditions as mentioned in the application by the person authorized shall constitute a breach of his authorization.
5. It is the duty of the authorized person to take prior permission of the SPCBs / PCCs **before closing** down the facility.
6. An application for the renewal of an authorization shall be made as laid down in Rule 5 (6) (ii).
7. The occupier and operator of the authorized facility shall maintain records of its operations and send annual returns to the SPCBs / PCCs in the specified Form 3 and Form 4 respectively.
8. Before transferring ownership or operation of a facility during its operating life, or of a disposal facility during the post closure care period, the owner or operator must seek prior permission of the SPCBs / PCCs and must notify the **new** 'occupier' or 'operator' in writing of the requirements of this authorization. An occupier or operator of the requirements of this authorization in no way relieves the new occupier or operator of his obligation to comply with all applicable requirements.
9. Before an occupier or operator transports, treats, stores, or disposes off any hazardous waste, **Occupier or operator of a facility** must conduct a detailed physical and chemical analysis of a representative sample of the waste as per a written waste analysis plan to be developed and followed by **the Occupier or Operator of a facility** and approved by the SPCBs / PCCs. At **the** minimum, this waste analysis must contain all the information which must be known to treat, store or dispose **off** the waste. At the minimum, the waste analysis plan must specify:

- (i) The parameters for which each hazardous waste will be analyzed and the rationale for the selection of these parameters
 - (ii) The sampling method to obtain a representative sample of the waste to be analyzed.
 - (iii) The test method, which will be used to test these parameters.
 - (iv) The laboratory in which the analysis is to be carried out.
 - (v) The frequency with which the initial analysis of the waste will be reviewed or repeated to ensure that the analysis is accurate and upto date. (The analysis must be repeated as necessary to ensure that it is accurate and upto date. At the minimum, the analysis must be repeated, wherever there is a change in the process and operation generating the hazardous waste.)
10. For off-site facilities, the occupier or operator must inspect and, if necessary, analyze each hazardous waste consignment received at the facility to determine whether it matches the **identity** of the waste specified on the accompanying manifest.
11. The occupier and operator must prevent the unknown entry and minimize the possibility for the unauthorized entry of persons or livestock onto the active portions of **his (her)** facility. There should be an appropriate 24-hour surveillance system, a natural and artificial barrier surrounding the active portion of the facility, and a means to control entry at all times through the gates. Signs with the legend "Danger - unauthorized personnel keep out" must be posted at each entrance to active portion of a facility. The legend must be written in English and in **Vernacular Language** predominant in the area surrounding the facility and must be legible from a distance of at least 10m.
12. The occupier or operator must develop and maintain a written schedule for inspecting all monitoring equipment, safety and

emergency equipment, security devices and equipment that are important for preventing, detecting or responding to environmental or human health hazards. The schedule must identify the type of problems to be looked for during the periodic inspection by the occupier/operator and frequency of inspection to each item of schedule. The inspection details including date and time of inspection, name of the inspector, observations during inspection, nature and details of any repairs or other remedial actions shall be recorded and such records shall be maintained for at least 3 years.

13. All the facility personnel must be well informed about the hazardous waste management procedure relevant to the positions in which they are employed. All the facility personnel must be trained to ensure that they are able to respond effectively to emergencies by familiarizing them with the emergency procedures, emergency equipment operations and communication or alarm systems.
14. Facilities must be established, tested periodically and maintained to minimize the possibility of a fire, explosion or any unplanned sudden or non-sudden release of hazardous waste to air, soil, **sub surface** or surface water which could threaten human health or environment.
15. Wherever and whenever hazardous material is being handled, all personnel involved in the operation must have immediate access to an internal alarm or emergency communication device, such as a telephone capable of calling for external assistance.
16. The occupier **or** operator of the facility must maintain aisle space to allow the unobstructed movement of personnel and equipments to any area of the facility in an emergency.
17. The occupier of operator of the facility must make arrangements, as appropriate for the type of waste handled at the facility,

- (i) to familiarize police, fire departments and emergency response teams with the layout of the facility, properties of hazardous waste handled at the facility and associated hazards and possible evacuation routes.
 - (ii) to familiarize local hospitals with the properties of hazardous waste handled and the type of injuries or illnesses which could result from fires, explosions or releases at the facility.
18. Each occupier or operator of the facility must develop, implement, maintain and keep upto date, a contingency plan designed to minimize **impacts on** human health or the environment from fires, explosions or any unplanned sudden or non-sudden release of hazardous waste to air, soil or water environment.

The contingency plan must include:

- (i) Arrangements agreed to by local police departments, fire departments, hospitals, State and local emergency response teams to coordinate emergency services
- (ii) List of names, addresses and phone numbers of all persons qualified to act as emergency coordinator who is responsible for all emergency response measures
- (iii) List of all emergency equipment at the facility, and
- (iv) Evaluation plan for facility personnel where there is a possibility that evacuation could be necessary.

5.2 Special Conditions

5.2.1 Transportation and reception of hazardous wastes:

- 1. An occupier or operator who transports or offers for transportation, hazardous wastes for off-site treatment, storage or disposal, must prepare a manifest, in six

copies, and must designate on the manifest one facility which is permitted to handle the waste described on the manifest.

2. The occupier/operator who offers the wastes for transportation must:
 - (i) Sign the manifest certification by hand
 - (ii) Obtain hand-written signature of the transporter and **the** date of acceptance
 - (iii) Retain one copy and send one copy to the SPCBs / PCCs, and
 - (iv) Give the remaining copies of the manifest to the transporter **for necessary action as per manifest system.**
3. Before transporting of hazardous waste or offering hazardous waste for transportation off-site, the occupier/operator must package the waste in accordance **with the requirements** in respect of packaging, labeling and marking.
4. An occupier/operator shall not offer for transport or receive hazardous wastes from transporter who have not received an authorization, for transport of hazardous wastes, from the SPCBs / PCCs.
5. A transporter must not accept hazardous waste from a generator unless it is accompanied by a manifest signed by the generator. The transporter must sign and date the manifest acknowledging acceptance of the hazardous waste from the generator and ensure that the manifest accompanies the hazardous waste.
6. A transporter who delivers a hazardous waste to the designated facility, indicated in the manifest, must obtain

the date of the delivery and handwritten signature of the operator of the designated facility on the manifest, retain one copy of the manifest for a period of three years and give the remaining copies of the manifest to the designated facility.

7. In the event of an accident and discharge of hazardous waste during transportation, the transporter must take appropriate immediate action to protect human health and the environment, (e.g. notify to SPCBs / PCCs, local police and district administration, dike the discharge area) and must clean up the discharge as required and approved by the State Pollution Control Board.
8. If a facility receives hazardous waste accompanied by a manifest, the operator must
 - (i) Sign and date each copy of the manifest to certify that the hazardous waste concerned by the manifest was received.
 - (ii) Note significant discrepancy in the Manifest
 - (iii) Immediately give the transporter at least one copy of the signed manifest.
 - (iv) Within 15 days from the date of delivery send a copy of the signed manifest to the generator and to the SPCB/PCC.
 - (v) Retain at the facility a copy of each manifest for at least three years from the date of delivery.
9. Manifest discrepancies are differences between the quantity or type of hazardous waste designated on the manifest and the quantity or type of hazardous waste a facility actually receives.

10. If the generator / SPCBs / PCCs do not get back the signed manifest from the designed facility, generator has to bring this to the notice of SPCBs / PCCs and the appropriate action has to be initiated by the SPCBs / PCCs to identify and rectify the deficiency.
11. A transporter should engage drivers, provided with special training for handling and transport of hazardous wastes. Vehicles transporting the hazardous wastes and shall carry the Transport Emergency (TREM) card. In the event of accidental spillage during transport the instructions of the TREM card has to be followed.
12. The driver training shall, at the minimum, include:
 - (i) use of the manifest system
 - (ii) use of emergency equipment, such as fire extinguisher, gas mask, first aid etc.
 - (iii) procedure to be followed in case of an emergency during transit
 - (iv) use of TREM card
13. If the transporter cannot deliver the hazardous waste in accordance with the requirements must contact the generator for further directions.
14. The transporter should ensure that ignitable, reactive or non-compatible wastes are not transported along with the other waste. The transport vehicle should have proper lining, cover, cushioning, shock absorbers etc.

5.2.2 Handling and storage of hazardous wastes

1. On-site storage of the hazardous waste shall be permitted for a maximum period of 90 days, maximum quantity of 10 tonnes or a truck load, whichever is less, if otherwise

specially permitted. It must be stored in an **environmentally sound manner** i.e., in isolated location away from the plant operational area.

2. The off-site storage at a hazardous waste treatment, storage and disposal facility shall be permitted for a minimum period as required for economical and efficient treatment/disposal of the hazardous wastes.
3. The storage facility should have an appropriate containment system as per the "Spill Prevention, Control and Counter Measures Plan", approved by the SPCBs / PCCs.
4. Each container holding hazardous wastes **shall** be marked "HAZARDOUS WASTE", in red colour, both in **English, Hindi and in Vernacular language (s).**
5. The occupier or operator must take precautions to prevent accidental ignition or reaction of ignitable or reactive wastes. Such **waste** must be separated and protected from sources of ignition or reaction including, but not limited to, open flames, smoking, cutting and welding, hot surfaces, frictional heat, water, sparks, radiant heat etc.
6. The containment system in the storage area should be designed and operated to:
 - (i) have an underlying base free from cracks and sufficiently impervious to contain **leachate, any leaks, spills etc.**
 - (ii) drain and remove liquids which may result from leak, spill or precipitation
 - (iii) contain at least 10% of the volume of containers or the largest container whichever is higher

- (iv) "Run-on" into the containment system should be prevented
 - (v) have a slump or collection area to collect any leak, spill or precipitation and provision for immediate transfer of the same to prevent overflow of the collection system.
7. Hazardous wastes must not be placed in tanks for storage/treatment. **Otherwise**, it could cause the tank or its liner to rupture, leak, corrode and fail before the end of its intended life. Uncovered tanks must be operated to ensure at least 60 cm free board.

5.2.3 Treatment of hazardous waste

1. Surface Impoundments

- (a) Surface impoundments to treat, store or dispose **off** hazardous waste must have at least 60 cm free board. All earthen dykes must have a protective cover such as grass, or rock to minimize wind and water erosion. Ignitable or reactive wastes must not be placed in a surface impoundment, except in cases solely for emergencies, unless the waste is treated, rendered or mixed, so that it no longer meets the definition of ignitable or reactive wastes.
- (b) Hazardous waste shall not be placed in land treatment facility unless the waste is made non-hazardous by biological degradation or chemical reaction occurring in it or on the soil. "Run-on" must be diverted away from the active portions of a land treatment facility and "Run-off" from active portions of a land treatment facility must be collected and treated. Food chain crops must not be grown on the treated area of a hazardous waste land treatment facility unless the occupier/operator can demonstrate, based on field testing, that heavy

metals and other hazardous constituents will not be transferred to the food portion of the crop by plant uptake or direct contact and will not otherwise be ingested by food chain animals.

2. Incineration

- (a). Before adding hazardous waste, the occupier or operator must bring the incinerator to steady state (normal) conditions of operation in terms of operating temperature and airflow using auxiliary fuel or other means.

- (b). In addition to the waste analysis specified under general requirements, the occupier/operator shall sufficiently analyze any waste, which has not been previously **burnt** in the incinerator, so as to decide the "feed mix" and to determine the type of pollutants, which might be emitted. **The analysis must determine at least the following parameters:**
 - (i) Calorific value of the waste
 - (ii) Halogen content.
 - (iii) Sulphur content, and
 - (iv) Lead and mercury content, unless there are written /documented data to indicate that **such elements are absent.**

- (c). An incinerator shall be operated in accordance with the stack emission standards and tolerance limits for discharge of effluents as prescribed by the SPCBs / PCCs.

- (d). The incinerator shall not be operated below the specified minimum temperature, according to the waste characteristics, to achieve prescribe

destruction efficiency of the waste and also to avoid generation of toxic emissions, like dioxins.

- (e). The combustion zone shall be totally sealed against fugitive emissions, or combustion zone pressure is maintained lower than the atmospheric pressure.
- (f). The incinerator must be operated with a safety system to automatically cut off waste feed to the incinerator when operating conditions deviate.
- (g). A "trial-run" has to be done as per the "trial burn plan" duly approved by the SPCBs / PCCs to test the performance of the incinerator under the extreme operational conditions that may occur during the course of operation. The trial burn has to be repeated at least once a year or when the feed characteristics change or where the incinerator is restarted after a shut down/maintenance. The "trial burn plan" shall specify the operating conditions for the test, the parameters for monitoring the performance and mode of their measurement, waste feed rate, air flow, auxiliary fuel feed etc.
- (h). Combustion temperature, **scrubber flow & its p^H** and carbon monoxide in the stack emission shall be monitored and recorded on a continuous basis.
- (i). The liquids / gases introduced into the incinerator must be maintained for two seconds detention time at $1200 \pm 100^{\circ}$ C and three percent oxygen in the stack gas.
- (j). Combustion efficiency (%) of the incinerator, calculated as: $[(\text{concentration of carbon dioxide}) \div (\text{concentration of carbon dioxide} + \text{carbon monoxide})] \times 100$, shall be at least 99.99.

- k). The principal organic hazardous constituents(s) (POHC) for the waste feed to the incinerator has to be identified by the occupier/operator and approved by the SPCBs / PCCs. The incinerator must achieve a Destruction and Removal Efficiency (DRE) of 99.99 % for each POHC using the following equation:

$$\text{DRE} = \frac{W_{\text{in}} - W_{\text{out}}}{W_{\text{in}}} \times 100\%$$

Where,

W_{in} = mass feed rate of one POHC in the waste stream, and

W_{out} = mass emissions rate of the same POHC present in exhaust emissions prior to release to atmosphere.

- (l). Emission from incinerator shall meet the standards placed at Annexure-I.

3. Physico-chemical & biological treatment

- (a). Hazardous wastes or treatment reagents must not be placed in the treatment process or equipment if they could cause the treatment process or equipment to rupture, leak, corrode or otherwise fail before the end of its intended life.
- (b). Where hazardous waste is continuously fed into a treatment process or equipment, the process or equipment must be equipped with the means to stop this flow in the event of a malfunction in the treatment process/equipment (e.g. a waste feed cut-off system or by-pass system to a standby containment device).

- (c). The occupier/operator must conduct waste analysis and trial treatment tests or obtain documented information on similar treatment of similar waste under similar operation conditions and get the approval of SPCBs / PCCs, whenever:
 - (i). a hazardous waste, which is substantially different from waste previously treated in a treatment process / equipment at the facility, is to be treated, or
 - (ii). a substantially different process than any one previously used at the facility is to be used to treat the waste.
- (d). Incompatible wastes or materials must not be placed in the same treatment process/equipment.

4. Disposal **in landfills**

- (a). The landfill for disposal of hazardous wastes shall be a scientifically designed and engineered secure landfill with double liners and leachate control collection, **removal** and treatment systems.
- (b). Bulk or non-containerized liquid waste or waste containing free liquids must not be directly placed in a landfill.
- (c). Stabilized / solidified / encapsulated hazardous wastes **and other hazardous waste** shall only be admitted to the landfill **for final disposal** if it **passes the Toxicity Characteristic Leaching Procedure (TCLP) test or The Criteria for Disposal of HW into landfills, as applicable/notified under E (P) Act, 1986.**

- (d). An empty container must be crushed flat, shredded or similarly reduced in volume before it is disposed in a landfill.
- (e). Ignitable or reactive wastes must not be placed in a landfill, unless the waste is treated, rendered or mixed, so that the resulting waste mixture is no longer ignitable / reactive.
- (f). The occupier / operator of a landfill must maintain operating records indicating the exact location and dimensions of each cell and its contents and the environmental monitoring data.
- (g). The occupier / operator of a facility must maintain a specimen sample of each waste received and its characteristics alongwith exact location of the cell where it is disposed off.
- (h). The occupier / operator of a landfill, surface impoundment or land treatment facility has to implement a **groundwater** monitoring programme capable of determining the facility's impact on the quality of groundwater in the uppermost aquifer underlying the facility. The groundwater monitoring programme must be carried out in and around the facility during the active life and post - closure care period of the facility. The "groundwater quality monitoring programme" shall be as approved by the SPCBs / PCCs, and annual reports of the monitoring shall be submitted to the SPCBs / PCCs.
- (i). Any landfill facility must have a liner system for all portions of the landfill. The liner system must have a liner that is designed, constructed, and installed to prevent any migration of wastes out of the landfill to the adjacent **sub-surface soil or groundwater or surface water at any time**

during the active life (including the closure period) of the landfill. The liner shall be:

- (1). Constructed of materials that have appropriate chemical properties, and sufficient strength & thickness to prevent failure due to pressure gradients (including static head and external hydro-geologic forces), physical contact of the **waste** to leachate to which they are exposed, climatic conditions, the stress of installations and daily operations.
 - (2). Placed upon a foundation or base which is capable of providing support to the liner and resistance to the pressure gradients above and below the liner to prevent any failure of the liner due to settlement, compression or uplift.
 - (3). Installed to cover all surrounding earth, which is likely to be in contact with the waste or leachate.
- (j) There should be a leachate collection and removal system immediately above the liner, which is designed, constructed, maintained and operated in order to collect and remove the leachate generated from the landfill activity. The depth of leachate over the liner should not exceed 30 cm (one foot). The leachate collection and removal system shall be:
- (1). Constructed of materials that are chemically resistant to the waste and leachate, and of sufficient strength and thickness to prevent collapse under the pressures exerted by deposited wastes, cover materials, and by any equipment used at the landfill.

- (2). Designed and operated to function without clogging **till** the scheduled closure of the landfill.
 - (3). The collected leachate shall be treated before discharging through the sewer/to the surface water as per the standards **notified** under the Water (Prevention & Control of Pollution) Act, 1974 / the **Environment (Protection) Act, 1986.**
- (k). The owner or operator of a facility must design, construct, operate, and maintain a run-on control system capable of preventing any flow on to the active portion of the landfill.

In case of any fugitive emission of particulate matter in the landfill area due to the action of wind, the owner or operator should cover or otherwise manage the landfill by any other suitable means to control wind dispersal.

During construction or installation of liners and cover systems, the owner or operator **should inspect for checking the uniformity of the liner material and reject if found any damage or imperfections (e.g. holes, cracks, thin spots, or foreign materials).**

The owner or operator of the facility should invite the concerned SPCBs / PCCs officials periodically during the construction and/or installation of liners and cover systems for inspection.

Before operation of the facility, the owner or occupier of the facility should check for quality of the construction of the facility by using suitable techniques for its suitability for

disposal of HW and prior approval be obtained from SPCB/PCC in the form of “Consent to Operate”.

- (1). While landfill is in operation, the owner or operator should inspect atleast once in a week and after **any natural calamity** to detect:
 - (1). Deterioration, malfunctions, or improper operation of run-on and run-off control systems.
 - (2). Proper functioning of wind dispersal control systems.
 - (3). The presence of leachate, if any, and proper functioning of leachate collection & removal systems, wherever present.
 - (4). The treatment system of the leachate for proper operation, functioning and treatment efficiency.

5. Closure and post-closure requirements

- (a). The occupier/operator of all hazardous waste management facilities to store, treat and disposal **of** hazardous wastes shall apply in writing, at least one year in advance, seeking approval for the closure of the facility. The application must be accompanied with details **of** the closure plan, which should be approved by the SPCBs / PCCs.
- (b). The closure plan should indicate all steps to perform partial and/or final closure of the facility. The minimum action shall include:

- (i) a description of how each hazardous waste management unit at the facility will be closed.
- (ii) closure schedule
- (iii) a detailed description of the steps needed to remove or decontaminate all hazardous waste residues and contaminated containment system components, equipment, structures and soils during the closure including procedures for clearing equipment and removing contaminated soils.
- (iv) details of post-closure care including monitoring of the facility, **ground water quality etc.,**
- (v) a chronological list of different types of wastes disposed off in low facility site.

6. Location-specific requirements

SPCB/PCC shall specify site-specific requirements, if any, in line with the local regulations and site conditions under the 'Consent' granted.

ANNEXURE - I

EMISSION STANDARDS FOR COMMON HAZARDOUS WASTES INCINERATOR

- A. Emission limit of incinerator while operating properly at 100% rated capacity, shall have an emission limit from the discharge stack to atmosphere of less than or equal to:

Parameter	Emission limit (mg/Nm ³)
Particulates	50
HCl	50
SO ₂	200
CO	100
Total Organic Carbon	20
HF	4
NO _x (NO and NO ₂ expressed as NO ₂)	400

Note: All values corrected to 10% oxygen on a dry basis

- B. Hydrocarbons: 10 ppm, over an hourly rolling average dry basis, measured as propane.
- C. Opacity: While operating properly at 100% rated capacity, the system shall have a visible emission rate of less than or equal to 10%, except for condensed water vapour, from the discharge stack to atmosphere (one hour rolling average).
- D. Dioxins/Furans: While operating properly at 100% rated capacity, the system shall have an emission of dioxins and furans of less than or equal to 0.1 ng TEQ/Nm³ corrected to 10% oxygen. Sampling period shall be minimum 6 hours and maximum 8 hours. Analysis of dioxins and furans as well as reference measurement methods to calibrate automated measurement systems shall be carried out as given by CEN-standards. If CEN-standards are not available, ISO standards, National or International Standards, which

will ensure the provision of data of an equivalent scientific quality, shall apply.

- E. Metals: While operating properly at rated capacity, the system shall have an emission rate from the discharge of stack to atmosphere less than or equal to

Metals	Emission Limit (mg/Nm³)
Cd + Th (and its compounds)	0.05
Hg (and its compound)	0.05
Sb + As + Pb + Cr + Co + Cu + Mn + Ni + V (and their compounds)	0.50

Note: All values corrected to 10% oxygen on a dry volume basis

- F. Operating standard:

1. Combustion efficiency (CE) shall be at least 99.9% and shall be computed as follows:

$$CE = \% CO_2 \div [\% CO_2 + \% CO] \times 100 \%$$

2. Temperature of the primary chamber shall be at least 850 °C.
3. Secondary chamber gas residence time shall be at least 2 (two) seconds at 1100°C, with minimum 3% oxygen in the stack gas.
4. Destruction and Removal Efficiency (DRE) for each principal organic hazardous constituent (POHC) in the waste feed shall be at least 99.99%.
5. DRE for hazardous waste containing PCBs, PCTs and other chlorinated compounds shall be 99.9999%.

- G. Air pollution control device: The emission control system shall be installed for gas cleaning and removal of air pollutants. The system shall comprise the following equipment, singly or in combination, with design efficiencies to meet the emission norms:

- (i) Waste heat boiler / heat exchanger / quencher
- (ii) Bag filters / ESP / Cyclone
- (iii) Dry / wet scrubber with hydrated lime or sodium hydroxide injection
- (iv) Chimney / stack of minimum 30 m height or as per formula: $H = 14 (Q)^{0.3}$ [where, Q is the emission rate of SO₂ in kg/hr] which ever is more.

(Note: Dry/wet ESP, spray dryer, dedioxide filter and mist eliminator shall also be considered as may be required)

- H. Operating conditions: Incineration plants shall be operated in order to achieve a level of incineration such that the Total Organic Carbon (TOC) content of the slag and bottom ashes is less than 3%, or their loss on ignition is less than 5% of the dry weight of the material. If necessary appropriate techniques of waste pretreatment shall be used.

Incineration plants shall be designed equipped, built and operated in such a way that the gas resulting from the process is raised, after the last injection of combustion air, in a controlled and homogenous fashion and even under the most unfavorable conditions, to a temperature of 850 °C, as measured near the inner wall or at another representative point of the combustion chamber as authorized by the competent authority, for two seconds. If hazardous wastes with a content of more than 1% of halogenated organic substances, expressed as chlorine, are incinerated, the temperature has to be raised to 1200 ± 100 °C for at least two seconds.

Each line of the incineration plant shall be equipped with at least one auxiliary burner. This burner must be switched on automatically with the temperature of the combustion gases after the last injection of combustion air falls below 850°C or 1100 °C as the case may be. It shall also be used during plant start-up and shut-down operations in order to ensure that the temperature of 850 °C or 1100 °C, as the case may be, is maintained at all times during these operations and as long as unburnt wastes is in the combustion chamber.

During the start-up and shut-down or when the temperature of the combustion gas falls below 850 °C or 1100 °C, as the case may be, the auxiliary burner shall not be fed with fuels which can cause higher emissions than those permitted.

- I. Monitoring requirements: Continuous monitoring and recording system for opacity, CO, SO₂ and NO_x shall be; installed and reports shall be sent to the State Pollution Control Boards on regular basis. Interlocking arrangements for CO and temperature controls (in primary and secondary chamber) with feeding devices shall also be provided.

Waste feed has also to be terminated on loss of ignition in the after burner.

Safety valve shall be provided in case of high-pressure development in the furnace.

- J. Notification of compliance: The operator of the incinerator shall undertake comprehensive performance test. Within 90 days of completion of comprehensive performance test, the operator shall issue a notification of compliance documenting compliance or non-compliance, as the case may be, for public information / notice.

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HAZARDOUS WASTE MANAGEMENT

**GUIDELINES FOR GRANTING
CONSENT TO ESTABLISH / OPERATE TSDF
BY SPCB/PCC**

(A SUGGESTED DRAFT)

TO BE ISSUED TO M/s ABCD

STATE POLLUTION CONTROL BOARD
August 2004

Order No.:

Dated:.....

Sub: Consent to Establish /Operate TSDF

Consent to Establish / Operate under Section 25 / 26 of the Water (Prevention & Control of Pollution) Act, 1974, as amended and under Section 21 of the Air (Prevention & Control of Pollution) Act, 1981, as amended and Authorization under Rule 5 of the Hazardous Wastes (Management & Handling) Rules, 1989, as amended, and the Bio-Medical (Management & Handling) Rules, 1998, notified under the Environment (Protection) Act, 1986 (to be hereinafter referred as Water Act, Air Act, HW (M&H) Rules and Bio-Medical Rules, respectively) is hereby granted to :

M/s ABCD

(name & address with telephone number)

to establish / operate a common facility as ‘Operator for collection, treatment, storage and disposal of composite hazardous wastes’ (hereinafter referred as TSDF), subject to the following conditions.

1. The consent to establish is granted as Operator of the facility, under Rule 5 of the Hazardous Waste (Management & Handling) Rules, 1989, as amended, and to set up common hazardous wastes and bio-medical waste, collection, transportation, treatment, storage and disposal facility (TSDF) at (provide address)
2. The consent to establish is valid for the period of two years from the date of issue of this consent order.
3. The installed and operating capacity of the TSDF shall be as under:
 - (a) Secured landfill : tonne / year HW + tonne / year of incineration ash, i.e. @% of HW incinerated
 - (b) Incineration : tonne/ year
 - (c) Bio-medical wastes : tonne year
4. The capital cost of the proposed project shall not be less than Rs..... Crores which shall include plant and machinery, buildings, site infrastructure etc. as per the criteria of selection adopted by State Industrial Development Corporation..... and its agreement to this effect with the TSDF operator.
5. The TSDF shall cater to the requirements of environmentally sound management as required under the HW (M&H) Rules, for the hazardous wastes generated by the

industries possessing valid authorization by SPCBs / PCCs and operating in the following SIDC and nearby non-IDC Industrial Areas:

- (a)
 - (b)
 - (c)
 - (d)
 - (e)
 - (f)
 - (g) Till the common TSDF for(name: industrial estates) is established, hazardous wastes from SIDC industrial area at (designated area) shall also be accepted by TSDF at(area).
 - (h) Depending upon the technical capacity and feasibility, hazardous wastes from industries operating in non-IDC industrial areas and also industries operating in SIDC areas other than mentioned at no. (a) to (f) above and authorized by concerned SPCB, shall also be accepted by the TSDF at this area.
6. SPCB/PCC shall issue suitable amendments in the authorizations issued under Rule 5 of HW Rules, to the industries generating hazardous wastes and operating in the areas mentioned at Serial Number 5 (a to h), directing them to send their wastes to the TSDF at..... , through implementation of manifest system stipulated in the HW (M&H) Rules, failing which their authorization shall be revoked or not granted.
7. The generators of the hazardous wastes utilizing the common facility of TSDF atshall be bound to pay the costs to the TSDF Operator (on polluter pays principle as enunciated by the Honourable Supreme Court of India) based on the criteria adopted by the SIDC in its RFP (Request for Proposal) document No....., based on which SIDC has entered into agreement with the TSDF operator. The revision of costs involved in TSDF operations shall be further governed accordingly. SPCB/PCC shall issue suitable directions in this regard to all concerned.
8. In case of variations in the quantities of hazardous wastes available for TSDF operations, concerned SPCB shall review, as may be required, and revise the jurisdiction of the command area allocated to the TSDF at
9. The Operator of the TSDF shall **only** accept the wastes covered under the HW (M&H) Rules and Bio-medical Waste Rules.
10. Transportation of hazardous wastes and bio-medical wastes shall be done in compliance with the HW (M&H) Rules and Bio-medical Waste (M&H) Rules respectively. Suitable transport vehicles, closed containers etc. shall be provided commensurate with the nature/characteristics of wastes. Transportation costs shall be recovered from the waste generators in accordance with the RFP and the agreement of SIDC with the TSDF Operator.

11. The TSDF operator shall be responsible for implementation of conditions and criteria as laid down in the RFP document and agreement with SIDC.
12. The TSDF Operator shall be legally bound under this authorization to co-operate and comply with the directions as may be issued by SIDC in terms of its agreement with TSDF operator.
13. Treatment and disposal of the hazardous wastes shall be done as under:
 - [a] **Secured Landfill**
 - (a1) Direct landfill
 - (a2) Landfill after treatment
 - [b] **Incineration**
 - (b1) Direct incineration
 - (b2) Treatment followed by incineration and disposal of ash in the landfill.
 - [c] **Physico-chemical treatment**
14. Secured landfill shall be constructed in accordance with the guidelines issued by CPCB in its document entitled "Criteria for Hazardous Wastes Landfills, [HAZWAMS/17/2000-01]". However, the total clay thickness provided shall be 1m at the base of the landfill without any intermittent clay layer. Double liner system shall also be provided. Rest of the requirements in the said document shall remain unchanged.
15. Quality control and assurance programme during the course of construction and installation/commissioning shall be prepared by the TSDF Operator and its implementation shall be done under the supervision of concerned SPCB/PCC and SIDC, as the case may be. SIDC may consider appointing a special authority for this purpose as provided in the RFP.
16. SIDC, being an authority notified under Rule 8 of HW (M&H) Rules, shall coordinate with the TSDF Operator for implementation of the project in accordance with its agreement with the Operator. For this purpose, continuance of the role of the Expert Committee for HWM set up by SIDC is envisaged for advice from time to time and this may inter-alia include arbitration in terms of cost escalations and dispute resolution.
17. **Incinerator**

In order to treat combustible and organic hazardous wastes, incinerator shall be designed, constructed and commissioned for operation in accordance with the requirements stipulated in the Schedule "A" of this consent order.

The incinerator shall be a dual chambered incinerator with the primary chamber operating at a temperature > 850 °C and the secondary chamber operating at a temperature > 1100 °C. The incinerator shall be provided with a minimum gas phase residence time of 2 seconds and combustion air shall be 100% in excess of the stoichiometric requirements.

The destruction and removal efficiency (DRE %) of the Persistent Organic Pollutants (POPs) in the hazardous wastes shall be greater than 99.99.

18. Laboratory

The TSDF Operator shall set up the laboratory for analysis of hazardous wastes in accordance with the provisions contained in the RFP document. The laboratory shall have the capability to carry out the comprehensive and finger print parameter (s) analysis as may be necessary for treatment and disposal of the hazardous wastes. The laboratory shall be adequately staffed and equipped to carry out the above work. The laboratory shall be responsible to maintain the analytical records.

Laboratory instruments and equipment as indicated in the RFP document of SIDC and the techno-business proposal submitted by the TSDF Operator shall be installed and commissioned. Any additional instruments/equipment required for sampling, storage, transportation, analysis etc. shall also be procured by TSDF operator.

19. Transportation of Wastes

The TSDF operator shall also be responsible for transportation of hazardous wastes as “transporter”. The transportation vehicles and containers shall be suitably designed to handle the hazardous wastes and bio-medical wastes. The transporter shall carry / display the TREM card during transportation of the hazardous wastes and comply with the provisions under Motor Vehicles Act (MVA), 1988, as amended, and rules made there under.

The TSDF operator shall be responsible for cleanup operators in case of spillage, leakage or any other accidental/incidental discharge of hazardous wastes and shall keep the concerned SPCB/PCC suitably informed.

The waste transporter shall be responsible to maintain the manifest system.

20. Emergency Preparedness Plan

The TSDF operator shall prepare an on-site emergency plan and provide adequate training to the staff at the facility. The emergency preparedness plan shall be prepared and put in place prior to the commencement of TSDF operations and shall be submitted to the concerned SPCB/PCC along with application for Consent to Operate.

21. Conditions regarding Water Act

(i) The daily quantity of water consumption shall not exceed KLD.

- (ii) The daily quantity of trade effluent from the TSDF operations shall not exceed KLD.
- (iii) The daily quantity of sewage from the TSDF operations shall not exceed ... KLD.
- (iv) Trade effluent treatment

The TSDF Operator shall provide comprehensive treatment system consisting of Primary / Secondary and / or Tertiary treatment as may be warranted with reference to influent quality, and operate and maintain the same continuously so as to achieve the quality of the treated effluent to the following standards before disposal:

S. No.	Parameters	Standard
1.	pH	5.5 - 9
2.	BOD, 3 days, 27°C	100
3.	Oil & Grease	20
4.	Suspended solids	100
5.	Residual chlorine	1
6.	NH ₃ as N	50
7.	TKN as N	100
8.	COD	250
9.	Arsenic (as As)	0.2
10.	Mercury (as Hg)	0.01
11.	Lead (as Pb)	1.0
12.	Cadmium (as CD)	2.0
13.	Total Chromium (as Cr)	2.0
14.	Copper (as Cu)	3.0
15.	Zinc (as Zn)	15
16.	Selenium (as Se)	0.05
17.	Nickel (as Ni)	5.0
18.	Cyanide (as CN)	0.2
19.	Fluoride (as F)	15
20.	Sulphide (as S)	5.0
21.	Pesticides	Absent
22.	Phenolic Compounds (as C ₆ H ₅ OH)	5.0

Note: All parameters are in mg/l except pH

- (v) **Trade Effluent Disposal Outlet Conditions:** Treated effluent complying with the disposal standard shall be transported to nearby CETP till incineration facility for disposal of treated effluent (forced evaporation system) is commissioned by the TSDF operator alongwith the commissioning of hazardous waste incinerator.
- (vi) **Sewage Treatment:** The TSDF Operator shall provide a comprehensive treatment system as is warranted with reference to influent quality and operated and maintain the same continuously so as to achieve the quality of treated effluent to the following standards before disposal:

Suspended solids	Not to exceed 100 mg/l
B.O.D., 3 days, 27°C	Not to exceed 100 mg/l

- (vii) **Sewage Disposal Outlet Conditions:**

Refer : General standards for sewage treatment and disposal as per E(P)Rules

- (viii) **Non-hazardous Solid Wastes:**

Type of waste	Quantity Treated (Tonnes/year)	Disposal
Incineration ash	6000	Secured Landfill

(ix) **Other Conditions:**

.....

(Please mention, if any.)

22. Conditions under the Air (P&CP) Act, 1981

- (i) The TSDF Operator shall erect the chimney(s)/stack(s) of the following specifications:

S. No.	Chimney/ stack attached to	Height (m)	Dia. at top (m)	Gas velocity (m/s)	Gas discharge (Nm ³ /hr)
01.	CHW Incinerator	30	0.80		
02.	BMW Incinerator	30	0.50		
03.	Gen. set: 300 KVA				
04.					
05.					
06.					

- (ii) Incinerator for composite hazardous wastes (CHW)

The TSDF Operator shall install a comprehensive air pollution control system consisting of dust separators, gas scrubbers, and stack height of at least 30 m. and operate & maintain the same continuously so as to achieve the emission level of air pollutants from the CHW incinerator in compliance with the following emission standards/limits:

S. No.	Parameters	Emission limit*
1	Particulates	30 mg/Nm ³
2	<i>HCl</i>	60 mg/Nm ³
3	<i>SO₂</i>	200 mg/Nm ³
4	<i>CO</i>	100 mg/Nm ³
5	<i>HBr</i>	60 mg/Nm ³
6	<i>Dioxin/Furan</i>	0.1 ng TEQ/Nm ³
7	<i>Opacity</i>	10%
8	<i>Cadmium (Cd)</i>	0.05 mg/Nm ³
9	<i>Thallium (Tl)</i>	0.05 mg/Nm ³
10	<i>Mercury (Hg)</i>	0.05 mg/Nm ³
11	<i>Antimony (Sb)</i>	0.5 mg/Nm ³
12	<i>Arsenic (As)</i>	0.5 mg/Nm ³
13	<i>Lead (Pb)</i>	0.5 mg/Nm ³
14	<i>Chromium (Cr)</i>	0.5 mg/Nm ³
15	<i>Cobalt (CO)</i>	0.5 mg/Nm ³
16	<i>Copper (Cu)</i>	0.5 mg/Nm ³
17	<i>Manganese (Mn)</i>	0.5 mg/Nm ³
18	<i>Nickel (Ni)</i>	0.5 mg/Nm ³
19	<i>Vanadium (V)</i>	0.5 mg/Nm ³
20	<i>Tin (Sn)</i>	0.5 mg/Nm ³

* 10% Oxygen, dry basis

(iii) Incinerator for Bio-medical wastes

(a) Emission Standards

The TSDF Operator shall install a comprehensive air pollution control system consisting of dust separators, gas scrubbers and

stack height of atleast 30 m and operate & maintain the same continuously so as to achieve the emission level of air pollutants from the incinerator of the bio medical wastes in compliance with the following emission standards/ limits:

S. No.	Parameter	Emission Limit*
01.	Particulate matter	150 mg/Nm ³
02.	Nitrogen Oxides	450 mg/Nm ³
03.	HCl	50 mg/Nm ³
04.	Stack Height	30 m above the ground
05.	VOC in ash	Not more than 0.01%

* 12% CO₂ correction

Note:

- Wastes to be incinerated shall not be chemically treated with any chlorinated disinfectants
- Chlorinated plastics shall not be incinerated.
- Incineration ash containing toxic metals shall be treated as hazardous wastes and disposal of the same shall be done at the secured landfill as per conditions stipulated for disposal of hazardous wastes under HW (M&H) Rules.
- Only low sulphur fuel, such as LDO/LSHS/Diesel shall be used as fuel in the incinerator.

(b) Operating Standards

1.	Combustion efficiency (CE) shall be at least 99%. CE = % CO₂ ÷ [% CO₂ + % CO] x 100%
2.	Temperature of the primary chamber shall be 800 ± 50°C.
3.	Secondary chamber gas residence time shall be at least 1 (One) second at 1050 ± 50°C, with minimum 3% oxygen in the stack gas.

(iv) The TSDF Operator shall observe the following fuel consumption

S. No.	Type of fuel	Quantity/ month
01.	LDO	
02.	LSHS	
03.	Furnace Oil	

- (v) The TSDF Operator shall provide ports in the chimney/stack and facilities, such as ladder, platform etc., as per requirements for monitoring the air emissions and the same shall be open for inspection and use by the authorities.

The chimney / stacks attached to various sources of emission shall be designated by numbers such as S-1, S-2 etc. and these shall be painted / displayed to facilitate identification.

- (vi) Noise: The TSDF Operator shall take adequate measures for control of noise from its own source particularly the generators set so as to comply with the standards notified under the Environment (Protection) Act, 1986.

- (vii) Other Conditions: (Please mention, if any)

23. Conditions under the Bio-medical Wastes (M&H) Rules, 1998:

The TSDF Operator shall comply with the provisions and standards / requirements regarding collection, transport, treatment and disposal of Bio-Medical Wastes as stipulated under the Bio-medical Waste (Management & Handling) Rules, 1998, notified under the Environment (Protection) Act, 1986.

- 24. General conditions presented in the Schedule - A of this order shall be complied with by the Operator / occupier of the TSDF.

- 25. All the conditions of this consent shall be strictly implemented and the consent order shall be displayed at a prominent location in the factory premises.

This is issued pursuant to the decision taken by the Consent Appraisal Committee of the concerned SPCB..

For and on behalf of the SPCB/PCC

Date:
Place:

Member Secretary

Encl: Schedule - A

To

M/s.ABCD

Copy to:

1. Chief Executive Officer, State Industrial Development Corporation
2. Joint Secretary, HSM Division, Ministry of Environment & Forests, 'Paryavaran Bhavan', C.G.O.Complex, Lodi Road, New Delhi - 110 003
3. Member Secretary, Central Pollution Control Board, 'Parivesh Bhavan', East Arjun Nagar, Shahadara, Delhi - 110 032
4. District Collector (Concerned District)
5. Regional Officer, State Pollution Control Board/PCC,
6. Sub-Regional Officer, SPCB/PCC
7. Chief Accounts Officer, SPCB/PCC

Received Consent fees of:

Amount (Rs)	DD No.	Date	Drawn on

8. Cess Branch, SPCB/PCC.
9. Master File

SCHEDULE - A

**OPERATING REQUIREMENTS FOR THE
COMPATIBLE HAZARDOUS WASTE (CHWTSDF)**

**Ref.: Consent to Establish / Operate Issued to The TSDF Operator / Occupier, namely
.....**

1. Compliance with the Regulations:

All operations involving collection, transport, treatment, storage and disposal shall comply with the guidelines / regulations issued by CPCB / MoEF as may be adopted by the SPCB/PCC and stipulated in the authorisation under Rule 5 of the HW (M&H) Rules. The Operator should ensure that the wastes from the generators are accepted at the facility in compliance of the manifest notified under the said rules.

2. Overall Responsibilities of the Operator:

- (a) Accepting hazardous wastes and bio-medical wastes at TSDF from the generators authorized by the concerned SPCB
- (b) Establishing a system for optimal movement of wastes transportation and treatment and disposal operations, which may include resource recovery / recycling, regarding as the case may be.
- (c) Operating the TSDF as per conditions stipulated in the authorization.
- (d) Undertaking cleanup operation in case of contamination resulting from TSDF.
- (e) Pollution and the odour arising out of TSDF operations and subsequent abatement.
- (f) Compliance of regulations concerning occupational safety and health of TSDF employees.

3. Sequence of Operations at the CHWTSDF

- (a) Hazardous wastes / bio-medical wastes and its analysis report shall be received by Operator from the generator.
- (b) The operator shall examine the report and plan pathway for waste treatment and disposal.

- (c) Upon confirmation of the same by the operator to the generator, the waste shall be dispatched to the TSDF accompanied by transport manifest.
- (d) Upon receipt at the facility, the wastes shall be weighed and properly logged.
- (e) Waste shall then undergo a visual inspection to confirm the physical appearance.
- (f) A representative sample of the waste shall be collected and sent to the on-site laboratory for analysis.
- (g) The results of the analysis shall be compared with the results of earlier analysis.
- (g) Upon confirmation, waste shall then be sent for TSD operations according to the identified pathway.

4. Storage at Generator's Premises

It is the responsibility of the Operator to inform the Generator about non-compatible wastes, so that the generator may take precautions against mixing or storing of such wastes. The Operator shall have to educate the Generator's staff to make on-site storages in colour-coded containers that are supplied by the Operator. The volume of specific type of waste and carting cycle shall govern the size of the containers, drums, trolleys etc. While considering this, the Operator shall see that problems, like odour, surface water contamination, groundwater percolation etc. do not occur.

5. Characterization

- 5.1 Generator shall provide declaration to the effect that hazardous wastes generated are as per authorisation by the Board.
- 5.2 Generators of hazardous wastes shall identify and provide analysis report including CRIT criteria of the waste consignments. The operator should ensure that the generator provides such information regarding:
 - (a) throughput and process that generates the waste, with quantities, and
 - (b) the physical and chemical description of the waste as per parameters.
- 5.3 The operator should ensure that hazardous waste codes are properly placed as per HW (M&H) Rules.

6. Pretreatment at Site

This aspect is basically for making the wastes more amenable for transport and further treatment. This can be done by way of incinerator neutralization, oil & grease removal, change in form, dewatering etc., so as to render such waste less hazardous. This activity should be done in an engineered manner and the pollution so generated would have to be treated, so as to meet the standards stipulated in this consent order.

7. Pre-Transport

- 7.1 The occupier / generator of the Hazardous waste shall send one copy (white) out of the six coloured copies of the manifest to the SPCB, retain one copy (light yellow) with dated signature of the waste transporter after handing over the waste. The remaining 4 copies to be used for further necessary action as prescribed in the HW (M&H) Rules. The Operator of the TSDF shall not accept hazardous wastes from a generator (through the transporter), unless the four remaining copies (with colour codes) of the manifest are provided by the generator. The operator of the TSDF will retain a copy (pink), return a copy (orange) to the transporter after receipt of the waste, and forward a copy (green) to the SPCB and send a copy (blue) to the occupier after disposal of the waste as per HW (M&H) rules.

This aspect shall include the envisaged strength of fleet of hazardous waste transportation vehicles that the Operator desires to place in service. The transport vehicles shall be designed suitably to handle and transport the hazardous wastes of various characteristics. The transportation may include transferring of the containers or contents. In both the cases, however, it has to be seen that non-compatible wastes are not mixed. The wastes shall be transported in closed containers at all times. Necessary precautions should be taken as envisaged under the guidelines issued by MoEF in 1991, CPCB in 1998 and Central Motor Vehicles Rules, 1989. There should be a garage / workshop to inspect cushioning springs, sparking from silencer, engine getting hot, starting trouble, washing of vehicles, closing arrangement etc.

- 7.2 Pre-transportation operations shall include pre-inspection of tankers/containers before filling, to check for cleanliness/ washing followed by packaging, labelling and marking. Drivers should be trained and knowledge should be provided regarding TREM (Transport Emergency) Cards and the manifest books. Washing of the containers/vehicles shall be done at the CHWTSDF or transfer stations after unloading of wastes and not in the Generator's premises before loading of fresh waste. Old labels shall be removed to avoid misleading messages. Proper documentation shall be done as per HW (M&H) Rules.

8. Loading & Transportation

Since the transportation cargo would be hazardous, it is essential that mechanical loading of containers take place with the help of mobile or in-built cranes/ loading equipment in the transportation vehicles meant for transporting the hazardous wastes. Portable or inbuilt cranes should be engaged to lift the containers and place them on the transporting vehicles. Spillages should be avoided through measures, such as checking shock

absorbing capacity of vehicles, road surfaces, free board in the containers, curvature of the roads, unsecured fastenings of the drums etc. Manifest / shipping documents or a change of custody receipt books is essential. A location map may be prepared on a daily basis where every entry of hazardous waste load is shown.

9. Spillage Handling

- 9.1 Spillages during handling should be avoided by adopting good housekeeping practices and upkeep of storages/handling equipment. Operator would have to train transporting staff and provide them with instructions to use the TREM (Transport Emergency) Cards to deal with fires and accidents and should equip them with road signs, placards, etc. This aspect should also be covered under the insurance scheme.
- 9.2 The Operator shall immediately inform the concerned SPCB and other regulatory authorities in case of spillage, leakage or other accidents during transportation.

10. Waste Treatment / Stabilization

- 10.1 Waste Treatment/Stabilisation is a process designed to convert hazardous wastes in the form of non-aqueous liquids, semi-solids or reactive solids into less leachable solids that can be then deposited directly into the secured landfill. The treatment/stabilisation operations will be carried out for all wastes identified for the purpose so as to minimise their contaminant leaching potential. This will change the nature of these wastes to a less hazardous category. Treatment/ stabilisation could involve immobilisation of leachable materials by fixation of non-reactive solids, reduction of volume, reducing contaminant level of organic/inorganic components. etc. Selection of technology would depend on the nature of waste, physical properties, options for technology applications cost etc. The treated wastes will be assessed for compatibility with other wastes as with liner system used before being land-filled.
- 10.2 The term treatment/stabilisation is intended to cover a number of mechanisms including:
- (a) Immobilization/Chemical Fixation: The chemical binding of contaminants within a cementing structure to reduce the mobility or leachability of the waste constituents
 - (b) Encapsulation: The occlusion or entrapment of contaminant particles within a solid matrix
 - (c) Solidification: The conversion of slurries that do not readily de-water into solids, by addition of solidification and absorption agents.
- 10.3 General Operations for waste treatment /stabilisation may include:
- (a) Receiving waste and its storage at designated place
 - (b) Reagent addition as per the pre-estimated quantities

- (c) Mixing and curing
- (d) Thermal treatment to remove moisture, organics etc.
- (e) Analysis of the stabilized sample
- (f) Transfer of stabilized material to landfill

The above process operations generally have the potential to create gaseous and particulate emissions into the air. This can be controlled by proper management practices including masking (and would have to be properly managed).

- 10.4 Ambient odour due to TSDF operations has to be neutralised by the operator.
- 11.0 Placing bulk, containerised, or non-containerised liquid hazardous wastes containing free liquids (whether or not absorbents have been added, liquids that have been absorbed in bio-degradable materials and liquids that have been stabilised by adsorbents but will release liquids when compressed under normal pressure that might occur during and after land filling) in the landfill is prohibited regardless of the length of time, presence of liners or leachate collection system.
- 11.1 Hence, the Operator shall use the Paint Filter Liquid Test (PFLT) to comply with this requirement. This test determines whether the waste can be accepted to landfill. If the work does not pass the PFLT, it must be treated before it can be placed in the landfill.
- 12.0 Waste treatment/stabilisation would have to be performed on all wastes that find their final disposal into the secured landfill but do not meet the landfill disposal criteria (placed at Annexure I of this schedule).

13.0 Identification of Parameters for Waste Treatment / Stabilization

Waste treatment/stabilisation parameters shall include both physical and chemical tests. Physical tests shall be performed to characterise wastes before and after stabilisation / solidification / treatment. The chemical tests shall primarily be the leaching tests, which will be conducted to evaluate the performance of specific treatment processes.

14.0 Analysis Protocol to Confirm Treatment / Stabilization of Waste

The operator has to conduct and document the results of the following physical tests applicable to incoming waste as well as on treated/stabilized hazardous waste. The physical tests shall be classified into the following categories:

Test	Purpose
Index Property Test – Particle size analysis (PSA)	To determine the particle size distribution of a material
Moisture Content – Paint filter liquid test (PFLT)	To determine the presence of free liquids in a representative sample of bulk of non-containerized waste

Density Testing – Bulk Density	To determine the in-place density
Compaction Testing	To minimize volume of the waste
Moisture Density Relations	To determine the relation between moisture content and density of the waste
Permeability Testing – Falling head permeability / constant head (FHP/CH)	To measure the rate at which water will pass through a stabilized waste
Strength Testing – Unconfined compressive strength (UCS)	To evaluate how cohesive the stabilized materials behave under mechanical stress
Flexure Strength (FS)	To evaluate a stabilized waste's ability to withstand loads over a large area
Cone Index (CI)	To evaluate a stabilized waste's stability and bearing capacity
Durability Testing – Wet dry durability (WDD)	To determine how the stabilized waste behaves or degrades after repeated wet-dry cycles

- 14.1 Chemical Tests: Leaching tests shall be used in evaluating the performance of treatment / stabilisation / solidification processes for wastes as per the recommended TCLP procedure for the identified chemical constituents in the stabilised waste. The waste stabilised shall meet the BDAT standards of USEPA before their disposal to the secured landfill till the Indian Standards for BDAT are notified.

15. Storage at TSDF

Separate area shall be earmarked for storing the waste at TSDF. The storage area may consist of different cells for storing different kinds of hazardous wastes. In designing these cells, the following points may be taken into consideration:

- (a) That ignitable, reactive and non-compatible wastes shall be stored separately.
- (b) That wastes containing volatile solvents or other low vapour pressure chemicals shall be adequately protected from direct exposure to sunlight
- (c) The storage area shall have a proper containment system. The containment system shall have a collection area to collect and remove any leak, spill or precipitation.
- (d) It shall be designed in such a way that the floor level of the storage area is at least 150 mm above the maximum flood level.
- (e) The operator shall put in place a system for inspection of the storage area to check the conditions of the containers, spillages, leakages etc and maintain proper

records as may specified by the concerned SPCB in the authorization to operate TSDF.

- (f) The hazardous wastes should not be stored for more than 2 weeks at this temporary storage area.
- (g) In case the waste is not in accordance with the authorization issued by the concerned SPCB to the generator, the operator shall inform immediately to the concerned SPCB for advice and necessary action.

16. Post-treatment

Even after complete treatment there may be some residues left and care of this post-treatment residue has to be taken through physico-chemical, biological treatment, i.e. separation of oil, de-water sludge, mother liquor during solvent recovery reappearance of leachates, incinerator's ash. Safe treatment and disposal of these wastes shall be done within the TSDF.

17. Secured Landfill

- 17.1 Prior to the placement of wastes in the secure landfill, an engineered capping over the surface shall be placed after completion of work daily so as to minimise the infiltration of rainfall.
- 17.2 During rains, the secured landfill shall have to be capped provisionally in order to prevent entry of rain into the landfill and storage areas and avoid leachate generation. The Operator shall maintain a run on control system capable of preventing flow on to the active portion of the landfill as well on the storage areas. The run off from the areas in proximity to the TSDF site shall have to be diverted away from the site. Location map of the landfill showing disposed wastes shall have to be prepared and continuously updated for monitoring and precautionary purposes.

18. Leachate Treatment and Disposal

Having considered leachate quantity, quality and the variations associated, it is essential to identify the components of the leachate that are to be treated or removed such as:

- (a) Removal of high concentrations of degradable organic compounds
- (b) Removal of high concentrations of non-degradable organic compounds
- (c) Removal of varying concentrations of specific hazardous organics
- (d) Removal of varying concentrations of specific hazardous inorganic
- (e) Removal of ammonia

- (f) Denitrification of nitrates/nitrites
- (g) Removal of odours including sulphides
- (h) Removal of suspended solids
- (i) Disinfection (if required)

19. Incineration

19.1 The primary aim of incineration is to completely destroy the toxicity of wastes and to get products (solids and gases) of combustion that are harmless. To achieve these aims, attention must be given to the “Three T’s of Combustion”:

- ❖ Temperature
- ❖ Time
- ❖ Turbulence

19.2 Availability of oxygen is an additional parameter, which forms an integral part of the incineration system. When the waste is burnt at the higher temperature destruction would be complete and formation of un-burnt waste, formation of organic by-products etc. would also be eliminated. The longer the waste is held at high temperature, the greater will be the degree of destruction and the less-likelihood of formation of PICs / POPs.

19.3 Turbulence relates to the degree of mixing between the waste and oxygen in the combustion air to the absence of temperature gradients within the furnace. Greater turbulence provides better control, better access to air and more complete oxidation and destruction of the wastes being burnt.

19.4 Operating Requirements

- (a) Temperature of 900 - 1100 °C for hydrocarbon wastes and 1100 - 1200 °C for certain wastes like PCBs, waste oil residues etc. For certain halogenated organics this has to be decided on a case-to-case basis.
- (b) Time: Minimum gas phase residence time shall be of 2 seconds. Residence time of hearth solids is measured in hours and this control would be on complete destruction of solids
- (c) Combustion Air: 100% in excess of stoichiometric requirements
- (d) Turbulence: is achieved through good incinerator design.

20. Monitoring

- 20.1 Monitoring is essential because it gives a final signal about the success of treatment in converting the hazardous waste to a non-hazardous waste. It also allows timely intervention in case of leakages of pollutants before they could lead to serious accidents.
- 20.2 Monitoring shall be done with benchmarking the present environment in its original state i.e. before CHWTSDF is brought into construction or operation. Monitoring will continue during the operation and will go on during the post closure phase too. Monitoring shall have to be designed for various environmental facets such as:
- (a) Air - Regular monitoring at upwind, downwind and at three stations at 120° angle around the CHWTSDF is necessary. The locations of these stations depend on the stack height and location of any particular ecologically sensitive feature. Samples should be collected from stacks, vents and ducts as per emission regulations stipulated by CPCB.
 - (b) Surface waters - Monitoring of waters at locations upstream, downstream and in adjoining local nullah/ river is necessary. It is also necessary to collect the sample of surface waters of the impoundment as well as the benthal deposit of the stream.
 - (c) Groundwater - Samples should be collected from specially dug wells one on the upgradient and at least three on the down gradient and deep enough.
 - (d) Soil - Samples of surrounding soil at ground level should be collected in a circular grid as per CPCB guidelines.
 - (e) Vegetative cover - To assess the ill effect occurrence, inspection of vegetative cover is necessary along the periphery of the site.
 - (f) Biological indicator - By planting sensitive plants in all directions and at different distances and to note periodically the health of each plant.
 - (g) Complaint - Complaint oriented monitoring and redressal will have to be done from time to time before it becomes an issue throttling the entire project under public pressure or with the public interest litigations. The complaints may be on aesthetics, such as odour, hazardous accidents, noise, colouration or imparted tastes to well waters and ill-health effects in residential areas around the CHWTSDF.

21. Closure & Post-closure Facilities

- 21.1 The landfills have certain design capacity, and hence are bound to get filled up in certain period. They will have to be guarded thereafter for a period of 30 years after closure. Monitoring would have to be continued to check for leakages and remedial measures.

21.2 The closed site will have to be looked after to avoid any disturbances created by run-on and run-off storm waters, stray cattles and ignorant humans. A fenced area with security is an essential part along with routine monitoring and rectification efforts. A closure and post-closure plan will have to be prepared which will include the following:

- (a) A description how each of this unit in the CHWTSDF will be closed.
- (b) A description of how final closure of the entire CHWTSDF will be conducted.
- (c) An estimate of the leachates and other hazardous wastes residues that may be generated on site at any time during the closure/post-closure life of CHWTSDF.
- (d) A description of the steps needed to remove or decontaminate all hazardous waste residues generated during post-closure period of the operations.
- (e) A sampling and analysis plan to know as to how much decontamination will be necessary.
- (f) A timetable of commencement of closure prospects and completion.

21.3 In practice, the post-closure care shall include:

- (a) Elimination all free liquid by either removing the liquid wastes / residues from landfill / impoundment or by solidifying them
- (b) Stabilization of the remaining waste and waste residues to a bearing capacity sufficient to support a final cover
- (c) Installation of a final cover that provides long-term minimization of infiltration into the closed unit
- (d) In course of time, the material inside a landfill is likely to face settling or subsidence in a small way. The cover be such that under all such subsidence of support, it should not get cracked and its integrity be maintained.
- (e) Provide drainage diversions to prevent any run-on.
- (f) To grow an appropriate vegetation on the top of the cover.

22. Record-keeping

A day-to-day record with weekly, monthly, quarterly and annual extracts is required. Operator shall have to devise a separate format for daily record or logbook. This shall include:

- (a) Hazardous waste generation
 - category number
 - category
 - origin of manufacturing activity

- (b) Description of hazardous waste
 - physical form
 - chemical form
 - quantity (volume & weight)

- (c) Description of
 - daily method of storage of hazardous waste
 - daily method of treatment of hazardous waste

- (e) Details of transportation
 - name and address of consignee of package
 - mode of packing
 - mode of transportation
 - date of transportation
 - quantity transported

- (f) Details of disposal of hazardous waste (date wise)
 - date of disposal
 - Concentration of hazardous material in the final waste form
 - site of disposal (identify the location on the relevant layout drawing for reference)
 - method of disposal

- (g) Data on environmental surveillance
 - Date of measurement
 - Groundwater (sampling location, depth of sampling, results)
 - Soil (sampling location, depth of sampling results)
 - Air (sampling location, data)

- Any other (keep record)
- (h) Details of hazardous waster reused / recycled
- Quantity of waste received to site
 - Quantity of waste minimized by reuse and recycle
 - Final quantity of waste subjected to final landfill or incineration mode of disposal.
- (i) Details of waste disposal operations
- (i) Description of hazardous waste
- Physical form and contents
 - Chemical form
 - Total volume of hazardous waste disposed
 - No. of packages
- (k) Mode of transportation to the site of disposal
- (l) Site of disposal
- (m) Brief description of method of disposal
- (n) Date of disposal
- (o) Remark (like discrepancy in manifest etc)
- (p) Details of environmental surveillance
- Date of measurement
 - Groundwater (sampling location, depth of sampling, results)
 - Soil (sampling location, depth of sampling, results)
 - Air (sampling location, data
 - Any other (keep record)
- (q) Accident Reporting
- Date and time of accident
 - Sequence of events leading to accident
 - Name of hazardous waste involved in the accident
 - Chemical datasheet assessing effect of accident on health and environment
 - Emergency measure taken

- Step to prevent recurrence of such wastes
- (r) The operating agency shall also maintain a record of inspections and visits of officials from SPCB/PCC, CPCB, Factory Inspector, SIDC, MoEF & local authorities. This should be followed by compliance report.

23.0 Safety, Security, Contingency Plans, Risk Management & Emergency Procedures

- 23.1 Safety: Safe work environment shall be considered, provided and maintained for the staff by Operator. Safety and security considerations shall be made for all facets, like pre-treatment at Generator's site, loading, transportation and unloading of hazardous waste, spill control, treatment and disposal, laboratory and also in the post-closure period. Personal protection equipment, and fire control systems shall be provided at site (e.g. fire extinguishers, sand pails etc., water tanks). Training and mock drills shall be conducted with staff for emergency situations. A complete primary health unit with medicines/antidotes shall have to be provided as per the provisions of the Factory Act, 1948 and 1987. Aspects like ventilation, illumination and safe duration of limited working hours shall also have to be considered. Periodical check-up of health shall be undertaken and the persons be kept rotated. This shall also cover other emergencies, like snake bites or sabotage. EIA recommendations, statutory rules and regulations, Acts etc., shall be considered while providing for this aspect of operations.
- 23.2 Security: Entry of persons or livestock shall be prevented both during operation and post-closure period. Artificial barriers, like fence, watchtowers, shall be provided. Entry gates shall be minimum, and preferably one only, apart from emergency gates. Cautionary boards in appropriate languages and in readable letter size shall be displayed at various locations within and on the periphery of the CHWTSDF. Register of entry and exit shall be maintained.
- 23.3 Risk management, contingency plans & emergency procedures: An onsite contingency plan and emergency procedure shall be prepared and approved from the district emergency officer who in turn will prepare the off-site management plan. The contingency plan shall describe the responses in case of fires, explosion, unforeseen acts or events, sudden releases due to natural calamities. The strategic administrative arrangements with local police, fire department or medical facilities of the area, departments dealing safety, health & environment, offices of SIDC and revenue authorities shall be designed. Latest phone and fax numbers of concerned authorities shall be printed and distributed. Mock drills shall demonstrate evacuation plan with evacuation routes. Documentation shall be immediately prepared for benefits of future planning. Other considerations as per EIA have to be integrated within this aspect of the operations of the CHWTSDF.

24.0 Public Consultation

Precaution shall have to be taken by the Operator to satisfy any peculiar situation as may be demanded by the people relating to aesthetics, discomfort etc. Regular public consultation and awareness programme shall be undertaken.

25.0 Greenbelt

A greenbelt of 20 m width shall be provided at the periphery of the site to have better visual impact, to protect the surrounding environment by abating gaseous and particulate pollution as well as to reduce the noise levels and to protect the area from the cyclonic winds. The plant species should be as per EIA, and MoEF/CPCB guidelines.

26.0 Occupational Health

- 26.1 This is a CHWTSDF where all kinds of hazardous waste are getting collected. Workers and staff are exposed to high levels of toxins, pollution and pathogenic environment. There is high risk of occupational hazards at such sites, it is, therefore, essential to formulate a health policy / plan for the workers by the Operator. Periodical checking of workers shall not show any deterioration in their immunity levels. A medical room, concession for workers in working hours, not employing the people of tender age or old age, early retirement benefits, daily nutritional support, group insurance schemes and other such measures shall have to be adopted.
- 26.2 All above aspects inter-alia as prescribed under the Factory Act, 1948 amended in 1987 and the rules framed thereunder shall have to be complied with. The detailed risk analysis as per the technology adopted, and an on-site risk mitigation plan shall be prepared and the impact on the occupational health of the workers shall be mitigated as identified in the plan.
27. Waste acceptance criteria for disposal of hazardous wastes into the secured land fill is placed at Appendix-I of this schedule.

MEMBER SECRETARY

Date:
Encl.: Appendix I.