



**EVALUATION REPORT OF COMMON HAZARDOUS
WASTE TREATMENT, STORAGE AND DISPOSAL
FACILITIES**

**M/S KERALA ENVIRO INFRASTRUCTURE LTD.,
KOCHI, KERALA**

**South Zonal
Office,
Bangalore**

1)	Name & Address of the HWTSDF	:	M/s Kerala Enviro Infrastructure Ltd. Common TSDF Project, Inside FACT- CD Campus, Ambalamedu, Kochi - 682 303		
2)	Contact person & Telephone No, Fax No, Cell No	:	Dr. N.K Pillai (Chief Executive Officer) 9846618133, 0484-3117937		
3)	Month & Year of operation	:	August, 2008		
4)	HWTSDF established by	:	Kerala Enviro Infrastructure Ltd.		
5)	HWTSDF presently operated by	:	Kerala Enviro Infrastructure Ltd.		
6)	Industry or industrial location (nearby TSDF)	:	FACT - CD		
7)	Total area of TSDF	:	Activity	Area in acres	
			DLF	20 acres	
			Incinerator	No	
			Storage for incinerable waste	No	
			Other storage	1800 m ²	
			Total area	50 acres	
	Location of the TSDF a) Delineated Area of the TSDF if any	:	Notified Industrial Area Ernakulum - District, Kerala		
8)	Area of influence	:	1 square kilometer		
9)	Capacity of the TSDF	:	10 lakh MT (50, 000 TPA)		
10)	Facilities available with the TSDF in respect of treatment, storage & disposal	:	Transportation, Analytical Operations, Storage, Treatment (Stabilization/ Neutralization/ Solidification), Secured landfilling		
11)	Industries or industrial Estate nearby TSDF (indicate type of industries)	:	Fertilizers & Chemicals Travancore Ltd (FACT) - Cochin Division, Fertilizer Industry, TSDF is situated in Ambalamedu Industrial Area.		
	i	Total member Industries	:	229 member industries	
	ii	Whether TSDF is located in industrial estate or not	:	Yes, Ambalamedu Industrial Area	
	iii	Total HW generation by the member industries as per authorization	:	<i>Type of wastes</i>	<i>Quantity (TPA)*</i>
				Landfillable	51,524
Incinerable				223.36	
			Recyclable	23,085	
			(*as per Hazardous waste Inventory 2006-2007)		
iv	Total HW proposed to be disposed off by the member units annually	:	<i>Type of wastes</i>	<i>Quantity (TPA)</i>	
			Landfillable	51,524	
			Incinerable	Nil	
			Recyclable	Nil	

12)	Total quantity of HW handled	:	Type of wastes	Quantity (TPA)
			Landfillable	2008-09 - 3641 MT 2009-10 - 18901 MT 2010-11 - 38454 MT 2011-12 - 45327 MT 2012-13 - 44283 MT 2013-14 - 26033 MT* (*upto 07-12-2013)
			Incinerable	Nil
			Recyclable	Nil
13)	Total Cost of the facility	:	2295 lakh (as per DPR)	
	i Financing patterns	:	Shareholding from industries with subsidy from Kerala State Govt. and MoEF	
	ii Subsidy, if any (Central Govt., State Govt.) in Rs.	:	Central Govt. subsidy Rs. 2 crore + State Govt. subsidy Rs 2 crore	
14)	Authorization details	:	Renewed - Consent no: PCB HO/EKM/ICO-R/15/2012 valid upto 30.06.2015	
	Date of authorization	:	14.11.2012	
	Authorization issued by	:	Kerala State Pollution Control Board	
	Validity upto	:	30.06.2015	
	Main conditions of authorization	:	<ul style="list-style-type: none"> There shall be no effluent discharge from the unit. Leachate shall be pumped regularly and evaporated in the MEE. Condensate shall be utilized for irrigation and gardening and the slurry shall be diverted to secured landfill. 	
	Whether the authorization issued as per the guidelines of CPCB	:	Yes	
15)	Whether TSDF posses own transportation vehicles & containers for handling of HW (if so, provide details)	:	Yes. 2 Nos. (One tipper, one hook loader with three containers - capacity 7, 9 and 12 MT)	
16)	Total population in and around the disposal facility upto radius of 150 Kms	:	Entire state of Kerala 33.3 million as per 2011 census	
17)	Total no of industries upto radius of 150 Kms	:	Approx. 423 Units	
18)	Land use around the disposal facility up to radius of 5 KM (Indicate any forest or monuments or sensitive areas)	:	The area around the disposal facility is occupied by industries like FACT - CD, BPCL- KRL and HOCL. The facility is situated in an industrial area. There is no forest or monuments.	
19)	Rivers/canals if any in & around the TSDF with approximate distance from TSDF	:	Chitrapuzha River - 500 meter (Approx) Ambalamedu Lake - 2 km (Approx.)	
20)	Total Rainfall (annual average in mm)	:	As per EIA report 2004 data, 3195 mm	

21)	Geo hydrological features of the TSDF Site	:	As per EIA study Report: <ul style="list-style-type: none"> • The ground water level at the landfill site is around 6-7 m, and rated good. • The GW gradient is in the range of 5-10 km, and rated Ideal. • The depth of the bedrock at the landfill site is 5-10 m and rated good. • The seismic intensity of 5 & 6 and rated ideal for seismic intensity criteria.
22)	Sources of water intake	:	Treated water from FACT- CD
23	Electrical Resistivity Data around SLF	:	Not available as on now
24	Emergency preparedness details	:	Not available.
25)	Level of Groundwater in and around the disposal facility (Below ground level)	:	The ground water level at the landfill site is around 6-7 m, as per EIA report.
26)	Ground water Quality reports	:	(As submitted by the Facility)
	i) Before setting the facilities	:	From EIA report (Annexure 1)
	ii) Mid period	:	Pl. See Annexure 2
	iii) Latest period	:	The monitoring team collected ground water samples, the results are discussed below in other observations
27)	Wind pattern details (average)	:	Present data not available.
28)	Reduced level of TSDF w.r.t MSL	:	10 to 18 mtr. above MSL
29)	Maximum Flood level of river, lakes, reservoir if any	:	2 mtrs. above MSL
30)	Details of consent to operate issued under Water & Air Acts	:	Consent no: PCB HO/EKM/ICO-R/15/2012 valid up to 30.06.2015
II. Site Identification Procedures Followed and Approval of Designs of the TSDF			
a)	Whether the selection of TSDF is as per the criteria given by CPCB	:	Yes
b)	EIA conducted through reputed organization	:	Yes
c)	Whether public hearing conducted by SPCB/PCC	:	Yes
d)	Whether the recommendations of SPCB/PCC regarding EIA study to the state Govt. is favorable.	:	Yes
e)	Whether the state Govt. notified the TSDF site	:	Yes
f)	Whether the design of TSDF is as per criteria of CPCB	:	Yes
g)	Whether the design of TSDF is approved by SPCB/PCC	:	Yes
	Single/Double liner	:	Double liner
	Thickness of liner system	:	1.95 mtr.
	Thickness of cover system	:	1.80 mtr.

	Drainage collection system details	:	Yes
	Leachate collection system details	:	A drainage liner 1.5 mt thicknesses of cobblestones (200 mm to 300mm) and 300 to 450 mm HDPE pipes to collect leachate is provided with submersible pump to pump leachate if any to leachate feed tank to MEE.
	Leachate removal system details	:	Multiple Effect Evaporator
	Leachate transportation provision	:	Yes, by pumping.
h)	Whether the SPCB/PCC monitored the development and construction of the TSDF	:	Yes by Kerala SPCB

III. Waste Acceptance Procedures Followed By TSDF

1	Information collected by the TSDF on the following :		
a)	Name & Address of the Industry	:	Yes
b)	Products manufactured	:	Yes
c)	Stepwise process chemical reactions	:	Yes
d)	Quantity of waste generated	:	Yes
e)	Characteristics of the waste (physical)	:	Yes
f)	Chemical characteristics of the waste (finger print as well as detailed analysis)	:	Yes
g)	Category of the wastes (as per schedule 1 or 2)	:	Yes
h)	Any pre-treatment given, if so, type of treatment given by the generator	:	Yes
i)	Any other relevant information collected by the operator	:	-
2	Procedures followed by the operator of the facility :		
3	Whether the TSDF accepting the waste from generator having the manifest or not	:	Yes
(a)	Report Selected waste received / observed at the time of inspection / based on the verification of the records maintained by the TSDF operator	:	Yes
4	Whether the TSDF sending the copies of the manifest to the respective agencies (like SPCB / PCC& the generator of the HW)	:	Yes
5	Whether the waste accepted on cross verifying the characteristics of the waste (finger print)furnished by the generator or not	:	Yes, Not at all the time by repeating analysis.
6	Laboratory facilities provided for finger print analysis	:	Yes
7	Check for the unloading facilities and the adequacy of the environmentally sound storage facilities before treatment of wastes	:	Yes
8	Record keeping & maintenance with regard to the waste acceptance procedures	:	Yes
9	Whether the transportation vehicles allowed to leave	:	Yes

	the facilities only after cleaning		
10	Whether WW generated from cleaning of vehicles is treated before disposal	:	Yes
11	Check for any other relevant information in respect of waste acceptance procedures	:	-
IV. Pre-Treatment Facilities Provided by the TSDF			
1	Type of waste lying in the premises of pre-treatment area and the details of such wastes as per the records		
(a)	Whether the wastes are segregated (recyclable, incinerable, disposal) before the pre - treatment	:	This facility accepts only land fillable waste.
(b)	Record keeping of the segregated wastes	:	NA
(c)	Check for adequacy and storage of segregated wastes	:	NA
2	Check for treatment proposed & the exact treatment given to the HW	:	Yes
3	Check for wastes lying for its appropriateness / adequacy.	:	Yes
4	Check record keeping / maintenance with the respect to the consumption of chemicals (waste - wise & date - wise)	:	Yes, consumption of chemical waste wise not provided.
5	Whether the TSDF having the facilities as maintained in the records for treating the various wastes accepted by the TSDF operator	:	Yes
6	Has spillage collection provision is satisfactory	:	Yes
7	Whether the treated wastes meeting with the criteria for disposal of hazardous waste prepared by the CPCB before disposal into disposal facility	:	Yes
8	Record keeping with respect to treated wastes (like hazardous waste , liquid waste , sludge's with sample no. analysis of wastes before & after treatment	:	Yes
9	Whether transportation of treated waste is done in an environmentally sound manner up to disposal site	:	Yes
10	Whether the TSDF provided adequate treatment facilities for		
(a)	Treatment of hazardous wastes ;	:	Yes
(b)	Leachate generated from disposal facility	:	Yes
(c)	Whether the TSDF possess facilities for treatment of wastewater generated from sources like cleaning of vehicles, utilities, waste water from pre-treatment area , air pollution control systems , Leachate	:	Yes

	generated from the disposal facility etc.		
11	Details of the next cells closed and capped		Filled-up portions of the 1 st and 2 nd Cell capped. 3 rd cell is operational.
12	Fire Safety provisions		Yes
13	Laboratory facilities		Yes
	i	Waste water analysis	Yes
	ii	Water analysis	Yes
	iii	Ambient Air Quality monitoring	Yes
	iv	Stack emission monitoring	Yes
14	Insurance provisions		Yes, Public Liability Insurance, Special : Contingency Insurance, Fire & General Insurance
15	Escrow Fund details		Yes, FD in lieu of Escrow Fund regularly : maintained.
V. Disposal Site & Assessment of operation of the Disposal Facility			
1	No. of cells in TSDF as per the designs approved by the SPCB		10 lakh MT (50, 000 TPA)
2	No. of cells completely filled with the HW so far with total quantity of HW disposed (cell wise)		Filled-up portions of the 1 st and 2 nd Cell capped. 3 rd cell is operational.
3	Whether the wastes are pre -treated before transportation of HW to the TSDF		No.
4	Mode of transportation of treated hazardous waste up to the disposal facility		By dedicated vehicle
5	Whether the records maintained with respect to HW which is disposed in facility		Yes, records available with facility
6	Check for any spillages around the disposal facilities		No spillage noticed during visit
7	Whether the liners used are as per the specification of CPCB criteria and as approved by the SPCB/PCC		Yes, as per record furnished by the facility
8	Whether the operation of the facility is scientific		Yes
9	Adequacy of the provision made for the collection of spillages around the TSDF & its disposal		Man and machineries are in place for landfilling and in case of spillage if any during operation.
10	Check for adequacy of the		
	• Leachate collection system		As on date adequate
	• Provision for collection of Leachate /drainage provision		Leachate collection system has grid of leachate perforated pipes of a lower diameter, the collected leachate are being drains into the common header pipes with a larger diameter and pumped for treatment.
	• Provision made for removal of Leachate from Leachate collection pits		The facility has leachate collection system; the leachate generated from the

			landfill area is pumped to the leachate collection tanks (syntax) placed above ground.
	<ul style="list-style-type: none"> Provision for transportation of Leachate to the treatment facility 	:	The leachate stored in a syntax tanks above ground are being pumped using centrifugal pump for further treatment in MEE, the salt residue is landfilled. Also part of the leachate is used for spraying on the landfill. The distillate is used as Boiler feed and the balance is used for irrigation.
12	Whether any provision made for covering the facility so as to avoid entry of rainwater during monsoon	:	Only temporary tarpaulin covers are provided to avoid entry of rainwater during monsoon.
13	Whether the groundwater monitoring provision made around the disposal facility is scientific	:	There is 4 bore well of different depth i.e. 9 m, 12 m, 30 m and 80 m are existing to monitor the groundwater.
14	The GW monitoring provision has been made as per the CPCB criteria	:	Yes
15	Level of Leachate in the collection pit	:	Low (in the tank)
16	Whether records maintained with the respect to the location of the HW and its characteristics that has been disposed in the facility	:	Yes
17	Whether any provision made for samples of HW that has been disposed in the facility	:	No.
VI. The recyclable waste storage area / Incineration facility			
1	Check for adequacy of the waste storage area of the wastes intended for recycling or incineration	:	Not applicable
2	Record keeping and its maintenance with respect to the quantum of the HW proposed /treated by incineration	:	NA
3	Check records for characteristics of the HW before incineration process	:	NA
4	Details of incineration facility	:	NA
	<ul style="list-style-type: none"> Supplier of the incinerator 	:	NA
	<ul style="list-style-type: none"> Capacity of the incinerator 	:	NA
	<ul style="list-style-type: none"> Operation condition of the incineration based on the designs 	:	NA
	<ul style="list-style-type: none"> Performance assured by the supplier 	:	NA
	<ul style="list-style-type: none"> Temperature probes provided 	:	NA
5	<ul style="list-style-type: none"> Provision for measurement of O2 	:	NA
	Whether the operation of the	:	NA

	incineration facility as observed at the time of visit is as per the guidelines of CBCB and or prescribed by the SPCB/PCC		
	• Operation temperature of the primary chamber	:	NA
	• Operation temperature of the secondary chamber	:	NA
	• Residence time	:	NA
	• Type of fuel used and its quantity	:	NA
	• Characteristics of the HW that feed into the incinerator	:	NA
	• Provision made for waste feeding	:	NA
	• Provision made for desired negative pressure in the incineration chambers	:	NA
	• Air pollution control systems attached with the incinerator is as per the guidelines or not	:	NA
	• Whether stack monitoring provision has been made like porthole and monitoring platform	:	NA
	• Whether stack emissions are complying with the consent issued by the SPCB/PCC	:	NA
	• Whether the construction, maintenance and operation of the incineration is as per the guidelines for HW incinerators	:	NA
	• Quantum of ashes or residues generated from the incineration unit	:	NA
6	Characteristics of the wastes generated from the incineration process (ashes /residues)	:	NA
7	Whether the incineration ashes /sledges from the APCD are pretreated and then disposal facility	:	NA
VII . Compliance of Provisions of the Rules			
1	Characteristics of the wastes (untreated , treated and before disposal to facility)	:	Sample was not available during inspection for analysis (untreated & treated).
2	Characteristics of the Leachate before and after treatment	:	The inspection team collected a raw leachate and MEE condensate for analysis; the results are discussed below in other observations.
3	Characteristics of the wastewater from	:	Not applicable.

	different sources within the facility before and after treatment		
4	Stack emission monitoring results (incinerator)	:	Not applicable
5	Ambient air quality monitoring results (to be carried out as per the consent or Guidelines)	:	The team does not carry out Ambient Air Quality analysis.
6	GW quality in and around the disposal facility	:	The team collected ground water from 4 bore well of different depth i.e. 9 m, 12 m, 30 m and 80 m, which are existing to monitor the groundwater. The analysis results of the same are discussed in observation.

VIII. ANY OTHER OBSERVATIONS:

1. The M/s Kerala Enviro Infrastructure Ltd, Common TSDF project has been in operation since from August 2008. Presently having 229 member industries. The Consent issued under Water, Air & HW rules by Kerala State Pollution Control Board is having validity up to 30.06.2015.
2. The Secured land fill Cells 1 & 2 are filled up (Covering 7500 M² area) and Cell 3 is in operation.
3. During the inspection it is observed that the wastes which can be utilized for resource recovery also being landfilled, the Kerala Board shall take appropriate measures to co-process incinerable wastes and to discourage landfilling of incinerable wastes.
4. During inspection, it is observed that the unit has provided plastic tanks (Sintex) for collection of leachate and again re-pumped to MEE for treatment. In order to avoid pumping cost and operation difficulties, the unit may be directed to construct permanent RCC leachate holding tank near MEE and easy operation and to save energy cost.
5. The unit may be directed to start Monitoring of gaseous emissions from vents of capped cells for total VOC and H₂S.
6. All the internal roads used for transportation of wastes are not paved, due to that fugitive emission are more. The unit shall be directed to pave the roads with proper storm water drains.
7. On the day of inspection the MEE was not in operation, the inspection team collected samples from leachate tank and the MEE condensate. The analysis results are given below:

S. No.	Parameters	Raw Leachate	MEE Condensate
1	pH	7.8	7.5
2	EC (µS/cm)	29990	1544
3	TDS (mg/l)	28890	1010
4	COD (mg/l)	4680	76
5	Chloride (mg/l)	9360	412
6	Copper (mg/l)	BDL	BDL
7	Cadmium (mg/l)	BDL	BDL
8	Chromium (mg/l)	BDL	BDL

9	Iron (mg/l)	3.71	BDL
10	Manganese (mg/l)	1.68	0.65
11	Nickel (mg/l)	BDL	BDL
12	Lead (mg/l)	BDL	BDL
13	Zinc (mg/l)	BDL	BDL
14	Cobalt (mg/l)	BDL	BDL

8. The analysis results of ground water samples (bore well) collected are given below:

S. No.	Parameters	Bore well (9M)	Bore well (12M)	Bore well (30M)	Bore well (80M)
1	pH	7.5	5.5	6.4	5.7
2	EC ($\mu\text{S}/\text{cm}$)	131	134	110	88
3	TDS (mg/l)	84	91	68	57
4	Chloride (mg/l)	36	41	19	16
5	Sulphate (mg/l)	21	24	10	2
6	Copper (mg/l)	BDL	BDL	BDL	BDL
7	Cadmium (mg/l)	BDL	BDL	BDL	BDL
8	Chromium (mg/l)	BDL	BDL	BDL	BDL
9	Iron (mg/l)	0.753	0.322	0.357	BDL
10	Manganese (mg/l)	0.453	1.02	0.545	BDL
11	Nickel (mg/l)	BDL	BDL	BDL	BDL
12	Lead (mg/l)	BDL	BDL	BDL	BDL
13	Zinc (mg/l)	BDL	BDL	BDL	BDL
14	Cobalt (mg/l)	BDL	BDL	BDL	BDL

9. Relevant photographs are given at **Annexure 3**

IX. Recommendations

The TSDF shall be directed to implement the following:

- To stop landfilling of waste which can be utilized for resource recovery.
- To direct the Kerala State Pollution Control Board to take appropriate measures to co-process incinerable wastes and to discourage landfilling.
- To construct permanent RCC leachate holding tank near MEE in place of Sintex tank for easy operation and to save energy cost in pumping.
- To start Monitoring of gaseous emissions from vents of capped cells for total VOC and H₂S
- To pave all internal roads with proper storm water drains to control fugitive emissions.

Date of Visit : December 11, 2013

X. Signature :

(G.Thirumurthy)
EE

PHOTOGRAPHS



Fig.1: Showing the Leachate treatment system (MEE) with boiler.



Fig.2: Leachate Storage tank (Sintex) with pumping arrangement.



Fig.3: Cell 3 is in operation, temporary cover provided to the cells.



Fig.4: Truck carrying H.W. for landfilling directly.



Fig.5: Cells under construction for expansion.



Fig.6: Cells green cover is provided with sprinklers.



Fig.7: Cells cover bottom is provided with garland drain. The internal roads are not paved.



Fig.8: Cells cover is provided gas vents.

No. Tech 30/ TSDf/ZOB/2013-14/

March 19, 2014

To

The Member Secretary
Central Pollution Control Board,
Parivesh Bhawan,
East Arjun Nagar,
Delhi – 110 032

Subject: Inspection of TSDf facility, Kochi

Sir,

With reference to above mentioned subject, Common TSDf of Kochi operated by Kerala Enviro Infrastructure Ltd. was inspected by SZO, CPCB, Bangalore on December 11, 2013 along with other activities. The inspection report of the same is enclosed for kind perusal, pl.

Yours faithfully,

Encl.: As above

(S.Suresh)
Zonal Officer